

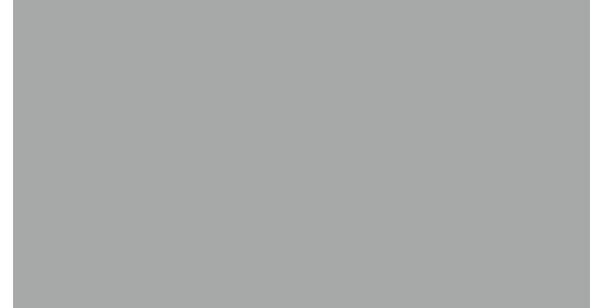


Potrero Yard: 3-Level Bus Facility Design Criteria Document

San Francisco Municipal
Transportation Agency

Conformed Design Criteria Document
September 12, 2022





INTRODUCTION



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Abbreviations		ABBREVIATIONS	
A	= Amperes	BRBF	= Buckling Restrained Brace Frame
AABC	= Associate Air Balance Council	Btu	= British Thermal Unit
AAMA	= American Architectural Manufacturer Association	CA	= Compressed Air
AC	= Air Conditioning	CAL	= California Green Building Standards Code
AC/DC	= Alternate Current/Direct Current	Green	= California Green Building Standards Code
ACS	= Access Control Server	CAT	= Collision Avoidance Technologies
ADA	= American Disabilities Act	CBC	= California Building Code
AEP	= American Electric Power	CCTV	= Closed Circuit Television
AFF	= Above Finished Floor	CE	= Computer Equipment
AHJ	= Authority Having Jurisdiction	CEC	= California Energy Code
AHRI	= Air conditioning Heating & Refrigeration Institute	CF	= Contractor Furnished
AISC	= American Institute of Steel Construction	CFC	= California Fire Code
AISI	= American Iron & Steel Institute	CFM	= Cubic Feet Per Minute
Alum	= Aluminum	CFR	= Code of Federal Regulations
AMCA	= Air Movement & Control Association	CG	= Chassis Grease
ANSI	= American National Standards Institute	CI	= Contractor Installed
ANSI/		Circ	= Circulation
AWC	= American National Standards Institute/ American Wood Council	CMC	= California Mechanical Code
ANSI/		CMU	= Concrete Masonry Unit
IWCA	= American National Standards Institute/ International Window Cleaning Association	CO	= Carbon Monoxide
ASCE	= American Society of Civil Engineers	CO2	= Carbon Dioxide
ASCE/		COMM	= Communication
SEI	= American Society of Civil Engineers/ Structural Engineering Institute	CPAA	= Concrete Polishing Association of America
ASHRAE	= American Society of Heating and Refrigeration Association of Engineers	CPC	= California Plumbing Code
ASJ	= All Service Jacket	CPVC	= Chlorinated Polyvinyl Chloride
ASME	= American Society of Mechanical Engineer	C.R.	= Changing Room
ASTM	= American Society for Testing & Materials	CSA	= Civil Structural Architectural
ATF	= Automatic Transmission Fluid	CWA	= Common Work Area
AWWA	= American Water Works Association	DASMA	= Door and Access Systems Manufacturers Association
BACnet	= Building Automation and Control Network	dB(A)	= Decibels, A-Weighted
BAS	= Building Automation System	DC	= Direct Current
BEB	= Battery Electric Buses	DCM	= Design and Construction Management
BICSI	= Building Industry Consulting Service International	DCOF	= Dynamic Coefficient of Friction
		DCD	= Design Criteria Document
		DDC	= Direct Digital Controls
		DEF	= Diesel Exhaust Fluid
		Demo	= Demolition
		Div	= Division
		DX	= Direct Expansion
		EC	= Engine Coolant
		EFCO	= Economy Forms Company
		Elec	= Electrical
		EMCS	= Energy Management Control System
		EMS	= Energy Management System
		EMT	= Electrical Metallic Tubing
		EO	= Engine Oil
		EPDM	= Ethylene Propylene Diene Monomer
		ESFR	= Early Suppression Fast Response
		EV	= Electric Vehicle
		fc	= Foot Candle
		f'm	= Compressive Strength
		F/Btu	= Fahrenheit/British thermal unit
		FACP	= Fire Alarm Control Panel
		FDC	= Fire Department Connection
		FEVE	= Fluoroethylene Vinly Ether
		FPS	= Feet Per Second
		fy	= Force to Yield
		GFI	= Ground Fault Interrupter
		GO	= Gear Oil
		GPF	= Gallons Per Flush
		GPM	= Gallons Per Minute
		GSF	= Gross Square Feet (within the exterior face of exterior walls)
		GS6	= General Schedule 6 Form
		H2	= Hydrogen
		H2O	= Water
		HCFC	= Hydrochlorofluorocarbon
		HDPE	= High Density Polyethylene
		HET	= High Efficiency Toilet
		HFHC	= Hydrochlorofluorocarbons
		HO	= Hydraulic Oil
		HP	= Horse Power
		HPC	= High Performance Computing
		HVAC	= Heating, Ventilation and Air Conditioning
		IBC	= International Building Code
		ICC	= International Code Council
		IFC	= Industry Foundation Classes
		IGMAC	= Insulating Glass Manufacturers Association of Canada
		IGCC	= Insulating Glass Certification Council
		IDF	= Intermediate distribution frame
		IES	= Illuminating Engineering Society

ABBREVIATIONS			
Abbreviation			
IPLV	=	Integrated Part Load Value	NO2 = Nitrogen Dioxide
J-STD	=	Joint Standard	NRCA = National Resources Conservation Authority
K	=	1,000 Pounds	OC = Overhead Cabinet
ksi	=	Kilopound per square inch	OCS = Overhead Contact System
kVA	=	kiloVolt Ampere	OF = Owner Furnished
LAN	=	Local Area Network	OI = Owner Installed
lb	=	Pound	OSHA = Occupational Safety and Health
LCC	=	Low Cost Carriers	OS&Y = Outside Stem & Yoke
LD	=	Lead Developer	PA = Public Address
LED	=	Light Emitting Diode	PC = Personal Computers
LEED	=	Leadership in Energy and Environmental Design	PCI = Pre-Construction Information
LEL	=	Lower Limit Explosive Limit	PDA = Preliminary Development Agreement
LLWA	=	Lower Level Work Area	PDI = Plumbing and Drainage Institute
LSIG	=	Long time, short time, instantaneous, ground	PDI-WH = Plumbing and Drainage Institute-Wall Hydrant
Max	=	Maximum	PDR = Production Distribution Repair
MaP	=	Maximum Performance	PES = Portable Equipment Storage
MCB	=	Motor Coach Buses	PLC = Programmable Logic Controller
MDF	=	Main Distribution Frame	PM = Preventive Maintenance
Mech	=	Mechanical	PPC = Principal Project Company
MERV	=	Minimum Efficiency Reporting Value	PPG = Pittsburgh Plate Glass Company
MIG	=	Metal Inert Gas	PROM = Programmable Read-Only Memory
Min	=	Minimum	PS = Power Steering
MME	=	MUNI Metro East	psf = pounds per square foot
MOH	=	Friedrich Mohs scale of mineral hardness	PSI = Pounds Per Square Inch
MPOE	=	Main Point of Entry	PSIG = Pounds Per Square Inch Gauge
MR	=	Low temp liquid, emulsion, vapor, permeable air membrane	PVC = Polyvinyl Chloride
MRO	=	Maintenance, Repair, & Operations	PVDF = Polyvinylidene Fluoride
MSS	=	Manufacturers Standardization Society	RDC = Reference Design Concept
MTC	=	Main Telecommunication Center	RFID = Radio-Frequency Identification
MS/TP	=	Master Slave/Token Passing	RFP = Request For Proposal
MUD	=	Mixed Use Development	RLWP = Roof Level Work Platform
MW	=	Megawatt	SCADA = Supervisory Control and Data Acquisition
NEBB	=	National Environmental Balance Bureau	SDI = Steel Door Institute
NEC	=	National Electric Code	sf = Square Feet
NEMA	=	National Electrical Manufacturers Association	SFFD = San Francisco Fire Department
NFPA	=	National Fire Protection Association	SFPUC = San Francisco Public Utilities Commission
NFRC	=	National Fenestration Rating Council	SGCC = Safety Glazing Certification Council
			SHGC = Solar Heat Gain Coefficient
			SNMP = Simple Network Management Protocol
			STC = Sound Transmission Class
			Struc = Structural
			TABB = Testing, Adjusting, and Balancing Bureau
			TB = Trolley Buses
			TBD = To Be Determined
			TBS = ToolBox Storage
			TC = Task Chair
			TCNA = Tile Council of North America
			TCP/IP = Transmission Control Protocol/Internet Protocol
			TIA/EIA = Telecommunication Industries Association/Electronic Industries Alliance
			TIG = Tungsten Inert Gas
			TMS = The Masonry Society
			TPO = Thermoplastic Polyolefin
			TPSS = Traction Power Substation
			TR/TC = Telecommunications Room/Telecommunications Closet
			Typ = Typical
			UC = Used Coolant
			UL = Underwriters Laboratories
			UNO = Unless Noted Otherwise
			ULWP = Upper Level Work Platform
			UO = Used Oil
			UPS = Uninterruptible Power Supply
			USGBC = United States Green Building Council
			UV = Ultraviolet
			V = Volts, Alternating Current
			VAV = Variable Air Volume
			VCT = Vinyl Composite Tile
			VFD = Variable Frequency Drive
			VLAN = Virtual Local Area Network
			VLM = Vehicle Lift Module
			VOC = Volatile Organic Compound
			VSS = Video Surveillance System
			W = Water
			WAN = Wide Area Network
			WC = Water Closet
			WDMA = Window and Door Manufacturers Association
			wg = Water gauge
			WWF = Windshield Washer Fluid

SECTION 1 - INTRODUCTION

1.0 INTRODUCTION

The San Francisco Municipal Transportation Agency (SFMTA) has engaged a consultant team led by Hatch Associates Consultants (the Hatch Team) to analyze the feasibility of developing non-transit uses above or adjacent to the SFMTA's bus maintenance and storage yards. The Potrero Yard Bus Facility Design Criteria Document has initially focused on joint development opportunities at the Potrero Yard, which will be the first of the SFMTA's older bus yards to be rebuilt.

SFMTA has directed that any joint development at Potrero Yard must not impede the core transit function of the facility if rebuilt. The integration of joint development with the reconstruction of the Potrero Yard has been an integral part of these activities and also for the Project's procurement.

Potrero Yard (located at 2500 Mariposa Street in the Mission District and opened in 1915) currently serves as one of two SFMTA Electric Trolley Bus (Trolley Bus) Operations and Maintenance facilities. The existing two-level facility includes bus parking, service (fare recovery and wash lane), and a ten-lane maintenance facility at grade, accessed via Mariposa Street. The second level includes bus operations space, non-revenue vehicle parking, trolley bus parking, a tire bay/shop, and a body bay/shop accessed via 17th Street. The Potrero Yard Modernization Project will demolish the existing facility and construct a new, expanded bus maintenance and operations facility on the site. The new facility will serve the existing Trolley Bus Fleet and will be the SFMTA's first purpose-built battery-electric bus facility. The facility will also house the SFMTA's transit operator training classrooms, as well as Street

Operations, the SFMTA's street incident response team.

The Design Criteria Document prescribes technical, functional, and performance requirements for the Potrero Yard Bus Component's building systems including architectural, civil, structural, equipment, mechanical, electrical, and plumbing. This document is attached to the Potrero Yard Division 3 (*Design Criteria Document*) of the Technical Requirements. The Design Criteria Document was prepared by transit design specialist HDR | Maintenance Design Group (HDR | MDG) in close coordination with urban design specialist SITELAB Urban Studio, transit operations specialist CHS, and real estate advisory firm Hatch (the Hatch team). Technical building and building system requirements for the Housing and Commercial Component are not addressed here, but can be found in Divisions 4 (*Design Criteria for the Housing and Commercial Component*) and Division 6 (*Program for the Housing and Commercial Component*) of the Technical Requirements.

1.1 Sources Consulted

The Bus Facility Design Criteria Document is informed by discussions with the SFMTA subject matter experts during the Potrero Yard Design Charrette held on January 31 through February 2, 2018 as well as the Hatch Team's review of the following studies, reports, and analyses prepared by or on behalf of the SFMTA.

- SFMTA Facilities Framework Addendum (10/6/17)
- SFMTA Master Plan Report (7/28/17)
- SFMTA Transit Fleet Management Plan (2014, amended 2017)
- SFMTA Zero Emission Bus Rollout Plan (2021 draft)

Follow up in-person interviews with the SFMTA also took place in September 2018 and December 2018, with a conference call also held in November 2018. Between 2018 and publication in 2021, SFMTA staff were consistently consulted to finalize details and review drafts of this document.

1.2 Design

Following in-depth discussions with SFMTA staff on required bus program, overlain with HDR's industry best practices recommendations, the SFMTA and the Hatch team produced a Reference Design Concept (RDC) that is generally consistent with the Technical Requirements which is Document 1 (*Reference Design Concept*) of the Reference Documents. The RDC is one expression of general conformance to this Design Criteria Document.

Tables 1.A and 1.B identify the quantitative capacity of bus fleet vehicles and square footage summaries in the RDC. All required bus storage programming numbers are based on a design capacity representing the bus storage number the facility can accommodate using parking spaces and several (approximately half) of maintenance bays. The SFMTA refers to this design capacity methodology as "planning capacity." Table 1.A lists the 2030 programming bus capacity numbers. Table 1.B contains the 2030 overall programming square footage numbers.

The following is a list of Design Principles established during planning:

- Minimize impact of bus circulation on the neighborhood.
- Provide improved efficiency and seismic performance.
- Promote mixing and socializing across

SECTION 1 - INTRODUCTION

TABLE 1.A - POTRERO YARD PROGRAM SUMMARY AT SUBSTANTIAL COMPLETION OF THE INFRASTRUCTURE FACILITY*

	BATTERY ELECTRIC**		TROLLEY BUS		TOTAL	MAINT.	BUS : BAY
	40'	60'	40'	60'	BUSES	BAYS	RATIO***
Potrero Bus Yard	--	57	53	93	213	13	17

*All figures are planning capacities and represent the fleet mix at Potrero Yard when the Yard is completed in 2026. The fleet mix will ultimately transition to 100 percent battery electric.

** Refer to Division 5 (Battery-Electric Bus Supplemental Criteria) of the Technical Requirements. Opening fleet is 40' BEBs due to fleet technology limitations.

***Ratio is total for all Repair Bays and Preventive Maintenance Bays based on a ratio of 17:1. Does not include speciality bays like tire bay, body bay, and chassis wash bay.

TABLE 1.B - REFERENCE DESIGN CONCEPT PROGRAM SUMMARY AREA (SF)

	PARKING	MAINT. BAY/SHOPS	SERVICE & CLEAN	PARTS	MAINT. ADMIN	OPS.	TRANSIT SVCS.	SHARED	TRAINING	BODY/ PAINT	TOTAL
Potrero Bus Yard	299,215	48,252	10,921	8,806	9,423	14,017	8,519	15,390	17,819	---	432,362

- divisions.
- Provide well laid out Dispatch and check-in spaces.
- Facilitate good relationship between operators, supervisor, and dispatch spaces.
- Enhance ability for on-time pull-out.
- Provide flexibility in bus parking and crush capacity.
- Enhance good communication between functional areas.
- Efficient and safe movements of vehicle and pedestrians.
- Incorporate daylight as much as possible given the site and building constraints.
- Create good line of sight from Dispatch to pull-in and pull-out of buses, including design options such as:
 - ✓ Windows with direct or indirect views of interior bus operations.
 - ✓ Use of technology such as cameras for improved security and more efficient operations.
- Utilize durable, easy to clean casework.

- Provide adequate lockers and space – well lighted and ample clearance between lockers.
- Provide a facility that is welcoming, uncluttered, appreciated, presents a discrete public face, and instills employee pride and ownership

1.3 Report Overview

This Bus Facility Design Criteria Document consists of five sections, which are described briefly here.

Section One - Introduction. This section describes the background of the project and provides an overview of the Bus Facility Design Criteria Document.

Section Two - Space Needs Program. This section presents a detailed listing of space requirements for Parking, Bays and Shops, Service and Clean, Parts, Maintenance, Operations, Shared Areas, and Training.

Programmed spaces are further defined by their quantity, area, and any remarks significant to design. Information began and then was

updated using information from the 2017 SFMTA Facilities Framework Addendum, published in October 2017.

Section Three - Design Criteria Narrative. This is the first of two design criteria sections. The Design Criteria Narrative presents a narrative version of the functional.

Section Four - Performance Requirements. This section describes the requirements per design discipline.

Section Five - Requirements for Bus Yard Component Space Modules. This is the second of two design criteria sections. This section presents a graphic version of the functional and performance requirements and is organized by functional space as presented in the Space Needs Program.

Appendices:

- Appendix A: Maintenance Equipment Manual
- Appendix B: SFMTA OCS Design Criteria
- Appendix C: SFPUC Application for Electrical Service
- Appendix D: Traction Power Feeder Map

SECTION 2 - SPACE NEEDS PROGRAM

The Design Team prepared the Design Criteria Document, Maintenance Equipment Manual, Building Drawings, and Equipment Drawings to Reference Design Concept prepared by the SFMTA prior to the Project's procurement, CEQA Project Description, and the basis for the programmatic and functional requirements for the Project's procurement. The Maintenance Equipment Manual is included as Appendix A in this Design Criteria Document.

1.4 Acknowledgments

The Hatch Team would like to acknowledge the efforts and contribution of the SFMTA staff members during the development of the design charrette process and input to matters related to the development of the Bus Facility Design Criteria Document. This continued enthusiastic participation and dedication will ensure the realization of the Potrero Yard program.

SECTION 2 - SPACE NEEDS PROGRAM

2.0 INTRODUCTION

This section presents the Space Needs Program for the Potrero Yard. The Space Needs Program defines the minimum space requirements for efficient operations. The program is summarized at the end of this section, and includes projected square footage needs for building and exterior areas.

All required programming numbers are planning, not crush, capacity. The Space Needs Program was used as the basis to develop the Reference Design Concept that, which is Document 1 (*Reference Design Concept*) of the Reference Documents.

All spaces in the proposed bus yard concept should be within 10% +/- of the programmed square footages listed in Table 2.E.

2.1 Staff Summary

Minimum facility staffing levels that are either required or planned by the SFMTA are crucial to planning efforts when determining the size of support facilities and developing occupancy levels. Table 2.A shows the summary of facility staffing levels.

2.2 Vehicle Parking Summary

The following Table 2.B is the summary of vehicles.

TABLE 2.A - POTRERO YARD PROGRAM STAFFING SUMMARY AT SUBSTANTIAL COMPLETION OF THE INFRASTRUCTURE FACILITY*

Function	Potrero Staff
Bays & Shops	10
Service & Clean	37
Parts	21
Maintenance - Administration	10
Mechanics & Technicians	90
Operations - Administration	22
Operators	383
Transit Services	192
Shared	1
Training	63
TOTAL	829

TABLE 2.B - POTRERO YARD PROGRAM VEHICLE SUMMARY AT SUBSTANTIAL COMPLETION OF THE INFRASTRUCTURE FACILITY*

Function	Potrero Vehicles
40' Bus	53
60' Bus	160
Large Non-Rev Vehicle	5
Standard Non-Rev Vehicle **	84
Transit Services	68
TOTAL	360

*All figures are planning capacities

**An estimated 10-20 NRV spaces may be considered for BYC Transportation Demand Management programming

¹The square footages in the Drawing Package may not match exactly those of the Program, but the Program has guided the formulation of the Drawing Package.

SECTION 2 - SPACE NEEDS PROGRAM

2.3 Planning Ratio

Table 2.C lists only the key/major planning ratios. For a complete list of the square footages for each type of use, refer to the Space Needs Program in Table 2.E.

TABLE 2.C - PLANNING RATIO	
SPACE	RATIO OR SPACE STANDARDS*
Bus Repair Bay (20' x 75')	1 bay for every 20 buses to be maintained
Preventive Maintenance (PM) Bay (20' x 75')	1 bay for every 50 buses to be maintained
Tire Bay (20' x 75')	1 bay for every 125 buses to be maintained
Minor Body Repair Bay (20' x 75')	1 per facility
Chassis Wash Bay (25' x 75')	1 bay for every 200 buses to be maintained
Service Position (20' x 70')	1 bay for every 75 buses
Bus Washer (20' x 100')	1 bay for every 150 buses
Water Reclamation (15' x 60')	1 per facility, handles multiple bus washers
Tool Box Storage	24 square feet (sf) per Maintenance Technician
Tire Storage	5 sf per bus for 1 tire per bus
Parts Storage	20 sf per bus with High Density Storage System

*For Potrero Yard, all bays are designed to be used by both 40' and 60' buses.

SECTION 2 - SPACE NEEDS PROGRAM

2.4 Space Standards

Space standards were applied to the Space Needs Program and generally apply to the Offices, Shops, Bays, and Vehicle Parking Areas. Area requirements in Shops and Storage Areas were derived from functional requirements and equipment space needs. The space standards listed are the minimum required space square footages. The space standards listed in Table 2.D were utilized to develop the facility program and overall area requirements. The space standards are based on functional needs and requirements.

TABLE 2.D - SPACE STANDARDS

AREA	SIZE
SHOPS & STORAGE:	
Common Work Area	500 sf
Trolley Bus Electronics Shop	1,000 sf
Portable Equipment Storage	600 sf
Tool Storage	150 sf
Tire Shop	600 sf
Lube Room	400-600 sf
Compressor Room	200 sf
Bench Shop	300 sf
Cleaning Equipment Storage	200 sf
Battery Storage	200-300 sf
Parts Window	200 sf
Shipping and Receiving	600 sf
Loading Dock	900 sf (15 x 60)
PARKING:	
40' Transit Bus	540 sf (12 x 45)
60' Bus	780 sf (12 x 65)
Large Non- Revenue Vehicles	420 sf (12 x 35)
Standard Non-Revenue Vehicles	200 sf (10 x 20)
CIRCULATION:	
Aisles for 90 degrees turns	65' turning into parking lanes or service
Aisles for 90 degrees turns	70' turning into maintenance bays
Bypass Lane	20' wide
One Way Ramp	15' wide
Forklift Circulation	10' wide

SECTION 2 - SPACE NEEDS PROGRAM

2.5 Circulation Factors

Circulation factors have been applied to interior building spaces; exterior circulation is unnecessary as the Potrero Yard will occupy the entire site. The space requirements shown for each function are net usable area.

2.6 Interior or Building Circulation

Circulation factors are applied to the program as a percentage of the total building square footage. These factors account for miscellaneous building spaces such as hallways, stairwells, wall thickness, structure (Circ/Mech/Elec/Struc - Net:Gross), and access requirements. The following is a list of the minimum required factors that have been applied to the program:

- Parking 75%
- Bays and Shops 20%
- Service and Clean 10%
- Parts 10%
- Maintenance - Admin. 35%
- Operations - Admin. 35%
- Transit Services (MRO) 35%
- Shared 35%
- Training 35%

2.7 Minimum Design Requirements

- Total Bus Parking Planning Capacity is 213 trolley buses.
- The full space needs program shall be accommodated on three bus levels and a basement, to the extend a basement is needed.
- Unique 100 percent drive-through, bus maintenance facility that include:
 - ✓ 70-foot internal drive aisle
 - ✓ Ten Bus Repair Bays
 - ✓ Five PM/Inspection Bays
 - ✓ Tire Bay(s), Shop and Storage

SECTION 2 - SPACE NEEDS PROGRAM

- ✓ One Miscellaneous Body Repair Bay
- ✓ Support Shops and Storage Areas,
- ✓ Parts Storage Warehouse with dedicated delivery dock
- ✓ One Bus Washer per bus parking level
- ✓ Dedicated Mechanical Systems Yard with a water reclamation equipment area.
- The top and bottom 40 feet of the ramp shall be a maximum 5 percent slope with the remainder of the ramp at a maximum slope of 10 percent.
- There is vertical space available over shops, offices, and other spaces within the maintenance areas not requiring 20-foot clearances.
- Access to the upper level joint development uses shall be provided via appropriate vertical circulation access points that preserve the SFMTA facility's security and that are safe and functional for the joint development opportunities.
- Bus turning radius has been evaluated within the building. The site and street bus turning radius will be evaluated farther in final design and with the City of San Francisco planning department.
- The Lead Developer (LD) must apply and show turning templates on drawings, and it has to be agreed upon that they are sufficient and work for circulation. SFMTA reserves the right to request a turning simulation to demonstrate that vehicles can maneuver safely if turning template is tight.
- The following uses had been envisioned on the basement and must be included on the site:

- ✓ SFMTA loading
- ✓ Full building waste management and pickup
- ✓ Access to lower-level work areas
- ✓ Car-share spaces
- ✓ No public access
- Staff work areas shall be located in an above-grade, naturally lit location while accommodating the required spaces and adjacencies. To the extent feasible, include access to private outdoor spaces from staff break areas and rest spaces.

2.8 Space Needs Program & Summary

A summary of the Space Needs Program is provided below. The summary tables include projected square footage needs for building areas, parking, and staff totals.

These projected space needs are subtotaled into net square footage requirements. The detailed Space Needs Program begins with the identification of each space by name and a space standard (if applicable). The space column represents spaces required to accommodate the fleet and operation for the final build out.

Table 1.B gives an overall square footage for each large area indicated. Table 2.E is a detailed program for each space required. Table 2.E totals are not identical to the actual square footages within the RDC but the design of the RDC was informed by Table 2.E.

The above minimum requirements notwithstanding, the design shall meet all other program, functional, and space requirements within a maximum square footage deviation of ±10% applied to each function as shown in Table 2.E- Space Needs Program.

SECTION 2 - SPACE NEEDS PROGRAM

2.9 Battery Electric Bus Fleet Infrastructure

In accordance with the CA Air Resources Board Innovative Clean Transit legislative mandate, the SFMTA is transitioning its fleet to battery-electric buses. Potrero Yard currently operates a fleet of trolley buses, and the new facility will need to account for the existing fleet, the future battery-electric fleet, and the transition between the two propulsion technologies.

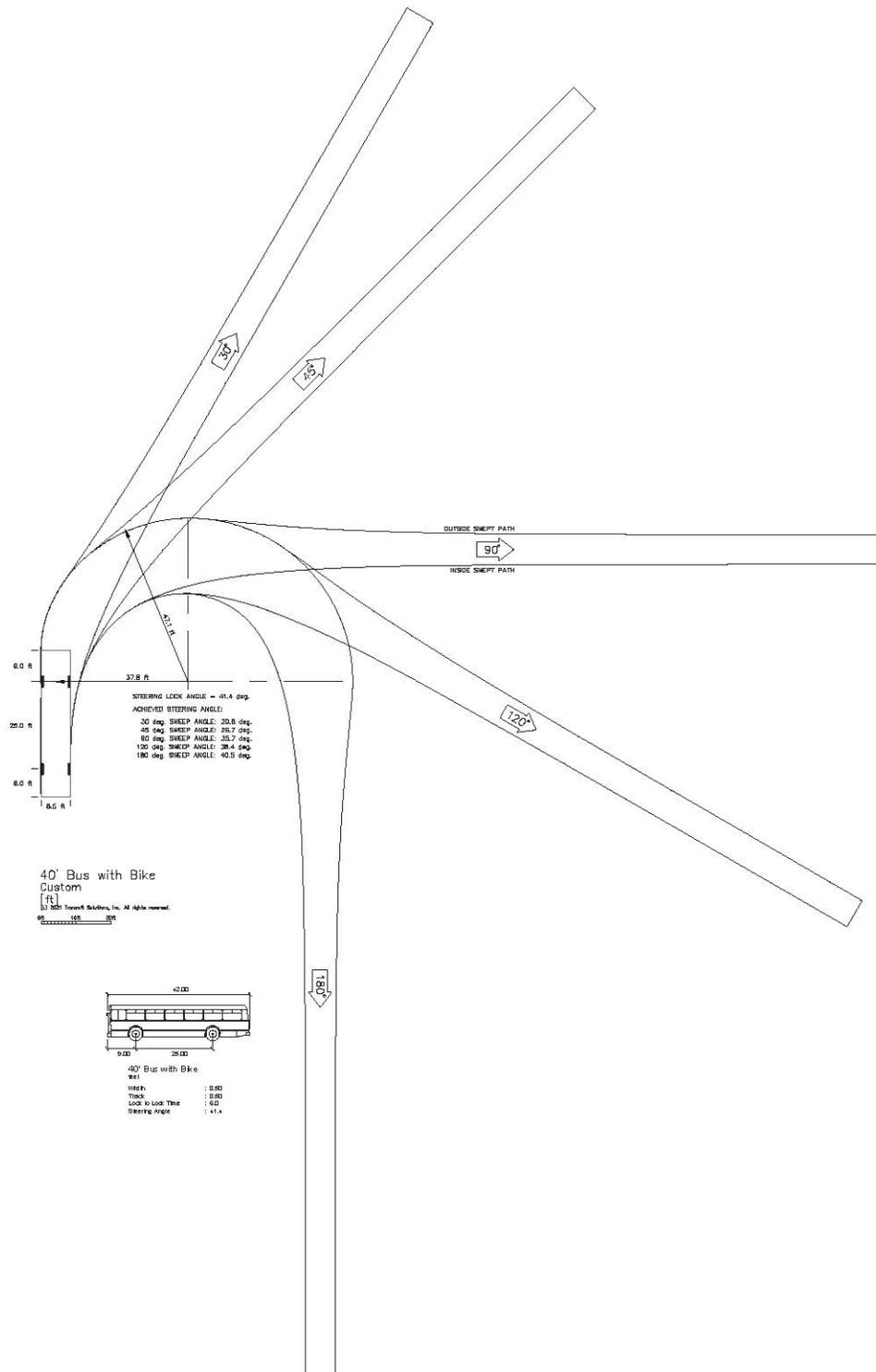
While compliance with this DCD is required and mandated, design and implementation of BEB infrastructure is envisioned as more of a progressive design process. Refer to Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements for BEB requirements and considerations.

2.10 Minimum Clearance and Design Requirements

The following are minimum clearance and design requirements for the different levels of the Bus Yard Component:

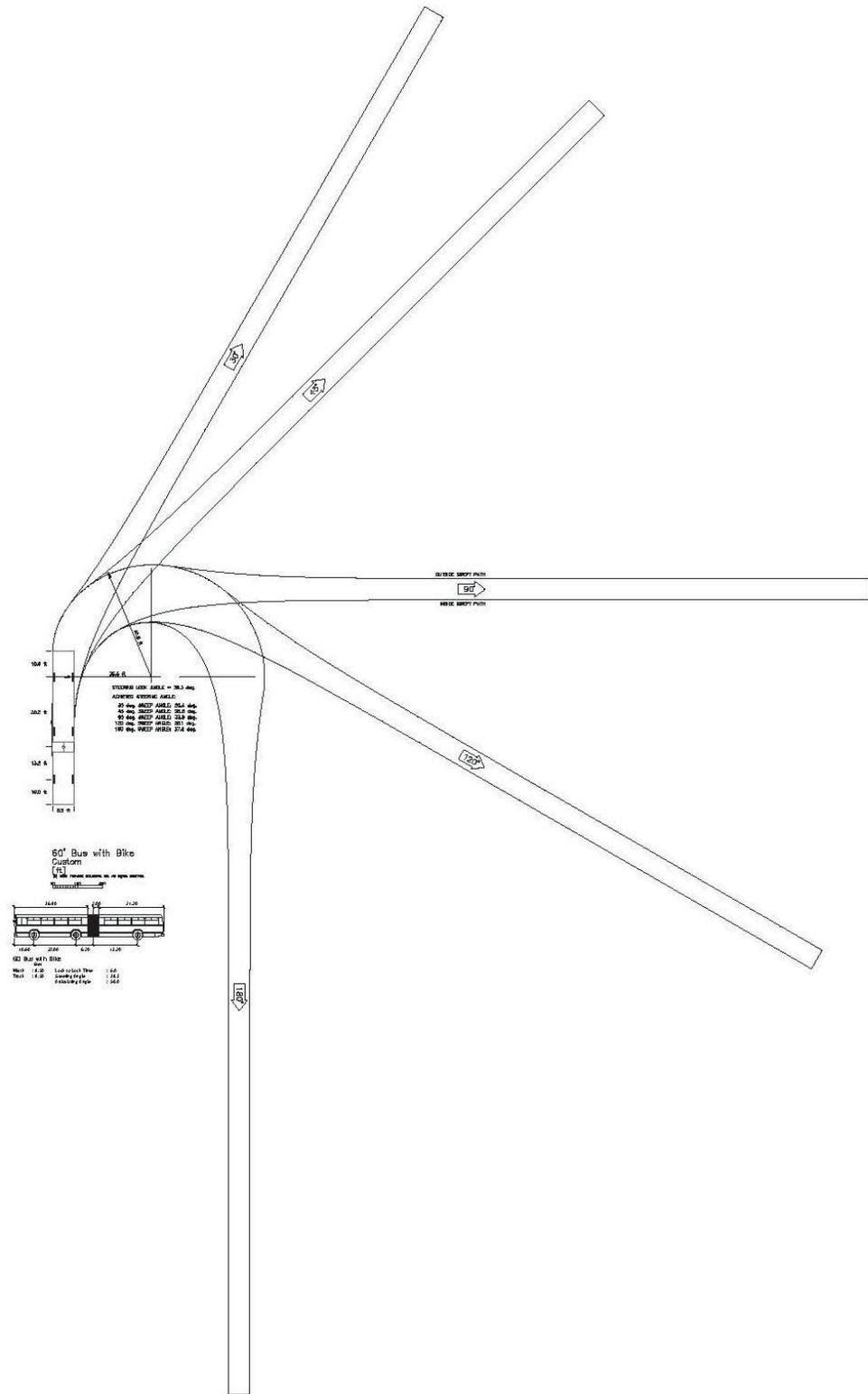
- For the minimum drive aisle for bus turning, see Table 2.D.
- The minimum turning radii for buses is 36'-43', depending on degree of turn. See 40' and 60' turning template models in Exhibits 1 and 2.
- Vertical circulation for under the catwalks is 20 feet.
- The bus floor levels of the Bus Yard Component should be designed for the full bus live load, regardless of whether the floor plans indicate other non-bus uses.
- Vertical clearance listed in the DCD is the minimum clearance height to any structure, system, building components or equipment, or fixtures.

EXHIBIT 1



40' Bus with Bike Rack
 Scale - 1:20

EXHIBIT 2



60' Bus with Bike Rack
 Scale - 1:30

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM											
SCENARIO 2 POTRERO											
FUNCTION	SPACE STANDARD			STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)		COMMENTS		
PARKING											
40' Bus	12	x	45	53	53	540	28,620		The number split between 40' and 60' buses may be modified based on the BEB technology. Reference the E-Bus Performance Requirements Document. Five of these spaces should be provided adjacent to the maintenance bays & shops for down bus parking.		
60' Bus	12	x	65	160	160	780	124,800		The number split between 40' and 60' buses may be modified based on the BEB technology. Reference the E-Bus Performance Requirements Document. Five of these spaces should be provided adjacent to the maintenance bays & shops for down bus parking.		
TOTAL BUSES				213							
Large Non-Rev Vehicle	12	x	35		5	420	2,100		Operations and maintenance; All non-revenue vehicles will be electric vehicles		
Standard Non-Rev Vehicle	10	x	20		84	200	16,800		Operations and maintenance; All non-revenue vehicles will be electric vehicles		
Large Non-Rev Vehicle	12	x	35		3	420	1,260		Transit Services (MRO); Sprinter Command Vehicles; All non-revenue vehicles will be electric vehicles		
Standard Non-Rev Vehicle	10	x	20		65	200	13,000		Transit Services (MRO); 45 pickups and 20 sedans; All non-revenue vehicles will be electric vehicles		
Stationary Engineer Non-Revenue Vehicle	12	x	35		1	420	420		F250 with crew cab		
Building Maintenance Non-Revenue Vehicles	12	x	35		3	1,260	3,780		For FIT/B&G		
Assignable Area							190,780				
Net: Gross (75%)							333,865				
BAYS & SHOPS											
Running Repair Supervisor	64			3	3	64	192		Workstation, Shared office with PM Supervisor		
Control Room - Clerk	64			2	2	64	128		Workstation, Shared Office		
Floor Supervisor	64			2	2	64	128		Workstation, Shared Office		
Preventive Maintenance Supervisor	64			2	2	64	128		Workstation, Shared Office with RR Supervisor		
Electronic Supervisor	64			1	1	64	64		Workstation		
60' Bus Repair Bay	75	x	20		10	1,500	15,000		Mix of parallelogram and inground lifts; one shared with Minor Body Repair Bay		
60' Bus Preventive Maintenance	75	x	20		5	1,500	7,500		All pit and roof level bays		
60' Bus Tire Bay	75	x	20		2	1,500	3,000		Two, if space allows		
60' Bus Minor Body Repair	75	x	20		2	1,500	3,000		Shared with a Repair Bay		
60' Bus Chassis Wash	75	x	25		1	1,875	1,875				
TOTAL BAYS				20							
TOTAL BAYS & SHOP STAFF				10							

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM											
FUNCTION	SPACE STANDARD		SCENARIO 2 POTRERO					COMMENTS			
			STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)					
Common Work Area					2	500	1,000				
Portable Equipment Storage					2	600	1,200				
Tool Box Storage		24			1	2,160	2,160				Total Mechanics and Technicians listed under Maintenance Admin
Tool Storage					1	150	150				Access off of Shop floor
AC Shop/Storage					1	500	500				
Battery Rebuild Shop					1	500	500				
Tire Shop					1	600	600				
Tire Storage		5			1	1,065	1,065				5 sf per total bus number
Lube Room					1	600	600				
Compressor Room					1	200	200				
Minor Body Shop					1	400	400				With workstation
Electronic Shop Workstations		30			4	30	120				Workstations, adjacent to Electronic Bench Shop
Electronic Bench Shop					1	600	600				Space for six electric benches test equipment space
Telecommunication Room					1	100	100				
Assignable Area							40,210				
Net: Gross (20%)							48,252				
FARE BOX & CLIPPER CARD READER REPAIR SHOP											
This section of the space needs program is not included in the Reference Design Concept. Developer's bus yard design submission must include a Fare Box & Clipper Card Reader Repair Shop.											
Manager				1	1	120	120				Private Office
Fare Box Staff				12	12	64	768				Shared Office with space for shared computers
Incoming & Outgoing Device Storage					1	350	350				
Shop					1	300	300				
Storage					1	200	200				Secure
Parts Storage					1	600	600				
Assignable Area							2,338				
Net: Gross (20%)							2,806				
SERVICE & CLEAN											
Service Supervisor Office			64	2	2	64	228				Shared Office with space for shelves
Service Position	20	x	70		3	1,400	4,200				
Bus Washer	20	x	100		2	2,000	4,000				
Water Reclamation					1	900	900				
Cleaning Equipment Storage					3	200	600				
Assignable Area							9,928				
Net: Gross (10%)							10,921				
CLEANING STAFF					35						
CLEANING STAFF TOTAL					37						

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM										
SCENARIO 2 POTRERO										
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)		COMMENTS			
PARTS										
Parts Supervisor		120	1	1	120	120				Private Office
Parts Lockers		7		15	7	105				
Break Room				1	200	200				
Gender Neutral Restroom					100	100				
Parts Storage		20		1	4,260	4,260				
Battery Storage				1	300	300				Adjacent to Parts, temp controlled to 60 degrees
Parts Shopkeeper		64	5	5	64	320				Workstation
Parts Window				1	200	200				
Staging				1	600	600				Located in Basement; secured from any publicly accessible and joint development spaces
Receiving Office				1	300	300				Two workstations, file cabinets, valuable items storage
Shipping & Receiving				1	600	600				
Dock				1	900	900				
Assignable Area						8,005				
Net: Gross (10%)						8,806				
PARTS STAFF			21							

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM												
FUNCTION	SPACE STANDARD	SCENARIO 2 POTRERO					SUBTOTAL (sf)					COMMENTS
		STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)								
MAINTENANCE												
ADMINISTRATION												
Superintendent		224	1	1	224	224					Private Office	
Assistant Superintendent		120	1	1	120	120					Private Office	
Senior Controller		120	1	1	120	120					Private Office	
Administrative Assistant		64	2	2	64	128					Workstation	
Hoteling - Workstation		64	4	4	64	256					Workstation	
Support Shop		64	1	1	64	64					Workstation	
Copy/Supply				1	120	120						
Records Storage				1	200	200						
Archive Record Storage				1	200	200						
Library/Online Resources				1	172	172					Two - 36 sf Workstations and bookshelves	
Telecommunication Room				1	100	100						
Kitchenette/Vending				1	375	375						
Break Room		25		1	1,250	1,250					Sized for 40-50 people	
Training Room		25		1	500	500					Sized for 15-20 people	
Uniform Alcove		1		147	1	147						
Men's Restroom/Shower				1	1,000	1,000						
Men's Locker		7		147	7	1,029					Total Maintenance and Clean Staff within Restroom/Shower	
Women's Restroom/Shower				1	500	500						
Women's Locker		7		37	7	257					25% of total Maint. staff; within Restroom/Shower	
Gender Neutral Accessible Locker/Shower/Restroom				1	150	150						
Custodial				1	100	100						
Staff & Assignable Area						7,012						
Net: Gross (Plus 35%)						9,467						
MAINTENANCE ADMIN STAFF			10									
MECHANICS			75									
TECHNICIANS			15									

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM						
SCENARIO 2 POTRERO						
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)	COMMENTS
OPERATIONS						
ADMINISTRATION						
Superintendent	224	1	1	224	224	Private Office
Assistant Superintendent	120	2	2	120	240	Private Office
Operations Supervisor	100	8	1	100	100	1 per 50 operators, huddle space for 4 person meeting. These Operations Supervisors are not included in the Reference Design Concept
Trainer	64	2	2	64	128	Shared Office
Yard Starter Office	120	2	1	120	120	Located at bus exit
Receiver	64	1	1	64	64	Workstation
Dispatch	64	6	2	64	128	Workstation
Administrative Assistant	64	2	2	64	128	Shared Office, Adjacent to Superintendent and Assistant Superintendent
Hoteling - Workstation	64	4	4	64	256	Workstation
Union Office	224	2	1	224	224	Private Office
Copy/Supply			1	120	120	
Records Storage			1	400	400	
Uniform Storage			1	80	80	
OPERATORS			383			
Operator Check-In			1	500	500	
Kitchenette/Vending			1	600	600	Separated from the Break Room
Break Room			1	2,000	2,000	Access to exterior space via green space on the roof
Lockers	3		413	3	1,240	Locker for all Operation staff
Locker Changing Area			2	36	72	Located adjacent to Operator Lockers
Recreation Area			1	875	875	
TV Room			1	450	450	
Quiet Room			1	500	500	
Telecommunication Room			1	100	100	
Men's Restroom/Shower			1	870	870	Shower to include changing area
Women's Restroom/Shower			1	870	870	Shower to include changing area
Gender Neutral Accessible Locker/Shower/Restroom			1	150	150	
Custodial			1	100	100	
Staff & Assignable Area		413			10,539	
Net: Gross (35%)					14,228	

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM											
SCENARIO 2 POTRERO											
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)						COMMENTS
TRANSIT SERVICES (MRO)											
Operations Manager		120	2	2	120	240					Private Office
Transit Manager II		64	3	3	64	192					Shared Office
Transit Operations Specialist		64	20	8	64	512					Shared Office
MRO, Street Operations		30	160	10	30	300					Workstation
Junior Management Assistant		48	4	4	48	192					Workstation
Conference Room		20	1	1	600	600					Sized for 30 people, dividable with Training Room
Training Room		25	1	1	700	700					Sized for 20 person with component space, dividable with Conference Room
Break Room		15	1	1	300	300					Sized for 20 people
Lockers		7		192	7	1,344					Large lockers with electrical charging
Locker Changing Area				5	36	180					Located adjacent to Lockers
Transit Operations/Equipment Storage/Component Rebuild Assembly				1	200	200					Unconditioned space located adjacent to Transit Services Vehicles for chains, hotsticks, and cones
Telecommunication Room				1	100	100					
Men's Restroom/Shower				1	600	600					
Women's Restroom/Shower				1	600	600					
Gender Neutral Accessible Locker/Shower/Restroom				1	150	150					
Custodial				1	100	100					
Staff & Assignable Area			192			6,310					
Net: Gross (35%)						8,519					

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM										
SCENARIO 2 POTRERO										
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)		COMMENTS			
SHARED										
Lobby			1	400	400					
Medium Conference Room	25		2	250	500					Sized for 8-10 people
Large Conference/Small Training	25		2	500	1,000					Sized for 15-20 people
Fitness	80		6	80	480					5-6 pieces of equipment/floor space
Facilities Stationary Engineer		2	2	200	200					These Facilities Stationary Engineers are not included in the Reference Design Concept
Transit Maintenance Engineer		2	2	200	200					These Transit Maintenance Engineers are not included in the Reference Design Concept
Building Maintenance Storage			1	600	600					
Telecommunication Room			1	100	100					
Main Point of Entry			1	200	200					
Main Telecommunication Room			1	200	200					
Bicycle Parking			1	250	250					Room with hooks, Class 1, ratio in SF planning code
Revenue Office			1	120	120					IT space, workstation, fare box storage; two vaults located outside space
Meet and Greet			1	100	100					At entrance of site
Security Office			1	250	250					
Gender Neutral Accessible Restroom			5	100	500					Adjacent to Security Office and two on each parking level
Trash/Recycling/Compost Compactor			1	600	600					Spread through building and compactors
Hazardous Waste			1	200	200					
Community Room			1	1,200	1,200					
Low Voltage Room Allowance			1	1,000	1,000					Subject to change based on the results of the ongoing electric study for battery electrical buses
Electrical Room Allowance			1	1,500	1,500					Subject to change based on the results of the ongoing electric study for battery electrical buses
Mechanical Room Allowance			1	2,000	2,000					
Emergency Generator			1	500	500					
Lactation Room			1	300	300					
Assignable Area		4			12,400					
Net: Gross (35%)					16,740					

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM											
SCENARIO 2 POTRERO											
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)						COMMENTS
TRAINING											
Reception			1	120	120						
Manager	224	1	1	224	224						Private Office
Superintendent	224	1	1	224	224						Private Office
Assist Superintendents	120	4	4	120	480						Private Office
Supervisors	64	2	2	64	128						Workstation
Clerical Staff	64	3	3	64	192						Workstation
Team Leader	64	6	6	64	384						Shared Office with storage space
CAT Training	64	2	2	64	128						Shared Office
Instructors	30	43	15	30	450						Shared Office
IT Office	120	1	1	120	120						Private Office
Classroom A	25		1	25	1,250						Sized for 50 People/ Dividable
Classroom B	25		1	25	1,450						Sized for 50 People and components
Classroom C	25		1	25	500						Sized for 20 people
Classroom D	25		1	25	500						Sized for 20 people
Conference Room A	25		1	25	250						Sized for 10 people; dividable
Conference Room B	25		1	25	250						Sized for 10 people; dividable
Simulator Room			3	500	1,500						Sized for three students, one instructor station in each
Computer Lab			1	720	720						Sized for 25 computer stations
Handouts Storage			1	120	120						

SECTION 2 - SPACE NEEDS PROGRAM

TABLE 2.E - SPACE NEEDS PROGRAM												
SCENARIO 2 POTRERO												
FUNCTION	SPACE STANDARD	STAFF OR VEHICLES	NUMBER OF SPACES	UNIT SIZE (sf)	SUBTOTAL (sf)							COMMENTS
TRAINING (CONT.)												
Training Aid Storage			1	800	800							Includes chair and table storage
Uniform Storage			1	120	120							
Records Storage			1	200	200							
Records Archive Storage			1	200	200							
Copy/Supply			1	120	120							
Telecommunication Room			1	100	100							
Kitchenette/Vending			1	200	200							
Breakroom			1	500	500							Sized for 25 people
Operator Locker		3	50	3	150							
Instructor Locker		3	43	3	129							
Lactation Room			1	300	300							
Men's Restroom/Shower			1	570	570							
Women's Restroom/Shower			1	570	570							
Gender Neutral Accessible Locker/Shower/Restroom			1	150	150							
Custodial			1	100	100							
Staff & Assignable Area			63		13,199							
Net: Gross (35%)					17,819							
BUS TOTAL					471,421							
VEHICLE CIRCULATION (will vary depending on site configuration, number of levels, and number of ramps required)												

SECTION 3 - DESIGN CRITERIA NARRATIVE

3.0 PURPOSE & INTENT

The purpose of this chapter is to define the goals developed throughout the SFMTA Potrero Yard Planning Study, which includes the reconstruction of the Potrero Yard and the joint development opportunity of non-transit uses above the Bus Yard Component. Guided by planning, compliance, and general site criteria, simple narratives are included to provide an overview of specific systems and assemblies that the Facility requires. The intent of these narratives is to present an easy to understand, non-technical explanation of how this Facility is required to function and includes considerations from the SFMTA employee and stakeholder input.

3.1 Planning Criteria

Table 3.A provides a description of the primary planning, building quality, and transit objectives for the Bus Yard Component.

3.2 Compliance

The Project shall comply with all applicable governing codes and ordinances that regulate building construction, site design, life safety, fire protection, accessibility, energy, and environmental requirements as well as the Project Specific Design Criteria as follows (or those which are applicable at the time the design is initiated). Applicable codes to which the project must adhere are included in Table 3.B.

TABLE 3.A - PLANNING CRITERIA

Design Life	99 years
Quality	The planning, design, and construction of the facility shall be high quality and long-lasting, have the necessary spaces and systems to function well, provide a safe and healthy work environment, and be economical and resource efficient to operate and to maintain.
Planning	The facility layout shall have a logical and efficient organization and flow to allow easy and safe access and circulation for staff, vehicles, and service providers. The layout shall be open and modular with the structure located to support building and equipment loads.
Flexibility	The facility shall be designed to be flexible. Vehicle parking, service, and maintenance spaces shall have an open and modular layout to accommodate 40- and 60-foot motor coaches, trolley buses, and future electric buses. Staff areas shall be designed with an open plan with modular partitions and furnishings that can accommodate staffing and programming needs over time. Training spaces shall be modular co-located spaces with movable partitions to accommodate a wide range of group meeting needs (i.e. one large group, several small groups, etc.)
Space Utilization	The facility shall include all required spaces and assignable square footages (area inside room or boundary) in Section Two of the Facility Program as well as minimum dimensions and clearances as defined in the Space Standards. Bus areas shall be planned to maximize fleet capacity, where possible sharing circulation between functions such as parking and maintenance bays.
Workspace	Workspaces shall be designed based on needs to be highly functional spaces with quality environments that support staff health, safety, and productivity with good day lighting, good ventilation, and durable finishes. If feasible, provide direct access to green space on the roof for employee use and enjoyment.
Safety	The facility shall have the best practice safety features including fire life safety systems; adequate means of egress and way-finding components to exit discharge; fall protection; eye and ear protection; unobstructed circulation and equipment clear space; easy to use fluids collection; and good ventilation with positive pressure in staff areas.
Security	The facility shall have passive and active security. The site shall have limited vehicular and pedestrian entries that are easy to find and visible. The facility shall have card readers at all exterior entries, suite entries, and support spaces. Security camera system shall be installed to monitor all exterior access and interior areas.
Emergency Response	The SFMTA Emergency Response Plan includes emergency transportation after a disaster and then owl service (late night service) plus several additional routes in the first stage of recovery. The number of buses needed during the initial response depends on the disaster. The first stage of recovery requires approximately 250 buses and 530 operators. Please see Section 4.8.1 for more information on the expected resilience and recovery time of Potrero Yard following a major disaster.
Future Electric Buses	The facility shall build in infrastructure for battery-electric buses, using overhead fast-charge in accordance with the battery-electric bus performance metrics in Appendix x. The space program and allocation shall include electrical switchgear room and adequate space for all charging equipment, conduit, and ancillary features. Day 1 of operation shall accommodate 158 trolley buses, and the remaining bus spaces shall be outfitted for battery electric bus. The trolley bus parking spaces will be transitioned to battery-electric charging spaces over time in accordance with the transition plan approved in the Project Agreement.
Window Cleaning	The facility shall have a window cleaning regime which includes regular use of non-aggressive cleaning products. The use of aggressive or corrosive cleaning products shall be avoided. Regular window cleaning shall happen every 12 months, but not exceeding 18 months, unless undue soiling is apparent in which case the cleaning intervals should be reduced. For the Potrero Facility, the use and contract with a company that specializes in this type of cleaning is required.

SECTION 3 - DESIGN CRITERIA NARRATIVE

The Building Code and Zoning Requirements include, but are not limited to the following. The LD is solely responsible for compliance with all applicable codes.

TABLE 3.B - BUILDING CODE & ZONING REQUIREMENTS	
Authority Having Jurisdiction:	City and County of San Francisco
Zoning Code:	San Francisco Administrative Code (Planning Code)
Applicable Codes (Adopted):	ASHRAE- 62.1, 90.1, 189.1 California Building Standards Code (with local amendments) California Electrical Code (with local amendments) California Energy Code (with local amendments) California Existing Building Code (with local amendments) California Fire Code (with local amendments) California Green Building Standards Code (with local amendments) California Historical Building Code (with local amendments) California Mechanical Code (with local amendments) California Plumbing Code (with local amendments) California Reference Standards Code (with local amendments) Department of Justice ADA Standards for Accessible Design NFPA Codes- 13, 30, 30A, 33, 88A, 110, 111, 704, 720 San Francisco Code Amendments, State Amendments, Ordinances, and Law
Occupancy Group:	S-2, B, R-2, M
CONSTRUCTION TYPE/ HEIGHT & AREA (SEE ICC TABLE 503; ICC TABLE 504.3)	
Type I-B Max.	150'-0" / _Floors @ _sf ea. Per ICC 2016; 85' per San Francisco Municipal Code
Fire Protection:	Sprinkler System

⁴ The joint development square footages presented in this table are based on preliminary models prepared by the consultant team (The Hatch Team). The ultimate size and form of the joint development component of the project are subject to change.

SECTION 3 - DESIGN CRITERIA NARRATIVE

TABLE 3.B - BUILDING CODE & ZONING REQUIREMENTS (CONT.)

FIRE RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS, FOR TYPE 1-B CONSTRUCTION (ICC TABLE 601)

Structural Frame Including Columns, Joists, & Girders	Supporting Floors - 2 hours Supporting Roof ONLY - 1 hour
Bearing Walls Exterior	(per ICC Table 602) - 2 hours
Bearing Walls Interior	Supporting Floors - 2 hours Supporting Roof ONLY - 1 hour
Non-Bearing Walls & Partitions Exterior	(per ICC Table 602) - 1 hour
Floor Construction Including Supporting Beams & Joists	2 hours
Roof Construction Including Supporting Beams & Joists	2 hours

OCCUPANCY SEPARATION, FIRE BARRIERS, FIRE PARTITIONS, & REQUIRED OPENING PROTECTIVES, FOR TYPE I-B CONSTRUCTION (ICC TABLE 504.3, TABLE 504.4, TABLE 716.5)

	PARTITIONS	OPENINGS
Occupancy Separation between (S-2, Bus Repair Garage) & (B, Training Area, Operations)	2 hours	
Occupancy Separation between (S-2, Bus Repair Garage) & (R-2, Residential T.O.D.)	2 hours	
Exit Passageways	1 hour	1 hour
Exit Enclosures	1 hour	1 hour
Vertical Shafts (for 14 stories, 144 feet, 0 inch total height)	1 hour	1 hour

INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY (SPRINKLERED BUILDING), FOR TYPE I-B CONSTRUCTION (ICC TABLE 803.11)

OCCUPANCY GROUP	EXIT ENCLOSURES & EXIT PASSAGEWAYS	CORRIDORS	ROOMS & ENCLOSED SPACES
S-2	Class C	Class C	Class C
B	Class B	Class C	Class C
R-2	Class C	Class C	Class C

SECTION 3 - DESIGN CRITERIA NARRATIVE

3.3 General Site Requirements

There are specific site requirements necessary to ensure safe, efficient, and functional facilities that are outlined (and not limited to) the following:

TABLE 3.C - GENERAL SITE REQUIREMENTS

Facility Accessibility	Provide a minimum of two vehicular entries/exits configured such that either could work as the entry/exit if the other is unavailable.
Facility Lighting	Use appropriate and adequate lighting for day to day operations and to ensure high level of surrounding visibility. Transit facility will have movement around and through the facility at all times of day.
Pedestrian Safety & Accessibility	Observe all code and regulation requirements to insure safe and defined pedestrian circulation paths (necessary striping, bollards, curb cuts, etc.); and that paths minimally intersect fleet ingress and egress. The SFMTA staff have made a number of suggestions to ensure that bus/pedestrian conflicts are minimized. While beyond the scope of this document, specific design treatments within the right of way to advance this goal include traffic signal pre-emption for buses; separating entrances to the bus facility and joint development to the greatest degree possible; provide transit lanes for buses to connect to OCS; and striping for on-street parking, bicycle facilities, and loading to minimize conflicts with bus movements.
Site Stormwater Drainage	Positive drainage and appropriate stormwater discharge from site and upper exterior/open decks; a stormwater management and pollution prevention plan shall be established. Required per the San Francisco Green Building Code Amendments and GS6 Form for municipal projects and the SFPUC Stormwater Management Ordinance.
Sustainability	Provide as required including the San Francisco Municipal Green Building Code (Environment Code Chapter 7), CALGreen, and the San Francisco Green Building Code. Potrero must be built to a LEED Gold rating.
Parking	(Employee Parking will not be provided)
Security	Provide site video surveillance and building security.
Better Streets	https://www.sf-planning.org/ftp/BetterStreets/

3.4 Sustainability Narrative

Per Table 3.C, the Project must be designed, built, and commissioned in compliance with the San Francisco Municipal Green Building Code (Environment Code Chapter 7) and must achieve a LEED Gold certification (minimum). The following are sustainability strategies that the SFMTA looks favorably on, in addition to all applicable code requirements:

- Innovative and creative storm water management that does not result in square footage loss
- On-site rainwater harvesting and reuse

- Solar panel or other on-site generation
- Commissioning and enhanced energy performance
- Wastewater recycling

In addition, District Utility Systems shall be evaluated as part of the Project’s sustainability strategy, so long as a District Utility model could maintain the SFMTA’s security and emergency backup power requirements. See Division 4 (*Supplementary Design Criteria*) of the Technical Requirements.

San Francisco Green Code Mandates:

- Indoor water use reduction

- Construction waste management
- Commissioning
- Storm water management
- Energy performance
- Temporary ventilation and IAQ management during construction
- Low-emitting materials (low VOCs)

Cal Green Mandates:

- Light pollution reduction
- No halons in HVAC, refrigeration and/or fire suppression equipment electric vehicle charging.

SECTION 3 - DESIGN CRITERIA NARRATIVE

3.4.1 Materials

Mass walls:

- Structural concrete walls are beneficial for tempering the temperature fluctuations throughout the day. Reduce mechanical cooling during daytime hours and containing/ emitting heat during cold nights.

Construction Materials:

- Select materials and products that minimize resources used, are locally available and produced.
- Use recycled content in all carpet, tile, millwork, and ceiling finishes.
- Use recycled content in all CMU, concrete, and steel structure components.
- During construction phase, divert construction waste from landfill, collect paper, glass, plastic, cardboard, metal, and batteries on site to be recycled.
- Use low VOC emitting paint, coatings, adhesives, flooring, composite wood, and ceiling/wall/thermal/acoustic insulation.
- Use of high fly ash content in concrete
- Use modular furniture systems
- Use certified wood and comply with Chapter 8 of the San Francisco Environment Code.

Proximity:

- Use locally harvested and manufacturer materials.
- Plan for Future Use:
 - ✓ Conduct life cycle cost analysis.
 - ✓ Ensure programmatic functionality.

3.4.2 Water

Indoor Water Use Reduction and Grey Water Treatment:

- In addition to low flow fixtures and rainwater storage, explore the use of gray water treatment and reuse.
- Grey water from lavatories and showers can be treated and used as flush water and/or irrigation water to further reduce the potable water required on site.

Wash Water Recycling System:

- Conserves water and reduces wastewater effluent.

Water Metering:

- Install sub-meters on systems that have the potential for large consumption (vehicle wash system, irrigation, heating and cooling systems, etc.)

3.4.3 Energy Efficiency

Demand Control Ventilation – CO2 Monitoring:

- Provide CO2 sensors to be used in densely populated spaces to eliminate over-ventilation and energy waste.

Air Side Economizers:

- Economizers shall be incorporated with HVAC units to provide free cooling to the spaces when outdoor conditions permit.

Reduce Fan Operating Pressure:

- Select coils and filters with the intent to reduce overall pressure and fan energy. Coils and filters shall be sized for face velocities no greater than 600 fpm. Ductwork pressure drops shall be sized no greater than 0.08 inches wg.

High Efficiency Equipment:

- Selected HVAC equipment shall provide the most efficient heating and cooling for the interior space.

Improved Building Envelope:

- Exterior walls and roof insulation value shall have an (R-value) above CALGreen minimum requirements.

Commissioning:

- Prior to occupancy, HVAC, plumbing, power, and lighting systems shall be commissioned to confirm operation is in accordance with the design intent.

3.4.4 Site/Building

Water:

- Stormwater Management
 - ✓ Pre-treat stormwater water to draw out pollutants, reduce peak flow and recharge groundwater.
- Water Conservation
 - ✓ Apply San Francisco standards and best practices where applicable on the site.
- Rainwater Harvesting
 - ✓ Determine if rainwater harvesting, collection, and reuse is feasible on this site and what size cistern is appropriate.

Vegetation:

- Sustainable Planting Design
 - ✓ Plant trees for shade over paved surfaces to reduce heat island effect. Preserve trees where possible and plant native trees per LEED and San Francisco Bureau of Urban Forestry requirements.

SECTION 3 - DESIGN CRITERIA NARRATIVE

Site Lighting:

- Avoid light pollution by selecting full cutoff fixtures, utilizing LED source for all site lighting, lighting levels in full compliance with IES recommended lighting levels, by taking advantage of the LED drivers' ability for dimming, and occupancy sensors to reduce lighting levels whenever the site is not fully utilized.

Health and Well-being:

- Design for physical activity
 - ✓ Design for physical activity and health of employees workout in the Facility by providing a room and access to planned greenspace.
- Design for optimal social interaction and community engagement.
 - ✓ Provide outdoor and indoor space for employee meals and other activities.
- Wayfinding
 - ✓ Provide clear wayfinding that utilizes multiple best practices to direct employees and the public around the site as appropriate.

Alternative Transportation:

- Ensure unhindered access to public transportation.
- Provide bicycle storage/changing rooms.

Pollution Prevention:

- Create and implement an erosion and sedimentation control (ESC) plan.
- Filter storm water run-off with an oil/water separator.
- Plan for 100 percent on-site storm water detention, if possible.

Noise and Vibration:

- This Facility will be operated year-round, 24 hours a day, 7 days a week. Proper public nuisance notification and sound abatement needs shall be addressed in the design. Details of the noise and vibration performance criteria are presented in a supplemental document in Division 4 (*Supplementary Design Criteria*) of the Technical Requirements.

3.4.5 Efficiency and Quality of Operations

Minimum Performance:

- Prohibit smoking in the building and locate designated areas 25 feet from entries to comply with code and enhance employee and visitor health.

Construction Management:

- Protect stored on-site or installed absorptive materials from moisture damage
- Replace all filtration media prior to occupancy
- Perform building flush-out (14,000 or 3,500 cubic feet) prior to occupancy

Low emitting materials:

- Low VOC Adhesives/ sealants, paints, carpet, and composite wood
- Comply with Green seal standard for commercial adhesives
- Anti-corrosive and anti-rust low VOC paints
- No use of urea-formaldehyde resins in laminating adhesives

Plan for Flexibility:

- Include flex shop space.
- Create appealing public and private spaces.
- Circulation shall be function and equipment driven.
- Plan for the transition to battery-electric buses. Reference section 3.12.5 in the DCD.

Parts Storage System:

- Optimally utilize the volume of space, minimizing the building area footprint.

3.4.6 Electrical

Power Monitoring for Possible Load Shed:

- Service feeder main and all sub-distribution switchboard feeder breakers shall include power digital meters for centralized digital remote monitoring of the building's energy usage for trending analysis and management.

Natural Lighting:

- Daylight harvesting shall be utilized where possible to provide a better working environment by introducing natural light within the work place.

On-Site Generation and Storage:

- Include on-site energy generation and storage where possible, including solar panels and battery systems, to assist in overall building electrical demand and/or backup power.

3.5 Architectural Narrative

The Project will be a mixed-use, joint development consisting of a bus garage and maintenance facility (the Bus Yard Component) and multiple levels of joint development (the Housing and Commercial Component). In addition, the Common Infrastructure is the collection of elements of the Facility that are shared by the Bus Yard and Housing and Commercial Components. The Bus Yard Component is intended to service, maintain, and store a fleet of 40- and 60-foot buses. It consists of a main building that will house separate operations and training facilities, service and inspection bays, bus washes, bus parking, and the associated ancillary and office facilities.

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The Potrero Yard bus garage will have three-levels accessible by a scissor express ramp structure for vehicular circulation. Each of the floor plans have areas designated for vehicle parking, service, and maintenance spaces to accommodate 40- and 60-foot trolley buses and battery electric buses. A bypass ramp at grade will allow buses to enter the facility from Mariposa Street and bypass the scissor express ramp structure, and then travel directly to the bus parking spaces.

Pigeon abatement is a major concern. Numerous abatement measures, including bird repellent and spikes, bird wire, bird netting, shock flex tracks, lodge design, bird coils, moving owl, and ultrasonic electric devices can be used.

The new Potrero Yard shall comply with the San Francisco Green Building Code requirements. The building shall meet US Green Council (USGBC) and Leadership in Energy and Environmental Design (LEED) requirements, and obtain GOLD certification. In addition, new construction will have electrical infrastructure capable of supplying electricity for electric vehicle charging at 100 percent of new non-revenue vehicle parking spaces. Refer to Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements for detailed discussion of BEB power needs.

The materials used in the construction of the Potrero Yard Facility shall be attractive and, durable inside and outside the building, complement the context/environment around the site and neighborhood, and meet the design standards of SF Planning and the San Francisco Arts Commission⁵. Reference the Project Design Guidelines for facade, glazing, etc.

3.6 OCS - Trolley

Potrero Yard's current trolley fleet is anticipated to be the final trolley bus fleet operated by the SFMTA. Upon construction completion, the trolley fleet will only have 5-7 years of service life remaining. As a result, the SFMTA requires a simplified overhead charging system within the new Potrero Yard.

As the trolley buses enter the Facility, they will transition off-wire to navigate through. Once the trolley bus is parked in a bus parking stall, OCS must be provided above for on-wire connection while stored. When leaving the parking stall, the trolley bus will go off-wire again to navigate through the Facility. Once through the exit of the Facility, the trolley bus will connect back to the wire. OCS wire shall also be provided in all repair bays except the preventive maintenance bays for needed power during maintenance. The mechanism for disconnecting from the right-of-way OCS to the facility (pull-in), as well as back onto the right-of-way OCS from the facility (pull-out), shall be carefully considered by the Project Team and proposed through the Bus Facility Technical Proposal.

Shoe replacement will take place just after the trolley bus enters the Facility at the Meet and Greet area. There shall be access to the roof of the vehicles; via a three-axis lift, elevated platform, or any equal means of access for an employee to be able to safely access the shoes on top of the trolley buses.

Appendix B to this document is the SFMTA's OCS Design Criteria document. For this project, the Project Team shall focus on the first section of the document for relevant OCS requirements. Much of the information in the later sections of Appendix B should be interpreted as reference information. See room data sheets for illustration of OCS in applicable

spaces. See also the Traction Power section of this document for information on the electrical connection for the trolley OCS network.

Design transition and adaptability between trolley and battery electric buses to be seamless and intuitive. Deviation from OCS criteria, such as use of overhead charging pans in the maintenance bays, or non-tension wire in the parking stalls, is acceptable if full functionality is met. This deviation must be considered through the Alternative Technical Concept process. During construction, the Project Team must work closely with the SFMTA's Transit Division to accept all design drawings, and Muni Construction Support for all right of way work and relevant Clearance Permits.

Trolley pole system inspection and maintenance to be conducted in the Preventative Maintenance (PM) Bays. See diagram below and PM Bay room data sheet for requirements.

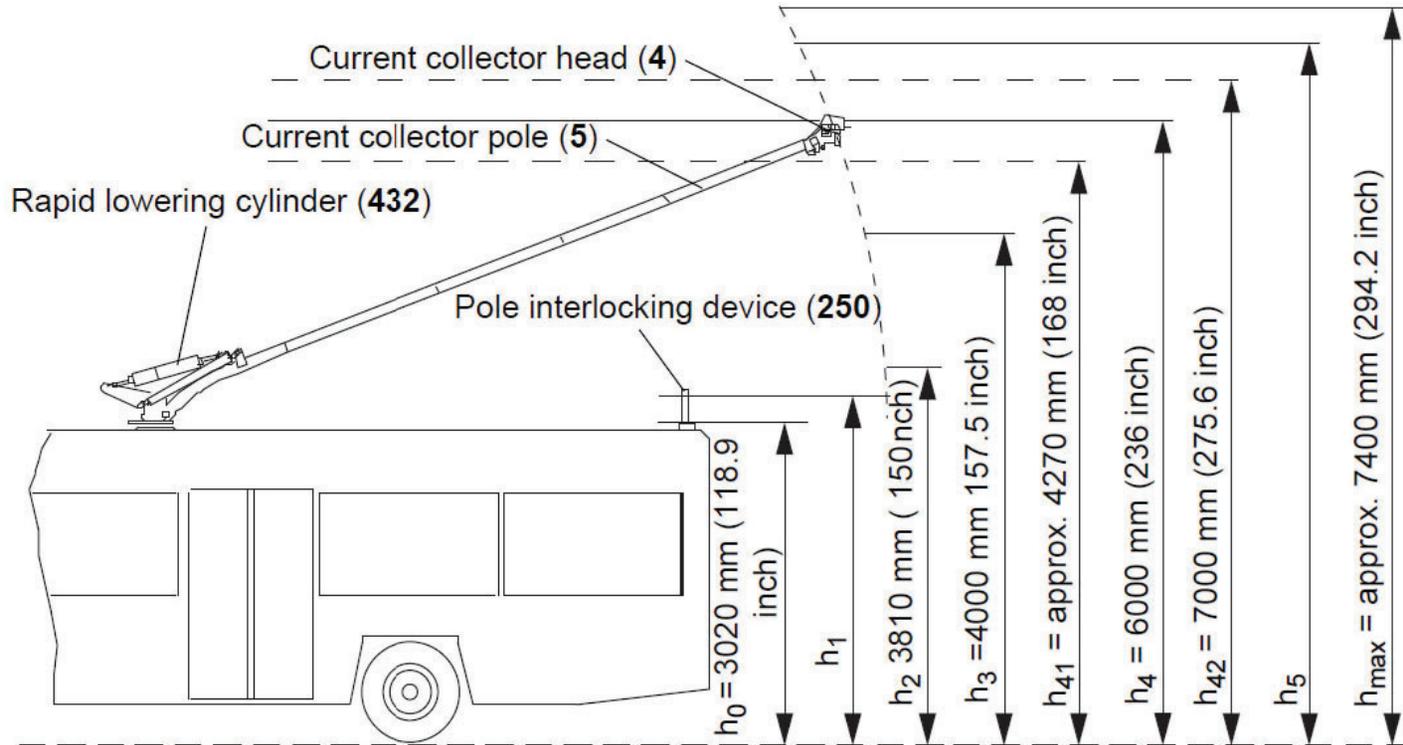
3.7 Site

The current Potrero Yard, located on a city block bound by Mariposa Street to the south, 17th Street to the north, Hampshire Street to the east, and Bryant Street to the west, sits at the edge of the Mission District and Potrero Hill.

The current site is rectangular in plan and measures approximately 480 feet east to west by 400 feet north to south. On the east side of the site, an approximately 215-foot wide building extends length-ways from the northern site boundary to within 30-feet of the southern boundary. The remaining western portion of the site is occupied by an asphalt and Portland

⁵Please see the adopted Urban Design Guidelines for the City and County of San Francisco at <http://default.sfplanning.org/plans-and-programs/planning-for-the-city/Urban-Design-Guidelines/Urban_Design_Guidelines.pdf>.

OCS TROLLEY HEIGHT DIAGRAM



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cement concrete (PCC) paved electrified-bus parking area at ground-level.

The ground-level parking area features numerous ancillary facilities and overhead catenary system (OCS) support poles, guy wires, and live electrical lines. A bus wash station occupies the north central area of the lot and a trash compactor facility occupies the northwest corner of the lot. Access to the ground-level parking area is by an entrance on Mariposa Street.

The ground-level parking area slopes gradually from approximately elevation +54 foot SF-VD13 in the northeast corner to elevation +48 foot SF-VD13 in the southwest corner. The relatively level site has been created by cutting a bench into the natural slope. As a result, along the northern boundary of the site, the elevation of 17th Street is between 10 feet and 23 feet higher than site grade. This difference reduces along the eastern and western boundaries of the site, along Hampshire Street and Bryant Street, respectively, such that Mariposa Street at the southern boundary is at the same grade as the parking area.

The differences in elevation between the site and surrounding streets are accommodated by reinforced concrete retaining walls along the western portion of 17th Street and along Bryant Street, and by integral retaining walls within the building along the eastern portion of 17th Street and along Hampshire Street.

The existing building on the site is predominantly a single-story structure housing a maintenance garage at grade (at Mariposa Street level). The garage area features vehicle service pits for maintenance access to the underside of the buses.

3.8 Structural Narrative

The Potrero Yard project will require several considerations in the appropriate selection of a structural system given, among other things, the long spans of the Bus Yard Component and the load requirements for the Housing and Commercial Component above.

Additional geotechnical investigations will be required to further inform the structural design for the Project. For the Reference Concept Design, the SFMTA commissioned ARUP/RYCG to perform a preliminary geotechnical analysis for the Project.

3.8.1 Structural Summary

This section summarizes the project's structural design standards and outlines the approach for the new structure at the site, with an eye toward earthquake resilience. This approach is developed to provide consistency in design between the existing and new structures throughout the Facility. Items included within this section are Structural design criteria, code analysis, materials, earthquake resilience, and geotechnical information provided in the 2018 geotechnical report for Potrero Yard completed by ARUP/RYCG.

The concept plan for the rebuild of Potrero Yard involves the demolition of the existing building and all existing utilities serving the existing facilities (including the building, bus wash, and any others) must be demolished, removed, and capped in place unless otherwise noted on the site⁶ and the construction of a three-level bus storage and maintenance facility. The maintenance facility will feature vehicle service pits formed by shallow excavations below current site grades and a basement to serve the Facility.

LD shall accept existing site perimeter retaining walls in their current condition and is responsible for any required due diligence or site investigation required to inform their design and construction. As-built drawings are provided by the City for information only and shall not be relied upon. Shall any existing retaining walls remain in place or be incorporated in the Development Team's design, the Development Team shall demonstrate suitability and viability of the existing retaining walls and ensure the future design life is commensurate with the new construction.

Design and construction associated with temporary or permanent retaining structures, including the removal, partial re-use or re-use of the existing perimeter walls, shall adequately consider impacts on adjacent property. These include, but are not limited to impacts on:

- Temporary stability
- Temporary street closures and permitting required for proposed works, including impact on MUNI operations
- Buried and overhead utilities
- MUNI lines
- Pavements
- Groundwater levels
- Any other structure, building or utility that may be affected

Ground movements associated with any basement or retaining structure design, including removal, partial re-use or re-use of the existing walls, shall be evaluated. Impact assessments shall be carried out for all structures, buildings, and utilities within movement zone of influence.

⁶See Section 4.7.1 for a discussion of the preservation of the façade of the existing Potrero Yard Car House.

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The LD shall be responsible for obtaining any permits and/or easements necessary to perform work outside of the property line, should this be required to complete the reinforcement and/or reconstruction of perimeter retaining walls.

For the Reference Design Concept, a post-tensioned, cast-in-place concrete beam and slab system with concrete shear walls for resisting lateral loads was considered an appropriate design solution; however, this does not preclude alternative solutions such as structural steel framing. In areas that may be accessible to buses, all columns shall be painted yellow and protected by bollards or other means to minimize the risk of damage from vehicle collisions.

3.8.2 Seismic Resilience

The desired resilience performance criteria for the Facility in the event of a major earthquake is required for the design of its structural system and other building systems. Details of the resilience performance criteria are presented in a supplemental document in Division 4 (*Supplementary Design Criteria*) of the Technical Requirements.

3.8.3 General Structural Approach

The structural design shall be closely coordinated with all other disciplines to ensure that structures perform to their intended purpose over 99 years. The structural design shall incorporate the following principles, in addition to meeting all applicable code requirements:

- **Strength:** Structures will have adequate strength to support their own weight and the weight of all equipment and vehicles and resist all anticipated gravity and lateral forces.

- **Serviceability:** Structures will be designed to meet day-to-day user needs and be highly functional over their intended service life. Serviceability considerations include:
 - ✓ Floor stiffness to minimize adverse vibration effects to equipment and floors
 - ✓ Durability of structures to resist effects of temperature variation, weather exposure, shrinkage, in-service use, chemical exposure, and corrosion
 - ✓ Resistance to groundwater infiltration and structure buoyancy in high groundwater conditions
- **Load Path:** A clear and identifiable load path will be provided for all gravity and lateral forces to be resolved into the foundations.
- **Constructability:** Structures shall also be designed with consideration given to current construction practices, including items such as:
 - ✓ Placement of formwork
 - ✓ Placement of reinforcing and concrete
 - ✓ Placement of deep foundations, such as driven piles, drilled concrete piers, etc.
 - ✓ Construction joints
 - ✓ Efficient use of materials
 - ✓ Limiting use of field fabrication & welding
 - ✓ Site constraints and existing building structures
 - ✓ Cold and hot weather construction
- **Code Compliance:** Structures will comply with all applicable codes, as described further into this document.

3.8.4 Foundations

Shallow foundations bearing on the weathered rock in Zone 1⁷ may be possible; however, shallow foundations bearing on the near surface Clayey Sand unit in Zones 2, 3, and 4 are ruled out to avoid excessive differential settlement. Deep foundation solutions are therefore required to transfer building loads to the dense sand layer and the underlying weathered rock in these zones. Deep foundation options identified as suitable for this site include:

- Driven steel H-piles
- Continuous flight auger (CFA) piles (also referred to as auger-cast-in-place or auger-pressure grouted piles)
- Concrete-filled steel pipe (CFSP) piles installed with proprietary tips

The length of the deep foundations/piles/piers will vary with the depth rock profile. Additional information about foundation can be found in the ARUP/RYCG draft report.

⁷Please see the geotechnical report in Appendix A for a full explanation of the composition and location of Zones 1-4.

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3.8.5 Structural Design Loads

Loads used in the structural design are noted in Table 4.D, except as further defined in the following sub-sections.

3.8.5.1 Load Criteria for Suspended Structure Supporting Buses

To allow for future programming flexibility, the criteria specified in this section shall apply to all suspended floor structures accessible to and having sufficient ceiling heights for buses.

This loading shall apply as a minimum. During the PDA phase, the Development Team shall work with SFMTA to confirm the live load criteria that may be specific to the types of buses envisaged in the future for this Facility.

Floor Live Loads for the Bus Yard Component:

- For strength considerations, the vehicle live load cases given in AASHTO shall be used. These load cases shall be applied utilizing ASCE7 load combinations and without AASHTO dynamic impact factors. The live load cases shall include concentrated loads considering the AASHTO design truck. Partition loading need not be combined with these loads.

Deflection shall also be checked under live loading. These checks shall utilize the AASHTO live load configurations for deflections, and shall meet deflection criteria as set out by the California Building Code.

These loads shall not be reduced based on supported tributary area. This applies to floor structure and columns supporting a single floor as well as multiple floors containing buses. Live load reductions may be taken as permitted by the code for other types of live load where a structural component supports those types of load in addition to bus loading.

Seismic Mass:

- Seismic mass for floors supporting buses shall be derived from the weights of structure and permanent non-structural components in addition to a uniform load associated with the weight of empty parked buses. That load shall be taken as 100 psf. Accidental eccentricity of the mass as required by ASCE7 shall also apply to this load.

3.8.5.2 Structural Design Criteria for Podium Lid

The structure supporting the Housing and Commercial Component over the top of the Bus Yard Component is subject to considerations which are unique to this Project. These considerations are described in this section. In this section the structure of the Bus Yard Component is termed the “podium,” and the horizontal structure supporting the Housing and Commercial Component over the Bus Yard Component is termed the “podium lid.” The podium lid is considered to be part of the Common Infrastructure.

Transfer Structures:

- It is likely that the column grids for the Housing and Commercial Component and Bus Yard Component will not fully align, and that transfer structures will be required at the podium lid. The following criteria shall be met for such structures.

Vertical seismic accelerations shall be included in all load combinations involving seismic loading for transfer structures. Vertical seismic accelerations shall be derived from a site-specific vertical response spectrum or from ASCE 7 Section 11.9. The transfer structure shall remain elastic under this loading. Reinforcing steel in concrete transfer structures shall also remain below the yield stress.

Transfer structures that support columns which are part of the lateral force resisting system for the structure above the podium are discouraged. If such transfers are unavoidable, they shall be designed to resist overturning forces based on the capacity of the supported seismic system using expected material properties as defined by ASCE 41, in addition to gravity loading and vertical seismic accelerations. In addition, the flexibility of transfer structures shall be considered in evaluating the seismic behavior of the structure above.

Live load deflection in the residential structure shall include the cumulative deflection due to all live loads supported by the transfer structure, including permitted live load reductions. This deflection shall not exceed $\frac{3}{4}$ ” for the building interior and $\frac{1}{2}$ ” at the building perimeter. Levelness and flatness requirements for floors supported by transfer structures shall consider deflections locked into the structure due to the construction sequence.

Transfer structures shall not support areas which are accessible to buses.

Water-Tightness Considerations:

- For portions of the podium lid that are subject to exterior exposure, special consideration shall be given to water-tightness in order to protect the operations of the Bus Yard Component and the Common Infrastructure. Three levels of protection shall be incorporated: (1) a watertight barrier shall be provided on top of the structure, (2) the structural concrete mix shall be specified for low permeability, and (3) the structural design shall minimize cracking. The latter two requirements are described below in more detail.

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The concrete mix design shall incorporate the following requirements:

- ✓ The mix shall be proportioned to meet or exceed requirements for exposure category "W1" as defined by ACI 318.
- ✓ The mix shall have a shrinkage limit of 0.045%. Shrinkage testing shall be conducted on the trial mix and also on field cured specimens extracted from each truck at the point of delivery.

The podium lid structural design shall additionally include the following:

- ✓ Minimum temperature reinforcement area shall be 0.60% of the slab cross section.
- ✓ Spacing of control joints shall not exceed 20 feet. The maximum dimension of a concrete pour shall not exceed 120 feet.
- ✓ Waterstops shall be provided at contraction joints.
- ✓ Crack widths under service loading shall be calculated for the top surface of the slab and shall not exceed 0.012 inches.

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3.8.6 Applicable Code & Referenced Standards

The design of structural engineering systems for the Project shall be in accordance with the laws and regulations of the State of California, City and County of San Francisco ordinances, and industry standards, except where more stringent standards are given in this document. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

TABLE 3.E - STRUCTURAL APPLICABLE CODES

Governing Agency	City and County of San Francisco, CA
Agency Contact	https://sfdbi.org/
Adopted Building Code	International Building Code 2015 (IBC 2015)
Loads	ASCE 7-16
Concrete and other structures	ACI 318-14
Specifications for Structural Concrete for Buildings	ACI 301-99
Structural Steel	AISC Manual of Steel Construction, 14th Edition
Specification for Structural Joints Using	ASTM A325 or A490 Bolts
Masonry	ACI 530-08/ ACI 530.1-08
Aluminum	Aluminum Design Manual ADM 1-05
Wood	ANSI/AWC NDS-2015
Light Gauge Steel Framing	AISI D100-08, AISI S1000-07
California Building Standards Commission	California Building Code (CBC), Latest Edition
Code of Standard Practice for Steel Buildings and Bridges Design, Manufacture, and Installation of Concrete Piles	ACI 543R-00

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3.9 Mechanical Narrative

General HVAC:

All HVAC design shall be in compliance with applicable codes and standards (including but not limited to): California Building, Mechanical and Fire Codes, with local amendments; NFPA 30A, 75, 88A, 90A, 90B and 91; ASHRAE 1, 21, 52.2, 55, 62.1, 90.1, 111, 135 and 189.1.

The use of combustion-fired equipment (including natural gas, liquid propane gas and fuel oil) is strictly prohibited.

Supply, exhaust, and return ducts shall be designed with a maximum of 0.08-inch water gauge static pressure drop per 100 feet of duct. Supply ductwork serving mechanical air conditioning shall be insulated. Exposed ductwork shall be round or oval, uninsulated and suitable for painting.

Transmission mechanisms of SARS-CoV-2 (COVID-19) are not fully understood and there is evidence for an airborne route to be considered, as the virus remains viable in aerosols for at least 3 hours and that mask usage was the best intervention to prevent infection. Heating, Ventilation and Air Conditioning Systems (HVAC) are used as a primary infection disease control measure. However, if not correctly used, they may contribute to the transmission/spreading of airborne diseases as proposed in the past for SARS. Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of COVID-19 and thus the risk of transmission through the air. All ducted supply air systems shall be equipped with MERV-8 pre-filter and 4-inch MERV-13 final filter.

Seismic-restraint systems shall comply with CBC requirements. See Section 4.8.1 for seismic resilience requirements.

3.9.1 Mechanical Sustainable Design Systems

Sustainable design requirements and best practices shall be complied with, adopted, and implemented where such requirements are promoted by the United States Green Building Council (USGBC), as defined under the published LEED Standards. The Project must conform to LEED Gold Standards. Code required restrictions placed on the use and quantities of toxic and/or environmentally deleterious substances such as Volatile Organic Compounds, (VOCs), that are components in certain sealants and construction materials, and on the use of HCFC refrigerants in HVAC systems, are specific examples of applicability of such sustainable-based Code design requirements. An energy model will be required based on performance approach to confirm compliance with CALGreen/Title 24 and LEED requirements.

Heating and cooling load calculations for the industrial areas shall be performed in accordance with LEED, CALGreen, and Climate Zone 3. The design of the mechanical ventilation systems, heating systems and cooling systems must comply with the respective requirements of the California Mechanical Code (CMC), ASHRAE Standards of Indoor Air Quality and Thermal Comfort, and CALGreen/Title 24 where applicable.

3.9.2 Operations Areas

The operations portion, as described in the Space Needs Program, any space needed for operators of the Facility shall be climate controlled by heating and air conditioning capabilities. No more than three offices per

thermostat. Ventilation shall be in accordance with ASHRAE 62.1. Exhaust fans must be provided for locker rooms, restrooms, kitchen/break rooms and janitorial areas. A minimum of 1/2 to 1.0 CFM per sf exhaust is recommended for these types of spaces.

3.9.3 Maintenance Parking Areas

Filtered and heated ventilation supply air distribution system, plus exhaust, is required to serve the maintenance and vehicle parking areas. Vehicle maintenance and enclosed parking areas must comply with California Fire Code (CFC), California Mechanical Code (CMC) Table 403.7 and NFPA.

3.9.4 Building Temperature Controls

Direct digital controls (DDC) and Energy Management Control System (EMCS) are required to comply with CalGreen/Title 24, §102.2, Article 4.5.1. All new DDC/EMCS systems must be able to interface with existing Trane BACNet system or Daikin's VRV/VRS controls.

EMCS shall incorporate integrated hardware and software designed to: perform data acquisition, monitor alarms, provide exception reporting, automate controls, and produce historical records of the buildings or the site.

EMCS shall maintain zone comfort, access the system locally (for each building) and centrally (for the entire site, campus, or portfolio) at the same time, to monitor local and remote alarm systems, and provide graphical system displays, graphical analyses, and energy-use summary reports customized to the facility's operations. In addition, the EMCS shall ensure the operation of each buildings' HVAC, domestic hot water, fire alarm, security and lighting systems. The EMCS shall evaluate the

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energy characteristics of the HVAC, domestic hot water and lighting system and validate that cost reductions are, in fact, being achieved.

3.10 Plumbing Systems

Domestic and fire protection water shall be provided to the building from a water line extended from the site service connection. A strainer, lead-free reduced pressure backflow and utility grade remote reading water meter must be provided on domestic water lines serving the building. The backflow relief shall discharge outside of the building. Pipe sizing inside of the Facility shall comply with the requirements in the California Plumbing Code (CPC) and a maximum system piping loss to provide a 10 percent pressure safety factor at full system flow. Velocities within any main or branch of the piping shall not exceed 7-feet per second (FPS). Interior domestic water piping above grade will be Type L copper with copper solder- or pressure-sealed joints. All buried domestic water pipe below slab shall be protected with 20 mil polyethylene tape and pipe sleeve at slab penetration.

The supply line to each item of equipment or fixture must be able to be isolated for repair and maintenance without interfering with the operations of other equipment or fixtures. Water hammer arrestors will be in an accessible location on the domestic water piping system where shock pressures could occur. Water hammer arrestors will be PDI-WH 201 certified.

A high efficiency domestic water heating system will be provided with hot water recirculation. Per CALGreen/Title 24 standards, a recirculation pump with timer are required to provide sufficient hot water throughout the facility. A thermostatic mixing valve will be installed on hot water systems. Domestic hot water system to be provided with thermal

expansion tank, and re-circulating pump, for hot water return system. All hot water piping shall be insulated. The use of combustion-fired equipment is prohibited. High-efficiency, low-flow plumbing fixtures will be employed throughout the building to meet current CALGreen/Title 24 standards. ADA-compliant electric water coolers and toilet room fixtures will be incorporated.

Water closets will be low flow, vitreous china, siphon jet, 1.28 gallon per flush (GPF) maximum; commercial seat with self-sustaining check hinge. Utilize ultra-low flow vitreous urinals (0.125 GPF).

Lavatories will be under-counter or wall-hung mounting, with deck mounted, hydraulic powered, 0.35 GPM infrared faucets, with sensor under spout.

The floor mounted mop basin will be molded stone with wall-mounted chrome-plated service sink faucet with vacuum breaker; ADA compliant handles with maximum flow rate of 2.0 GPM. Break (coffee) and kitchen area sinks will be stainless steel.

A gravity sanitary lateral will handle all levels, except the basement. The basement will have a sewage ejection system consisting of a sump tank, duplex ejector pumps and pits sized to unit pump to a maximum of six starts per hour. Ejector pumps will be connected to standby power. Sanitary waste will discharge to the street main.

All industrial waste, covered parking, deck drains, and site runoff will drain to an appropriately sized oil/water interceptor prior to connecting to the municipal sanitary system. The storm water system will consist of area drains, roof drains and over-flow drains. Reclaimed water will be used for landscaping

at new City facilities, as required per the San Francisco Green Building Code Amendments and GS6 Form for municipal projects.

3.11 Fire Protection Systems

The LD shall comply with all requirements and criteria (for safety, security, and reliability) to design, furnish, and install a complete and integrated fire protection system. The hazard and coverage requirements for fire protection systems shall be established in conjunction with the City and Authority Having Jurisdiction (AHJ). Provide fire suppression systems in compliance with San Francisco Building Code, San Francisco Fire Code, NFPA 13, 14, 30A, and 88A. Emergency Responder radio signal shall cover the entire Facility, in compliance with the San Francisco fire code. The need for a fire pump will be determined by the fire suppression designed and available fire water pressure in the existing system.

Electric bus technology is rapidly evolving. The battery chemistries that will be deployed in a future battery electric fleet are unknown. The fire risk and corresponding fire suppression strategies for various lithium ion battery chemistries vary greatly. To ensure that robust fire suppression strategies are in place, the design team responsible for the detailed design of the Facility must include a fire protection engineer, licensed in the state of California, with applicable experience. Furthermore, the design team must coordinate with the SFMTA's fleet engineering division to determine the likely composition of the future battery electric fleet, including battery chemistry, capacity, suppliers, size, and charging stations.

For the Bus Yard Component and the Common Infrastructure, a risk analysis shall be conducted to demonstrate to the satisfaction

SECTION 3 - DESIGN CRITERIA NARRATIVE

of the City that the required active and passive fire protection systems can be expected to provide a level of performance equivalent to that envisioned by regulatory requirements. For areas where buses are garaged, the number of buses assumed to be involved in a fire scenario shall be rationally justified. The risk analysis shall include the basis for assumptions about fire growth, fire spread amongst buses, and fire department response time. It shall also consider performance of active and passive fire protection systems with respect to a fire scenario which may exceed traditional material performance testing criteria.

The fire protection experts on the detailed design team will be responsible for devising a robust fire protection system for the Facility that minimizes risk to the Housing and Commercial Component. Their review and recommendations will include, but not be limited to, the location, ventilation, and fire suppression systems for the Bus Yard Component and the Common Infrastructure, as well as for the Housing and Commercial Component. Consistent with California Fire Code, Section 1206.2.11.3, minimum continuous ventilation in battery storage rooms shall be the greater of 1 CFM/SF or 150 CFM, and shall follow any additional guidelines within the California Building Code and California Mechanical Code. Current and potential future EV Charging Areas shall include provision for ventilation compliant with California Building Code Section 1202.2 and California Electrical Code Section 625.29. This requires ventilation by parking space based on the type of charger serving the location. Ventilation requires proper supply and exhaust, which can be achieved through active supply ventilation or direct outdoor exhaust with passive intake.

The final design of the fire protection system shall be completed by a C-16 licensed fire protection contractor based on design criteria developed by the Development Team's Fire Protection Engineer. The design criteria shall be informed by the risk analysis referred to above and by regulatory requirements. The system shall be hydraulically calculated. Sprinkler system occupancy hazard classification, minimum density and maximum sprinkler spacing and standpipe requirements shall be determined in concert with the AHJ. Street hydrant flow test data will need to be determined during the PDA phase.

3.12 Electrical

3.12.1 Systems Overview

Basic electrical systems requirements for the Project include powering the mechanical systems, maintenance equipment, convenience receptacle power, interior and exterior lighting systems with controls, an addressable fire alarm system and to provide power to other utilization pieces of equipment through the Facility.

The electrical distribution system shall be set up to allow for charging of the future electric bus fleet and electric non-revenue vehicles.

3.12.2 General Facility Requirements

As a municipal City department, the SFMTA partners with the San Francisco Public Utilities Commission (SFPUC) as electrical provider. The SFPUC operates Hetch Hetchy Power, a Publicly Owned Utility. The SFPUC relies upon PG&E's transmission and distribution grid to serve its customers, for which PG&E receives a fee. This situation, with the lack of designated service territory boundaries between the two utilities, is unlike any other in the country, and greatly limits the SFPUC's visibility into PG&E's

grid infrastructure and capacities. PG&E does not provide feeder capacities unless the SFPUC applies for service through the Wholesale Distribution Tariff (WDT), a costly process that requires up to three years for PG&E to perform a System Impact Study to determine the available new load capacity.

Under the WDT, each SFPUC customer intertie point is viewed by PG&E as a utility-to-utility connection. As such, PG&E applies the rules of the WDT to each SFPUC customer connection. Upon completion of the review, any grid or infrastructure upgrades required by PG&E are borne solely by the SFPUC customer.

To limit the Project's schedule risk to PG&E's extended timelines for the System Impact Study and ultimate service connection, the SFMTA has submitted two online Applications for Electrical Service to the SFPUC in March 2021, so that the SFPUC could initiate a WDT service application to PG&E. The form and content of these online applications was a collaboration between the SFMTA and SFPUC and relies on a series of project assumptions garnered from the RDC and other studies. Additional information regarding the Project electrical requirements, including draft data to be submitted to the SCPUC, is attached to this DCD as Appendix C.

Power for the Facility will be 480V/277V, 3 phase, 4 wire, with solid neutral. All equipment with a large electrical load will be served at the highest voltage possible, 480V, 3 phase⁸. A transformer will step down the voltage to 480V.

Power requirements for battery-electric bus charging infrastructure are included in

⁸ See Appendix C and Division 5 Battery-Electric Bus Supplemental Criteria for power needs for BEB fleet infrastructure.

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Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements. The main electrical room shall be designed to accommodate switchgear and associated electrical equipment to handle the future BEB fleet charging.

The electrical distribution system will be segregated by the type of load; life safety, critical emergency, and optional emergency power loads. Loads shall also be separated by lighting, industrial, receptacle, and mechanical equipment. Provisions to monitor these load through meters shall not be initially installed; however, the design shall allow their installation in the future. An ATS shall be provided for each of the emergency systems provided for the facility. ATS's shall be provided with programmable testing, generator start-up, and connected to a building information system to monitor the status of the emergency system.

CALGreen receptacle control will be achieved by tying receptacle control devices into the lighting system control panel. The Lighting System occupancy sensors will be utilized to turn off 50 percent of the receptacles within a room when the room is not occupied.

Electrical charging for non-revenue vehicles shall be installed in compliance with Department of Building Inspection Form GS6: San Francisco Green Building Submittal Form for Municipal Projects. Initial panel boards in the vicinity of non-revenue vehicle parking, shall be provided with 20 % 40 Amp, 208V single phase spaces for future EV charging stations. Panelboard serving EV charging shall be a minimum 225 amp bussed with a calculated demand load that will allow the future EV loading to be added to the panelboard. EV charging stations shall be installed per SF Environment Code requirements.

3.12.3 SFMTA Traction Power Network

The SFMTA's traction power network is comprised of 26 substations and 41 independent feeds, which together deliver Direct Current (DC) traction power to about 500 route miles of overhead catenary system and serve 3 different modes (trolley buses, historic streetcars, and light rail trains). The network delivers DC traction power at 650 V (4000 Amps), and the SFMTA trolley bus vehicles are suited to run on that system. The total capacity of the traction power network is approximately 180 MW. The SFMTA's utility provider to this network is PG&E.

When power leaves an SFMTA substation, it travels underground through a duct bank (concrete channel with conduit running through it), which are accessible by a series of manholes in the public right-of-way. Approximately every 400' at the site or route served by the system, there is a riser cable bringing power from the below grade duct bank and traveling up a pole. There is support infrastructure (poles and guy wires) in the ROW, and the feed is continuous.

3.12.4 Potrero Yard Traction Power System

The electric trolley buses at Potrero Yard is fed from the Bryant substation. One feeder circuit (Feeder B-3) is reserved specifically for electric trolley buses in the yard, and another feeder circuit (Feeder B-7) powers the OCS ROW around the yard for service adjustments and transitions. The overall power system feeder diagram and individual diagrams for the on-site feeder and the feeder that circles the right-of-way of the yard are attached.

The SFMTA requires that the traction power system be safely disconnected when the yard is demolished and that the new facility be reconnected to the traction power system to

serve the overhead catenary powering and charging the vehicles in the yard and supporting the transition to revenue service in the right-of-way. This section provides relevant information to support that process.

3.12.5 Isolating and Disconnecting the Traction Power System for Demolition

Within the yard boundary, specifically for the feed serving the yard, the process for disconnecting the traction power feed is straightforward because the feeder circuit is dedicated to the yard. Standard process to rack out and lock the feeder, verify de-energization, and place protective ground is required. The LD shall coordinate closely with the SFMTA on this process.

For work in the right-of-way around the yard, the circuit is a lot more widespread and will require a local isolation. Right-of-way work requires close coordination with the SFMTA. LD shall submit each phase of design drawings specifically for SFMTA review so limits of work can be understood and levels of isolation determined for the project.

LD is responsible for designing and performing all traction power disconnection and reconnection, in close coordination with the SFMTA.

3.12.6 Reconnecting the Traction Power System to Serve the Trolley Bus Fleet

Upon completion of the facility, the trolley bus charging function and all transitions to revenue service (navigating from Mariposa Street into the Project Site) must return to the SFMTA traction power system. This will require close coordination with the SFMTA to ensure a seamless reconnection. The electrical design and built connection must be accepted by the SFMTA to indicate it meets specifications before plugging into new system. To design the

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reconnection, the LD shall use the enclosed feeder map to understand how electricity is currently distributed through the yard. LD shall follow all California General Orders pertaining to electrical utilities, including but not limited to the list contained on page 1 of Appendix B: SFMTA OCS Design Criteria.

3.12.7 Existing Traction Power Circuit Condition

The existing circuit service Potrero Yard from the Bryant Substation is approximately 40 years old. A condition assessment for this traction power circuit is being completed by the SFMTA. If the condition is determined to be poor, the LD shall plan to upgrade the feeder as determined by the SFMTA.

3.12.8 Battery Electric Fleet Requirements

The California Air Resources Board Innovative Clean Transit legislation requires all bus public transit fleets in California to convert to clean energy propulsion by 2040. The SFMTA has made an organizational decision to replace our Hybrid Electric and Trolley Electric Buses with BEBs. BEB charging infrastructure is required at Potrero Yard. BEB design requirements and standards are described in Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements.

Charging infrastructure for the battery-electric buses at the Potrero Facility will be required once the SFMTA transitions from trolley buses. The Potrero Facility shall be designed to enable a fluid, efficient transition. Trolley buses require an overhead line affixed in some way above the parking lanes. The SFMTA will leave the design solution to the Development Team, and requires that the overhead infrastructure for the trolley bus parking spaces shall be designed to ensure seamless transition from the trolley buses to battery electric buses.

Performance standards and acceptance criteria for charging modules/equipment are described in the E-Bus Performance Requirements Documents. The bus charging solution shall be fed at 480V, 3-phase. The intent is to power multiple units using a single charging cabinet. To facilitate the transition to a battery electric fleet, all bus charging feeders will be run above grade in the ceiling structure or overhead/mezzanine space. Bollards and other physical barriers shall be placed to protect any ground-mounted charging infrastructure.

The facility's overall power requirement shall accommodate a full yard of Battery Electric Buses (213 bus capacity). The final orientation and fleet organization shall be confirmed with the SFMTA at the PDA phase. All battery-electric bus switchgear/equipment shall be provided within the main electrical room. Any power or equipment that cannot be provided due to utility provider requirements must be accounted for in transition planning documents and have adequate space reserved and identified in the main electrical room.

3.12.9 Battery Electric Bus Transition

When Potrero Yard fully transitions to battery-electric bus, the battery-electric bus parking lanes and associated infrastructure shall be designed to transition to the new electrical service connection for the building. When this occurs, the traction power feeder to the yard shall again be deenergized. The LD or Principal Project Company (PPC) may consider reuse of the traction power feeder to provide enhanced emergency backup power, or another building purpose following replacement of the trolley bus fleet with battery-electric buses. The SFMTA will also begin a process in earnest in the coming years to consider the full decommissioning of the trolley bus OCS system, including how

the traction power system could be safely repurposed.

3.12.10 Fire Alarm System

A fully addressable fire alarm system shall be provided for the Facility. The fire alarm system shall contain sufficient activation devices (i.e., pull stations, smoke detectors, heat detectors, UV/IR detectors, etc.) as required by Code and additional detection necessary to achieve the overall fire safety goals. It shall monitor the building's sprinkler system and provide occupant notification in the case of a fire event. Premise monitoring shall be provided by an off-site entity in accordance with NFPA 72.

3.12.11 Lighting**Interior Lighting:**

Lighting systems for the Facility shall utilize LED light sources with dimmable drivers. Daylight harvesting shall be utilized wherever practical. Daylight sensors shall be installed to allow the dimming of the LED lights when there is enough natural daylight within the space. Occupancy and vacancy sensors will be incorporated into a low voltage lighting control system for all interior and exterior lighting systems. All offices and small rooms shall be provided with occupancy sensor(s) as required for full room coverage. The Facility's lighting control shall operate on the following properties:

- An addressable lighting control system shall be provided. The system shall be programmed with normal building operational hours and shall turn the lights on and off in compliance with the hours of operation.
- All regularly occupied spaces such as offices shall be provided with vacancy sensors. All other spaces such as bathrooms, janitor closets, back of house shall be provided with

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occupancy sensors. All sensors shall turn off the lights after 5 minutes of no occupancy.

- All areas with natural daylight shall be provided with daylight harvesting. Once the sensor picks up enough daylight within a space the lighting control system shall dim the LED luminaries. The luminaries shall be dimmed to a minimum level of 10 percent while maintaining design fc levels.

Exterior Lighting:

Site lighting fixtures will be an LED light source with a dimmable driver. The fixtures will be controlled by a programmable low voltage lighting control panel. Luminaries shall be provided with occupancy sensors. The required control of the exterior lighting shall be:

- An addressable lighting control system shall be provided. The lighting control system shall contain an astronomical time clock and input from a photo sensor. The lighting control system will turn on the lights at dusk so that the lights are on at the start of the normal parking lot hours. The lighting control system shall turn the lights off at either the scheduled time, or dawn (whichever is first).
- After 11:00 PM the luminaries shall reduce to 25 percent light output. If a luminaire senses motion, that luminaries shall increase brightness to full bright. After 10 minutes of no motion the luminaries shall drop back down to 25 percent.
- All staff entrances and exits should have pedestrian level lighting for staff circulation safety.

3.12.12 Emergency Power

The Bus Yard Component and the Common Infrastructure shall be provided with an emergency generator which will allow the

Facility to operate for 24 hours, at limited capacity in the event of a power outage or emergency. The emergency generator must be designed to provide power to Life Safety Loads, Critical Electrical Loads, and Additional Emergency Loads. In addition to this Section, refer to Section 3.8.1 for the resilience and recovery requirements for the Facility, and to Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements for emergency power requirements related to BEB fleet resiliency.

Generators shall be designed and installed to meet all applicable codes.

The following list of items must be on emergency power (NFPA 110 requirement included):

Life Safety Loads:

- Pathway egress lighting
- Exit lighting
- Fire alarm systems
- Other loads to ensure human life safety

Critical Electrical Loads:

- Telecommunication rooms and systems
- Security systems
- Communications systems
- HVAC equipment serving
- HVAC control system
- Elevator(s)
- Fume ventilation systems
- Battery electric charging equipment – Reference Division 5: Battery-Electric Bus Supplemental Criteria of the Technical Requirements for BEB emergency backup power requirements.

Additional Emergency Loads:

- Compressor(s) and dryer(s).

- Lube pumps - SFMTA with the assistance of the Development Team's design team to specify during the PDA phase.
- Automatic garage door openers at entrance and exits of the facility.
- Four maintenance bays- SFMTA with the assistance of the Development Team to specify which during the PDA phase.

Diesel generators are assumed to be the base case for design and pricing purposes and are a reliable mode of backup power generation but are inconsistent with long-term decarbonization goals for the City of San Francisco and State of California, and create space, maintenance, and hazard impacts for the site. During the PDA phase the Development Team shall evaluate potential alternatives to diesel generators for emergency power supply and their feasibility for the Project. These may include:

- A second, independent utility service with independent routing into the Facility's main electrical gear.
- Solar panels and batteries for on-site backup power. This shall provide resilience through a system-wide outage, provided that batteries were operated such that a minimum state of charge were maintained. Additionally, a combination of solar panels and batteries can provide a source of revenue via peak demand management and time of use energy cost avoidance during non-emergency periods. If solar and storage are pursued, appropriate allowance must be provided for shared benefit between the Bus Yard Component and the Housing and Commercial Component (e.g., district electrical system, community solar

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arrangement, roof lease agreement).

A final decision for emergency backup power source shall be made during the PDA phase on an appropriate evaluation of life-cycle cost, likelihood of the required approach meeting the backup requirements, resilience goals of the Bus Yard, and impact on the Project's sustainability goals.

There are lift safety loads on the generator; the Life Safety Code and NEC requires an uninterruptible fuel source for the generator. Permission is required by local AHJ to verify the generator is uninterruptible.

3.12.13 Electrical Communications

Electronic Communications System Overview:

Communications systems shall include a Structured Cable System, Public Address (PA) System, and a Telecommunications Grounding Connection. The general systems and basic operations of the communications system are covered in this section.

Governing Codes:

California Electrical Code (CEC) provides minimum safety requirements for these systems. Design and installation shall be based on the CEC, BICSI, and IT best practice and manufacturer's recommendations. Structured Cable System pathways shall be based on current telecommunications performance standards.

Public Address (PA) System:

Amplifiers and speakers shall be provided throughout the Facility and will be accessed through the telephone system or dedicated

microphone. PA speakers must be strategically placed within the Facility allowing the PA system to provide uniform sound coverage for all PA announcements.

Structured Cable System:

Structured Cable System pathways will be provided for City-provided equipment including, but not limited to: wireless access points (full building coverage), administrative workstations, shop workstations, and fuel stations.

IT space requirements depend on total number and sizes of the workspaces. See Table 3.G for workspace details.

General industry standards shall be followed for wiring and wiring runs. Category 6 cables generally cannot be longer than 100 meters.

NETWORK CABLE (QTY.)	19" RACKS	SPACE NEEDED
0 - 100	Half rack	3' x 3'
0 - 300	1	10' x 6'
301 - 600	2	10' x 8'
601 - 900	3	10' x 10'
901 - 1200	4	10' x 12'
1200 - 1500	5	10' x 15'

Telecommunications Rooms:

The Bus Yard Component and the Common Infrastructure shall have a Main Telecommunications Room (MTC) for the Main Distribution Frame (MDF), security equipment, routers, core switches, and servers. Provide two four inch conduits to the MTC from the Main Point of Entry (MPOE) to facilitate current program and future growth. The MTC shall include two to four empty network racks for potential equipment. Telecommunications

Rooms shall be provided as required to provide connectivity and house the Intermediate Distribution Frame (IDF) for all work stations. TC rooms shall have two-inch conduit paths back to the MTC. All rooms shall be designed for future expansion and be equipped with equipment racks and cable management systems for organized and efficient cable routing. A 48-strand fiber optic cable (single mode) running from MTC to TCs is required.

Grounding System:

A telecommunications grounding will be implemented to protect telecommunications equipment. The telecommunications grounding system shall be connected to the Electrical Safety Grounding System.

3.12.14 Electrical - Security

Electronic Security Systems Overview:

Security Systems include a Video Surveillance System (VSS), and an Access Control System. Security system devices shall be strategically placed throughout the Facility based on the SFMTA input during the PDA phase, best practice, and industry standards.

Governing Codes:

The CEC provides minimum safety rules for these systems. Design and installation shall be based on the minimum CEC requirements, best practices, and manufacturer's recommendations. Physical separation between the Bus Yard Component and the Housing and Commercial Component shall be provided to limit access and decrease the security threat to either.

Systems Monitoring:

Security Systems will be monitored from the operations or general manager office with exact locations to be determined during the

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PDA phase. Bus Yard Component will provide cameras and monitoring for the bus yard major entrance and exits. The Housing Components will provide cameras and monitoring for the housing major entrance and exits. Off-site monitoring is a minimum requirement.

Video Surveillance System (VSS):

The LD shall use a SFMTA approved VSS system that interface with our network software, etc. and to provide real time recording of critical areas and the parking areas. Strategically located cameras will be required in designated areas for video monitoring and recording for forensic use. At a minimum, all entrances and exits shall be covered. The cameras shall be IP based (minimum 1080P) and compatible with the SFMTA standards. Camera selection and placement will be determined during the PDA phase in consultation with the SFMTA. Required camera placement and field of view shall be shown on the floorplans. The SFMTA expects that available camera models may improve by the time construction is completed and therefore will do a final review of the camera selection and supporting infrastructure prior to their ordering and installation. The SFMTA maintains a list of approved camera models that have been tested and are approved. The SFMTA will review the VSS halfway through the design.

Access Control System:

A card access system shall be provided that is compatible with the existing SFMTA system to allow access to the site gates, building staff entry, and critical areas.

The existing SFMTA access control system works as follows. Each SFMTA employee has an access card that is encrypted with a facility code and card number. This information is

programmed into a Honeywell ProWatch Data Base by an SFMTA Administrator. The card is then waived in front of a card reader at a door, elevator, or any other location that requires a card reader for access. The card reader reads the information from the access card, and if the employee has access, the door or elevator will open or operate as normal. The door and card reader have wires running to it from the Access Panel usually installed in the IDF closet. The Panel then is tied into the SFMTA network. The power supply is tied into the access panel, and the panel has a relay that pulses the power supply when it receives a positive card read.

Building Access Doors:

Entrance into the Bus Yard Component through building doors and at all emergency egress routes that may be shared with the Housing and Commercial Component shall be controlled by a card reader system. When a valid RFID card is presented to the local card reader at the door, the lock will be opened, allowing ingress. Entrance gates shall also be capable of functioning on a schedule. For example, gates for bus and delivery entry may be left open during business hours for free ingress/egress, but after-hours ingress may be controlled by the card reader system.

Intercom System:

The Facility shall be equipped with an intercom system consisting of two-way intercom stations located at locations to be determined during the PDA phase in consultation with the SFMTA. The intercom system shall be IP based and must be compatible with existing SFMTA standards. The intercom system shall be interoperable with the access control system as ingress or egress requests can be made from an intercom station.

Uninterruptible Power Supply (UPS) System:

A UPS system shall be provided for security electronics to allow security electronics, network equipment, and phone system to maintain function in the event of a power interruption. This system is on emergency generator power system and a rack mounted UPS with 15 to 30 minute battery back-up for system ride through during power outage events shall be provided. Determine during PDA phase with consultation with SFMTA. Other customized IT systems such as Radio, Computer Aided Dispatching, Fleet Watch, and others shall be addressed in detailed design in coordination with the SFMTA.

3.13 Solid Waste Disposal

A single consolidated location for the Bus Yard Component is required in the basement for recycling, composting, and landfill waste. Waste shall be delivered to receptacles through trash chutes running from the Bus Yard Component to the basement. The trash facilities shall include a 30-yard recycling compactor. The basement shall be fully accessible to garbage collection vehicles. The trash area shall be well lit and ventilated to avoid noxious smells. The drawing package shows approximate location for waste area, final sizing, design, and equipment will be determined during detail final design. The waste area must be compliant with Chapter 19 of the Environment Code and the City and County of San Francisco.

This section of the code deals with waste disposal, the three waste streams (recycling, landfill, composting), and compliance monitoring.

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3.14 Compressed Air and Lubrication Distribution Equipment

The compressed air and lubrication distribution systems are two important aspects of a facility that provide ease of use for the mechanics working in a multi-bay facility. The compressed air and lubrication piping will need to be sized properly to support the shop equipment throughout the facility. The lubrication equipment needs to support the vehicles being serviced for the facility to be most efficient. Table 3.H provides comparison details for reciprocating and rotary screw compressors.

There are several factors to be considered in the appropriate compressed air and lubrication system selection including (but not limited to):

- Number of bays
- Lubrication fluids needed at each location
- Length of longest piping run
- Monitoring technology

Rotary Screw Compressors:

These types of compressors use two rotors or helical screws to compress air to produce compressed air. Rotary screw compressors are quieter than piston units, allowing a quieter work environment while operating relatively energy-efficiently. Operating temperatures are at least 100 degrees F cooler than piston units, resulting in longer life. Rotary screw compressors are most efficient when in constant operation because they require approximately six minutes to ramp down from compression duty. During this time, the compressor is not fully loaded but still requires some amount of power input that does not produce any compressed air.

However, the amount of time required to ramp down from compression duty will be reduced to about 20 seconds when the unit is operated by a variable frequency drive (VFD).

The maintenance (long-term) cost of a rotary screw compressor is one major drawback because the more complex equipment with

electronic components requires more regular maintenance compared to piston-type compressors. However, because screw-type compressors do not operate with as much friction as piston-type compressors, the frequency of maintenance is significantly less than piston-type compressors.

Reciprocating Piston Compressors:

Piston compressors are typically used for general-purpose applications such as workshop/air, where the air is used for hand-tools, cleaning dust, small paint jobs, etc. It is one of the most commonly used compressor types. Piston compressors are available from 1 HP to about 50 HP. The motors can be duplicated (duplex) in effort to double the power output (horsepower) and can then be configured in a lead-lag operation to ensure equal wear on the motors.

Piston compressors are more economical below 30 HP and work well in maintenance shops as they are more suitable for high pressure (175 PSIG or more) applications.

Piston-type compressors have a simple design and can be more easily fixed by facility maintenance staff compared to a screw-type compressor.

There are a few drawbacks to piston compressors such as excessive noise, high outlet temperature, and high oil content in air piping. These can all be mitigated through engineering a system appropriately.

Refrigerated Air Dryers:

An air dryer is an integral piece in compressed air treatment system. Air quality can have a significant impact on compressed air tools and equipment. Properly treated compressed air, and the right air dryer, will improve productivity, system efficiency, and

TABLE 3.H - RECIPROCATING VS. ROTARY SCREW AIR COMPRESSORS	
RECIPROCATING	ROTARY SCREW
Cost advantage as single-acting, air cooled unit below 30 HP	Used more in 150 PSIG, lubricated air systems above 30 HP
Double-acting units used in 175 PSIG and in non-lubricated applications	Used for constant volume, variable pressure applications
Normally used for heavy duty, continuous service	Oil or water is used for sealing and cooling
High overall efficiency	Must vent reservoir to lower power consumption when unloaded
Operates efficiently at partial loads	Delivers high air volume in a compact space
Saves horsepower under no-load conditions	Smooth pulse-free output
High maintenance costs	Easy to install and maintain
Requires heavy (concrete) housekeeping pad	Low vibration

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product or process quality. Refrigerated air dryers are specifically designed to handle the high discharge temperatures of piston compressors. The purpose of using a refrigerated air dryer is to remove entrained moisture in the air to prevent corrosion in air tools with moving steel parts. Refrigerated dryers typically provide dew points of 40 degrees F at rated conditions.

A few filters are required to be used in compressed air systems. The particulate air filter is downstream of the compressor and upstream of the dryer. This type of filter removes any dust or particulates in the air. The second filter located downstream from the dryer is the coalescing air filter, which removes the excess oil and water left in the air by the compressor and the dryer.

Desiccant Air Dryers:

These types of air dryers do not require power to dry the air, as is the case with refrigerated air dryers. These types of dryers utilize a filter that captures the entrained moisture in the compressed air. Desiccant dryers trap so much of the moisture from the air that they typically reduce the dew point temperature to -40 degrees F.

Compressed Air Receivers/Tanks:

Air receivers are pressure vessels that store treated or untreated compressed air. The air stored in these vessels alleviates the frequency of starts required by the compressor whenever compressed air is used. Some reciprocating and rotary screw compressors can be mounted on an air receiver, but some are base/floor-mounted.

Bulk Fluid Storage Tanks:

Bulk Storage Tanks allow facilities to store large quantities of fluids while meeting required

codes with double wall containment. Tanks can be monitored to promote more efficient product inventory control and throughput data. Tanks are available in sizes from 100 gallons to 50,000 gallons based on the frequency that the facility wishes to receive fluid deliveries. These tanks can also be utilized for waste/used fluids such as used oil and used coolant. Tanks are typically stored in a central location along an exterior wall for reduced piping lengths and ease of delivery and extraction of bulk fluids.

The amount of waste from empty bottles and jugs, the amount of time it takes to handle each bottle, and the amount of spilled fluid is greatly reduced when using bulk fluid storage tanks. Bulk fluid storage tanks typically hold amounts of liquid greater than 100 gallons for the use of all mechanics within the building.

A tank level monitor is an integral component of the storage tank and will signal the low-level condition at which point the lubrication distributor would refill the storage tanks. Storage tanks are also equipped with a sensor that signals an alarm to sound in the event of a leak.

Bulk fluid storage tanks are typically double-walled to conform to the code requirement for spill containment. Another method of containing leaks is to provide a recessed concrete pit in the bulk fluid storage room directly underneath the bulk fluid tanks. Whichever method is chosen, 110 percent of the storage capacity of the tank needs to be contained in the event of a leak, as required by code.

Delivery Pumps:

Fluids need to be pumped from the bulk fluid storage tanks to the point of application in the maintenance bays area.

Piston Pumps:

Pneumatically-powered piston pumps are powerful enough to transfer the fluid from the storage tank to the point of application, hundreds of feet away. Piston pumps can be mounted directly on top of the tank to dampen vibrations. Piston pumps are loud pieces of equipment (73 - 80 dB(A)). Noise dampening is one reason to enclose the lubrication storage area with heavy walls.

Diaphragm Pumps:

Diaphragm pumps can also be used to pump fluid from the bulk fluid storage room to the maintenance bays. These pumps do not offer any mechanical advantage – the pressure of the compressed air supply is equal to the pressure of the fluid at the discharge end of the pump at a low flow condition.

Diaphragm pumps are typically used for diesel exhaust fluid and engine coolant but are also capable of transferring engine oil, hydraulic oil, automatic transmission fluid, windshield washer fluid, diesel fuel, and gasoline.

Another special case involves the pumping of engine coolant when the coolant is provided as a concentrate. A 30-gallon drum of water with a float valve is typically specified when mixing the concentrated engine coolant with the water. The diaphragm pump handles the mixing duty to supply a mixture of coolant to water at the desired ratio.

Piping:

The size of each pipe varies according to the distance that the fluid travels from the storage tank to the point of application. To determine the size of the pipe required to ensure that fluid will transfer from the lubrication storage room to the point of application, the lubrication

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system designer will need to know how many dispensers stemming from the same pipeline header are requested to be in use at any given time. Generally, the pipe size increases as the demand of fluid flow increases. Wall thicknesses also need to be considered when selecting the pipe to provide the rigidity necessary to keep the pipe from bursting. The fluid pressure within the pipe is typically 1,000 PSI and even more for chassis grease.

The cross section of a header can be designed to decrease over the length of the run from the storage tank to the maintenance bays. This will help to decrease the cost of materials and will also ensure an acceptable fluid pressure at the point of application. The lubrication system designer calculates the size of pipe based on fluid mechanics equations.

The pumps are also sized in this way to ensure that the pipe length and the pumps are paired to dispense fluid at the furthest point of application.

The type of the pipe selection varies according to the type of fluid being transferred. Bulk fluid liquids may flow through carbon steel. Compressed air will be routed through copper to prevent corrosion. Compressed air does not require pipe of a high tensile strength because it operates at a comparatively low pressure than other fluids.

Lubrication/Commodity Hose Reels and Nozzles:

Lubrication hose reels are stationary units in the bays and piped from bulk storage tanks. These reels are in areas where maintenance and re-filling of fluids occurs, typically overhead on columns or mounted to nearby walls. Technicians can quickly dispense and measure fluids being dispensed into vehicles.

Hoses comprise the final length of fluid transfer material before exiting through the point of application (the nozzle). Hose reels offer the convenience of retracting the hose with no significant effort by the user to move the hoses out of the work space. This eliminates tripping hazards and it decreases the amount of time required to move the hose from the work area.

Multiple hose reels can be grouped in parallel and mounted onto the same bracket. In this case, the reels become a reel bank. Hose reels are typically installed overhead on columns, mounted to nearby walls, or are suspended from the ceiling structure.

Fluid Management System:

The volume of several types of fluids that the mechanics dispense can be tracked by use of the fluid management system.

The amount of each type of liquid can be monitored by the Fleet Manager to determine the appropriate time to order more bulk fluid from the distributor. The fluid management system tracks the amount of each dispensed liquid by each individual nozzle.

With the fluid management system, the user can enter the amount of fluid that they would like to dispense from the nozzle. The pump air controls will allow the transmission of compressed air to the pumps by the storage tank to allow pumping to commence.

Waste Recovery System:

When mechanics drain fluids such as oil and coolant from vehicles, a mobile receptacle is utilized to collect the used fluid. When the mechanics need to empty these containers, units can be rolled to nearby diaphragm pumps located in the maintenance area and used fluid can be pumped into respective storage tanks

in the lubrication storage room. Tank level monitors are typically installed in the tanks to signal an alarm to sound when the tank gets above a certain level. When the tank is full, a used fluid evacuation company can be contacted to remove the used fluid from the storage tanks.

3.14.1 Equipment Manual

To provide further specificity and direction, HDR | MDG was asked in the Fall of 2018 to formulate specific equipment recommendations in consultation with SFMTA maintenance staff. Those recommendations are included in Appendix C and are also reflected in the equipment drawings within the Reference Design Concept document.

SECTION 4 - PERFORMANCE REQUIREMENTS

4.0 Introduction

The SFMTA envisions the rebuild Potrero Yard as an asset to the SFMTA's transit facility as well as a well-designed, contextual building that celebrates its core public transit use and sensitively designs interactions between untraditional shared uses. The architectural team designing the Potrero Yard Modernization Project shall have proven aesthetic design experience and talent to develop functionally economical as well as aesthetically attractive buildings. Design of the rebuilt Potrero Yard shall be informed by the Division 2 (*Design Guidelines*) of the Technical Requirements.

Coordinate exterior building design, locations for building functional areas and actual room dimensions by functional relationships, local zoning, codes, regulations, ADA requirements, and equipment.

4.1 Special Foundations

Special foundations to support combined building/crane columns, jib cranes, and laterally loaded piers/piles shall have appropriate geotechnical parameters based on soil testing and analysis. The effects of repetitive loads shall be taken into consideration for allowable bearing pressures, both vertically and horizontally. Rotations and deflections shall be limited to differential settlement and total settlement that meets the serviceability requirements of IBC for the given material.

4.1.1 Slab on Grade

The slabs on grade shall be placed atop engineered soils as required by the geotechnical report. Provide continuous 15 mil vapor barrier meeting ASTM E 1745 Class A with a perm rating below 0.01 perms, immediately under slab over stone capillary break, under entire slab.

Design and locate joints to control and direct shrinkage cracking of concrete elements per ACI recommendations. Submit joint plan to the SFMTA for review and approval prior to placing exposed slabs and walls.

Concrete Floor Finishing: For all exposed concrete floors provide Euclid Surfex Light-Reflective Dry Shake Hardener sealed with Euclid Euco Diamond Hard or approved equal. The manufacturer's recommendations shall be followed including the use/non-use of fly ash and various troweling methods.

If Integrally Colored Ground and Polished Concrete is selected as a floor finish, special requirements include:

- In areas where polished concrete floors are to be installed, Development Team shall fine grade the sub grade uniformly flat using a laser device as described in "CPAA Recommendations for the Design, Specification, and Placement of Concrete Floor Slabs" from the Concrete Polishing Association of America.
- A below slab vapor barrier shall be installed in accordance with CPAA recommendations and shall meet all properties described therein.
- The mix design, placing and finishing of concrete shall comply with ACI standards and CPAA recommendations.
- Curing compounds and densifiers other than those that are included in the selected manufacturer's system shall not be used in areas of polished floor.
- Provide the following: Floor Flatness – specified overall value: 50, minimum local value: 35; Floor Levelness: - specified overall value: 30, minimum local value: 20. Flatness and levelness shall be tested within

8 hours after completion of the final troweling operation according to ASTM E1155 – 96 any out of tolerance work shall be remedied.

- Saw cut contraction joints shall be laid out by the Design Team and shall comply with CPAA recommendations.

4.1.2 Service/Inspection Lower Level Work Area

Service/Inspection LLWA's shall be provided a continuous membrane waterproofing system for the pit walls and floors. Provide a gravity perimeter underdrain system.

4.1.3 Waterproofing and Damp Proofing

All site retaining walls, below grade walls, elevator and LLWA pits, and or below grade conditioned or occupied spaces, shall be provided a full waterproofing system. Provide drainage board, protection board, waterproofing and footing drains. Insulation, when required, is preferred to be exterior to the structure. Acceptable products include:

- Under slabs on grade: Heavy-duty membrane comprised of an HDPE film, pressure sensitive adhesive and weather resistant protective coating. Preprufe 300R or approved equal.
- On vertical surfaces: Self-adhesive rubber/bitumen polyethylene waterproof membrane meeting ASTM E154 and ASTM D570. Bituthane 3000 or approved equal.
- For sandwich slabs, plaza decks above enclosed spaces and green roofs: Hot-applied rubberized asphalt meeting ASTM E-96, Procedure E and ASTM D-5329. Hydrotech MM6125 EV system or approved equal.
- Water based hydrophobic admixture shall be used in the concrete for construction of the below grade walls and floors forming the elevator, service pits, TPSS basement

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- foundation. Product: Hycrete W1000 (W1002 for air entrained elements) or approved equal.
- Footing drains shall be provided at all waterproof assemblies and below grade foundations. Drains shall gravity drain to the extent feasible. Include below grade floors such as elevator and LLWAs. Rigid slotted PVC footing drains shall be set in a bed of crushed stone (minimum 12 inches of stone outboard and above pipe) wrapped with filter fabric. Drainage board material shall extend into the gravel bedding.
 - Provide physical (dumbbell) water stops cast into the work at all concrete joints in assemblies to be waterproofed. Use of expansion/bentonite strip type water stops are permissible with prior SFMTA approval.
 - Damp proofing shall be odorless and meet ASTM D-1187 Type II and ASTM D-1227 Type III. It is required at below grade concrete stem walls that do not have a face exposed to view. Karnak Corporation, Karnak 100 Non Fibrated Emulsion Coating, or approved equal.
 - Where exposed to view, provide above grade concrete and masonry with a breathable, clear-drying, water-based silicone emulsion. Weather Seal Blok- Guard and Graffiti Control II by Prosoco or approved equal.

4.2 Shell - Super Structure

The structural framing shall be designed to include wind and seismic drift.

4.2.1 Floor Construction

Floor framing shall be designed for the dead and live loads to be used in the facility. In addition to the standard live loads presented in IBC, floors shall support equipment loading.

Concrete slabs to comply with ACI composite flatness and levelness ratings. The following slabs shall have the ratings listed below:

- Shop and storage areas: Flatness 35, Levelness 25.
- Thin-set tile and resilient floor: Flatness 35, Levelness 25.
- Carpeted areas: Flatness 25, Levelness 20.
- Areas where polished concrete flooring has been selected: Flatness 50, Levelness 30.

4.2.2 Roof Construction

Roof framing shall have adequate strength and stiffness to prevent ponding. Equipment suspended from or set on the roof shall be included in the design of the roof members. Roofs shall have a minimum slope of ½-inch per linear foot or greater as required by the roofing system selected.

Roof access shall be provided for all roofs.

Provide OSHA compliant roof fall protection/restraint system for access to all roof areas. The design shall include the ability for maintenance to provide for safe and accessible cleaning of windows per ANSI/IWCA I-14 Window Cleaning Safety Standards.

4.3 Exterior Enclosure

The Potrero Yard, including the roofs, may be visible from both the street level and adjacent development around and above the site. The buildings, facades and roofs shall be visually pleasing. The SFMTA shall accept the project aesthetics prior to submittal for design review to the SF Planning Department. Exterior finishes selected must meet SF Planning requirements.

Sustainability requirements may also drive material choices. Energy Code requirements establish the minimum building envelope performance. In the event of a conflict, the most stringent code will apply. The building enclosure shall be designed to preclude birds or other wildlife from nesting or otherwise taking up residence.

4.3.1 Exterior Walls

Exterior materials shall be considered on the basis of durability and appearance with the understanding that a minimum 50 year low maintenance life expectancy and 100 year minimum building lifespan is mandated. The SFMTA prefers the use of materials that require little refinishing or maintenance such as stainless steel, aluminum, glass, materials with anodized or factory finishes, materials with integral color, brick, terracotta, architectural pre-cast, or architectural exposed concrete.

Synthetic stucco, simulated materials such as river rock or other faux cladding, architectural foam detailing and aluminum, plastic, wood or vinyl siding will not be acceptable. Compliance with the City and County of San Francisco Development Standards is mandatory.

At a minimum, the bottom four feet above grade of the building shall consist of a hard material such as masonry or concrete.

Coordinate all elements of the wall assembly, including flashing, trim and transitions between materials to provide a weatherproof installation requiring little maintenance, detailed to limit accumulation of dirt or staining.

4.3.2 Water and Air Barrier

Provide City and County of San Francisco Energy Code compliant, fluid-applied, vapor-permeable, water and air barrier membrane system.

Performance Requirements:

- Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of

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accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits. Air leakage testing of the building envelope air barrier installation, as described in the Energy Code, is required prior to covering the air barrier.

- Membrane Air Permeance: (comply with current City and County of San Francisco Energy Code) Not to exceed 0.004 CFM by sf of surface area 4 at 1.57 pounds per sf pressure difference; ASTM E2178 5.
- Membrane Vapor Permeance: Not less than 10 perms; ASTM E96/E96M; Air Barrier systems other than that listed above will be considered on a case by case basis and require the SFMTA approval.
- Acceptable Product: Air Block 17 MR by Henry Company with associated auxiliary materials to provide a complete system including but not limited to transition membranes, sheathing joint membranes, adhesives and primers, sealants and self-adhesive thru-wall flashing, or approved equal. Obtain complete air barrier system from a single source.

4.3.3 Weather Barriers

Non-occupied / non-conditioned locations only: Provide a complete weather resistive barrier for all enclosed spaces and all wall assemblies requiring weather protection.

Provide flexible flashing as required to form a weather tight envelope. All openings to be fully wrapped with waterproof flexible flashing with joints shingle lapped. Seal all penetrations through the weather resistive barrier to create one continuous weather barrier enclosure.

Provide Weather Resistive Barrier as made by Vaproshield, or approved equal.

Provide Waterproof Flexible Flashing Blueskin by Henry, Vycor by Grace or approved equal.

4.3.4 Exterior Masonry

The following technical requirements shall be met by the Design Team if masonry is selected as a part of the building enclosure:

Unit Masonry, General:

- Unit masonry shall be utilized in a cavity wall that functions as a rain screen. Painted masonry will not be allowed.
- CMU is not permitted for the exterior.
- Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6.
- Where unit masonry is selected as a building material, design the building utilizing masonry module, both in plan and elevation, ensure coursing is designed for either full or half block for overall dimensions, control joints, and at all openings.
- Substrate supports for veneer masonry to have a maximum horizontal deflection of 1/720 of the wall height.
- Where exposed to view, provide above grade concrete and masonry with a breathable, clear-drying, water-based silicone emulsion. Weather Seal Blok- Guard and Graffiti Control II by Prosoco or approved equal.

Performance Requirements:

- Provide structural or non-structural unit masonry that develops indicated net-area compressive strengths at 28 days.
- Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types

(unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

Concrete Masonry Units:

- Integral Water Repellent: Provide units made with integral water repellent such as Dri-Block.
- CMUs- Standard, Decorative and Pre-faced: ASTM C 90
 - ✓ Ground face may be used for unpainted exposed locations on the interior the maintenance facility.
 - ✓ Textured block faces (split face, ribbed etc.) are not acceptable.
 - ✓ Painted CMU on the exterior of the building is not acceptable.
 - ✓ Concrete Building Brick: ASTM C 55.

Brick - Clay Face Brick:

- Facing brick complying with ASTM C 216 SW or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area). No oversized brick allowed. Norman modules preferred.
- Embedded Flashing Materials- Provide continuous flashings at base of wall, heads of openings and under wall caps.
 - ✓ Metal Flashing: Provide metal flashing complying with SMACNA's Architectural Sheet Metal Manual. Use one of the following:
 - Stainless Steel: All through wall flashings shall be 26 gauge, three way keyed stainless steel ASTM A 240/A 240M or ASTM A 666, Type 304. Where flashing is exposed at the touch zone (less than 9-feet 0-inches) the gauge shall be 24 gauge stainless.

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- Flexible Flashing: Use only with the SFMTA approval.

Miscellaneous Masonry Design Requirements:

- Ties and Anchors:
 - ✓ General: Ties and anchors shall extend at least 1-1/2-inches into veneer but with at least a 5/8-inch cover on outside face.
 - ✓ Utilize adjustable type 316 stainless steel ties installed in horizontal joints at not less than one metal tie for 4.5 sf of wall area spaced not to exceed 36-inches o.c. horizontally and 16-inches o.c. vertically. Stagger ties in alternate courses.
 - ✓ Provide additional ties within 12-inches of openings and space not more than 36-inches apart around perimeter of openings.
 - ✓ At intersecting and abutting walls, provide ties at no more than 24-inches o.c. vertically. Acceptable product: Hohmann and Barnard DW-10 or approved equal.
- Weep/Cavity Vent and Drainage Products:
 - ✓ Provide both, weeps at the base of the cavity and a minimum equal number of vents at the top of the cavity. Maintain clear airflow space of 1-1/2-inches minimum to face of insulation. Open head joints with mesh required in lieu of rope, tubes or formed inserts. Vertical compartmentalization is required such that no horizontal brick cavity space is longer than 25-feet. All building corners to be compartmentalized within 4-feet of the corner. Provide flashing (if at a control joint) or additional building insulation to back brick face such as to prevent horizontal air flow within the cavity.
- ✓ Provide mortar mesh at all through wall flashings and lintel locations.
- Control Joints:
 - ✓ Control Joints in brick masonry walls shall be placed at openings, near corners, at wall intersections, changes in wall height and as described in the Brick Industry Association document Technical Notes 18A "Accommodating Expansion of Brickwork".
 - ✓ Control joints in CMU walls shall be placed at/near openings, near corners, at wall intersections, changes in wall height or thickness and as described in the National Concrete Masonry Association documents TEK 10-2C or TEK 10-3.
- Minimum 1-1/2-inch airflow space between masonry and insulation
- Steel Lintels shall be hot dipped galvanized, primed and painted per Prescriptive Specification 90 96 00 High Performance Coatings.
- Precast Concrete Coping, Trim and Cladding.
 - ✓ Precast coping units to be utilized for wall caps on masonry walls and veneer. Coping units to include slope for surface drainage and one inch minimum overhang with cast in drip.
 - ✓ Provide mechanical anchorage utilizing stainless steel materials. Provide sealant joints between all cap units and between adjacent materials.
- Submittals - Material sample(s), mock-ups, shop drawings, anchorage and reinforcing materials.

4.3.5 Metal Panels

The following technical requirements shall be met by the Design Team if a metal panel system is selected as a part of the building enclosure:

Warranties:

- Special Warranty: manufacturer agreement to repair or replace components of metal panel systems that fail in materials or workmanship within the specified warranty period. Failures include but are not limited to - structural failures (rupturing, cracking, puncturing); deterioration of metals and other materials beyond normal weathering. Warranty Period: Two years from date of Substantial Completion.
- Special Warranty on Panel Finishes: manufacturer agreement to repair or replace metal panels that show evidence of deterioration of factory applied finishes within specified warranty period – including but not limited to color fading more than 5 Hunter unites when tested according to ASTM D 2244; chalking in excess of a No. 8 rating when tested according to ASTM D 4214; cracking, checking, peeling, or failure of paint to adhere to bare metal. Warranty Period: 20 years from date of Substantial Completion.

Minimum Performance Requirements Common to all panel types:

- Air Infiltration: Air leakage of not more than 0.06 CFM/sf when tested according to ASTM E 283 at a test-pressure difference of 6.24 lb/sf.
- Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the test-pressure difference of 6.24 lb/sf.

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- Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss for a temperature change range of 120 degrees F, ambient; 180 degrees F, material surfaces.
- Provide a concealed fastener wall system with minimum 22 gauge panels.

Minimum Finish requirements:

- Two coat fluoropolymer (AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions), - Kynar 500/ Hylar 5000.
- Metal Wall Panels- Plate (Rain screen type):
 - ✓ Additional Minimum Performance Requirements:
 - Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency and indicate design designations from UL's "Fire Resistance Directory".
 - ✓ Acceptable Products: AEP Span: Prestige Series; Centria: FormaBond or FormaBond II; or approved equal.
- Metal Wall Panels – Insulated:
 - ✓ Additional Minimum Performance Requirements:
 - Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 72:
 - Wind and seismic loads per IBC; deflection limits for wind loads no greater than 1/240 of the span.
 - ✓ Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - ✓ Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119
 - ✓ Intermediate-Scale Multistory Fire Test: Tested mock-up, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
 - ✓ Radiant Heat Exposure: No ignition when tested according to NFPA 268.
 - ✓ Potential Heat: Acceptable level when tested according to NFPA 259.
 - ✓ Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E 84.
- Acceptable Products: MBCI eco-FICIENT panels; Centria Versawall or approved equal.

4.3.6 Precast Architectural Concrete

The following technical requirements shall be met by the Design Team if precast architectural concrete is selected as a part of the building enclosure:

Performance Requirements:

- A qualified professional engineer shall design architectural precast concrete units.
- Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Pre-stressed Concrete," applicable to types of architectural precast concrete units included in design.
- (As applicable) Calculated Fire-Test-Response Characteristics: Provide architectural precast concrete units with fire-resistance rating indicated as calculated according to ACI 216.1 (for precast concrete) or PCI MNL 124, "Design for Fire Resistance of Precast Pre-stressed Concrete," (for precast pre-stressed concrete) and acceptable to authorities having jurisdiction.
- Precast concrete units and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements as follows:
 - ✓ Upward and downward movement of ½-inch.
 - ✓ Anchorage: Provide mechanical anchorage utilizing stainless steel materials. Provide sealant joints between all cap units and between adjacent materials.

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- ✓ Fabrication Tolerances: Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- ✓ Finishes: Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp.
- ✓ Submittals- Product data and samples, mock up and shop drawings.

4.3.7 Sheathing

The following technical requirements shall be met by the Design Team when sheathing is utilized as a part of the building enclosure:

Performance Requirements:

- Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- Do not use Plywood Sheathing, Paper-Surfaced Gypsum Sheathing, Cellulose Fiber-Reinforced Gypsum Sheathing, Cementitious Backer Units, Fiberboard Sheathing Extruded-Polystyrene Foam Sheathing or Foil-Faced Polyisocyanurate Foam Sheathing for roof or wall applications unless approved by the SFMTA.
- Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
- Type and Thickness: Type X, 5/8-inch Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M
- Acceptable Products: DensGlass by Georgia-Pacific or approved equal (walls); DensDeck by Georgia-Pacific or approved equal (roof)

4.3.8 Cold Formed Framing

The following technical requirements shall be met by the Design Team when cold formed framing is utilized as a part of the building enclosure:

Performance Requirements:

- A qualified professional engineer shall design all cold formed steel framing.
- Cold Formed Steel Framing Design Standards:
 - ✓ Floor and Roof Systems: AISI S210.
 - ✓ Wall Studs: AISI S211.
 - ✓ Headers: AISI S212.
 - ✓ Lateral Design: AISI S213.
- AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - ✓ Upward and downward movement of 1/2-inch.
 - ✓ Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- Fire-Resistance Ratings (where applies): Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- All cold formed framing to be galvanized, minimum G60.

4.3.9 Insulation

Provide insulation in walls, roof and under slab to meet or exceed the Energy Code requirements. Provide all insulation in thicknesses, widths, and lengths sized to fit applications and to meet code requirements. Exposed, faced, bagged or scrimmed insulation is not acceptable. All insulation materials integrated into the work shall NOT contain: added urea formaldehyde, nor halogenated flame retardants. All products and their manufacturing processes shall be CFC and HCFC free. Rockwool insulation materials in the form and density appropriate for the application and performance required unless noted otherwise.

- Accessories: Provide fasteners and adhesives required to attach insulation to substrates per manufacturer's recommendations.
- Insulation for Miscellaneous Voids: Spray Polyurethane Foam Insulation (Limited use only for penetration sealing): ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- Below Grade Insulation: EPS – Expanded Polystyrene. Recycled preferred.(Benchmark Foam, Inc. for reference).

4.3.10 Sheet Metal Flashing

Acceptable materials: Stainless Steel ASTM A 240/A 240M Type 316 Finish 2B (bright, cold rolled).

Sheet metal (steel or aluminum) finished with same system as adjacent metal panels or storefront/curtainwall system or as approved by the SFMTA. Finish Warranty Period: 20 years from date of Substantial Completion.

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4.3.11 Exterior Windows

Daylight glazing shall be incorporated to allow for a reduction in artificial lighting and shall meet or exceed the percentage required by the Sustainability Checklist. Daylighting strategies shall be incorporated in the design of all spaces including shop areas.

All exterior glazing shall meet fenestration performance requirements of the most stringent energy code. Glazing shall be located and designed so as to be accessible for cleaning and window washing attachment systems shall be provided as needed. Window frames shall be prefinished aluminum. Frames are required to be thermally broken.

Provide solid surface window sills, 3/4-inch thickness minimum, at all locations.

4.3.12 Glazing

Glazing shall perform successfully within an assembly that complies with the Energy Code, meeting or exceeding in performance the maximum U Value and SHGC for the assembly selected by the Design Team. All glazing shall be captured in a frame assembly. Butt-Glazed lites are not acceptable.

Acceptable manufacturers: Pilkington North America Inc, PPG Industries, Inc, AGC Glass Company North America, Guardian Industries, Saint-Gobain Corporation or approved equal.

The following technical requirements shall be met by the Design Team where glazing is utilized as a part of the building enclosure:

Warranties:

- Manufacturer's Standard and Special warranties for each product used.
 - ✓ Warranty Period: 10 years from Substantial Completion.

- ✓ For each glass type and all glazing accessories – Obtain from single source from single manufacturer.

Performance:

- General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- Design: Engage a qualified professional engineer, to design glazing.
- Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300 and Design Team Design Team per the applicable codes.
- Provide Float Glass per ASTM C1036.
- Safety Glass: ASTM C1172, and ANSI Z97.1, laminated and tempered as indicated or required by code.
- Heat Strengthened Laminated Float Glass (at overhead conditions including clerestories): Two sheets of heat strengthened 1/4-inch thick (minimum) clear float glass fully-bonded, high-impact, UV-resistant, clear polyvinyl butyl interlayer 0.030-inch minimum thickness;
- Laminated Glass (at skylights): Per DCM "Canopy glazing" Clear float glass with 65 percent VLT white interlayer to reduce glare and minimize visibility of dirt, unless approved otherwise by the SFMTA. Plastic, polycarbonate, fiberglass or similar skylights are not acceptable.

- All tempered glass to be heat soak tested.
- Insulated glazing units: Provide sealed insulating glass: per ASTM E 2190, double pane; total unit thickness of 1-inch minimum. Inner and outer pane types subject to requirements at all glazing in conditioned spaces; Basis of Design: Solarban 70 XL manufactured by PPG or approved equal.
 - ✓ Interpane Space: Dry hermetic air, kept dry with a dehydrating agent; Edge
 - ✓ Seal Construction: Dual seal, silicone foam warm-edge spacer system with high-performance acrylic adhesive structural seal, backed with moisture vapor seal.
 - ✓ Edge seal color to be black.
 - ✓ Super Spacer by Edgetech IG.
- Vision Glass Units Performance: Subject to conformance to requirements, provide sealed insulating glass units with minimum performance values based on units comprising an outer lite of 1/4-inch float glass, 1/2-inch air space and, inner lite of 1/4-inch clear float glass with Low E coating on third surface.
 - ✓ Visible Light Transmittance: 69 percent; Winter Nighttime U-Factor: 0.29.
 - ✓ Shading Coefficient: 0.44; Low Emissivity (Low E).
 - ✓ Glass Low-e Coating: Soft, sputtered applied to third surface; hard, pyrolytic coating on second surface for over-size glass units.
- Provide glazing sealants that are compatible with one another and with other materials they will contact, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience. Comply with sealant

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and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

- Structural Silicone Sealant for Glass Joints: Not allowed.
- Provide glazing accessories, including:
 - ✓ Lock Strip Gaskets: ASTM C542, ozone-resistant precision extruded neoprene or EPDM compound. Use gaskets with separate locking strips that are 10-points higher Shore A durometer hardness value than gasket body.
 - ✓ Fabricate gaskets in accordance with recommendations of ASTM C716.
 - ✓ Setting Blocks: Neoprene, EPDM or silicone, 80 to 90 Shore A durometer hardness tested to ASTM D2240. Maximum compression set to ASTM D395 and ASTM C864.
 - ✓ Spacers: Neoprene EPDM or silicone, 40 to 60 Shore A durometer hardness tested to ASTM D2240; quantity and location in accordance with IGMAC standards and as recommended by the frame and glass manufacturer.
 - ✓ Glazing Tape: AAMA 806.3, preformed butyl compound, UV resistant, self-adhering, coiled on release paper, color as selected by Owner's Representative; Pre-Shimmed Glazing Tape: AAMA 806.3, pre-formed butyl tape, UV resistant, self-adhering, integral continuous serrated synthetic rubber shim and release paper, color: black.

- ✓ Glazing Wedges and Splines: Precision extruded neoprene or EPDM compound, UV resistant, 55 to 65 Shore A durometer hardness.
- Labeling:
 - ✓ Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
 - ✓ Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- Submit: 12-inch by 12-inch samples for each glass type with fabricator product information.

4.3.13 Storefront

The following technical requirements shall be met by the Design Team where storefront is utilized as a part of the building enclosure:

- For glazed Aluminum Storefront and Entrances provide self-supporting, factory prefinished, thermally broken, glazed aluminum tube framing system. Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.
- Basis of design: Model 433 manufactured by EFCO for aluminum storefront, or approved equal. Entrance Doors: EFCO D518 HD style or approved equal.

Performance:

- General Performance: Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
- Test according to ASTM E 330 as follows:
 - ✓ When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - ✓ When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - ✓ Test Durations: As required by design wind velocity, but not less than 10 seconds.
- Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
 - ✓ Fixed Framing and Glass Area: Maximum air leakage of 0.06 CFM/sf at a static-air-pressure differential of 6.24 lb/sf.
 - ✓ Entrance doors:
 - Pair of Doors: Maximum air leakage of 1.0 CFM/sf at a static-air-pressure differential of 1.57 lb/sf.
 - Single Doors: Maximum air leakage of 0.5 CFM/sf at a static-air-pressure differential of 1.57 lb/sf.

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- Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - ✓ No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lb/sf.
 - ✓ Maximum Water Leakage: According to AAMA 501.1 no uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

Minimum acceptable aluminum finishes:

- Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF or FEVE resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4.3.14 Operable Windows

The following technical requirements shall be met by the Design Team where operable windows are utilized as a part of the building enclosure:

- Provide operable (casement or awning as approved by the SFMTA) prefabricated aluminum windows with thermally broken frames and insulated glazing to meet Energy Code and sustainability requirements. All windows shall have stainless steel screens and locking hardware. Finish to be manufacturer's standard Class I, coating that meets AAMA 2604. Clear anodic or two coat fluoropolymer (Kynar 500/ Hylar 5000) acceptable.
- Window performance: Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440-08 requirements for AW grade windows and shall meet all performance criteria of the basis of design product.
- Basis of Design: Series 2700 by EFCO or approved equal.

4.3.15 Glazed Aluminum Curtain Walls

The following technical requirements shall be met by the Design Team when a curtain wall system is utilized as a part of the building enclosure:

Warranties:

- Special Assembly Warranty: Manufacturer's standard 10 years from date of Substantial Completion.
- Special Finish Warranty: Manufacturer's standard 20 years from date of Substantial Completion.

Performance Requirements:

- Analysis and design data signed and sealed by the qualified registered professional engineer responsible for their preparation.
- General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum

curtain walls representing those selected for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

- ✓ Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
- ✓ Failure also includes the following:
 - Thermal stresses transferring to building structure.
 - Glass breakage.
 - Noise or vibration created by wind and thermal and structural movements.
 - Loosening or weakening of fasteners, attachments, and other components.
 - Failure of operating units.

Structural:

- Test according to ASTM E 330 as follows:
 - ✓ When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - ✓ When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
- Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
 - ✓ Fixed Framing and Glass Area: Maximum air leakage of 6.24 lb/sf.

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- Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - ✓ No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lb/sf.
- Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
 - ✓ No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 15 lb/sf.
 - ✓ Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to applicable codes by Design Team
 - ✓ Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
 - ✓ Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement and 1.5 times the design displacement.

- ✓ Energy Performance: Certify and label energy performance according to NFRC. Fixed glazing and framing areas shall have U-factor of not more than that required by the most stringent Energy Code as determined according to NFRC.
- ✓ Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than that required by the most stringent Energy Code as determined according to NFRC 200.
- ✓ Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

Minimum acceptable finishes:

- Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker
- High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
 - ✓ Acceptable manufacturers: Kawneer, EFCO or approved equal.

4.3.16 Exterior Doors

Exterior doors must comply with the most stringent energy code requirements for thermal performance and air infiltration. Any stainless steel utilized in doors or door hardware shall be Type 316. Type 304 stainless steel will be unacceptable. Storefront doors shall be utilized at vestibule entrances to administrative and office areas.

All exterior doors, including roof access doors, shall be coordinated with the security/intrusion detection/access control system design for the facility.

4.3.17 Exterior Hollow Metal Doors and Frames

The following technical requirements shall be met by the Design Team where hollow metal doors are utilized as a part of the building enclosure:

- General: Maximum-Duty Doors and Frames: SDI A250.8, Level 4.
- Physical Performance: Level A according to SDI A250.4.
- Frames: Metallic-coated steel sheet, minimum 14 gauge. All frames to be fully welded, and of commercial quality cold rolled sheet metal in conformance with ASTM A1008. Exterior frames (frames from conditioned to unconditioned spaces) shall be thermally broken, constructed of hot-dip galvanized steel in conformance with ASTM A-653, G90 coating designation.
- Lites: Exterior hollow metal doors to have insulated glass narrow lites or half lites as directed by the SFMTA.
- Anchors: Masonry Type: Locate anchors not more than 16-inches from top and bottom of frame. Space anchors not more than 32-inches o.c., to match coursing, and as follows: Three anchors per jamb from 60- to 90-inches high.
- Stud Wall Type: Locate anchors not more than 18-inches from top and bottom of frame. Space anchors not more than 32-inches o.c. and as follows: Three anchors per jamb up to 60-inches high.

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- Door Hardware: Locking and keying systems shall be fully compatible with the SFMTA standard system.
- ✓ All exterior doors shall be coordinated with the security/intrusion detection/access control system design for the facility and shall comply with security standards.
- ✓ Door and Frame Finishes: Doors and frames to be factory primed with galvalume primer compatible with top coats by the same manufacturer and then field painted. Exterior service doors and frames shall be finished with a high performance industrial coating.

4.3.18 Sectional Doors

The following technical requirements shall be met by the Design Team if sectional doors are utilized as a part of the building enclosure:

Special Warranty:

- Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
- ✓ Warranty Period: Minimum Two (2) years from date of Substantial Completion.

Performance Requirements:

- Structural Performance:
 - ✓ Design Wind Load: as determined by Design Team per applicable codes.
 - ✓ Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
 - Deflection of door sections in horizontal position (open) shall not exceed 1/120 of the door width.

- Deflection of horizontal track assembly shall not exceed 1/240 of the door height.
- Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and as determined by Design Team per applicable codes.
- Doors:
 - ✓ Sectional door formed with hinged sections and fabricated according to DASMA 102 consisting of minimum 16 gauge galvanized steel exterior face and minimum 26 gauge steel interior face with polystyrene insulation with fire retardant additive to meet requirements of UL R-1894A. R-Value for door shall meet or exceed Energy Code requirements.
 - ✓ Operation Cycles: door components and operators capable of operating for not less than 25,000 cycles.
 - ✓ Air infiltration: Maximum 0.08 CFM/sf.
 - ✓ Track Configuration: Vertical Lift.
 - ✓ Provide replaceable weather seals at jambs, head and sill.
 - ✓ Provide Keyed lock (compatible with the SFMTA system) with interlock switch for automatic operator.
 - ✓ Provide kick plate
- Operator:
 - ✓ Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL 325/2010 requirements for continuous monitoring of safety devices.

- ✓ Usage Classification: Heavy-duty, 25 or more cycles per hour and more than 90 cycles per day.
- ✓ Motor Exposure: Exterior, dust, wet, or humid.
- ✓ Emergency Manual Operation: Chain type.
- ✓ Acceptable Safety/Obstruction Detection Devices (provide a minimum of one of the following): photoelectric sensor, electric sensing edge, pneumatic sensing edge.
- ✓ Control Station: Interior and exterior, exterior location to be security access controlled.
- Finish: Door to be finished per system HPC-3.
- Acceptable Products: Model 418 by Overhead Door or approved equal

4.3.19 Exterior Door Hardware

All door hardware sets are to be reviewed and approved by the SFMTA. Default hardware material to be stainless steel. Alternate materials may be utilized with the SFMTA approval.

At a minimum, provide the following standard sets of hardware for exterior doors (single doors listed – adjust for pairs of doors accordingly):

Storefront doors: Offset Pivots (three minimum), surface mounted closer, push/pull set, exit device (as required by code), weatherstripping/sweep, threshold, entry/exit device (as applies) – the SFMTA standard card reader access control system and/or intrusion detection alarm. For doors without access control provide deadlock and cylinder.

Hollow Metal Personnel door: Hinges (3 minimum), mortise lockset, surface mounted closer, stop, exit device (as required by code), weatherstripping/sweep, rain drip, kick plate,

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threshold, entry/exit device (as applies), the SFMTA standard card reader access control system (as applies), door contact.

Hollow Metal Service Door (exit only): Hinges (three minimum), mortise lockset, surface mounted closer, stop, exit device (as required by code), weatherstripping/sweep, rain drip, kick plate, threshold, entry/exit device (as applies), the SFMTA standard intrusion detection (as applies),

Provide internal flush bolt for pairs of non-egress doors with an inactive leaf. Provide an automatic flush bolt and coordinator for doors with two active leaves.

4.3.20 Exterior Stairs

Exterior stairs shall be constructed of cast in place concrete with non-slip surface finish treads (Light broom finish with grooves cast directly in the treads).

4.3.21 Exterior Handrails and Guardrails

All handrails and top guardrails shall be stainless steel 316 with random orbital finish. Intermediate infill of railings may be stainless steel (preferred) or painted steel with highest durability paint system. Where welded wire mesh is used, use stainless steel or steel mesh with each joint welded prior to painting otherwise the joints will not be coated with paint and they will rust.

4.3.22 Roof Coverings

Roofing systems selected shall meet the most stringent Energy Code requirements for thermal and air barrier performance and shall meet LEED Gold certification requirements. Roofing must also meet all applicable City and County of San Francisco Building Code criteria as well as general recommendations and guidelines of the National Roofing Contractors Association

(NRCA) Roofing and Waterproofing Manuals. Selection of roofing systems shall be driven by a requirement for long term durability and appearance as well as sustainable criteria to reduce the Heat Island Effect. Roof deck coverings shall be UL listed Class A or Class B in accordance with the IFC and NFPA. Roofing design shall facilitate adequate shedding and diversion of water from the storm water system to use in landscape irrigation and water re-use systems. Flashing shall be either stainless steel, or steel with a baked on finish or factory finished to match metal panel systems.

If selected, metal panel steep slope roofing shall be of the architectural standing seam type and shall be replaceable without disturbing the building occupants. Metal roofing must comply with the NRCA Waterproofing Manual and the Metal Building Manufacturers Association (MBMA) Metal Roofing Systems Design Manual and provide adequate water-shedding with a focus on diversion of water from the storm water system to use in landscape irrigation or other water reuse systems.

If selected, low slope roofing shall be a single ply system such as TPO or PVC. EPDM, built up or modified bitumen roofing will not be acceptable. Type 316 stainless steel conductor boxes, gutters and downspouts with stainless steel flashing shall be required

Asphalt or wood shingles and clay tile will not be acceptable roof materials.

The roofing system selected must comply with the insurer's FM ratings for wind, fire and storm warranty. Coordinate roofing system selected with mounting for future photovoltaic requirements.

4.3.23 Thermoplastic Polyolefin (TPO) Roofing

Provide a fully adhered roofing system with Flexible Walkways to all roof mounted elements requiring maintenance. Roofing system shall include substrate board, ASTM C 1177/C, glass mat and slip sheet.

- Basis of design product: Firestone UltraPly™ TPO SA with Secure Bond™ Technology or approved equal.
- Warranty Period: Twenty five (25) years from substantial completion.
- Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories as required.

4.3.24 Polyvinyl-Chloride (PVC) Roofing

Provide a fully adhered roofing system with Flexible Walkways to all roof mounted elements requiring maintenance. Roofing system shall include substrate board, ASTM C 1177/C, glass mat and slip sheet. PVC Sheet: ASTM D 4434/D 4434M, Type II, Grade I, glass-fiber reinforced, felt backed, 60 mils thickness.

- Basis of design product: Sikaplan Adhered Energy Smart Roof membrane or approved equal.
- Warranty Period: Fifteen (15) years from substantial completion.

4.3.25 Standing Seam Metal Roof Panels

Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and

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accessories required for weather tight installation. Roof Panels shall be minimum 22 gauge.

- Minimum Finish requirements: Two coat fluoropolymer (AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions), - Kynar 500/ Hylar 5000.
- Basis of Design Product: AEP Span Klip Rib or Design Span HP.

4.3.26 Canopies and Protective Covers

Provide canopies or protective covers at all entrances to the building. All overhangs and coverings shall be designed to prevent bird nesting and shall have a minimum 1.5 percent slope. Structural performance of canopies shall be determined by a licensed professional engineer and shall withstand the effects of gravity loads and the additional live, roof, snow, seismic and wind loads and stresses as determined by the Design Team per applicable codes.

4.3.27 Skylights

Skylights must comply with Energy Code performance requirements and fenestration limitations as well as applicable building code provisions. Openings associated with mechanical equipment or roof access shall comply with all energy that apply to roof coverings. All roof openings shall be coordinated with the security/intrusion detection/access control system design for the facility.

Laminated insulated glass skylights with white translucent interlayer are to be the basis of design. Thermally broken frames and insulated

curbs, Preference is for use of clerestory daylighting strategies in lieu of horizontal glazing.

With the SFMTA approval and contingent upon the proposed design, use of factory pre-engineered, 4-inch thick aluminum skylight with translucent panel, thermal break core, 60 percent light transmission. Kalwall Standard Skylites or approved equal. Kalwall Corrosion-resistant finish with a 10 year finish warranty.

4.3.28 Roof Accessories

Pitch pockets and similar configured penetrations are prohibited. Use of sheet metal enclosures similar to NCRA TS-15 detail required.

Horizontal clear space of 24-inches shall be provided between all penetrations, curbs, parapets, similar transitions to allow for sufficient space to properly install, maintain and replace roofing systems.

General Performance:

Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

- Roof Curbs and Equipment supports: Prefabricated aluminum, clear anodic finish, internally reinforced and factory insulated units with integrally formed roof deck-mounting flange at perimeter bottom. Provide curbs to minimum height of 12-inches above roofing surface.
- Roof Hatch: Prefabricated aluminum, clear anodic finish, thermally broken roof hatch with integrally formed roof deck-mounting flange at perimeter bottom. Note: a hatchway would

be in addition to the required full stair roof access. Hardware: Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel butt- or pintle-type hinge system, and padlock hasps inside and outside. Intrusion detection shall be provided.

- ✓ Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
- ✓ Provide roof-hatch manufacturer's standard ladder-assist post and attachments.
- ✓ Basis of Design product: Bilco thermally broken roof hatch.

4.3.29 Roof Access & Safety

Roof access shall be provided for all roof areas. Fixed metal ladders shall be provided where stair access is not available. Walk pads shall be installed on low slope roofs to allow access to all roof mounted equipment requiring servicing. Mounting equipment on steep slope roofs is discouraged due to the lack of easy access.

- Provide OSHA compliant fall protection systems for all roof areas. If any mechanical equipment is mounted on the roof it must meet the screening and maximum building height requirements allowed by the Bel-Red Ordinance.
- Provide roof to roof access (gangways) from roof areas that are not accessible by fire lane at ground level – coordinate any access requirements with the fire department.

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- Changes in level on the roof exceeding 30-inches shall utilize a ladder or over the parapet ladder and platform complying with 29 CFR 1910.27. Ladders shall be constructed of stainless steel or aluminum. Rungs shall be provided an integral abraded finish. Galvanized or HPC painted ladders are not acceptable.

4.3.30 Exterior Joint Sealants

Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience. Joints shall be designed to meet the movement requirements for the installed conditions and shall present an aesthetic appearance that does not detract from the appearance of the building. The durability of the sealant shall also impact selection including aging characteristics and ultra-violet radiation, moisture, temperature, cyclic joint movement, movement during curing, and bio-degradation. Provide sealant backing or bond breaker as needed for specific applications.

Only sealants that have a current Validation Certificate from the SWRI (Sealant, Waterproofing & Restoration Institute) shall be utilized in the project. The Design Team shall confirm that all sealants selected meet the anticipated joint movement, are compatible with the materials they come in contact with and will adhere to the substrate(s) properly. Indicate joint locations, materials and spacing in construction document plans, elevations and details. Utilize sealants as follows:

- Latex (water based) sealants - not allowed on the exterior of the building.

- Acrylic (solvent-based) sealants – allowable for limited movement joints only as approved by the SFMTA.
- Butyl (solvent-based) – acceptable sealant for gutters, foundations and other non-exposed exterior joints.
- Silicone sealants – acceptable sealant for glass to metal framing systems and other porous and non-porous materials such as ceramic or stone panels.
- Polyurethane sealants – acceptable sealant for higher movement joints in concrete, masonry, metals, around window and door openings, expansion joints and other joints as approved by the sealant manufacturer.

Comply with joint sealant manufacturer's written instructions for products and applications indicated, unless more stringent requirements apply. Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

4.3.31 Expansion Control

Provide expansion control systems to accommodate building movement resulting from causes such as thermal change, seismic force or wind sway. Submit movement control diagrams addressing full structure. Submit calculations and rationale for joint locations, types and sizes. Expansion control elements shall match or be of a compatible color with the adjacent materials. Any exposed metal plates or covers shall be Type 316 stainless steel.

4.3.32 Exterior Signage

Exterior signage shall be designed and constructed per the SFMTA's corporate identify and brand standards. Refer to the Design Guidelines for notes on incorporating

the SFMTA and Muni brands within the larger building architecture. The SFMTA shall sign off on all final signage designs. The SFMTA facility signage shall include:

- Customer Signage:
 - ✓ Main Facility Signage: provide at each vehicle entrance to the site.
- Exterior Door Signs: at all personnel and service doors.
- Operational Signage: Provide Operational signage as required per project. Coordinate with the SFMTA Operations.
- A custom designed facility sign shall be provided on the exterior façade of the facility. Sign shall be visible and legible, and be derived from the architectural design of the facility. Facility façade sign shall be illuminated.

Signage shall be designed to be architecturally compatible with the building and shall contribute to the overall character of the facility. Site signage within the facility shall follow the SFMTA standards and shall clearly identify circulation and safety elements as well as hazardous areas.

4.4 Interior Construction

Interior partitions in any maintenance and storage or shop areas shall be reinforced concrete masonry or concrete extending to underside of deck. Concrete or concrete masonry units at a minimum height of 8-feet 0-inches above finished floor with metal stud and impact and moisture resistant fiberglass faced gypsum wall board or AC plywood partitions above may be proposed for appropriate areas and will be considered on a case by case basis. Provide masonry control joints at a maximum of 25-feet 0-inches on

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center in continuous partitions, at maximum one half control joint spacing from both sides of corners, at changes in wall height or thickness, at building movement joints and at all openings.

Partitions in administrative, office, support type areas shall be constructed of metal studs with gypsum board. All interior partitions assemblies enclosing conference rooms, restrooms, offices and all rooms provided with access control shall extend to underside of deck.

Partitions enclosing custodial rooms, sprinkler valve rooms and restrooms shall have a minimum 6-inch high concrete curb. Wall finish shall cover curb in restrooms. Curb may be exposed in other rooms.

Refer to the Room Data Sheets for finishes and furnishings by room type. Joints and gaps at the base and top of the wall shall be sealed as well as joints at ceilings, corners or changes in material. Wall penetrations, including but not limited to ductwork, outlets or j-boxes, shall also be acoustically sealed in these rooms.

Submit for approval by the SFMTA product data, certificates and test reports verifying materials selected conform to performance standards listed in this document.

4.4.1 Interior Masonry

Concrete masonry units - Exterior Masonry, for concrete masonry unit descriptions and requirements. All interior CMU must be precision faced with a high performance coating. Outside corners and returns shall be bullnose block profile typical.

4.4.2 Gypsum Board

Performance Requirements:

- Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in

assembly according to ASTM E 119 by an independent testing agency.

- STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lb/sf.
- Attach all gypsum board to steel stud partitions in accordance with the Northwest Wall and Ceiling Bureau (NWCB) Specification Standards Manual and ASTM C840.
- Paper faced gypsum board will not be allowed.
- Acceptable Interior Gypsum Board: Gypsum Board (office and support areas), Type X: ASTM C 1396/C 1396M, 5/8-inch.
 - ✓ Basis of Design: DensArmor Plus Fireguard High Performance Interior Panel.
- Abuse-Resistant Gypsum Board (corridor/high traffic/circulation areas, locker rooms (when not protected by lockers)): ASTM C 1629/C 1629M, Type X, 5/8-inch.
 - ✓ Surface Abrasion: Meets or exceeds Level 1 requirements.
 - ✓ Surface Indentation: Meets or exceeds Level 1 requirements.
 - ✓ Single-Drop Soft-Body Impact: Meets or exceeds Level 1 requirements.
 - ✓ Basis of Design: DensArmor Plus Fireguard Abuse Resistant Interior Panel.

- Impact-Resistant Gypsum Board (shop , tool box storage rooms, materials handling, shipping areas to 12-feet by 0-inches above finish floor.): ASTM C 1629/C 1629M, Type X, 5/8-inch.
 - ✓ Basis of Design: DensArmor Plus Fireguard Impact Resistant Panel.
- Glass-Mat Interior Gypsum Board: ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use; Type X, 5/8-inch.
- Acceptable Tile Backing Panels:
 - ✓ Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges, 5/8-inch thick. Tile backer board not acceptable.
- Auxiliary Materials:
 - ✓ Sound-Attenuation Blankets (required at all interior metal stud and gypsum board partitions and as required by mandated STC ratings in Room Data Sheets, Section Four of the Facility Program): ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - ✓ Acoustical Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing

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representative assemblies according to ASTM E 90.

- Gypsum Board Finish Levels: Finish panels to levels according to ASTM C 840. Finish all exposed gypsum board to a level 5 equivalent finish (use of a high solids primer or skim coat), ready to receive paint regardless of final finish. All exposed gypsum board is to be primed and painted UNO. Finish shall be established by use of mock-up. Concealed areas may be a level 3 finish and remain unpainted unless vapor control is needed.

4.4.3 Non Structural Metal Framing

Performance Requirements:

- Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- Comply with requirements in ASTM C 840 that apply to framing installation for gypsum board assemblies.
- Framing System:
 - ✓ Framing Members, General: Comply with ASTM C 754.
 - ✓ Steel Sheet Components: Comply with ASTM C 645 requirements for metal.
 - ✓ Protective Coating: ASTM A 653/A 653M, G60 hot-dip galvanized.
- ✓ Studs and Runners: ASTM C 645.
- ✓ Minimum Base-Metal Thickness: 0.0329-inch (22 gauge).
- ✓ Slip-Type Head Joints: Where required by design conditions, provide one of the following:
 - Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - Firestop Tracks: (where required in fire rated assemblies) Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- ✓ Provide blocking and Bracing behind all wall mounted items:
 - Flat Strap and Backing Plate: Steel sheet, minimum base-metal thickness: 0.0747 (14 gauge).
 - Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.
- ✓ Acceptable Furring:
 - Hat-Shaped, Rigid Furring Channels: ASTM C 645, minimum .0179 (25 gauge).
 - Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4-inch, wall attachment flange of 7/8-inch, minimum uncoated-metal thickness of 0.0179-inch, and depth required to fit insulation thickness indicated.
- ✓ Suspension Systems:
 - Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.
 - Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16-inch in diameter.
 - Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538-inch and minimum 1/2-inch wide flanges.
- ✓ Furring Channels (Furring Members):
 - Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges, 3/4-inch deep.
 - Steel Studs and Runners: ASTM C 645, minimum 0.0179-inch.
 - Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8-inch deep.
- ✓ Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

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- ✓ Provide ceiling and wall access doors as required, complete with cylinder locks compatible with bi-lock cylinders. Manufacturer's standard factory applied baked enamel primer and shall be field finished to match adjacent materials.
- Basis of Design: Milco, Cierra or approved equal.
- Ceiling access shall be provided for each room and at each equipment location.

4.4.4 Operable Partitions

Performance Requirements:

- Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and as determined by the Design Team per applicable codes.
- Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - ✓ Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413.
 - ✓ Provide minimum STC 52.
- Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

- ✓ Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - Flame-Spread Index: 25 or less.
 - Smoke-Developed Index: 450 or less.
- ✓ Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
- Operation: Manual, paired panels. Design shall provide for door recess and cover such the door pocket does not intrude into the combined room configuration.
- Panel Construction: Continuous 20 Gauge steel panel faces invisibly welded to minimum 16 gauge one-piece steel frames.
- Finishes: Color and texture chosen by the SFMTA from full range of Manufacturer fabrics.
- Acceptable Products: Moduflex Model 510PP fixed all of the used from 5.5 and on.

4.5 - Interior Glazing

Interior glazing shall be installed in prefinished aluminum or painted hollow metal frames. Glazing shall be minimum 1/4-inch thick laminated, heat strengthened glass. Glazing between conditioned and unheated spaces shall be insulated.

4.5.1 - Interior Doors

Interior doors in administrative, office type areas shall be solid core wood except where hollow metal (steel) doors are required to meet the fire rating of the partition or where doors are anticipated to receive heavy use

such as corridors or restrooms. Office doors shall have minimum 12-inch wide sidelights. Frames for wood doors and sidelights shall be hollow metal. Interior aluminum frame glazed storefront doors shall be used at vestibules in administrative/office type areas. Refer to PR Section 5.3.13 Storefront, for additional information concerning storefront.

Doors in maintenance, shop, support and storage areas shall be hollow metal (steel) as described below. Doors and frames opening into areas of excessive moisture or into a corrosive environment shall be fiberglass reinforced structural shapes designed and finished for these conditions. Refer to PR Section 5.4 for descriptions and requirements on FRP Doors. Doors to mechanical rooms shall be hollow metal (steel) with hollow metal frames identical to those in the shop areas.

Cross corridor doors which are anticipated to remain closed shall have half lites unless restricted to a smaller area by fire ratings. Doors opening into areas in which a person may be expected to be in the area of the door swing shall have half lites.

All personnel doors on accessible routes shall comply with the Americans with Disabilities Act (ADA) Standards.

Where required, interior doors shall be coordinated with the security/intrusion detection/access control system design for the facility.

Locking and keying systems shall be fully compatible with the SFMTA standard system. Interior door hardware finish shall be stainless steel. Stainless steel kick plates shall be provided at all maintenance and shop doors as well as restroom and stairwell doors.

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4.5.2 - Interior Door Requirements and Warranties

Regulatory Requirements:

- Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- Smoke and Draft Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
- Wood Doors:
 - ✓ Solid core wood doors clad with wood veneer faces, WDMA premium grade. Veneer to be selected by the SFMTA; book matched. Veneer face assembly-Running match.
 - ✓ Basis of Design: Heritage Collection VT Industries or approved equal.
- Hollow Metal Doors:
 - ✓ Office and Administration areas:
 - Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - Physical Performance: Level A according to SDI A250.4.
 - Minimum 16 gauge.
- ✓ Shop, Support and Storage areas:
 - Maximum-Duty Doors and Frames: SDI A250.8, Level 4.
 - Physical Performance: Level A according to SDI A250.4.
 - Minimum 16 gauge.
 - Grouted frames will not be allowed.
- ✓ Louvers: comply with SDI 111C.
- Finish: Doors and frames to be factory primed with galvalume primer compatible with top coats by the same manufacturer and then field painted with a high performance industrial coating as defined in Prescriptive Specification section 09 96 00, High-Performance Coatings.
- Glazing for Wood or Hollow Metal Doors: Provide ¼-inch thick minimum heat strengthened, laminated glass with a lifetime warranty.
- Hollow Metal Frames:
 - ✓ Minimum 14 gauge, fully welded.
 - ✓ Jamb Anchors:
 - Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042-inch thick, with corrugated or perforated straps not less than 2-inches wide by 10-inches long; or wire anchors not less than 0.177-inch thick.
 - Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042-inch thick.
 - ✓ Floor Anchors: Formed from same material as frames, minimum thickness of 0.042-inch, and as follows:
 - Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- Storefront doors:
 - ✓ Provide compatible non-insulated door from same manufacturer of storefront or curtainwall system selected. Refer to Section 5.3.13 Storefront for additional requirements.
- Overhead Coiling Doors
 - ✓ Insulated, motorized overhead coiling doors may be used at delivery and storage areas where applicable. Slats shall be stainless steel (minimum 22 gauge) or aluminum (minimum 18 gauge) and shall have a factory applied industrial quality finish. Doors must be provided with a lock with a master keyable cylinder that is compatible with the SFMTA standard system.
 - ✓ Warranty: minimum two (2) years from substantial completion.
 - ✓ Design Criteria:
 - Design Wind Load (where applicable): As determined by the Design Team per the applicable codes.
 - Deflection Limits (where applicable): Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

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- Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and the appropriate component importance factor as determined by the Design Team per the applicable codes.
- Operation Cycles: Door components and operators capable of operating for not less than 10,000 operation cycles (one cycle - door is opened from the closed position to the fully open position and returned to the closed position).
- Air infiltration (applicable between conditioned and heated only spaces): maximum rate of 0.08 CFM/sf when tested according to ASTM E 283 or DAMSA 105.
- Curtain R-value (applicable between conditioned and heated only spaces): as required by Energy Code, minimum R-7.
- ✓ Operator:
 - Electric, Standard duty usage classification; rated for a maximum of 20 cycles per hour.
 - Safety Features: sensor edge and photoelectric eye, emergency manual chain hoist assembly, provide an integral motor mounted interlock system to prevent damage to door and operator.
 - Controls: surface mounted manufacturer standard button control interior, key access exterior.
- ✓ Finish: factory applied powder coat.

- ✓ Acceptable Product: (Insulated) Stormtite 625 by Overhead Door or approved equal; (Non-Insulated) Model 610 by Overhead Door or approved equal.
- Access Doors: Provide ceiling and wall access doors where required for service or maintenance, complete with cylinder locks compatible with the SFMTA standard lock system. Provide fire rated access doors and frames complying with NFPA 80 that are listed and labeled by a qualified testing agency for fire protection ratings required, according to NFPA 252 or UL 10B. All doors to have manufacturer's standard factory applied powder coated primer and field painted to match adjacent materials.
- Special Door Requirements:
 - ✓ Doors providing access to the Telecommunication Rooms shall have replaceable gaskets, seals and sweeps at the jambs, head and sill to prevent the entry of dirt and debris.

4.5.3 - Interior Door Hardware

All door hardware sets and to be reviewed and approved by the SFMTA. Default hardware material shall be stainless steel. Alternate materials may be utilized with the SFMTA approval. Doors in fire-rated openings shall have hardware that is certified by Underwriters Laboratories (UL) or Warnock Hersey (WH).

At a minimum, provide the following standard sets of hardware for interior doors (single doors listed – adjust for pairs of doors accordingly):

- Storefront doors (vestibule): Offset Pivots (3 minimum), closer, push/pull set, stop.
- Personnel door (office area): Hinges (3 minimum), mortise lockset (secure) or mortise latchset (non-secure), stop, silencers.

- Hollow metal door (shop and office area perimeter): Hinges (3 minimum), mortise lockset (secure) or Mortise latchset (non-secure), closer, stop, kick plate or armor plate (materials handling), silencers, exit device (as required by code), entry/exit device (as applies), the SFMTA standard card reader access control system and/or intrusion detection alarm (as applies).
- Hollow metal Stair/Exit Door: Hinges (3 minimum), exit device, closer, stop, kick plate, silencers.
- Restrooms, Locker rooms: Hinges (3 minimum), push/pull, closer, stop, kick plate, mop plate, silencers.
- Custodial Rooms (Janitor Closet): Hinges (3 minimum), mortise lockset, stop, kick plate, mop plate, silencers

4.5.4 - Interior Joint Sealants and Firestopping

Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience. Joints shall be designed to meet the movement requirements for the installed conditions and shall present an aesthetic appearance that does not detract from the appearance of the building. The durability of the sealant shall also impact selection including aging characteristics, moisture, temperature, cyclic joint movement, movement during curing, and bio-degradation. Provide sealant backing or bond breaker as needed for specific applications. Provide mildew resistant sealants in wet areas.

Only sealants that have a current Validation Certificate from the SWRI (Sealant, Waterproofing & Restoration Institute) shall

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be utilized in the project. The Design Team shall confirm that all sealants selected meet the anticipated joint movement, are compatible with the materials they come in contact with and will adhere to the substrate(s) properly. Indicate joint locations, materials and spacing in construction document plans, elevations and details. Utilize sealants as follows:

- Latex (water based) sealants – acceptable for acoustic joints and firestopping systems as tested by UL Classified.
- Acrylic (solvent-based) sealants – acceptable for acoustic joints and firestopping systems as tested by UL Classified.
- Silicone sealants – acceptable sealant for plumbing fixtures, tile and stone applications and other porous and non-porous materials such as ceramic or stone panels.
- Polyurethane sealants – acceptable sealant for higher movement joints in concrete, masonry, metals, around window and door openings, expansion joints and other joints as approved by the sealant manufacturer.

Comply with joint sealant manufacturer's written instructions for products and applications indicated, unless more stringent requirements apply. Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

- Provide UL Classified firestopping systems at all penetrations and joints in or between Fire-Resistive Rated Construction complying with ASTM E 1966 or UL 2079.
- Provide fire-resistive joint systems in smoke

barriers with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

- Provide flame-spread and smoke-developed indexes for exposed joint firestopping systems of less than 25 and 450, respectively, as determined per ASTM E 84.
- Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

4.5.5- Expansion Control

Provide expansion control systems to accommodate building movement resulting from causes such as thermal change, seismic force or wind sway. Submit movement control diagrams addressing full structure. Submit calculations and rationale for joint locations, types and sizes. Expansion control elements shall match or be of a compatible color with the adjacent materials. Any exposed metal plates or covers shall be Type 316 stainless steel.

4.6 Interior Stairs

Communicating stairs in office and administration areas that are expected to be used on a daily basis shall be constructed of painted steel stringers with precast tread/riser units and landings or be fully pre-cast stair runs. The appearance of stairs in these areas shall be of a superior grade as approved by the SFMTA. Steel stairs used solely for egress and in shop and maintenance bay areas shall have precast tread/riser units or concrete filled metal pan treads with closed steel risers. All stair treads shall have a non-slip surface with

a replaceable nosing consisting of an inset aluminum extrusion with abrasive anti-slip safety material. Open grating stairs will not be allowed. Epoxy connections for precast concrete treads will not be allowed.

Provide a minimum of one stair with direct access from the shop areas on the ground floor to the roof. This stair should have a fully enclosed interior landing and be protected by an enclosed penthouse with a hollow metal door. Daylight should be provided within this stairwell to the extent allowable by the design. Exterior shall be provided a landing level with the door threshold. Landing shall be minimum of 5-feet, 0-inches deep and full width of stairwell with a minimum overhead canopy of the same size. Provide lighting, recessed weatherproof receptacle and hose bib at this location. All exterior doors shall be coordinated with the security/intrusion detection/access control system design for the facility.

Provide factory assembled stair units, fabricated by a firm or shop experienced and skilled in custom fabrication and construction of metal stairs and railings (as applies).

- Treads and risers for steel pan stairs: minimum 14 gauge steel.
- Landings for steel pan stairs: minimum 12 gauge.
- Stringers: steel channels or tubes, size and gauge to suite span and stair width.

4.6.1 Handrail Construction

All handrails (including supports) and top rails of guardrails shall be stainless steel 316 with random orbital finish.

4.7 Interior Wall Finishes

Wall finishes shall be selected on the basis of durability and low maintenance and shall comply with sustainability requirements for

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low-emitting materials. Finishes shall be aesthetically pleasing and appropriate to the building's function.

4.7.1 Wall Finish Requirements

- Paint:
 - ✓ Paint systems shall be designed for application on the partition or wall substrate and shall be designated by MPI (Master Painters Institute) numbers. All systems shall meet or exceed MPI Premium Grade.
- Tile (excluding shower stalls):
 - ✓ Full wall height. Minimum of two colors to provide field and accent.
 - ✓ Install in compliance with the latest edition of the Tile Council of North America (TCNA) recommendations. For metal stud walls with cement board substrate utilize method W241. For masonry or concrete walls utilize method W211. Provide a waterproof membrane (A118.10) typical.
 - ✓ Glazed porcelain (ANSI 137.1), large format (Minimum 12-inches by 12-inches), 1/4-inch thick minimum.
 - ✓ Provide curved wall/floor cove and inside corners, bullnose, quarter round and any other special shapes required for smooth transitions and ease of cleaning. Color and type shall be chosen from Price Group 2 or greater and approved by the SFMTA.
 - ✓ Grout: low VOC, to inhibit the growth of mold and mildew, and meet ANSI A118.3. Provide Laticrete "Spectra-Loc" or approved equal.
- Tile (Shower stalls):
 - ✓ Full wall height. Minimum of two colors to provide field and accent.

- ✓ Install in compliance with the latest edition of the Tile Council of North America (TCNA) recommendations. For metal stud walls with cement board substrate and mortar bed floor tile utilize method B415. For masonry or concrete walls utilize method B422. Provide a waterproof membrane (A108.13) typical. Complete waterproofing is required including treatment at termination points.
- ✓ Glazed porcelain (ANSI 137.1), large format (Minimum 12-inches by 12-inches), 1/4-inch thick, price Group 2 or greater.
- ✓ Trim units: bullnose at external corners.
- ✓ Grout: low VOC, to inhibit the growth of mold and mildew, and meet ANSI A118.3.
- ✓ Provide Laticrete "Spectra-Loc" or approved equal.
- Wall Protection:
 - ✓ Provide minimum 16 gauge type 316 stainless steel corner guards with minimum 3-inch wings, 4-feet 0-inches high (minimum) at all outside corners. Mounted from top of rubber base, radius corners, beveled pre-drilled holes. Attach with SS screws.
- Stainless Steel Wall Panels: Provide minimum 18 gauge Type 316 with No. 4 satin finish. Maximize panel size for installation location. Screw mount panels unless otherwise directed.

4.7.2 Steel Finishes

Exposed structural steel, steel handrails, exposed piping and conduit and associated supports shall be painted construction and finishing.

4.7.3 Floor Finishes

Floor finishes shall be selected on the basis of durability, low maintenance and shall be easily replaceable. They shall comply with sustainability requirements for low-emitting materials. Floor finishes are listed by room on the Room Data Sheets found in Section Five. Finishes selected shall require. Provide stainless steel transitions at all changes in flooring material. Provide maintenance materials for each floor type selected: five (5) full unopened boxes.

4.7.4 Floor Finish Requirements

Natural Concrete:

- Provide Euclid Surflect Light-Reflective Dry Shake Hardener sealed with Euclid Euco Diamond Hard or approved equal.
- Integrally Colored Ground and Polished Concrete:
 - ✓ Concrete to be mixed, placed and finished in compliance with "CPAA Recommendations for the Design, Specification, and Placement of Concrete Floor Slabs" from the Concrete Polishing Association of America.
- Color, aggregate size and polish level as selected and approved by the SFMTA.
- Mockup: at a location selected by the SFMTA place and finish a 10-foot by 10-foot area in compliance with "CPAA Recommendations for the Design, Specification, and Placement of Concrete Floor Slabs".
- Installer shall have 5 years minimum experience with work of similar scope and quality and shall be a CPAA certified applicator.
- Acceptable Manufacturer: L.M. Scofield Company. Provide a complete system from

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one manufacturer including but not limited to colored admixture, curing and sealing compound, chemical hardener/densifier and curing compound for polished concrete.

Walk Off Mats:

- Provide walk off mats at all entrances and at transitions between the shop or storage areas and office/administration areas. Textured patterned loop, 100 percent type 6.6 nylon. Provide 'Recourse II' by Mannington Commercial or approved equal.
- Carpet Tile: Must comply with the specification developed by the San Francisco Department of the Environment, dated June 8, 2018.
- Resilient Flooring:
 - ✓ Rubber Tile: Performance Requirements:
 - Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
 - Minimum 0.100-inch (2.54 mm) thick. Seams shall be chemically welded. Rubber tile selected shall be certified compliant with the "FloorScore" standard. Flooring adhesives shall be low VOC and shall meet the Carpet and Rug Institute Standard and "Green Label" program.
 - Provide: Endura Simply Smooth Flexibles by Burke or approved equal.
 - Rubber tile at Fitness area: Resilient Ecofitness Multifunctional Athletic Robber Flooring by Burke or approved equal.
- Linoleum Tile:
 - ✓ Minimum 2.5 mm (0.10-inch) thick, manufacturer standard size (minimum 10-inches by 10-inches).
 - ✓ Type II with polyester backing.
 - ✓ Heat welded seams.
 - ✓ Warranty period: minimum five (5) years from date of Substantial Completion.
 - ✓ Basis of Design: Modular Tile Linoleum Tile by Marmoleum or approved equal.
- Resilient Base:
 - ✓ ASTM F 1861 Type TS Rubber, Thermoset, Group I, minimum 4-inches high, 0.125-inch thick Floor Score Certified.
- Porcelain Tile :
 - ✓ Interior floor tile to be unglazed through body porcelain, minimum 1/4-inch thick, price Group 2 or greater. Provide all trim units: cove base, bullnose at external and internal corners, etc.
 - ✓ Install in compliance with the latest edition of the TCNA recommendations. Utilize method F114 with a cleavage membrane.
 - ✓ Tiles shall comply with ANSI A137.1 and have color extending uniformly through the body of the tile and provide a 0.5 percent maximum water absorption in accordance with ASTM C737.
 - ✓ Class Three (3) Commercial Medium to Heavy Traffic classification as rated by the manufacturer when tested in accordance with ASTM C1027-99 for visible abrasion resistance as related to foot traffic.
 - ✓ MOH Scale Rating of 7 or greater.
 - ✓ Slope tile floors to drain.
 - ✓ Provide expansion, control and isolation joints as needed to accommodate
- movement and maintain tile assembly integrity. Follow TCNA EJ171 Movement Joint Guidelines.
 - ✓ Provide waterproof membrane in shower areas in accordance with ANSI A118.10.
 - ✓ Wet Dynamic Coefficient of Friction (DCOF): For tile installed on horizontal surfaces, provide products with the following values as determined by testing identical products per ANSI A137.1 Section 9.6 DCOF: minimum 0.60.
 - ✓ Grout: low VOC, to inhibit the growth of mold and mildew, and meet ANSI A118.3.
 - ✓ Provide Laticrete "Spectra-Loc" or approved equal.
- Tile and installation requirements for Shower stalls:
 - ✓ Install in compliance with the latest edition of the TCNA recommendations. For tile shower receptor utilize method B415 with a waterproof membrane. Terrazzo tile receptors may be utilized with the SFMTA approval. Complete waterproofing is required including treatment at termination points.
 - ✓ Tiles shall comply with ANSI A137.1 and have color extending uniformly through the body of the tile and provide a 0.5 percent maximum water absorption in accordance with ASTM C737.
 - ✓ Class Three (3) Commercial Medium to Heavy Traffic classification as rated by the manufacturer when tested in accordance with ASTM C1027-99 for visible abrasion resistance as related to foot traffic.
 - ✓ MOH Scale Rating of 7 or greater.
 - ✓ Slope tile floors to drain.

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- ✓ ADA compliant shower stalls shall slope to a trench drain at the back of the stall.
- ✓ Provide integral soap dish.
- ✓ Provide expansion, control and isolation joints as needed to accommodate movement and maintain tile assembly integrity. Follow TCNA EJ171 Movement Joint Guidelines.
- ✓ Provide waterproof membrane in accordance with ANSI A118.10.
- ✓ DCOF: For tile installed on horizontal surfaces, provide products with the following values as determined by testing identical products per ANSI A137.1 Section 9.6 DCOF: Minimum 0.60.

4.7.5 Ceiling Finishes

Durability and ease of maintenance and access shall drive the selection of ceiling finishes. Sustainability requirements for low-emitting materials and environmental product disclosure shall be followed. Ceilings with recycled content are preferred but must meet performance criteria listed below. Acoustic properties of materials shall be considered and finishes shall be selected that reduce reverberation and noise to the greatest extent possible.

Coordination shall be required with security and communications systems and ceilings shall be designed to allow or prevent access to critical elements as needed by those systems. Access to mechanical, plumbing and electrical equipment requiring service or maintenance shall be designed into the selected ceiling systems. Ceiling access shall be provided for each room and at each equipment location.

Ceilings in maintenance bays, shops and associated storage, and the truck wash area shall be open to the deck. Exposed structural

steel structure and deck, exposed piping, conduit, raceways and shall be painted. Exposed insulation will not be allowed.

4.7.6 Acoustical Ceiling

- Tile size: 24-inches by 24-inches by (min) 3/4-inch
 - ✓ Armstrong Ultima Square or Beveled Tegular or approved equal.
- Suspension system:
 - ✓ Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation.
 - ✓ Prelude XL, Exposed Tee or approved equal.

4.7.7 Gypsum Board Ceilings

Performance Requirements:

- Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly according to ASTM E 119 by an independent testing agency.
- Attach all gypsum board to supports in accordance with the Northwest Wall and Ceiling Bureau (NWCB) Specification Standards Manual and ASTM C840.
- Paper faced gypsum board will not be allowed.
- Gypsum Board Type X: ASTM C 1396/C 1396M, 5/8-inch.
 - ✓ Basis of Design: DensArmor Plus Fireguard High Performance Interior Panel.

4.7.8 Interior Signage

Provide room identification signage for all rooms and spaces within the facility per the SFMTA Guidelines. Signage shall comply with applicable provisions of the ADA guidelines and include room numbers and names. Office spaces and other spaces as directed by the SFMTA shall have interchangeable inserts. Signage in shop areas to be made of highly durable material and shall be mechanically attached to the wall with non-corrosive fasteners compatible with the material joined (adhesive attachment will be unacceptable). Room identification signage shall be consistent in appearance throughout the building. Wayfinding signage shall be provided to facilitate access to all areas of the building.

Furnish and install all signage, required mounting and associated structural supports or backing for signage. Signage designs and locations shall be coordinated, reviewed and approved by the SFMTA prior to fabrication and installation. An approved sign location plan is required prior to the 100 percent review. The SFMTA interior signage shall include:

- Code mandated signage (including hazardous areas, safety, egress and accessibility).
- Room signage: for all rooms and spaces within the facility.
- Wayfinding Signage: clearly identify circulation routes to all areas of the facility.
- Operational signage: as directed by the SFMTA Operations.

Signage shall be designed to be architecturally compatible with the building and shall contribute to the overall character of the facility.

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4.7.9 Specialties

- Visual Display Units: Provide visual display units in conference rooms, training rooms, and lunch/break rooms. Provide marker boards and tack boards or combination units containing both marker boards and tack boards. Provide marker boards with chalk trays with lifetime surface warranty.
- Storage Shelving: Provide storage shelving as required in equipment schedule and specified here in.
- Toilet and Bath Accessories: Provide toilet and bath accessories fabricated from stainless steel. Provide paper towel dispensers, waste receptacles, toilet tissue dispensers, soap dispensers, grab bars, sanitary napkin dispensers and disposal units, shower curtains, hair dryers, mirrors, and clothes hooks, as required for convenient and efficient use of toilet and bath facilities. Provide mop sink and mop plus broom holder with shelf in custodial closets.
- Projection Screens: Provide ceiling recess mounted electrically operated projection screen in the Training Room. Screen material suitable for video projector, minimum screen size 5-feet by 7-feet.

4.8 Conveying - Elevators

- Personnel elevators: Provide elevator by Fujitec, KONE, Schindler, Thyssen, Cantonor approved equal. Passenger elevator features:
 - ✓ Capacity: 3,000 pounds.
 - ✓ Speed: per Development Team and the SFMTA
 - ✓ Car Interior and Hall Doors and Frames: Stainless steel, minimum 14 gauge. Sound deaden doors and frames.

- ✓ Emergency Return Unit: A battery powered lowering unit shall be provided to automatically return the elevator to its lowest landing at normal speed in a power failure and allow all passengers to exit safely.
- ✓ Floor Finish: Per Development Team and the SFMTA
- ✓ System Startup: Development Team to obtain and pay for permit, license, and inspection fee necessary to complete the installation.
- ✓ Power Characteristics: 480 V, 3 phase, 60 hertz.
- ✓ Minimum Clear Inside Car: minimum 6-feet 8-inches wide by 4-feet 9-inches deep by 8-feet high clear.
- ✓ Development Team shall submit 3-inch by 12-inch samples of actual finished material for review of color, pattern, and texture of exposed finishes.
- Freight elevators: Provide elevator by ThyssenKrupp, Otis, Schindler or Kone. Freight elevators shall meet all codes referenced therein. Selection of the elevator type (electric or hydraulic) shall be made based on the required performance and shall be subject to review and approval by the SFMTA.
 - ✓ Loading and Capacity: Class C-1, minimum loading capacity of 10,000 pounds, designed to transport a loaded industrial truck with the maximum combined weight of industrial truck and load not to exceed 10,000 lbs.
 - ✓ Speed: 100 feet per minute (minimum).
 - ✓ Clear Inside Dimensions: minimum 8-feet wide by 13-feet 6-inches deep
- with minimum height to accommodate an electric forklift.
- ✓ Operation: Simplex.
- ✓ Emergency Return Unit: A battery powered lowering unit shall be provided to automatically return the elevator to its lowest landing at normal speed in a power failure and allow all passengers to exit safely.
- ✓ Car Interior, Hall Doors, and Frames: stainless steel panels, minimum 14 gauge with No. 4 finish, flooring to be minimum 3/16 inch steel checker plate.
- ✓ Additional features: wire mesh car gate, stainless steel bumpers, buttons for cab protection pads.
- ✓ Provide an associated machine room as required by elevator manufacturer.
- ✓ System Startup: Development Team to obtain and pay for permit, license, and inspection fee necessary to complete the installation.
- ✓ Power Characteristics: 480 V, 3 phase, 60 hertz.
- Major elevator components, including driving machines or pump and tank units and plunger-cylinder assemblies (as applicable), controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by a single manufacturer. Elevators shall be installed by the elevator manufacturer or an authorized representative who is trained and approved by the manufacturer.
- Elevators shall be fully accessible to individuals with disabilities, meeting all requirements of the ADA Guidelines.

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- A minimum 2 year warranty from the date of Acceptance shall be provided in which Manufacturer agrees to repair, restore or replace elevator work that fails in materials or workmanship within the specified period. Failures include but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- Traveler Cable - Systems to elevator shall be provided via a traveler cable meeting the following requirements:
 - ✓ Terminate in a communications compartment/access panel on the rear wall accessible inside the car to hold communications equipment.
 - ✓ Carry compartment power for router and devices.
 - ✓ Wire-way from compartment to devices.
 - ✓ Router inside the communications compartment.
 - ✓ Router consolidates CCTV, ACS, phone if IP Phone.
 - ✓ Traveler cable to include Plastic Optic Fiber (POF) cable for IP communications to the Router. Use a POF fiber bundle in a sheath rated for Continuous-Bending. POF shall be rated for at least 5,000,000 (five million) Continuous-Bending cycles. POF fiber may be multi-mode or single mode. Terminate 1 pair of POF at elevator distribution cabinet and elevator cab systems. Leave remaining pairs

underminated in elevator and in elevator machine room.

- ✓ Provide four pairs of spare communication wires in addition to those required to connect specified items. Tag the spares in the machine room.

4.9 Plumbing

General:

The LD shall design, permit, and construct all plumbing systems. All work shall be in accordance with the California Building and Plumbing Codes with City and County of San Francisco amendments, local codes, and any criteria listed in this document.

The LD shall be responsible for verifying achievement of goals at each progress design deliverable and at permit.

All water and gas piping penetrations through concrete or masonry shall have a metallic pipe sleeve. Sleeves at floor penetrations shall extend at least 12 inches above slab. Seal all wall and floor penetrations.

Provide pipe labels for all piping every 50 feet and change of direction indicating size, content, and flow of direction.

Seismic-restraint systems shall comply with California Building Code with local amendment requirements. Refer to structural for wind- and seismic-restraint loading requirements.

4.9.1 Plumbing Piping

Potable Domestic Water:

Potable domestic water mains and new supply lines shall be installed at least 4-foot horizontally from, and one-foot vertically above a parallel pipeline conveying recycled water. The water main shall not be in the bus driveways.

Domestic water piping 3-inches and larger below the slab shall be ductile iron and piping 2-1/2-inches and less shall be ASTM B88 Type K soft copper with no joints or silver brazed joints. Above floor piping shall be ASTM B88 Type L hard copper with lead-free soldered or pressure-sealed joints. Push-on and drilled joints are prohibited. All buried domestic water pipe below slab shall be protected with 20 mil polyethylene wrap and tape and pipe sleeve at slab penetration. Hydrostatically test water piping to 100 PSI or 150 percent of operating pressure. Maintain pressure for not less than four hours.

Potable domestic water service must comply with the CCSF Plumbing Code and Health Code. Provide with a strainer and lead-free reduced pressure backflow preventer with secondary, utility grade remote reading water meter. The pulse meter shall be connected to the building automation system (BAS). The supply line to each item of equipment or fixture shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with the operation of other equipment or fixtures. Supply piping to reels, wall hydrants and equipment shall be anchored to prevent movement.

Domestic hot water piping shall be insulated.

Domestic water shall be sized to provide a minimum of 25 PSI at flush valves and 15 PSI at other fixtures. Sizing shall comply with the requirements of the California Plumbing code. Velocities with the main and branch piping shall not exceed 6 fps.

Domestic water valves 4-inches and larger shall be OS&Y gate valves type with cast iron body and bronze mounted trim type MSS SP-70 rated for a minimum of 175 PSI. Valves

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3-inches and less shall be bronze ball type MSS SP-110 rated for a minimum of 400 PSI. All potable domestic water valves shall be lead free.

Water sub metering shall be installed to monitor consumption of water uses including, but not limited to, individual monitoring of each vehicle or equipment wash area, shop area, irrigation system and all exterior hose bibs. Each sub meter shall be connected to the BAS.

4.9.2 Recycled Water

Recycled water piping shall be purple PVC or equivalent with SFPUC's City Distribution Division sign off, prior to installation.

The potable water line may be used to feed the recycled water lines(s) until such time that recycled water becomes available. When recycled water becomes available, the cross-connection will be broken by the SFPUC, and the potable and recycled water lines will be totally separated. Before recycled water is delivered to the property, cross-connection and backflow testing will take place to assure separation.

Connect water closet and urinal flushing and wash water system to metered recycled water system. Provide additional pulse meters for the boiler make-up water and wash water systems make-up water. Any irrigation systems shall have a dedicated recycled water tap with a separate meter. All meters shall connect to BAS.

4.9.3 Sanitary and Oily Waste and Vent

Sanitary/oily waste and vent piping shall be no-hub cast iron pipe and fittings.

4.9.4 Storm Drain

Storm drain piping that is not visible from the exterior of the building shall be no-hub cast iron pipe and fittings. Exterior storm piping shall be stainless steel, unless otherwise authorized by the SFMTA.

4.9.5 Waste Water Force Main

Waste water force main piping shall be ASTM B88 Type K hard copper with silver brazed joints. Above floor piping shall be ASTM B88 Type L hard copper with lead-free soldered joints.

4.9.6 Plumbing Fixtures

- Water closets shall be wall mounted with flush valve and elongated bowl and chair carrier. Water closet and flush valve shall be HET at 1.1 GPF with a MaP rating of 1000 as tested by Veritec Consulting, Inc. Flush valve shall be exposed, hydraulically powered, electronic sensor operated type with additional manual flush. Water closets and flush valves shall be suitable for use with recycled water.
- Urinals will be wall mounted flush valve type with carrier. Urinal and flush valve will be HEU at 0.125 GPF. Flush valve will be exposed, hydraulically powered, electronic sensor operated type with additional manual flush. Urinals and flush valves shall be suitable for use with recycled water.
- Lavatory will be white vitreous china, under counter mounted or wall mounted with chair carrier. Faucets will be hydraulically powered, electronic sensor operated, heavy-duty cast brass institutional grade with maximum flow rate of 0.5 GPM. Lavatory faucets shall comply with ASSE 1070.

- Sink in Break Rooms will be double compartment, under counter mounted, 18-gauge stainless steel. Faucets will be manual operated, heavy-duty cast brass institutional grade with maximum flow rate of 1.0 GPM. Sinks shall be provided with garbage disposer.
- Sink in Coffee Bars will be single compartment, under counter mounted, 18-gauge stainless steel. Faucets will be manual operated, heavy-duty cast brass institutional grade with maximum flow rate of 1.0 GPM.
- Showers will be provided with heavy-duty pressure balancing type mixing valve. Shower heads will be 1.5 GPM flow. Hand held shower heads for the handicapped will be 1.5 GPM flow.
- Electric water coolers will be dual height and constructed of stainless steel lead-free and with an integral filter and bottle filler.
- Wash fountains will be multi-station and constructed of stainless steel or precast terrazzo. Each station will be 0.5 GPM flow.
- Janitor's mop sink will be floor type constructed of precast terrazzo. Faucet will be manual operated heavy-duty cast brass institutional grade, wall mounted with support bracket, vacuum breaker with hose end spout with maximum flow rate of 2.2 GPM.
- Combination emergency/shower eyewashes shall be exposed type with floor flange, galvanized steel piping plastic shower head actuated by a stay open ball valve with rigid pull rod and handle, eyewash with large stainless steel bowl and two soft stream heads actuated by stay open ball valve with push flag. Unit will be provided with

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manufacturer's recommended thermostatic mixing valve to provide tepid (60 degrees to 90 degrees F) water in accordance with ANSI Z358.1 and local audio/visual alarm tied into the BAS. Minimum size for thermostatic mixing valve will be 44 GPM with a maximum pressure drop of 20 PSI. Pipe sizes will be 1-1/4-inch water inlet and 1-1/4-inch drain. Combination emergency shower/eyewashes shall be located throughout the maintenance areas in accordance with OSHA eyewash requirements. All emergency showers/eyewashes shall be floor drain.

- Emergency eyewashes shall be exposed type with floor flange, galvanized steel piping with large stainless steel bowl and two soft stream heads actuated by stay open ball valve with push flag. Unit will be provided with manufacturer's recommended thermostatic mixing valve to provide tepid (60 degrees to 90 degrees F) water in accordance with ANSI Z358.1 and local audio/visual alarm tied into the BAS. Minimum size for thermostatic mixing valve will be 5 GPM with a maximum pressure drop of 20 PSI. Pipe sizes will be 3/4-inch water inlet and 1-1/4-inch drain. Emergency eyewashes shall be located on the mezzanines. All emergency eye washes shall be hard plumbed and with floor drain.
- Exposed plumbing fixture trim shall be chrome plated.
- Trap primers shall be ASSE 1018 supply-type, trap-seal primer. Trap seals shall be ASSE 1072 certified waterless in-line drain trap seals at each drain outlet.
- Water hammer arrestors shall be properly applied to the domestic hot and cold

water systems for all plumbing fixtures in accordance with ASSE 1010.

- Handicapped plumbing fixtures shall be provided in accordance with ADA.

4.9.7 Plumbing Specialties

- Roof drains with overflow roof drains and roof clamps shall be provided. Roof drain system shall be sized for 1.5-inches of rainfall per hour. Storm water piping shall be no-hub cast iron above grade and HDPE below grade.
- Floor drains shall be provided in Restrooms, Showers, Changing areas, Custodial Rooms (Janitors Closets). Floor sinks shall be provided at each emergency showers/eyewashes, emergency eyewashes and Mechanical Rooms adjacent to water heaters, boilers, air compressors, HVAC units, and pumps. Reduced pressure backflow preventers shall be provided with a floor sink drain. Floor sinks for condensing domestic water heaters and boilers shall have a cast iron body and 13-inch square slotted heavy duty grate with acid resisting epoxy coated interior and top, with anti-splash interior dome strainer.
- Floor drain grates and frames in Restrooms, Showers and Custodial Rooms (Janitors Closets) shall be light duty with nickel bronze or stainless steel 6-inches grates. Floor sinks at mechanical rooms, water heaters, boilers and emergency showers/eyewashes and emergency eyewashes shall have a cast iron body and 13-inch square slotted heavy duty grate with acid resisting epoxy coated interior and top, with anti-splash interior dome strainer. Full grate configuration and emergency showers/eyewashes and emergency eyewashes. Grate configuration

for mechanical rooms shall be suitable for installation requirements.

- Floor drains in shop areas subject to wheel traffic shall be heavy-duty with 8-inch nickel bronze or stainless steel tractor grate.
- Trench drains shall be provided in lower level work areas, wash areas and overhead door openings. Grates shall be Load Class D / H-20 rated for extra heavy duty.
- Floor drains and floor sinks shall be provided with trap protection device. Trench drains shall have sediment baskets installed upstream of traps.
- Elevator pits shall be provided with sumps and sump pumps. Hydraulic elevator pumps shall discharge through an oil-water separator before discharge into the sanitary system. Provide a high level alarms for sump pump fail.
- Exterior freeze proof wall hydrants shall be box type and provided around the perimeter of each building at each man door. Non-freeze interior hose bibs shall be provided around the perimeter of the interior shop areas at 150-foot or less intervals, in lower level work areas, Restrooms and Mechanical Rooms.
- Compressed air drops shall be provided as indicated in the design criteria. Compressed air piping shall be Type L copper. Provide full-port, metal ball valves suitable for use with compressed air at all equipment to provide positive shut off, low leakage valves rated at 150 PSI suitable for piping without dielectric fittings. Provide pressure regulators, filters, quick connect couplings and accessories as required. Label piping and pressure test at 200 PSI for four hours.

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- Water hammer arrestors shall be provided on the domestic cold and hot water systems in accordance with PDI Standard WH-201. Water hammer arrestors shall be all stainless steel when installed in non-accessible locations. Provide water hammer arrestors at all solenoid valves.
- In the wash bay, provide provisions to safely and easily wash the forehead of the vehicles.

4.9.8 Plumbing Equipment

Domestic Water Heater and Accessories:

Each building will be provided with a central domestic water heating system located in the Main Mechanical Room. Water heaters will be commercial vertical ASME tank type with 400 series stainless steel or stainless steel alloy tank, 98 percent energy efficiency, low NOx rated, direct vent and sealed combustion chamber, with CPVC combustion intake and stainless steel flue vent piping.

Central domestic water heating systems shall include high/low flow thermostatic mixing valve(s) and a domestic hot water circulation pump(s) to maintain adequate temperature in the hot water circulation system throughout the building. Domestic water heating systems shall heat water to 140 degrees F and thermostatic mixing valve will be provided to temper water supply temperature down to 110 degrees F for distribution. Showers will be limited to 105 degrees F. Hot water circulation will be within a reasonable time frame from the fixture.

Central domestic hot water system shall be provided with in-line domestic hot water circulation pump to provide hot water to the fixtures within 15 seconds.

Elevator Pumps:

Each elevator shall be provided with and elevator sump and duplex pump to pump out accumulated water. Pump shall discharge to a minimum size of 6-inch industrial waste sewer pipe.

Sand and Oil Interceptor:

All maintenance shop, wash area, etc., floor and trench drains, and elevator sump that have the possibility of receiving oily drainage shall be piped to an exterior sand and oil interceptor prior to entering the site sanitary sewer system. Oil interceptor shall be sized in accordance with the Plumbing Code. Interceptor shall be precast concrete located in an accessible area for servicing.

Waste Water Lift Station:

If the waste water drainage piping systems inside the buildings are unable to connect to the site sanitary sewer piping system elevation, a waste water lift stations shall be provided. Waste water lift stations shall consist of duplex ejector pumps each sized at 100 percent of the peak load in a wet well and a separate valve vault. Duplex pumps shall alternate starts and both have the capability to run simultaneously upon rising level. Pumps shall be controlled by float switches. For ease of maintenance pumps shall be provide with stainless steel rail retrieval system. Waste water lift station shall be connected to the emergency generator. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

4.10 HVAC

General:

The LD shall design, permit, and construct all HVAC systems. All work shall be in accordance with the City and County of San Francisco, local

codes and any criteria listed in this document.

The performance goals depend on the level of insulation added to the building envelope and final glazing choice. The Development Team shall be responsible for verifying achievement of goals at each progress design deliverable and at permit. Title 24 requires HVAC design use the 0.4 percent ASHRAE design conditions for the current year. These design conditions may be exceeded for a number of hours per year (due to outside temperatures exceeding the ASHRAE 0.4 percent design conditions.) While designing to the ASHRAE 0.4 percent conditions by definition indicates that design set points will be exceeded during peak periods, typical design often requires a minimal amount of over sizing so that control is always maintained.

The SFMTA shall assist the Commissioning Agent in the development and implementation of a commissioning plan for LEED compliance.

Seismic-restraint systems shall comply with California Building Code requirements. Refer to structural for wind- and seismic-restraint loading requirements.

Each area within the Bus Yard shall be evaluated for hazardous area classification following NFPA Section 497 and NEC Sections 500-516. HVAC equipment located within each space shall be explosion-proof if relevant for the class designation (Class I, II, or III). Particular areas of concern include those where cleaning or fuel chemicals will be stored or used.

Air handling units may be either indoor or rooftop mounted and shall be located on rooftops or in enclosures with adequate ducting to intake and exhaust to enable effective operation per the manufacturer conditions. Air handlers must incorporate airside economizers

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as noted in the DCD. The Development Team shall propose the area required for air handlers based on ventilation requirements listed in the DCD, and propose locations for air handlers as part of the response.

Exhaust air ducts for air handlers and direct environmental exhaust from maintenance and other spaces shall not terminate within 3' of a property boundary or opening of the building or 10' from a forced air inlet, per CMC Section 502.2.1. Backdraft or motorized dampers are required for all exhaust openings.

Exhaust fans, air handling units, and other mechanical equipment shall be readily accessible for maintenance. Equipment installed above a ceiling must have adequate access through access panels for routine maintenance. Rooftop equipment must be provided with adequate access via a stairwell and at least 5' clearance around the equipment with a walking path. Access shall be limited to only maintenance personnel via secured openings (doors, access panels, etc.). Fans and motors weighing more than 200 pounds shall have full-length hoist rails mounted over the equipment to facilitate service, removal, and replacement.

The Site is located within an area with elevated pollution concentrations designated by the City as an Air Pollutant Exposure Zone (APEZ). As defined in San Francisco Health Code Article 38, this requires residential buildings and other sensitive uses to comply with an enhanced ventilation requirement. All residential units and other sensitive use spaces as defined in Article 38 must be provided with a ventilation system capable of achieving PM2.5 protection equivalent to that associated with MERV 13 filtration, as defined by ASHRAE Standard 52.2.

- RFP phase: Proposers shall indicate in their proposed design how they will achieve compliance with Article 38 requirements and demonstrate how compliance is expected to be met.
- PDA phase: To ensure compliance with the intent of this article, and to limit impact from potential pollution sources generated on-site at the Facility, the design team shall undertake a CFD evaluation of impact to at least one residential unit per façade. CFD analysis shall indicate the concentration of different particulate matter sizes developed in the unit and determine the equivalent MERV rating based on ASHRAE Standard 52.2. Mitigations shall then be determined to achieve a minimum MERV 13 compliance.
- Based on the results of this analysis during the PDA phase, the Development Team shall be responsible for creating a ventilation plan demonstrating compliance with this article, and submitting it to the San Francisco Department of Public Health for review and approval prior to submitting mechanical drawings for approval. Plans must indicate the path of outdoor air and filtration, impact of z-ducts, trickle vents, or other unfiltered air intakes to units, and strategies for common areas of residential units (note that common areas do not require enhanced ventilation if positive pressure is maintained in adjacent units and habitable spaces). The submission shall also include the findings from the CFD analysis.

4.10.1 Codes and Standards

The following design conditions apply to all interior building types and uses, unless noted otherwise.

Load Calculations:

- Use Radiant Time Series calculation methodology for cooling. Do not use occupancy schedules for cooling system design.
- Do not use internal heating load sources (lights, receptacles, people) when calculating heating system design loads.
- Account for duct leakage in load calculations
- Account for fan heat in load calculations. Model fan static pressure at dirty filter condition.
- Energy modeling programs shall meet all requirements of the USGBC LEED rating program energy modeling requirements. Energy modeling program shall be able to fully simulate all 8,760 hours in a year. The energy modeling program shall be able to separately schedule occupancy, internal loads, lighting, fans, compressors, and other plant equipment. The energy program shall be able to breakout packaged equipment to model supply fan energy separately from packaged energy rates.

4.10.2 HVAC Systems for Cooled and Heated Spaces

Unacceptable Systems:

- Variable Refrigerant Flow systems are not acceptable because the system is proprietary once a specific manufacturer is selected and installed.
- Systems that utilize electric resistance heating as the primary heating source are prohibited.
- Ground source heat pumps and packaged terminal air-conditioners or heat pumps (PTAC/PTHP) are prohibited.

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- Split-systems, except for isolated or remote rooms that require air-conditioning or heating and extending the main air or water distribution service is not cost effective.
- Baseboard, fan coil units or other floor-mounted equipment in occupied spaces. Local vertical fan coil units or heat pumps may be used if they are installed in mechanical closets.

4.10.3 System Notes

Systems that use terminal equipment as the primary cooling and air distribution source including, but not limited to fan-coil units, local heat pumps, chilled beams, etc. shall use a Dedicated Outdoor Air System (DOAS) to deliver outdoor air to occupied spaces. DOAS systems shall use exhaust air energy recovery utilizing total energy wheels. DOAS systems may deliver outdoor air to the return side of terminal devices or direct to space. DOAS units shall cool and dehumidify outdoor air to at least a 52 degrees F dew point prior to distribution to terminal devices or spaces. Provide filters upstream of the energy wheel in both airstreams. Outdoor air filters shall be minimum MERV 13. Exhaust air filters shall be minimum MERV 8. Supply fan motors and exhaust fan motors shall be driven with VFDs. Provide airflow stations in both the outdoor airstream and exhaust airstream and adjust fan speeds to maintain design airflow rates as filters load.

HVAC Zones - Up to four offices may be combined on one thermostat controller, provided the offices have identical solar, or the like, heat loading. If a corner office has two different window exposures, then provide a separate zone controller. Each conference room, training room, lounge or other similar room shall have its own zone controller.

4.10.4 HVAC Systems for Heated and Ventilated Spaces

Required Heating System:

In-floor radiant heating for maintenance bay areas and wash bays. Other storage rooms and shop rooms in the maintenance area may use forced air heat or overhead radiant heat.

Air Distribution System Design:

- Louvers:
 - ✓ The mechanical engineer shall select and specify louvers for all air associated with the HVAC system design.
 - ✓ Use wind-driven rain louvers.
 - ✓ Orient louvers so that prevailing winds do not oppose exhaust airflow to the maximum practical extent.
- Duct Design:
 - ✓ All ductwork shall be G90 galvanized steel except in areas where special requirements dictate aluminum or stainless steel duct construction.
 - ✓ Duct construction shall be in accordance with SMACNA HVAC Duct Construction Standards except that minimum duct thickness allowed shall be 24-gauge galvanized steel in all locations.
 - ✓ All duct systems shall be sealed to SMACNA Seal Class A.
 - ✓ Specify ducts to be constructed to the next higher pressure class than the maximum anticipated operating pressure.
 - ✓ Duct systems operating at a pressure class greater than 2-inches (positive and negative) shall be constructed of round or oval spiral seam ducts.
 - ✓ Duct elbows that have an air velocity exceeding 2,000 fpm shall have a radius/width ratio of 1.5. Duct elbows that have

an air velocity less than 2,000 fpm shall have a radius/width ratio not less than 1.0. All mitered elbows with a turning angle greater than 30 degrees shall use single wall turning vanes. All tees shall include turning vanes. Branch duct taps shall be use low-loss fittings.

- ✓ Acoustical duct liner shall be flexible elastomeric designed specifically for sound attenuation. Glass fiber or mineral fiber duct liner is not acceptable. Acoustical duct liner in ducts with an air velocity exceeding 2,000 fpm shall utilize double wall duct with a galvanized steel perforated duct liner. Acoustical duct liner in ducts with an air velocity less than 2,000 fpm may use single wall duct.
- ✓ Duct insulation shall be flexible wrap with factory applied FSK jacket. Ducts located in high-abuse areas such as mechanical rooms shall be rigid board insulation with factory-applied ASJ.
- ✓ All dampers that process outdoor air shall use 316 stainless steel dampers. Control actuators shall be mounted outside the airstream.
- ✓ Outdoor air dampers, exhaust air dampers, and control dampers shall meet AMCA Publication 511 Class 1 leakage requirements.
- ✓ Dampers at air-handling units mixing plenums and two-position dampers shall be parallel blade. All other control dampers and balancing dampers shall be opposed-blade.
- ✓ Fire dampers shall be "blades out of airstream" type.

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- ✓ Balancing dampers shall be located in duct branch as far from the supply air terminal as possible.
- VAV Terminal Units:
 - ✓ Acceptable types are single duct shut-off and parallel fan-powered. Preference is for single duct shut-off due to additional maintenance and noise concerns with fan-powered units. Fan-powered units if used shall only use electronically commutated fan motors. VAV units shall be pressure independent.
 - ✓ Select VAV units that can throttle to 20 percent of design airflow to reduce unnecessary reheat.
 - ✓ VAV units shall be double wall construction.
- Air Terminals:
 - ✓ All diffusers, registers, and grilles shall be aluminum construction.
 - ✓ Select air terminals with a high air diffusion performance index (ADPI) for the specific room.
- **Water Distribution System Design:**
 - Chilled Water Piping
 - ✓ Up to and including 2-inches – ASTM B88 Type L copper (use ASTM B88 Type K copper below grade)
 - ✓ 2-1/2-inches and larger – ASTM A53 Schedule 40 steel.
 - ✓ Pipe insulation – fiberglass, thickness as required by ASHRAE 90.1. Provide ASJ with vapor retarder on all chilled water piping. Chilled water piping greater than 1-1/4-inches located in unconditioned spaces and in all mechanical rooms shall use minimum 2-inch thick phenolic or 3-inch thick cellular glass. Chilled water piping 1-1/4-inches and smaller shall use 1-1/2-inch thick flexible elastomeric.
 - Pipe jacket – provide ASJ with vapor barrier in all locations. Provide PVC jacket in mechanical rooms and other areas subject to damage. Provide stainless steel jacket outdoors above grade.
 - Chilled Water Condensate Piping
 - ✓ Up to and including 2-inches – ASTM B88 Type L copper (use ASTM B88 Type K copper below grade)
 - ✓ 2-1/2-inches and larger – ASTM A53 Schedule 40 steel.
 - ✓ Pipe insulation – fiberglass with ASJ and vapor barrier or flexible elastomeric. Thickness as required to prevent surface condensation. Provide cleanouts on high ends of condensate piping.
 - Heating Water Piping
 - ✓ Up to and including 2-inches – ASTM B88 Type L copper (use ASTM B88 Type K copper below grade)
 - ✓ 2-1/2-inches and larger – ASTM A53 Schedule 40 steel.
 - ✓ Pipe insulation – fiberglass, thickness as required by ASHRAE 90.1. Provide ASJ with on all heating water piping.
 - ✓ Pipe jacket – provide ASJ in all locations. Provide PVC jacket in mechanical rooms and other areas subject to damage. Provide stainless steel jacket outdoors above grade.
 - Radiant Floor Heating Piping
 - ✓ Cross-linked high density polyethylene (PEX) manufactured in accordance with ASTM F876 and ASTM F877. Radiant floor tubing shall carry a minimum 30-year warranty.
- Pipe Hangers
 - ✓ Provide clevis type hangers with insulation shield, minimum 12-inches long centered in hanger. Strut systems may also be provided with protective insulation shield.
 - ✓ Use pipe rollers, guides, and expansion loops as necessary to accommodate thermal expansion.
- Flow meters, Separators, and Expansion Tanks
 - ✓ Provide in-line electromagnetic type. Provide isolation valves on both sides of meter with minimum straight pipe distance recommended by flow meter manufacturer.
 - ✓ Provide air and dirt separator in chilled water and heating water systems at plant. Provide dirt separator in condenser water system. Provide isolation valves on both sides of separator.
 - ✓ Expansion tanks shall be welded steel closed bladder type, tested and stamped in accordance with ASME SEC VIII, rated for working pressure of 125 PSIG, with replaceable flexible heavy-duty bladder.
- **Refrigerant Distribution System Design:**
 - Refrigerant Piping shall be ACR copper.
 - Pipe insulation – Flexible elastomeric, thickness as required by ASHRAE 90.1. Insulation both suction and gas piping separately.
 - Pipe jacket – Provide PVC jacket in mechanical rooms and other areas subject to damage. Provide stainless steel jacket outdoors above grade.

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- Use only brazed joints.

4.11 Equipment

General:

- All motors powered by variable frequency drives shall include a motor shaft grounding ring. All motors shall be premium efficient. Use direct drive motors where available
- Use electronically commutated motors in small, low power applications where available. Provide minimum 6-inch tall concrete housekeeping pads for major equipment
- Fouling factor for heating water heat-transfer coils shall be at least 0.00025 hr-ft, 2 degrees F/Btu.
- Provide buffer tanks if system water volume is below recommended minimum system values as directed by manufacturers.

4.11.1 Air-Cooled Chillers

Provide a factory assembled and tested, positive displacement packaged chiller. Design for primary variable flow to avoid unnecessary constant volume pump energy. Select chillers that maximize IPLV. Select chillers that have minimum turndown of 25 percent or lower. Provide chiller with the following features: Factory installed evaporator flow switch. Provide condenser coil with factory applied coating to protect against salt water corrosion. Air cooled chillers to be provided with these features.

- Microchannel condenser coil
- Low ambient controls to 0 degrees F
- Single point of power and integral disconnect switch
- Factory-insulated evaporator
- Hail guards
- Chiller heater
- Controls transformer

4.11.2 Central-Station Air-Handling Units

Central-station air-handling units shall be 18-gauge galvanized steel double wall casing. Casing insulation shall be a minimum R-12 rigid insulation. Insulation shall not be exposed to airstream. The casing air leakage rate shall be no more than 1 percent at 8-inches of water gauge pressure.

Hinged access doors shall be provided in every section requiring routine access for maintenance including, mixing plenums with damper actuators, filter section, access sections for coil cleaning, and fan sections. Provide LED lights in all access sections. Access doors shall be thermally broken and gasket around door perimeter.

Provide base rail and concrete pad combination necessary to support correctly sized condensate drain trap. Minimum base rail height shall be 6-inches.

Provide 4-inch thick MERV 8 pre-filters and MERV 13 pleated final filter. Each filter bank shall have a separate differential pressure gauge and separate analog inputs to BAS.

Provide window and lights in fan sections.

Hydronic coils shall be AHRI rated. Provide coils with thickest fin option. Provide coils with manufacturer applied coating to protect against salt air corrosion. Drain pans in chilled water coil section shall be stainless steel and constructed in compliance with ASHRAE Standard 62.1. Maximum face velocity for chilled water coils shall be 500 fpm.

Air-handling unit fans shall be direct drive plenum type, minimum Class II fan construction. Air-handling units greater than 20,000 CFM shall use at least two supply fans. Select fan and motor with pre-filter and main filter both at dirty filter conditions.

4.11.3 Heating Water Boilers

Boilers shall be certified and listed in accordance with AHRI.

UL Compliance: Boilers must be tested for compliance with UL 834, "Standard for Heating, Water Supply, and Power Boilers-Electric" Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

ASME Compliance: Condensing boilers must be constructed in accordance with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers".

Minimum of two boilers each sized at minimum 75 percent of design peak plant demand.

Stage boilers to provide maximum plant efficiency while maintaining minimum recommended flow rates through operating boilers.

Provide boilers to support variable-primary flow system configuration. Provide heating water boilers that do not require constant volume circulators.

Pipe boilers in reverse-return configuration at the boiler plant. Provide balancing valves on the low-pressure side of each boiler. Provide motor-operated isolation valves at each boiler to automatically shut-down flow through non-firing boiler.

Provide control interface to the BAS system.

4.11.4 Circulating Pumps

- Use split-coupled vertical in-line pumps
- Provide at least one pump to meet design flow condition and at least one back-up pump for all system types. Program pumps to alternate between operating duty and backup duty to equalize runtime.

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4.11.5 Water-Source Heat Pumps (WSHP)

Water-Source Heat Pump systems may use either tower/boiler water loop.

WSHP units 6-tons and smaller shall be use two-stage compressors and have an electronically commutated supply fan motor capable of automatically changing fan speed in response to space temperature demand. Size WSHP zones to maintain unit sizes no greater than 6 tons.

4.11.6 Chilled Beams

Chilled beam systems shall include temperature sensors and control algorithms to prevent condensation.

4.11.7 HVAC Controls

All HVAC equipment shall be fully integrated into a Building Automation System (BAS). All control set points shall be able to be viewed and remotely changed from the BAS operator workstation. Control and monitoring points available through equipment manufacturer's controller (including, but not limited to chillers, boilers, packaged DX-equipment, computer room units, etc.) shall be fully integrated with the DDC control system. This shall include all instrumentation and interface points.

All equipment shall operate on the local BAS controller or integrated packaged unit manufacturer's controller. The unit controllers and packaged equipment controllers shall have two way communication with the BAS and allow all control functions, alarms, operating schedules, set points, set point adjustment, optimum start and optimum stop sequences relayed to the BAS using BACnet protocol. The unit controller shall retain programming, schedules, and set points in the event of a power loss. Critical HVAC equipment shall have its control system on backup battery and

emergency generator. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

Provide control products including controllers, sensors, actuators, control dampers and devices required to make a complete and functional control system. Provide air measuring stations for outside air intake.

Provide items for operating and controlling heating, cooling, ventilating, systems and equipment for energy management and conservation. Include piping, wiring, conduit, control panels, thermostats, timers, and recording and alarm devices. Interlock controls with site BAS. System and components must be BACnet compliant.

4.11.8 Energy Metering

All energy meters shall report both consumption and demand for each system and sub-system listed. Energy data shall be fully integrated into the BAS. The BAS controls contractor shall be responsible for ensuring all connections from the energy meters to the BAS system are made and are fully functional. Provide separate electrical meters for:

Process power loads such as lighting must be metered and monitored by BAS separate from normal building consumption to have a comparable baseline between actual energy consumption and modeled energy.

Provide and monitor heating water system Btu meter for each unique boiler plant. Provide and monitor chilled water system Btu meter if applicable. Water flow meters shall be in-line electromagnetic type.

Provide and monitor domestic water meter(s).

4.11.9 Systems Testing and Balancing

Piping and Air Systems Testing, Adjusting and Balancing: Testing, adjusting and balancing agent must be AABC, NEBB or TABB certified. Makeup air units, exhaust fans, and air distribution system to be balanced in accordance with certifying agency standards. All system controls operation to be verified. Assist the Commissioning Agent as needed.

4.11.10 Building Automated System

The Building Automated System (BAS) shall be non-proprietary open protocol, BAC-net capable, and designed to be fully interoperable the existing SFMTA network of BMS systems presently functioning in other buildings. The PPC will coordinate with the SFMTA with respect to the SFMTA's established BAS system architecture, as well as standards and procedures in how to automate, record and track building systems and their performance over time. This shall include the ability for the SFMTA to monitor and manage the Facility's BAS system remotely using any PC that is connected to the SFMTA BAS internal network. The BMS shall be developed in coordination with the Project's Building Information Model (BIM).

4.12 Fire Protection**General:**

The Bus Yard Component and Common Infrastructure shall be fully protected with automatic fire suppression systems including wet and dry pipe automatic sprinklers, in-rack or ESFR sprinklers in high rack storage area, and fire department standpipe hose valve stations, and clean agent gas fire suppression systems.

A minimum of two fire department connections (FDC) shall be provided for the Facility on separate streets in locations approved by the

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San Francisco Fire Department (SFFD), each FDC shall be located within 100 feet of a fire hydrant. Provide FDC signage as required by the SFFD.

Provide a complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. Shop drawings, seismic and hydraulic calculations shall be provided as specified in NFPA 13 and 14. Fire suppression system permit plans and hydraulic calculations shall be sealed by an appropriately licensed fire protection contractor.

4.12.1 Fire Pump

Conduct a fire water flow test prior to design. If the fire flow test demonstrates insufficient water supply to satisfy the expected fire suppression demands coordinate with the City necessary infrastructure upgrades. A fire booster pump system shall be provided to supply fire water to the Project.

- A jockey pump shall be provided to maintain the system pressure.
- Fire pump shall be provided with both a test header and a closed test loop with flow meter.
- Fire pump shall be provided with an automatic transfer switch to transfer power from the building emergency generator. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

Sprinklers:

- Office Areas, Toilet Rooms, Locker Rooms, Lounges, Conference Rooms and similar type areas shall be designed based on Light Hazard Occupancy. The minimum design density shall be 0.10 GPM/sf over the hydraulically most

remote 1500 sf with a maximum sprinkler spacing of 225 sf. Hose stream allowance shall be 100 GPM.

- Office Storage Rooms, Custodial Rooms, Mechanical and Electrical Rooms and similar type areas shall be designed based on Ordinary Hazard Group 1 Occupancy. The minimum design density shall be 0.15 GPM/sf over the hydraulically most remote 1500 sf with a maximum sprinkler spacing of 130 sf. Hose stream allowance shall be 250 GPM.
- Shops and Service Areas (Non-Vehicle Maintenance) and similar type areas shall be designed based on Ordinary Hazard Group 1 Occupancy. The minimum design density shall be 0.15 GPM/sf over the hydraulically most remote 1500 sf with a maximum sprinkler spacing of 130 sf. Hose stream allowance shall be 250 GPM.
- Vehicle Maintenance Shops and Service Areas and similar type areas shall be designed based on Ordinary Hazard Group 2 Occupancy. The minimum design density shall be 0.20 GPM/sf over the hydraulically most remote 1500 sf with a maximum sprinkler spacing of 130 sf. Hose stream allowance shall be 250 GPM. The fire system in the main shop shall be designed to shut down the high voltage traction power instantaneously when the sprinkler or standpipe system is activated.
- Loading docks and building canopies with storage or vehicles parked beneath shall be provided with dry pipe automatic sprinkler systems with design based on Ordinary Hazard Group 2 Occupancy. The minimum design density shall be 0.20 GPM/sf over the hydraulically most remote 1950 sf or largest room, whichever is less, with a maximum

sprinkler spacing of 130 sf. Hose stream allowance shall be 250 GPM.

- Storage areas with storage 12-feet or less high shall be based on protection of Class IV encapsulated commodities stored on racks up to 12-feet high. Automatic sprinkler design shall be based Miscellaneous Storage, Extra Hazard Group 1, with minimum design density shall be 0.30 GPM/sf over the hydraulically most remote 2500 sf with a maximum sprinkler spacing of 100 sf.
- Storage areas with high rack storage above 12-feet high shall be based on protection of Class IV encapsulated commodities. High hazard commodities, such as rubber tires, Group A plastics, flammable liquids, idle pallets and similar commodities shall not exceed a height of 5-feet, stored on racks spaced 8-feet or greater apart, with storage up to a maximum height of 20-feet high. Automatic sprinkler design shall be based on in-rack sprinklers accordance with NFPA 13 with a maximum sprinkler spacing of 100 sf for ceiling sprinklers. Comply with NFPA 13 for ESFR coverage if used.
- In addition to the sprinkler systems, Maintenance, Inspection, Service and High Rack Storage (over 12-feet high) Areas shall be provided with a 2-1/2-inch fire department valve stations including a 2-1/2-inch angle valve with a capped outlet for fire department hose connection.
- For dry automatic sprinkler systems, the hydraulically most remote area shall be increased 30 percent.
- Dispatch and IT Server Rooms shall be provided with clean agent fire extinguishing gas system.

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- Heads shall be centered in ceiling tiles where acoustical ceiling tile is present. Two-piece adjustable escutcheons and extended coverage heads are prohibited.

Clean Agent Fire Suppression:

- Clean agent fire suppression systems shall be provided in Communication Rooms, Data Rooms and Computer Rooms where critical or high cost computer/network equipment is present. Clean agent suppression system shall be either fluorinated ketone (PFC) type clean agent or an inert gas system.
- Provide back-up wet automatic sprinkler systems in rooms with clean agent unless required by AHJ. If wet system is required, system shall be a preaction type dry system.

Standpipes:

- A Class 1 Standpipe system shall be provided throughout the Facility for Fire department access. Provide 2-1/2-inch fire department valves in accordance with NFPA 14.
- Initial coordination with San Francisco Fire Department indicated their preference for standpipes to be provided to the roof. Walkways and ladders will be requested to provide access to locations inaccessible to ladder trucks due to the presence of track, OCS wiring, or adjacent buildings.
- Automatic shutdown of OCS power systems shall be provided in response to fire detection or activation of fire suppression system.

Fire Suppression Piping:

- Fire water service from the existing site fire water main shall be routed below grade to provide service to each building. Underground fire service from inside 5-feet of the building to inside shall be ductile iron or stainless steel.

Underground service shall be wrapped in accordance with AWWA C105.

- Schedule 40 black steel pipe with threaded ends, ductile or malleable iron fittings for piping 2-inch and smaller. Schedule 40 black steel pipe with roll-grooved ends and uncoated fittings for piping 2-1/2-inch and larger. Dry pipe sprinkler system piping shall be Schedule 40, galvanized steel.

Fire Alarm and Supervisory Systems:

- Automatic sprinkler water flow alarm(s) shall be provided and connected to the fire alarm system and transmit a water flow alarm to the Fire Department and building fire alarm. Sprinkler valve tamper switches shall transmit a trouble alarm to the Fire Department and provide a local audible signal. Sprinkler systems shall have inspector's tests stations. Coordinate monitoring of tamper and flow switches with fire alarm contractor.

4.12.3 Fire Protection Specialties

Provide firefighting devices and storage cabinets, not including items or devices physically connected to a fire protection system. Include the following:

- Fire Extinguishers (FE) on brackets attached to wall.
- Fire Extinguisher Cabinets (FEC).
- Signage and Pavement Markings.
- Fire Department Key Box. As required by SFFD.

4.13 Electrical

General:

- The LD shall design, permit and construct all power, lighting, control, communications, fire alarm, and security systems as described in

all Sections of this Design Criteria. All work shall be in accordance with the listed Criteria. The Electrical Scope of Work shall include, but not be limited to:

- ✓ Site investigation to examine existing conditions
- ✓ Coordination with PG&E, the SFMTA representatives, building department, and other AHJ.
- ✓ Preparation of Construction Documents including drawings, calculations, analyses, protective device coordination, specifications, shop drawings and other necessary documents to fully describe the electrical work and to prove compliance with the listed criteria.
- ✓ Design and construction of Electrical components in accordance with listed seismic design requirements.
- ✓ Preparation of forms and exhibits as required to show compliance with prescribed energy and sustainability codes, standards and guidelines.
- ✓ Completion of necessary forms and documentation for electrical permits and energy code compliance as it pertains to the electrical work.
- ✓ Work with the SFMTA IT Department to define the power for systems components. Define requirements for power and communication conduit to meet systems requirements.
- ✓ Coordinate all electrical design work with the mechanical designer(s) and Facility design engineers to ensure all items requiring electricity are connected as well as environmental conditions for equipment such as the UPS batteries are met.

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- ✓ Coordinate between the elevator contractor and the electrical contractor work to meet all applicable local/state codes. This shall be delineated in the specifications and the design.
- ✓ Identify general location of equipment to define chases, duct-banks and support requirements to be included in building and structure. Provide information to architects and ensure that space is provided.
- ✓ Testing, coordination, observation, commissioning and reporting.
- ✓ Design and construction of BEB infrastructure, per Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements.
- ✓ Design and construction of electrical infrastructure and fit-out of electric non-revenue vehicle charging.
- ✓ Coordination, disconnection, and reconnection of OCS Traction Power system to support trolley bus charging.

Calculations and Analyses:

- Submit the following calculations and analyses, sealed by a Registered Professional Engineer:
 - ✓ Demand load as calculated per requirements of NFPA 70 Article 220.
 - ✓ Lighting Photometrics: Submit point-by-point calculations for 100 percent of the site and each unique room type in the buildings. Submit separate calculations proving compliance with NFPA 101 for emergency/egress lighting.
 - ✓ Emergency generator – provide calculations proving the capability of the proposed generator to serve the required

emergency loads plus 25 percent spare capacity. The analysis shall assume the spare capacity load to be constant kVA load. Analysis shall include starting of motor loads as sequenced by the BAS. Calculations shall assume generator operation with diesel fuel source. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

- ✓ Short circuit – provide calculated momentary (0.5 cycle) fault current values for all 15 kV and 480V busses, and 208/240V panels served from 75 kVA or larger transformers.
- ✓ Arc flash (hazard analysis, arc flash boundary, incident energy) – provide calculation results for all busses 150V (AC and DC) and greater.
- ✓ Voltage drop – provide calculations for the main building services, feeders longer than 50-feet, all site lighting branch circuits, and all branch circuits longer than 75-feet or loaded greater than 50 percent of the circuit rating.
- ✓ Protective device coordination – provide time-current curve (TCC) plots showing proper coordination of all panel main breakers with upline devices, coordination of switchboard feeder breakers with main breakers and coordination of switchboard main breakers with 15 kV feeder relaying.
- ✓ Fire Alarm – provide battery capacity calculations proving compliance with NFPA 72.
- ✓ UPS – provide battery capacity calculations.

Building Electrical Service:

- 480Y/277V shall be provided for the facility from the utility-owned transformer and electrical service. The service shall be sized using Appendix C as a guide, with final calculations provided and verified by the LD. The building service shall be rated to carry 150 percent of the building demand load at 104 degrees F maximum, and 86 degrees F average daily temperature. The LD shall accommodate any required electrical equipment for the building service in accordance with PG&E and SFPUC requirements.
- Low voltage service from the PG&E service equipment to the building switchgear shall be routed in a concrete encased duct bank. Two spare conduits shall be provided.

4.13.1 Building Power Distribution

- The building power distribution shall be organized substantially as presented in Appendix C, or as required by the SFPUC or PG&E in response to the Applications for Electrical Service initiated by the SFMTA. The main switchboard shall be rated for 150 percent of the building demand as calculated per NFPA 70 Article 220, 480Y/277V and provided with the following:
 - ✓ Copper phase bussing with a solidly grounded copper neutral bus and copper ground bus.
 - ✓ A main circuit breaker with intelligent solid-state LSIG trip units with data communications.
 - ✓ Fully rated feeder circuit breakers with solid-state intelligent LSIG trip units with data communications to serve the essential loads.

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- ✓ Fully rated feeder breakers with solid-state intelligent LSIG trip units for the shop and building distribution panelboards.
- ✓ A digital power metering system capable of providing data to the BAS.
- ✓ A Surge Protective Device integral to the switchboard, sized to protect all facility elements served through the switchboard.
- ✓ Backup power for switch gear control circuit.
- ✓ Transformers supplying non-linear loads will be K-rated.
- Building distribution shall be provided via a system of 480Y/277V circuit breaker distribution panelboards and a combination of 480Y/277V and 208Y/120V smaller branch panelboards. Electrical panels shall have copper buses with bolt-in circuit breakers. Plug-in circuit breakers will be allowed for circuit breaker sizes over 100 amperes where a positive locking device is available to retain the circuit breaker in place. Panelboards shall be provided with a main circuit breaker and shall be fully rated for anticipated fault current levels. Panelboards serving non-linear loads shall be furnished with a 200 percent rated neutral bus. Series rated circuit breakers shall not be used. All branch circuit and lighting panelboards shall be fully populated with circuit breakers. 20 percent of the circuit breakers in each panel shall be spares. Distribution panelboards shall have spare spaces amounting to 20 percent of the total breaker space. Conductors for all power circuits shall be THHN/THWN insulation.
- Sub-Metering: Building loads shall be sub-metered for energy consumption. Metering and data collection shall be provided as

required for LEED EA Credit “Advanced Energy Metering”. Load sub-categories shall also be metered.

Interior Lighting:

- All interior and exterior lighting shall employ fixtures with LED light sources. Interior lighting will generally be served at 277V in order to reduce circuit losses.
- Lighting in administrative areas shall typically be provided from LED direct/indirect grid troffers and recessed downlights. All spaces having a lay-in grid ceiling shall employ recessed fixtures, except spaces with ceiling heights of 9-feet or greater may be provided with pendant/stem mounted linear direct/indirect architectural fixtures.
- Exit signs shall be internally illuminated LED type. The emergency lighting at the exterior egress doors shall be provided to illuminate the path of egress outside of the exit.
- Lighting in the maintenance, shop and warehouse areas shall be LED high-bay fixtures. Maintenance pit lighting shall be enclosed and gasketed 4-foot strip LED fixtures with IP66 rating. Fixtures shall be mounted on or adjacent to the track support structures, with provisions to allow the individual fixtures to be rotated by hand to any angle from +90 degrees to -90 degrees relative to horizontal.
- Individual offices, group offices and conference room lighting shall be controlled with dual-technology occupancy sensors and daylight dimming controls. Lighting in conference rooms and training rooms shall be designed to an average level of 30 foot-candles, and shall be dimmable to 5 percent of maximum output.

- Spaces without occupancy-based controls shall be provided with lighting controls that operate on a scheduled time-of-day basis with one or more override switches to selectively extend lighting past the scheduled shut-off time. All controls shall conform to ASHRAE 90.1 guidelines.

Engine Generator:

- A diesel-fueled engine generator set shall provide power for the emergency/standby system loads. The presence of life safety loads requires the generator to be diesel powered. Generator set capacity shall be 125 percent of the calculated demand of the designated emergency loads. Provide a storage tank with a capacity to store 24 hours of fuel at a generator output of 100 percent of nameplate rating. See Section 4.8.1 for the resilience and recovery requirements for the facility. Provide the following accessories and options:
 - ✓ IBC seismic certification.
 - ✓ Corrosion-resistant sound attenuating enclosure.
 - ✓ Lead-acid starting battery.
 - ✓ Remote control/annunciator panel having all capabilities of the local control panel. The remote panel shall be located interior to the East in a normally-occupied space.
 - ✓ Control panel shall have network communications capability.
 - ✓ Engine block heater, jacket type heater for starting battery.
 - ✓ Alarms for low LP fuel tank level.
 - ✓ Alarm for low battery voltage.
 - ✓ Alarm for battery charger failure.

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The code-required emergency power for the lights will be provided from the generator. In addition to the emergency lighting load and other life safety loads, it is anticipated that the generator may be designed to carry additional loads within the facility. IT/communications systems, some HVAC loads, some bus charging loads, and some industrial equipment loads may be connected to the generator. The exact composition of the emergency loading will be coordinated with the SFMTA during the design phase. This loading will drive the generator sizing to handle the load and methods of facility operation in accordance with the SFMTA requirements. Some luminaries may be connected to the generator to provide operational lighting in the event of a power outage.

Items that must be on emergency power:

Life Safety Loads:

- Pathway egress lighting
- Exit lighting
- Fire alarm systems
- Other loads to ensure human life safety

Critical Electrical Loads:

- Telecommunication rooms and systems
- Security systems
- Communications systems
- HVAC equipment serving these spaces
- HVAC control system
- Elevator(s)
- Fume ventilation systems
- BEB backup as described in Division 5 (*Battery-Electric Bus Supplemental Criteria*) of the Technical Requirements

Additional Emergency Loads:

- Automatic garage door openers at entrances and exits of building.

Optional Emergency Loads:

- Two – four maintenance bays – the SFMTA with the assistance of the design team to specify in final design.
 - Compressor(s) and dryer(s).
 - Lube pumps - the SFMTA with the assistance of the design team to specify in final design.
- Battery electric charging equipment – the SFMTA with the assistance of the design team to specify percentage in final design.
- Section 4, Sitework, describes the SFMTA coordination underway with PSE to provide separate power feeders to the East site and the E335 TPSS.

Automatic Transfer Switches/Load Bank:

- Multiple automatic transfer switches (ATS) shall be provided to transfer loads between the normal power system and the emergency power system. Loads shall be assigned to the ATS in accordance with NEC Article 700. Provide a load bank to allow exercising the generator under load without interruption of the building emergency loads. The load bank shall be sized at 100 percent of the maximum generator rating and shall have a step load capability in increments of 25 percent, 50 percent, 75 percent and 100 percent of the load bank rating. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

UPS System:

- Loads which cannot tolerate more than a ¼ cycle interruption shall be provided with internal or dedicated battery backup and/or connected to a central UPS or inverter system. These loads include, but are not limited to:

- ✓ Fire alarm systems (battery).
 - ✓ CCTV systems (UPS).
 - ✓ Telecommunications equipment (UPS).
 - ✓ Emergency Telephone System (ETEL) (UPS).
 - ✓ AC/DC switchgear controls (battery).
 - ✓ BAS PLC (UPS).
 - ✓ Access control (UPS).
- The building UPS systems shall be sized to serve the anticipated demand load plus spare capacity of 25 percent. The UPS batteries shall be sized to carry the maximum UPS rated load for a period of 90 minutes. The Development Team shall submit calculations which support the required size of the UPS and batteries. The UPS input shall be fed from the generator or the secondary utility feed for continued operation following the rated load period of 90 minutes. A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

Service & Distribution:

- Dry-type distribution transformers shall be utilized to provide the 208Y/120V service to the branch panelboards serving the convenience receptacle and small motor loads. All dry-type distribution transformers shall be energy efficient type having the Energy Star rating. Dry-type transformers shall be VPI insulated. Indoor dry-type transformers shall have copper windings, 220 degrees C insulation and shall have a maximum winding temperature rise of 115 degrees C above an ambient temperature of 40 degrees C. Where transformers serve a significant amount of non-linear loads, the transformers shall have a “K” rating to handle the additional heating caused by high-harmonic load content. The

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neutral of secondary feeders from K-rated transformers shall be sized at 200 percent of the ampacity of the phase conductors.

Disconnecting Means:

- Receptacles for all small equipment loads may serve as the disconnecting means. 480V and 208V loads shall be provided with a disconnect (safety) switch with means to padlock disconnect in the off position. All safety switches shall be heavy-duty type. Transformers not located within eyesight of their source panel shall be provided with a disconnect (safety) switch on the primary side of the transformer.
- Motor loads ½ horsepower and larger shall be served at 480V 3 phase. Small fractional horsepower motors shall be served at 120V 1 phase. Shop equipment loads shall be served at 480V 3 phase, 208V 3 phase, 208V 1 phase, or 120V 1 phase as per their requirements. Convenience receptacles shall be served at 120V 1 phase.
- Welding equipment shall be supplied from dedicated panelboards.

Grounding:

- A quality single-point grounding system shall be provided in the main electrical room consisting of a main grounding bus bar (MGB) connected to a building counterpoise. The building steel frame, water service entrance pipe (if metallic piping is used, electrical equipment ground conductors, isolated ground conductors, and telecommunications and data system ground shall be connected to the MGB. The Main Telecommunication Room (MTR) and each telecommunications room or telecommunications closet (TR/TC) shall be provided with a copper

telecommunications ground bar (TGB). The Main Telecommunication Ground Bar (MTGB) shall be located in the MTR. A #3/0 AWG Telecommunication Bonding Backbone (TBB) shall connect the MTGB, the TGBs and the MGB. Grounding for communication circuits shall be in accordance with TIA/EIA J-STD 607 and Motorola R56 standards.

- All metal raceways shall include an equipment grounding conductor sized in accordance with NFPA 70.

Lightning Protection:

- LD shall perform a risk assessment calculation as shown in NFPA 780, Annex L to assess the lightning risk to the facility. If the risk assessment recommends protection, provide a UL Master Label lightning protection system in accordance with NFPA 780. Building lightning protection consisting of air terminals and down conductors shall be provided. The building counterpoise shall serve as the grounding electrode. Incoming copper telecommunications wiring shall be provided with individual gas-filled surge arrestors sacrificial pigtail connector to protect communications equipment and wiring for transient surges caused by lightning or other outside disturbances.

4.13.2 Electrical System Sustainability

The Project shall comply with all energy and electrical efficiency requirements in the San Francisco Municipal Green Building Code (Environment Code Chapter 7), which shall supersede the narrative provided in this DCD.

Energy and Emissions:

- The emergency generator shall be specified to

meet EPA emission requirements for gaseous fueled engines.

- A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.

Energy Efficiency:

- Lighting shall be designed to minimize the electricity consumption required and will meet or exceed the requirements of ASHRAE 90.1 and state and local energy codes.
- Electrical motors shall be the premium efficiency type.
- Transformers shall meet or exceed NEMA minimum efficiency ratings.
- Lighting controls shall be employed to reduce energy consumption. Vacancy sensors shall be provided in offices, conference room and other similar areas. Occupancy sensors shall be provided in janitor's closets, bathroom, locker rooms and other similarly occupied spaces. Time of day lighting controls shall be provided to turn lighting off throughout the building at specific times specified by the building or department user. A two hour over ride switch shall be provided to allow the lighting to remain on if someone is working additional hours. Lighting shall be able to be switched to 50 percent level when building cleaning staff is on site so that building lights to not have to be fully energized for this task. If daylighting can be employed, daylighting sensors may be used to reduce the lighting in areas where there is sufficient daylight to perform the required tasks.

Alternative Energy Sources:

- Solar Power:
 - ✓ LD shall integrate a photovoltaic (PV)

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- power system installation, consistent with the Municipal Green Building Code.
- ✓ The PV system installation shall conform to NFPA 70 Article 690 and requirements of PG&E.
- ✓ PV system shall supply power to the BYC. PV connection to the CIC is also acceptable.
- Battery Storage:
 - ✓ LD is encouraged to include on-site battery storage to maximum on-site power generation and storage potential to provide emergency backup power for the BYC or the BEB fleet specifically.

Commercial Equipment:

- Development Team shall coordinate with third party commercial suppliers of vending machines, wash soap, fluids utilized in maintenance shops, sand, parts suppliers and any other commercial supplier as indicated by the SFMTA to determine space and access requirements and incorporate this information into the facility layout.

4.13.3 General Arrangement and Infrastructure Requirements

- Special attention shall be made to ensure that equipment provided meets the requirements of the SFMTA prescriptive specifications and is fully compatible in form, fit and function with existing equipment as defined. Conduit in interior shop areas, external locations, the storage building or any locations subject to potential damage shall be rigid conduit. Conduit in interior office areas shall be EMT conduit.

4.13.4 Telecommunication Rooms and Closets

- The Telecommunication Room for each floor shall be environmentally controlled with HVAC equipment, lighted and fire protected. The Telecommunication Room shall be provided with keycard access and intrusion detection.
- Main Communication Room shall have all HVAC equipment requirements needed to keep the room and systems cool.
- In addition to the Telecommunication Rooms, the Development Team shall provide IT closets as required to ensure that raceway runs from data outlet or Ethernet connected equipment to the Telecommunication room or the nearest IT closet is not more than 275-feet.
- IT closets, if provided, shall have louvered doors to facilitate heat transfer from the room. Powered and temperature controlled exhaust fans are required for each IT closet if the IT closet electronics consumes over 80 watts of power.
- Lighting shall be configured parallel and in the front and back of all Development Team and the SFMTA required racks.
- Space and lighting requirements, including clearance in front and back of racks, in the Telecommunication rooms and closets shall conform to the latest version at time of notice to proceed of the Building Industry Consultants Service Industry Transmission Distribution Methods Manual (BICSI TDMM).
- An AC sub-panel with a separate 20A 120V breakers for each equipment rack (five (5) racks per room) shall be provided for the IT room. This sub-panel shall be supplied by the standby power circuit. Four (4) wall mounted

- 20A 120V convenience receptacles shall be provided in the Telecommunication room and one in each IT closet.
- Cable trays shall be provided along the perimeter of the Telecommunication room and over the planned location of the five (5) racks to support all required cabling systems. Cable trays shall be sized for maximum 40 percent fill; minimum width shall be 9-inches.
- Where ceilings are provided, control conduits and wiring will be run as high above the ceiling as possible to allow easy removal of ceiling tiles without interference due to control or communication subsystems.
- Cable runs above ceilings which are not in cable trays shall be supported by J-hooks specifically manufactured for supporting cable systems.
- For basis of design, the cooling provision of 20 tons shall be used. Actual heat loads and cooling equipment sizing shall be determined during final design.
- Telecommunications Rooms shall house the incoming telecom service conductors, the Development Team shall provide or install IT/Communications conductors or fiber optic cables, the E750 Development Team shall provide and install fiber optic cables, and owner provided telecommunications switch, horizontal cross connects and equipment racks.

4.13.5 Phone Jacks and Cabling

- Phone Jacks and Cabling are limited to the communications methods of the FACP to the remote Supervising Station and to the telephone and monitoring of the elevator(s).

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4.13.6 Network Ethernet Switches

- The LD shall coordinate with the SFMTA IT prior to design of the Data Room and TR/TCs for the space, power, cooling, bonding and other requirements of the SFMTA IT Network Ethernet Switches and other equipment.
- The SFMTA will install Network Ethernet Switches and other equipment in the Data Room and TR/TCs referenced in this chapter during the warranty period. The LD shall not invalidate the warranty based on the SFMTA Network Ethernet Switches and other equipment installation.

4.13.7 IT Servers

- The LD shall coordinate with the SFMTA IT prior to design of the Data Room and TR/TCs for the space, power, cooling, bonding and other requirements of the SFMTA IT servers and other equipment.
- The SFMTA will install IT Servers and other equipment in the Data Room and TR/TCs referenced in this chapter during the warranty period. The LD shall not invalidate the warranty based on the SFMTA IT Servers and other equipment installation.

4.13.8 IT Equipment Procurement

- Customized IT systems such as Radio, Computer Aided Dispatching, Access Control, Cameras, Fleet Watch (including antenna location to capture bus information), and others shall be addressed in detailed design and equipment procurement in coordination with the SFMTA. The SFMTA expects that available IT infrastructure may evolve by the time construction is completed and therefore will do a final review of the IT equipment and supporting infrastructure prior to their ordering and installation.

4.13.9 Closed Circuit Television System (CCTV)

- The LD will work with SFMTA Security staff to ensure all camera locations are correct and that camera views meet their needs. The LD shall design the quantity and location of cameras for the CCTV system using APTA IT-CCTV-RP-001-11," APTA Recommended Practice for the Selection of Cameras, Digital Recording Systems, Digital High-Speed Networks and Trainlines for Use in Transit-Related CCTV Systems".
- Camera views will be selected based on their function, location and resolution. The LD shall submit the CCTV design site plan that shows camera locations, coverage, camera function and the camera model for each location. Submittal shall also include required views generated from the project 3D model from each camera location. The camera design layout shall be approved by SFMTA Security staff prior to implementation. Once the design is approved, no changes shall be made without SFMTA Security staff's acceptance.
- The CCTV system shall be compatible with and integrated into the SFMTA's existing Genetec CCTV system. The LD's price shall allow for one version upgrade of the cameras beyond software version at time of installation. The LD shall coordinate with SFMTA to access and update the CCTV central servers.
- The LD shall provide all raceway, cabling, cameras, and mounting hardware/poles. Cameras shall be mounted in locations where maintenance staff can access without requiring fall protection.
- The LD shall provide fixed view (unless otherwise identified) CCTV coverage to the following areas at a minimum:

- ✓ The complete site perimeter shall be covered with cameras installed no greater than 200-feet apart oriented in an overlapping field of view configuration with resolution sufficient for security personnel to determine what is present by class (animal, blowing debris or person).
 - ✓ Entrances and exits into facility site shall be covered. All vehicle and pedestrian access points shall be covered with two dedicated fixed wide angle cameras with a resolution sufficient to uniquely identify an object on the basis of appearance (John, not Tom). One camera will be focused on the individual attempting to access the facility and the other camera will be focused on vehicle license plates.
 - ✓ All exterior building access points including vehicle, and pedestrian, shall be covered from the outside with a resolution sufficient to uniquely identify an object on the basis of appearance.
 - ✓ The loading dock(s) shall be covered.
 - ✓ Parking areas shall each be covered with a minimum of two dedicated fixed cameras with overlapping coverage and shall have resolution sufficient for security personnel to determine what is present by class (animal, blowing debris or person).
 - ✓ Note that additional cameras may be required for other systems outside of this CCTV section of the project requirements.
 - ✓ Coordinate with the SFMTA security for areas that may require additional cameras due to high probability of intrusions.
- Existing SFMTA camera monitoring stations shall be configured by the Development Team.

SECTION 4 - PERFORMANCE REQUIREMENTS

4.13.10 Fire Alarm System

- The Fire Alarm System shall be furnished and installed in the building conforming to NFPA 72. The system shall be looped, Class A, addressable, intelligent and supervised with a Fire Alarm Control Panel located in the main electrical room. The system shall be programmable, configurable and expandable in the field without the need for special tools, PROM programmers or PC-based programmers. Network communications capability over both a LAN or WAN shall be provided.
- The Supervising Station shall be a third party and shall conform to NFPA 72 as accepted by the AHJ and approved by the SFMTA. Communications Methods between the Supervising Station and the SFMTA in compliance with NFPA 72. The fire alarm control panel shall interface with the BAS system for general fire alarms.
- Photoelectric duct detectors will be provided in Air Handling Units when required by code. In accordance with NFPA 72 and the ADA, combination audible/visual notification devices will be installed throughout the facility to provide notification of an alarm. Visual devices shall be synchronized when more than one device is located in a common field of view. Tamper and flow switches shall be provided for the sprinkler system at the fire risers, valve pits and at the zone valves. Weatherproof exterior speakers shall be provided at exterior gathering locations and entrances to the buildings. An addressable analog fire alarm system with voice alarm shall be provided. A graphical annunciator panel showing the building floor plan depicting the location and

status of all fire reporting devices shall be provided at the dedicated entrance to be used by firefighting personnel to respond to emergencies. A remote annunciator for the emergency generator set and elevator shall also be provided.

- A diesel-fueled engine generator set shall provide power for the emergency/standby system loads.
- Pull stations shall be provided at exits and spaced so that there are no more than 100-feet of travel from any point to a pull station.
- Analog smoke detectors which allow the fire alarm system to automatically adjust the detector sensitivity shall be used except where nuisance tripping may occur. In areas where smoke detectors would be unsuitable, such as elevator machine rooms, combination heat and rate-of-rise detectors shall be used. Smoke detectors shall be installed in electrical rooms, telecommunications rooms, elevator lobbies, yard control, under raised computer floors, and other areas of high importance. Smoke detectors shall be provided in the return air ducts of the HVAC equipment to provide for automatic shutdown of these systems when smoke is detected.
- The fire alarm system shall monitor the automatic fire suppression system for water flow, air pressure (if a dry pipe system is installed), and OS&Y valve position. Water flow detection shall initiate a building evacuation alarm. Loss of air pressure and closed valves shall initiate a trouble signal at the main fire alarm panel and at the annunciator.

- The annunciator shall monitor the position of the elevators and indicate if they are operational.
- Control of the building emergency ventilation (if provided) shall be available at the fire alarm panel and at the annunciator.

4.13.11 Communications Server and Workstation Network Interfacing

- Network Interface: Two separate network interface cards (NICs) with 1G bit/sec minimum speed capability each.
- Network Segment Assignment Options:
 - ✓ Define different network segment assignments for each of the NICs.
 - ✓ Define different network segment assignments on the same NIC.

4.13.12 Outdoor Devices

- All electronic devices use in an outdoor environment shall be rated to IP66 level, and withstand operating to three standard deviations of temperature maximum and minimums for this region.
- Rain shields over electronic devices shall be used in most cases of installation for further protection and improved endpoint device function.

4.13.13 Network Management Capabilities

- LD shall implement all devices to be compatible with Standard Network management health status reporting via SolarWinds Event and Log Monitor software, or otherwise directed by the SFMTA. Devices shall be SNMPv3 compatible.
- LD shall obtain written direction prior to implementing network connection devices, for instruction herein.

SECTION 4 - PERFORMANCE REQUIREMENTS

4.14 Wind Study

- Pursuant to the City's wind ordinance (Planning Code Section 148), the Project is required to comply with wind comfort and hazard criteria set forth by the City. Wind analysis has been completed by the SFMTA for the RDC, which is Document 17 (*CEQA Pedestrian Wind Study*) of the Reference Documents. The RDC wind analysis determined that the Project would require design interventions to meet the wind criteria. The Project will be required to complete an updated wind study based on the LD's proposed massing for the Facility.

4.15 Strategies for Stormwater Handling and Treatment/Pre-Treatment

- Stormwater runoff generated by the Project area must be treated in accordance with the City of San Francisco Stormwater Management Requirements (SMR). The LD shall create a stormwater management plan meeting the City's SMR that emphasizes use of best management practices (BMPs) on site to mitigate stormwater quality and quantity concerns. Of particular concern, discharge containing oil, sediments, soaps, or other chemicals from the Bus Yard Component shall be captured and means for filtering and treating water prior to discharge shall be incorporated.
- Following the guidance from the City of San Francisco, preference shall be first for rainwater harvesting and reuse, bioretention and infiltration, and permeable pavement to reduce runoff, followed by detention and treatment through lined bioretention or a constructed wetland. The proposed solution shall acknowledge the different sources

of runoff on the site and demonstrate an appropriate management plan for each.

- The size of the Project necessitates compliance with San Francisco Article 12C Non-potable Water Ordinance as well. Based on the Project size, a non-potable water system is required on-site to treat and reuse available greywater, rainwater, and foundation drainage for toilet and urinal flushing. The LD shall propose where such a system shall be housed and identify which uses within the Facility are required to be served by the resulting treated greywater. This necessarily must integrate the stormwater management solutions with on-site treatment and reuse for a comprehensive water management system for the Project.

4.16 Evaluation of Life Cycle Cost Analysis

Decisions impacting resource use, maintenance, and capital cost, such as HVAC system choice, envelope materials and selection, etc., shall be evaluated using a life-cycle cost analysis framework. This approach shall include, at a minimum, the following factors:

- Capital cost
- Energy (electricity, gas, thermal) cost savings
- Water cost savings
- Operations, maintenance, and replacement cost impacts
- Applicable incentives such as tax credits and depreciation benefits
- Space savings

For decisions impacting the Bus Yard Component, the Common Infrastructure, and the Housing and Commercial Component, separate life-cycle cost analysis studies shall be performed indicating the impact to each

component individually. Decisions impacting only one of the components may be evaluated in isolation. The period of evaluation shall be assumed to be no less than 30 years and shall be reviewed and confirmed with the City at the outset of the PDA phase. Life-cycle cost analysis evaluation financial parameters shall be determined by the LD and shall be reviewed and confirmed with the City at the outset of the PDA phase. Financial parameters shall include discount rate, energy cost escalation, water cost escalation, labor and materials escalation, and applicable tax rate (if depreciation is evaluated for a measure) at a minimum. Decisions shall prioritize life-cycle cost benefit as a key driver of selection.

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

This document presents the Requirements for Bus Yard Component Space Modules for the proposed Potrero Yard, by providing both micro and macro level design requirements. The Requirements for Bus Yard Component Space Modules format found in this section consists of Functional Area Modules. The Functional Area Module represents a detailed description of specific design issues for each of the areas listed in Section 2 the Space Needs Program. Reference the Space Needs Program (Section 2.4) for specific data. All Modules and related equipment are for representation purposes only and do not necessarily depict strict design conformance.

5.0 MODULES

Each of the building space modules contains information regarding the function of the space, affinities, critical dimension (if any), equipment, furnishings, and finishes related to this operation. Technical considerations for architectural, structural, mechanical, plumbing, and electrical systems are delineated on the facing page. The space is graphically illustrated. Specific layouts of each area will be developed during detailed design. Note that the equipment and furnishings listed are not intended to be all-inclusive. Spaces are separated into groups based upon function.

Not all spaces listed in the Space Needs Program have a room data sheet including Custodial, Telecommunication Rooms, and Restrooms. This is because these spaces are code- or facility-specific, or are continually changing.

The following module colors are used in the room data sheets that follow as well as the Reference Design Concept plan sheets.

- OFFICE MODULES
- PARKING
- BAYS AND SHOPS
- FARE BOX AND CLIPPER CARD READER REPAIR SHOP
- SERVICE AND CLEAN
- PARTS
- MAINTENANCE - ADMINISTRATION
- OPERATIONS - ADMINISTRATION
- TRANSIT SERVICES
- SHARED
- TRAINING

5.1 Sustainable Design

There are several sustainable design opportunities that can be implemented at Potrero Yard. The Sustainable Design section outlines potential sustainable design opportunities appropriate for this type of facility. These options are broken into Site Features, Building Design and Materials, Mechanical Systems, Electrical Systems, and Plumbing Systems. The Development Team shall also refer to Department of Building Inspection Form GS6: San Francisco Green Building Submittal Form for Municipal Projects for guidance on required measures.

5.2 Utilities Design

The utilities for the maintenance facility are numerous and require close attention to detail. The coordination of the HVAC, electrical, and plumbing systems are critical to the proper function of the Shop and the heart of the facility. Providing an organized installation and design of these systems will enhance future system maintenance.

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

5.3 Creating Sustainable Facilities

Sustainability is an essential and fundamental component of the facility. The key sustainability issues that shall be explored in the planning and development of the facility include, but are not limited to, key points included in this section.

5.3.1 Balance Between Economic and Environmental Needs

To balance both economic and environmental needs, the facility design shall maximize employee health, safety, and operation efficiencies. This priority shall be considered at all stages of development of the facility.

5.3.2 Efficient Use of Resource Materials

Material resources are valuable, and efficient use shall be encouraged in the development and operations of the facility. This can be implemented with reusable, recyclable, and biodegradable materials, as well as mandating the use of products that are extracted, harvested, and manufactured locally.

5.3.3 Efficient Use of Water Resources

The facility plan shall encourage efficient use of water resources through resourceful planning. Examples could include implementing an effective storm water management plan and using environmentally compliant wash bays to service all vehicles. Reclaimed water will be used for irrigation at new City facilities, per the San Francisco Green Building Code Amendments and GS6 Form for municipal projects. Low flow plumbing fixtures and sub-metering are also required.

5.3.4 Energy Efficiency/Renewable Energy Systems

Renewable energy sources like solar, wind, and daylight harvesting shall be utilized, as well as exploring and promoting opportunities to increase energy savings at the facility through the use of high-performance systems.

5.3.5 Construction Methods

Methods of construction of the facility play a significant role in sustaining the environment. Minimizing transportation costs by utilizing local resources and recycling procedures during construction will conserve energy and minimize pollution.

5.3.6 Sustainable Criteria

The following is a list of potential strategies that contribute to sustainable building design:

- Operable windows/natural ventilation
- Occupancy sensors, vacancy sensors, lighting controls
- Lighting designed to meet targeted LEED points (Reference the LEED requirements in Chapter 7 of the City and County of San Francisco Environmental Code)
- Daylighting strategies and daylight harvesting
- User-adjustable comfort and lighting controls
- Underfloor ventilation
- In-floor radiant heating and cooling
- Water reclamation system
- Use of reclaimed water for vehicle washing
- Minimal landscaping along the north and south edges

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

5.4 LEED Certifications

LEED is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project.

Each rating system groups requirements that address the unique needs of building and project types on their path towards LEED certification. Once a project team chooses a rating system, they'll use the appropriate credits to guide design and operational decisions.

LEED points required for the Gold level and others are listed below:

- Platinum 80+ points
- Gold 60 to 79 points
- Silver 50 to 59 points
- Certified 40 to 49 points

- Insulated bay doors
- Low U-value windows and skylights
- Cleanable and maintainable light colored reflective floors, walls, and ceilings



Translucent clerestory windows daylighting



Insulated translucent sectional door

5.5 Architectural Systems

Design and materials that facilitate sustainability include, but are not limited to:

- Use of durable building materials
- Natural light
 - ✓ Skylights
 - ✓ Clerestory
 - ✓ Roof monitors
 - ✓ Windows in bay doors
- Operable windows for natural ventilation
- Low Volatile Organic Compound (VOC) finish materials
- Use of local building products
- Use of recycled materials
- High R-Value roof and wall insulation



Solar tube daylighting



Light reflective floor

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

5.6 Mechanical Systems

Mechanical systems that facilitate sustainability include, but are not limited to:

- Radiant floor slab heating
- Variable air volume air handling units
- Variable frequency drive motors
- High efficiency motors for air handling units and DX compressors
- Economizers for free cooling with 100 percent outside air at air handling units
- Demand control ventilation with CO2 and occupancy sensors for reducing ventilation requirements during unoccupied periods

5.7 Additional Cost Alternatives

- Radiant floor slab heating
- Solar Thermal heating for domestic water heater
- High efficiency boiler for hydronic heating loop
- Ground source heat pumps (geothermal)
- Destratification fans

Renewable energy production:

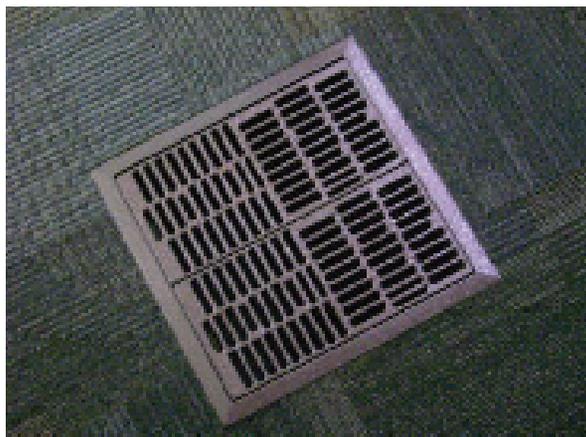
- Photovoltaic
- Wind



Destratification fan



Heat recovery piping



Underfloor air distribution vent



Radiant floor system

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

5.8 Electrical Systems

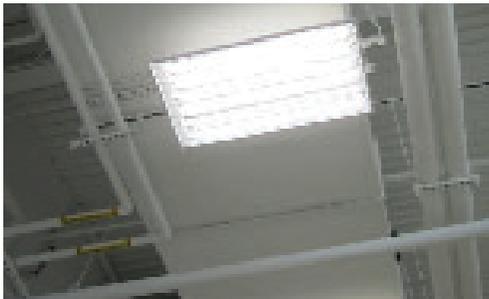
Electrical systems that facilitate sustainability include, but are not limited to:

- Photovoltaic panels to be installed on roof of building
- Maximize lighting controls with daylight harvesting and occupancy and vacancy sensors
- LED lighting systems
- Task lighting in Repair Bays
- Efficient process equipment

5.9 Plumbing Systems

Plumbing systems that facilitate sustainability include, but are not limited to:

- “We fix” program for new plumbing fixtures
- Rainwater harvesting for irrigation
- Vehicle wash water reclaim
- Low flow plumbing fixtures
- Sensor operated faucets
- Grey water (purple pipe) for water closets
- Tankless water heaters
- Reclaimed water will be used for landscaping at new City facilities, per the San Francisco Green Building Code Amendments and GS6 Form for municipal projects



LED lighting



Photovoltaic panels on roof



Dual flush toilet



Low-flow plumbing fixtures



Wash water reclamation system



Rainwater harvesting

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES**5.10 Architectural/Structural Systems Coordination**

- Coordinate routing, support systems, and clearances for mechanical ductwork, plumbing piping and electrical conduit
- Routing shall run above forklift and walk aisles
- Group wherever possible
- Route main ventilation ductwork above walk/ forklift aisles
- Use mezzanines for mechanical units

5.10.1 Mechanical Systems Coordination

- Route main ventilation ductwork above walk/ forklift aisles
- Use mezzanines for mechanical units

5.10.2 Plumbing Systems Coordination

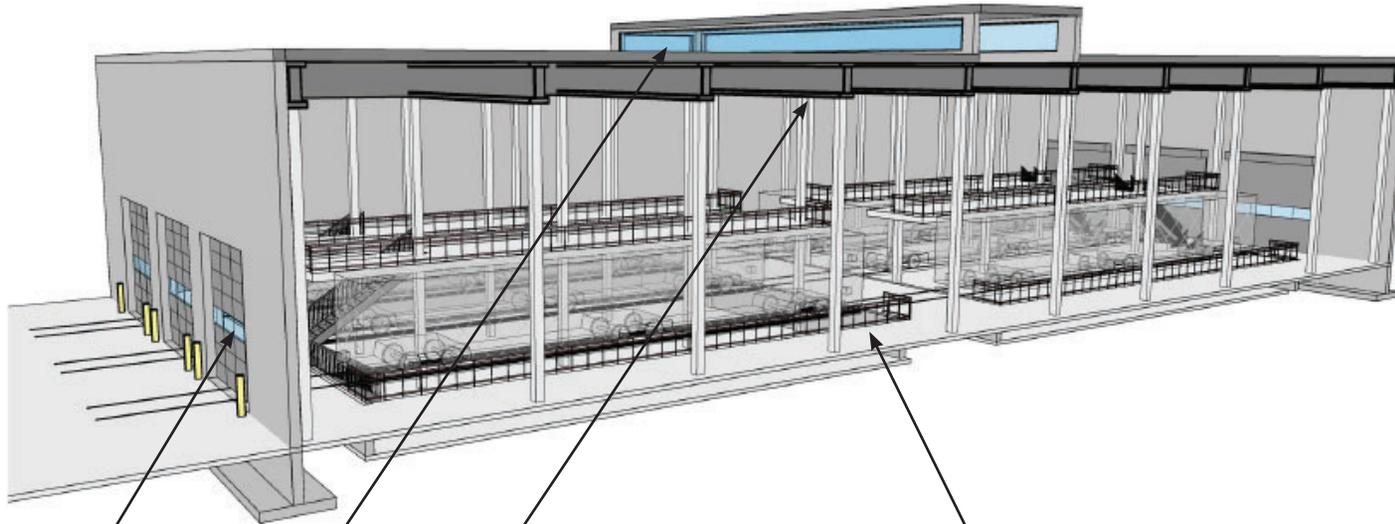
- Route water, sanitary, vent, storm, and service equipment piping above ground and above walk/forklift aisles

5.10.3 Electrical Systems Coordination

- Route main conduit runs above ground and above walk/forklift aisles.
- Communication systems and cable trays shall be coordinated with other building systems to allow for installation, removal of cables in the future. All communications conduits and cable trays shall be routed above ground.
- Route branch circuits, equipment feeds above ground to facilitate future renovations

SECTION 5 - REQUIREMENTS FOR BUS YARD COMPONENT SPACE MODULES

Sustainable Strategies



- Daylighting through skylights/clerestories/roof/monitors/windows in bay doors
- Low VOC finishes
- Operable windows/natural ventilation
- Use of recycled content of materials
- Destratification fans in high bay areas

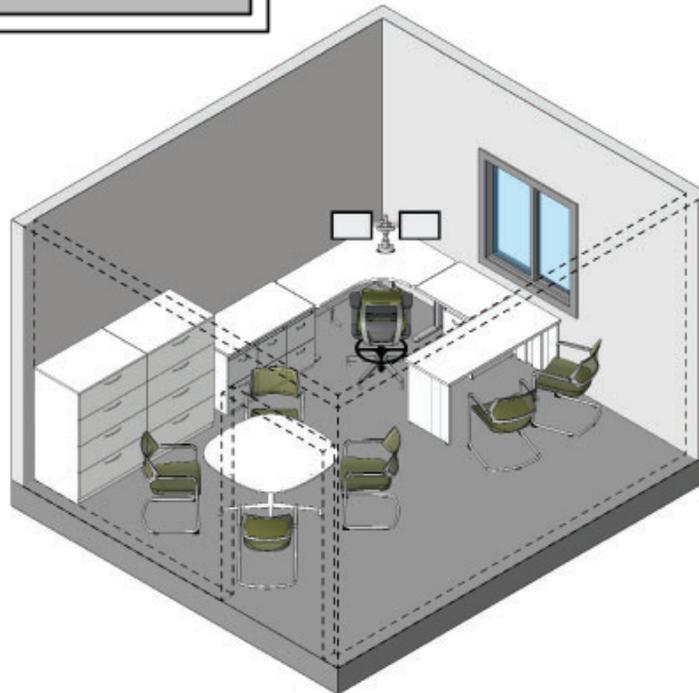
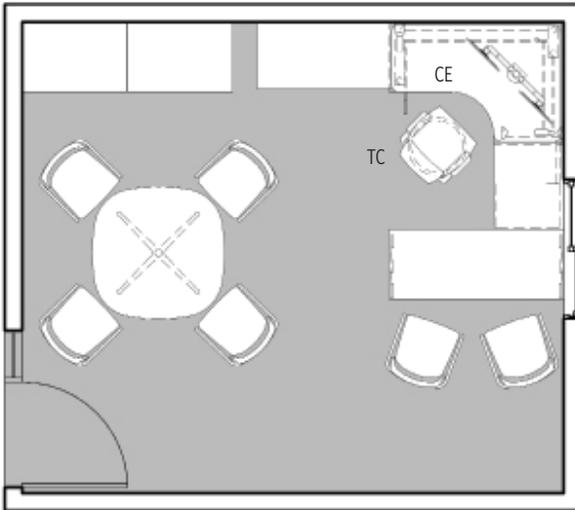
- Radiant floor slab heating
- Air quality sensors for exhaust fan controls
- Use of durable, long-lasting building materials
- Occupancy sensors
- Use of local building products
- Renewable energy sources such as solar and geothermal



SECTION 5.1: OFFICE MODULES



PRIVATE OFFICE - 224 SF



FUNCTION

Private office for completing work tasks and holding small meetings.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

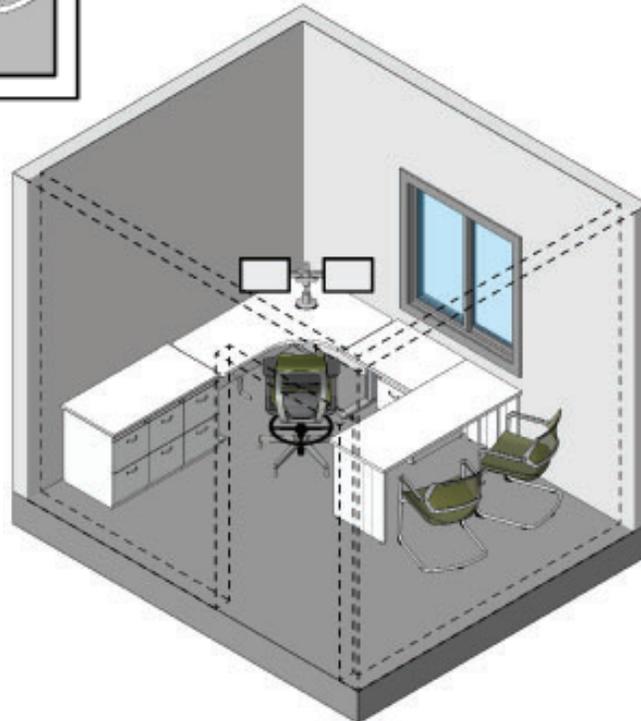
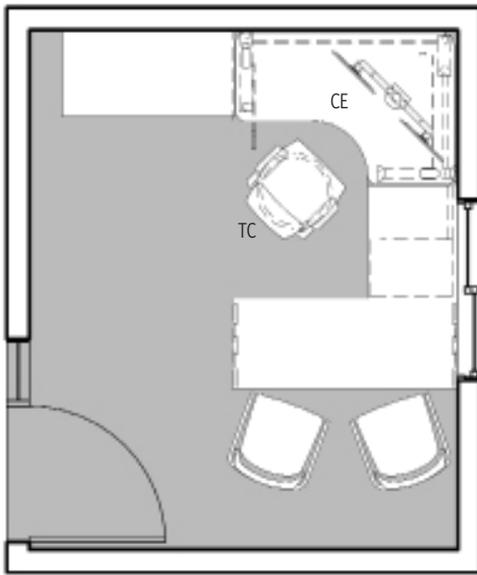
EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files
- Table and Chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile
 - ✓ Doors:
 - Single leaf 3'-0" door with sidelight and lockable lever set hardware
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (as required)

PRIVATE OFFICE - 120 SF



FUNCTION

Private office for completing work tasks and holding one on one meetings.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

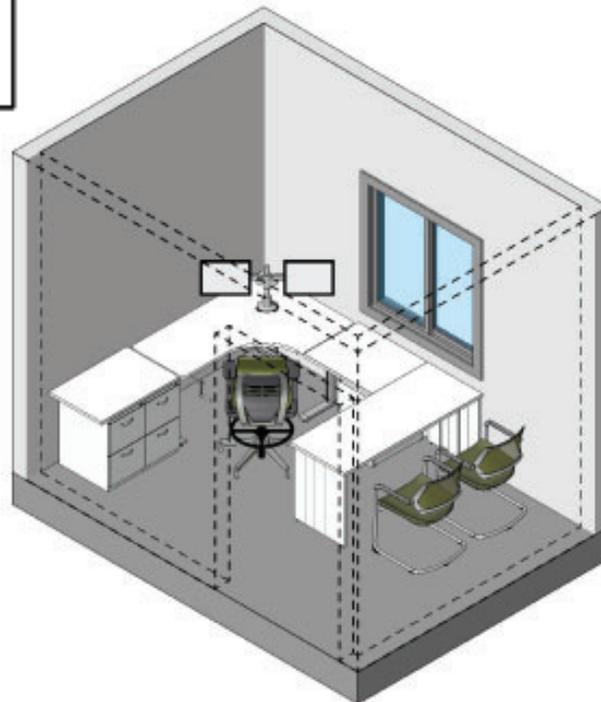
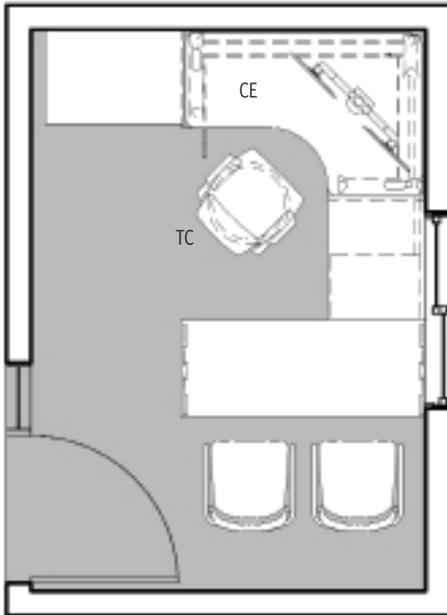
EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files
- Guest chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile
 - ✓ Doors:
 - Single leaf 3'-0" door with sidelight and lockable lever set hardware
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (as required).

PRIVATE OFFICE - 100 SF



FUNCTION

Private office for completing work tasks and holding one on one meetings.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

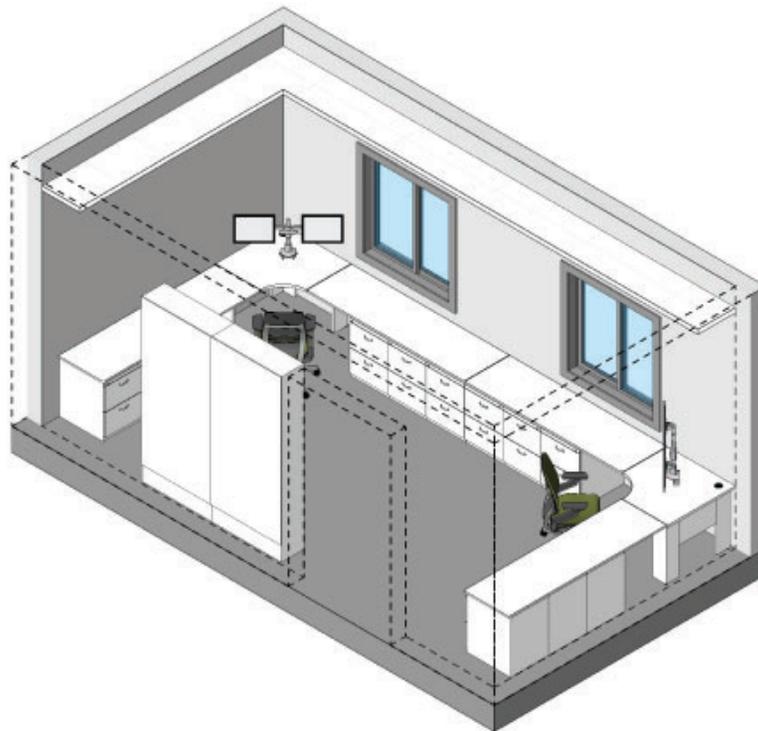
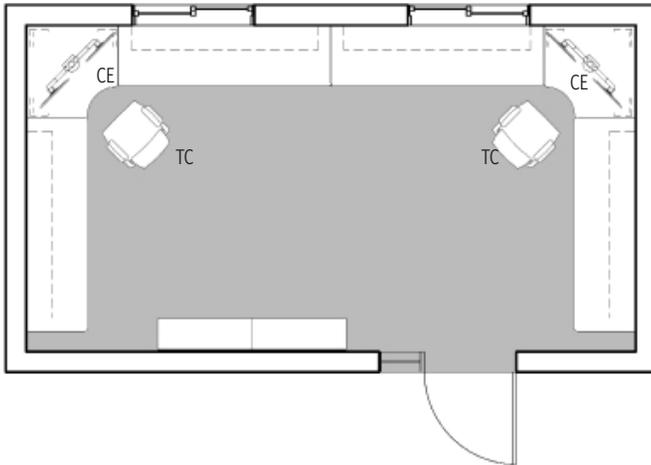
EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files
- Guest chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile
 - ✓ Doors:
 - Single leaf 3'-0" door with sidelight and lockable lever set hardware
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (as required).

SHARED OFFICE



FUNCTION

Shared office for completing work tasks and holding one on one meetings.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

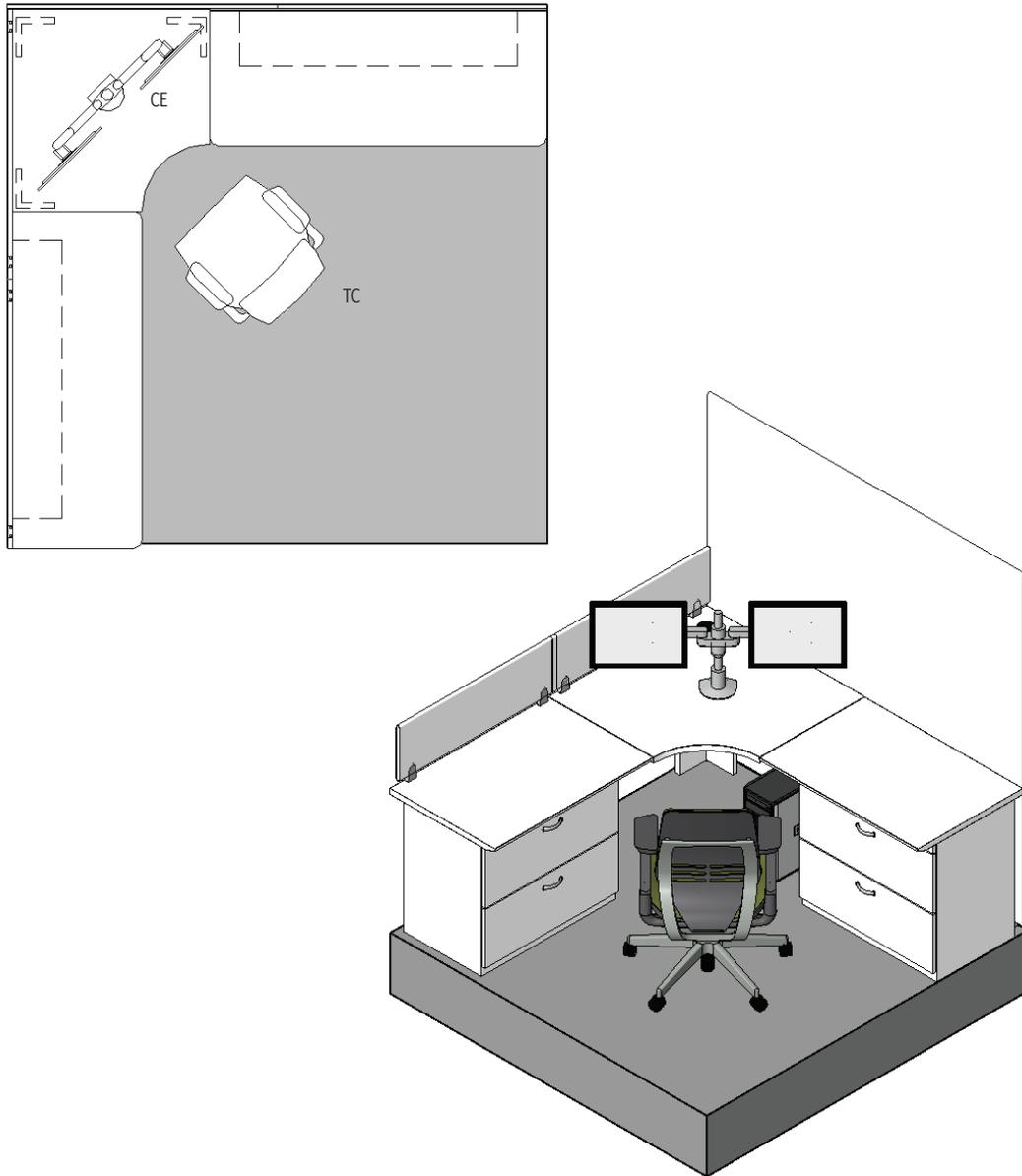
EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files
- Guest chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile
 - ✓ Doors:
 - Single leaf 3'-0" door with sidelight and lockable lever set hardware
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (as required).

WORKSTATION - 64 SF



FUNCTION

Open office workstation to complete work tasks.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

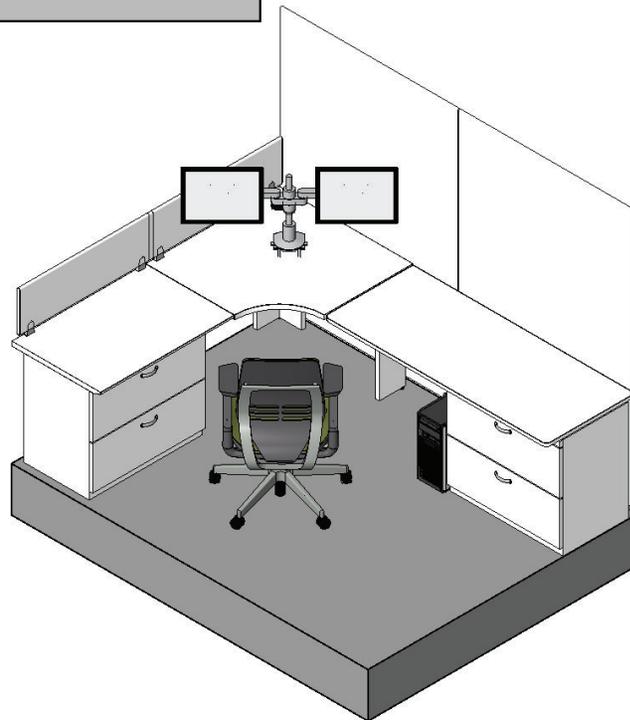
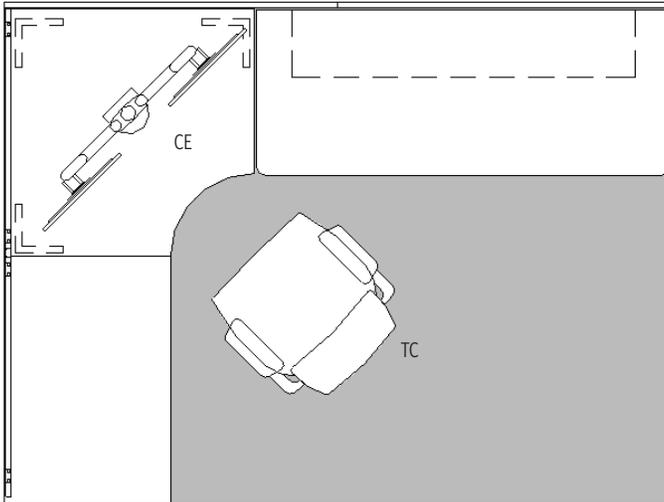
EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Ceiling: Acoustical ceiling tile
- Daylighting: Access to natural light
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (three minimum) and a quad receptacle at workstation
 - ✓ Provide one data outlet with four data ports at workstation
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation (35 fc average)
 - ✓ Verify feasibility of providing individual control of selected luminaires
 - ✓ Task lighting (as required).

WORKSTATION - 48 SF



FUNCTION

Open office workstation to complete work tasks.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

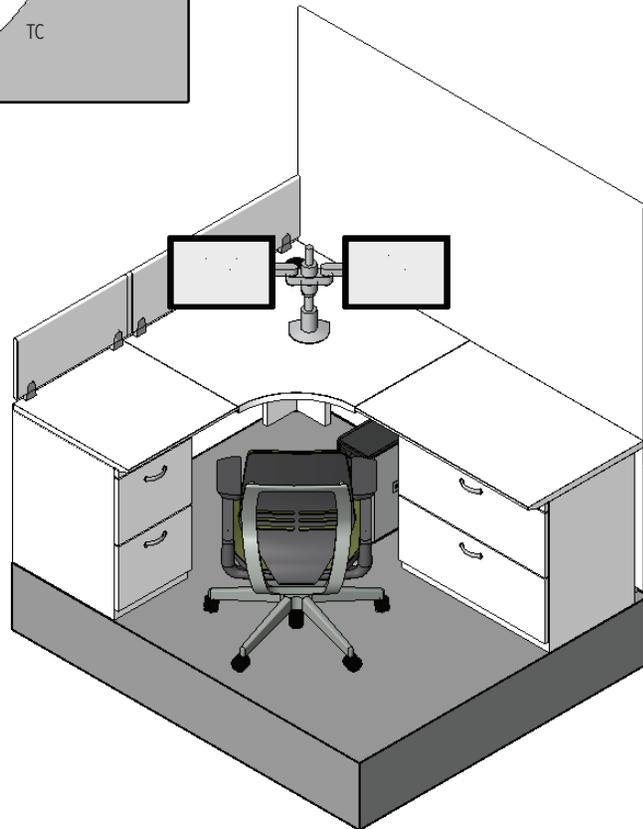
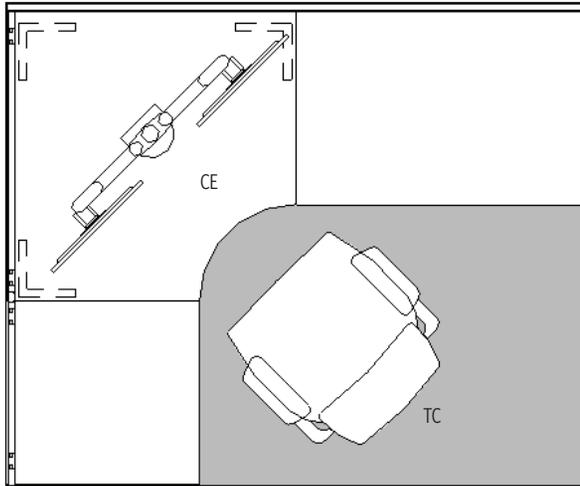
EQUIPMENT/FURNISHINGS

- Task chair
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DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Ceiling: Acoustical ceiling tile
- Daylighting: Access to natural light
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (three minimum) and a quad receptacle at workstation
 - ✓ Provide one data outlet with four data ports at workstation
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation (35 fc average)
 - ✓ Verify feasibility of providing individual control of selected luminaires
 - ✓ Task lighting (as required).

WORKSTATION - 30 SF



FUNCTION

Open office workstation to complete work tasks.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general modules

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- Task chair
- TMC 60" by 30" typical sit/stand workstation
- Two pedestal cabinets per station. One two-drawers for files, and one three-drawers for personal items and files

DESIGN FEATURES

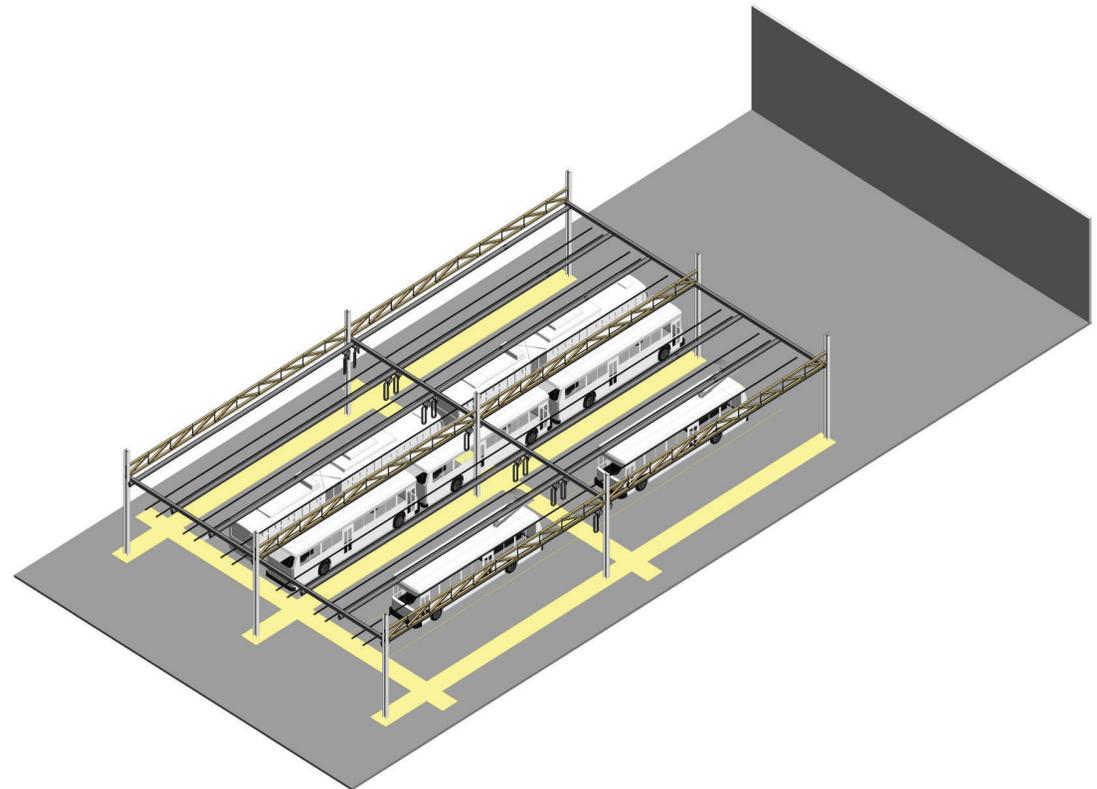
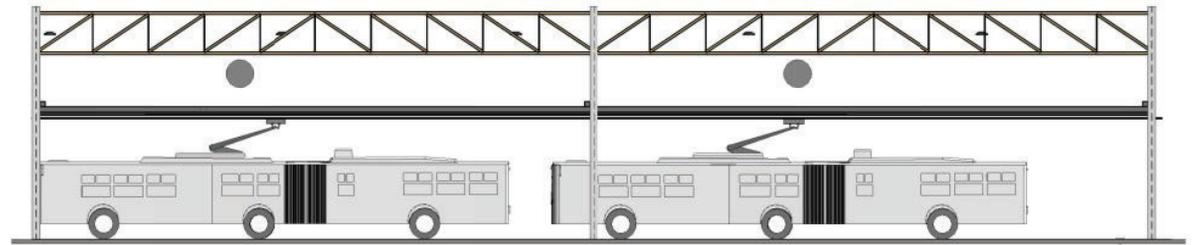
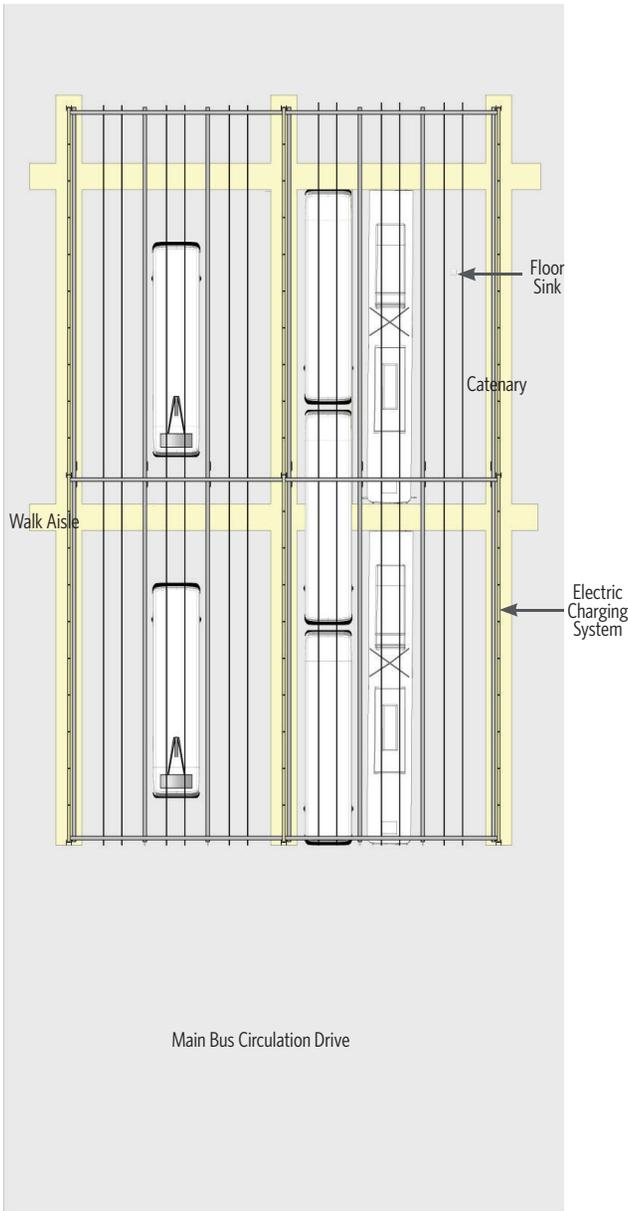
- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for operation and administration areas. Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas
 - ✓ Ceiling: Acoustical ceiling tile
- Daylighting: Access to natural light
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ Provide general purpose duplex receptacles (three minimum) and a quad receptacle at workstation
 - ✓ Provide one data outlet with four data ports at workstation
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation (35 fc average)
 - ✓ Verify feasibility of providing individual control of selected luminaires.
 - ✓ Task lighting (as required).

GENERAL NOTES

- Based on the Fleet Plan in the 2017 Framework Addendum, the 57 motor coaches shown at Potrero will be replaced with the first purchase of battery electric buses (BEBs). SFMTA bus procurement schedule of BEBs should take this into account. Potrero will not be designed to accommodate motor coaches
- Overhead Catenary System (OCS) is only required in parking positions for programmed trolley buses.
- As SFMTA converts trolley buses to battery electric buses, OCS will be phased out as charging infrastructure is phased in.

SECTION 5.2: PARKING

40' AND 60' BUS PARKING



40' AND 60' BUS PARKING		
<p style="text-align: center;">FUNCTION</p> <p>Dedicated area to park 40' and 60' trolleys and BEBs.</p>	<ul style="list-style-type: none"> ✓ Have the buses go on wire at different locations on the street depending on their route. One block after pullout, another 5 blocks after pullout, and so on. 	<p style="text-align: center;">PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Trench drain at overhead door with flush, removable grate covers, with sediment basket upstream of trap, to central sediment and oil interceptor. • 3/4" water hose bibb with standard faucet at rear of bay 2'-0" AFF (one per three bays) • Compressed air: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge and quick disconnects on 4'-0" AFF (one per four parking stalls) ✓ Provide 3/8" and 1/2" disconnects at locations to be determined during detailed design ✓ As required by equipment • Additional plumbing connections (water, drainage, etc.) as required by equipment
<p style="text-align: center;">RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to Service Positions • Access to Bus Washer 	<p style="text-align: center;">ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finish, concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish • Doors: <ul style="list-style-type: none"> ✓ Personnel door with view panel to meet applicable code exit requirements ✓ Exterior of building overhead doors: High-lifting sectional, steel, insulated, size per Fleet 16'-0" wide by 16'-0" with view panels, automatic operator, detection loops ✓ Bollards on exterior at jambs of overhead door (two each) 	<p style="text-align: center;">ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles on every column ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation (5 fc average) ✓ Fixtures located to illuminate work spaces and around the vehicles ✓ Luminaires shall be placed between every row of buses to allow illumination between buses • Communications: Paging/intercom system speakers with 100 percent coverage of all parking stalls
<p style="text-align: center;">CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 19'-0" preferred vertical clearance to structure and fixtures. This vertical clearance height may be reduced to a minimum of 17' only if all fixtures, building systems, OCS, ETB pole systems, BEB Charging Equipment, structure, and all other Technical Requirements are fully accommodated. • 12'-0" wide x 65'-0" long per space (60' bus) • 12'-0" wide x 45'-0" long per space (40' bus) • Ramps: <ul style="list-style-type: none"> ✓ 15'-0" wide ramp (minimum) ✓ 14'-0" vertical clearance to structure and fixtures ✓ Maximum 10 percent slope with 40' long 5 percent transition ramps at top and bottom 	<p style="text-align: center;">STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment 	
<p style="text-align: center;">EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • OCS: Wire in parking positions for trolley buses • Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document. 	<p style="text-align: center;">MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Ventilation: <ul style="list-style-type: none"> ✓ 1.5 CFM exhaust per square foot of floor area ✓ Return air openings in areas used for repair or servicing vehicles shall not be less than 18" above floor level accordance with NFPA 30A and ASHRAE 62.1 • Heating set point: 65 degrees Fahrenheit 	
<p style="text-align: center;">DESIGN FEATURES</p> <ul style="list-style-type: none"> • Buses parking in each aisle of every bus parking level must be organized by buses of the same length. Further, each bus parking aisle shall be designated for its respective bus length so that the charging infrastructure can be efficiently accommodated. • Pulling out from the facility needs to be further evaluated in final design because of the affects of going on wire could have on backups or delays at pullout. A couple of options are: <ul style="list-style-type: none"> ✓ Having wires connected to the street wires from inside the building so that going on wire would happen in a parking que lane at the exit of the facility. 		

GENERAL NOTES

- Provide one Preventive Maintenance Bay for every 50 buses
- All Maintenance Bays are designed for 40' and 60' buses
- The above are all industry standards. Reference Appendix C: Equipment Manual for industrial shop equipment specified per space.

SECTION 5.3: BAYS AND SHOPS

GENERAL OFFICE MODULES: OFFICE AREAS

RUNNING REPAIR - SUPERVISOR

- Reference **Office Module Workstation - 64 sf**
- View of Repair Bays and Shops
- Adjacent to Preventive Maintenance Supervisor

CONTROL ROOM CLERK

- Reference **Office Module Workstation - 64 sf**
- Adjacent to Supervisors

FLOOR SUPERVISOR

- Reference **Office Module Workstation - 64 sf**
- View of Repair Bays and Shops

PREVENTIVE MAINTENANCE SUPERVISOR

- Reference **Office Module Workstation - 64 sf**
- View of Repair Bays and Shops
- Adjacent to Running Repair Supervisor

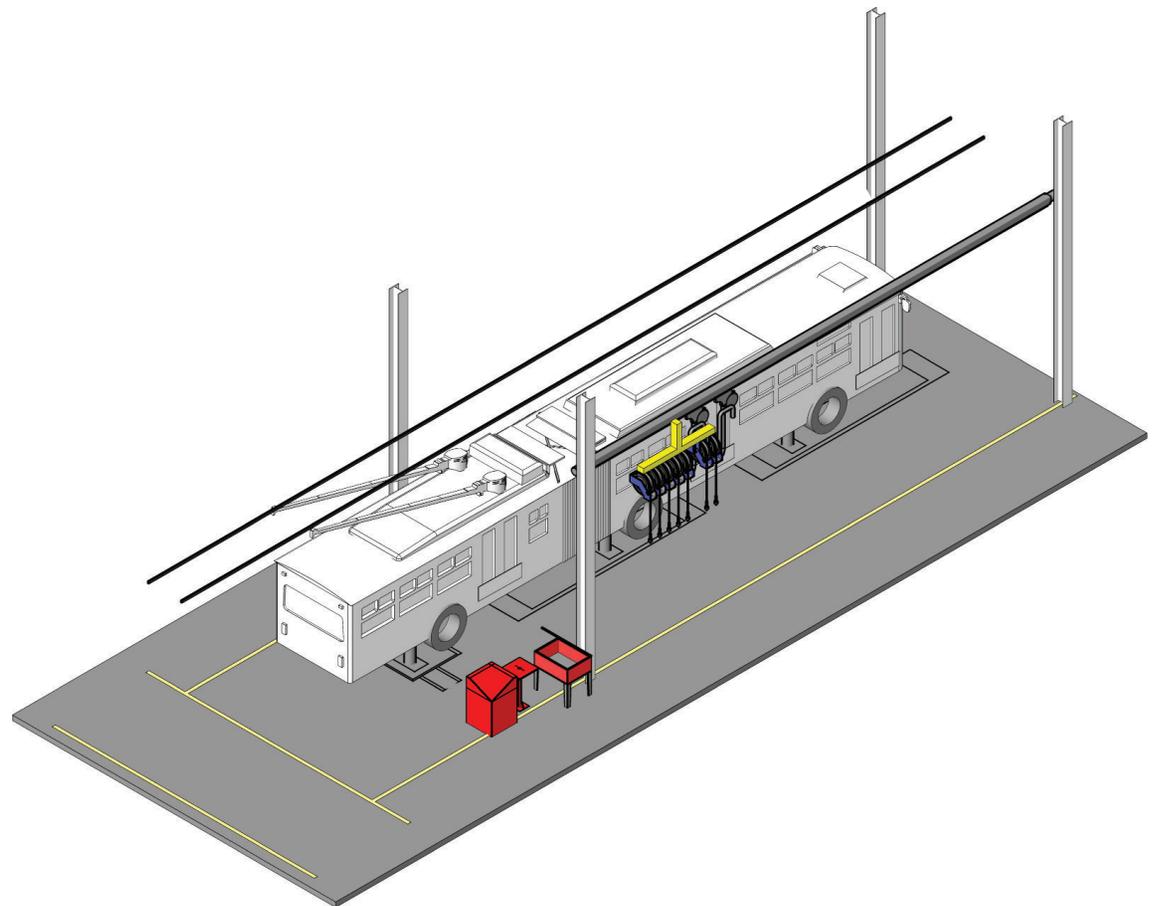
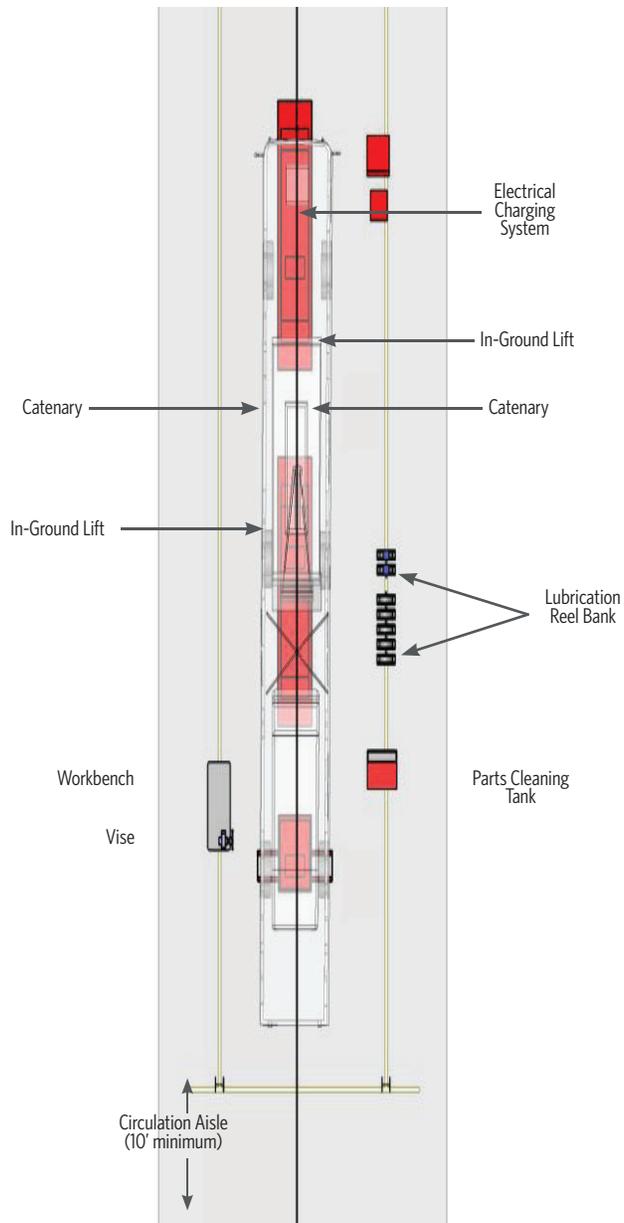
ELECTRONIC SUPERVISOR

- Reference **Office Module Workstation - 64 sf**
- View of Repair Bays and Shops
- Adjacent to Supervisors
- Access to Electronic Bench Shop

ELECTRONIC SHOP WORKSTATIONS

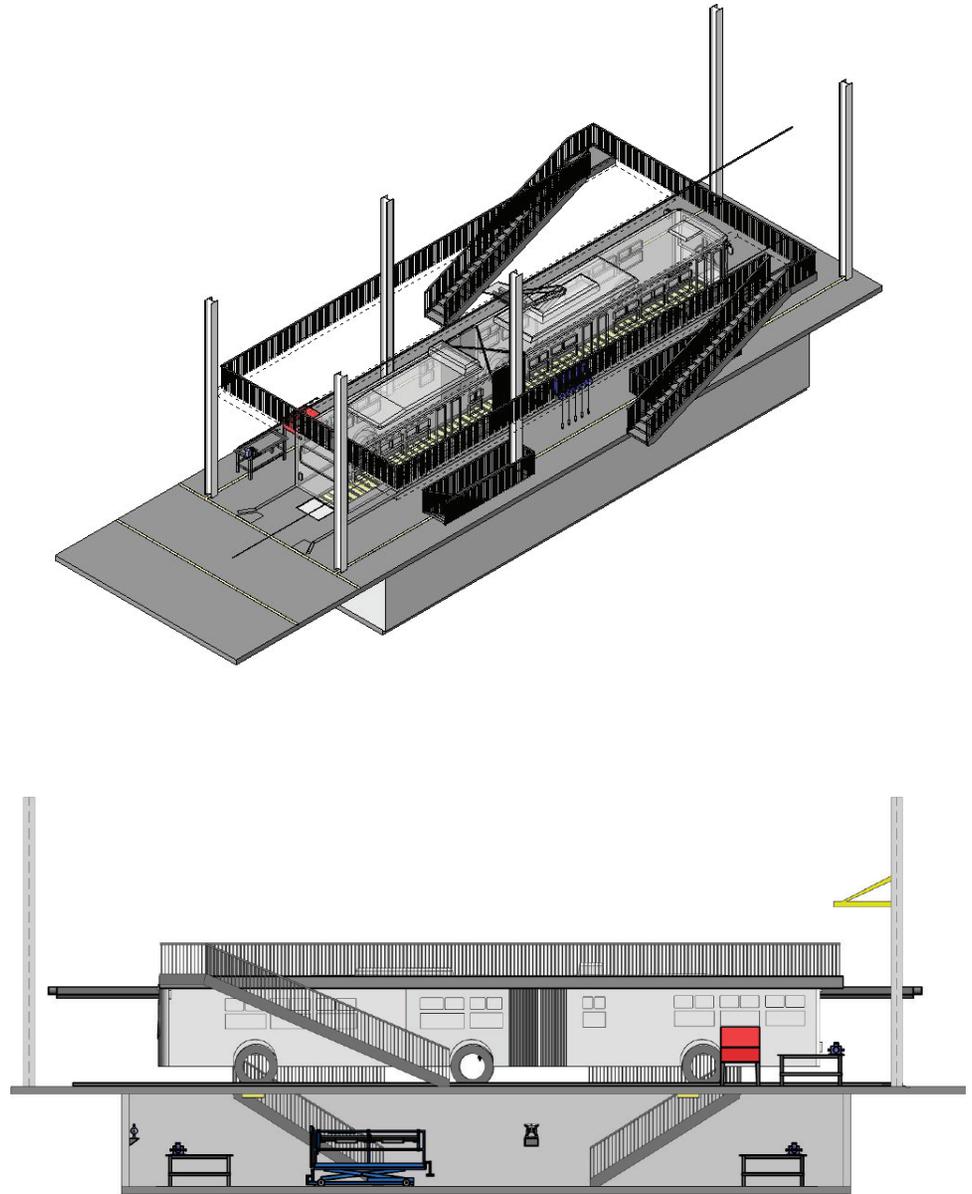
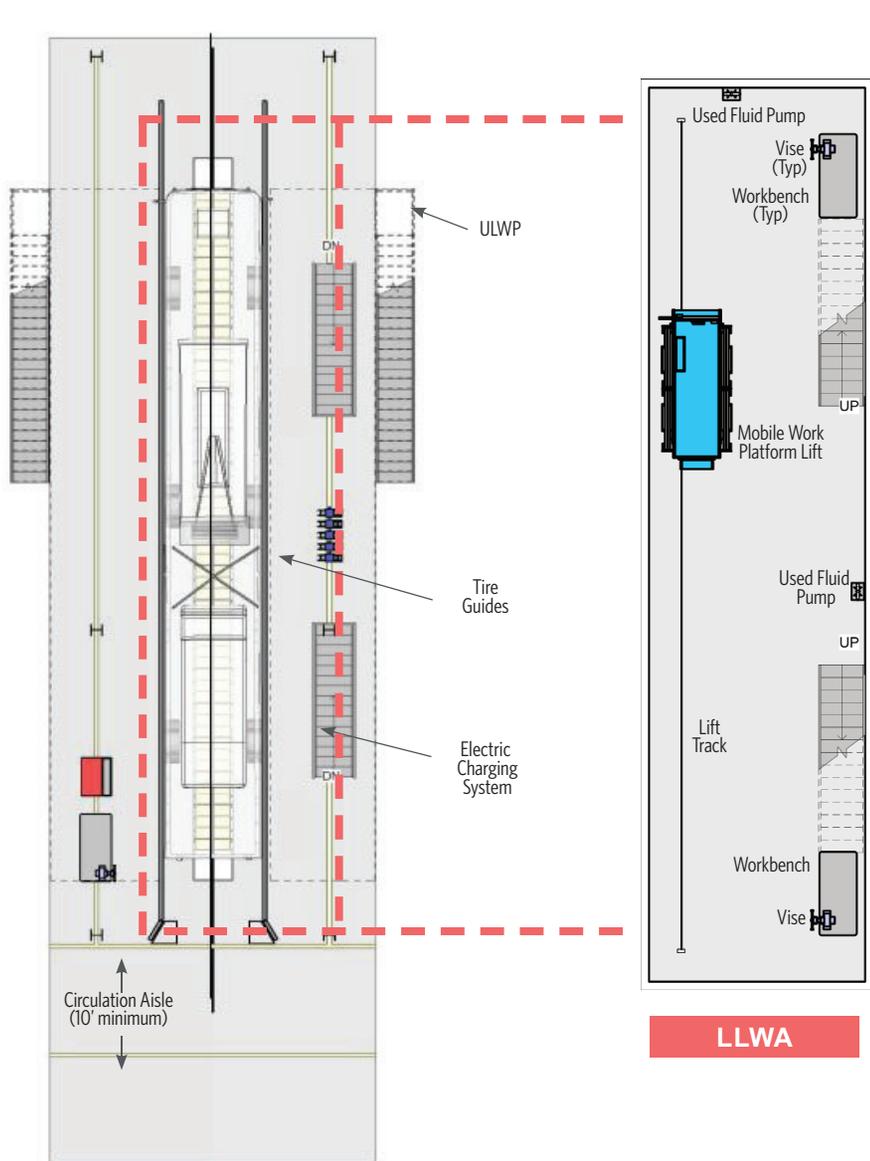
- Reference **Office Module Workstation - 30 sf**
- Adjacent to Electronic Bench Shop

60' BUS REPAIR BAY



60' BUS REPAIR BAY		
<p>FUNCTION</p> <p>Bay space to perform general repair and maintenance on trolleys and BEBs.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Lubrication reel bank (shared one per two bays) • 3/4" water hose bibb with standard faucet at rear of bay 2'-0" AFF (one per three bays) • Compressed air: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design ✓ As required by equipment • Additional plumbing connections (water, drainage, etc.) as required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to Common Work Area, Parts Storage, Portable Equipment Storage Areas, and Maintenance Office areas 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment • Floor slab designed to accommodate in-floor radiant heat (if desired) • Floor slab designed to accommodate forklift access 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles (four minimum) on walls, columns, and between overhead doors ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (75 fc average) ✓ Fixtures located to illuminate work spaces and around the vehicles • Communications: <ul style="list-style-type: none"> ✓ Paging/intercom system speakers ✓ Data conduit on columns at each bay
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 19'-0" vertical clearance to structure and fixtures • 20'-0" wide by 75'-0" long 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • As required by equipment • Ventilation: <ul style="list-style-type: none"> ✓ 1.5 CFM exhaust per square foot of floor area ✓ Return air openings in areas used for repair or servicing vehicles shall not be less than 18" above floor level accordance with NFPA 30A and ASHRAE 62.1 • Heating set point: 65 degrees Fahrenheit • In-floor radiant heat (if desired) 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment • OCS: Wire in positions for trolley buses • Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document. 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Forklift access • Natural daylighting desired • Roof Level Work Platform (RLWP) with fall protection 		

60' BUS PREVENTIVE MAINTENANCE



60' BUS PREVENTIVE MAINTENANCE

FUNCTION

Bay space to perform preventive maintenance such as inspections, and underfloor component replacement or repair on trolleys, and battery electric buses with a Lower Level Work Area (LLWA). As well as, roof top component repair or replacement with an Upper Level Work Platform (ULWP) are performed in this area as well.

RELATIONSHIP TO OTHER AREAS

- Access to Common Work Area, Parts Storage, Portable Equipment Storage Areas, and Maintenance Office areas

CRITICAL DIMENSIONS

- 19'-0" vertical clearance to structure and fixtures
- 20'-0" wide by 75'-0" long
- LLWA: 60'-0" long by 10'-0" wide by 8'-6" depth (min.)
- 25'-0" (min) vertical clearance within the bay where bus is in position.

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment
- Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document.
- Lockout/tag out system required when bus is in position
- No OCS: Wire in position for trolley buses. Provide plug in charging for buses to charge while being maintained

DESIGN FEATURES

- Forklift access
- Natural daylighting desired
- LLWA
- ULWP
- Tire guides are required to assist with the maneuvering into the bay
- Lockout/tag out system for access to ULWP
- Trolley pole system inspection and maintenance to be conducted in all PM Bays. Reference diagram in section 3.6 OCS-Trolley for height diagram.

- Multiple PM bays should be located adjacent to one another and the LLWA for each should be contiguous from one to another, to allow for uninhibited passage from one LLWA to the next LLWA across the entire length of the LLWA.

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access
- LLWA opening to support bridge jacks

MECHANICAL CONSIDERATIONS

- As required by equipment
- Ventilation:
 - ✓ 1.5 CFM exhaust per square foot exhaust
 - ✓ Return openings in areas used for repair or servicing vehicles shall not be less than 18" above floor level accordance with NFPA 30A and ASHRAE 62.1
- Heating set point: 65 degrees Fahrenheit
- In-floor radiant heat (if desired)
- LLWA:
 - ✓ Minimum 1 CFM per square foot of LLWA floor area at all times the building is occupied or when vehicles are parked over these areas.
 - ✓ Exhaust shall be taken from a point within 1'-0" of the floor

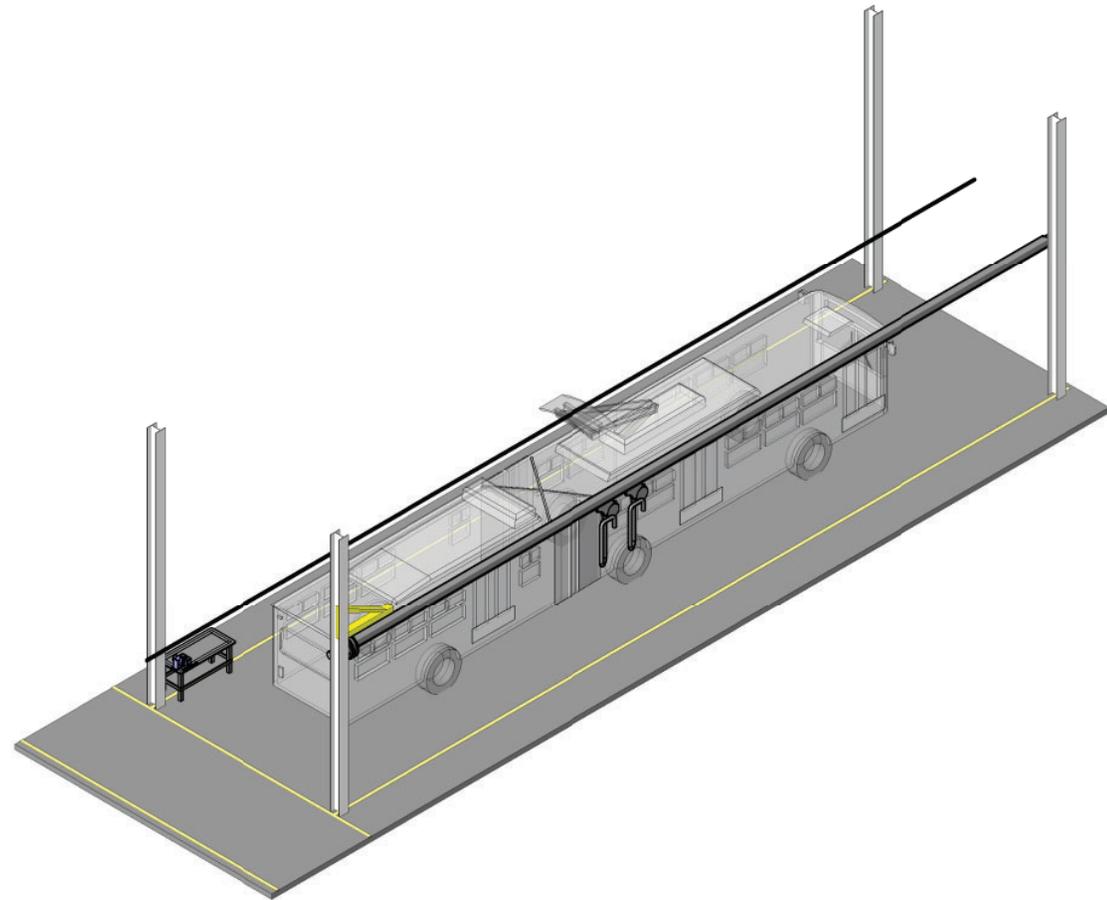
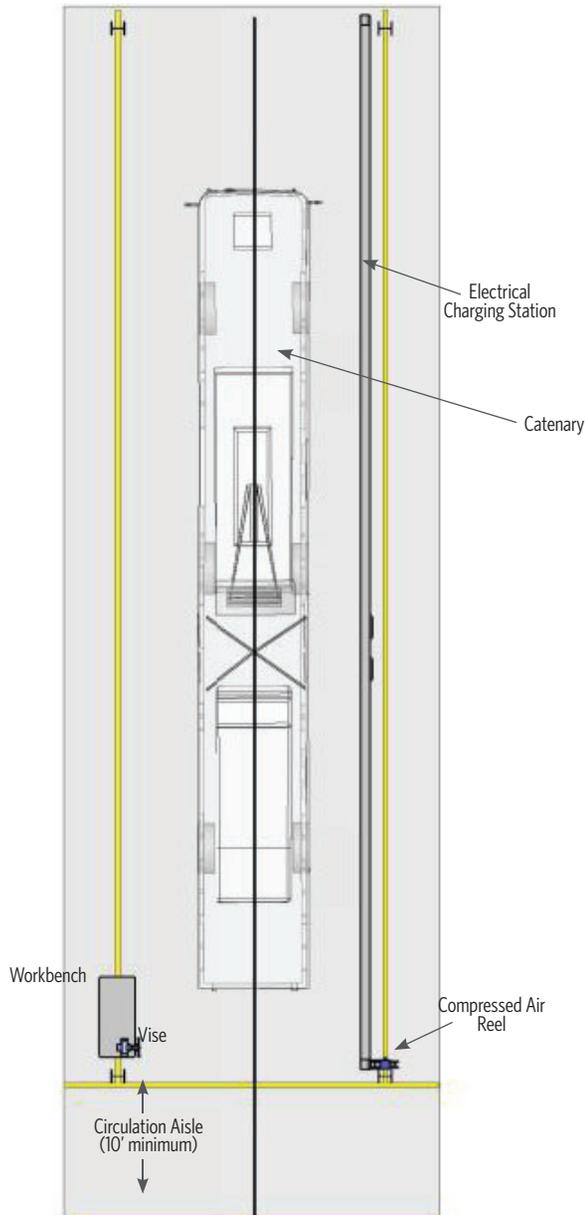
PLUMBING CONSIDERATIONS

- 3/4" water hose bibb with standard faucet at rear of bay on main and LLWA level, 2'-0" AFF (one per bay)
- Compressed air:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ Provide on Main Level, ULWP, and LLWA
 - ✓ As required by equipment
- Additional plumbing connections (water, drainage, etc.) as required by equipment

ELECTRICAL CONSIDERATIONS

- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls, columns, and between overhead doors
 - ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (75 fc average)
 - ✓ Explosion proof LED lighting in pit
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns at each bay

60' BUS TIRE BAY



60' BUS TIRE BAY

FUNCTION

Bay space to perform tire replacement and repair on trolleys and BEBs.

RELATIONSHIP TO OTHER AREAS

- Access to Common Work Area, Parts Storage, Portable Equipment Storage Areas, and Maintenance Office areas
- Adjacent to Tire Shop

CRITICAL DIMENSIONS

- 19'-0" vertical clearance to structure and fixtures
- 20'-0" wide by 75'-0" long

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment
- Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document.
- OCS: Wire in positions for trolley buses

DESIGN FEATURES

- Forklift access
- Natural daylighting desired

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- As required by equipment
- Ventilation:
 - ✓ 1.5 CFM exhaust per square foot of floor area
 - ✓ Return air openings in areas used for repair or servicing vehicles shall not be less than 18" above floor level accordance with NFPA 30A and ASHRAE 62.1
- Heating set point: 65 degrees Fahrenheit
- In-floor radiant heat (if desired)

PLUMBING CONSIDERATIONS

- Lubrication reel bank (shared one per two bays)
- 3/4" water hose bibb with standard faucet at rear of bay 2'-0" AFF (one per three bays)
- Compressed air:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- Additional plumbing connections (water, drainage, etc.) as required by equipment

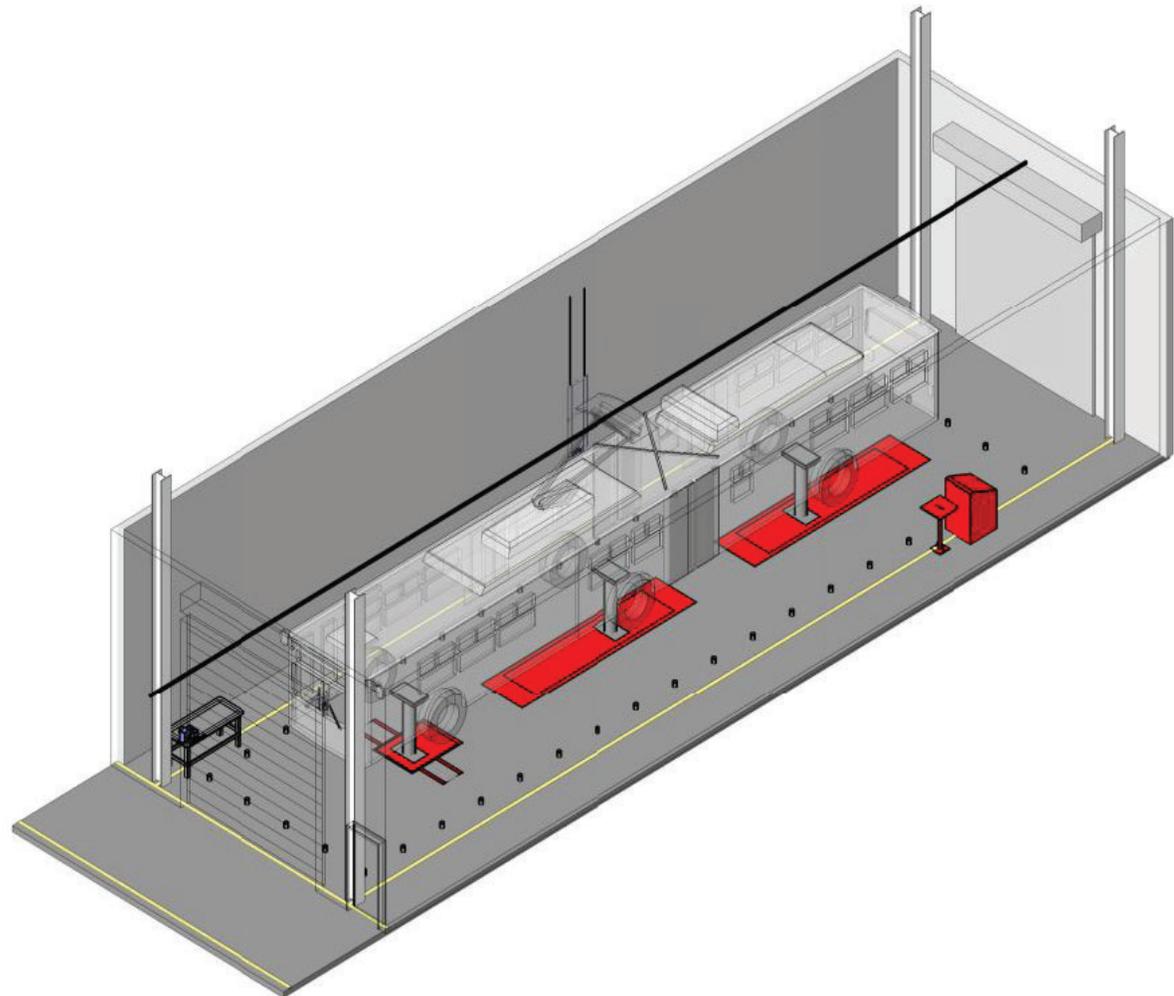
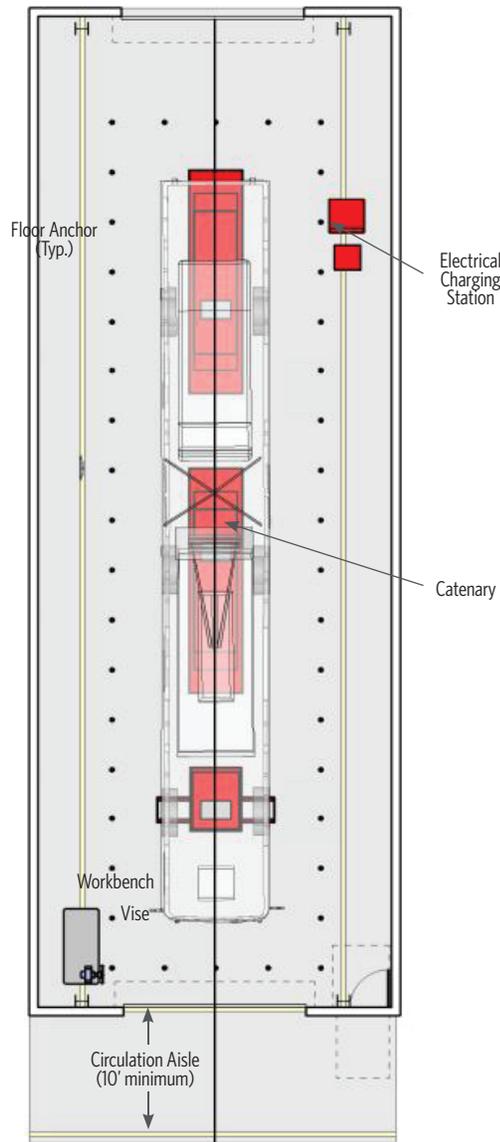
ELECTRICAL CONSIDERATIONS

- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls, columns, and between overhead doors
 - ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (25 fc average)
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns at each bay

FIRE SUPPRESSION CONSIDERATIONS

The fire protection and pyrotechnics experts on the detailed design team will be responsible for devising a robust fire protection system for the tire bay and tire shop/storage areas that minimizes risk to the Yard and any joint development above. Review and recommendations provided by the experts will include, but not be limited to, the location, ventilation, and fire suppression systems for Potrero Yard's tire facilities.

60' BUS MINOR BODY REPAIR



60' BUS MINOR BODY REPAIR

FUNCTION

Perform minor replacement and repair of glass panel and other body parts of the trolley and BEBs.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Minor Body Shop

CRITICAL DIMENSIONS

- 19'-0" vertical clearance to structure and fixtures
- 20'-0" wide by 75'-0" long

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment
- Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document.
- OCS: Wire in positions for trolley buses

DESIGN FEATURES

- Forklift access
- Natural daylighting desired

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish
- Doors:
 - ✓ Personnel door with view panel to meet applicable code exit requirements
 - ✓ Overhead door: High-lifting sectional, steel, insulated, 14'-0" by 14'-0" with view panels, automatic operator, interior and exterior push button controls

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- As required by equipment
- Ventilation:
 - ✓ 1.5 CFM exhaust per square foot of floor area
 - ✓ Return air openings in areas used for repair or servicing vehicles shall not be less than 18" above floor level accordance with NFPA 30A and ASHRAE 62.1
- Heating set point: 65 degrees Fahrenheit
- In-floor radiant heat (if desired)

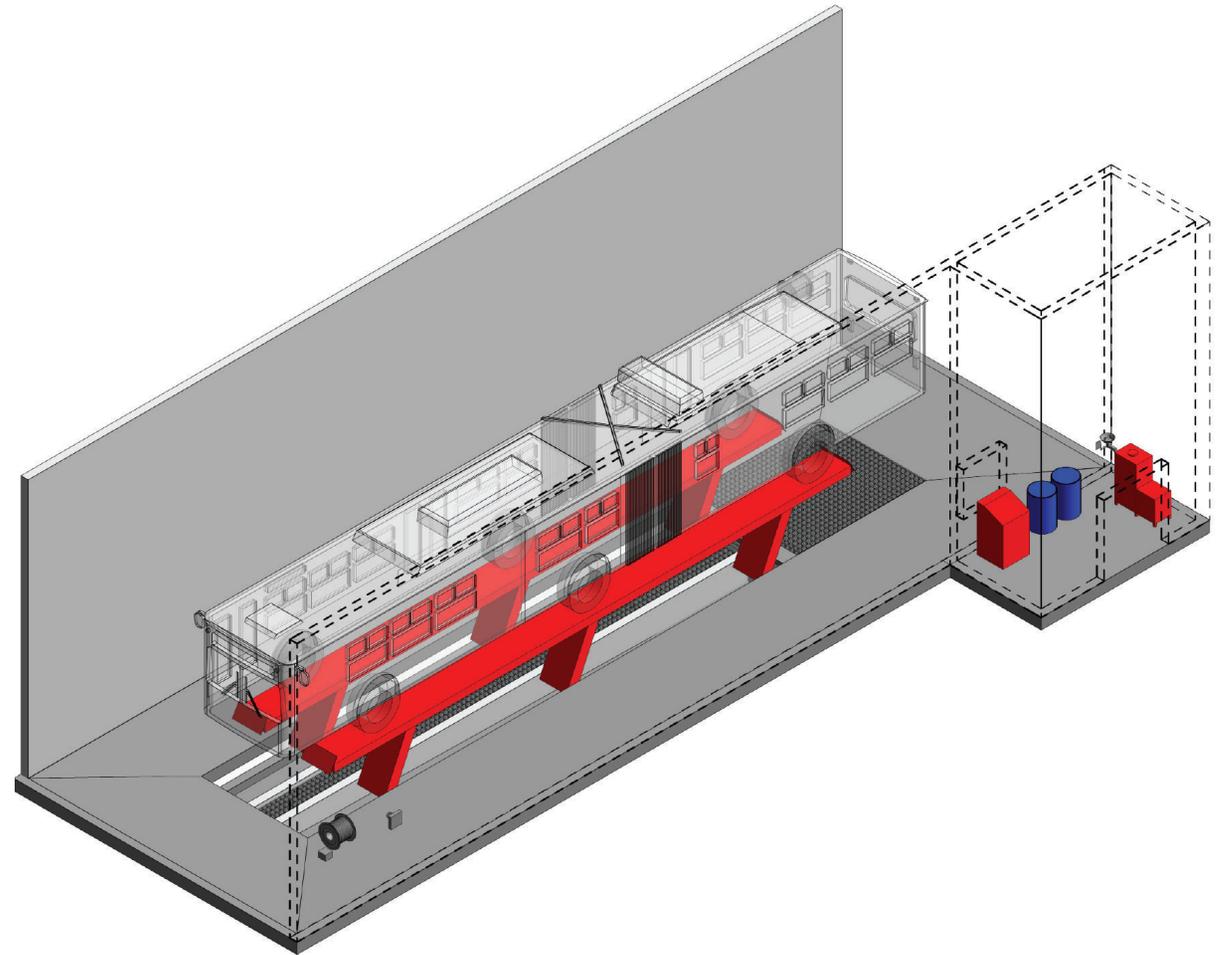
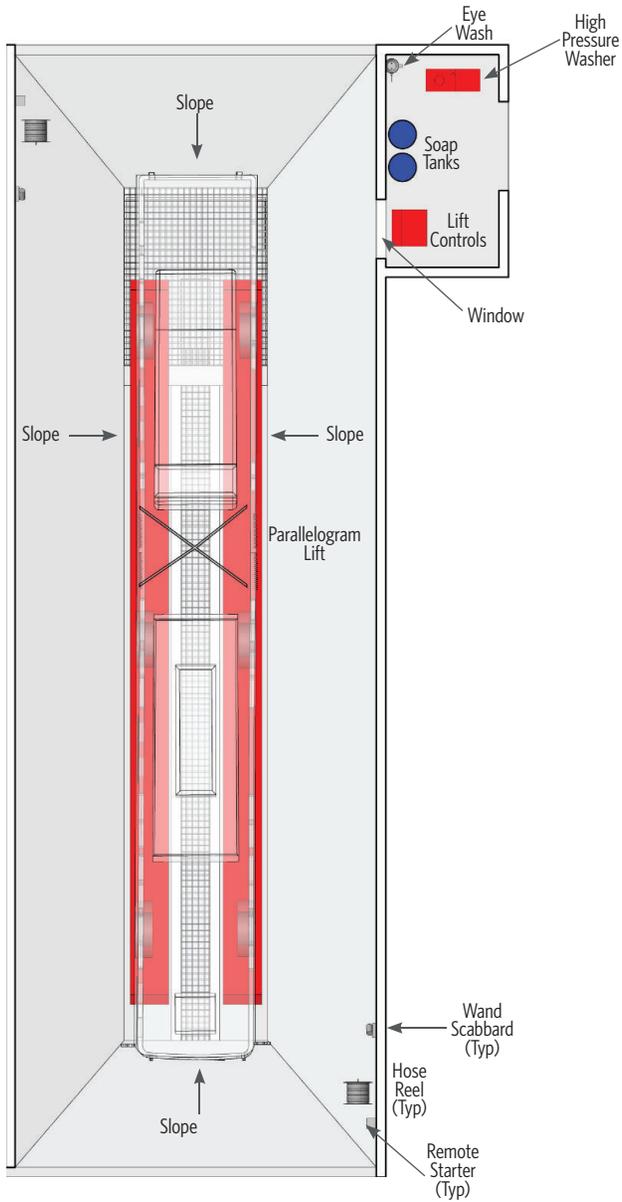
PLUMBING CONSIDERATIONS

- Lubrication reel bank (shared one per two bays)
- 3/4" water hose bibb with standard faucet at rear of bay 2'-0" AFF (one per three bays)
- Compressed air:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- Additional plumbing connections (water, drainage, etc.) as required by equipment.

ELECTRICAL CONSIDERATIONS

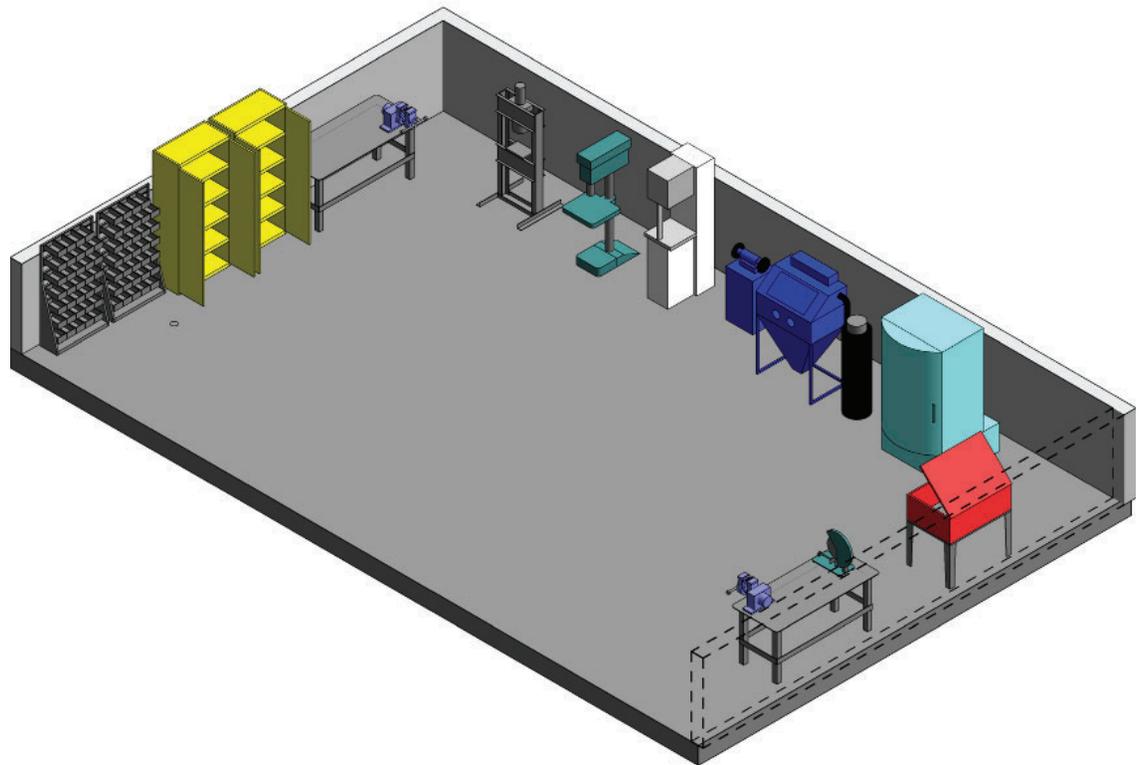
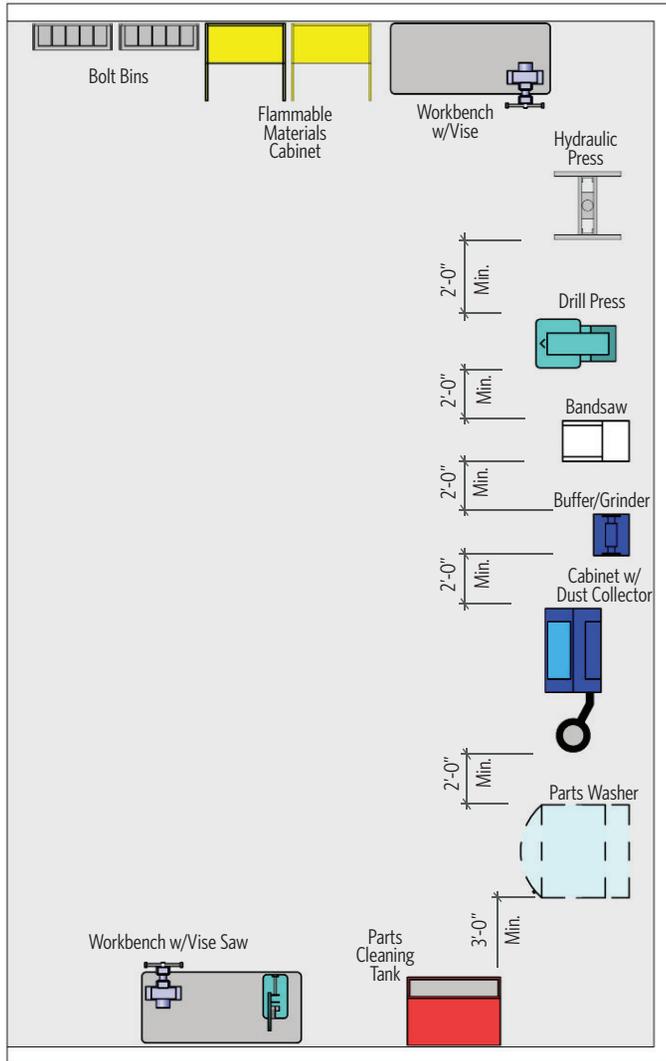
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls, columns, and between overhead doors
 - ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (75 fc average)
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns at each bay

60' BUS CHASSIS WASH



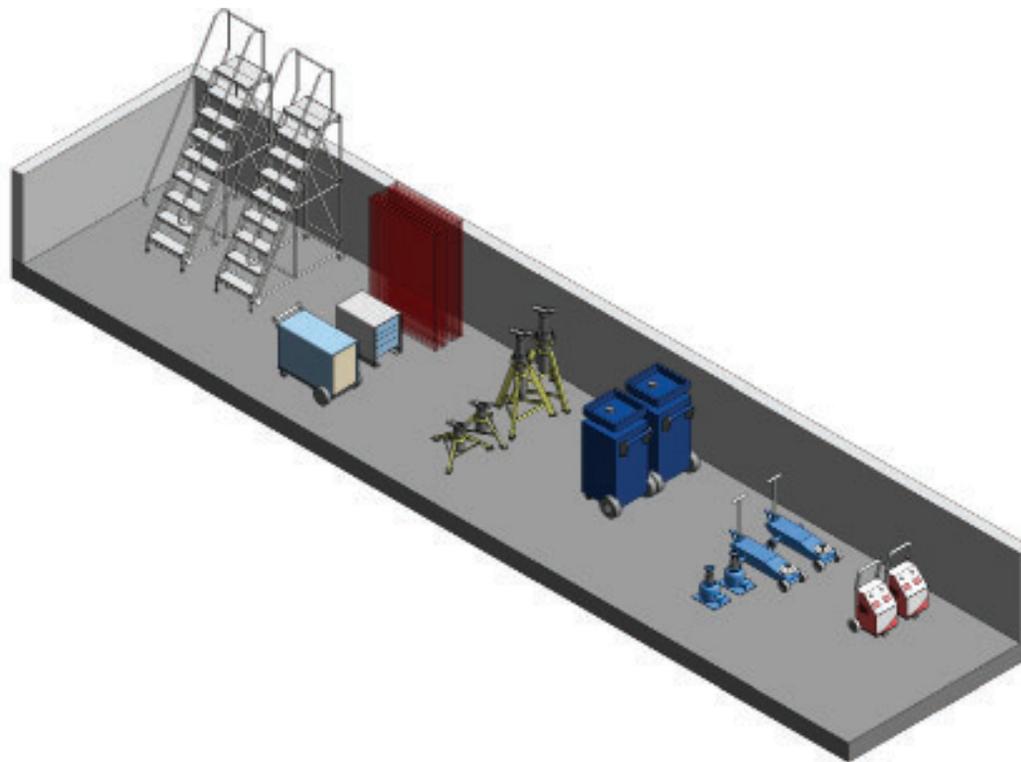
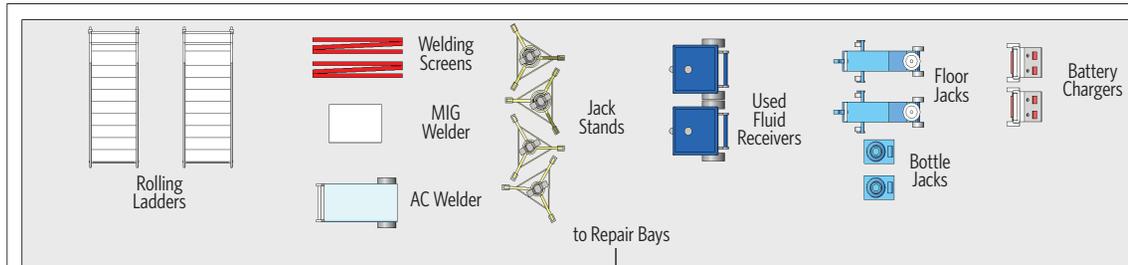
60' BUS CHASSIS WASH		
<p>FUNCTION</p> <p>Chassis Wash Bay: Enclosed bay for washing of underside of trolleys and battery electric buses before bringing into repair bays. Wash Equipment Room: A room adjacent to the Wash Bay for high pressure washer and soap drums.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry, with polyurea coatings treatment for wet and moisture protection ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish • Doors: Personnel doors with view panels to meet applicable code exit requirements 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Compressed air: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ As required by equipment • Wash connections from high pressure washer to wand scabbard on both sides of bay • Water connection to emergency eye wash/shower station • Trench drain area (with removable cover), with sediment basket upstream of trap, to central sediment and oil inceptor • Large grated sump with side drain overflow to central sediment and oil inceptor • Additional plumbing connections (water, drainage, etc.) as required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to all other shop areas 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structural grating over sump pit to accommodate H-20 loading • Large grated sump with side drain for overflow • Slope floor to trench drain and sump pit • Structure as needed to support equipment 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide waterproof duplex receptacles (four minimum) on walls • Lighting: <ul style="list-style-type: none"> ✓ Sealed LED water tight lighting fixtures with no external reset device on walls (20 fc average) ✓ Fixtures located to illuminate work space and around vehicles • Communications: Paging/intercom system speakers
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 19'-0" vertical clearance • 20'-0" wide by 75'-0" long 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Special ventilation to remove moisture • Water resistant heating system • In-floor radiant heating (if desired) • As required by equipment • Exhaust: <ul style="list-style-type: none"> ✓ Minimum 10 air changes per hour when wash equipment is activated. ✓ Minimum one air change per hour when wash equipment is inactive • Heating set point: 55 degrees Fahrenheit 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment • No OCS: Wire in position for trolley buses. 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Forklift access • Natural daylighting desired 		

COMMON WORK AREA



COMMON WORK AREA		
<p>FUNCTION</p> <p>Designated area for common fixed shop equipment which supports all repair bays and associated shop areas.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, light colored finish • Doors: None 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Compressed air drop: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design ✓ As required by equipment • Water: 3/4" water hose bibb with standard hose bibb at 2'-0" AFF • Additional plumbing connections (water, drainage, etc.) as required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access from Maintenance Office areas • Adjacent to Repair Bays, Parts Room, and Portable Equipment Storage • Located on first floor 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment • Floor slab designed to accommodate in-floor radiant heat (if desired) • Floor slab designed to accommodate forklift access 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (50 fc average) ✓ Fixtures located to illuminate work spaces • Communications: <ul style="list-style-type: none"> ✓ Paging/intercom system speakers ✓ Data conduit on columns and/or walls
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 12'-0" to vertical clearance to structure and fixtures 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Heating set point: 65 degrees Fahrenheit • General ventilation (per code) • In-floor radiant heat (if desired) • As required by equipment 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Half-height 56" walls on three sides for utilities and to prevent blocking vision of shop from office areas and repair bays • Forklift access • Natural daylighting desired 		

PORTABLE EQUIPMENT STORAGE



FUNCTION

A dedicated area for storage of portable shop equipment.

RELATIONSHIP TO OTHER AREAS

- Access to all Repair Bays and all shop areas

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

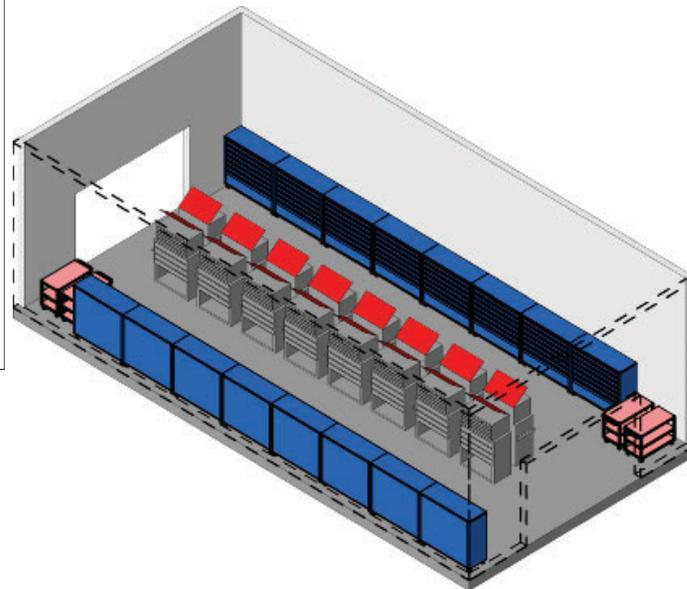
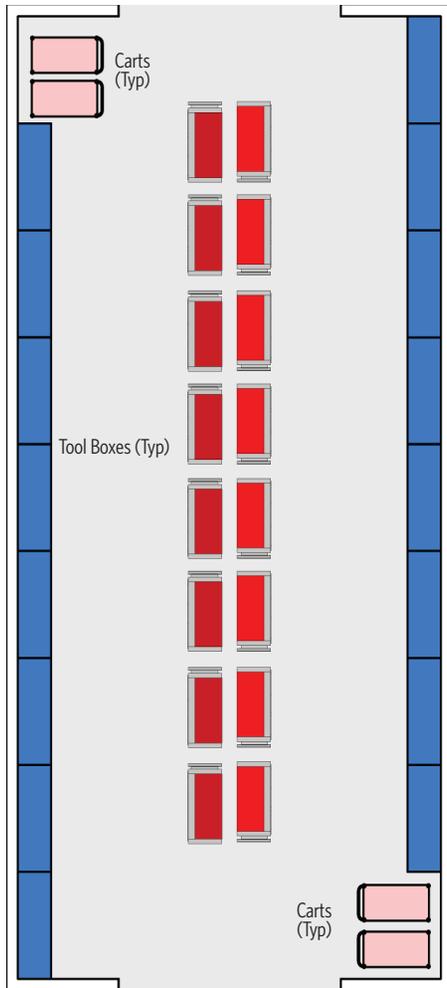
EQUIPMENT/FURNISHINGS

- Portable equipment including but not limited to: Service jacks, bottle jacks, jack stands, ladders, diagnostic equipment, used fluid drain pans, battery chargers, work platforms, welders, welding screens, etc.
- Typical equipment is shown, reference Appendix C: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete with integral non-metallic light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finish concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (20 fc average)
 - ✓ Fixtures located to illuminate work spaces

TOOL BOX STORAGE



FUNCTION

Dedicated area for the storage of toolboxes and carts.

RELATIONSHIP TO OTHER AREAS

- Access to all repair bays and all shop areas

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

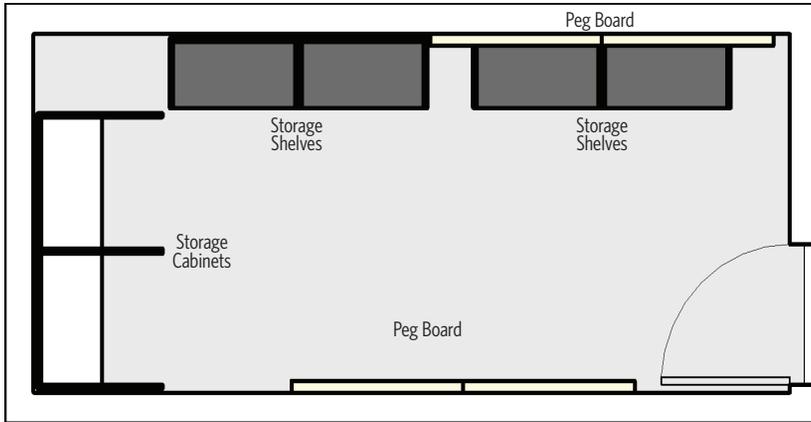
EQUIPMENT/FURNISHINGS

- Toolboxes
- Carts
- Anchors to be installed for security toolboxes
- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

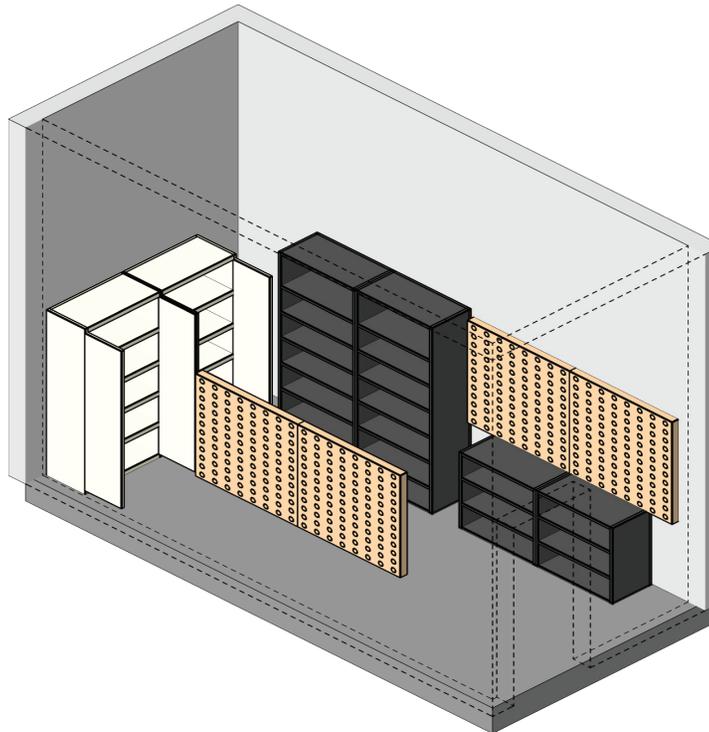
DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete with integral non-metallic light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (20 fc average)
 - ✓ Fixtures located to illuminate work spaces

TOOL STORAGE



GENERIC WALL



FUNCTION

Secure area for storing specialized tools and equipment.

RELATIONSHIP TO OTHER AREAS

- Access to Repair Bays and Shops
- Adjacent to Parts Room and Maintenance Offices

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

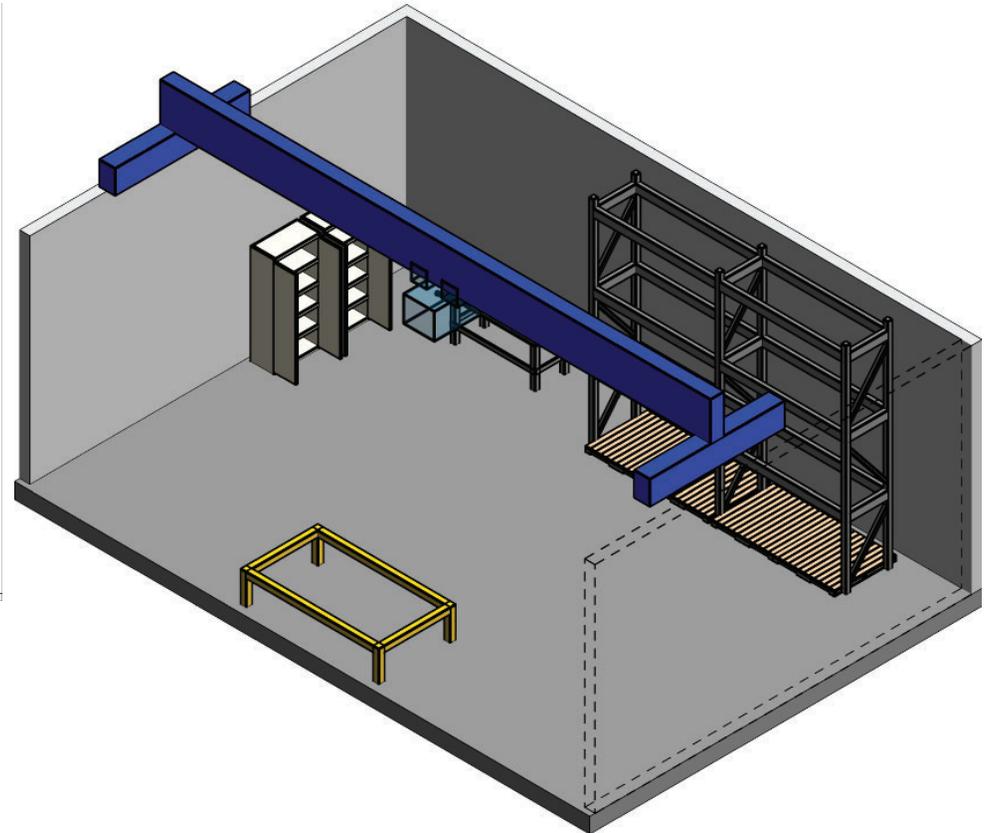
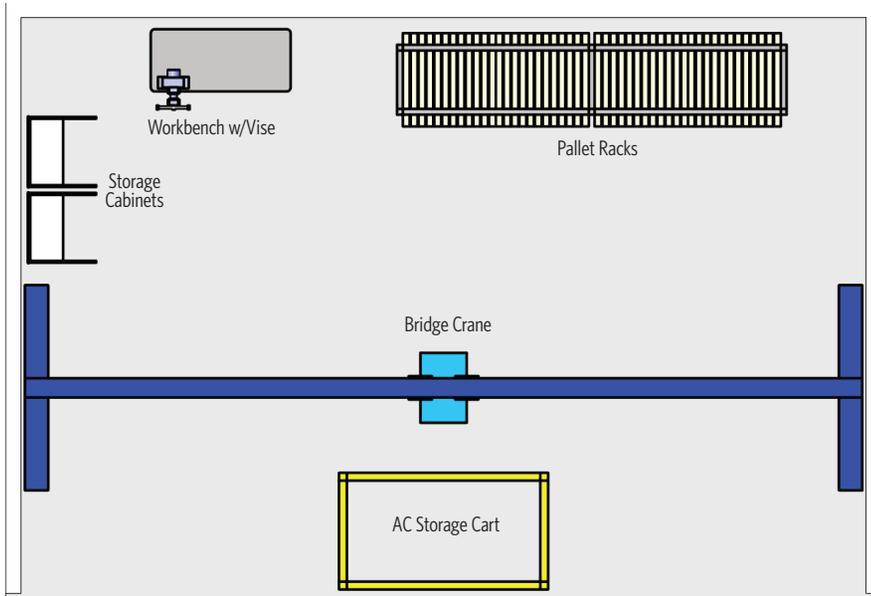
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

AC SHOP/STORAGE



AC SHOP/STORAGE

FUNCTION

Designated shop for repair and storage of air conditioning units for trolley and BEBs.

RELATIONSHIP TO OTHER AREAS

- Adjacent to 60' Bus Preventive Maintenance

CRITICAL DIMENSIONS

- 19'-0" vertical clearance to structure and fixtures

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Forklift access
- Physically separated from other areas to prevent migration of noise, dirt and fumes, if possible
- Natural daylighting desired

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- In-floor radiant heat (if desired)
- Heating set point: 65 degrees Fahrenheit
- General ventilation (per code)
- As required by equipment

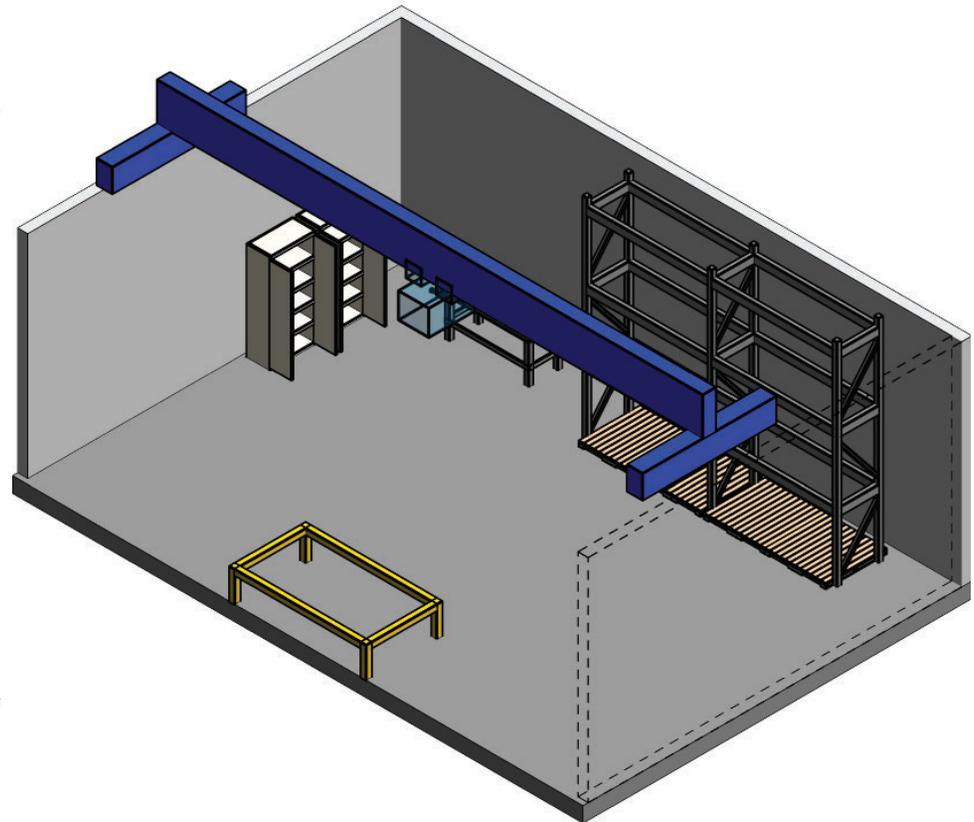
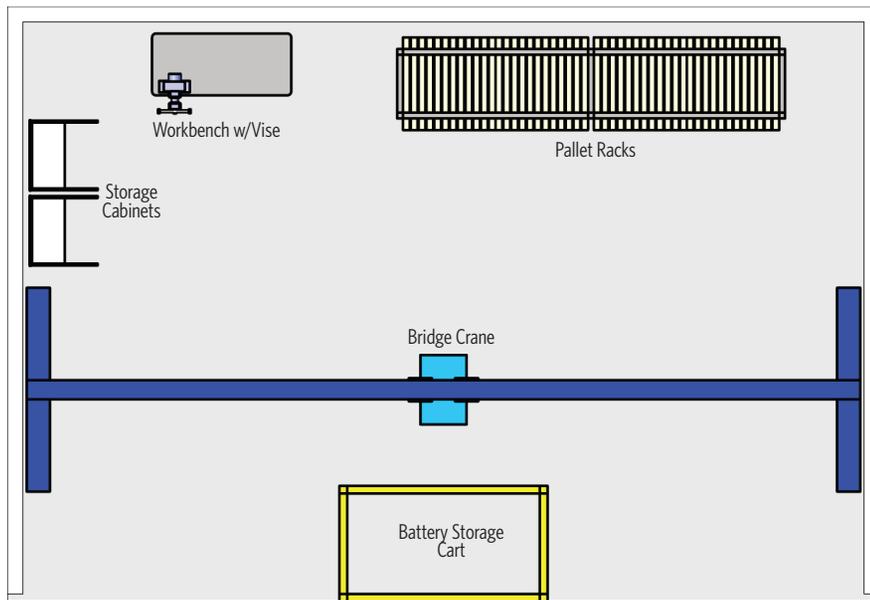
PLUMBING CONSIDERATIONS

- Compressed air drop:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- Water: 3/4" water hose bibb with standard hose bibb at 2'-0" AFF
- As required by equipment

ELECTRICAL CONSIDERATIONS

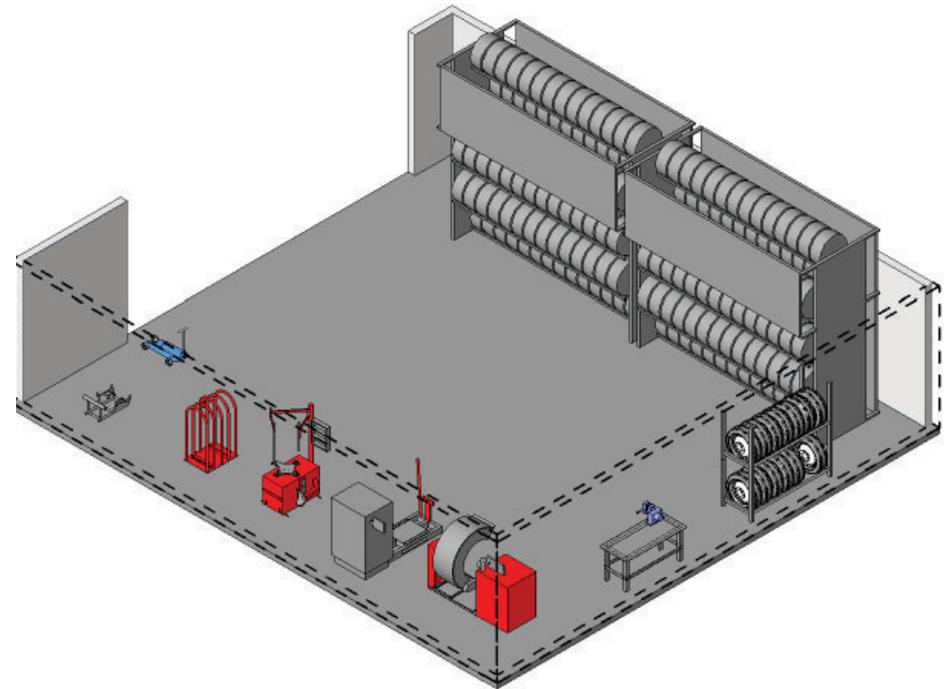
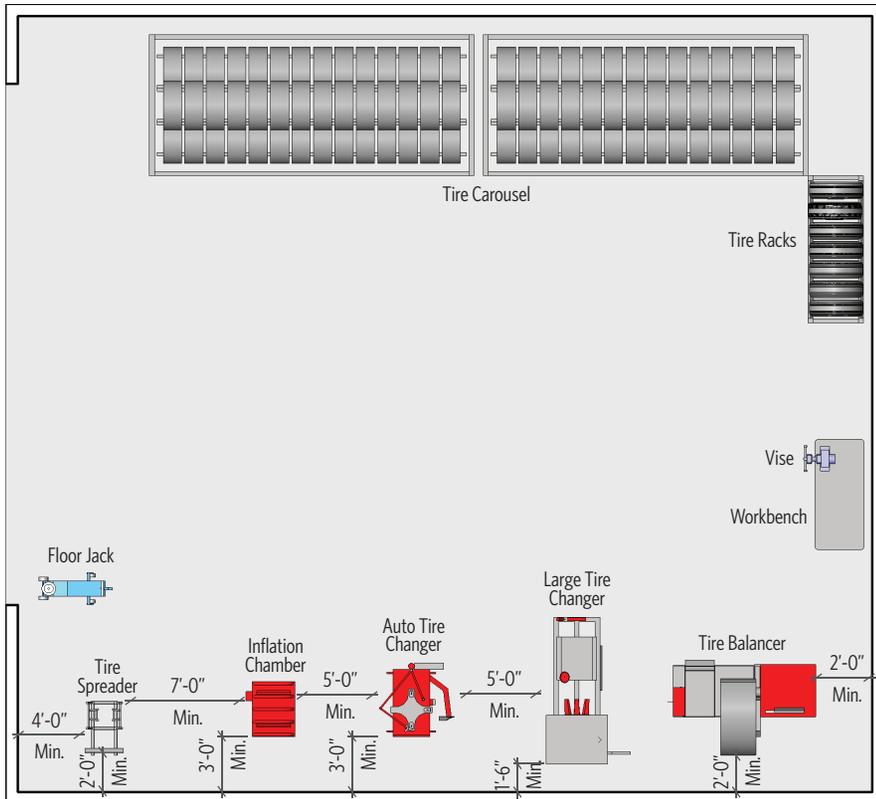
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (50 fc average)
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns and/or walls

BATTERY REBUILD SHOP



BATTERY REBUILD SHOP		
<p>FUNCTION</p> <p>Designated shop for the repair and storage of batteries for trolley and BEBs.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Compressed air drop: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design ✓ As required by equipment • Water: 3/4" water hose bibb with standard hose bibb at 2'-0" AFF • As required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Adjacent to 60' Bus Preventive Maintenance 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment • Floor slab designed to accommodate in-floor radiant heat (if desired) • Floor slab designed to accommodate forklift access 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles (four minimum) on walls and columns ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (50 fc average) ✓ Fixtures located to illuminate work spaces and around the vehicles • Communications: <ul style="list-style-type: none"> ✓ Paging/intercom system speakers ✓ Data conduit on columns and/or walls
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 19'-0" vertical clearance to structure and fixtures 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • In-floor radiant heat (if desired) • Heating set point: 65 degrees Fahrenheit • General ventilation (per code) • As required by equipment 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Forklift access • Physically separated from other areas to prevent migration of noise, dirt and fumes, if possible • Natural daylighting desired 		

TIRE SHOP/STORAGE



TIRE SHOP/STORAGE

FUNCTION

Repair, changing, balancing, and storage of tires.

RELATIONSHIP TO OTHER AREAS

- Adjacent to 60 Foot Bus Tire Bay
- Access to Common Work Area and Parts Storage

CRITICAL DIMENSIONS

- 19'-0" vertical clearance to structure and fixtures

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Forklift access
- Access to exterior for delivery of tires
- Physically separated with full height walls from other areas to prevent migration of noise, dirt, and fumes
- Natural daylighting desired

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, light colored finish

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed for equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- In-floor radiant heat (if desired)
- Heating set point: 65 degrees Fahrenheit
- General ventilation (per code)
- As required by equipment

PLUMBING CONSIDERATIONS

- Compressed air:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- As required by equipment

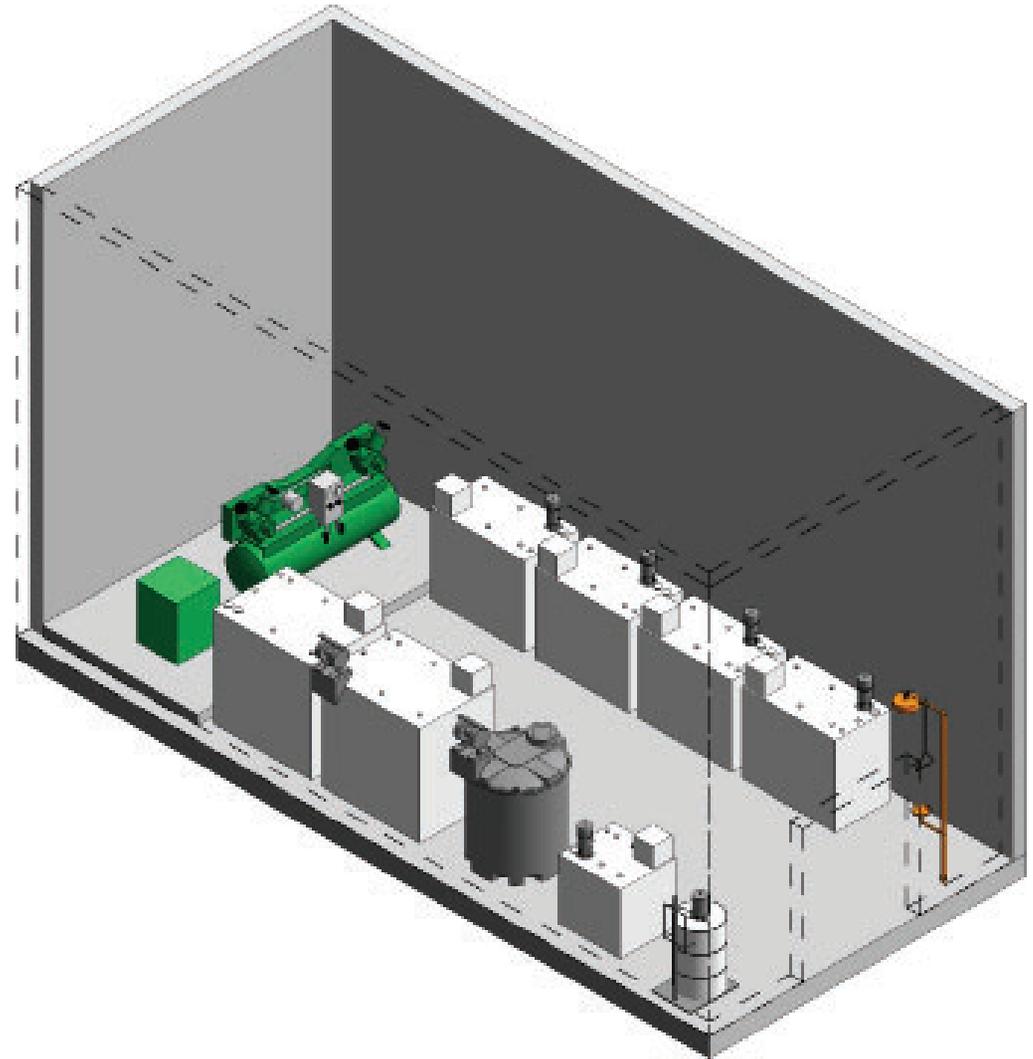
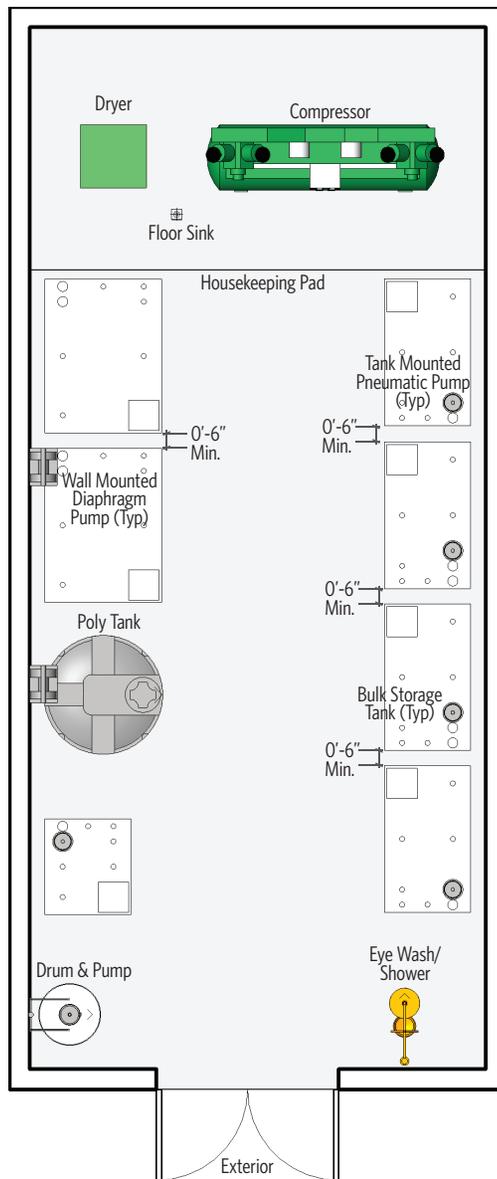
ELECTRICAL CONSIDERATIONS

- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (five minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum in Storage Area (15 fc average) and Shop Area (25 fc average)
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns and/or walls

FIRE SUPPRESSION CONSIDERATIONS

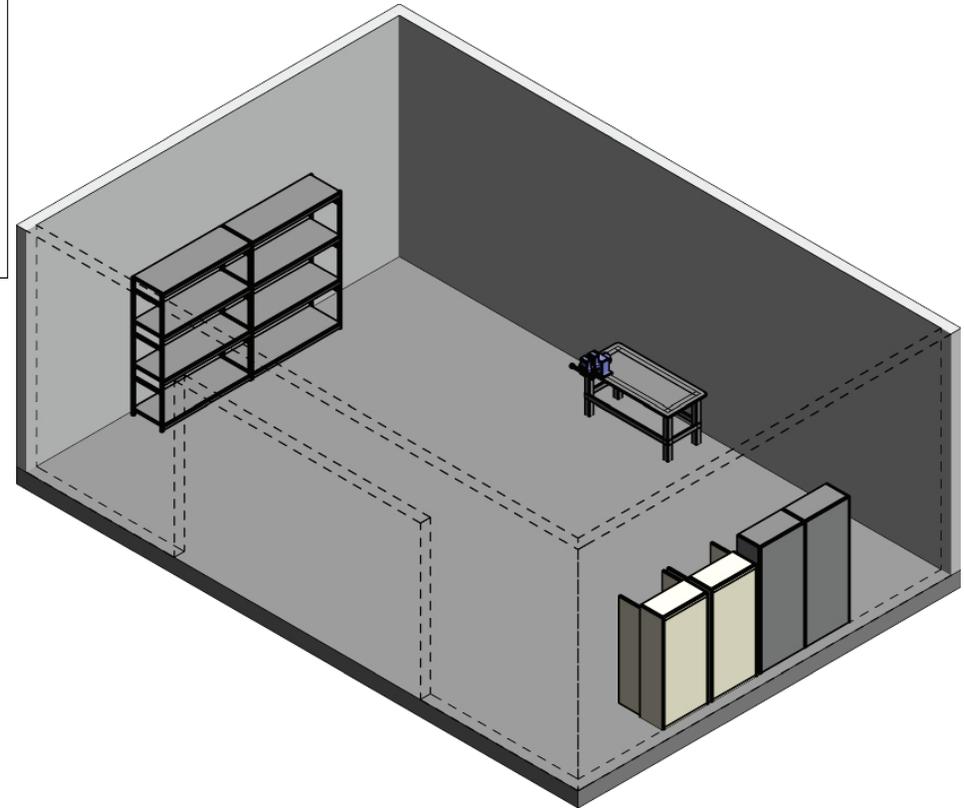
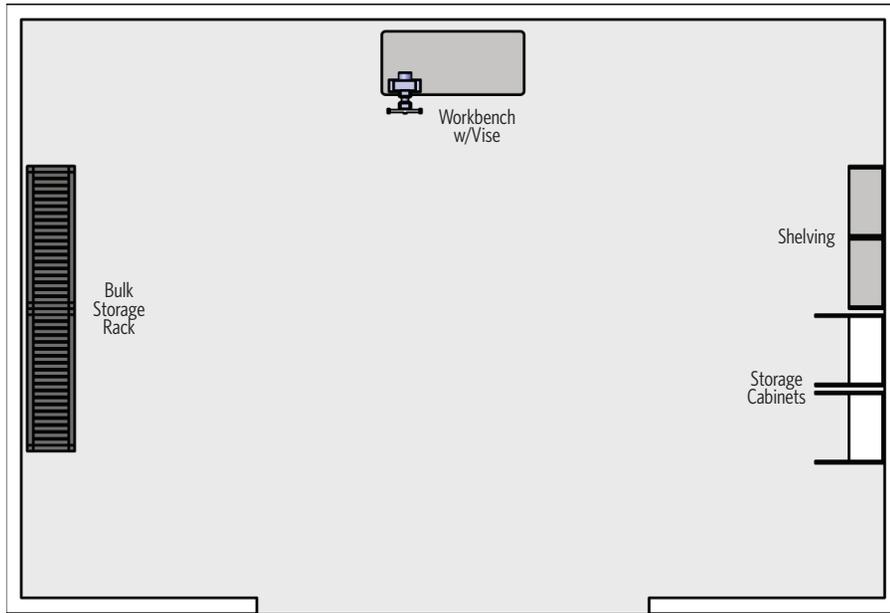
The fire protection and pyrotechnics experts on the detailed design team will be responsible for devising a robust fire protection system for the tire bay and tire shop/storage areas that minimizes risk to the Yard and any joint development above. Review and recommendations by these experts will include, but not be limited to, the location, ventilation, and fire suppression systems for Potrero Yard's tire facilities.

LUBE/COMPRESSOR ROOM



LUBE/COMPRESSOR ROOM		
<p>FUNCTION</p> <p>Enclosed room for storage and central distribution of lubricants. Space shall include a compressor(s) and refrigerated air dryer(s).</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finish sound absorption material ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, with light colored finish, and sound absorption material • Doors: <ul style="list-style-type: none"> ✓ Personnel door with view panel to meet applicable code exit requirements ✓ Double 6'-0" wide door with interior exit device ✓ No thresholds • Acoustics: Determine based on equipment and location of adjacent spaces 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Compressed air: <ul style="list-style-type: none"> ✓ Duplex air compressor, air dryer, and air receiver ✓ Floor sink between air compressor and dryer. Plumb to central sediment and oil interceptor ✓ 2'-0" compressed air piping loop (minimum) started in the Lube/Compressor Room ✓ Compressed air line with 3/8" and 1/2" shut-off valve, separator, regulator with gauge, lubricator, and quick disconnect on wall at 4'-0" AFF ✓ Connect to lubricant pumps • Tank mount all piston lubricant pump(s) • Wall mount all diaphragm pump(s) • CG pump mounted to an air operated hoist (if required) • Plumb tanks to corresponding lube reel banks located in the Repair Bays • Plumb UC tanks to corresponding pumps located in the Repair Bays (if required) • 3/4" water hose bibb with standard faucet 2'-0" AFF • Emergency eyewash
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to exterior for deliveries 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • 0'-6" housekeeping pad for both the air compressor and refrigerated air dryer • Structure as needed to support equipment • Containment pit for 110 percent of largest tank (per local code) 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles (four minimum) on walls ✓ Lube/compressor: 25 fc average ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (25 fc average) ✓ Fixtures located to illuminate work spaces
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 12'-0" vertical clearance to structure and fixtures 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Heating set point: 55 degrees Fahrenheit • Exhaust: Minimum 1.0 CFM per square foot • Negative pressurization • As required by equipment 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Exterior access for deliveries • Acoustically and physically separated from other areas to prevent migration of noise, dirt, and fumes 		

MINOR BODY SHOP



MINOR BODY SHOP

FUNCTION

Designated shop for minor body repair or replacement and storage.

RELATIONSHIP TO OTHER AREAS

- Open to Minor Body Bay

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Forklift access
- Physically separated from other areas to prevent migration of noise, dirt and fumes, if possible
- Natural daylighting desired

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- In-floor radiant heat (if desired)
- Heating set point: 65 degrees Fahrenheit
- General ventilation (per code)
- Exhaust and makeup air for dust collection system
- As required by equipment

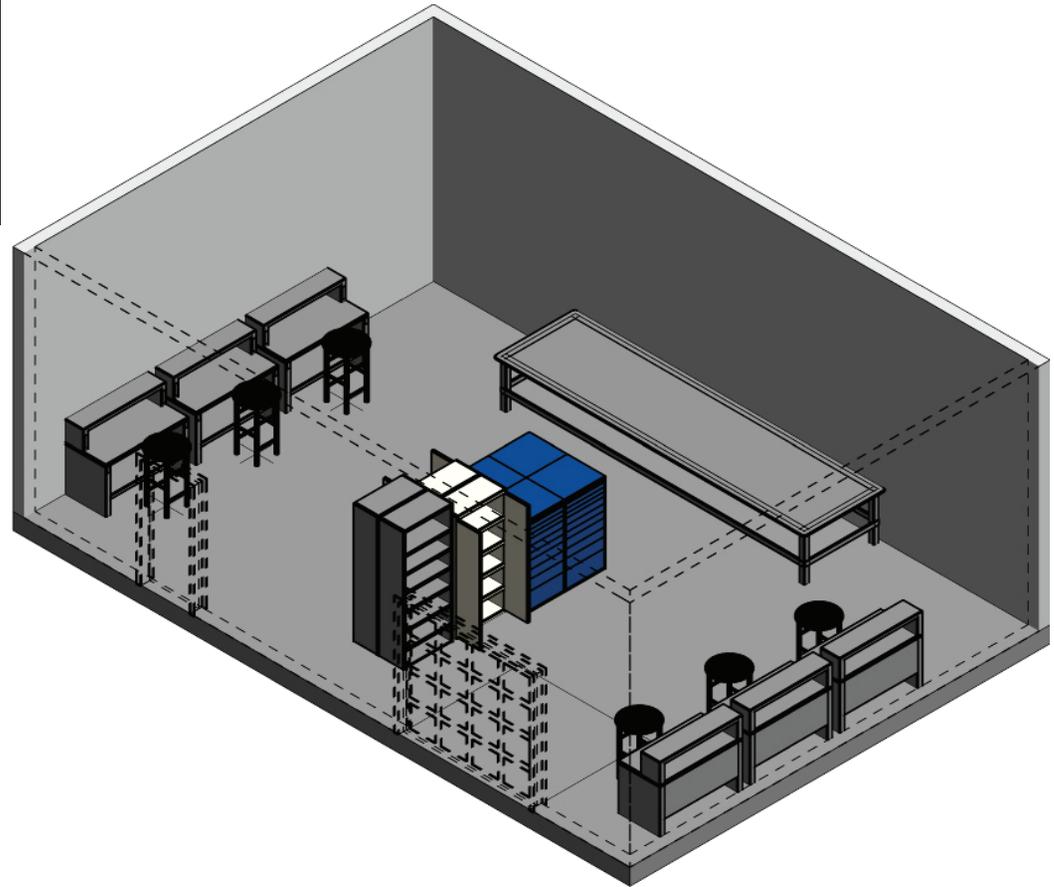
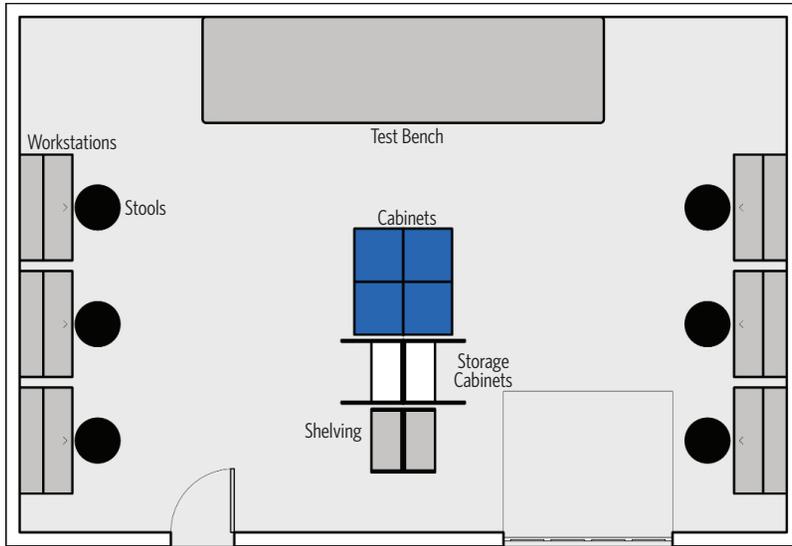
PLUMBING CONSIDERATIONS

- Compressed air drop:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- Water: 3/4" water hose bibb with standard hose bibb at 2'-0" AFF
- As required by equipment

ELECTRICAL CONSIDERATIONS

- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (50 fc average)
 - ✓ Fixtures located to illuminate work spaces and around the vehicles
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns and/or walls

ELECTRONIC BENCH SHOP



ELECTRONIC BENCH SHOP

FUNCTION

Enclosed area for repairing and modifying trolleys and BEBs electronic and computer control systems. Radio equipment, electrical signage, and other electrical equipment is installed and maintained in this space.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Electronic Shop Workstations

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Dust proof required for electrical components

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, light colored finish
- Doors:
 - ✓ Personnel doors with view panels to meet applicable code exit requirements
 - ✓ Overhead door (if desired): High-lifter sectional, steel, insulated, 10'-0" by 10'-0" with view panels, automatic operator, interior and exterior push button controls

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)

MECHANICAL CONSIDERATIONS

- In-floor radiant heat (if desired)
- Cooling set point: 74 degrees Fahrenheit
- Heating set point: 65 degrees Fahrenheit
- General ventilation (per code)
- As required by equipment
- Relative humidity: 50-35 percent

PLUMBING CONSIDERATIONS

- Compressed air drop:
 - ✓ 2'-0" compressed air piping loop (minimum)
 - ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, and quick disconnects on 4'-0" AFF
 - ✓ Provide disconnects for 3/8" impact tools at locations to be determined during detailed design
 - ✓ As required by equipment
- As required by equipment

ELECTRICAL CONSIDERATIONS

- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (four minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum (50 fc average)
 - ✓ Fixtures located to illuminate work spaces
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns and/or walls



SECTION 5.4: FARE BOX AND
CLIPPER CARD READER
REPAIR SHOP



GENERAL OFFICE MODULES: OFFICE AREAS

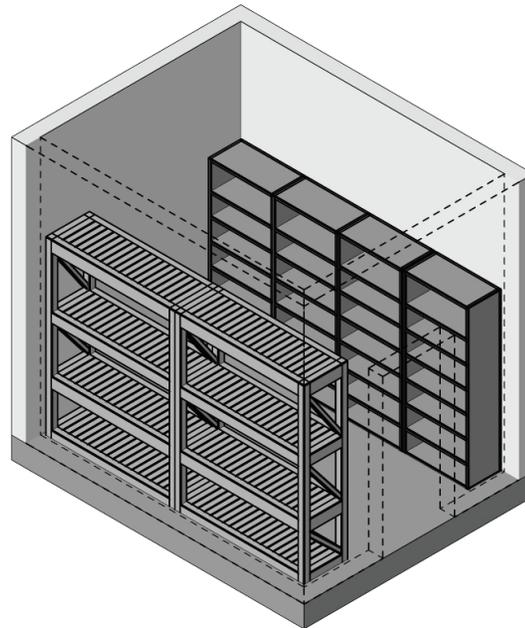
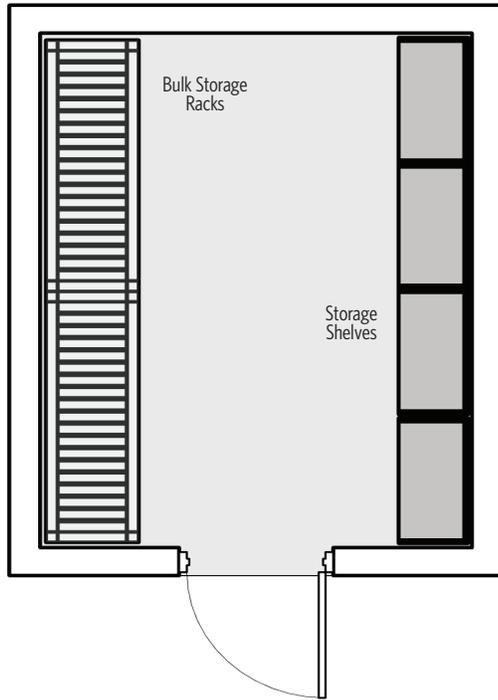
MANAGER

- Reference **Office Module Private Office- 120 sf**
- Adjacent to Fare Box Staff

FARE BOX STAFF

- Reference **Office Module Workstation- 64 sf**
- Adjacent to Manager
- Adjacent to Shop, Storage, and Parts Storage

INCOMING AND OUTGOING DEVICE STORAGE



FUNCTION

Storage of the fare box and clipper card readers when needing repair and repair is completed.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Fare Box Staff

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

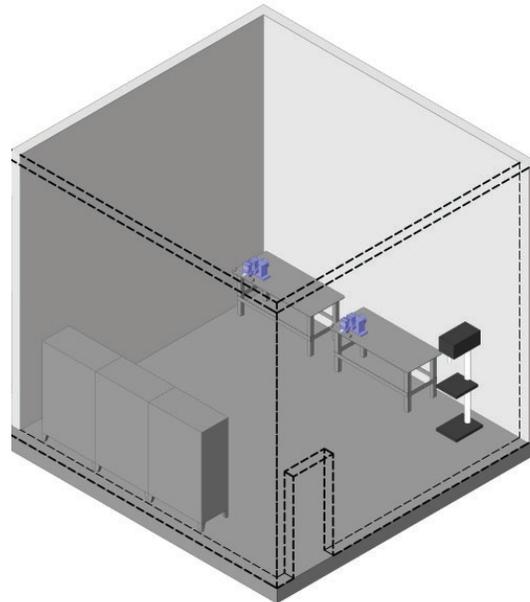
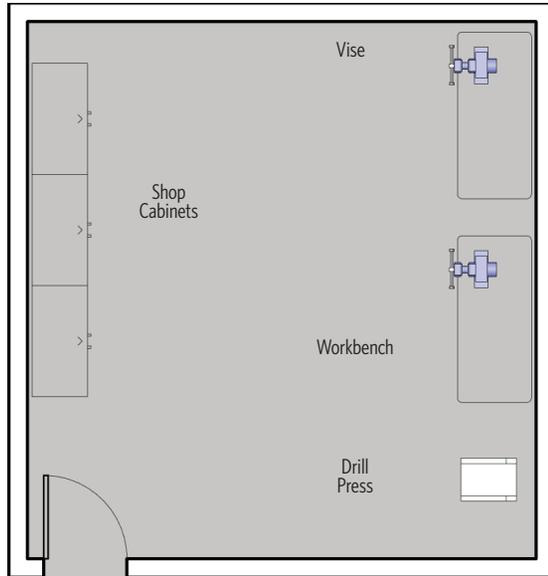
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

SHOP



FUNCTION

Designated shop for repair of fare boxes and clipper readers.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Fare Box Staff, Storage, and Parts Storage

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

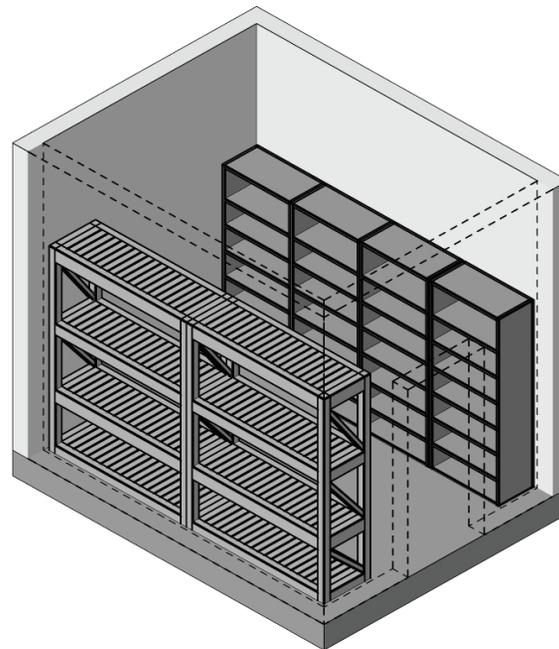
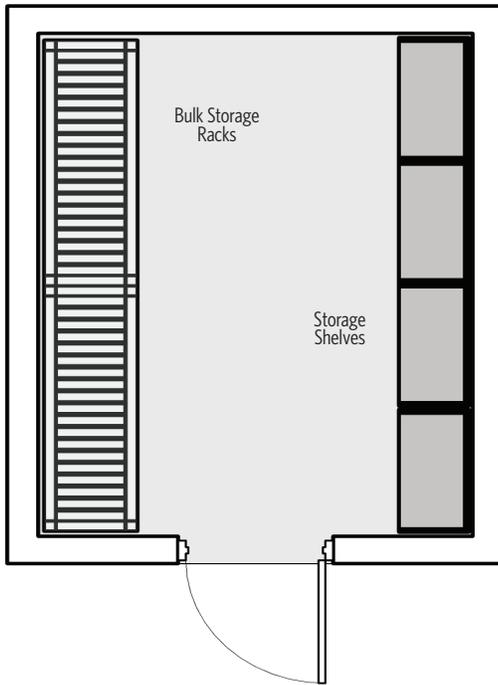
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

STORAGE



FUNCTION

Dedicated secure storage for fare box and clipper reader supplies.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Shop and Parts Storage

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

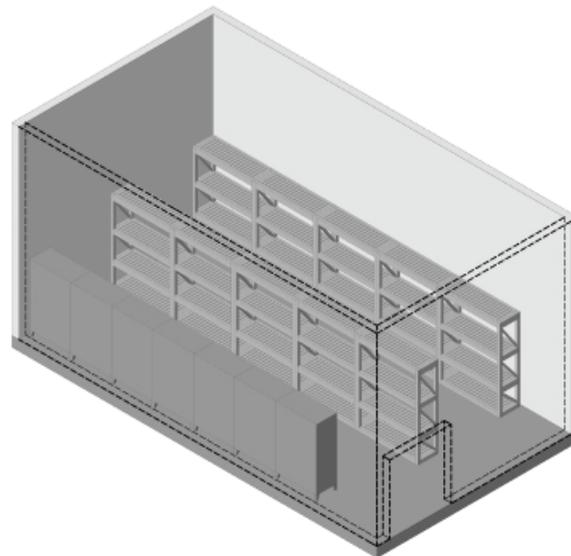
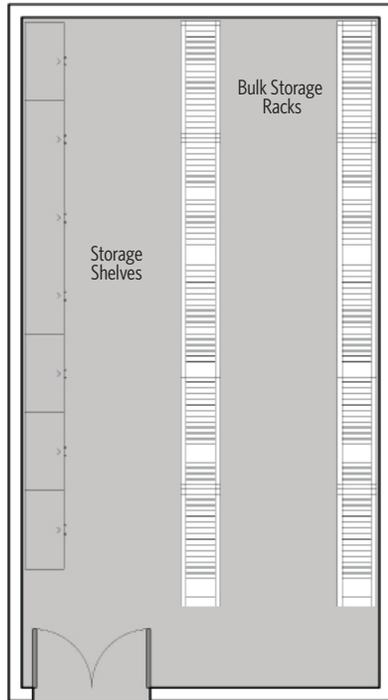
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

PARTS STORAGE



FUNCTION

Dedicated storage for fare box and clipper reader components.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)



SECTION 5.5: SERVICE AND
CLEAN

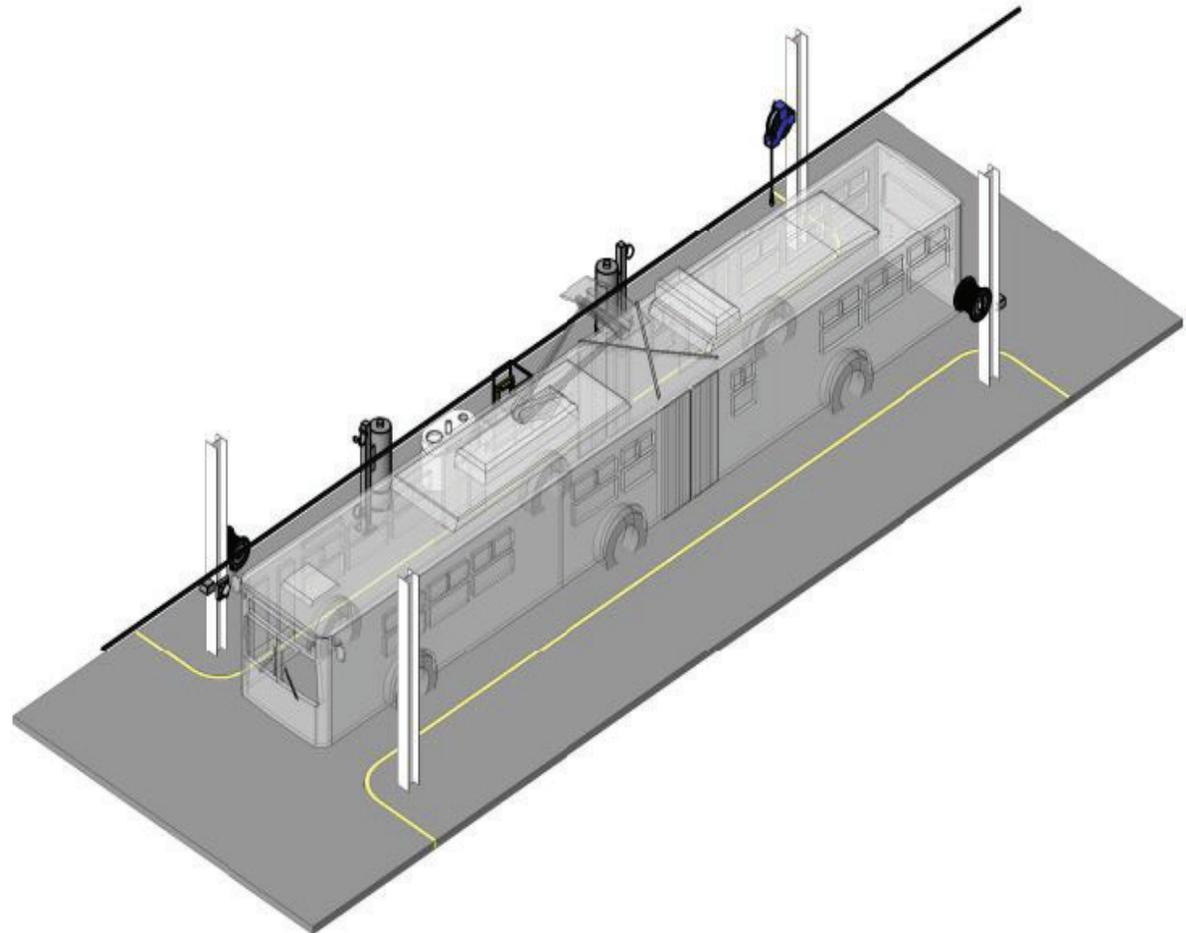
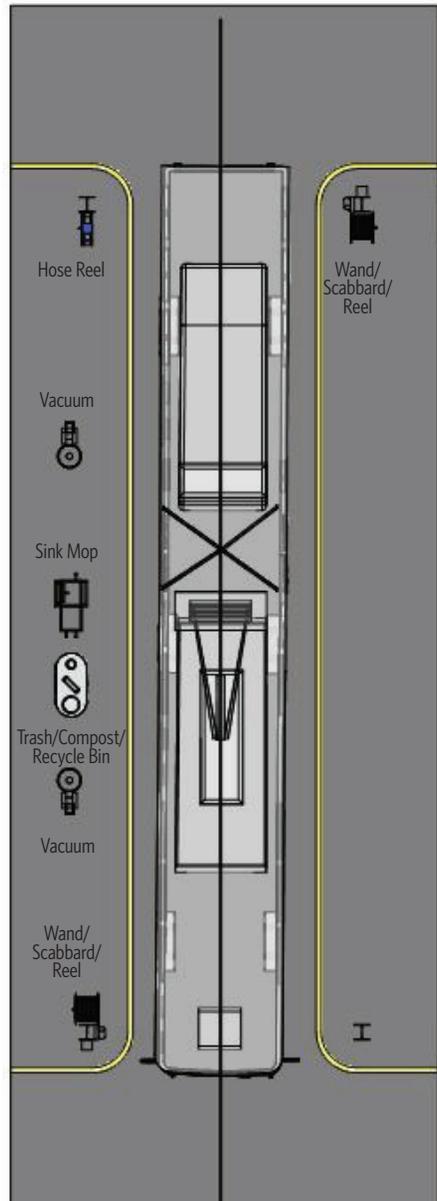


GENERAL OFFICE MODULE: OFFICE AREAS

SERVICE SUPERVISOR OFFICE

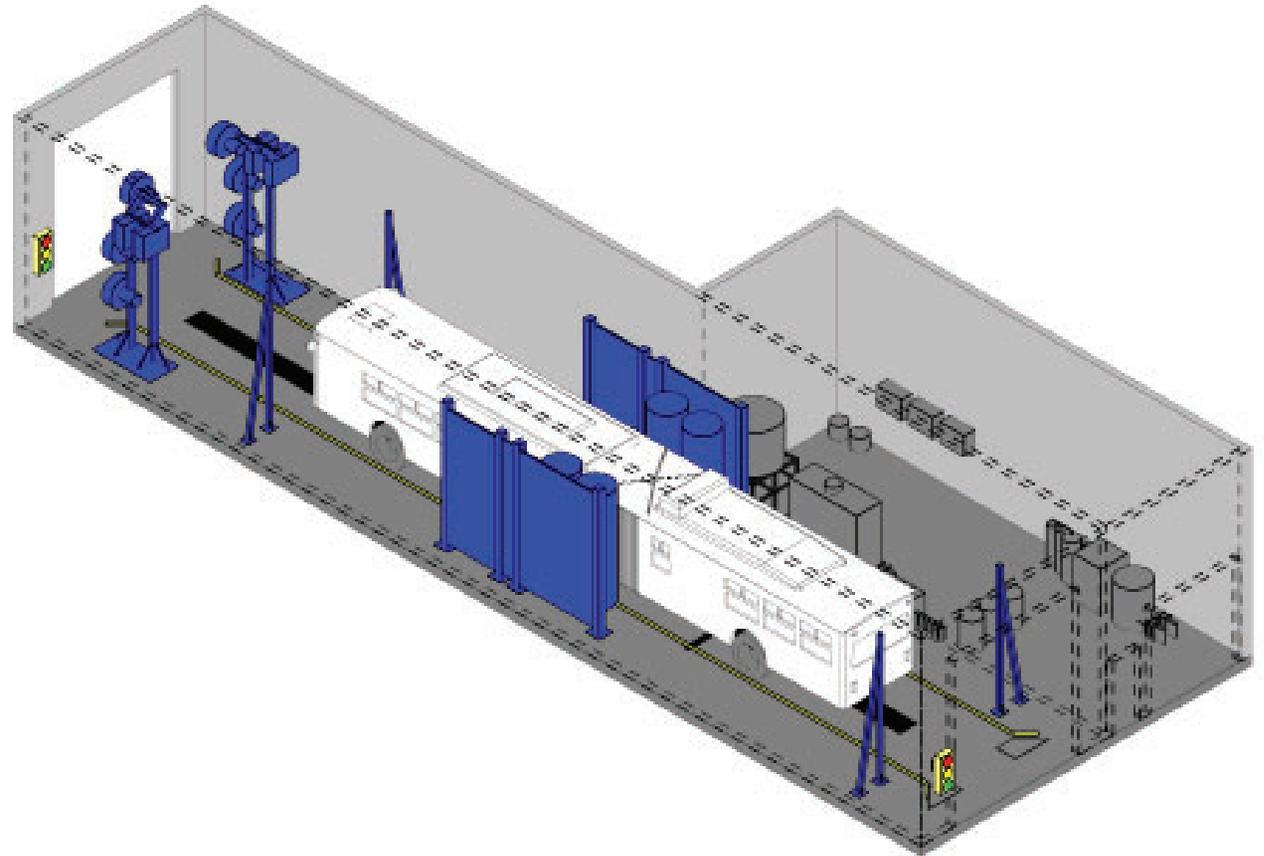
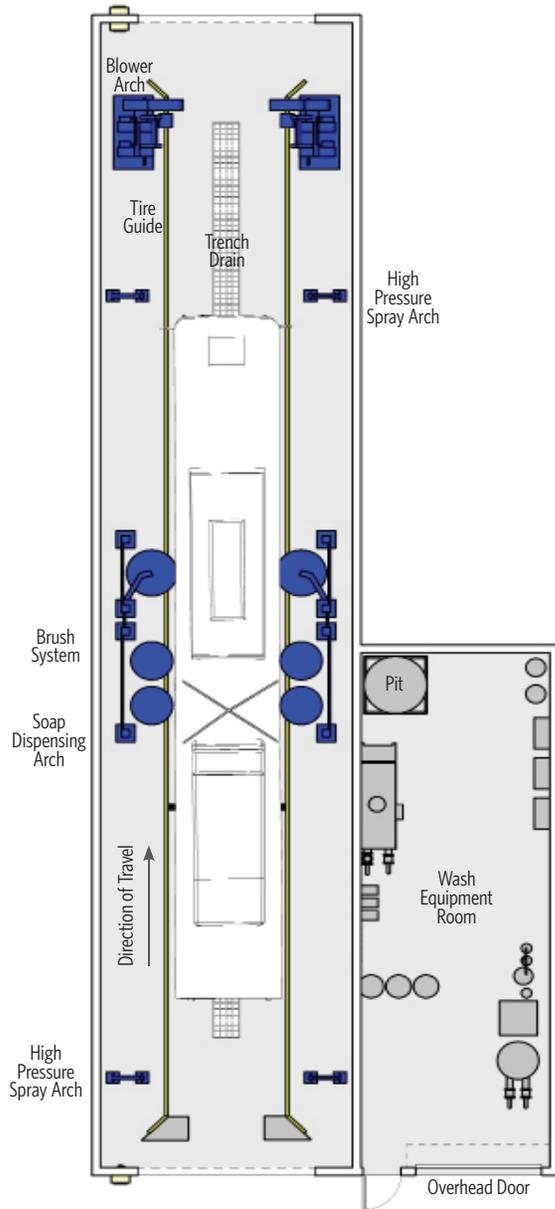
- Reference **Office Module Shared Office**
- Adjacent to Service Position and Bus Washer

SERVICE POSITION



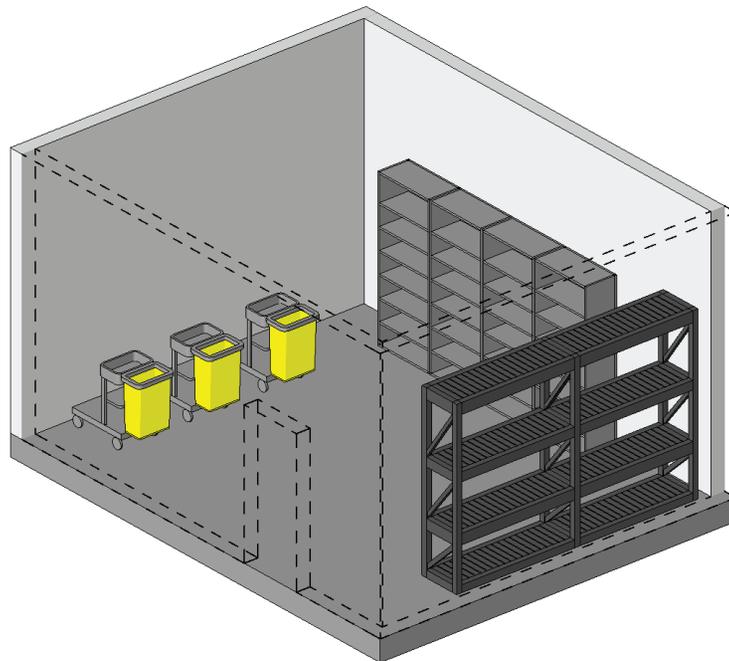
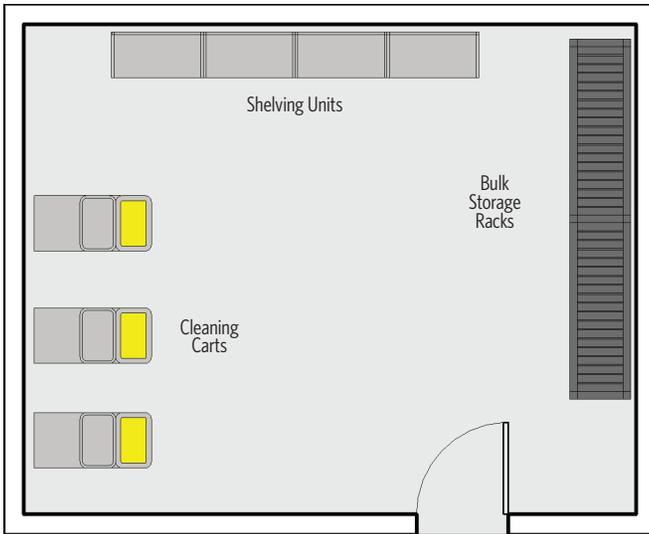
SERVICE POSITION		
<p>FUNCTION</p> <p>Dedicated bay used for nightly servicing, fluid level checks, and tire pressure checks. The space also serves as detail bay cleaning position (when needed).</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, light colored finish • Doors: None 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • 3/4" hot water hose bib with standard faucet, 2'-0" AFF (one per mop sink) • As required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Adjacent to Cleaning Equipment Storage 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets mounted at 3'-6" AFF and water protected ✓ Provide general purpose duplex receptacles (four minimum) on walls, columns, and between overhead doors ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (20 fc average) ✓ Fixtures located to illuminate work spaces and around the vehicles • Communications: <ul style="list-style-type: none"> ✓ Paging/intercom system speakers ✓ Data conduit on columns at each lane/fuel position
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 16'-0" vertical clearance • 20'-0" wide by 70'-0" long • 8'-0" island • 12'-0" lane 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • As required by equipment • 1.0 CFM per square foot continuous exhaust in accordance with NFPA 30A • Heating set point: 65 degrees Fahrenheit • In-floor radiant heat (if desired) 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment • Wand • Scabbard • Trash/Compost/Recycle bin • OCS overhead • Electric charging: Reference E-Bus Performance Requirements. This E-Bus Performance Requirements Document supersedes anything in this document. 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Natural daylighting desired 		

BUS WASHER/WATER RECLAMATION



BUS WASHER/WATER RECLAMATION		
<p>FUNCTION</p> <p>Dedicated area for automatic washing of sides, top, front, back, and under carriage of the trolleys, motors coaches, and BEBs.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, cast-in-place concrete or CMU block, light colored finish, with polyurea coating treatment for wet and moisture protection ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish • Doors: <ul style="list-style-type: none"> ✓ Personnel doors with view panels to meet applicable code exit requirements (Equipment Room) ✓ Equipment Room overhead door, 10'-0" by 12'-0" • Bollards on exterior jambs of overhead door (two each) 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Trench drains: <ul style="list-style-type: none"> ✓ Integrated trench drain sump pit with removable covers to central sediment and oil interceptor ✓ Trench drain with removable cover at overhead door, with sediment basket upstream of trap. ✓ Wash Equipment Room: sump with removable covers at an overflow to sediment and oil interceptor • Water and compressed air connections to wash and reclamation equipment • Emergency eyewash in Wash Equipment Room • As required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to Service Position 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structural grating over sump pit to accommodate H-20 loading • Slope floor to trench drain and sump pit • Structure as needed to support equipment • Control joints to have metal water stops • Wash Bay: <ul style="list-style-type: none"> ✓ Integrated trench drain and sump pit with removable covers ✓ Trench drain with removable cover at overhead door(s) ✓ Wash Equipment Room: sump pits with removable covers 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets mounted at 3'-6" AFF and water protected ✓ Provide waterproof duplex receptacles (four minimum) on walls ✓ All outlets and electrical boxes sealed for a hose down environment ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in Bay (50 fc average) and in Water Reclamation Room (25 fc average) ✓ Fixtures located to illuminate work spaces and around vehicles • Communications: Paging/intercom system speakers
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 18'-0" vertical clearance to structure (minimum) • 20'-0" wide by 100'-0" long 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Special ventilation to remove moisture, low air supply to eliminate steam • Water resistant heating system • As required by equipment • Exhaust: <ul style="list-style-type: none"> ✓ Minimum 10 air changes per hour when wash equipment is activated ✓ Minimum one air change per hour when wash equipment is inactive • Heating set point: 55 degrees Fahrenheit 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment • Drive through wash system • Water reclamation system • No OCS 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Forklift accessible • Natural daylighting desired 		

CLEANING EQUIPMENT STORAGE



FUNCTION

Secure room for storage of vehicle cleaning equipment.

RELATIONSHIP TO OTHER AREAS

- Adjacent to service position

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

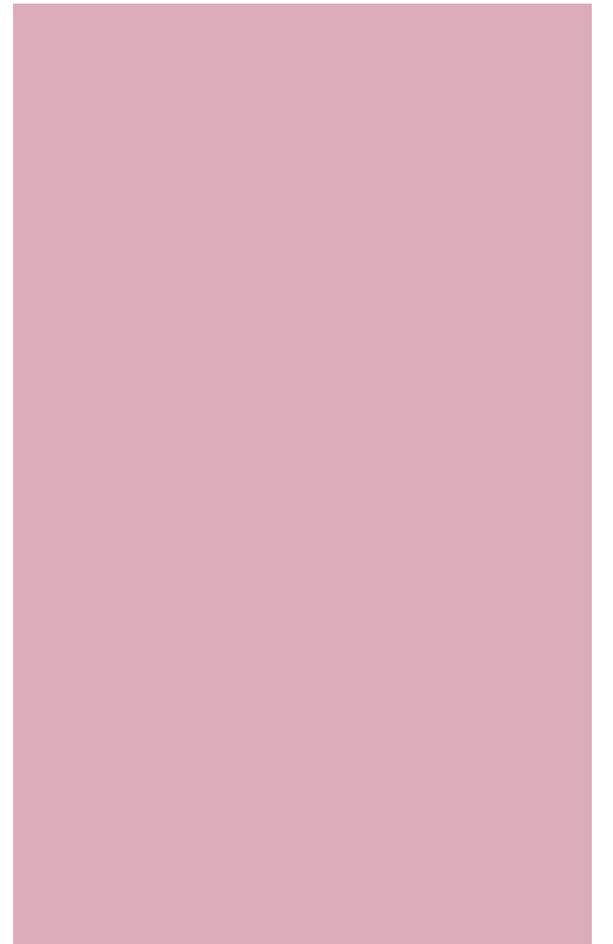
- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: finished concrete (recommended)
 - ✓ Walls: Soil and grease resilient, with light color finish
 - ✓ Ceiling: Painted exposed structure
 - ✓ Doors:
 - Personnel door with view panels to meet applicable code exit requirements.
 - Electronically secured entry (as required)
- Mechanical: Provide appropriate balanced cooling, heating, and ventilation (per code)
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors



SECTION 5.6: PARTS

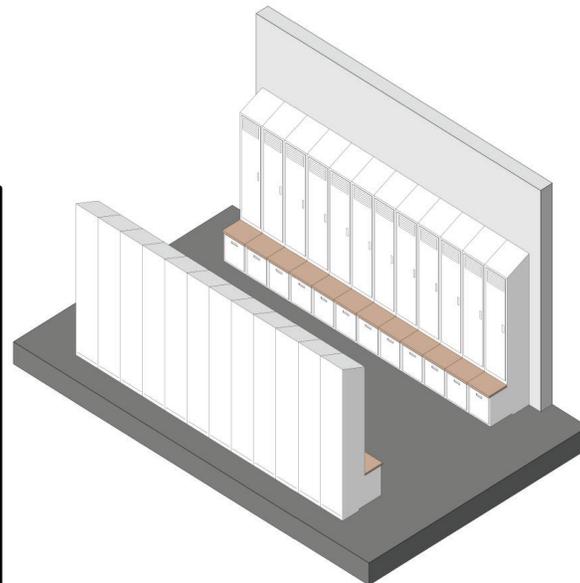
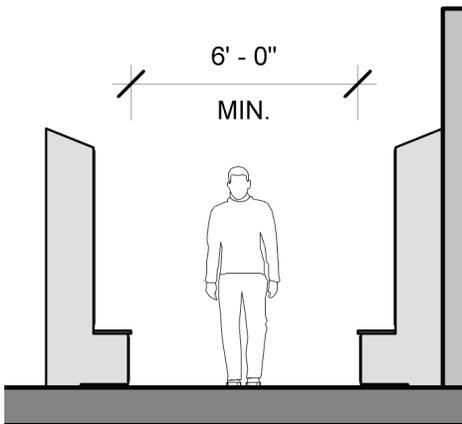
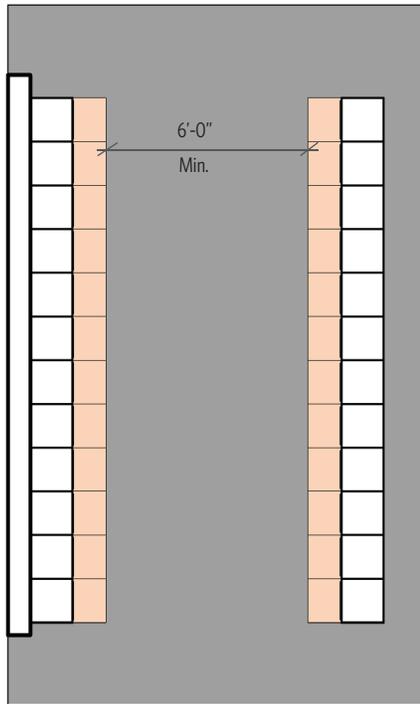


GENERAL MODULE: OFFICE AREAS

PARTS SUPERVISOR

- Reference **Office Module Private Office - 120 sf**
- Adjacent to Parts Storage
- Adjacent to Shopkeepers

PARTS LOCKERS



PARTS

Locker area for each Parts employees. Locker areas must be appropriately sized to meet the needs of Parts staff.

RELATIONSHIP TO OTHER AREAS

- Located within Parts Room

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

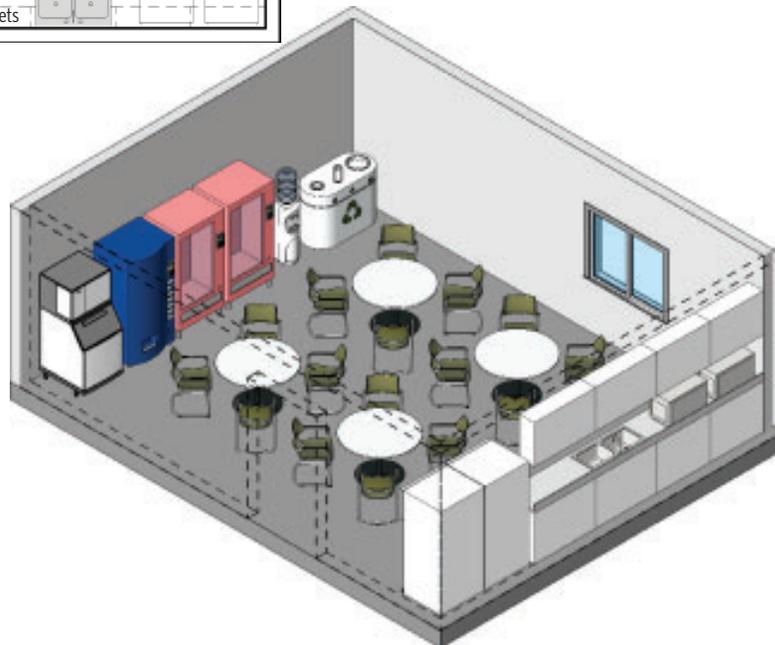
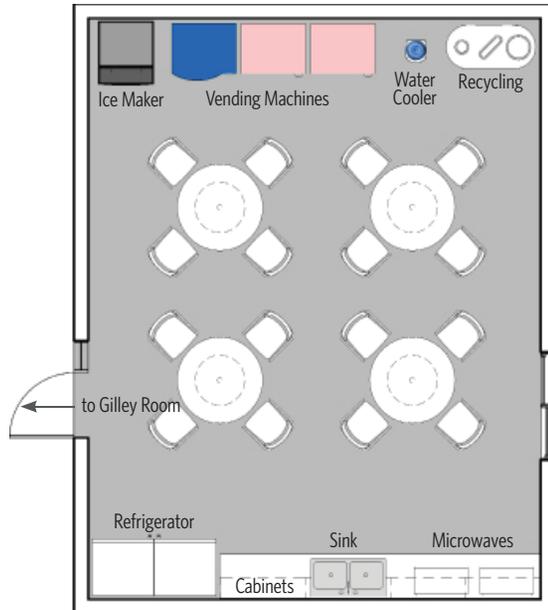
EQUIPMENT/FURNISHINGS

- 6'-0" high gear, well-ventilated lockers with built-in bench
- Lockers must be ADA compliant and have mirrors
- Locker Dimensions: 24" by 24"
- Lockers to have sloped tops

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or finished masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (15 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

BREAK ROOM



FUNCTION

Area used for staff to eat, prepare, and store food.

RELATIONSHIP TO OTHER AREAS

- Located within Parts Room.

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

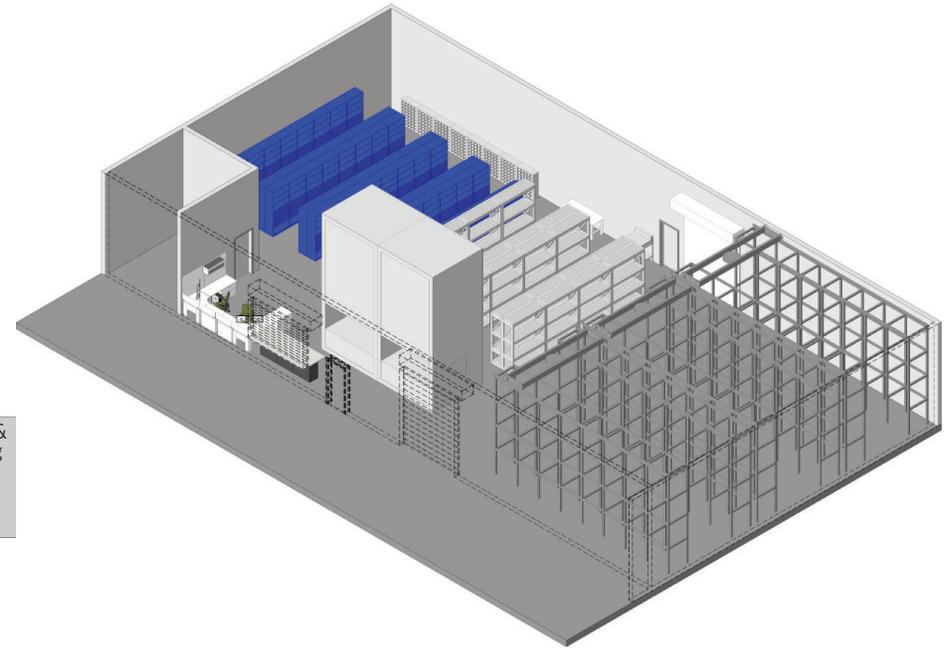
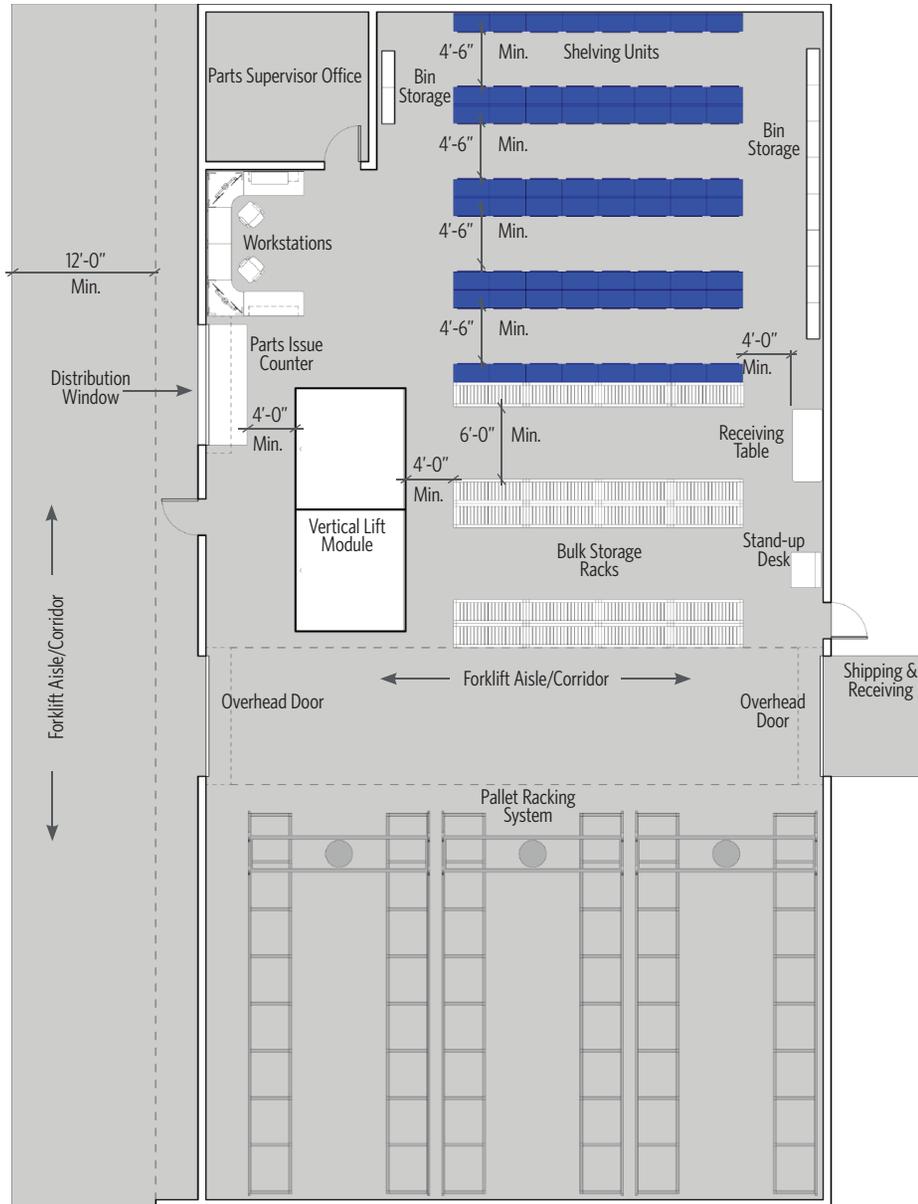
EQUIPMENT/FURNISHINGS

- Counter, upper and lower cabinets, sink with water filter, microwaves, refrigerators, coffee maker, ice maker, water coolers, vending machines, trash/recycling/compost bins, tables, chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Plumbing: Rough-in for equipment
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide three GFCI outlets above the kitchenette counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

PARTS WINDOW/SHOPKEEPER/PARTS STORAGE/SHIPPING AND RECEIVING



PARTS WINDOW/SHOPKEEPER/PARTS STORAGE/SHIPPING AND RECEIVING

FUNCTION

Dedicated secure area for receiving, storage, and issuing of parts, material, and specialized tools.

RELATIONSHIP TO OTHER AREAS

- Access to exterior for deliveries
- Adjacent to Parts Office
- Access from Repair Bays and Shops

CRITICAL DIMENSIONS

- Vertical clearance below mezzanine: 12'-0" (minimal) (if mezzanine is desired)
- Vertical clearance above mezzanine: 15'-0" (minimum)(if mezzanine is desired)
- 20'-0" clear for high bay pallet storage (minimum)
- VLM or stack system can be any desired height

EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Exterior access for deliveries
- Provide Issue Counter with stainless steel top and fire rated rolling overhead door
- Provide staging area for shipping/receiving with an overhead door to exterior of building
- Forklift access
- Parts deliveries should be as functionally separated and as secure as possible in relation to any public accessible and joint development area in the basement.

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish
- Doors:
 - ✓ Personnel door with view panel to meet applicable code exit requirements
 - ✓ Exterior overhead door: High-lifting sectional, steel, insulated 10'-0" by 12'-0" with view panels, automatic operator, interior and exterior push button controls with lockout on exterior
 - ✓ Overhead door at Issue Window
 - ✓ Interior overhead door: Coiling steel, 10'-0" by 12'-0", automatic operator, push controls, lockable

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- Cooling set point: 74 degrees Fahrenheit
- Heating set point: 65 degrees Fahrenheit
- General ventilation (per code)
- In-floor radiant heat (if desired)
- As required by equipment

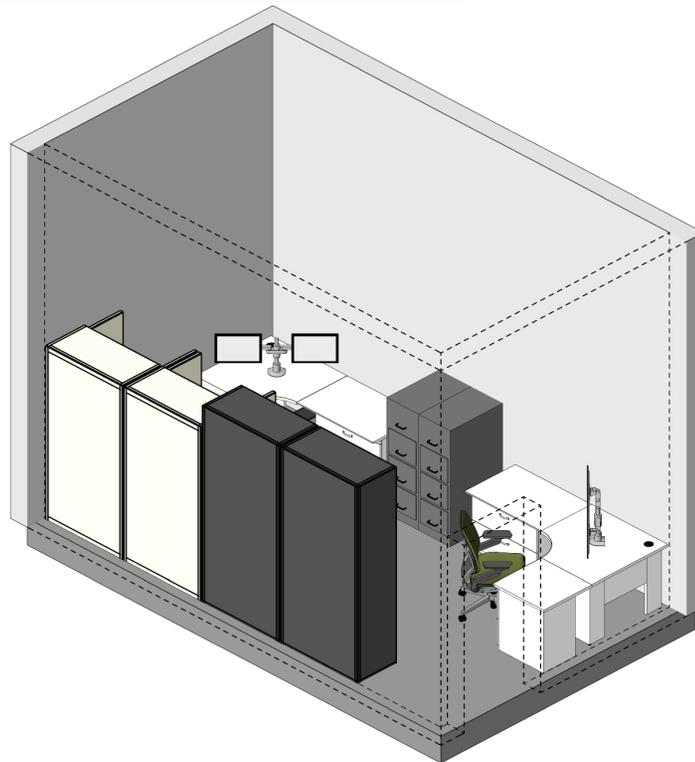
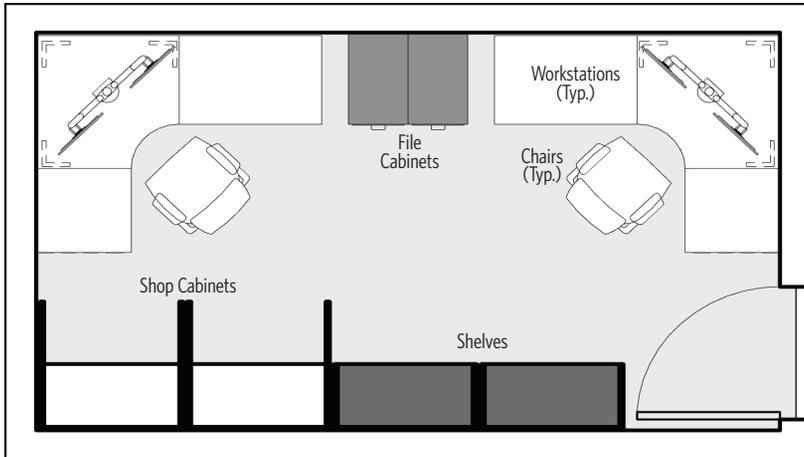
PLUMBING CONSIDERATIONS

- Water: 3/4" water hose bibb with standard hose bibb at 2'-0" AFF
- As required by equipment

ELECTRICAL CONSIDERATIONS

- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommended lighting levels for Parts Window, Shipping/Receiving, and Shopkeeper (35 fc average) and Storage Area (20 fc average)
 - ✓ Fixtures located to illuminate work spaces
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns and/or walls

RECEIVING OFFICE



FUNCTION

Workstations and storage for Receiving staff.

RELATIONSHIP TO OTHER AREAS

- Access to Parts Window/Shopkeeper/Parts Storage/ Shipping and Receiving/ Dock

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

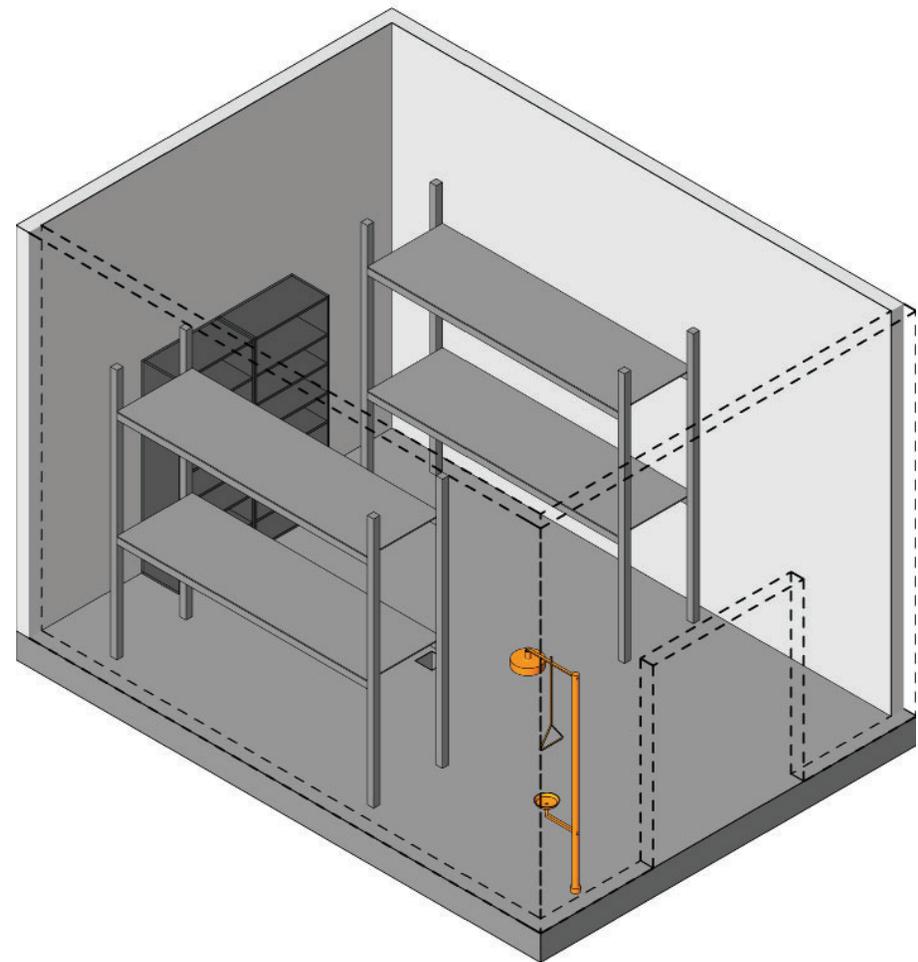
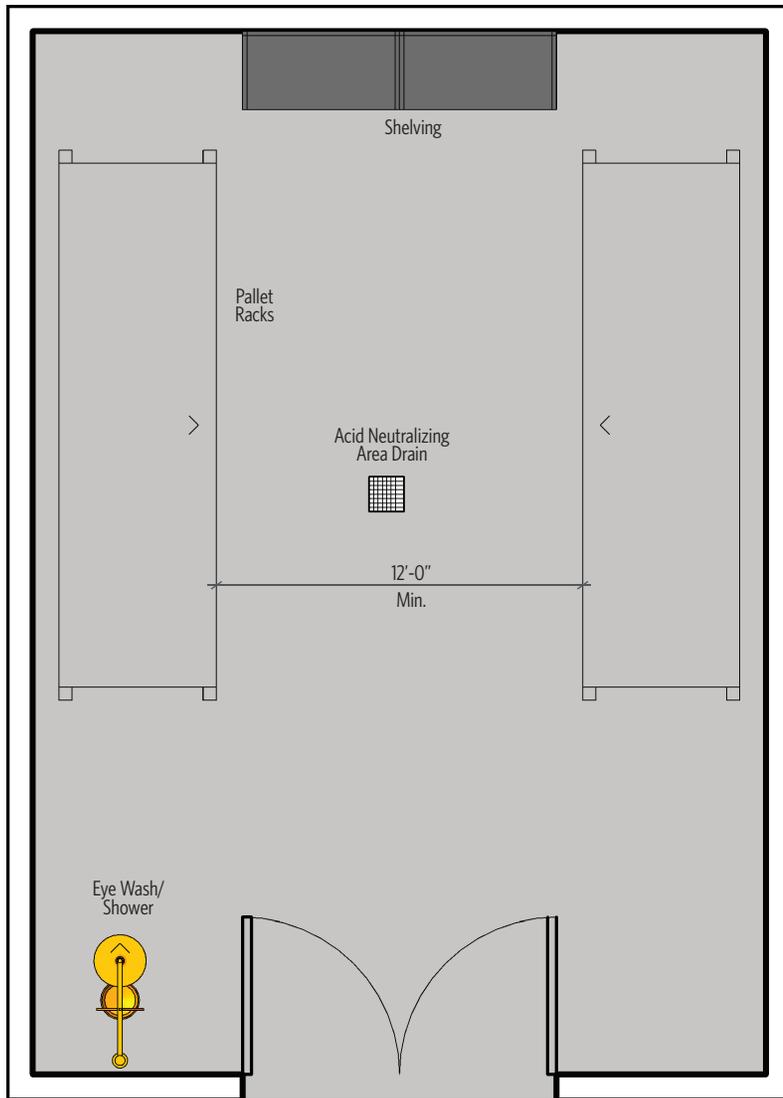
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit and utilities, light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

BATTERY STORAGE



BATTERY STORAGE

FUNCTION

Enclosed and secure room for storage of trolley and BEBs batteries and components.

RELATIONSHIP TO OTHER AREAS

- Access from Repair Bays and Shops

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures (minimum)

EQUIPMENT/FURNISHINGS

- Emergency eyewash/shower
- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Acoustically and physically separated from other areas to prevent migration of noise, dirt, and fumes

ARCHITECTURAL CONSIDERATIONS

- Finishes:
 - ✓ Floor: Soil, grease, water, slip resistant concrete, and treated with chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, with light colored finished concrete or masonry, with polyurea coatings for acid and chemical resistance
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities with light colored finish
- Doors:
 - ✓ Personnel door with view panel to meet applicable code exit requirements
 - ✓ Double 3'-0" wide doors

STRUCTURAL CONSIDERATIONS

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Floor slab designed to accommodate in-floor radiant heat (if desired)
- Floor slab designed to accommodate forklift access

MECHANICAL CONSIDERATIONS

- Heating set point: 65 degrees Fahrenheit
- Exhaust (per code)
- General ventilation (per code)
- As required by equipment

PLUMBING CONSIDERATIONS

- Tempered water: Connection to emergency eye wash/shower
- Acid neutralizing floor drain and piping to acid dilution tank

ELECTRICAL CONSIDERATIONS

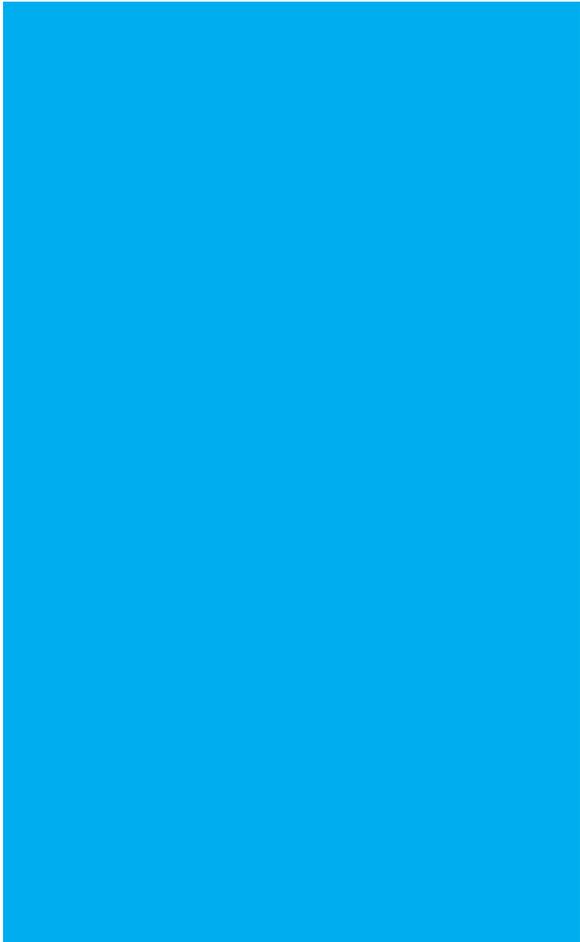
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles on walls
 - ✓ Dedicated computer receptacle, adjacent to data conduit on column adjacent to workbench
 - ✓ As required by equipment
- Lighting:
 - ✓ LED lighting in accordance with IES recommendation minimum, explosion proof (20 fc average)
 - ✓ Fixtures located to illuminate work spaces
- Communications:
 - ✓ Paging/intercom system speakers
 - ✓ Data conduit on columns at each bay

FIRE SUPPRESSION CONSIDERATIONS

The fire protection and pyrotechnics experts on the detailed design team will be responsible for devising a robust fire protection system for the tire bay and tire shop/storage areas that minimizes risk to the Yard and any joint development above. Review and recommendations by the experts will include, but not be limited to, the location, ventilation, and fire suppression systems for Potrero Yard's tire facilities.



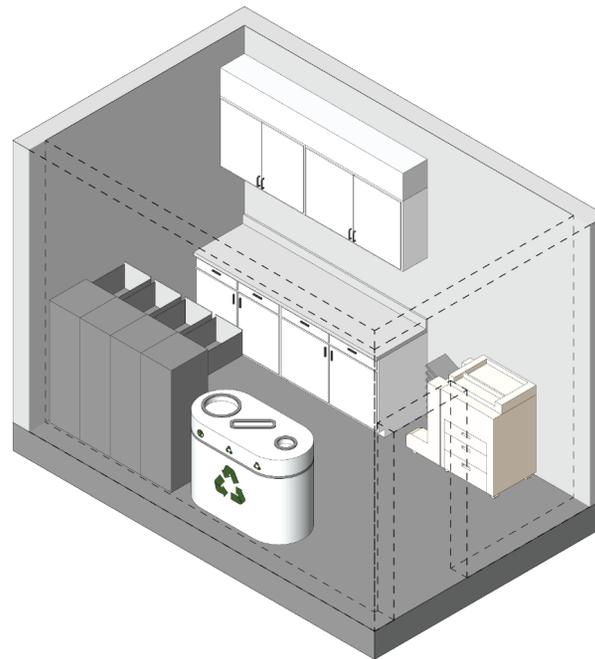
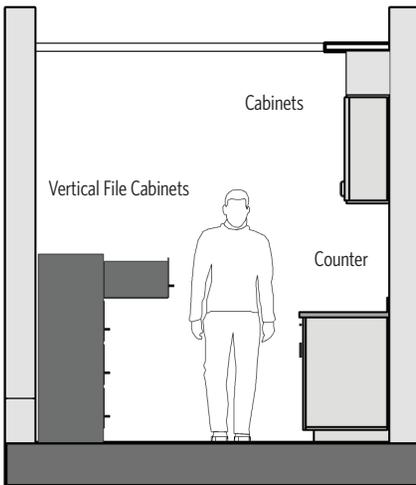
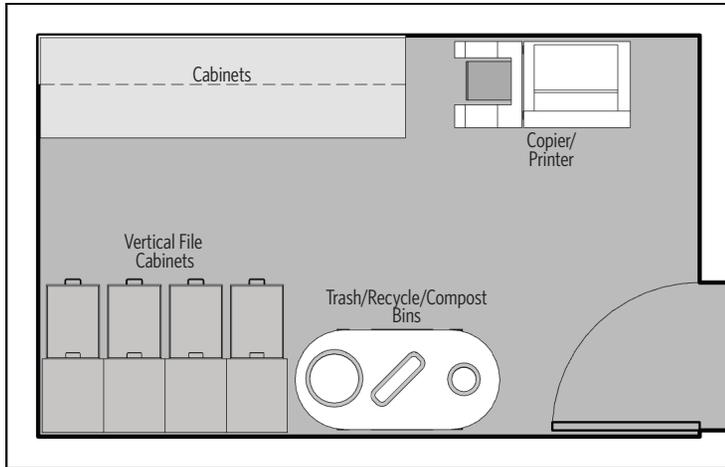
SECTION 5.7: MAINTENANCE - ADMINISTRATION



GENERAL MODULE: OFFICE AREAS

SUPERINTENDENT	ASSISTANT SUPERINTENDENT	SENIOR CONTROLLER	ADMINISTRATIVE ASSISTANT		
<ul style="list-style-type: none"> Reference Office Module Private Office - 224 sf Adjacent to Assistant Superintendent Adjacent to Administrative Assistant 	<ul style="list-style-type: none"> Reference Office Module Private Office - 120 sf Adjacent to Superintendent Adjacent to Administrative Assistant 	<ul style="list-style-type: none"> Reference Office Module Private Office - 120 sf Adjacent to Assistant Superintendent Adjacent to Administrative Assistant 	<ul style="list-style-type: none"> Reference Office Module Workstation - 48 sf Adjacent to Superintendent and Assistant Superintendent 		
<th data-bbox="581 602 1037 699">HOTELING - WORKSTATION</th> <td colspan="2" data-bbox="1043 602 1499 932"> <th data-bbox="1043 602 1499 699">SUPPORT SHOP</th> </td>		HOTELING - WORKSTATION	<th data-bbox="1043 602 1499 699">SUPPORT SHOP</th>		SUPPORT SHOP
<ul style="list-style-type: none"> Reference Office Module Workstation - 64 sf Located within open office space Access to copy/supply 		<ul style="list-style-type: none"> Reference Office Module Workstation - 64 sf Located within open office space Access to copy/supply 			

COPY/SUPPLY



FUNCTION

Dedicated alcove or room for copier/printer/scanner/fax machine, storage for office supplies, and a work surface.

RELATIONSHIP TO OTHER AREAS

- Access to all office areas

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

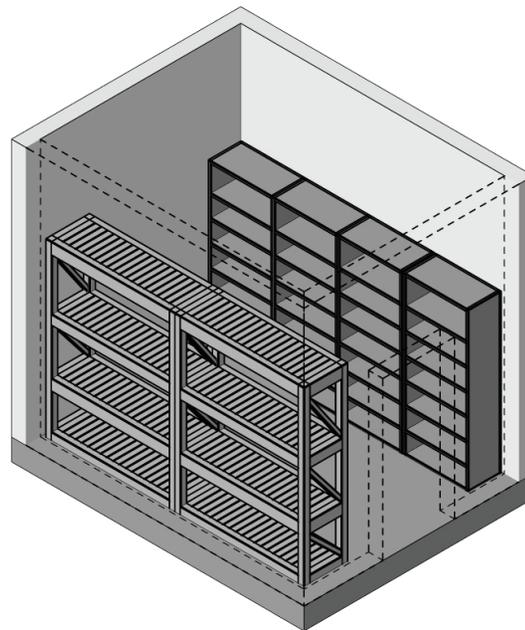
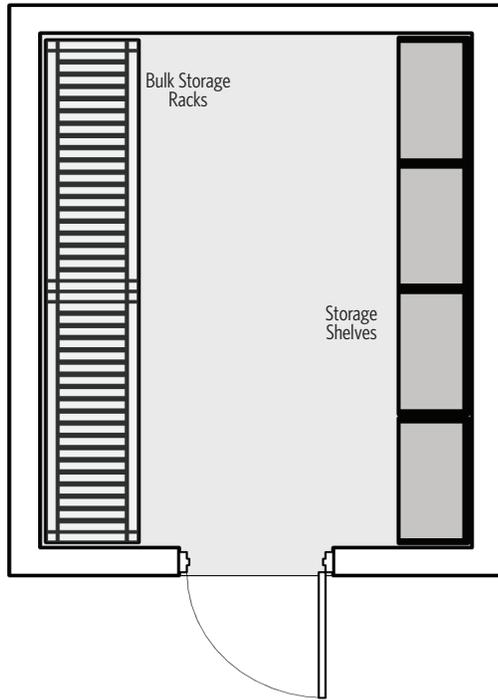
EQUIPMENT/FURNISHINGS

- Copier/printer/scanner/fax machine
- Work surface with cabinets below and above
- Filing cabinets

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide one data outlet with four data ports
 - ✓ Provide box conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

RECORDS STORAGE



FUNCTION

Secure area for the storage of files and records.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

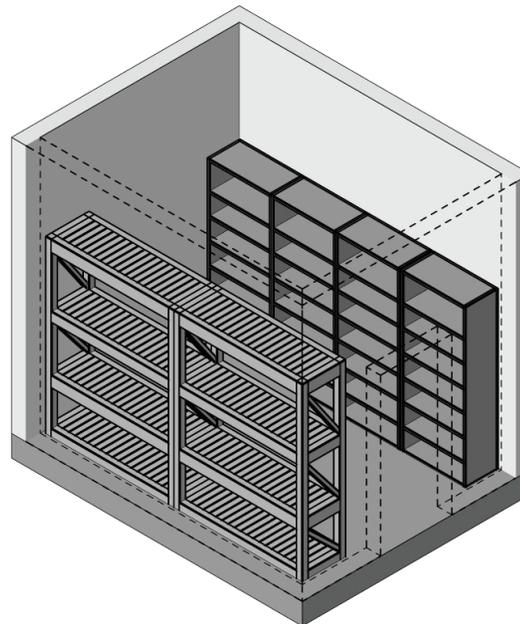
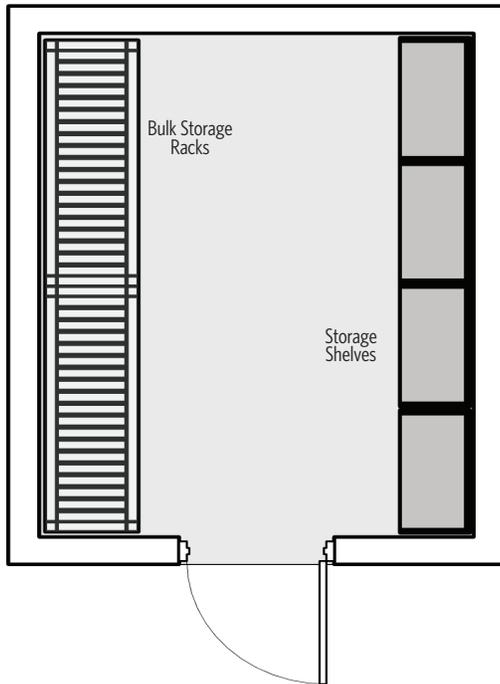
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (35 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

ARCHIVE RECORDS STORAGE



FUNCTION

Secure area for the long term storage of archived files and records.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

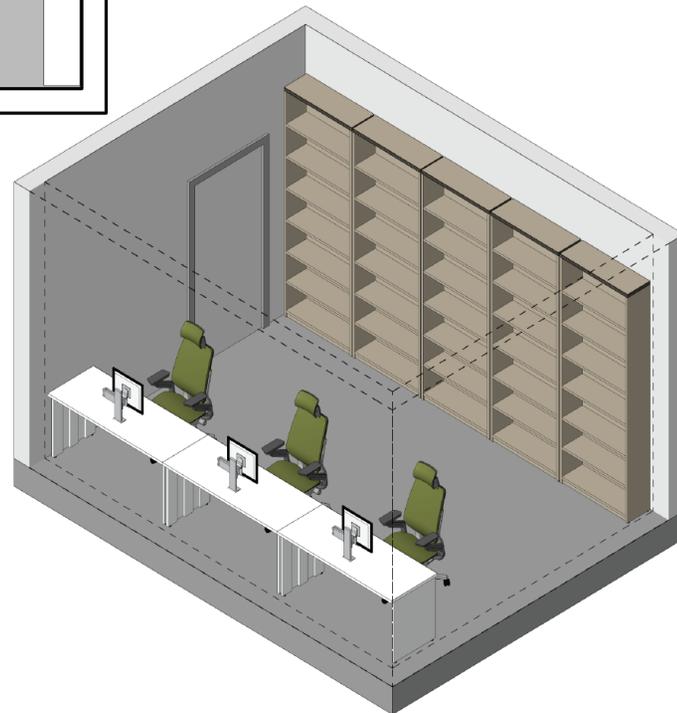
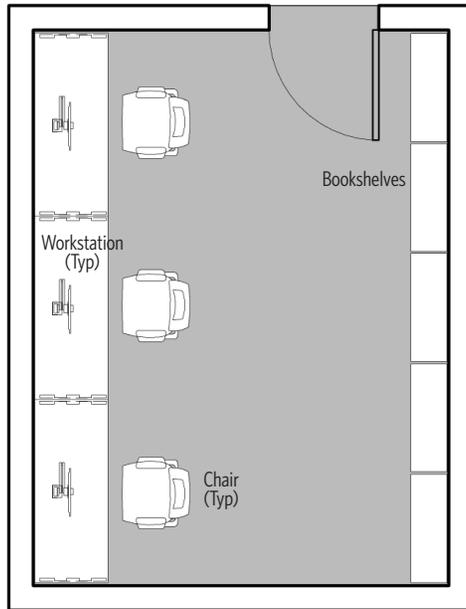
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

LIBRARY/ONLINE RESOURCES



FUNCTION

Enclosed area for storage and reference of vehicle maintenance reference manuals and materials.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Repair Bays
- Adjacent to Maintenance-Administration open office area

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

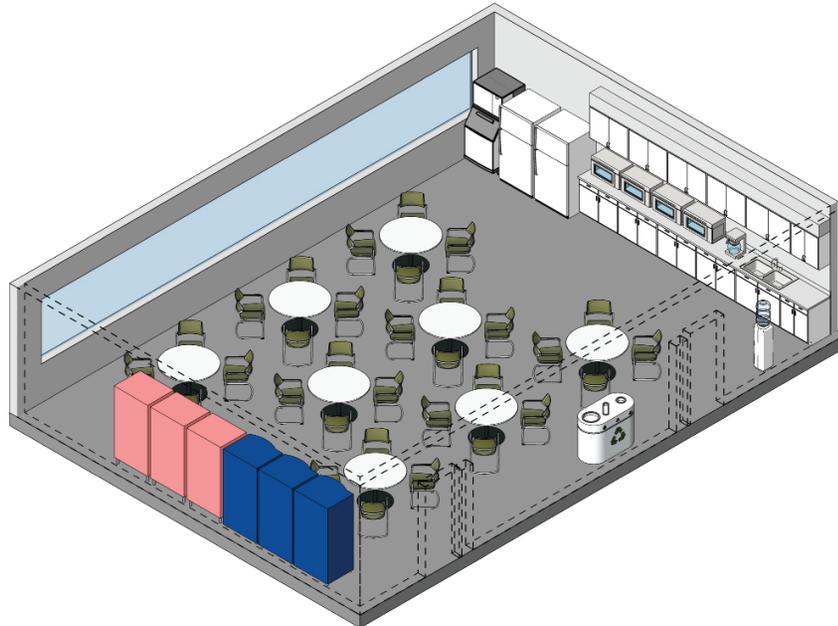
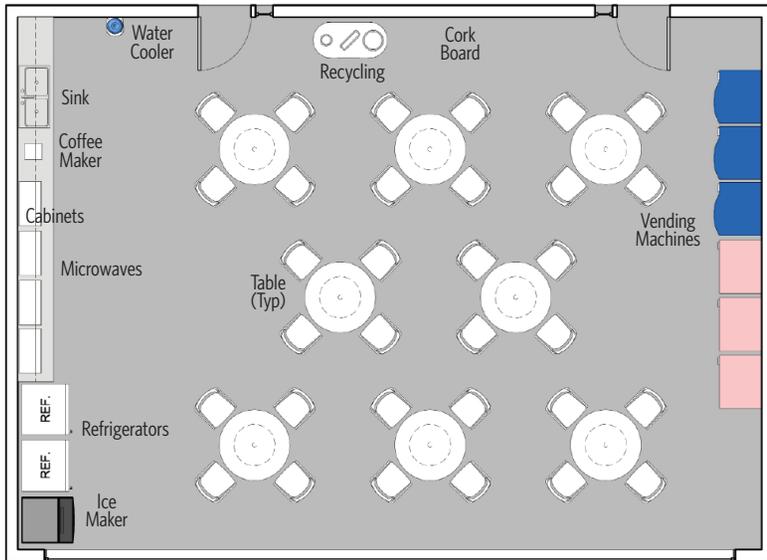
EQUIPMENT/FURNISHINGS

- Workstations
- Bookshelves
- Chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc of indirect lighting average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

BREAK ROOM/KITCHENETTE/VENDING



FUNCTION

Enclosed room for use by staff as a break area.

RELATIONSHIP TO OTHER AREAS

- Centrally located
- Access to all office areas, repair areas, and Restrooms

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

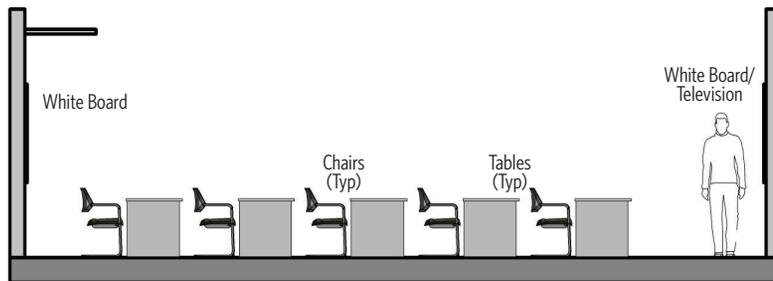
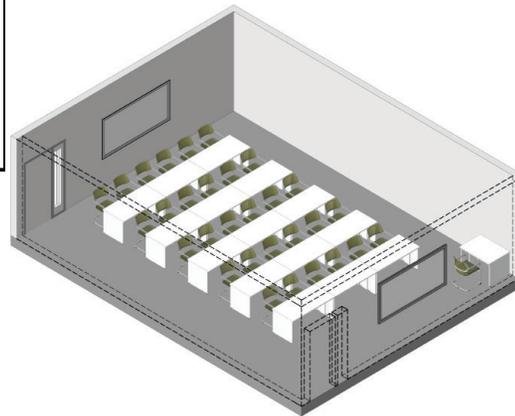
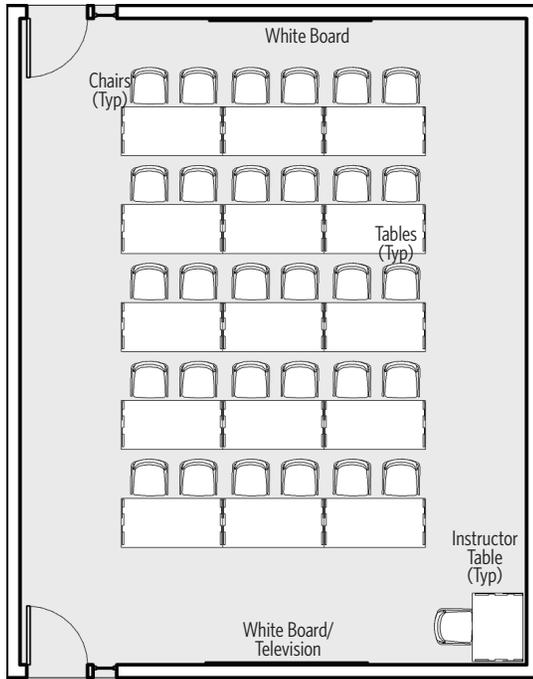
EQUIPMENT/FURNISHINGS

- Counter space, upper and lower cabinets, sink, microwaves, refrigerators, coffee maker, ice maker, water filter, vending machines, water coolers, tables, chairs, trash/recycling/compost bins

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Plumbing: Rough in for equipment
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide data outlets with four data ports (two minimum)
 - ✓ Provide five GFCI outlets above kitchenette counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

TRAINING ROOM



FUNCTION

Large room for staff to participate in training activities. This space will also be available as a Conference Room, with training as the primary activity.

RELATIONSHIP TO OTHER AREAS

- Accessible by Maintenance staff
- Adjacent to Maintenance Office area

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

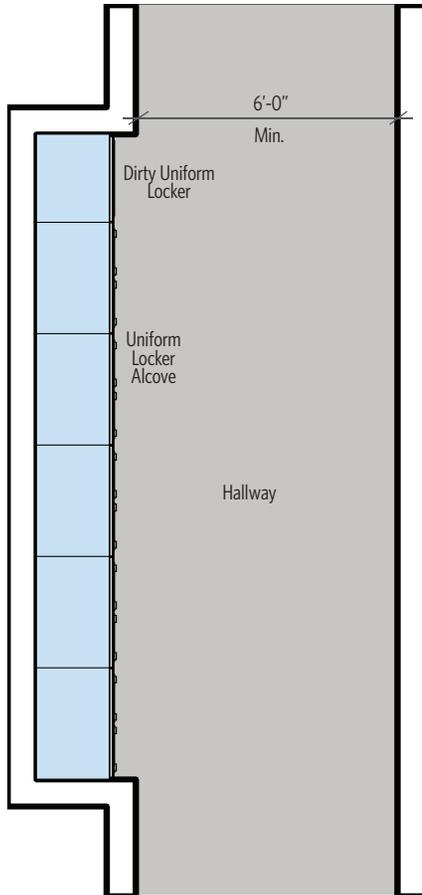
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60" by 30" laminate
- Cool mesh nesting chairs
- Whiteboard/Television
- Overhead projector

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Power:
 - ✓ LED lighting in accordance with IES recommendations (35 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

UNIFORM ALCOVE



FUNCTION

Co-ed locker area with an alcove for vendors to drop off and pick up uniforms (changing areas are located in the respective male/female restrooms).

RELATIONSHIP TO OTHER AREAS

- Accessible from Men's and Women's Lockers/Showers/Restroom
- Adjacent to an exterior door for vendor pickup/drop off

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

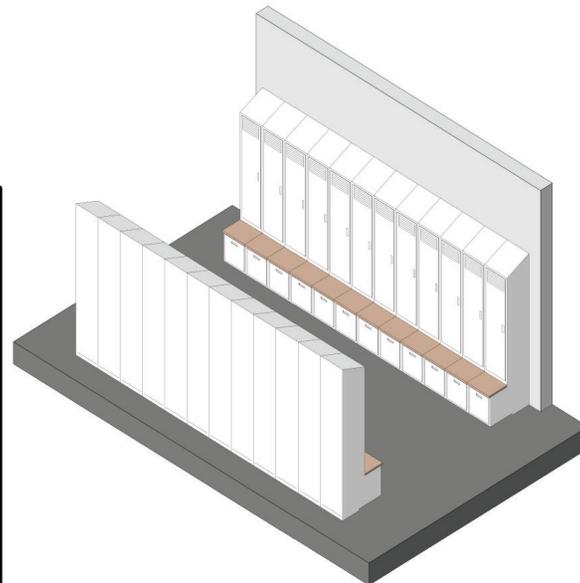
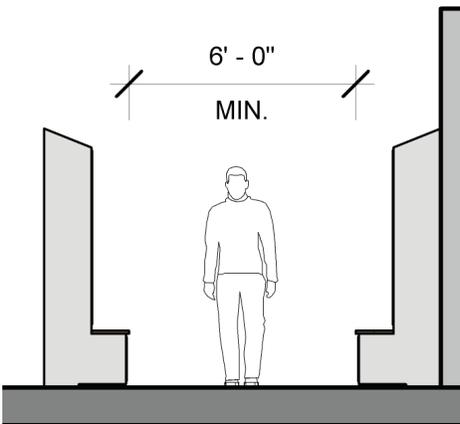
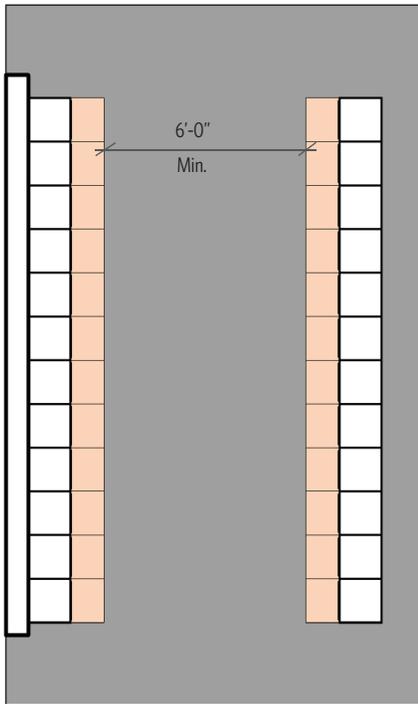
EQUIPMENT/FURNISHINGS

- Vendor provided well-ventilated uniform lockers, bin for dirty uniforms

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power: LED lighting in accordance with IES recommendation (15 fc average)
- Lighting: Dimmable, indirect lighting with occupancy sensor

MEN'S AND WOMEN'S LOCKERS



FUNCTION

Locker area for each male and female Bus Maintenance employees. Locker areas must be appropriately sized to meet the needs of Maintenance staff.

RELATIONSHIP TO OTHER AREAS

- Access by Repair and Shop Areas
- Located within each Men's and Women's Restrooms

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- 6'-0" high gear, well-ventilated lockers with built-in bench
- Lockers must be ADA compliant and have mirrors
- Locker Dimensions: 24" by 24"
- Lockers to have sloped tops

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or finished masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (15 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)



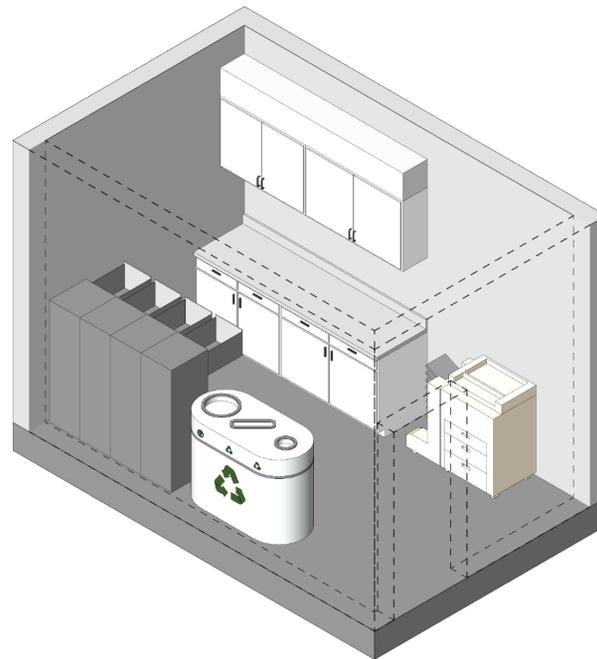
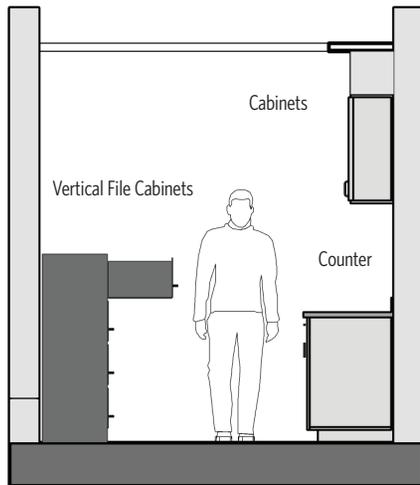
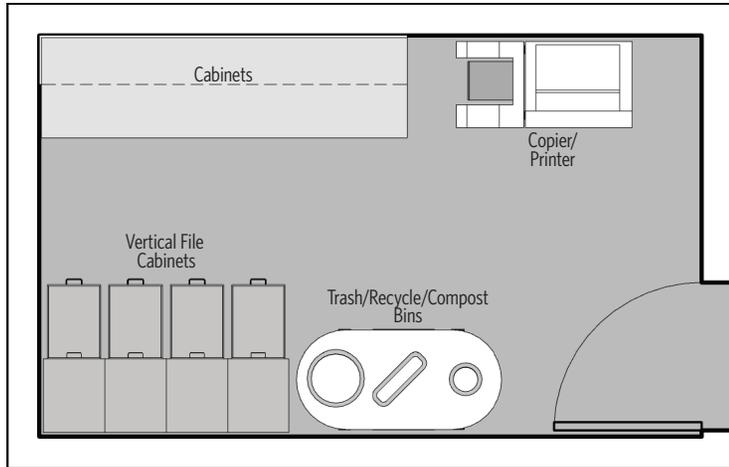
SECTION 5.8: OPERATIONS -
ADMINISTRATION



GENERAL MODULE: OFFICE AREAS

SUPERINTENDENT	ASSISTANT SUPERINTENDENT	TRAINER	YARD STARTER OFFICE
<ul style="list-style-type: none"> • Reference Office Module Private Office - 224 sf • Adjacent to Assistant Superintendent • Adjacent to Administrative Assistant 	<ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to Administrative Assistant • Adjacent to Superintendent 	<ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Access to Training Access Areas 	<ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to facility exit • Views of buses coming off ramps through facility to exit
DISPATCH/RECEIVER	ADMINISTRATIVE ASSISTANT	HOTELING - WORKSTATION	UNION SHARED OFFICE
<ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Within the Operator check-in • Adjacent to Break Room • Adjacent to restrooms 	<ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Superintendent and Assistant Superintendent 	<ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Located within open office space • Access to Copy/Supply 	<ul style="list-style-type: none"> • Reference Office Module Private Office - 224 sf • Accessible by union staff

COPY/SUPPLY



FUNCTION

Dedicated alcove or room for copier/printer/scanner/fax machine, storage for office supplies, and with a work surface.

RELATIONSHIP TO OTHER AREAS

- Access to all office areas

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

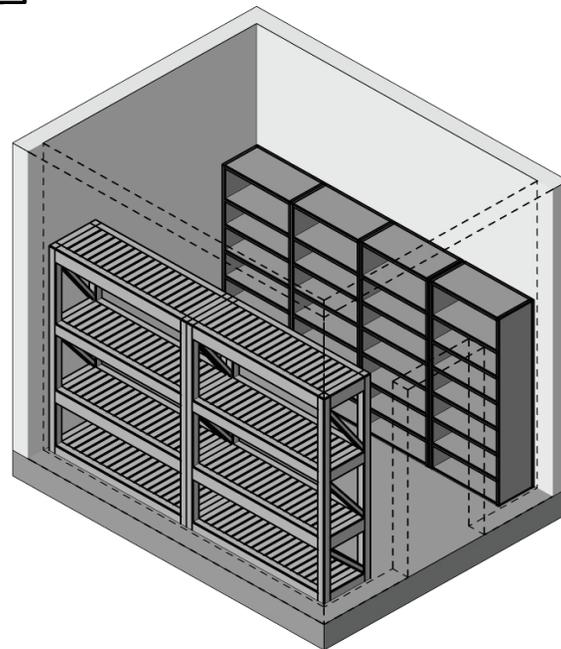
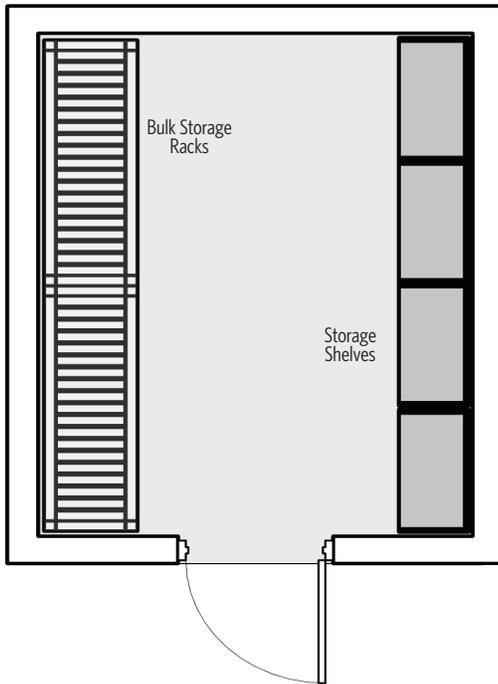
EQUIPMENT/FURNISHINGS

- Copier/printer/scanner/fax machine
- Work surface with cabinets below and above
- Filing cabinets

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide one data outlet with four data ports
 - ✓ Provide box conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

RECORDS STORAGE



FUNCTION

Secure area for the long term storage of archived files and records.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

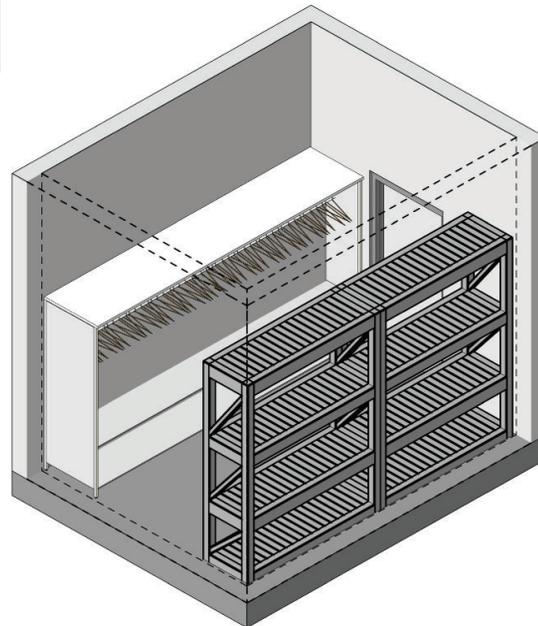
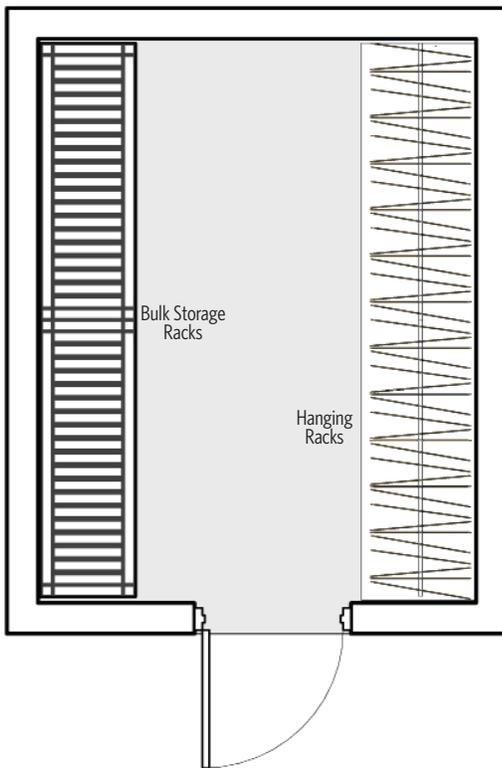
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (30 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

UNIFORM STORAGE



FUNCTION

Enclosed room for storage of Operator uniforms.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Operator Check-in

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

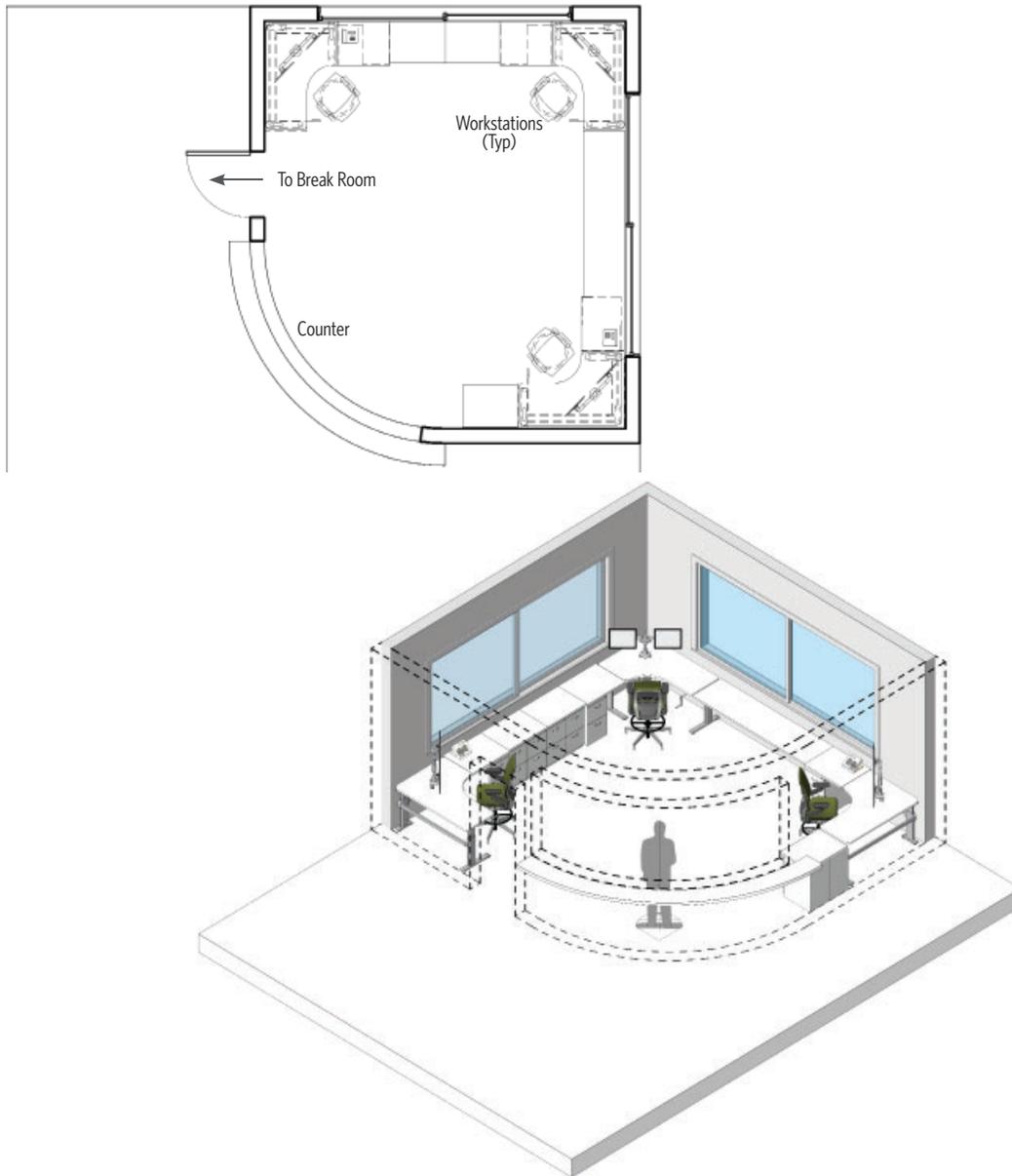
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendation (15 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensor

OPERATOR CHECK-IN/ DISPATCH/ RECEIVER



FUNCTION

Area for Operators to report, receive information, and write reports.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room
- Adjacent to Dispatch/Receiver

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

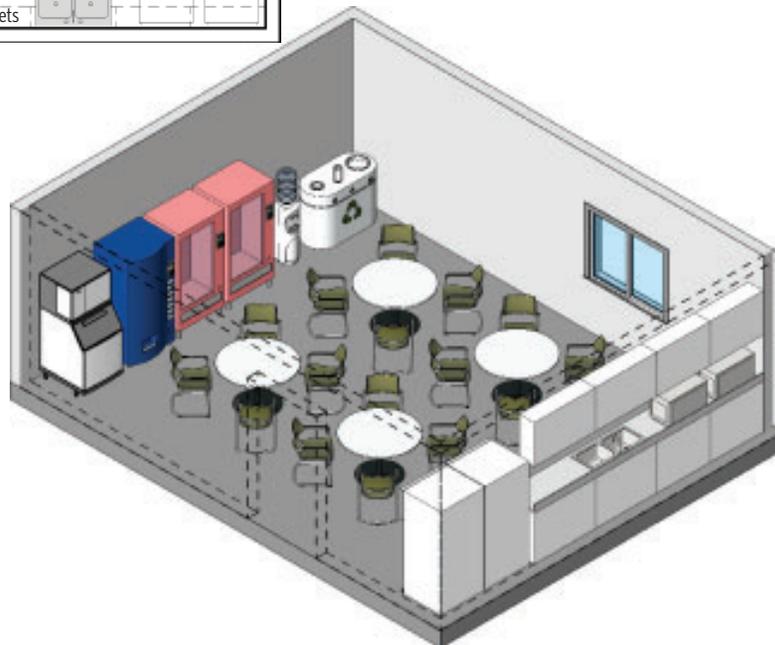
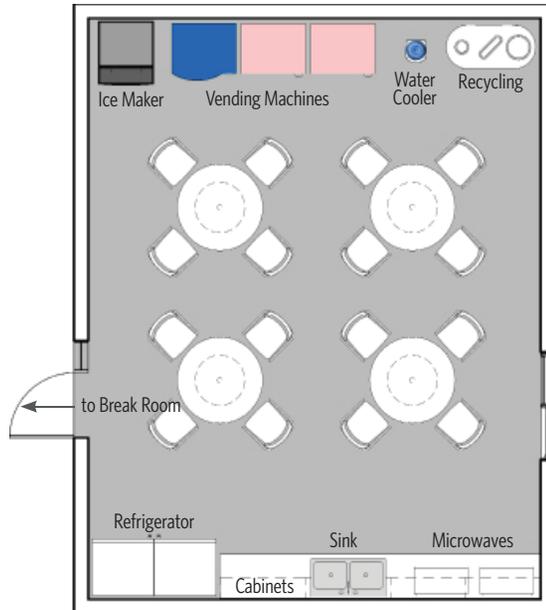
EQUIPMENT/FURNISHINGS

- Computer workstations
- Bulletin board
- Standing counter height, with portion of the counter at ADA accessible height

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc of indirect lighting average, no glare)
 - ✓ Provide general purpose duplex receptacles (three minimum)
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and conduit rough-ins to three other locations in room
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

KITCHENETTE/VENDING



FUNCTION

Area used for staff to eat, prepare, and store food.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

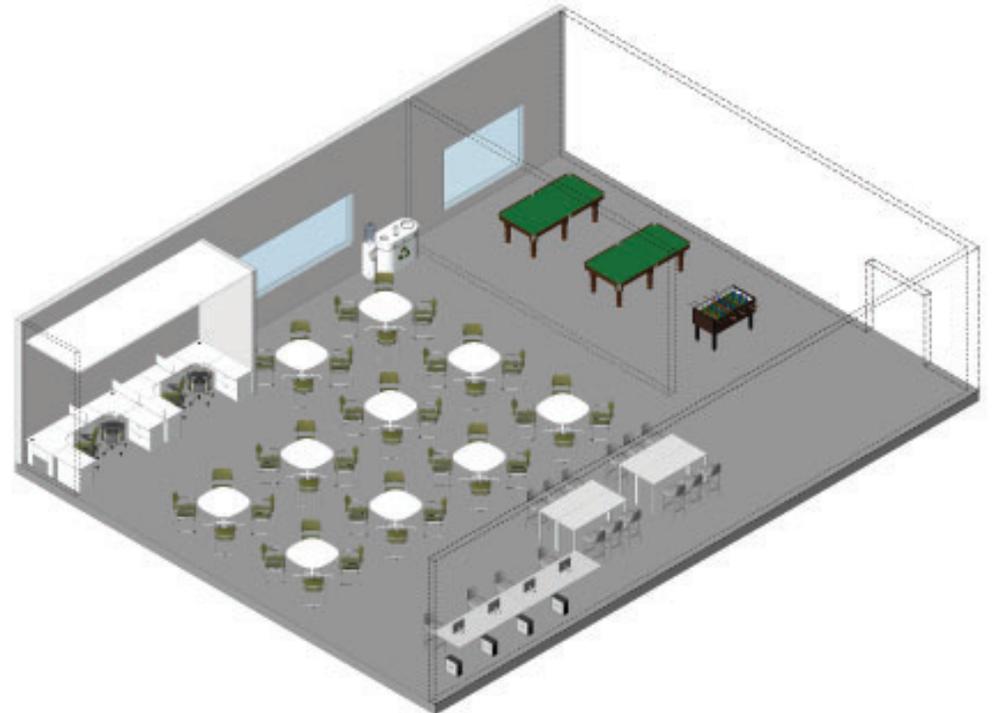
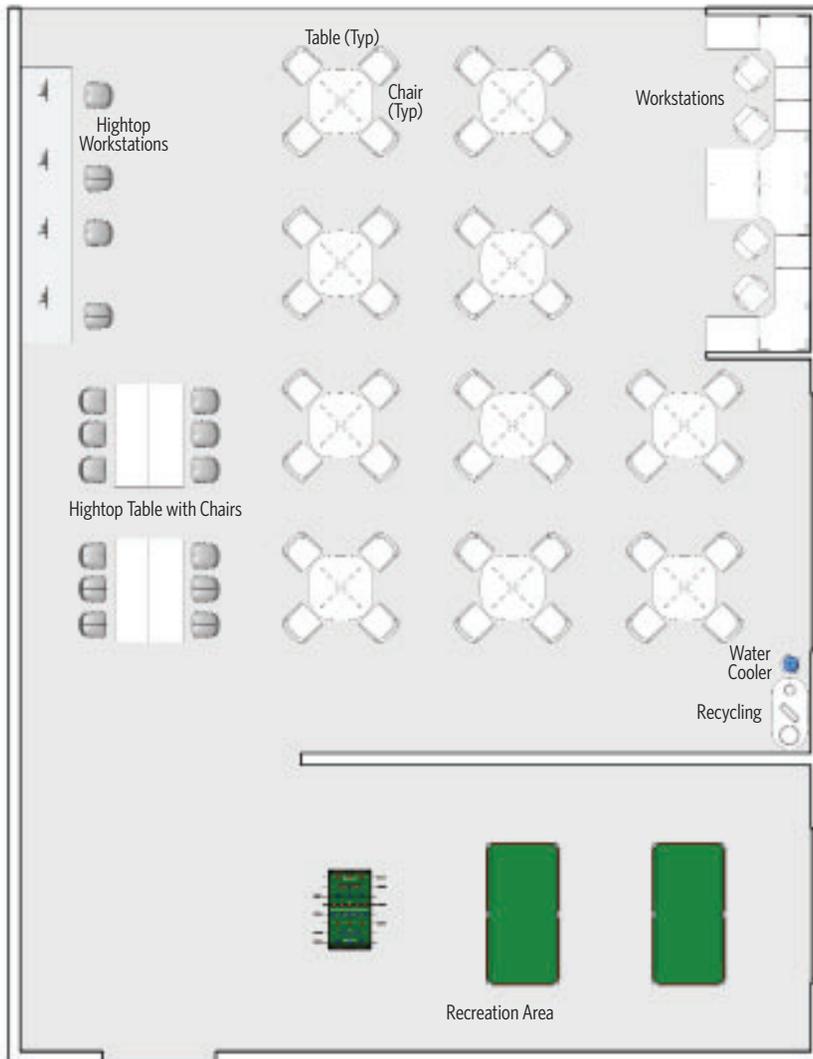
EQUIPMENT/FURNISHINGS

- Counter, upper and lower cabinets, sink with water filter, microwaves, refrigerators, coffee maker, ice maker, water coolers, vending machines, trash/recycling/compost bins, tables, chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Plumbing: Rough-in for equipment
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide three GFCI outlets above the kitchenette counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

BREAK ROOM/RECREATION AREA



BREAK ROOM/RECREATION AREA

FUNCTION

Area for Operators to gather, take breaks, and relax between shifts.

RELATIONSHIP TO OTHER AREAS

- Connected to Kitchenette/Vending
- Adjacent to:
 - ✓ TV Room
 - ✓ Quiet Room
 - ✓ Restrooms
 - ✓ Lockers
 - ✓ Mailboxes
 - ✓ Operator Check-In
 - ✓ Dispatch/Receiver

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

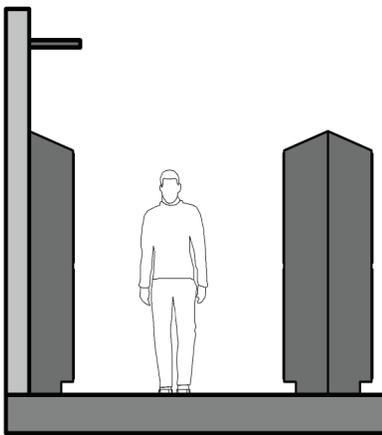
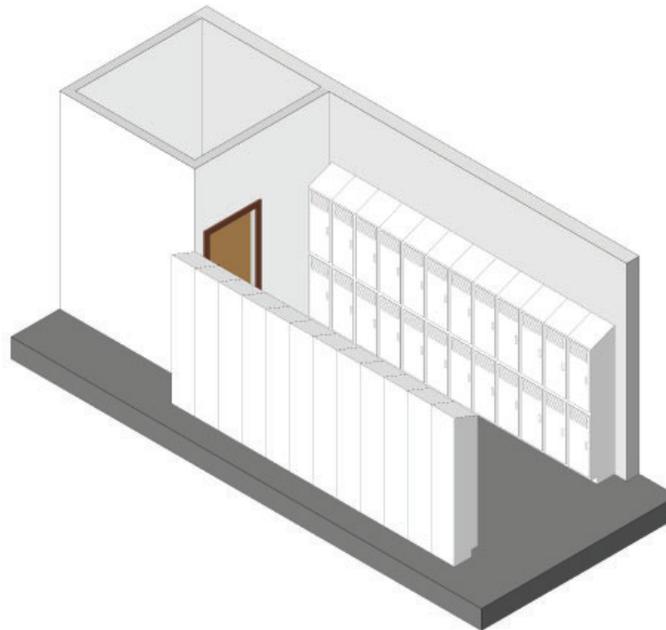
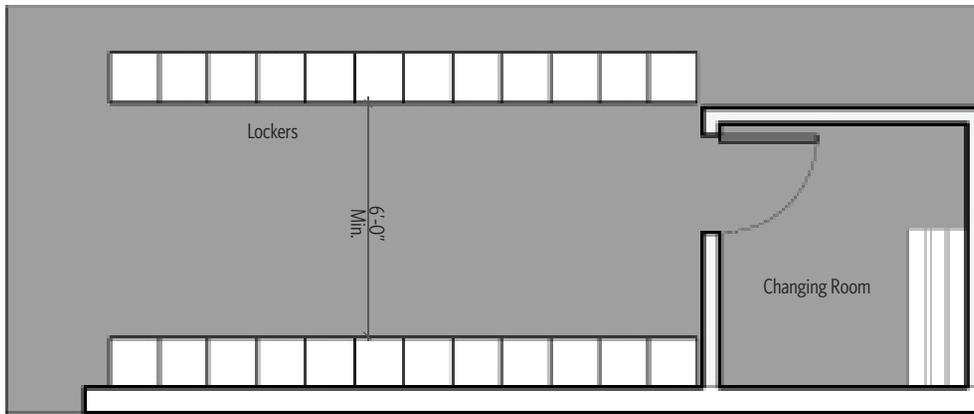
EQUIPMENT/FURNISHINGS

- Computer workstations
- Tables and chairs (no tables with attached chairs)
- Message and information televisions
- Chairs
- End tables
- Bulletin boards
- Recreation equipment
- Mailboxes
- Pool tables
- Alcove with workstation for incident reporting

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (30 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and conduit rough-ins to three other locations in room
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

LOCKERS



FUNCTION

Co-ed locker room with alcove for Operators to store personal gear and clothing in half-height lockers (Single person occupancy private changing area within locker room and private changing areas in respective restrooms as well).

RELATIONSHIP TO OTHER AREAS

- Connected to Break Room
- Adjacent to Restroom/Showers

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

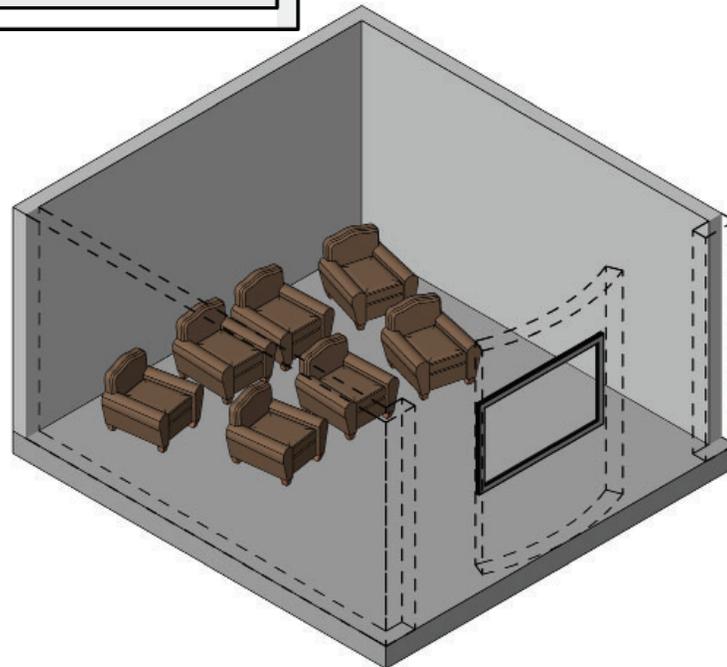
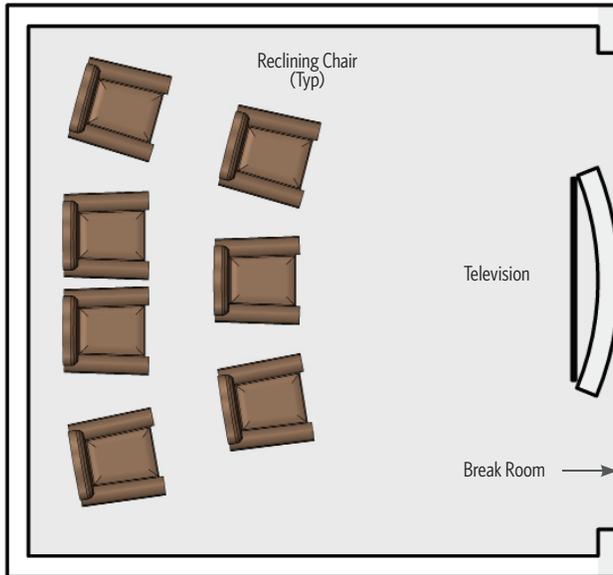
EQUIPMENT/FURNISHINGS

- Heavy duty, two tier, 3'-0", well-ventilated, half-height lockers; one each per Operator assigned to the facility
- Locker dimensions: 12" by 36"
- Lockers to have slant tops

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or painted masonry (recommended)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

TV ROOM



FUNCTION

Enclosed room for Operators to watch television between, before, and after shifts.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

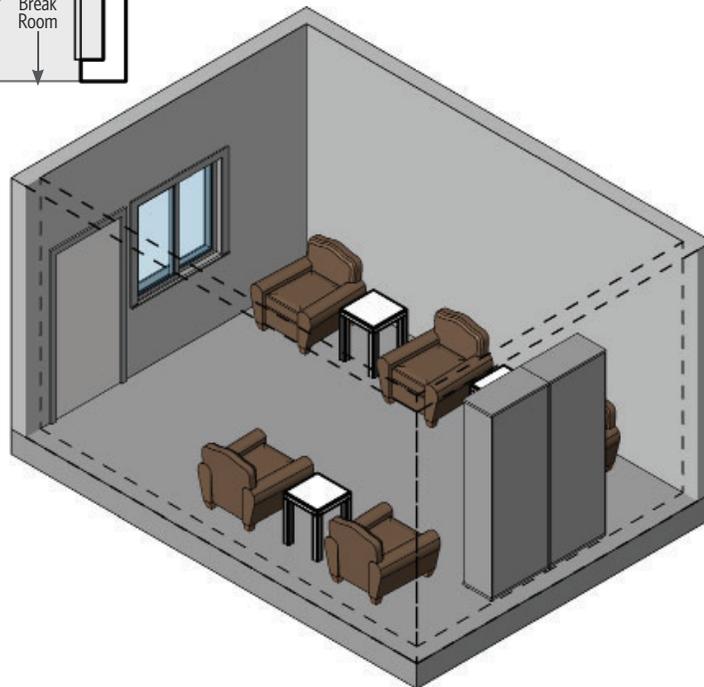
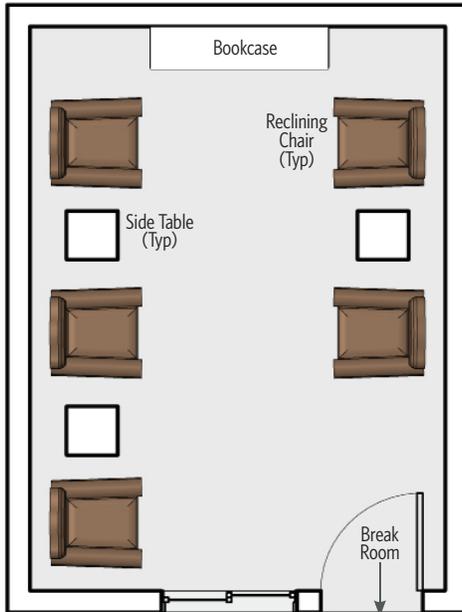
EQUIPMENT/FURNISHINGS

- Television
- Chairs
- End tables
- Table and chairs

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
- Daylighting: No exterior openings
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (15 fc indirect lighting average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide one data outlet with four data ports at back of TV
 - ✓ Provide coax cable to building MPOE
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

QUIET ROOM



FUNCTION

Enclosed room for Operators to relax in a quiet environment between, before, after shift.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- Chairs
- Side tables
- Bookcase

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Daylighting: No exterior openings
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Electrical:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc indirect lighting average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting Control:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)



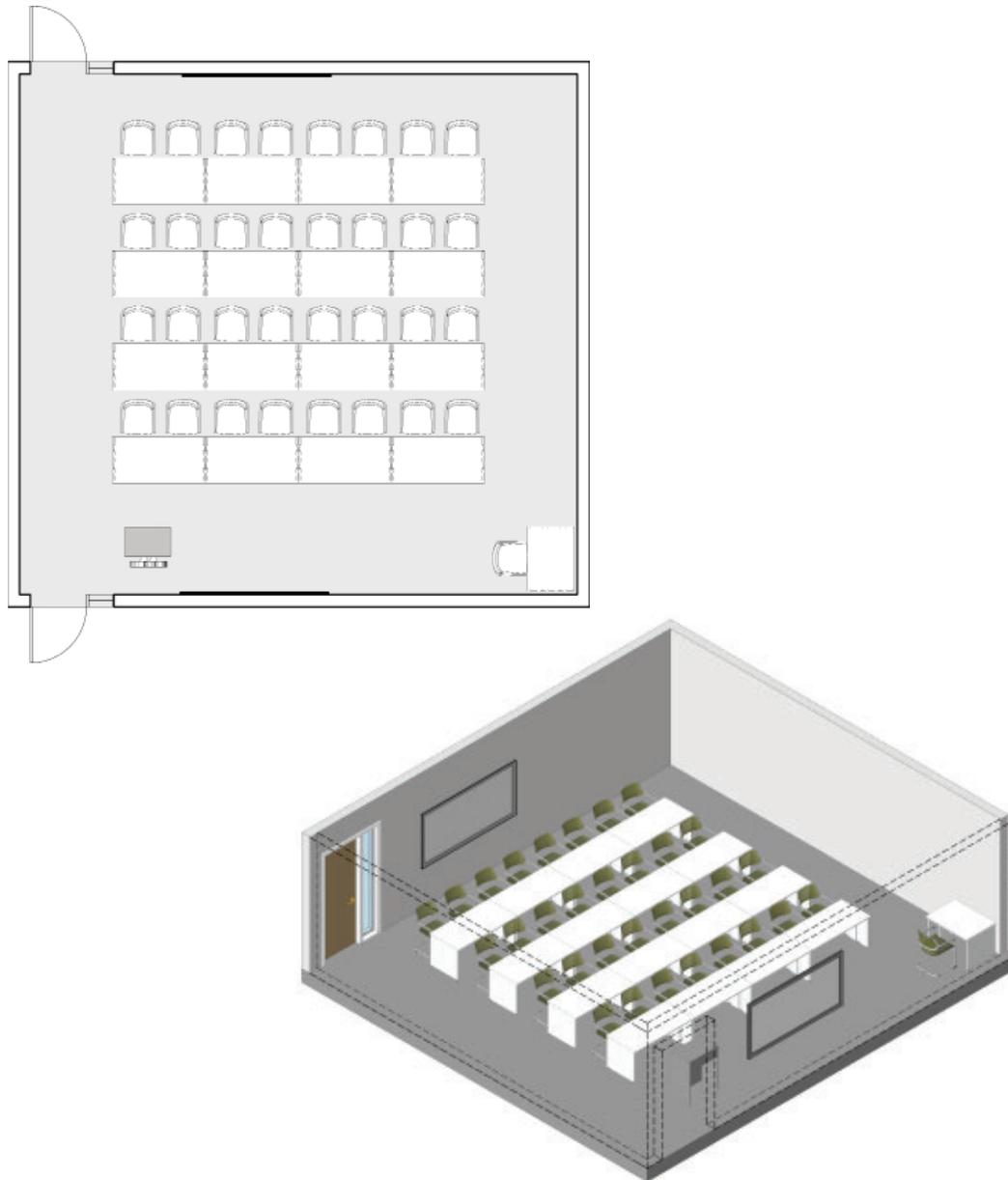
SECTION 5.9: TRANSIT SERVICES
(MRO)



GENERAL OFFICE MODULES

<p>OPERATIONS MANAGER</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to Operations Manager • Adjacent to Junior Management Assistant 	<p>OPERATIONS MANAGER</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to Operations Manager • Adjacent to Junior Management Assistant 	<p>TRANSIT MANAGER II</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Transit Operations Specialist • Adjacent to Junior Management Assistant 	<p>TRANSIT OPERATIONS SPECIALIST</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Transit Manager II • Adjacent to Junior Management Assistant
<p>MRO, STREET OPERATORS</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 30 sf • Adjacent to Office Areas 		<p>JUNIOR MANAGEMENT ASSISTANT</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Operations Manager • Adjacent to Operations Manager 	

CONFERENCE ROOM



FUNCTION

Room to accommodate up to ten people for meetings.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

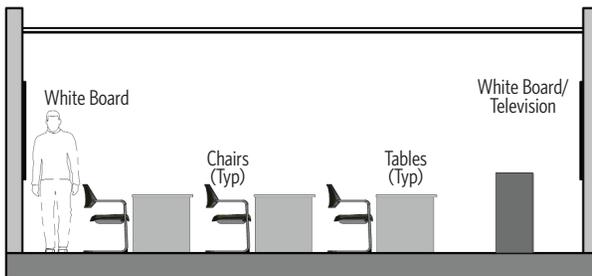
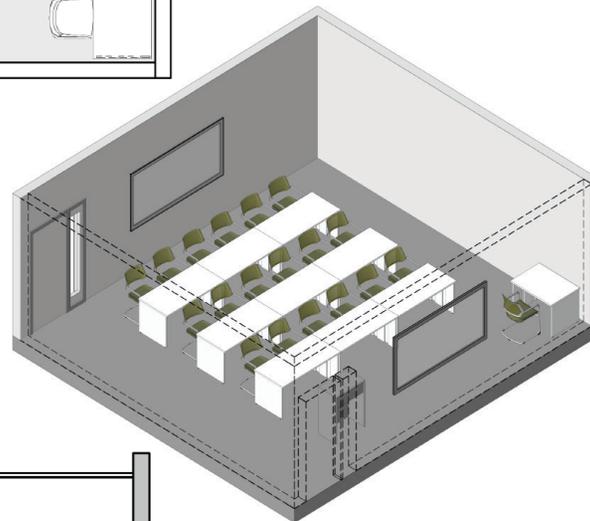
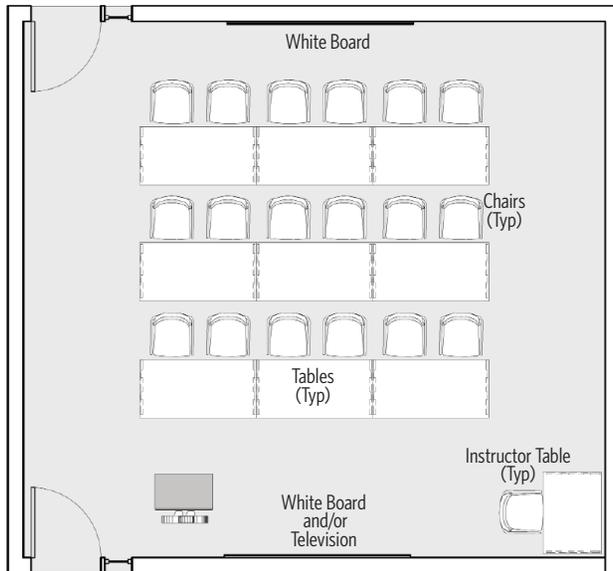
EQUIPMENT/FURNISHINGS

- Table
- Chairs
- White board and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations (30 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

TRAINING ROOM



FUNCTION

Room to accommodate up to 20 people for meetings or trainings.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

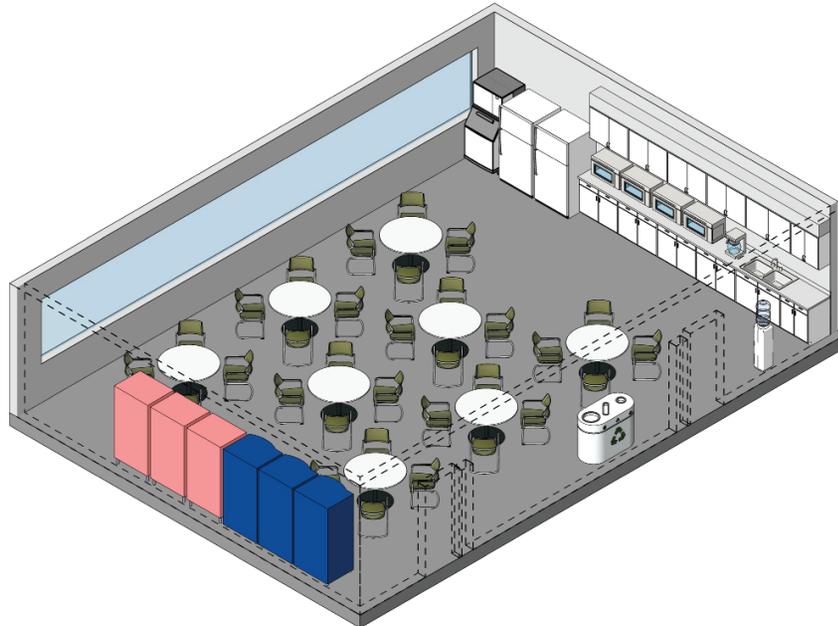
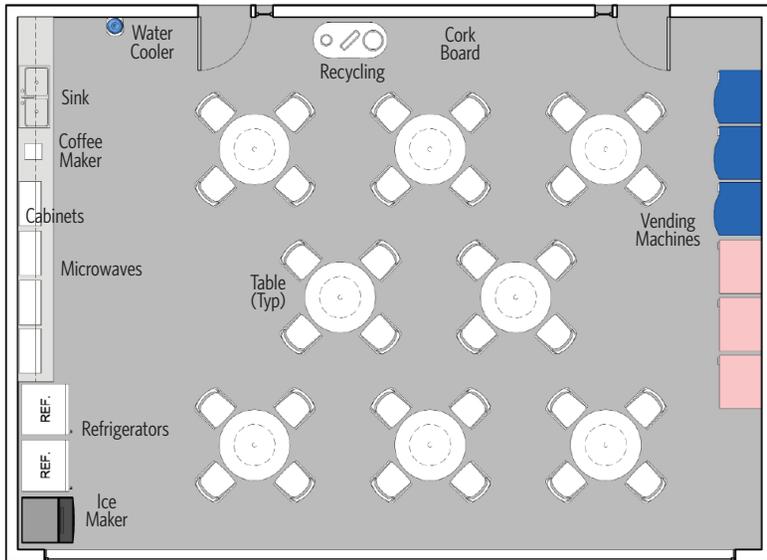
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60" by 30" laminate
- Cool mesh nesting chairs
- White board and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations (30 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

BREAK ROOM



FUNCTION

Enclosed room used as a break area for staff.

RELATIONSHIP TO OTHER AREAS

- Centrally located
- Access to all office areas, repair areas, and Restrooms

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

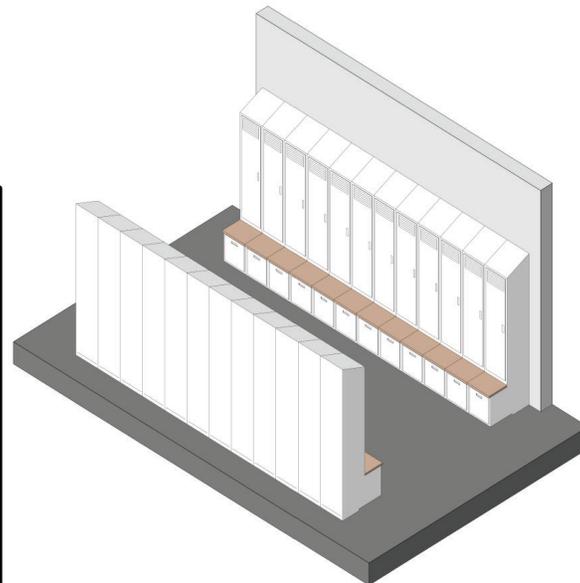
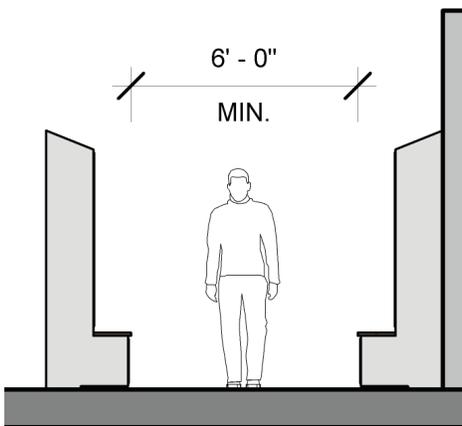
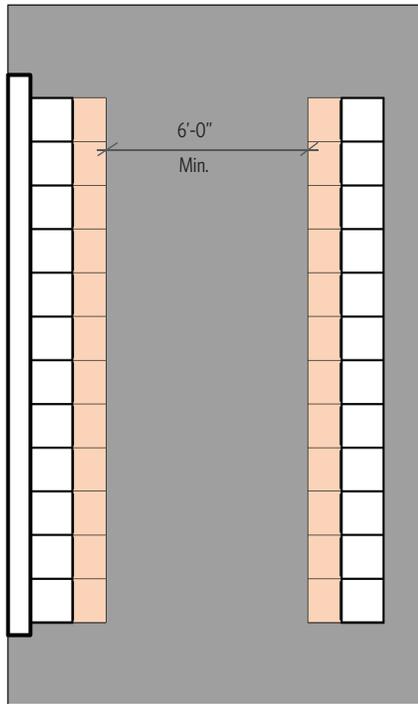
EQUIPMENT/FURNISHINGS

- Counter space, upper and lower cabinets, sink, microwaves, refrigerators, coffee maker, ice maker, water filter, vending machines, water coolers, tables, chairs, trash/recycling/compost bins

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Plumbing: Rough in for equipment
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide data outlets with four data ports (two minimum)
 - ✓ Provide five GFCI outlets above kitchenette counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

LOCKERS



FUNCTION

Locker area for each male and female Transit Services (MRO) employees. A few changing areas behind curtain or other partition will be provided.

RELATIONSHIP TO OTHER AREAS

- Access by Repair and Shop Areas
- Located within each Men's and Women's Restrooms

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

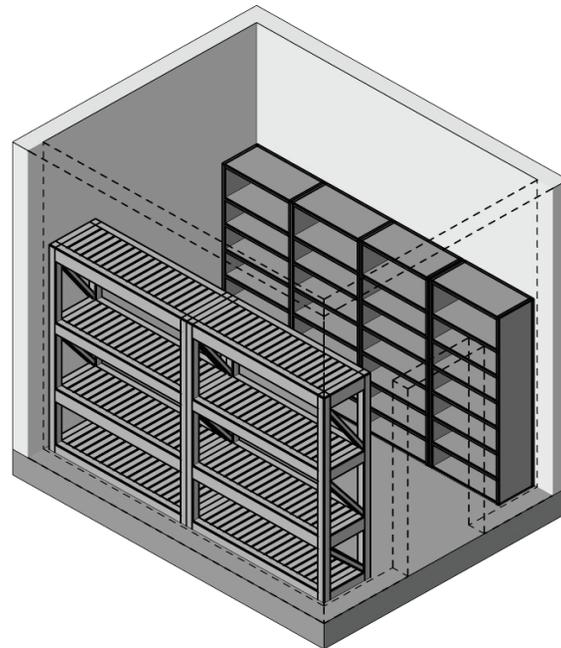
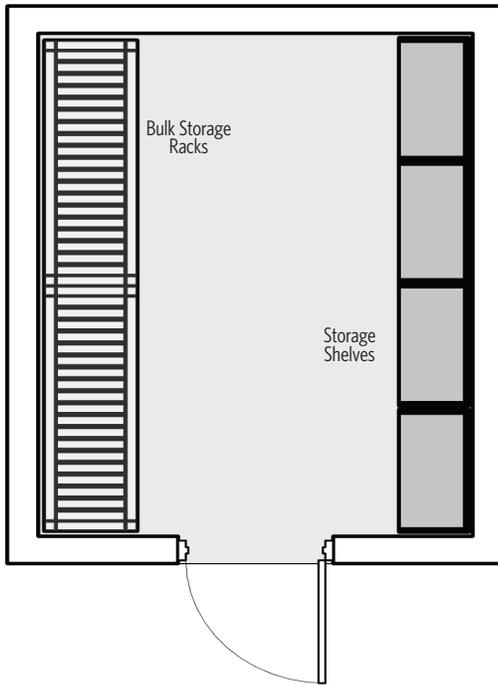
EQUIPMENT/FURNISHINGS

- 6'-0" high gear, well-ventilated lockers with built-in bench
- Lockers must be ADA compliant and have mirrors
- Locker Dimensions: 24" by 24"
- Lockers to have sloped tops

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or finished masonry
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (15 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

STORAGE



FUNCTION

Dedicated secure storage for Transit Service supplies.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

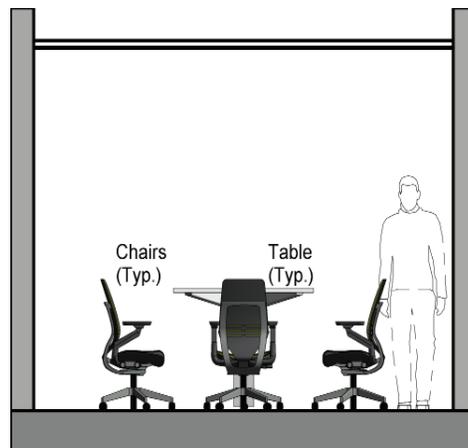
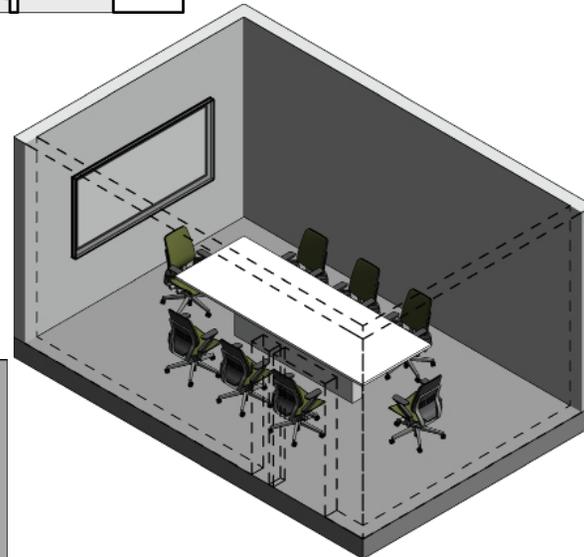
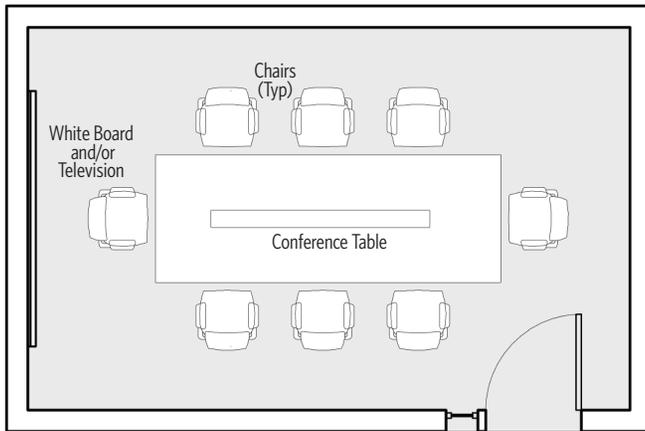
- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (30 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors



SECTION 5.10: SHARED



MEDIUM CONFERENCE ROOM



FUNCTION

Room to accommodate up to ten people for meetings.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

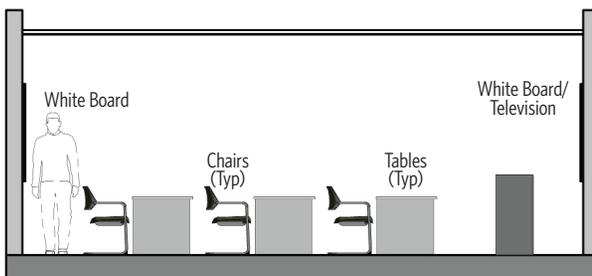
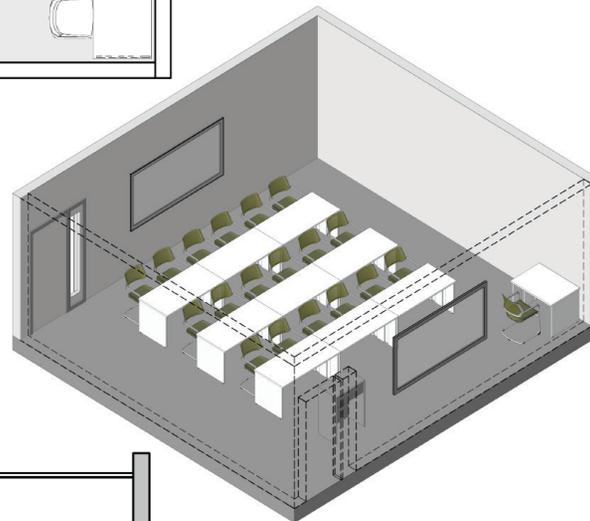
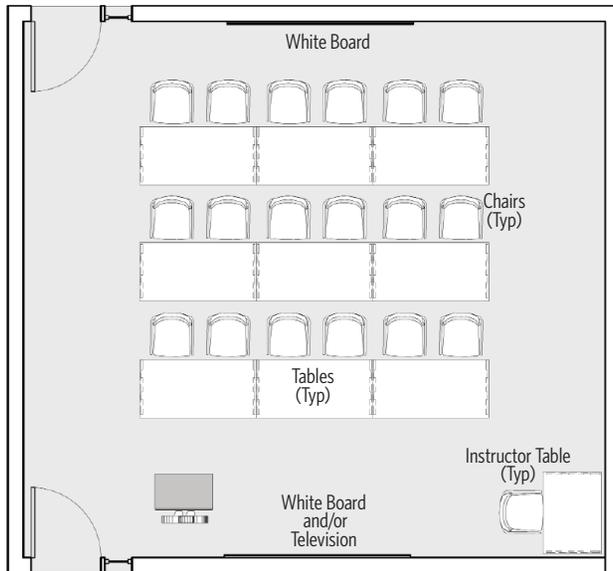
EQUIPMENT/FURNISHINGS

- Table
- Chairs
- White board and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations (30 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

LARGE CONFERENCE/SMALL TRAINING



FUNCTION

Room to accommodate up to 20 people for meetings or trainings.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

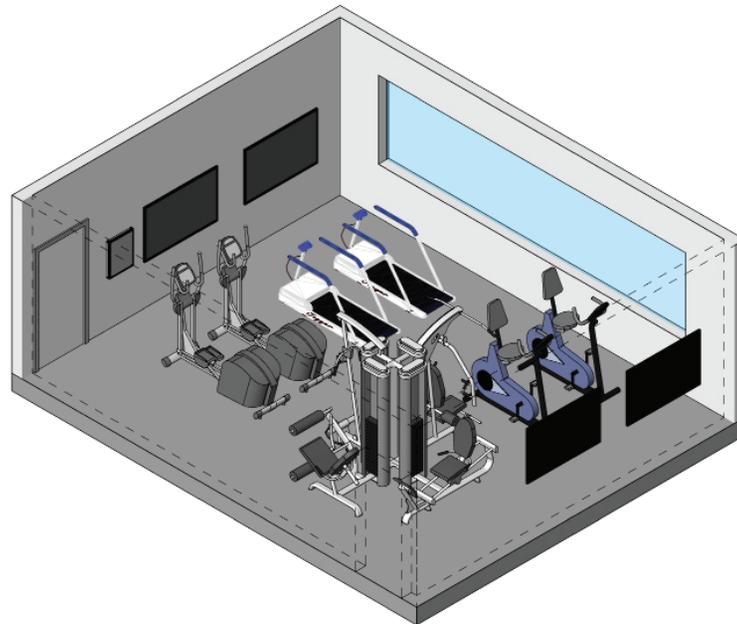
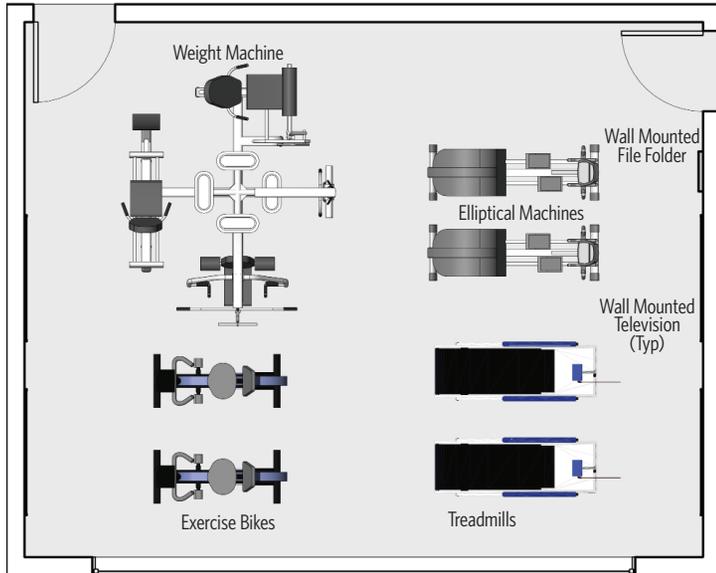
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60" by 30" laminate
- Cool mesh nesting chairs
- White board and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations (30 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

FITNESS ROOM



FUNCTION

Enclosed area with exercise equipment for employee fitness.

RELATIONSHIP TO OTHER AREAS

- Accessible from the Break Room, Lockers, and Restrooms and Showers

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

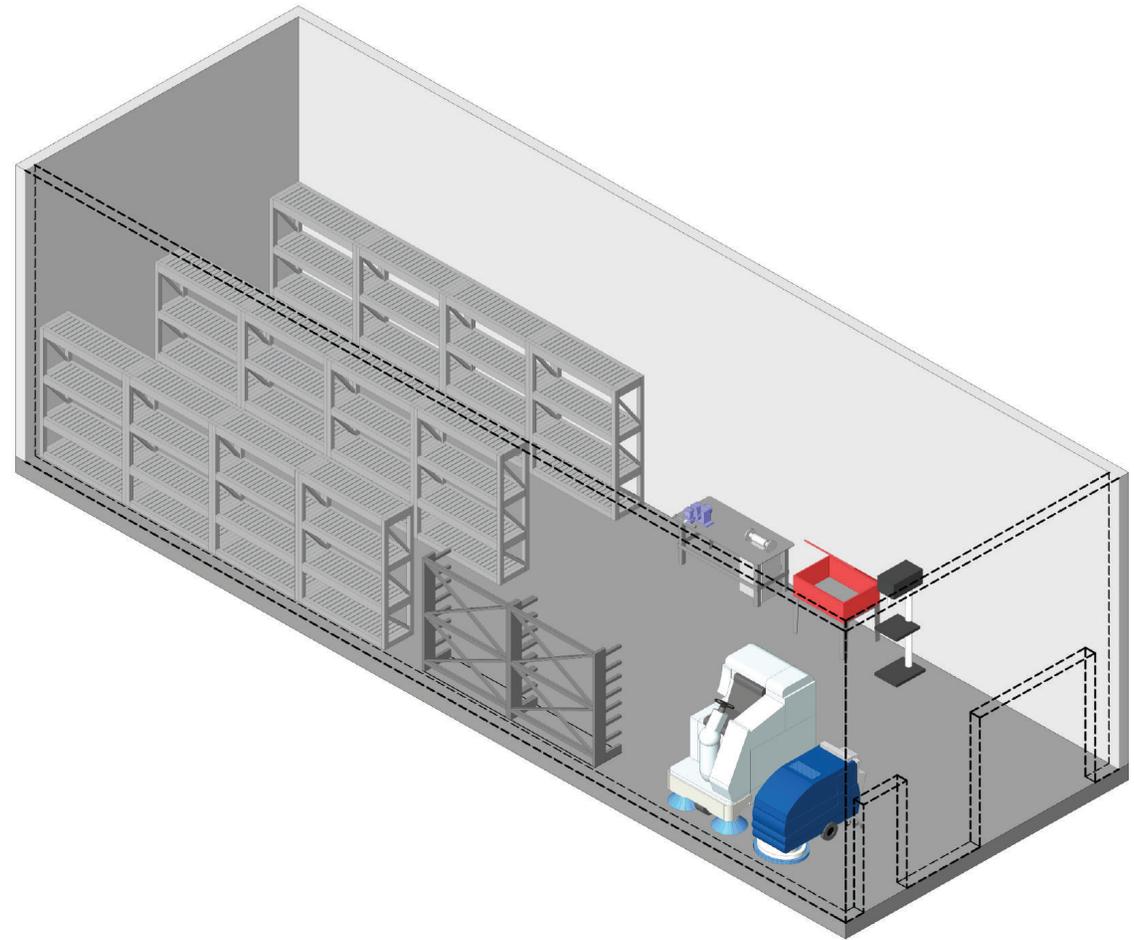
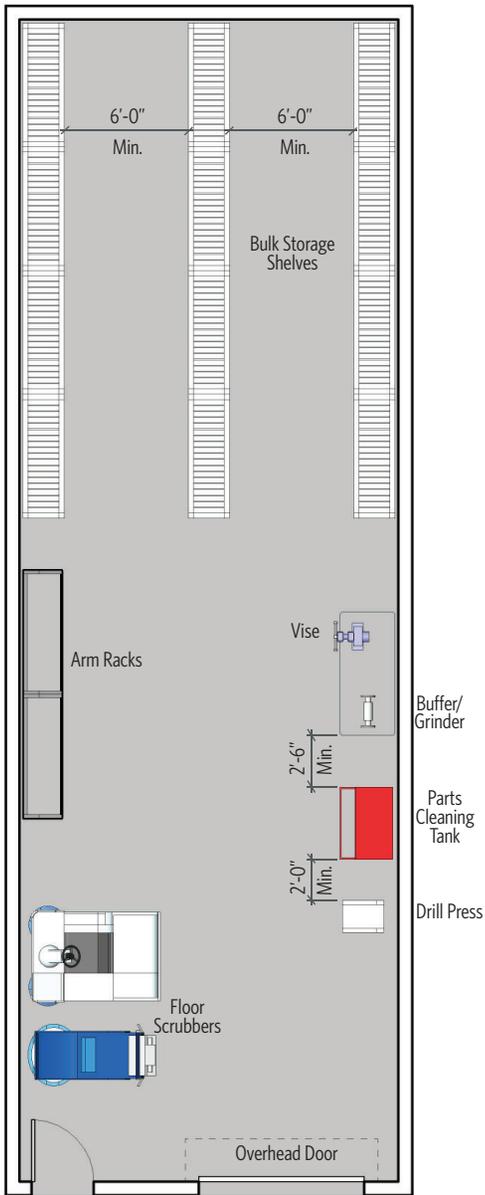
EQUIPMENT/FURNISHINGS

- Miscellaneous fitness equipment determined by the Owner
- Television

DESIGN FEATURES

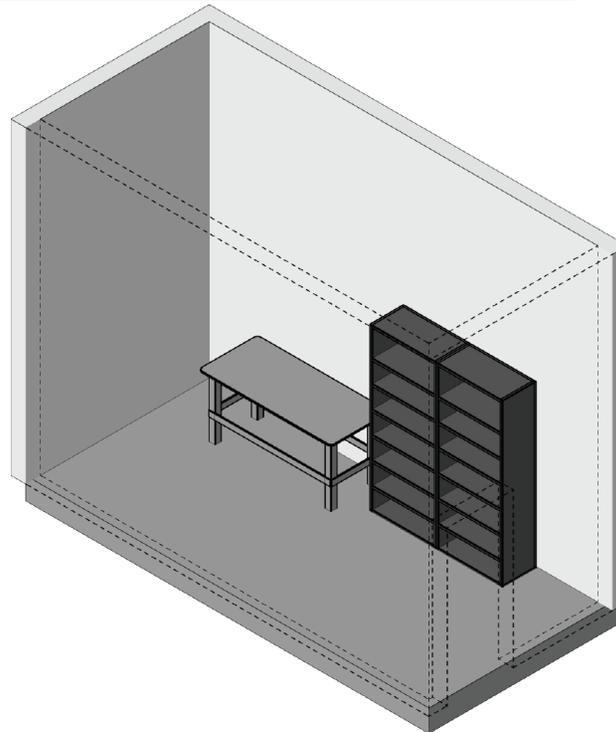
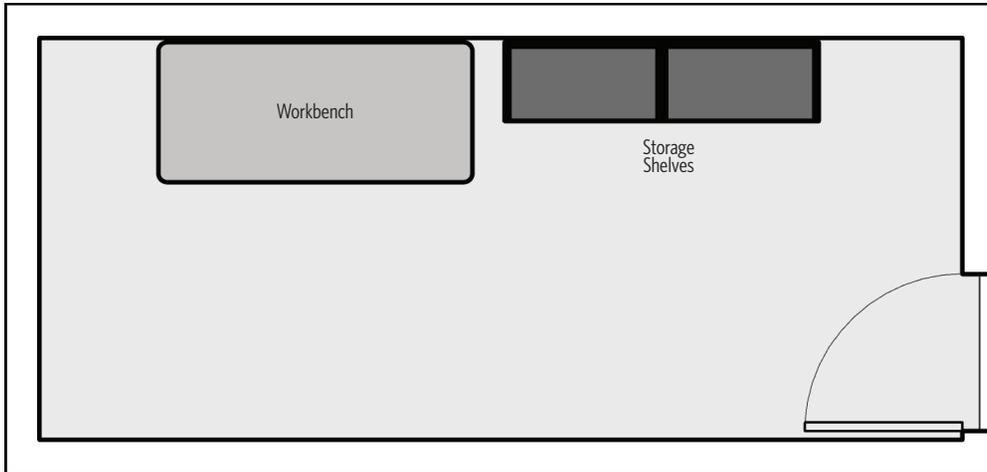
- Architectural:
 - ✓ Floor: Athletic rubber floor tiles with base (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors: Single leaf 3'-0" doors
- Daylighting: Exterior window desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (25 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

BUILDING ENGINEER/BUILDING STORAGE



BUILDING ENGINEER/BUILDING STORAGE		
<p>FUNCTION</p> <p>Enclosed, secure shop and materials storage and upkeep of materials related to maintenance buildings and site grounds.</p>	<p>ARCHITECTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Finishes: <ul style="list-style-type: none"> ✓ Floor: Soil, grease, water, slip resistant concrete with integral, non-metallic, light reflective hardener, and chemical bonded concrete sealer ✓ Walls: Soil and grease resistant, with light colored finish, made of concrete or masonry ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, light colored finish • Doors: <ul style="list-style-type: none"> ✓ Personnel door with view panel to meet applicable code exit requirements ✓ Exterior overhead doors: High lifting sectional, steel, insulated, 10'-0" by 12'-0" with view panels. Automatic operator, interior and exterior push button controls with lockout on exterior ✓ Bollards on exterior at jambs of overhead door (two each) 	<p>PLUMBING CONSIDERATIONS</p> <ul style="list-style-type: none"> • Compressed air drop: <ul style="list-style-type: none"> ✓ 2'-0" compressed air piping loop (minimum) ✓ Compressed air drops with shut-off valve, union separator, regulator with gauge, lubricator, and quick disconnects on 4'-0" AFF ✓ Provide disconnects for 3/8" and 1/2" impact tools at locations to be determined during detailed design ✓ As required by equipment • As required by equipment
<p>RELATIONSHIP TO OTHER AREAS</p> <ul style="list-style-type: none"> • Access to all Restroom>Showers and Break/Crew Room 	<p>STRUCTURAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Control joints in floor slab at adequate spacing • Structure as needed to support equipment • Floor slab designed to accommodate in-floor radiant heat (if desired) 	<p>ELECTRICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Power: <ul style="list-style-type: none"> ✓ All receptacles and outlets at 3'-6" AFF ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column ✓ As required by equipment • Lighting: <ul style="list-style-type: none"> ✓ LED lighting in accordance with IES recommendation minimum (20 fc average) ✓ Fixtures located to illuminate work spaces • Communications: <ul style="list-style-type: none"> ✓ Paging/intercom system speakers ✓ Data conduit on columns and/or walls
<p>CRITICAL DIMENSIONS</p> <ul style="list-style-type: none"> • 14'-0" vertical clearance to structure and clearance 	<p>MECHANICAL CONSIDERATIONS</p> <ul style="list-style-type: none"> • Heating set point: 65 degrees Fahrenheit • General ventilation (per code) • In-floor radiant heat (if desired) • As required by equipment 	
<p>EQUIPMENT/FURNISHINGS</p> <ul style="list-style-type: none"> • Severe use workbench with vise • Buffer/grinder • Drill press • Parts cleaning tank • Shelving units • Arm racks • Floor scrubbers 		
<p>DESIGN FEATURES</p> <ul style="list-style-type: none"> • Forklift access • Electronically secured entry 		

REVENUE OFFICE



FUNCTION

Secure area for storing specialized tools and equipment for fare retrieval, adaptable with space for workstation.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Meet & Greet at entrance

CRITICAL DIMENSIONS

- 12'-0" vertical clearance to structure and fixtures

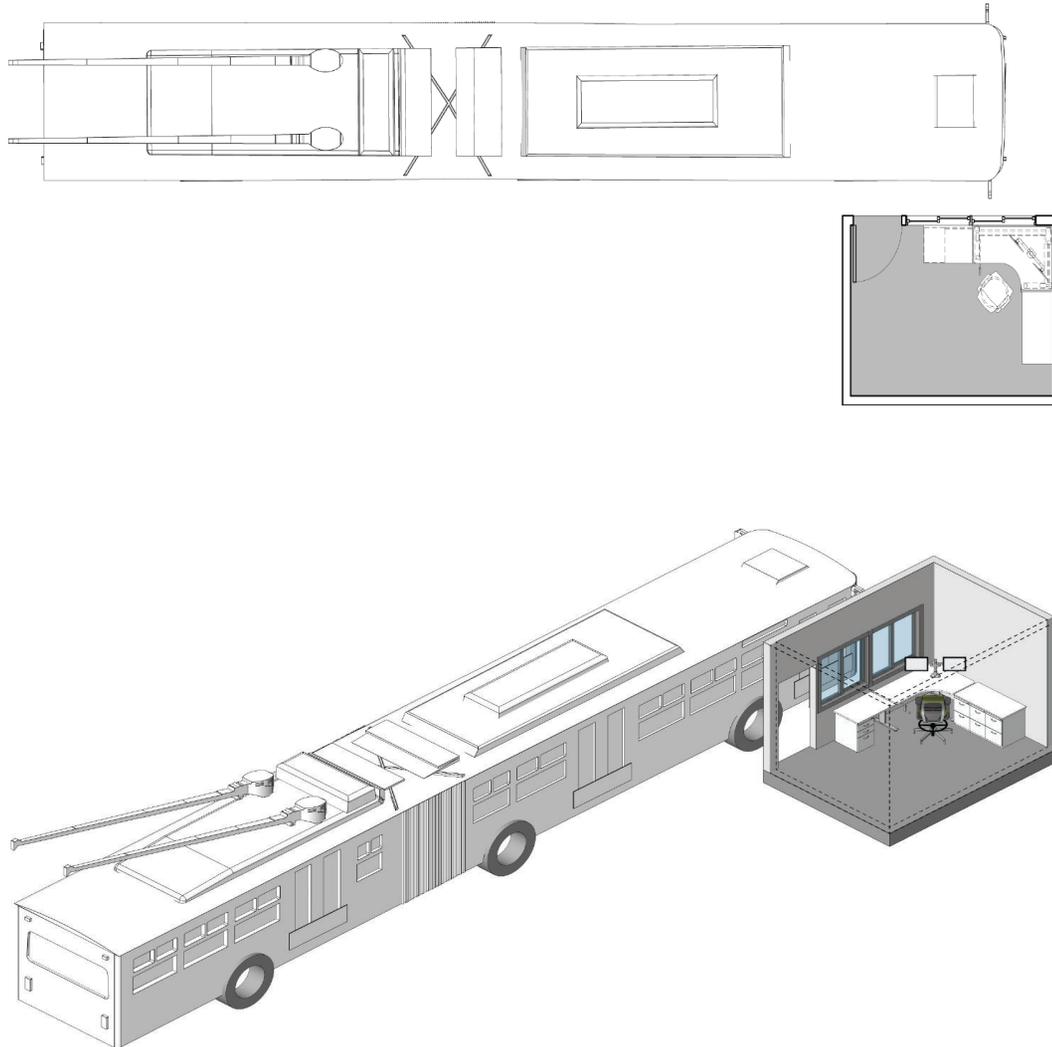
EQUIPMENT/FURNISHINGS

- Typical equipment is shown, reference Appendix A: Equipment Manual for specific project equipment

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Soil, grease, water, slip resistant concrete, with integral non-metallic light reflective hardener, and chemical bonded concrete sealer
 - ✓ Walls: Soil and grease resistant, light colored finished concrete or masonry
 - ✓ Ceiling: Painted exposed structure, ductwork, conduit, and utilities, with light colored finish
 - ✓ Doors: Personnel door with view panels to meet applicable code exit requirements (not required with wire mesh walls)
- Structural:
 - ✓ Control joints in floor slab at adequate spacing
 - ✓ Floor slab to accommodate in-floor radiant heat (if desired)
 - ✓ Structure as needed to support equipment
 - ✓ Floor slab designed to accommodate forklift access
- Mechanical:
 - ✓ In-floor radiant heat (if desired)
 - ✓ Heating set point: 65 degrees Fahrenheit
 - ✓ General ventilation (per code)
 - ✓ As required by equipment
- Power:
 - ✓ All receptacles and outlets at 3'-6" AFF
 - ✓ Provide general purpose duplex receptacles (ten minimum) on walls and columns
 - ✓ Dedicated computer receptacle, adjacent to data conduit on wall or column
 - ✓ As required by equipment
- Lighting: LED lighting in accordance with IES recommendation minimum (20 fc average)

MEET & GREET



FUNCTION

Space for buses to be greeted as they enter the facility.

RELATIONSHIP TO OTHER AREAS

- Adjacent to entrance of facility
- Buses will use circulation aisle to access Meet & Greet

CRITICAL DIMENSIONS

- 19'-0" vertical clearance (minimum)

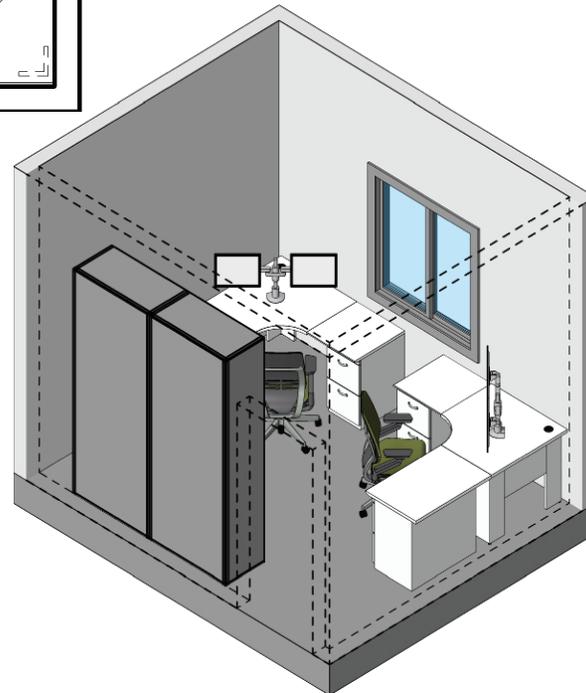
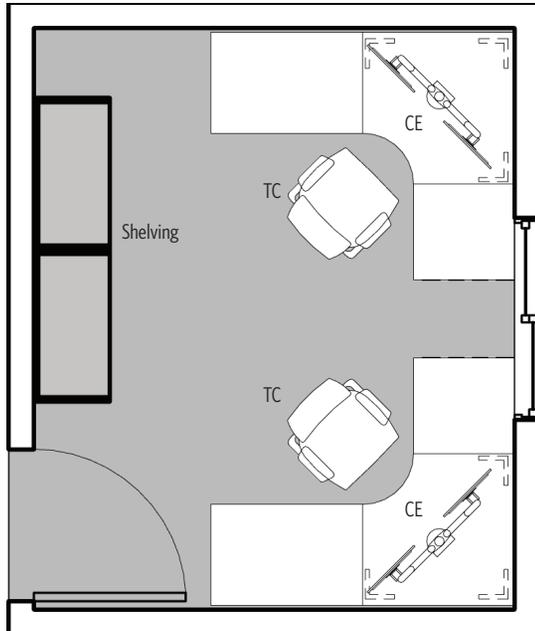
EQUIPMENT/FURNISHINGS

- Task chair
- Sit/stand workstation
- Under surface vertical files
- Cabinets
- Guest chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for Administration or Operations areas (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas (recommended).
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

SECURITY OFFICE



FUNCTION

Office for security staff to monitor facility.

RELATIONSHIP TO OTHER AREAS

- Case specific (office areas specific to each group); reference general module

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

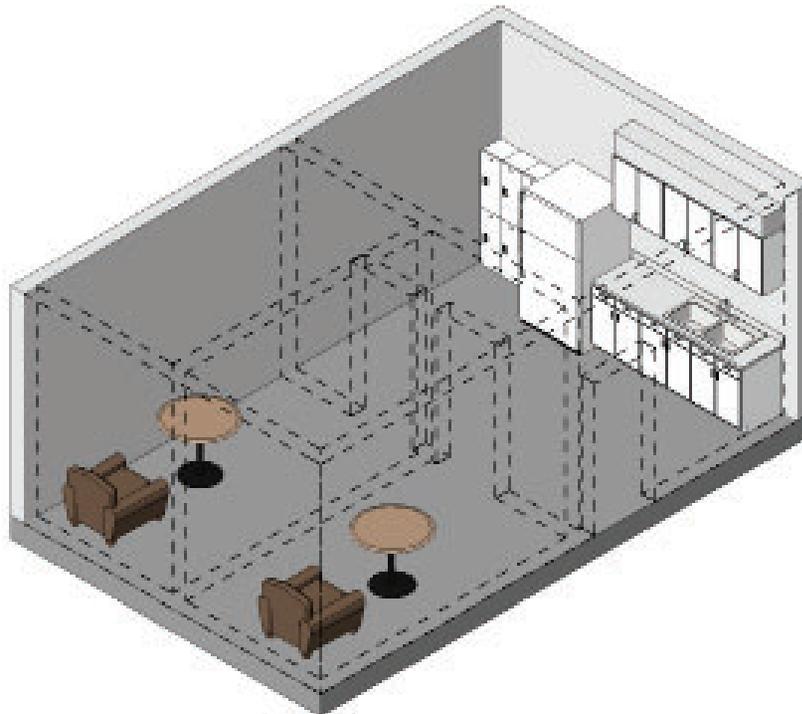
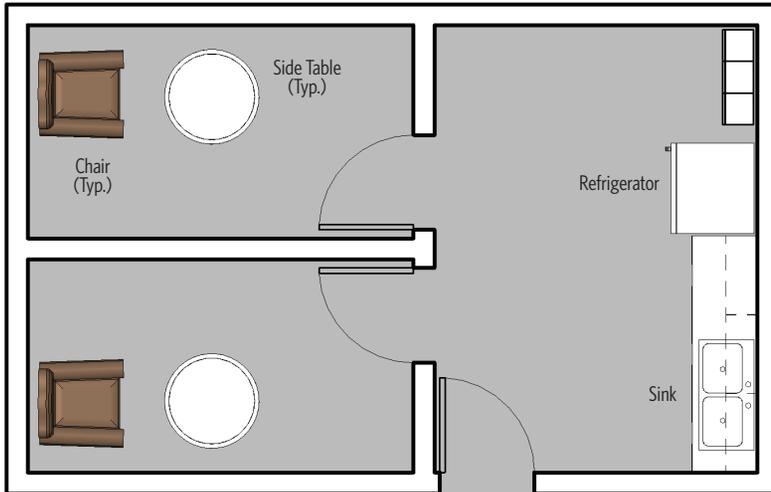
EQUIPMENT/FURNISHINGS

- Task chair
- Sit/stand workstation
- Under surface vertical files
- Cabinets
- Guest chairs

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring:
 - Carpet tile floor with rubber base for Administration or Operations areas (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - Resilient floor covering with base for maintenance areas (recommended).
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (35 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a quad receptacle at each workstation
 - ✓ Provide one data outlet with four data ports at each workstation
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

LACTATION ROOM



FUNCTION

Dedicated room for employees who are breastfeeding to pump breast milk in private.

RELATIONSHIP TO OTHER AREAS

- Accessible from department office areas

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- Sink with countertops and cabinets
- Secure storage for equipment and supplies
- Lockers
- Side tables
- Refrigerator
- Chairs
- Door with interior lock

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf lockable 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Plumbing: rough-in for fixtures
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc indirect lighting average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
 - ✓ Provide one GFCI outlet above counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)



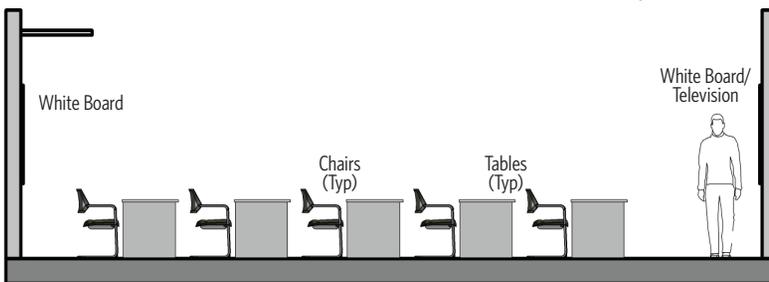
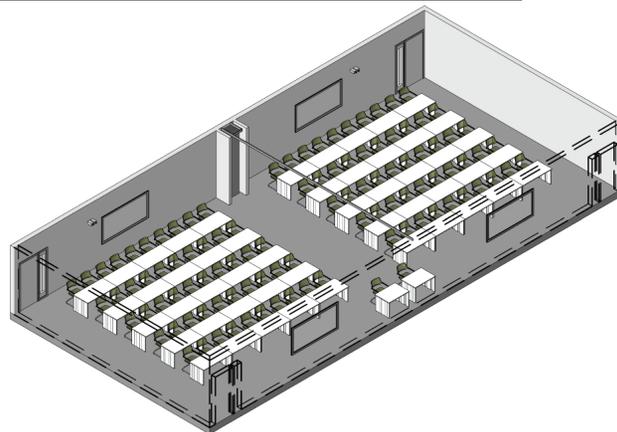
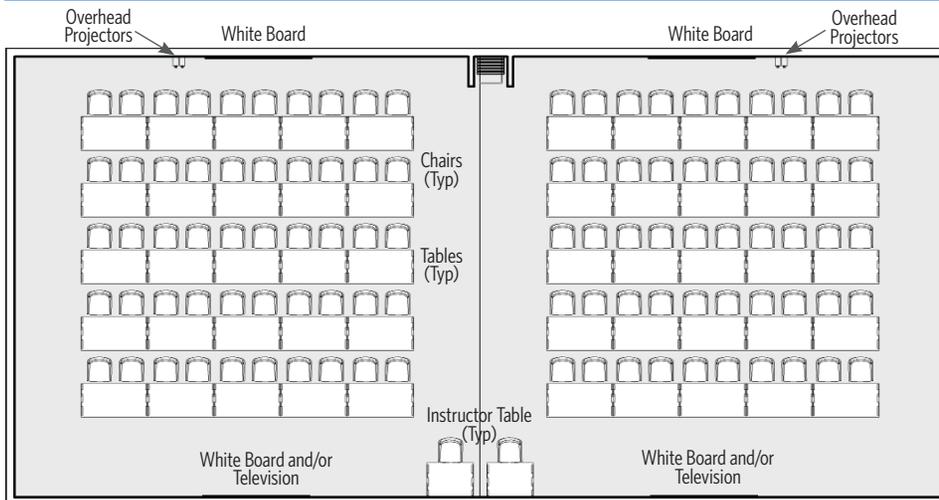
SECTION 5.11: TRAINING



GENERAL OFFICE MODULES

<p style="text-align: center;">MANAGER</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 224 sf • Adjacent to Superintendent • Adjacent to Assistant Superintendent 	<p style="text-align: center;">SUPERINTENDENT</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 224 sf • Adjacent to Manager • Adjacent to Assistant Superintendent 	<p style="text-align: center;">ASSISTANT SUPERINTENDENT</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to Manager • Adjacent to Superintendent 	<p style="text-align: center;">SUPERVISOR</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Verification of Transit Training • Adjacent to Instructors
<p style="text-align: center;">CLERICAL STAFF</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Team Leaders 	<p style="text-align: center;">TEAM LEADERS</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Clerical Staff 	<p style="text-align: center;">CAT TRAINING</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 64 sf • Adjacent to Supervisors 	<p style="text-align: center;">INSTRUCTORS</p> <ul style="list-style-type: none"> • Reference Office Module Workstation - 30 sf • Adjacent to Training Room • Adjacent to Classroom
<p style="text-align: center;">IT OFFICE</p> <ul style="list-style-type: none"> • Reference Office Module Private Office - 120 sf • Adjacent to Computer Lab 			

CLASSROOM A & B



FUNCTION

Large room(s) for staff training activities. Each space will accommodate 50 students separately, 100 when combined. Classrooms A & B can be divided or joined via folding partition wall.

RELATIONSHIP TO OTHER AREAS

- Accessible to all departments in the building
- Adjacent to Training Office area

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

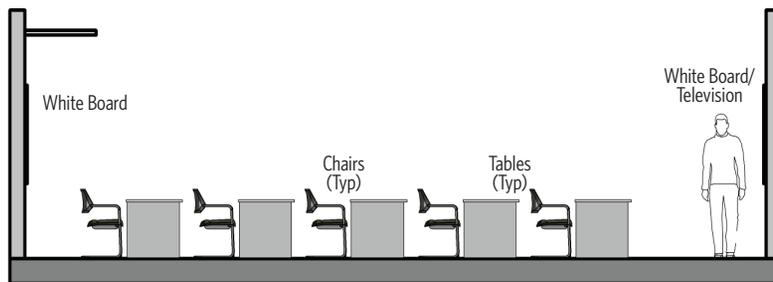
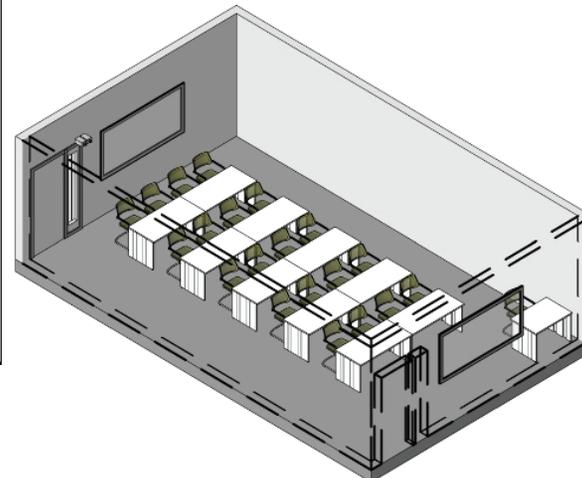
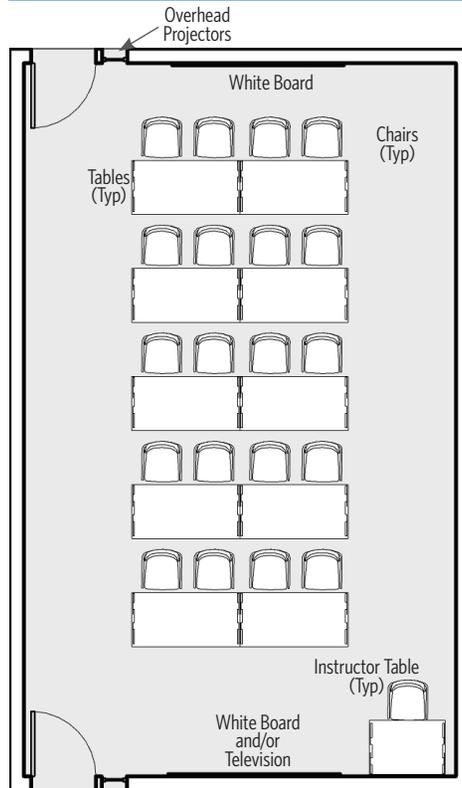
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60" by 30" laminate
- Cool mesh nesting chairs
- Whiteboard and/or television
- Overhead projectors

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Power:
 - ✓ LED lighting in accordance with IES recommendations (35 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins every ten feet in all walls in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

CLASSROOM C & D



FUNCTION

Room(s) for staff training. This space accommodates 20 students and one instructor.

RELATIONSHIP TO OTHER AREAS

- Accessible to all departments in the building
- Adjacent to Training Office area

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

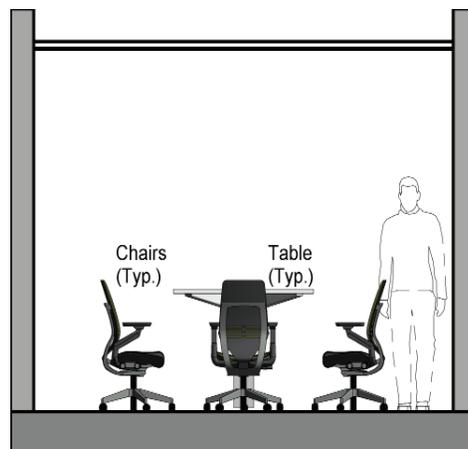
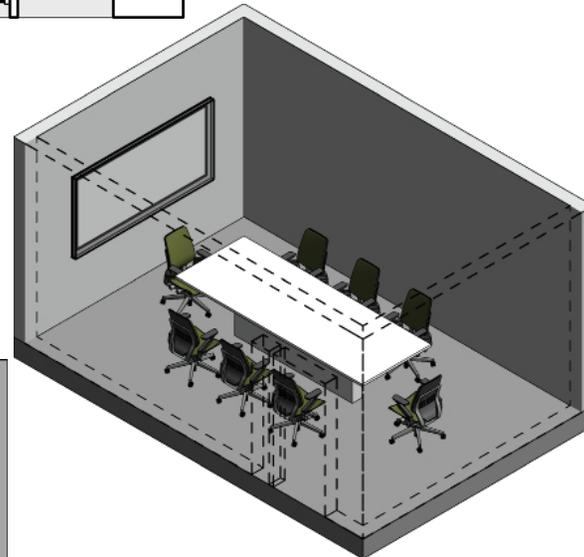
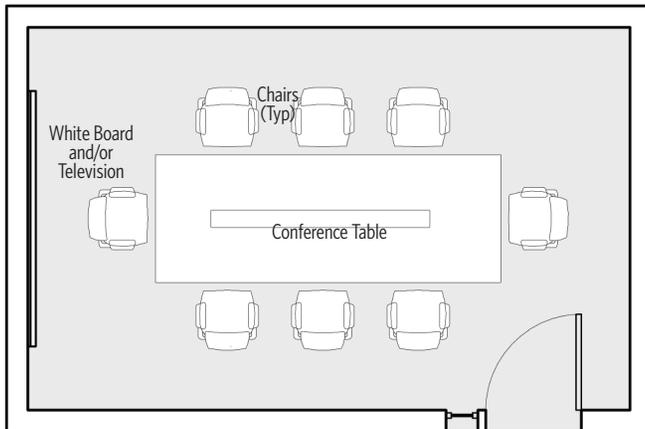
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60"
- Cool mesh nesting chairs
- Whiteboard and/or television by 30" laminate
- Overhead projector

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Power:
 - ✓ LED lighting in accordance with IES recommendations (35 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins every ten feet in all walls in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

CONFERENCE ROOM A & B



FUNCTION

Room to accommodate up to 10 people for meetings.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

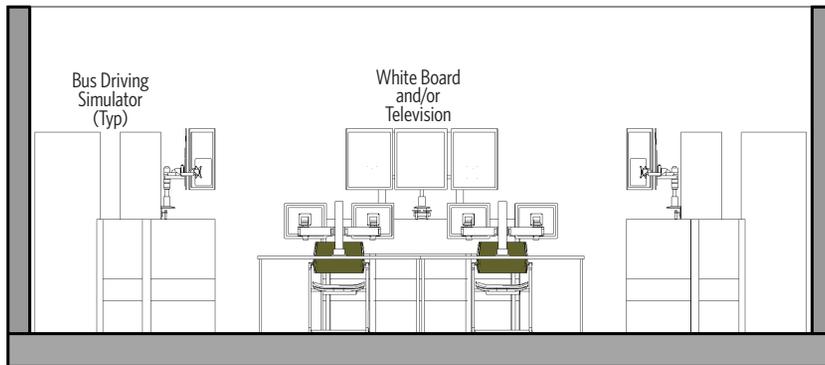
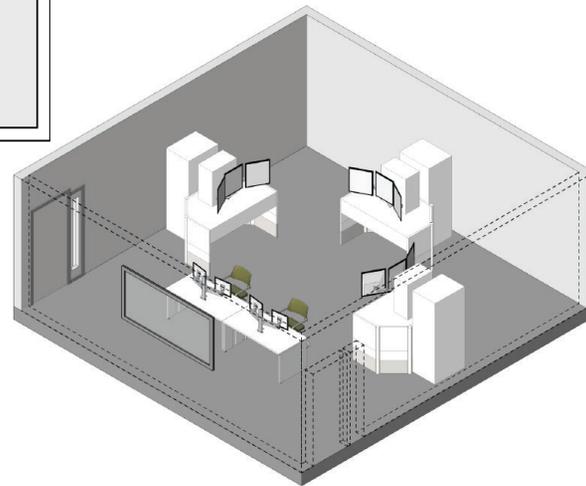
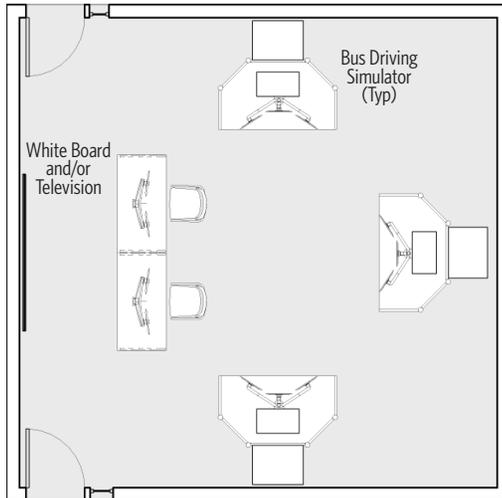
EQUIPMENT/FURNISHINGS

- Table
- Chairs
- White board and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations (30 fc average)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

SIMULATOR ROOM



FUNCTION

Room for computer-based simulator training for staff.

RELATIONSHIP TO OTHER AREAS

- Accessible to all departments in the building
- Adjacent to Training Office area

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

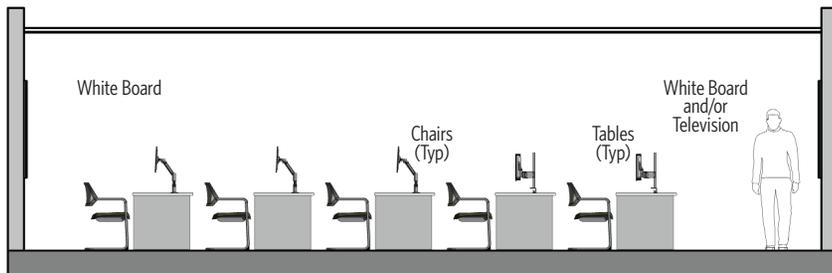
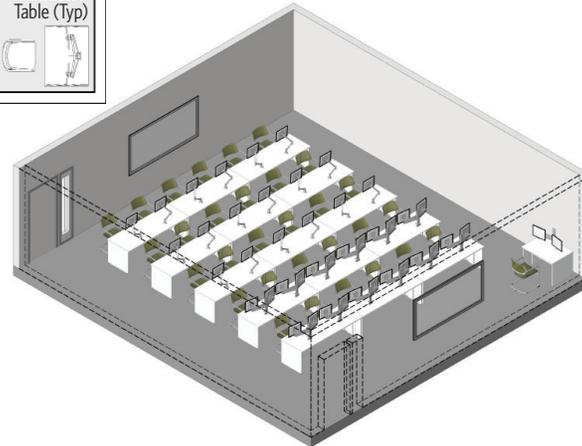
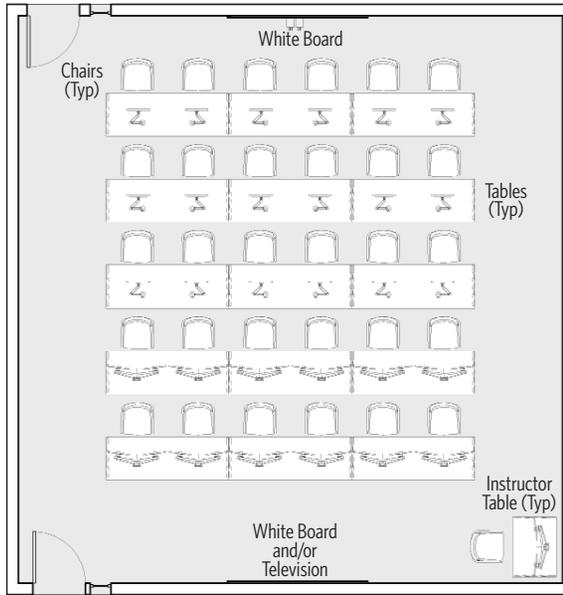
EQUIPMENT/FURNISHINGS

- Simulators
- Whiteboard and/or television

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendations. (20 fc indirect lighting average) (no glare)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of the table
 - ✓ Provide one data outlet with four data ports in the floor under the middle of the table
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

COMPUTER LAB



FUNCTION

Room for computer-based training activities.

RELATIONSHIP TO OTHER AREAS

- Accessible from all departments in the building
- Adjacent to Training Office areas

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

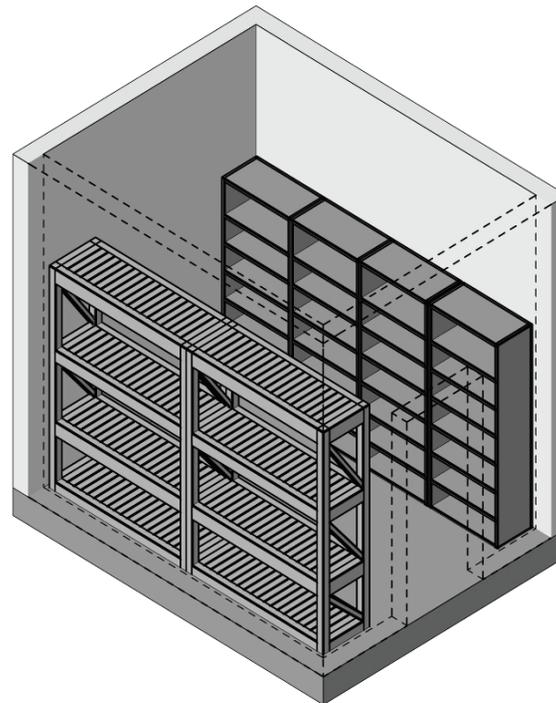
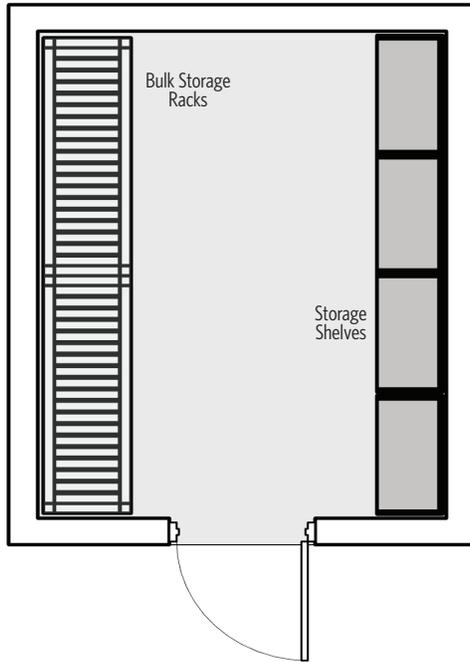
EQUIPMENT/FURNISHINGS

- Mayline Cohere Flip/nest table 60" by 30" laminate
- Cool mesh nesting chairs
- Whiteboard and/or television
- Computers
- Overhead projector

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Carpet tile floor with rubber base or resilient floor covering with base (recommended). Carpet tile must comply with the specifications developed by the San Francisco Department of the Environment, dated June 8, 2018
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window or vision glass desired
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Provide CO2 detection
- Power:
 - ✓ LED lighting in accordance with IES recommendations. (20 fc indirect lighting average) (no glare)
 - ✓ Provide general purpose duplex receptacles (four minimum) and a guard receptacle in the floor under the middle of each of the tables
 - ✓ Provide one data outlet with four data ports in the floor under the middle of each table
 - ✓ Provide box and one inch or larger conduit rough-ins every ten feet in all walls in room
- Lighting:
 - ✓ Dimmable, indirect lighting with vacancy sensor
 - ✓ Task lighting (recommended)

HANDOUTS STORAGE



FUNCTION

Secure room for storage of training handout materials and supplies.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Classroom and Computer Lab

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

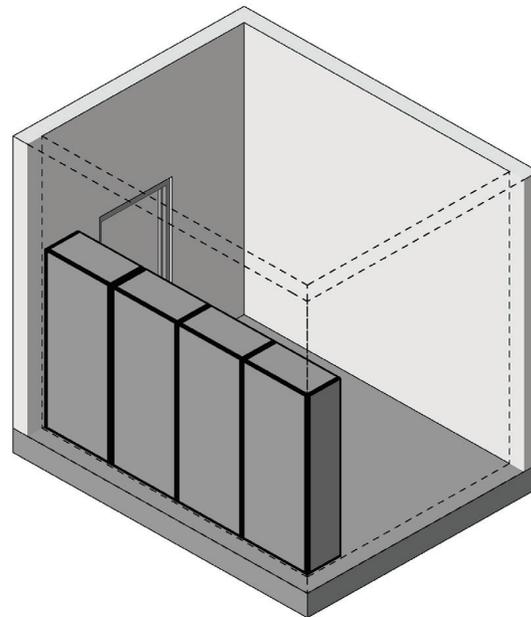
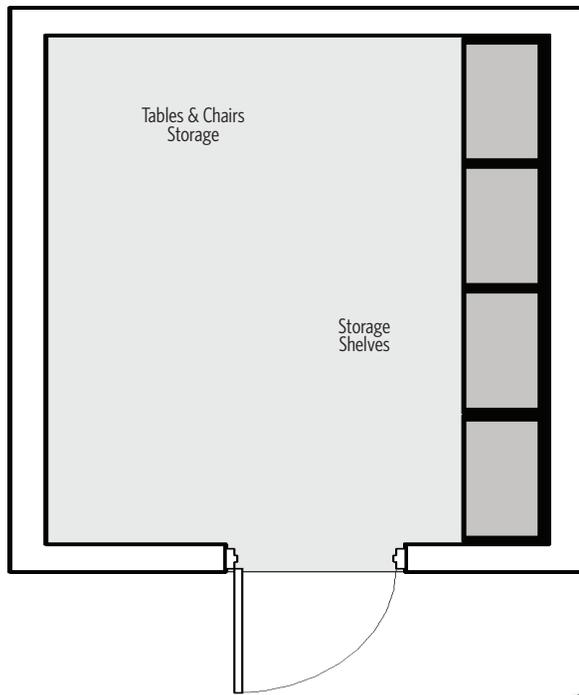
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

TRAINING AID STORAGE



FUNCTION

Secure room for storage of training aid materials and supplies.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Classroom and Computer Lab

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

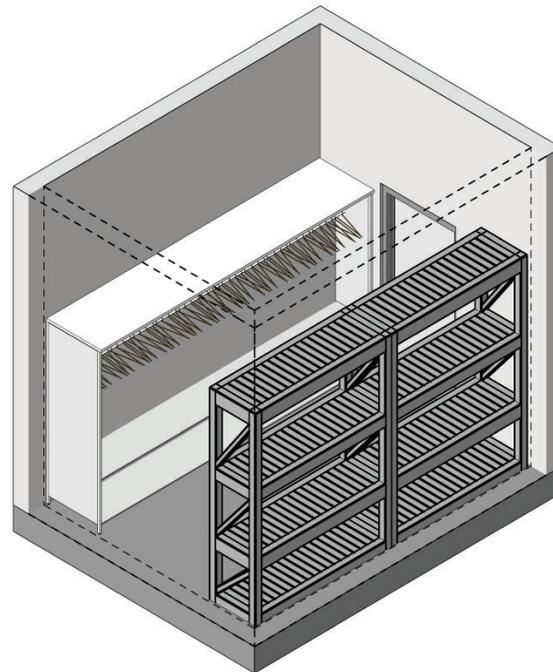
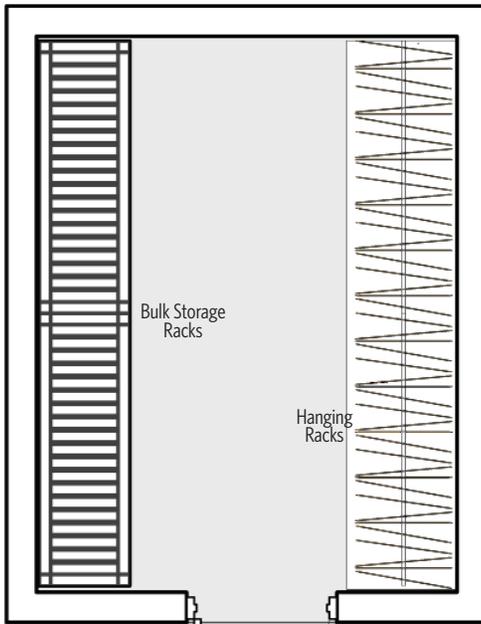
EQUIPMENT/FURNISHINGS

- Shelves
- Includes Tables and Chairs storage (as needed)

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 4'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

UNIFORM STORAGE



FUNCTION

Enclosed room for storage of operator uniforms and safety attire.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Training Office areas

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

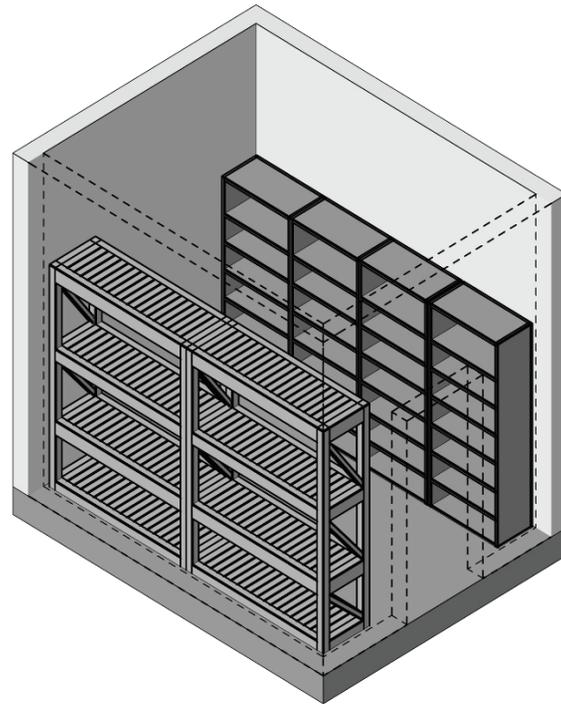
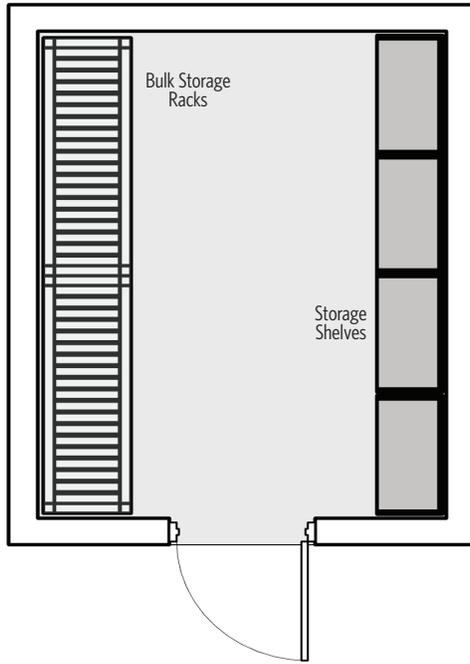
EQUIPMENT/FURNISHINGS

- Hanging racks
- Bulk storage racks

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED lighting in accordance with IES recommendation (15 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensor

RECORDS STORAGE



FUNCTION

Secure area for the storage of files and records.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

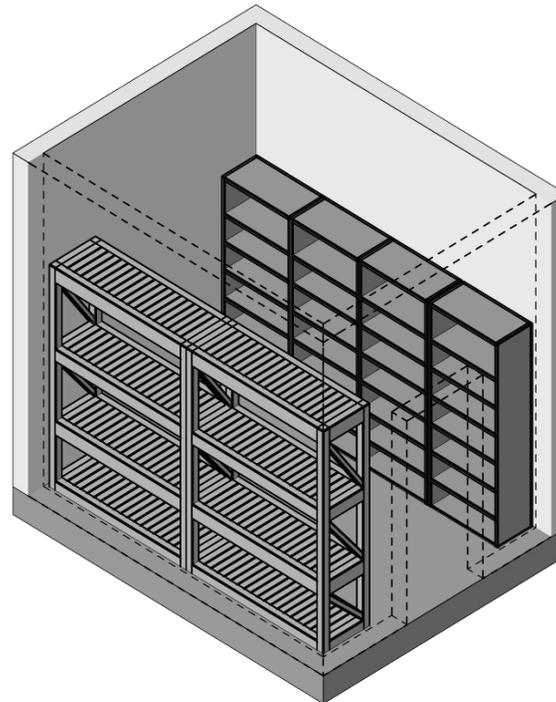
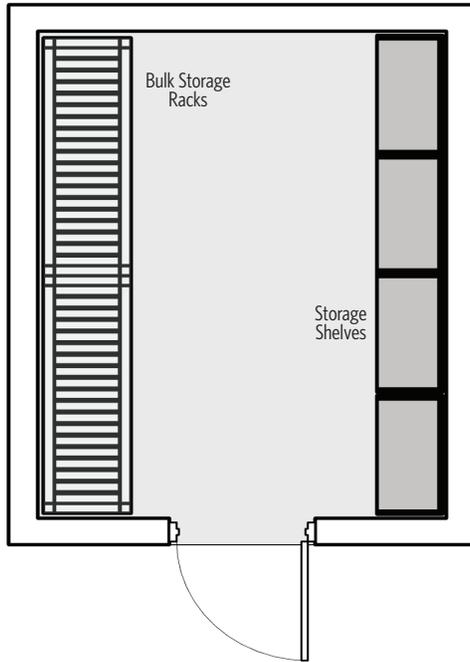
EQUIPMENT/FURNISHINGS

- Shelving
- Racking

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Plumbing: Rough in for equipment
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (35 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

RECORDS ARCHIVE STORAGE



FUNCTION

Secure area for the long term storage of archived files and records.

RELATIONSHIP TO OTHER AREAS

- N/A

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

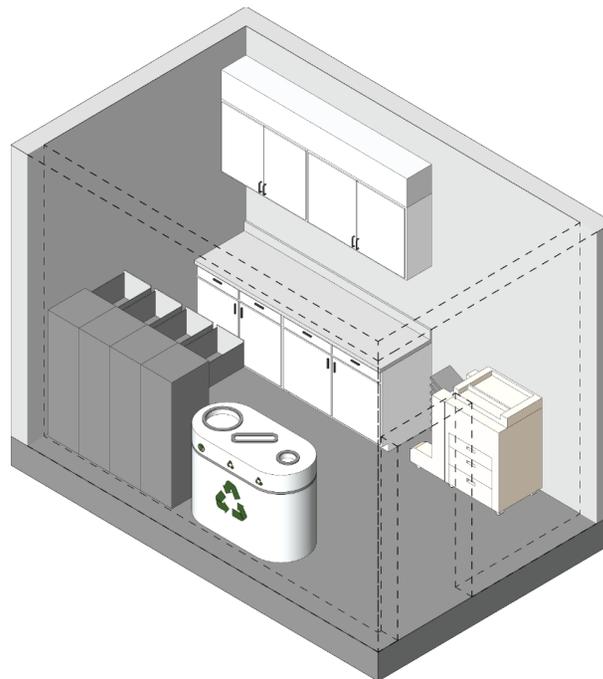
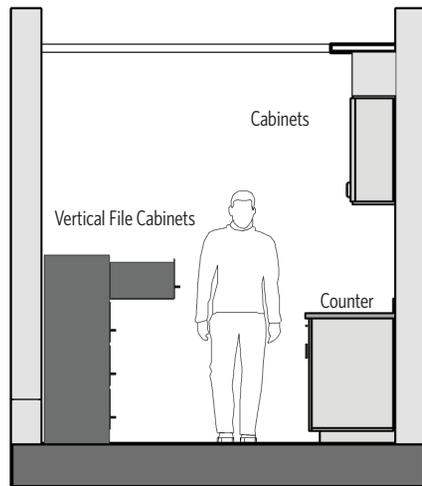
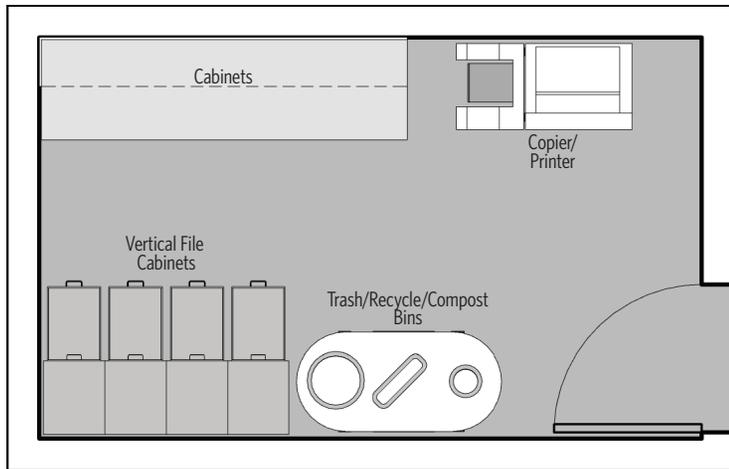
EQUIPMENT/FURNISHINGS

- Shelves
- Racks

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: No exterior exposure
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
 - ✓ Keep consistent humidity levels
- Power:
 - ✓ LED lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
- Lighting: Dimmable, indirect lighting with occupancy sensors

COPY/SUPPLY



FUNCTION

Dedicated alcove or room for copier/printer/scanner/fax machine, storage for office supplies, and work surface.

RELATIONSHIP TO OTHER AREAS

- Access to all office areas

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

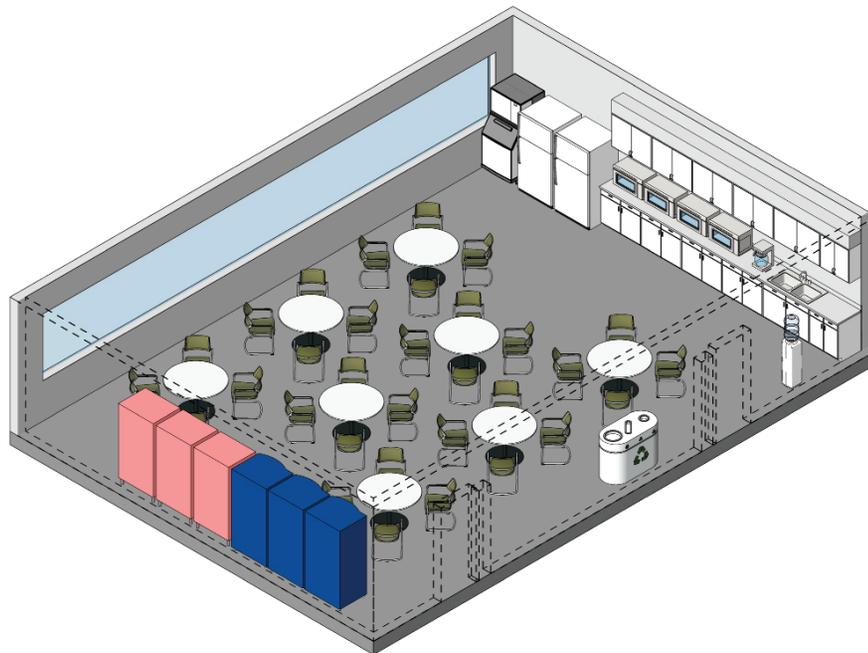
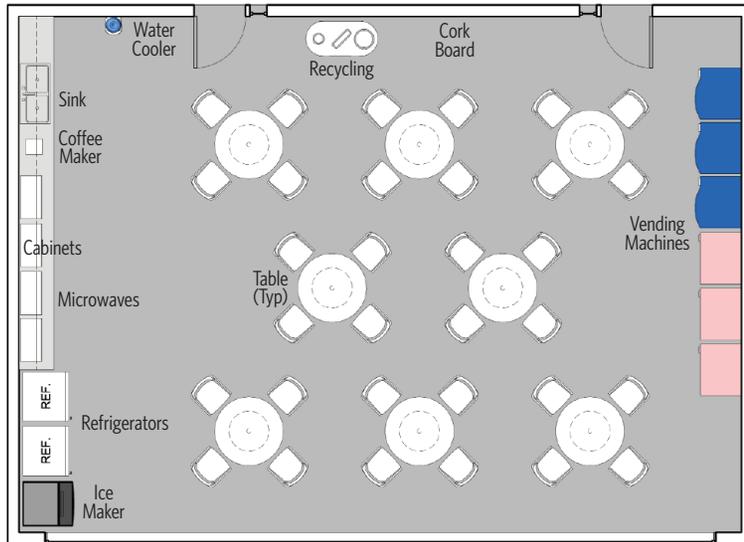
EQUIPMENT/FURNISHINGS

- Copier/printer/scanner/fax machine
- Work surface with cabinets below and above
- Filing cabinets
- Trash/recycling/compost bins

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" door with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide one data outlet with four data ports
 - ✓ Provide box and one inch or larger conduit rough-ins to three other locations in the room
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

BREAK ROOM/KITCHENETTE/VENDING



FUNCTION

Enclosed room for use as a break area for training staff.

RELATIONSHIP TO OTHER AREAS

- Access from all Training Office areas

CRITICAL DIMENSIONS

- 9' -0" vertical clearance (minimum)

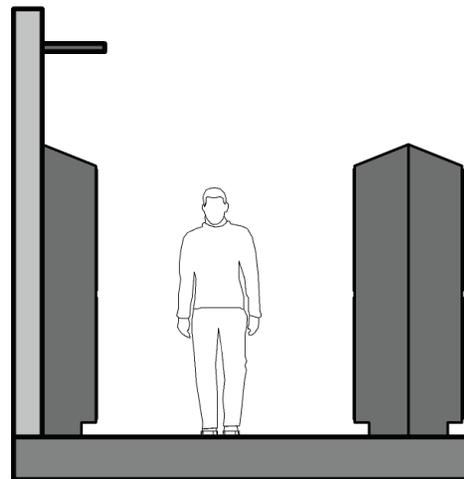
EQUIPMENT/FURNISHINGS

- Counter space, upper and lower cabinets, sink, microwaves, refrigerators, vending machines, water coolers, ice maker, water filter, coffee maker, tables, chairs, trash/recycling/compost bins

DESIGN FEATURES

- Architectural:
 - ✓ Furniture: Use owner furniture standards (if applicable)
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf 3'-0" doors (two minimum) with lockable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Daylighting: Exterior window desired
- Plumbing: Rough-in for fixtures
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Provide CO2 detection
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
 - ✓ Provide five GFCI outlets above kitchenette counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

OPERATOR LOCKERS



FUNCTION

Co-ed locker room with private changing areas and locker space for Operators to store personal gear and clothing.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room/Kitchenette/Vending
- Adjacent to Men's and Women's Restrooms

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

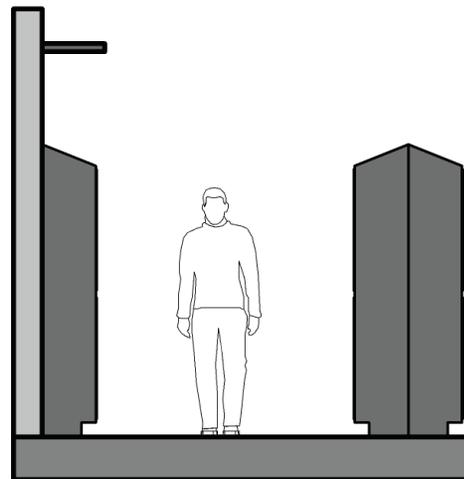
EQUIPMENT/FURNISHINGS

- Heavy duty, two tier, 3'-0", well-ventilated, slant top, half-height lockers; one each per Operator assigned to the facility

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or painted masonry (recommended)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

INSTRUCTOR LOCKER



FUNCTION

Co-ed locker room with private changing areas and locker space for Instructors to store personal gear and clothing.

RELATIONSHIP TO OTHER AREAS

- Adjacent to Break Room/Kitchenette/Vending
- Adjacent to Men's and Women's Restroom

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

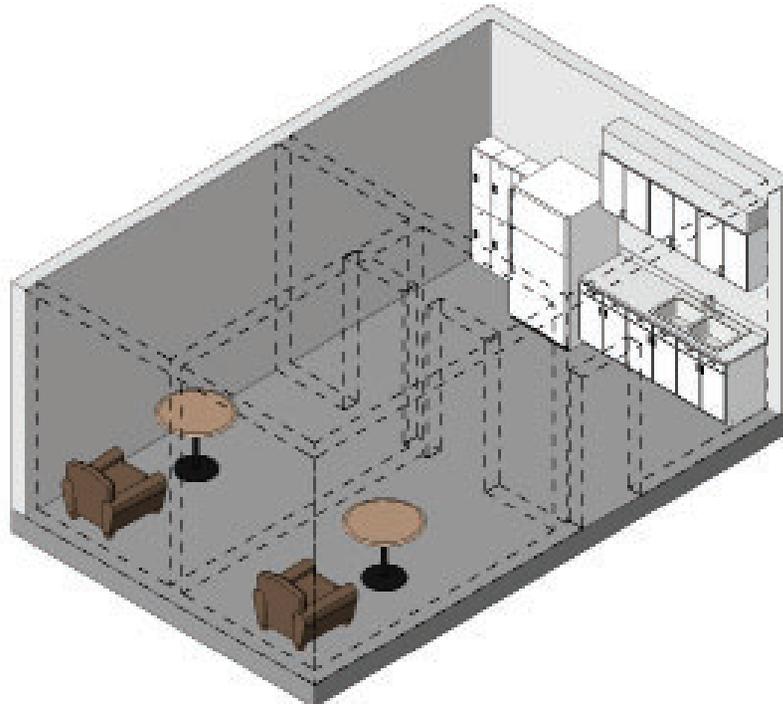
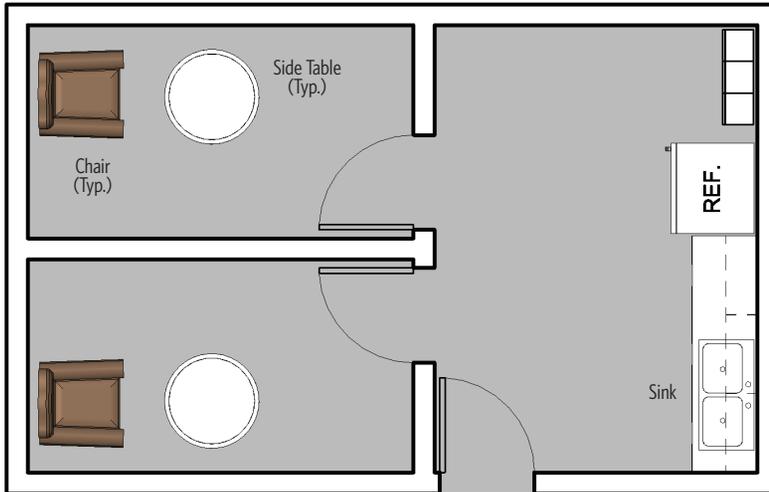
EQUIPMENT/FURNISHINGS

- Heavy duty, two tier, 3'-0", well-ventilated, slant top, half-height locker (one each per Instructor assigned to the facility)

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering or finished concrete (recommended)
 - ✓ Walls:
 - Tile covering or painted masonry (recommended)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile or painted exposed structure (recommended)
 - ✓ Doors: Single leaf 3'-0" door
- Mechanical:
 - ✓ Provide appropriate balanced cooling, heating, ventilation, and exhaust (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc average)
 - ✓ Provide general purpose duplex receptacles (six minimum)
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)

LACTATION ROOM



FUNCTION

Dedicated room for personal privacy and storage of first aid supplies and personal care items.

RELATIONSHIP TO OTHER AREAS

- Accessible from department office areas

CRITICAL DIMENSIONS

- 9'-0" vertical clearance (minimum)

EQUIPMENT/FURNISHINGS

- Sink with countertops and cabinets
- Secure storage for equipment and supplies
- Lockers
- Side tables
- Refrigerator
- Chairs

DESIGN FEATURES

- Architectural:
 - ✓ Flooring: Resilient floor covering with base or finished concrete (recommended)
 - ✓ Walls:
 - Gypsum board on metal studs (typical) with wall finishes or painted masonry (optional gypsum board furring)
 - Wall protection as needed
 - ✓ Ceiling: Acoustical ceiling tile (recommended)
 - ✓ Doors:
 - Single leaf lockable 3'-0" door with loadable lever set hardware (recommended)
 - Electronically secured entry (as required)
- Plumbing: rough-in for fixtures
- Mechanical:
 - ✓ Provide appropriate, balanced cooling, heating, and ventilation (per code)
 - ✓ Heating set point: 68 degrees Fahrenheit
 - ✓ Cooling set point: 74 degrees Fahrenheit
- Power:
 - ✓ LED Lighting in accordance with IES recommendation (20 fc indirect lighting average)
 - ✓ Provide general purpose duplex receptacles (three minimum)
 - ✓ Provide one GFCI outlet above counter
- Lighting:
 - ✓ Dimmable, indirect lighting with occupancy sensor
 - ✓ Task lighting (recommended)



APPENDIX A:
MAINTENANCE EQUIPMENT MANUAL



Introduction

Overview

The equipment listed in the Equipment List, Datasheets, and Cutsheets is the minimum expectation of the SFMTA. If SFMTA wishes to require a higher standard of equipment during the PDA phase, then that would be negotiated at that time. The purpose of this document is to reflect the preferences of the SFMTA and provide a high level of detail so that there may be clear expectations on the part of all parties for the type of equipment that is expected and the associated budget. This Appendix was commissioned by the SFMTA in fall of 2018, and it builds on the equipment narrative and strengths and weaknesses discussion in Section 4 of the Design Criteria Document. This Appendix includes:

- Introduction
- Equipment List- organized from low to high equipment ID number.
- Equipment Datasheets
- Equipment Cutsheets

These minimum requirements are based on existing equipment and potential equipment acquisitions. Maintenance equipment described in this Manual represents the needs of each functional area of the facility based on discussions with stakeholders.

Reference Appendix A.

Equipment List Definitions:

Discipline Coordination					Revision	Eqmnt	Description	Unit	Qty	Extended	Dimensions (inches)			Spec By	Furnish/	Projects Comments
Arch	Struc	Mech	Elec	Plum	Note	ID #		Price		Price	Length	Width	Height		Install	
							Fleet Maintenance									
							PM/Inspection Bays (2)									
						1880	Workbench, severe use, 8 feet	1400	2	2800	72	32	34	MDG	CF/CI	
						2832	Vise, swivel base, inches	760	2		4	9-1/4		MI	CF/CI	
						3540	Tank, parts cleaning, 15 gal		1			22	60	MI	CF/CI	
						7190	Drops, air/electric,	1	2			2-1/4		MI		

Category:	Description:
Discipline Coordination:	Identifies other design team disciplines requiring coordination to properly accommodate equipment items in the facility design. Refer to Datasheets for detailed coordination issues.
Equipment Identifier:	All identical equipment items are assigned the same number. The Equipment Identifier coordinates this list with equipment layout drawings, datasheets, and, cutsheets. New equipment items are indicated by a 4-digit Equipment Identifier and owner supplied items are indicated by a 5-digit Equipment Identifier number.
Item Description:	Description for equipment.
Quantity:	The number of equipment items located within the functional area is listed.
Price:	All pricing is list from the manufacturer.
Dimensions:	Overall equipment length, width, and height respectively, listed in inches unless otherwise noted.
Furnish/Install:	Recommends responsibility to furnish and install equipment.
CF/CI	Contractor to furnish and install, usually by bid package specifications for General Contractor installation.
OF/OI	Owner to furnish and install, usually smaller office and shop equipment normally purchased by owner. This also includes any items owner will provide.
Project Comments:	Includes special requirements and other relevant data to be considered during detailed design for the project.

Equipment Datasheets

The purpose of this document is to identify the various coordination issues and disciplines associated with the types of equipment recommended for facility operations. The Equipment Datasheets are for discipline coordination purposes only. Coordination issues are grouped per Equipment Datasheet according to the following disciplines:

- Architectural
- Structural
- Mechanical
- Electrical
- Plumbing

The equipment design in this document is minimum requirements, with final equipment selection to be made during the PDA phase.

Equipment Cutsheets

The equipment Cutsheets aid in the identification of equipment and serves to assist the owner with establishing standards of quality items. The Cutsheets establish standards of quality, performance, feature, and construction.

General Information

- All equipment should be heavy duty industrial grade.
- All equipment should be “equal to or better than” the listed equipment.
- Quantities have been established based on initial floor plans. All quantities need to be verified by the final design team.
- At each phase of the design process, the team will need to review the Equipment Layout Drawings and Equipment List with the SFMTA to verify that they are acceptable.

Preliminary Equipment List

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					MAINTENANCE								
					60' Bus Repair Bay (10)								
			●		1128	Cabinet, computer, mobile	6	26	24	68	CF/CI		
					1860	Workbench, severe use, six foot	10	72	32	34	CF/CI		
					2835	Vise, five inch	10	9	18	10	CF/CI		
			●		3540	Tank, parts cleaning, 15 gallon	6	36	22	38-1/2	OF/OI	Leased	
●	●		●	●	5630	Lift, axle, three post, 105,000 pound, shallow design	8	25-3/8	14-1/4	32-7/8	CF/CI		
			●	●	5645	Lift, parallelogram, 75,000 pounds, 48 feet	1	576	112	63	CF/CI		
●	●		●	●	5692	Lift, axle, scissor, adjustable, 90,000 pound	1	---	66	---	CF/CI		
●			●	●	7541	Pump, diaphragm, used fluid evacuation (UC)	6	14-3/4	10-3/4	16	CF/CI		
●	●			●	7780	Reel bank	6	---	---	---	CF/CI	Compressed Air (CA), Differential fluid, Gear Oil 1 (GO1), Gear Oil 2 (GO2), Water (H2O), Compressor Oil (CO), Power Steering (PS), Future	
					60' Bus Preventative Maintenance (5)								
					Lower Level Work Area (LLWA)								
					1185	Cabinet, storage, shop	5	36	18	78	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Lower Level Work Area (LLWA) [Continued]								
					1688	Shelving unit, eight shelf	5	36	18	84	CF/CI		
					1860	Workbench, severe use, six foot	5	72	32	34	CF/CI		
					2835	Vise, five inch	5	9	18	10	CF/CI		
●	●	●	●	●	5558	Lift, man, mobile, LLWA	5	138	63	58	CF/CI	---	
●			●	●	7541	Pump, diaphragm, used fluid evacuation (UC)	2	14-3/4	10-3/4	16	CF/CI		
				●	7575	Hose and dispenser (GO)	5	2	2	10	CF/CI		
●	●				7993	Drain pan, rolling (UC)	5	33	24	11	CF/CI		
					Ground Level								
			●		1128	Cabinet, computer, mobile	3	26	24	68	CF/CI		
					1860	Workbench, severe use, six foot	5	72	32	34	CF/CI		
					2835	Vise, five inch	5	9	18	10	CF/CI		
			●		3540	Tank, parts cleaning, 15 gallon	3	36	22	38-1/2	OF/OI	Leased	
●	●			●	7780	Reel bank	3	---	---	---	CF/CI	Compressed Air (CA), Differential fluid, Gear Oil 1 (GO1), Gear Oil 2 (GO2), Water (H2O), Compressor Oil (CO), Power Steering (PS), Future	
●	●				9315	Cover, safety, metal	96	38	40-1/2	2	CF/CI	24 per PM Bay	

EQUIPMENT LIST
3 LEVEL

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
					Upper Level Work Platform (ULWP)							
					1860	Workbench, severe use, six foot	2	72	32	34	CF/CI	
					2835	Vise, five inch	2	9	18	10	CF/CI	
●	●	●	●	●	5010	Crane, bridge, top running, 5 ton	2	0	0	0	CF/CI	Wireless controls, bridge crane should be over ULWP and AC Shop; second bridge crane should be over ULWP and Battery Shop. See drawing package for additional information.
					60' Bus Tire Bay (1)							
					1860	Workbench, severe use, six foot	1	72	32	34	CF/CI	
					2835	Vise, five inch	1	9	18	10	CF/CI	
●	●			●	7710	Reel bank	2	---	---	---	CF/CI	CA
					60' Bus Minor Body Repair (1)							
			●		1128	Cabinet, computer, mobile	1	26	24	68	CF/CI	
					1860	Workbench, severe use, six foot	1	72	32	34	CF/CI	
					2835	Vise, five inch	1	9	18	10	CF/CI	

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					60' Bus Minor Body Repair (1) [Continued]								
●	●		●	●	5630	Lift, axle, three post, 105,000 pound, shallow design	1	25-3/8	14-1/4	32-7/8	CF/CI		
●	●			●	7710	Reel bank	2	---	---	---	CF/CI	CA	
					Minor Body Shop								
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
	●				1456	Rack, bulk storage, six foot	2	72	24	96	CF/CI		
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI		
					1860	Workbench, severe use, six foot	1	72	32	34	CF/CI		
					2835	Vise, five inch	1	9	18	10	CF/CI		
					60' Bus Chassis Wash (1)								
			●	●	5645	Lift, parallelogram, 75,000 pounds, 48 feet	1	576	112	63	CF/CI		
					Wash Equipment Room								
●	●	●	●	●	3718	Washer, high pressure, hot water, NG, 4 GPM	2	47-1/2	21	51	CF/CI	Includes soap drum	

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
					Common Work Area (CWA) (2)							
					1185	Cabinet, storage, shop	4	36	18	78	CF/CI	
					1445	Storage unit, 48 bin	4	36	18	84	CF/CI	
					1860	Workbench, severe use, six foot	2	72	32	34	CF/CI	
	●				1950	Cabinet, flammable materials, large	4	43	18	65	CF/CI	
					2102	Press, hydraulic, 20 ton	2	31	30	74	CF/CI	
	●		●		2610	Drill press, variable speed, 20 inch	2	22	36	69	CF/CI	
			●		2689	Saw, band, horizontal, large	2	72	60	37	CF/CI	
			●		2698	Saw, cutoff, abrasive, 14 inch	2	11	19-3/4	23-5/8	CF/CI	
					2835	Vise, five inch	2	9	18	10	CF/CI	
			●		2880	Buffer/grinder, eight inch, with dust collector	2	24-3/4	41	41-3/4	CF/CI	
			●	●	3085	Cabinet, abrasive blast, with dust collector	2	38	25	64	CF/CI	
●	●	●	●	●	3555	Washer, parts, automatic, front load	2	50	62	69	CF/CI	

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
						Portable Equipment Storage (PES) (2)						
			●		2440	Scrubber, floor, walk behind, 28 inch path, battery operated	2	37-1/2	64	43	CF/CI	
			●		2740	Welder, MIG, with cart	2	18	36	35	CF/CI	
			●		2750	Welder, multiprocess	2	38	23	30	CF/CI	
			●		2760	Welder, TIG	2	18-1/2	43	31-1/2	CF/CI	
					2770	Screen, welding	2	144	18	77-1/2	CF/CI	
			●	●	3275	Extractor, fume, welding, portable, 1,200 CFM	2	24	49-1/4	31-1/4	CF/CI	1 for alum, 1 for metal
				●	7995	Receiver, 25 gallon, portable (UC)	2	24	24	45	CF/CI	---
				●	7996	Receiver, 25 gallon, portable (UO)	2	24	24	45	CF/CI	
						Tool Box Storage						
						Tool boxes provided by the SFMTA or Mechanics/Technicians						

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Tool Storage								
●					1098	Board, peg, tool	4	72	1/2	36	CF/CI		
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI		
					Cleaning Equipment Storage (Ground Level)								
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
					1204	Cart, cleaning	4	21-3/4	46	38-3/8	CF/CI		
	●				1456	Rack, bulk storage, six foot	4	72	24	96	CF/CI	Quantities check with drawings	
					1688	Shelving unit, eight shelf	4	36	18	84	CF/CI		
	●				1950	Cabinet, flammable materials, large	2	43	18	65	CF/CI		
					1966	Pallet, containment, hazardous materials, four drum	2	49	49	10-1/4	CF/CI		
					AC Shop/Storage								
					10001	Rack, AC	2	---	---	---	OF/OI	SFMTA will custom build	
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					AC Shop/Storage]Continued]								
					1860	Workbench, severe use, six foot	2	72	32	34	CF/CI		
		●			1950	Cabinet, flammable materials, large	2	43	18	65	CF/CI		
					2835	Vise, five inch	2	9	18	10	CF/CI		
					Battery Rebuild Shop								
					10002	Rack, battery	1				OF/OI	SFMTA will custom build	
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
					1860	Workbench, severe use, six foot	1	72	32	34	CF/CI		
		●			1950	Cabinet, flammable materials, large	2	43	18	65	CF/CI		
					2835	Vise, five inch	1	9	18	10	CF/CI		
					Tire Shop/Storage								
●	●		●	●	1632	Carousel, storage, tire, 44 inch	2	179	112	---	CF/CI		
●	●				1636	Rack, tire, heavy duty, one tier	1	60	26	47-1/2	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Tire Shop/Storage [Continued]								
					1860	Workbench, severe use, six foot	1	72	32	34	CF/CI		
			●	●	2353	Changer, heavy duty, 44 inch max tire	1	78	48	36	CF/CI		
	●		●	●	2363	Balancer, tire, heavy duty	1	93	62	84	CF/CI		
	●		●	●	2365	Cage, inflation, tire	1	28	36	60	CF/CI		
				●	2368	Spreader, tire	1	25	35	17	CF/CI		
					2835	Vise, five inch	1	9	18	10	CF/CI		
●	●			●	7710	Reel bank	1	---	---	---	CF/CI	CA	
					Lube/Compressor Room								
				●	7520	Pump, air piston, 10:1 ratio	6	8 dia.	---	28-1/2	CF/CI		
●				●	7531	Pump, diaphragm, non-mixing (EC)	1	14-3/4	10-1/4	16	CF/CI		
	●				7907	Tank, double wall, polyethylene, 275 gallon	1	47 dia.	---	58-1/2	CF/CI	H2O	
	●	●	●	●	7970	Tank, double wall, cube, 500 gallon	7	61	46	61	CF/CI	coolant, power steering, GO1, GO2, future, UC, diff.	
●	●	●	●	●	8276	Compressor, air, screw, rotary, 40 HP, with integral dryer	2	69-5/8	35-3/8	60-1/4	CF/CI		
●	●			●	8637	Receiver, vertical mounted, 400 gallon	1	36 dia.	---	101	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Electronic Bench Shop								
					10003	Equipment, test, electronic	1				OF/OI	19'x5'	
		●			1110	Cabinet, 10 drawer, modular	4	30	27-3/4	59	CF/CI		
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
					1745	Stool, electronic station, anti-static	6	18	18	34-1/4	CF/CI		
			●		1805	Workstation, electronics, static dissipative, five foot, with shelf	6	60	30	33-1/2	CF/CI		
					FARE BOX AND CLIPPER CARD READER REPAIR SHOP (Not included in Equipment Layout Drawings)								
					Incoming and Outgoing Device Storage								
		●			1456	Rack, bulk storage, six foot	4	72	24	96	CF/CI		
					1688	Shelving unit, eight shelf	4	36	18	84	CF/CI		
					Shop								
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI		
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI		
					1860	Workbench, severe use, six foot	2	72	32	34	CF/CI		
		●		●	2610	Drill press, variable speed, 20 inch	2	22	36	69	CF/CI		
					2835	Vise, five inch	2	9	18	10	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
						Storage						
					1185	Cabinet, storage, shop	5	36	18	78	CF/CI	
					1688	Shelving unit, eight shelf	5	36	18	84	CF/CI	
						Parts Storage						
		●			1456	Rack, bulk storage, six foot	8	72	24	96	CF/CI	
					1688	Shelving unit, eight shelf	8	36	18	84	CF/CI	
						SERVICE AND CLEAN						
						Service Position (Level 2)						
●	●			●	3300	Tank, mop, with wringer	2	40	25	42	CF/CI	
●	●		●		3610	Vacuum, canister, stainless steel	4	20-1/8	26	52	CF/CI	2 at each position
	●		●		3611	Vacuum, backpack, 10 quart HEPA	5	9	10	26	CF/CI	
●	●			●	7710	Reel bank	3	---	---	---	CF/CI	CA

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Service Position (Level 3)								
●	●			●	3300	Tank, mop, with wringer	2	40	25	42	CF/CI		
●	●		●		3610	Vacuum, canister, stainless steel	4	20-1/8	26	52	CF/CI	2 at each position	
	●		●		3611	Vacuum, backpack, 10 quart HEPA	5	9	10	26	CF/CI		
●	●			●	7710	Reel bank	3	---	---	---	CF/CI	CA	
					Bus Washer (1) (Level 2)								
●	●	●	●	●	3834	Washer, bus, drive through, four brush	1	1020	192	170	CF/CI		
					Bus Washer (2) (Level 3)								
●	●	●	●	●	3834	Washer, bus, drive through, four brush	1	1020	192	170	CF/CI		
					Wash Equipment Room (1) (Level 2)								
●	●	●	●	●	3718	Washer, high pressure, hot water, NG, 4 GPM	2	47-1/2	21	51	CF/CI	1 for each service position/ 2 wand, scabbard, controls per position	

Discipline Coordination					Eqpmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
					Wash Equipment Room (2) (Level 3)							
●	●	●	●	●	3718	Washer, high pressure, hot water, NG, 4 GPM	2	47-1/2	21	51	CF/CI	1 for each service position/ 2 wand, scabbard, controls per position
					Cleaning Equipment Storage (on Bus Garage Level 2)							
					1185	Cabinet, storage, shop	4	36	18	78	CF/CI	
					1204	Cart, cleaning	8	21-3/4	46	38-3/8	CF/CI	
	●				1456	Rack, bulk storage, six foot	10	72	24	96	CF/CI	
					1688	Shelving unit, eight shelf	4	36	18	84	CF/CI	
	●				1950	Cabinet, flammable materials, large	4	43	18	65	CF/CI	
					1966	Pallet, containment, hazardous materials, four drum	4	49	49	10-1/4	CF/CI	
					Cleaning Equipment Storage (on Bus Garage Level 3)							
					1185	Cabinet, storage, shop	4	36	18	78	CF/CI	
					1204	Cart, cleaning	8	21-3/4	46	38-3/8	CF/CI	
	●				1456	Rack, bulk storage, six foot	10	72	24	96	CF/CI	

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments	
Arch	Struc	Mech	Elec	Plum				Length	Width	Height			
					Cleaning Equipment Storage (on Bus Garage Level 3) [Continued]								
					1688	Shelving unit, eight shelf	4	36	18	84	CF/CI		
		●			1950	Cabinet, flammable materials, large	4	43	18	65	CF/CI		
					1966	Pallet, containment, hazardous materials, four drum	4	49	49	10-1/4	CF/CI		
					PARTS								
					Parts Storage								
●					1098	Board, peg, tool	4	72	1/2	36	CF/CI		
●	●				1106	Cabinet, six drawer, modular, underbench	10	30	27-3/4	33-1/2	CF/CI		
●	●	●	●		1500	Storage system, 2,000 pound capacity, with rack mounted crane	1	203	436	184	CF/CI		
	●				1536	Rack, pallet, ten foot, two tier	2	126	36	120	CF/CI		
					1688	Shelving unit, eight shelf	42	36	18	84	CF/CI	4'-6" aisles	
●	●	●	●	●	1730	Storage system, automated, vertical tray	2	---	---	---	CF/CI		
					1753	Table, layout, stainless steel top, eight foot	3	96	36	34	CF/CI		
			●		5404	Forklift, electric, 4,000 pound, stand up	1	93	40-1/4	95	CF/CI		
					5420	Forklift, 10,000 pound, LPG	1	175	69	90-1/2	CF/CI		

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
					Battery Storage							
	●				1536	Rack, pallet, ten foot, two tier	2	126	36	120	CF/CI	
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI	
					SHARED							
					Building Storage							
					1185	Cabinet, storage, shop	2	36	18	78	CF/CI	
	●				1456	Rack, bulk storage, six foot	2	72	24	96	CF/CI	
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI	
	●				1950	Cabinet, flammable materials, large	2	43	18	65	CF/CI	
					Meet and Greet							
●	●	●	●	●	5558	Lift, man, mobile, LLWA	1	138	63	58	CF/CI	---

Discipline Coordination					Eqmnt ID#	Description	Qty	Dimensions (inches)			Furnish/ Install	Project Comments
Arch	Struc	Mech	Elec	Plum				Length	Width	Height		
					Revenue Office							
					1215							
					1688	Shelving unit, eight shelf	2	36	18	84	CF/CI	
			●		1805	Workstation, electronics, static dissipative, five foot, with shelf	1	60	30	33-1/2	CF/CI	
●					9900	Vault, collection, revenue	2	32	36	66	CF/CI	
●	●		●		9910	Probe, farebox, with software system	2	---	---	---	CF/CI	

Equipment Datasheets/Cutsheets

1098 Equipment Datasheet

Manufacturer:		Kennedy Manufacturing Company				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		50004UGY				Equipment		72		1/2		36		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	36	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Wall mounted 36 inches above finish floor typically.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Board, peg, tool										1098				

1098 Equipment Cutsheet

Equipment Description:

Board, peg, tool

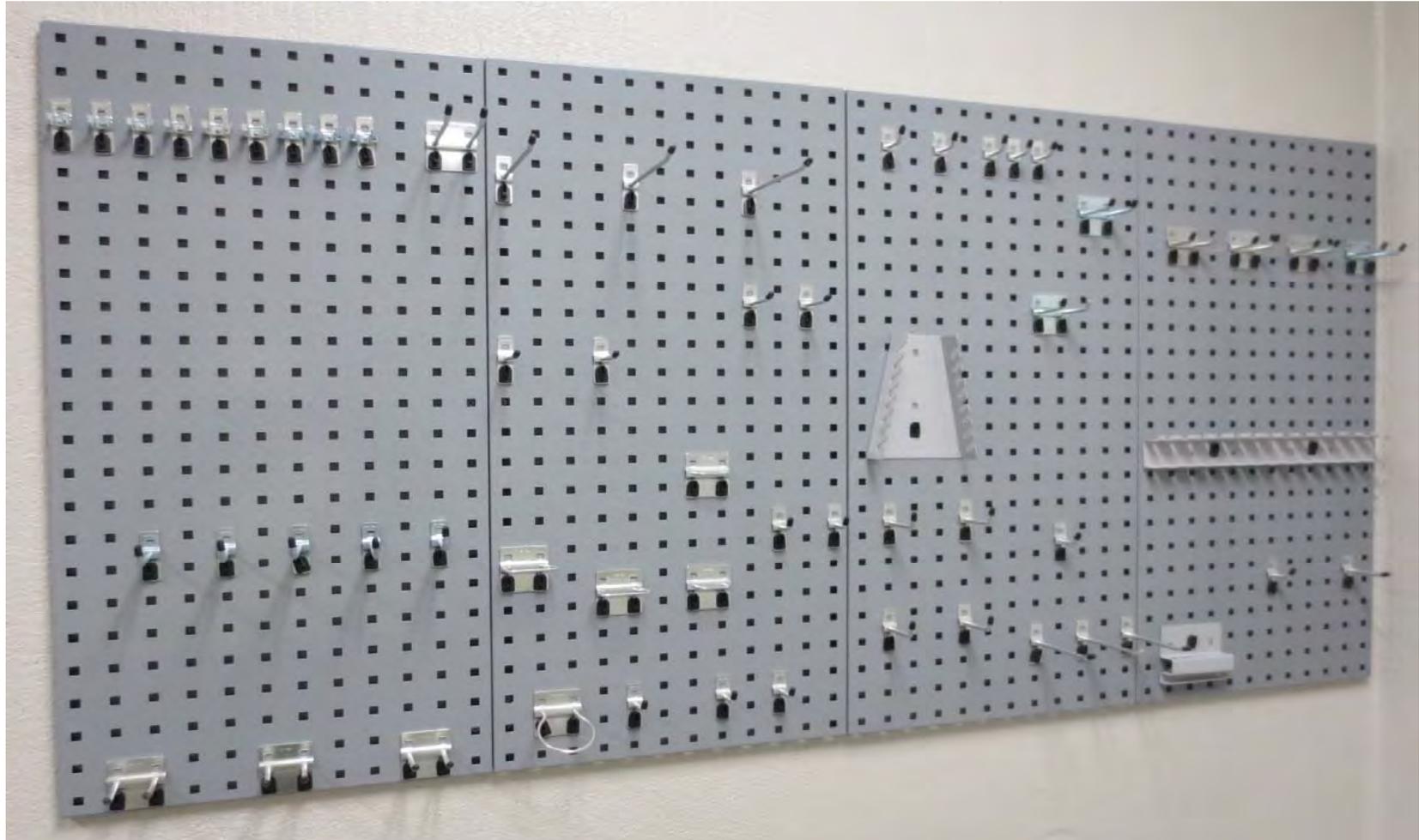
EQ ID Number:

1098

Manufacturer:

Kennedy Manufacturing Company

Model No.: 50004UGY



1106 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		4433				Equipment		30		27-3/4		33-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	42	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Unit to be installed below workbench or architectural millwork; Coordinate with equipment to determine millwork location and height AFF.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Unit to be anchored to the floor.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		----				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Cabinet, six drawer, modular, underbench										1106				

1106 Equipment Cutsheet

Equipment Description:

Cabinet, six drawer, modular, underbench

EQ ID Number:

1106

Manufacturer: Equipto

Model No.: 4433



1110 Equipment Datasheet

Manufacturer:		Equipto					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		4424					Equipment		30		27-3/4		59		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	12	
									Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		Unit weight: 462 pounds; full weight: 4,462 pounds					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements		---	---	---		
									Voltage		---	---	---		
									Phase		---	---	---		
									Horsepower (HP)		---	---	---		
									Amps		---	---	---		
							Connection Type		---						
Plumbing		---					Domestic Water		Connection (inches)		---				
									Flow Rate (GPM)		---				
									Capacity (PSI)		---				
							Natural Gas		Connection (inches)		---				
									Capacity (BTU)		---				
							Drain		Floor Drain (Y/N)		N				
							Compressed Air		Connection (inches)		---				
									Volume (CFM)		---				
									Capacity (PSI)		---				
Equipment Description:										EQ ID Number:					
Cabinet, 10 drawer, modular										1110					

1110 Equipment Cutsheet

Equipment Description: Cabinet, 10 drawer, modular	EQ ID Number: 1110
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Manufacturer: Equipto	Model No.: 4424
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1128 Equipment Datasheet

Manufacturer:		Strong Hold				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		26-CC-LCD-240-1SOSRK with casters				Equipment		26		24		68		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	6	Front	36	Above	---
								Right	6	Back	6	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Unit is mobile; provide standard grounded receptacles and data receptacles throughout usable area(s).				Connection Size		Requirements		Unit	Fan	---		
								Voltage		120	120	---		
								Phase		1	1	---		
								Horsepower (HP)		---	---	---		
								Amps		15	15	---		
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Cabinet, computer, mobile										1128				

1128 Equipment Cutsheet

Equipment Description: Cabinet, computer, mobile	EQ ID Number: 1128
Manufacturer: Strong Hold	Model No.: 26-CC-LCD-240-1SOSRK with casters



1185 Equipment Datasheet

Manufacturer:		Equipto					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		1710					Equipment		36		18		78	
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	36	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Mechanical		---					Venting		Connection (inches)		---			
									Volume (CFM)		---			
Electrical		---					Connection Size		Requirements		---	---	---	
									Voltage		---	---	---	
									Phase		---	---	---	
									Horsepower (HP)		---	---	---	
									Amps		---	---	---	
							Connection Type		---					
Plumbing		---					Domestic Water		Connection (inches)		---			
									Flow Rate (GPM)		---			
									Capacity (PSI)		---			
							Natural Gas		Connection (inches)		---			
									Capacity (BTU)		---			
							Drain		Floor Drain (Y/N)		N			
							Compressed Air		Connection (inches)		---			
									Volume (CFM)		---			
									Capacity (PSI)		---			
Equipment Description:										EQ ID Number:				
Cabinet, storage, shop										1185				

1185 Equipment Cutsheet

Equipment Description:

Cabinet, storage, shop

EQ ID Number:

1185

Manufacturer: Ekipto

Model No.: 1710



1204 Equipment Datasheet

Manufacturer:		Rubbermaid Commercial Products				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		6173-88 with accessories				Equipment		21-3/4		46		38-3/8		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Cart, cleaning										1204				

1204 Equipment Cutsheet

Equipment Description:

Cart, cleaning

EQ ID Number:

1204

Manufacturer: Rubbermaid Commercial Products

Model No.: 6173-88 with accessories



1445 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		673-9S starter and 673-9A add-on with accessories				Equipment		36		18		84		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	24
								Right	---	Back	2	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Empty weight: 381 pounds; full weight: 1,081 pounds.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Storage unit, 48 bin										1445				

1445 Equipment Cutsheet

Equipment Description:

Storage unit, 48 bin

EQ ID Number:

1445

Manufacturer: **Equipto**

Model No.: **673-9S starter and 673-9A add-on with accessories**



Starter

Add-On

1456 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		1028D62S starter and 1028D62A add-on with accessories				Equipment		72		24		96		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	72	Above	48
								Right	---	Back	6	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Unit to be anchored to the floor.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Rack, bulk storage, six foot										1456				

1456 Equipment Cutsheet

Equipment Description:

Rack, bulk storage, six foot

EQ ID Number:

1456

Manufacturer: **Equipto**

Model No.: **1028D62S starter and 1028D62A add-on with accessories**



1500 Equipment Datasheet

Manufacturer:		Stanley Vidmar					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		2k Stak System					Equipment		203		436		184		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	6	Front	96	Above	36	
									Right	6	Back	6	Below	---	
DISCIPLINE COORDINATION:															
Architectural		Coordinate OSHA clearances, overhead door clearances, duct and piping routing with mechanical/plumbing and design with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		Coordinate the design of slab with manufacturer to accommodate the weight of system and its loaded pallets. Reference design details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		Coordinate duct routing and HVAC equipment with equipment to avoid conflicts with bridge crane travel.					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements		Unit		---		---
									Voltage		460		---		---
									Phase		3		---		---
									Horsepower (HP)		1		---		---
									Amps		30		---		---
							Connection Type		Provide disconnect						
Plumbing		Coordinate pipe routing with equipment to avoid conflicts with bridge crane travel.					Domestic Water		Connection (inches)			---			
									Flow Rate (GPM)			---			
									Capacity (PSI)			---			
							Natural Gas		Connection (inches)			---			
									Capacity (BTU)			---			
							Drain		Floor Drain or Floor Sink (Y/N)			N			
							Compressed Air		Connection (inches)			---			
									Volume (CFM)			---			
									Capacity (PSI)			---			
Equipment Description:										EQ ID Number:					
Storage system, 2,000 pound capacity, with rack mounted crane										1500					

1500 Equipment Cutsheet

Equipment Description:

Storage system, 2,000 pound capacity, with rack mounted crane

EQ ID Number:

1500

Manufacturer: Stanley Vidmar

Model No.: 2k Stak System



1536 Equipment Datasheet

Manufacturer:		Lyon Workspace Products				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Uprights 36M120, Beams S120, Decking WD5836H with accessories				Equipment		126		36		120		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	144	Above	60
									Right	---	Back	6	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Coordinate anchor bolt requirements with local codes.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Rack, pallet, ten foot, two tier										1536				

1536 Equipment Cutsheet

Equipment Description:

Rack, pallet, ten foot, two tier

EQ ID Number:

1536

Manufacturer: Lyon Workspace Products

Model No.: Uprights 36M120, Beams S120, Decking
WD5836H with accessories



1632 Equipment Datasheet

Manufacturer:		Vidir Vertical Storage Systems				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		HT54162-0563-12 OR HT54193-0663-12 OR HT54225-0763-12 OR HT54256-0863-12 OR HT54288-0963-12 OR HT54319-1063-12				Equipment		179		112		---		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	6	Front	72	Above	6
									Right	24	Back	6	Below	0
DISCIPLINE COORDINATION:														
Architectural		Coordinate with building clear heights.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Coordinate with building clear heights. Approximate unit weight: 4,500 pounds. Unit to be anchored to the floor.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		460	---	---		
								Phase		3	---	---		
								Horsepower (HP)		4	---	---		
								Amps		15	---	---		
						Connection Type		Provide disconnect						
Plumbing		Verify fire protection requirements with local authority having jurisdiction.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Carousel, storage, tire, 44 inch										1632				

1632 Equipment Cutsheet

Equipment Description:

Carousel, storage, tire, 44 inch

EQ ID Number:

1632

Manufacturer: Vidir Vertical Storage Systems

Model No.: HT54162-0563-12 OR HT54193-0663-12 OR
HT54225-0763-12 OR HT54256-0863-12 OR



1636 Equipment Datasheet

Manufacturer:		Jarke Manufacturing				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		TW-3943				Equipment		60		26		47-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	12
								Right	---	Back	12	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Rack, tire, heavy duty, one tier										1636				

1636 Equipment Cutsheet

Equipment Description: Rack, tire, heavy duty, one tier	EQ ID Number: 1636
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Manufacturer: Jarke Manufacturing	Model No.: TW-3943
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1688 Equipment Datasheet

Manufacturer:		Equipto					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		773-8S starter with 773-8A add on with accessories					Equipment		36		18		84	
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	12
									Right	---	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Mechanical		---					Venting		Connection (inches)			---		
									Volume (CFM)			---		
Electrical		---					Connection Size		Requirements			---	---	---
									Voltage			---	---	---
									Phase			---	---	---
									Horsepower (HP)			---	---	---
									Amps			---	---	---
							Connection Type		---					
Plumbing		---					Domestic Water		Connection (inches)			---		
									Flow Rate (GPM)			---		
									Capacity (PSI)			---		
							Natural Gas		Connection (inches)			---		
									Capacity (BTU)			---		
							Drain		Floor Drain (Y/N)			N		
							Compressed Air		Connection (inches)			---		
									Volume (CFM)			---		
									Capacity (PSI)			---		
Equipment Description:										EQ ID Number:				
Shelving unit, eight shelf										1688				

1688 Equipment Cutsheet

Equipment Description:

Shelving unit, eight shelf

EQ ID Number:

1688

Manufacturer:

Equipto

Model No.: 773-8S starter with 773-8A add on with accessories



Add-on



Starter

1730 Equipment Datasheet

Manufacturer:		Kardex Remstar					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		XP HD 500					Equipment		---		---		---	
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	---	Front	60	Above	24
								Right	48	Back	---	Below	---	---
DISCIPLINE COORDINATION:														
Architectural		Coordinate OSHA clearances, ducting clearances, piping clearances, and design with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Structural		Provide foundation design per Design Details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Mechanical		Coordinate ducting and HVAC equipment with equipment and architectural to avoid conflicts with unit.					Venting		Connection (inches)			---		
									Volume (CFM)			---		
Electrical		Provide disconnect near unit; Provide data connection adjacent to unit; Provide additional lighting near unit for parts retrieval.					Connection Size		Requirements		Unit	---	---	---
									Voltage		460	---	---	---
									Phase		3	---	---	---
									Horsepower (HP)		---	---	---	---
									Amps		14.2	---	---	---
							Connection Type		Provide disconnect					
Plumbing		Coordinate piping with architectural to avoid conflicts with unit.					Domestic Water		Connection (inches)		---			
									Flow Rate (GPM)		---			
									Capacity (PSI)		---			
							Natural Gas		Connection (inches)		---			
									Capacity (BTU)		---			
							Drain		Floor Sink (Y/N)		N			
							Compressed Air		Connection (inches)		---			
									Volume (CFM)		---			
									Capacity (PSI)		---			
Equipment Description:										EQ ID Number:				
Storage system, automated, vertical tray										1730				

1730 Equipment Cutsheet

Equipment Description:

Storage system, automated, vertical tray

EQ ID Number:

1730

Manufacturer: **Kardex Remstar**

Model No.: **XP HD 500**



1753 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)								
Model No.:		2333D8 with 441D8SS stainless steel				Equipment		96		36		34								
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	36	36	Front	Back	36	36	Above	Below	36	---
DISCIPLINE COORDINATION:																				
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N								
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N								
Mechanical		---				Venting		Connection (inches)				---								
Mechanical		---				Venting		Volume (CFM)				---								
Electrical		---				Connection Size		Requirements				---		---		---				
Electrical		---				Connection Size		Voltage				---		---		---				
Electrical		---				Connection Size		Phase				---		---		---				
Electrical		---				Connection Size		Horsepower (HP)				---		---		---				
Electrical		---				Connection Size		Amps				---		---		---				
Electrical		---				Connection Type		---												
Plumbing		---				Domestic Water		Connection (inches)				---								
Plumbing		---				Domestic Water		Flow Rate (GPM)				---								
Plumbing		---				Domestic Water		Capacity (PSI)				---								
Plumbing		---				Natural Gas		Connection (inches)				---								
Plumbing		---				Natural Gas		Capacity (BTU)				---								
Plumbing		---				Drain		Floor Drain (Y/N)				N								
Plumbing		---				Compressed Air		Connection (inches)				---								
Plumbing		---				Compressed Air		Volume (CFM)				---								
Plumbing		---				Compressed Air		Capacity (PSI)				---								
Equipment Description:														EQ ID Number:						
Table, layout, stainless steel top, eight foot														1753						

1753 Equipment Cutsheet

Equipment Description:

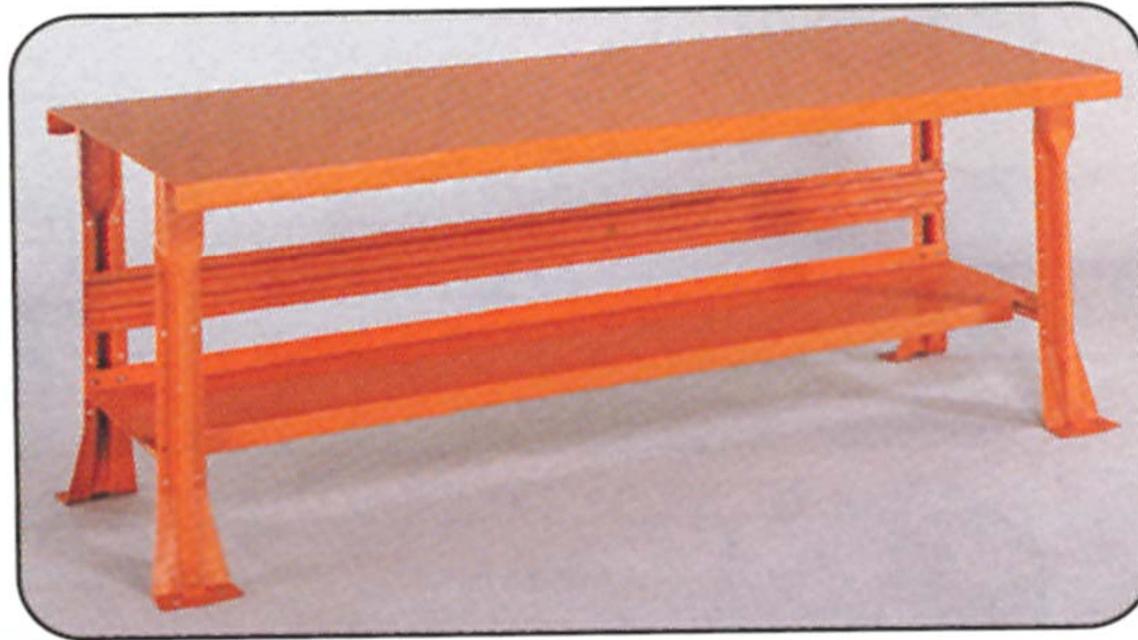
Table, layout, stainless steel top, eight foot

EQ ID Number:

1753

Manufacturer: Equipto

Model No.: 2333D8 with 441D8SS stainless steel



1805 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		388-5C with accessories				Equipment		60		30		33-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	36	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Power Strip	Instrumental Shelf	---		
								Voltage		120	120	---		
								Phase		1	1	---		
								Horsepower (HP)		---	---	---		
								Amps		15	15	---		
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain or Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Workstation, electronics, static dissipative, five foot, with shelf										1805				

1805 Equipment Cutsheet

Equipment Description:

Workstation, electronics, static dissipative, five foot, with shelf

EQ ID Number:

1805

Manufacturer: Equipto

Model No.: 388-5C with accessories



1860 Equipment Datasheet

Manufacturer:		Fabricated				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		---				Equipment		72		32		34		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	36
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:														
Workbench, severe use, six foot										EQ ID Number:				
										1860				

1860 Equipment Cutsheet

Equipment Description:

Workbench, severe use, six foot

EQ ID Number:

1860

Manufacturer:

Fabricated

Model No.: ---



1950 Equipment Datasheet

Manufacturer:		Equipto				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		FSC45S				Equipment		43		18		65		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	---
									Right	---	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Unit to be anchored to the floor.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain or Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Cabinet, flammable materials, large										1950				

1950 Equipment Cutsheet

Equipment Description: Cabinet, flammable materials, large	EQ ID Number: 1950
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Manufacturer: Equipto	Model No.: FSC45S
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1966 Equipment Datasheet

Manufacturer:		Justrite Manufacturing				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		28635				Equipment		49		49		10-1/4		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	81	Above	96
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Pallet, containment, hazardous materials, four drum										1966				

1966 Equipment Cutsheet

Equipment Description:

Pallet, containment, hazardous materials, four drum

EQ ID Number:

1966

Manufacturer: **Justrite Manufacturing**

Model No.: 28635



2102 Equipment Datasheet

Manufacturer:		Nugierfroom Corporation					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		H20-6-3F					Equipment		31		30		74	
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	12	Front	36	Above	24
									Right	24	Back	12	Below	---
DISCIPLINE COORDINATION:														
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Mechanical		---					Venting		Connection (inches)		---			
									Volume (CFM)		---			
Electrical		---					Connection Size		Requirements		---		---	
									Voltage		---		---	
									Phase		---		---	
									Horsepower (HP)		---		---	
									Amps		---		---	
							Connection Type		---					
Plumbing		---					Domestic Water		Connection (inches)		---			
									Flow Rate (GPM)		---			
									Capacity (PSI)		---			
							Natural Gas		Connection (inches)		---			
									Capacity (BTU)		---			
							Drain		Floor Drain (Y/N)		N			
							Compressed Air		Connection (inches)		---			
									Volume (CFM)		---			
									Capacity (PSI)		---			
Equipment Description:										EQ ID Number:				
Press, hydraulic, 20 ton										2102				

2102 Equipment Cutsheet

Equipment Description:

Press, hydraulic, 20 ton

EQ ID Number:

2102

Manufacturer: Nugierfroom Corporation

Model No.: H20-6-3F



2353 Equipment Datasheet

Manufacturer:		Hennessy Industries, Inc.				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		HIT-6000				Equipment		78		48		36			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	60	Above	24	
									Right	36	Back	24	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		Unit		---		---	
								Voltage		208		---		---	
								Phase		3		---		---	
								Horsepower (HP)		3		---		---	
								Amps		25		---		---	
						Connection Type		Provide disconnect							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		1/4					
								Volume (CFM)		5					
								Capacity (PSI)		110 to 175					
Equipment Description:										EQ ID Number:					
Changer, heavy duty, 44 inch max tire										2353					

2353 Equipment Cutsheet

Equipment Description:

Changer, heavy duty, 44 inch max tire

EQ ID Number:

2353

Manufacturer:

Hennessy Industries, Inc.

Model No.: HIT-6000



2363 Equipment Datasheet

Manufacturer:		Hennessy Industries				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		6450-2D				Equipment		93		62		84		
						Hydraulic Tire Lift		48		34		42		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	60	Above	24
									Right	24	Back	12	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Unit will be anchored to the slab. Approximate weight: 1,500 pounds; Capacity: 500 pounds				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Special purpose outlet = L620 plug for single phase or L1520 plug for three phase				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		220	---	---	---	---
								Phase		1	---	---	---	---
								Horsepower (HP)		1-1/2	---	---	---	---
								Amps		20	---	---	---	---
						Connection Type		Provide special purpose outlet						
Plumbing		Compressed air connection only required when optional accessory of hydraulic lift (Hennessy Model No. 575) is used.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		1/4 NPT				
								Volume (CFM)		3				
								Capacity (PSI)		120 to 150				
Equipment Description:										EQ ID Number:				
Balancer, tire, heavy duty										2363				

2363 Equipment Cutsheet

Equipment Description:

Balancer, tire, heavy duty

EQ ID Number:

2363

Manufacturer: Hennessy Industries

Model No.: 6450-2D



2365 Equipment Datasheet

Manufacturer:		Branick Industries, Inc.				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		2250				Equipment		28		36		60			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	60	Above	36	
									Right	36	Back	12	Below	0	
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		Unit weight 200 pounds				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		Automatic Inflation Kit		---		---	
								Voltage		120		---		---	
								Phase		1		---		---	
								Horsepower (HP)		---		---		---	
								Amps		20		---		---	
						Connection Type		Provide standard grounded receptacle							
Plumbing		Provide 3/4 inch combination filter-regulator.				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		1/4					
								Volume (CFM)		6					
								Capacity (PSI)		120					
Equipment Description:										EQ ID Number:					
Cage, inflation, tire										2365					

2365 Equipment Cutsheet

Equipment Description:

Cage, inflation, tire

EQ ID Number:

2365

Manufacturer: **Branick Industries, Inc.**

Model No.: 2250



2368 Equipment Datasheet

Manufacturer:		Branick Industries				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		S-FLL				Equipment		25		35		17			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	12	Front	60	Above	60	
									Right	12	Back	12	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		---		---		---	
								Voltage		---		---		---	
								Phase		---		---		---	
								Horsepower (HP)		---		---		---	
								Amps		---		---		---	
						Connection Type		---							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		3/8					
								Volume (CFM)		---					
								Capacity (PSI)		80-120					
Equipment Description:										EQ ID Number:					
Spreader, tire										2368					

2368 Equipment Cutsheet

Equipment Description:

Spreader, tire

EQ ID Number:

2368

Manufacturer:

Branick Industries

Model No.: S-FLL



2440 Equipment Datasheet

Manufacturer:		Tennant				Dimensions		Length (inches)		Width (inches)		Height (inches)					
Model No.:		5700-700D with Fast				Unit		37-1/2		64		43					
						Wall Mounted Charger		12		12		5					
Provided:	Cutsheet	Y	Functional Model	N	Design Details	N	Operational Clearance		Left	Right	---	Front	Back	---	Above	Below	---
DISCIPLINE COORDINATION:																	
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N					
Mechanical		---				Venting		Connection (inches)				---					
								Volume (CFM)				---					
Electrical		Wall mounted battery charger				Connection Size		Requirements		Unit		---		---			
								Voltage		120		---		---			
								Phase		1		---		---			
								Horsepower (HP)		0.6		---		---			
								Amps		16		---		---			
						Connection Type		Provide dedicated outlet									
Plumbing		---				Domestic Water		Connection (inches)				---					
								Flow Rate (GPM)				---					
								Capacity (PSI)				---					
						Natural Gas		Connection (inches)				---					
								Capacity (BTU)				---					
						Drain		Floor Drain or Floor Sink (Y/N)				N					
						Compressed Air		Connection (inches)				---					
								Volume (CFM)				---					
								Capacity (PSI)				---					
Equipment Description:												EQ ID Number:					
Scrubber, floor, walk behind, 28 inch path, battery operated												2440					

2440 Equipment Cutsheet

Equipment Description:

Scrubber, floor, walk behind, 28 inch path, battery operated

EQ ID Number:

2440

Manufacturer: Tennant

Model No.: 5700-700D with Fast



2610 Equipment Datasheet

Manufacturer:		Clausing Industrial				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		2277 with accessories				Equipment		22		36		69			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	48	Above	24	
									Right	24	Back	6	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		Weight: 650 pounds				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		Unit		---		---	
								Voltage		460		---		---	
								Phase		3		---		---	
								Horsepower (HP)		1.5		---		---	
								Amps		3		---		---	
						Connection Type		Provide disconnect							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		---					
								Volume (CFM)		---					
								Capacity (PSI)		---					
Equipment Description:										EQ ID Number:					
Drill press, variable speed, 20 inch										2610					

2610 Equipment Cutsheet

Equipment Description:

Drill press, variable speed, 20 inch

EQ ID Number:

2610

Manufacturer: Clausing Industrial

Model No.: 2277 with accessories



2689 Equipment Datasheet

Manufacturer:		Kalamazoo Machine Tool				Dimensions		Length (inches)		Width (inches)		Height (inches)													
Model No.:		H350M with accessories				Equipment		72		60		37													
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	48	36	Front	Back	48	120	Above	Below	12	---					
DISCIPLINE COORDINATION:																									
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N													
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N													
Mechanical		---				Venting		Connection (inches)				---		Volume (CFM)				---							
Electrical		---				Connection Size		Requirements		Unit		---		---		Voltage		460		---					
								Phase		3		---		---		Horsepower (HP)		3		---					
								Amps		---		---		---				---		---					
						Connection Type		Provide disconnect																	
Plumbing		---				Domestic Water		Connection (inches)				---		Flow Rate (GPM)				---		Capacity (PSI)				---	
						Natural Gas		Connection (inches)				---		Capacity (BTU)				---				N			
						Drain		Floor Drain (Y/N)				N													
						Compressed Air		Connection (inches)				---		Volume (CFM)				---		Capacity (PSI)				---	
Equipment Description:														EQ ID Number:											
Saw, band, horizontal, large														2689											

2689 Equipment Cutsheet

Equipment Description:

Saw, band, horizontal, large

EQ ID Number:

2689

Manufacturer:

Kalamazoo Machine Tool

Model No.: H350M with accessories



2698 Equipment Datasheet

Manufacturer:		Makita				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		LW1401				Equipment		11		19-3/4		23-5/8		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	36	Above	24
									Right	36	Back	12	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		120	---	---		
								Phase		1	---	---		
								Horsepower (HP)		---	---	---		
								Amps		15	---	---		
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Saw, cutoff, abrasive, 14 inch										2698				

2698 Equipment Cutsheet

Equipment Description:

Saw, cutoff, abrasive, 14 inch

EQ ID Number:

2698

Manufacturer: Makita

Model No.: LW1401



2740 Equipment Datasheet

Manufacturer:		Miller Electric				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Millermatic 141 Package (951601)				Equipment		18		36		35		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		120	---	---	---	---
								Phase		1	---	---	---	---
								Horsepower (HP)		---	---	---	---	---
								Amps		20	---	---	---	---
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Welder, MIG, with cart										2740				

2740 Equipment Cutsheet

Equipment Description:

Welder, MIG, with cart

EQ ID Number:

2740

Manufacturer: Miller Electric

Model No.: Millermatic 141 Package (951601)



2750 Equipment Datasheet

Manufacturer:		Miller Electric Manufacturing Company				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Dimension 452 (Part No.: 903254)				Equipment		38		23		30		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		208	---	---		
								Phase		3	---	---		
								Horsepower (HP)		---	---	---		
								Amps		60	---	---		
						Connection Type		Provide pecial purpose outlet						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Welder, multiprocess										2750				

2750 Equipment Cutsheet

Equipment Description:

Welder, multiprocess

EQ ID Number:

2750

Manufacturer: Miller Electric Manufacturing Company

Model No.: Dimension 452 (Part No.: 903254)



2760 Equipment Datasheet

Manufacturer:		Miller Electric Manufacturing Co.				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Syncrowave 210 Runner No. 951684				Equipment		18-1/2		43		31-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---		
								Voltage		120	---	---		
								Phase		1	---	---		
								Horsepower (HP)		---	---	---		
								Amps		20.5	---	---		
						Connection Type		Provide special purpose outlet						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Welder, TIG										2760				

2760 Equipment Cutsheet

Equipment Description: Welder, TIG	EQ ID Number: 2760
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Manufacturer: Miller Electric Manufacturing Co.	Model No.:	Syncrowave 210 Runner No. 951684
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2770 Equipment Datasheet

Manufacturer:		Singer Safety Company				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		13-011066				Equipment		144		18		77-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Screen, welding										2770				

2770 Equipment Cutsheet

Equipment Description:

Screen, welding

EQ ID Number:

2770

Manufacturer:

Singer Safety Company

Model No.: 13-011066



2835 Equipment Datasheet

Manufacturer:		WMH Tool Group/Wilton					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		1755					Equipment		9		18		10		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	36	Above	24	
									Right	36	Back	12	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements			---	---	---	
									Voltage			---	---	---	
									Phase			---	---	---	
									Horsepower (HP)			---	---	---	
									Amps			---	---	---	
							Connection Type		---						
Plumbing		---					Domestic Water		Connection (inches)			---			
									Flow Rate (GPM)			---			
									Capacity (PSI)			---			
							Natural Gas		Connection (inches)			---			
									Capacity (BTU)			---			
							Drain		Floor Drain (Y/N)			N			
							Compressed Air		Connection (inches)			---			
									Volume (CFM)			---			
									Capacity (PSI)			---			
Equipment Description:										EQ ID Number:					
Vise, five inch										2835					

2835 Equipment Cutsheet

Equipment Description:

Vise, five inch

EQ ID Number:

2835

Manufacturer:

WMH Tool Group/Wilton

Model No.: 1755



2880 Equipment Datasheet

Manufacturer:		Baldor Electronics				Dimensions		Length (inches)		Width (inches)		Height (inches)									
Model No.:		8123 WD				Equipment		24-3/4		41		41-3/4									
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	24	24	Front	Back	36	12	Above	36	Below	---	
DISCIPLINE COORDINATION:																					
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N									
Structural		Weight grinder: 112 pounds; Dust collector: 325 pounds				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N									
Mechanical		---				Venting		Connection (inches)				---									
Mechanical		---				Venting		Volume (CFM)				---									
Electrical		---				Connection Size		Requirements		Grinder/ Fan		Dust Control		---							
Electrical		---				Connection Size		Voltage		460		120		---							
Electrical		---				Connection Size		Phase		3		1		---							
Electrical		---				Connection Size		Horsepower (HP)		3/4		1		---							
Electrical		---				Connection Size		Amps		1.5		12		---							
Electrical		---				Connection Type		Provide disconnect													
Plumbing		---				Domestic Water		Connection (inches)				---									
Plumbing		---				Domestic Water		Flow Rate (GPM)				---									
Plumbing		---				Domestic Water		Capacity (PSI)				---									
Plumbing		---				Natural Gas		Connection (inches)				---									
Plumbing		---				Natural Gas		Capacity (BTU)				---									
Plumbing		---				Drain		Floor Drain (Y/N)				N									
Plumbing		---				Compressed Air		Connection (inches)				---									
Plumbing		---				Compressed Air		Volume (CFM)				---									
Plumbing		---				Compressed Air		Capacity (PSI)				---									
Equipment Description:														EQ ID Number:							
Buffer/grinder, eight inch, with dust collector														2880							

2880 Equipment Cutsheet

Equipment Description:

Buffer/grinder, eight inch, with dust collector

EQ ID Number:

2880

Manufacturer: Baldor Electronics

Model No.: 8123 WD



3085 Equipment Datasheet

Manufacturer:		Trinity Tool Company (TRINCO)				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Master 36/BP				Equipment		38		25		64		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	48	Above	---
									Right	48	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit		---		---
								Voltage		120		---		---
								Phase		1		---		---
								Horsepower (HP)		1-1/3		---		---
								Amps		9		---		---
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		3/8				
								Volume (CFM)		25				
								Capacity (PSI)		60-80				
Equipment Description:										EQ ID Number:				
Cabinet, abrasive blast, with dust collector										3085				

3085 Equipment Cutsheet

Equipment Description:

Cabinet, abrasive blast, with dust collector

EQ ID Number:

3085

Manufacturer: Trinity Tool Company (TRINCO)

Model No.: Master 36/BP



3275 Equipment Datasheet

Manufacturer:		Airflow Systems, Inc.				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		PCH-2				Equipment		24		49-1/4		31-1/4		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	2	Above	72
								Right	42	Back	2	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		460	---	---	---	---
								Phase		3	---	---	---	---
								Horsepower (HP)		3	---	---	---	---
								Amps		8.4	---	---	---	---
						Connection Type		Provide standard grounded receptacle						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		3/8				
								Volume (CFM)		---				
								Capacity (PSI)		100				
Equipment Description:										EQ ID Number:				
Extractor, fume, welding, portable, 1,200 CFM										3275				

3275 Equipment Cutsheet

Equipment Description:

Extractor, fume, welding, portable, 1,200 CFM

EQ ID Number:

3275

Manufacturer: Airflow Systems, Inc.

Model No.: PCH-2



3300 Equipment Datasheet

Manufacturer:		Fabricated/Makai Solutions					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Stainless steel mop tank with accessories					Equipment		40		25		42		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	36	Front	36	Above	36	
									Right	36	Back	36	Below	0	
DISCIPLINE COORDINATION:															
Architectural		Coordinate floor sink locations per Design Details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			Y			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			Y			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements			---	---	---	
									Voltage			---	---	---	
									Phase			---	---	---	
									Horsepower (HP)			---	---	---	
									Amps			---	---	---	
							Connection Type		---						
Plumbing		Provide faucet: Hot and cold water supply; Drain: 1-1/2 inches; Provide fabricated support for plumbing fixtures and hot and cold water supply; Reference Design Details.					Domestic Water		Connection (inches)			3/4			
									Flow Rate (GPM)			3.5			
									Capacity (PSI)			---			
							Natural Gas		Connection (inches)			---			
									Capacity (BTU)			---			
							Drain		Floor Sink (Y/N)			Y			
							Compressed Air		Connection (inches)			---			
									Volume (CFM)			---			
									Capacity (PSI)			---			
Equipment Description:										EQ ID Number:					
Tank, mop, with wringer										3300					

3300 Equipment Cutsheet

Equipment Description:

Tank, mop, with wringer

EQ ID Number:

3300

Manufacturer: Fabricated/Makai Solutions

Model No.: Stainless steel mop tank with accessories



3540 Equipment Datasheet

Manufacturer:		Graymills				Dimensions		Length (inches)		Width (inches)		Height (inches)								
Model No.:		PL36-A with accessories				Equipment		36		22		38-1/2								
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	6	6	Front	Back	36	6	Above	24	Below	---
DISCIPLINE COORDINATION:																				
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N								
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N								
Mechanical		---				Venting		Connection (inches)				---								
Mechanical		---				Venting		Volume (CFM)				---								
Electrical		---				Connection Size		Requirements		Unit		---		---						
Electrical		---				Connection Size		Voltage		120		---		---						
Electrical		---				Connection Size		Phase		1		---		---						
Electrical		---				Connection Size		Horsepower (HP)		1/5		---		---						
Electrical		---				Connection Size		Amps		1.04		---		---						
Electrical		---				Connection Type		Provide standard grounded receptacle												
Plumbing		---				Domestic Water		Connection (inches)		---										
Plumbing		---				Domestic Water		Flow Rate (GPM)		---										
Plumbing		---				Domestic Water		Capacity (PSI)		---										
Plumbing		---				Natural Gas		Connection (inches)		---										
Plumbing		---				Natural Gas		Capacity (BTU)		---										
Plumbing		---				Drain		Floor Drain (Y/N)		N										
Plumbing		---				Compressed Air		Connection (inches)		---										
Plumbing		---				Compressed Air		Volume (CFM)		---										
Plumbing		---				Compressed Air		Capacity (PSI)		---										
Equipment Description:														EQ ID Number:						
Tank, parts cleaning, 15 gallon														3540						

3540 Equipment Cutsheet

Equipment Description:

Tank, parts cleaning, 15 gallon

EQ ID Number:

3540

Manufacturer: Graymills

Model No.: PL36-A with accessories



3555 Equipment Datasheet

Manufacturer:		Better Engineering				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		F-3000-P with accessories				Equipment		50		62		69		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	48	Above	24
									Right	36	Back	12	Below	---
DISCIPLINE COORDINATION:														
Architectural		Coordinate exterior penetration size and location of steam vent with mechanical.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Coordinate exterior penetration size and location of steam vent with mechanical.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		Steam exhaust: Vent PVC steam exhaust to exterior				Venting		Connection (inches)		4				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		460	---	---	---	---
								Phase		3	---	---	---	---
								Horsepower (HP)		5	---	---	---	---
								Amps		43	---	---	---	---
						Connection Type		Provide disconnect						
Plumbing		Provide back flow device.				Domestic Water		Connection (inches)		1/2				
								Flow Rate (GPM)		10 to 12				
								Capacity (PSI)		50 to 150				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain or Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Washer, parts, automatic, front load										3555				

3555 Equipment Cutsheet

Equipment Description:

Washer, parts, automatic, front load

EQ ID Number:

3555

Manufacturer: **Better Engineering**

Model No.: **F-3000-P with accessories**



3610 Equipment Datasheet

Manufacturer:		J.E. Adams Industries				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		9235-3 with accessories				Equipment		20-1/8		26		52		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	24	Above	---
									Right	24	Back	6	Below	---
DISCIPLINE COORDINATION:														
Architectural		Column mounted or on steel reinforced housekeeping pad at desired height of owner; Must be at least 20 feet from outside face of any fuel dispenser. [Project specific]				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Structural		Column mounted or on steel reinforced housekeeping pad a minimum of 18 inches. [Project specific]				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Requires a dedicated circuit and hardwire connection.				Connection Size		Requirements		Motor		---		---
								Voltage		120		---		---
								Phase		1		---		---
								Horsepower (HP)		4.8		---		---
								Amps		30		---		---
						Connection Type		Provide j-box						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Vacuum, canister, stainless steel										3610				

3610 Equipment Cutsheet

Equipment Description:

Vacuum, canister, stainless steel

EQ ID Number:

3610

Manufacturer: J.E. Adams Industries

Model No.: 9235-3 with accessories



3718 Equipment Datasheet

Manufacturer:		Hotsy Corporation				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		945N with accessories				Equipment		47-1/2		21		51		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	36	Front	36	Above	48
									Right	36	Back	36	Below	0
DISCIPLINE COORDINATION:														
Architectural		Coordinate roof penetration with equipment, mechanical, and structural.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Structural		Coordinate roof penetration size and location of exhaust vent with mechanical and architectural; Weight of unit: 545 pounds; Reference Design Details.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Mechanical		If enclosed, provide louvered opening sized according to combustion air requirements and NFPA54; Provide exhaust stack through the roof; Draft diverter supplied by manufacturer; Reference Design Details.				Venting		Connection (inches)		8				
								Volume (CFM)		---				
Electrical		Reference Design Details.				Connection Size		Requirements		Unit	---	---		
								Voltage		460	---	---		
								Phase		3	---	---		
								Horsepower (HP)		5	---	---		
								Amps		8	---	---		
						Connection Type		Provide disconnect						
Plumbing		Water supply terminates at standard hose bibb; Provide gas regulator; Reference Design Details.				Domestic Water		Connection (I.D. inches)		5/8				
								Flow Rate (GPM)		4				
								Capacity (PSI)		30				
						Natural Gas		Connection (inches)		3/4				
								Capacity (BTU/Hr)		365,000				
								Gas Pressure (W.C.I)		9 to 14				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Washer, high pressure, hot water, NG, 4 GPM										3718				

3718 Equipment Cutsheet

Equipment Description:

Washer, high pressure, hot water, NG, 4 GPM

EQ ID Number:

3718

Manufacturer: Hotsy Corporation

Model No.: 945N with accessories



3834 Equipment Datasheet

Manufacturer:		Interclean Equipment				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Four brush and touchless hybrid #LY16-042 with accessories				Equipment		1020		192		170		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	---	Front	---	Above	---
									Right	---	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		Settling pit in wash bay; Floor slopes at 1/4 inch per foot; Coordinate with overhead door clearances; Vehicle wash pumps to be mounted on housekeeping pad.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Structural		Provide cast in place settling pit per manufacturer's design details in wash bay with water stops to prevent water leaking out of sump; Vehicle wash pumps to be mounted on housekeeping pad.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Mechanical		Coordinate 6 inch exhaust flue through roof from the water heater.				Venting		Connection (inches)		6				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---	---	
								Voltage		---	---	---	---	
								Phase		---	---	---	---	
								Horsepower (HP)		---	---	---	---	
								Amps		---	---	---	---	
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		2				
								Flow Rate (GPM)		---				
								Capacity (PSI)		30 to 80				
						Natural Gas		Connection (inches)		3/4				
								Capacity (BTU)		199000				
						Drain		Floor Drain (Y/N)		Y				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Washer, bus, drive through, four brush										3834				

3834 Equipment Cutsheet

Equipment Description:

Washer, bus, drive through, four brush

EQ ID Number:

3834

Manufacturer: Interclean Equipment

Model No.: Four brush and touchless hybrid
#LY16-042 with accessories



5010 Equipment Datasheet

Manufacturer:		Kone Cranes, Inc					Dimensions		Length (inches)		Width (inches)		Height (inches)							
Model No.:		Model #					Equipment		0		0		0							
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	Right	6	6	Front	Back	6	6	Above	Below	6	6
DISCIPLINE COORDINATION:																				
Architectural		Coordinate OSHA clearances, overhead door clearances ducting clearances, process piping, routing with mechanical and design with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N							
Structural		Coordinate beam size clearances, and mounting details for crane rails per manufacturer's drawings.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N							
Mechanical		Coordinate ducting and HVAC equipment with architectural to avoid conflicts with the operation of the bridge crane.					Venting		Connection (inches)				---							
									Volume (CFM)				---							
Electrical		Provide power through disconnect to the support beam.					Connection Size		Requirements		Unit		---		---					
									Voltage		460		---		---					
									Phase		3		---		---					
									Horsepower (HP)		---		---		---					
									Amps		35		---		---					
							Connection Type		Provide disconnect											
Plumbing		Coordinate piping with architect to avoid conflicts with the operation of the bridge crane.					Domestic Water		Connection (inches)				---							
									Flow Rate (GPM)				---							
									Capacity (PSI)				---							
							Natural Gas		Connection (inches)				---							
									Capacity (BTU)				---							
							Drain		Floor Sink (Y/N)				N							
							Compressed Air		Connection (inches)				---							
									Volume (CFM)				---							
									Capacity (PSI)				---							
Equipment Description:												EQ ID Number:								
Crane, bridge, top running, 5 ton												5010								

5010 Equipment Cutsheet

Equipment Description:

Crane, bridge, top running, 5 ton

EQ ID Number:

5010

Manufacturer:

Kone Cranes, Inc

Model No.: Model #



5404 Equipment Datasheet

Manufacturer:		Clark Material Handling Company				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		NPX 20 with accessories				Equipment		93		40-1/4		95		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	0	Front	0	Above	0
									Right	0	Back	0	Below	0
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Weight of battery charger: 159 pounds.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Provide dedicated circuit.				Connection Size		Requirements		Battery Charger		---		
								Voltage		460		---		
								Phase		3		---		
								Horsepower (HP)		---		---		
								Amps		13.5		---		
						Connection Type		Provide disconnect						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Forklift, electric, 4,000 pound, stand up										5404				

5404 Equipment Cutsheet

Equipment Description:

Forklift, electric, 4,000 pound, stand up

EQ ID Number:

5404

Manufacturer: Clark Material Handling Company

Model No.: NPX 20 with accessories



5420 Equipment Datasheet

Manufacturer:		Clark Material Handling Co.				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		C50S				Equipment		175		69		90-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	36	Above	---
								Right	---	Back	36	Below	---	
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Forklift, 10,000 pound, LPG										5420				

5420 Equipment Cutsheet

Equipment Description:

Forklift, 10,000 pound, LPG

EQ ID Number:

5420

Manufacturer:

Clark Material Handling Co.

Model No.: C50S



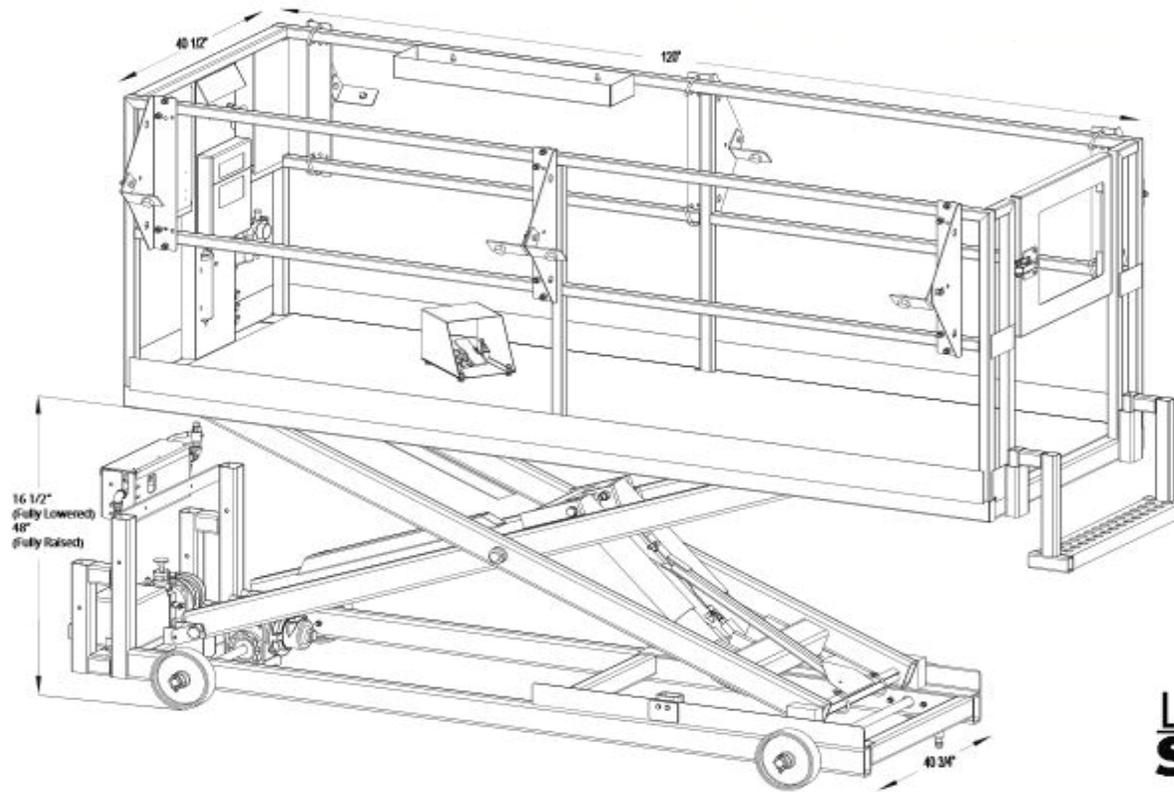
5558 Equipment Datasheet

Manufacturer:		LPI Lift Systems				Dimensions		Length (inches)		Width (inches)		Height (inches)				
Model No.:		TK 48-S with accessories				Equipment Platform		138		63		58				
Provided:		Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	4-1/2	Front	4-1/2	Above	48	
								Right	4-1/2	Back	4-1/2	Below	0			
DISCIPLINE COORDINATION:																
Architectural		Minimum 6 feet clear width in lower level work area below pit opening. Coordinate/verify location of systems are not in equipment path of travel or within lifting clearances.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N			
Structural		Coordinate with design details. Coordinate/verify location of systems are not in equipment path of travel or within lifting clearances.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N			
Mechanical		Coordinate/verify location of systems are not in equipment path of travel or within lifting clearances.					Venting		Connection (inches)		---		Volume (CFM)		---	
Electrical		Coordinate location of electric with equipment; Electrical connection wired into light- no plug (explosion proof).					Connection Size		Requirements		Lighting	---	---			
								Voltage		120	---	---				
								Phase		1	---	---				
								Horsepower (HP)		---	---	---				
								Amps		4	---	---				
						Connection Type		Provide j-box								
Plumbing		Coordinate/verify location of systems are not in equipment path of travel or within lifting clearances.					Domestic Water		Connection (inches)		---		Flow Rate (GPM)		---	
								Capacity (PSI)		---						
						Natural Gas		Connection (inches)		---		Capacity (BTU)		---		
						Drain		Floor Drain (Y/N)		N						
						Compressed Air		Connection (inches)		1/2		Volume (CFM)		50		
								Capacity (PSI)		90						
Equipment Description:										EQ ID Number:						
Lift, man, mobile, LLWA										5558						

5558 Equipment Cutsheet

Equipment Description: Lift, man, mobile, LLWA	EQ ID Number: 5558
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Manufacturer: LPI Lift Systems	Model No.: TK 48-S with accessories
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5630 Equipment Datasheet

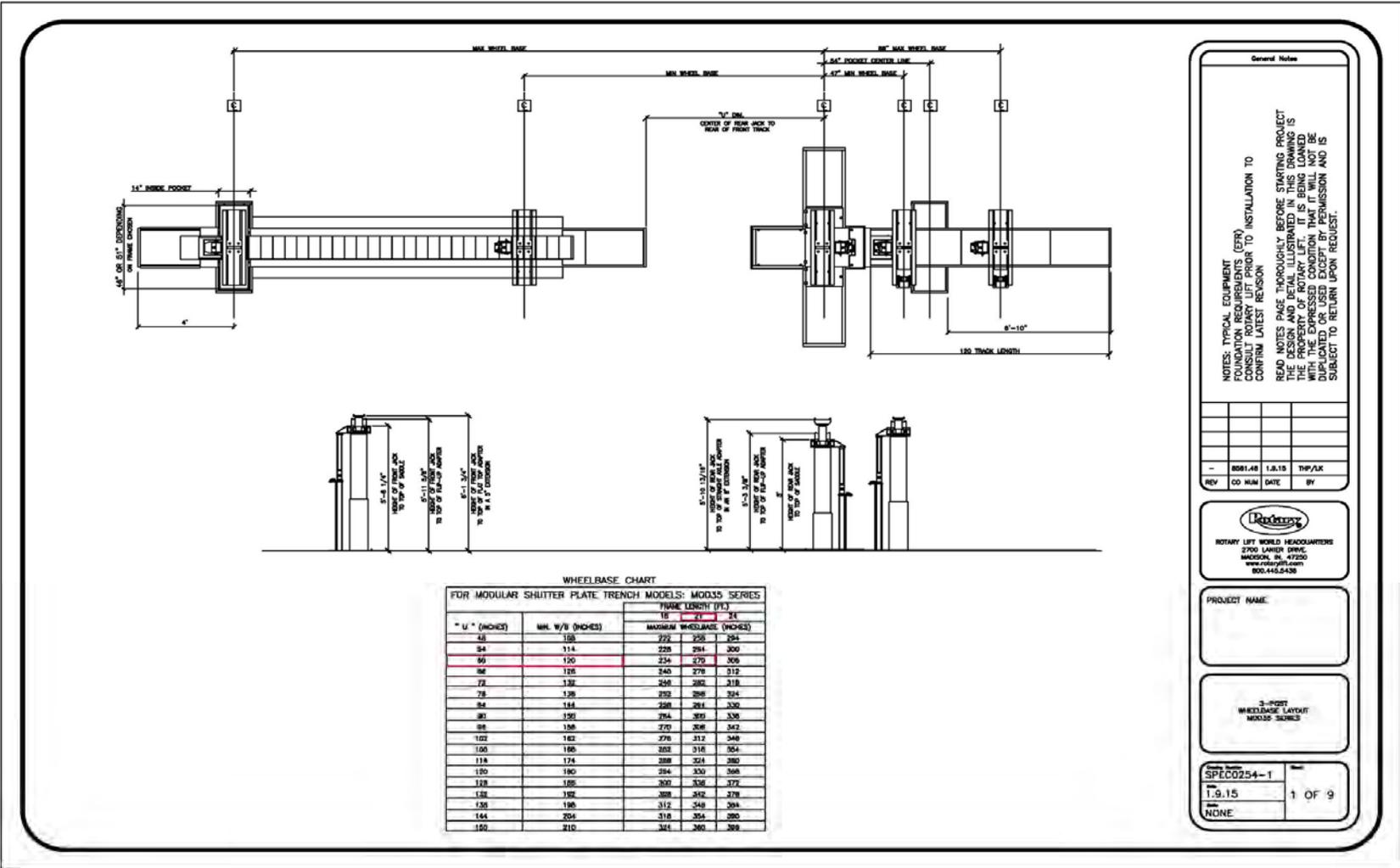
Manufacturer:		Rotary Lifts				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		MOD335 with accessories				Equipment		25-3/8		14-1/4		32-7/8		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	---	Front	---	Above	---
									Right	---	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		Coordinate foundation design with structural; Reference Design Details.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Provide note to reference approved manufacturer shop drawings prior to construction; Provide foundation details for lift per Design Details.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Provide 2 inch conduits from control cabinet to lift; Reference approved manufacturer shop drawings; Provide two 2 inch conduits from disconnect to control panel.				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		460	---	---	---	---
								Phase		3	---	---	---	---
								Horsepower (HP)		5	---	---	---	---
								Amps		28	---	---	---	---
						Connection Type		Provide disconnect						
Plumbing		Provide drain for liquid evacuation system; Provide filter/regulator/lubricator to lift control panel; Reference Design Details.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		1/2				
								Volume (CFM)		5				
								Capacity (PSI)		90 to 110				
Equipment Description:										EQ ID Number:				
Lift, axle, three post, 105,000 pound, shallow design										5630				

5630 Equipment Cutsheet

Equipment Description:
Lift, axle, three post, 105,000 pound, shallow design

EQ ID Number:
5630

Manufacturer: **Rotary Lifts** Model No.: **MOD335 with accessories**



General Notes

NOTES: TYPICAL EQUIPMENT FOUNDATION REQUIREMENTS (EFR) CONSULT ROTARY LIFT PRIOR TO INSTALLATION TO CONFIRM LATEST REVISION

READ NOTES PAGE THOROUGHLY BEFORE STARTING PROJECT THE DESIGN AND DETAIL ILLUSTRATED IN THIS DRAWING IS THE PROPERTY OF ROTARY LIFT. IT IS BEING LOANED WITH THE EXPRESSED CONDITION THAT IT WILL NOT BE REPRODUCED OR USED FOR ANY OTHER PROJECT WITHOUT PERMISSION AND IS SUBJECT TO RETURN UPON REQUEST.

REV	CO	NUM	DATE	THP/LJK	BY
-	888148	1.9.15			

Rotary Lifts
 ROTARY LIFT WORLD HEADQUARTERS
 2700 LANIER DRIVE
 MADISON, IN 47205
 WWW.ROTARYLIFT.COM
 800.445.5436

PROJECT NAME:

3-POST WHEELBASE LAYOUT MOD35-340000

SP1C0254-1
 1.9.15
 NONE

1 OF 9

5645 Equipment Datasheet

Manufacturer:		Rotary Lift				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		75/48-F with accessories				Equipment		576		112		63		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Coordinate with overhead door clearances; Control panel mounted on housekeeping pad; Coordinate conduit in slab from controls to lift.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Structural		Pits and other concrete work shall be provided per design details; Housekeeping pad shall be sized for equipment console.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Provide disconnect near controls; provide two inch conduit in slab from controls to the lift; Coordinate with design details.				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		460	---	---	---	---
								Phase		3	---	---	---	---
								Horsepower (HP)		20	---	---	---	---
								Amps		---	---	---	---	---
						Connection Type		Provide disconnect						
Plumbing		Provide floor drain in each lift recess; Coordinate with design details.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		1/2				
								Volume (CFM)		5				
								Capacity (PSI)		120				
Equipment Description:										EQ ID Number:				
Lift, parallelogram, 75,000 pounds, 48 feet										5645				

5645 Equipment Cutsheet

Equipment Description: Lift, parallelogram, 75,000 pounds, 48 feet	EQ ID Number: 5645
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Manufacturer: Rotary Lift	Model No.: 75/48-F with accessories
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Surface in recessed mount



Model:	75/48-S 75/48-F
Rise*	63" (1600mm)
Lifting Capacity	75,000 lbs. (34000kg)
Length Platform	48' (14630mm)
Length Overall	56' 3 3/16" (17150mm) 48' (14630mm)
Width Platform	32" (813mm)
Width Overall	109" (2769mm)
Height Retracted	12 7/8" (327mm) Flush
Motor	20hp
Number of Legs	8
Min. Floor Thickness	6 3/4" (152mm) 9" (229mm)

* Rise is calculated from 1

5692 Equipment Datasheet

Manufacturer:		Stertil-Koni				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		ECO90 with accessories				Equipment		---		66		---		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	160	Front	120	Above	228
									Right	160	Back	120	Below	---
DISCIPLINE COORDINATION:														
Architectural		Coordinate foundation requirements with structural. Mount control console on housekeeping pad. Refer to Design Details for size and location of concrete block out service opening.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Structural		Concrete work shall be per manufacturer's shop drawings for a complete flush with floor installation; Control console on housekeeping pad.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Provide fused disconnect on wall or column near control console; Provide conduit under slab between disconnect and control console and between console and lift; Reference Design Details.				Connection Size		Requirements		Unit	---	---	---	---
								Voltage		460	---	---	---	---
								Phase		3	---	---	---	---
								Horsepower (HP)		15	---	---	---	---
								Amps		13	---	---	---	---
						Connection Type		Provide disconnect						
Plumbing		Provide 2 inch conduit in slab from adjacent wall to control console for compressed air; Provide floor drain in each pit; Reference Design Details.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		Y				
						Compressed Air		Connection (inches)		1/4				
								Volume (CFM)		5				
								Capacity (PSI)		60				
Equipment Description:										EQ ID Number:				
Lift, axle, scissor, adjustable, 90,000 pound										5692				

5692 Equipment Cutsheet

Equipment Description:

Lift, axle, scissor, adjustable, 90,000 pound

EQ ID Number:

5692

Manufacturer: Stertil-Koni

Model No.: ECO90 with accessories



7520 Equipment Datasheet

Manufacturer:		Graco, Inc.				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		425 Fire-Ball				Equipment		8 dia.		---		28-1/2			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	12	Front	12	Above	18	
									Right	12	Back	12	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		---		---		---	
								Voltage		---		---		---	
								Phase		---		---		---	
								Horsepower (HP)		---		---		---	
								Amps		---		---		---	
						Connection Type		---							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Drain (Y/N)		N					
						Compressed Air		Connection (inches)		1/2 NPT(F)					
								Volume (CFM)		24					
								Capacity (PSI)		100					
Equipment Description:										EQ ID Number:					
Pump, air piston, 10:1 ratio (commodity)										7520					

7520 Equipment Cutsheet

Equipment Description:

Pump, air piston, 10:1 ratio (commodity)

EQ ID Number:

7520

Manufacturer: Graco, Inc.

Model No.: 425 Fire-Ball



7531 Equipment Datasheet

Manufacturer:		Graco, Inc.					Dimensions		Length (inches)		Width (inches)		Height (inches)							
Model No.:		647016 for water/antifreeze, 647731 for OH					Equipment		14-3/4		10-1/4		16							
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	12	12	Front	Back	12	---	Above	18	Below	12
DISCIPLINE COORDINATION:																				
Architectural		Coordinate wall mounting of pump above tank.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N							
Structural		Coordinate wall mounting of pump above tank. Weight: 23 pounds.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N							
Mechanical		---					Venting		Connection (inches)				---							
Mechanical		---					Venting		Volume (CFM)				---							
Electrical		---					Connection Size		Requirements				---		---		---			
Electrical		---					Connection Size		Voltage				---		---		---			
Electrical		---					Connection Size		Phase				---		---		---			
Electrical		---					Connection Size		Horsepower (HP)				---		---		---			
Electrical		---					Connection Size		Amps				---		---		---			
Electrical		---					Connection Type		---											
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Domestic Water		Connection (inches)				---							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Domestic Water		Flow Rate (GPM)				---							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Domestic Water		Capacity (PSI)				---							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Natural Gas		Connection (inches)				---							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Natural Gas		Capacity (BTU)				---							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Drain		Floor Drain or Floor Sink (Y/N)				N							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Compressed Air		Connection (inches)				1/2							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Compressed Air		Volume (CFM)				67							
Plumbing		Plumb to reel banks; Provide compressed air from main compressed air loop.					Compressed Air		Capacity (PSI)				100							
Equipment Description:													EQ ID Number:							
Pump, diaphragm, non-mixing (EC)													7531							

7531 Equipment Cutsheet

Equipment Description:		EQ ID Number:
Pump, diaphragm, non-mixing (EC)		7531
Manufacturer:	Graco, Inc.	Model No.: 647016 for water/antifreeze, 647731 for OH



7541 Equipment Datasheet

Manufacturer:		Graco, Inc.					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		24E166 with accessories					Equipment		14-3/4		10-3/4		16		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	12	Front	12	Above	18	
								Right	12	Back	---	Below	12		
DISCIPLINE COORDINATION:															
Architectural		Coordinate mounting of pump.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		Route control wiring in conduit between fluid monitoring system and solenoid valve and strobe at corresponding extraction pump; Provide dedicated outlet adjacent to unit.					Connection Size		Requirements		Unit	---	---	---	---
									Voltage		120	---	---	---	---
									Phase		1	---	---	---	---
									Horsepower (HP)		---	---	---	---	---
									Amps		2	---	---	---	---
							Connection Type		Provide standard grounded receptacle						
Plumbing		Plumb to used fluid tank; Provide compressed air from main compressed air loop.					Domestic Water		Connection (inches)		---				
									Flow Rate (GPM)		---				
									Capacity (PSI)		---				
							Natural Gas		Connection (inches)		---				
									Capacity (BTU)		---				
							Drain		Floor Drain (Y/N)		N				
							Compressed Air		Connection (inches)		1/2				
									Volume (CFM)		67				
									Capacity (PSI)		100				
Equipment Description:										EQ ID Number:					
Pump, diaphragm, used fluid evacuation (UC)										7541					

7541 Equipment Cutsheet

Equipment Description:

Pump, diaphragm, used fluid evacuation (UC)

EQ ID Number:

7541

Manufacturer: Graco, Inc.

Model No.: 24E166 with accessories



7575 Equipment Datasheet

Manufacturer:		Graco Incorporated				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		220592 and 247713 with accessories				Equipment		2		2		10		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	12	Front	12	Above	12
									Right	12	Back	12	Below	12
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		Plumbed to tank in Lube Room.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Hose and dispenser (GO)										7575				

7575 Equipment Cutsheet

Equipment Description:

Hose and dispenser (GO)

EQ ID Number:

7575

Manufacturer: Graco Incorporated

Model No.: 220592 and 247713 with accessories



7710 Equipment Datasheet

Manufacturer:		Graco, Inc.					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		XD Series					Equipment		---		---		---	
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance	Left	3-1/2	Front	48	Above	---	
								Right	3-1/2	Back	48	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Coordinate mounting of reel banks with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Structural		Reel bank shall be hung from a structural frame with mounting plate at 16 feet AFF; Weight approximately 100 pounds; Reference Equipment Drawing Details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N			
Mechanical		---					Venting		Connection (inches)		---			
									Volume (CFM)		---			
Electrical		---					Connection Size		Requirements		---		---	
									Voltage		---		---	
									Phase		---		---	
									Horsepower (HP)		---		---	
									Amps		---		---	
							Connection Type		---					
Plumbing		Plumb to lube/compressor room.					Domestic Water		Connection (inches)		---			
									Flow Rate (GPM)		---			
									Capacity (PSI)		---			
							Natural Gas		Connection (inches)		---			
									Capacity (BTU)		---			
							Drain		Floor Drain (Y/N)		N			
							Compressed Air		Connection (inches)		---			
									Volume (CFM)		---			
									Capacity (PSI)		---			
Equipment Description:										EQ ID Number:				
Reel bank (CA)										7710				

7710 Equipment Cutsheet

Equipment Description: Reel bank (CA)	EQ ID Number: 7710
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Manufacturer: Graco, Inc.	Model No.: XD Series
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7780 Equipment Datasheet

Manufacturer:		Graco, Inc.					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		XD Series					Equipment		---		---		---	
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance		Left	3-1/2	Front	48	Above	---
									Right	3-1/2	Back	48	Below	168
DISCIPLINE COORDINATION:														
Architectural		Coordinate mounting of reel banks with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N	
Structural		Reel bank shall be hung from a structural frame with mounting plate at 16 feet AFF; Weight approximately 800 pounds; Reference Design Details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				N	
Mechanical		---					Venting		Connection (inches)				---	
									Volume (CFM)				---	
Electrical		---					Connection Size		Requirements		---		---	
									Voltage		---		---	
									Phase		---		---	
									Horsepower (HP)		---		---	
									Amps		---		---	
							Connection Type		---					
Plumbing		Plumb to lube/compressor room.					Domestic Water		Connection (inches)				---	
									Flow Rate (GPM)				---	
									Capacity (PSI)				---	
							Natural Gas		Connection (inches)				---	
									Capacity (BTU)				---	
							Drain		Floor Drain (Y/N)				N	
							Compressed Air		Connection (inches)				---	
									Volume (CFM)				---	
									Capacity (PSI)				---	
Equipment Description:										EQ ID Number:				
Reel bank (CA, diff. GO1, GO2, H2O, CO, Power Steering PS. future)										7780				

7780 Equipment Cutsheet

Equipment Description:

Reel bank (CA, diff. GO1, GO2, H2O, CO, Power Steering PS. future)

EQ ID Number:

7780

Manufacturer:

Graco, Inc.

Model No.: XD Series



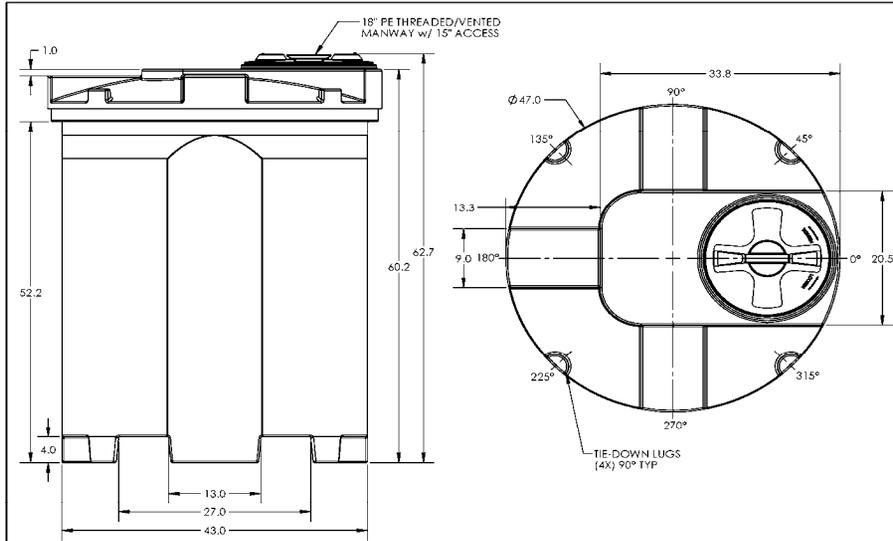
7907 Equipment Datasheet

Manufacturer:		Snyder Industries					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		5740100N					Equipment		47 dia.		---		58-1/2		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	48	Above	---	
								Right	---	Back	---	Below	---		
DISCIPLINE COORDINATION:															
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Structural		Approx. wet weight (water): 2,296 pounds. Approx. dry weight: 96 pounds.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N			
Mechanical		---					Venting		Connection (inches)			---			
									Volume (CFM)			---			
Electrical		---					Connection Size		Requirements		---	---	---		
									Voltage		---	---	---		
									Phase		---	---	---		
									Horsepower (HP)		---	---	---		
									Amps		---	---	---		
							Connection Type		---						
Plumbing		---					Domestic Water		Connection (inches)		---				
									Flow Rate (GPM)		---				
									Capacity (PSI)		---				
							Natural Gas		Connection (inches)		---				
									Capacity (BTU)		---				
							Drain		Floor Sink (Y/N)		N				
							Compressed Air		Connection (inches)		---				
									Volume (CFM)		---				
									Capacity (PSI)		---				
Equipment Description:										EQ ID Number:					
Tank, double wall, polyethylene, 275 gallon (commodity)										7907					

7907 Equipment Cutsheet

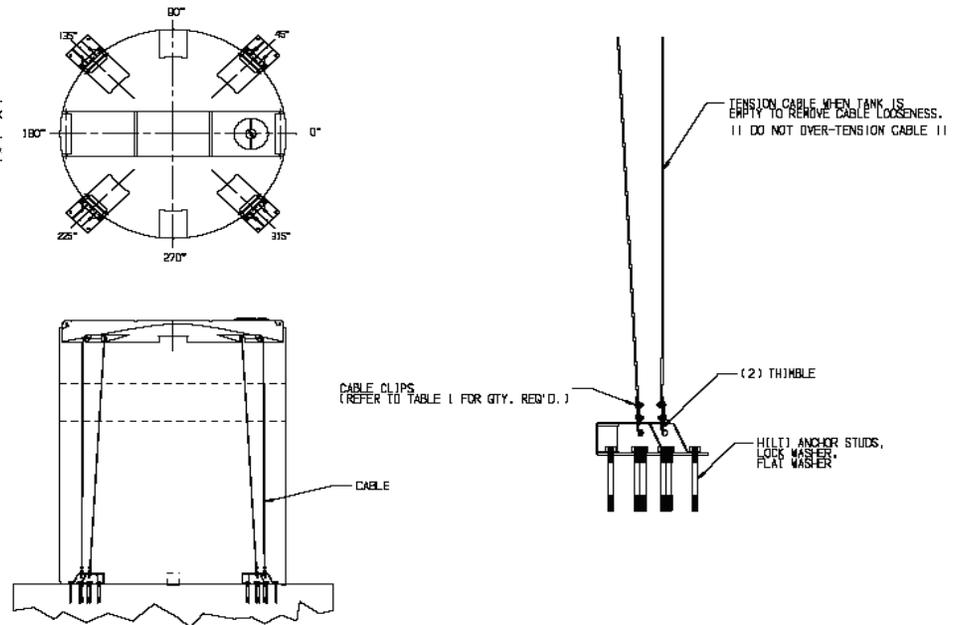
Equipment Description: Tank, double wall, polyethylene, 275 gallon (commodity)	EQ ID Number: 7907
---	-------------------------------------

Manufacturer: Snyder Industries	Model No.: 5740100N
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*ALL EXTERNAL PIPING MUST BE INDEPENDENTLY SUPPORTED.
 *ONLY BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SH PROCEDURE.
 *Consult Snyder's Guidelines for Use and Installation prior to delivery.
 Available on-line at <http://www.snyderind.com/techsupport>
 ALL DIMENSIONS ARE IN INCHES, NOMINAL, & SUBJECT TO CHANGE WITHOUT NOTICE.
 ALL DIMENSIONS ON ROTATIONAL MOLDED PARTS ARE SUBJECT TO A ± 3% TOLERANCE.

DOC NO/ISSUE	REVISED	DATE	BY	APPROVED	DESCRIPTION
Released					ASM TK 275VNT X 42 DC
SYDNER INDUSTRIES, INC.			5740102N		
			D00		



7970 Equipment Datasheet

Manufacturer:		Containment Solutions, Incorporated				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		LC500DW with accessories				Equipment		61		46		61		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	6	Front	72	Above	48
									Right	6	Back	6	Below	0
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Dry Weight: 1,350 pounds; Filled Weight: 11,273 pounds; Anchored at tabs; anchor size by Structural Engineer				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		Provide venting to exterior [for used fluid tanks only].				Venting		Connection (inches)		2				
								Volume (CFM)		---				
Electrical		[For UO/UC tanks only with Fluid Management System] Control wiring between Fluid Monitoring System and solenoid valve at corresponding extraction pump; Route all wiring in conduit; Provide outlet(s) on wall above tank for alarm or Fluid Management System (FMS), pump air control (PAC); Control wiring between FMS and tank; Route in conduit.				Connection Size		Requirements	PAC	Alarm	FMS			
								Voltage	120	120	120			
								Phase	1	1	1			
								Horsepower (HP)	---	---	---			
								Amps	2	---	1			
						Connection Type		Receptacle, Standard Grounded						
Plumbing		Plumb to corresponding overhead reels/used fluid pumps.				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Sink (Y/N)		N				
						Compressed Air		Connection (inches)		1/2				
								Volume (CFM)		60				
								Capacity (PSI)		50				
Equipment Description:										EQ ID Number:				
Tank, double wall, cube, 500 gallon (commodity)										7970				

7970 Equipment Cutsheet

Equipment Description:

Tank, double wall, cube, 500 gallon (commodity)

EQ ID Number:

7970

Manufacturer: Containment Solutions, Incorporated

Model No.: LC500DW with accessories



7993 Equipment Datasheet

Manufacturer:		Graco Incorporated				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		218 969 with accessories				Equipment		33		24		11			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	6	Front	36	Above	2	
									Right	6	Back	6	Below	12	
DISCIPLINE COORDINATION:															
Architectural		Coordinate clearances and design with structural. Drain pan shall travel on rails the complete length of pit and store at end of pit under a steel plate flush with the finished floor.; rails must be 2-1/2 inches wide to support drain pan wheels for travel on.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		Drain pan shall travel on rails the complete length of pit and store at end of pit under a steel plate flush with the finished floor.; rails must be 2-1/2 inches wide to support drain pan wheels for travel on.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		---		---		---	
								Voltage		---		---		---	
								Phase		---		---		---	
								Horsepower (HP)		---		---		---	
								Amps		---		---		---	
						Connection Type		---							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Sink (Y/N)		N					
						Compressed Air		Connection (inches)		---					
								Volume (CFM)		---					
								Capacity (PSI)		---					
Equipment Description:										EQ ID Number:					
Drain pan, rolling (UC)										7993					

7993 Equipment Cutsheet

Equipment Description:

Drain pan, rolling (UC)

EQ ID Number:

7993

Manufacturer: Graco Incorporated

Model No.: 218 969 with accessories



7995 Equipment Datasheet

Manufacturer:		Graco, Incorporated				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		248632				Equipment		24		24		45		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	30
									Right	---	Back	---	Below	---
DISCIPLINE COORDINATION:														
Architectural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		---				Connection Size		Requirements		---	---	---		
								Voltage		---	---	---		
								Phase		---	---	---		
								Horsepower (HP)		---	---	---		
								Amps		---	---	---		
						Connection Type		---						
Plumbing		3/4" pump connection				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Receiver, 25 gallon, portable (UC)										7995				

7995 Equipment Cutsheet

Equipment Description:

Receiver, 25 gallon, portable (UC)

EQ ID Number:

7995

Manufacturer: Graco, Incorporated

Model No.: 248632



7996 Equipment Datasheet

Manufacturer:		Graco, Incorporated.					Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		238866					Equipment		24		24		45		
Provided:	Cutsheet	Y	Functional Model	N	Design Details	N	Operational Clearance		Left	---	Front	---	Above	30	
									Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:															
Architectural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		---					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---					Venting		Connection (inches)		---				
									Volume (CFM)		---				
Electrical		---					Connection Size		Requirements		---	---	---		
									Voltage		---	---	---		
									Phase		---	---	---		
									Horsepower (HP)		---	---	---		
									Amps		---	---	---		
							Connection Type		---						
Plumbing		3/4" pump connection.					Domestic Water		Connection (inches)		---				
									Flow Rate (GPM)		---				
									Capacity (PSI)		---				
							Natural Gas		Connection (inches)		---				
									Capacity (BTU)		---				
							Drain		Floor Drain (Y/N)		N				
							Compressed Air		Connection (inches)		---				
									Volume (CFM)		---				
									Capacity (PSI)		---				
Equipment Description:										EQ ID Number:					
Receiver, 25 gallon, portable (UO)										7996					

7996 Equipment Cutsheet

Equipment Description:

Receiver, 25 gallon, portable (UO)

EQ ID Number:

7996

Manufacturer: Graco, Incorporated.

Model No.: 238866



8276 Equipment Datasheet

Manufacturer:		Kaeser Compressor				Dimensions		Length (inches)		Width (inches)		Height (inches)									
Model No.:		ASD40ST				Equipment		69-5/8		35-3/8		60-1/4									
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	Right	15	40	Front	Back	50	40	Above	24	Below	---	
DISCIPLINE COORDINATION:																					
Architectural		Coordinate size of housekeeping pad with equipment.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				Y									
Structural		Coordinate size of housekeeping pad with equipment. Weight: 1,747 pounds.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)				Y									
Mechanical		Heat rejection: 119,270 BTU/hour; 8240 CFM. No equipment vibration isolation if mounted slab on grade. Refrigerant: R-134A. 1.76 pounds.				Venting		Connection (inches)				---									
Mechanical						Venting		Volume (CFM)				---									
Electrical		Provide fusible disconnect with 70 A fuse. Provide data port.				Connection Size		Requirements		Unit		---		---							
Electrical						Connection Size		Voltage		460		---		---							
Electrical						Connection Size		Phase		3		---		---							
Electrical						Connection Size		Horsepower (HP)		40		---		---							
Electrical						Connection Size		Amps		47		---		---							
Electrical						Connection Type		Provide disconnect													
Plumbing		Floor sink between compressor and dryer on housekeeping pad to sand-oil interceptor				Domestic Water		Connection (inches)				---									
Plumbing						Domestic Water		Flow Rate (GPM)				---									
Plumbing						Domestic Water		Capacity (PSI)				---									
Plumbing						Natural Gas		Connection (inches)				---									
Plumbing						Natural Gas		Capacity (BTU)				---									
Plumbing						Drain		Sink Drain (Y/N)				Y									
Plumbing						Compressed Air		Connection (inches)				---									
Plumbing						Compressed Air		Volume (CFM)				---									
Plumbing						Compressed Air		Capacity (PSI)				---									
Equipment Description:														EQ ID Number:							
Compressor, air, screw, rotary, 40 HP, with integral dryer														8276							

8276 Equipment Cutsheet

Equipment Description: Compressor, air, screw, rotary, 40 HP, with integral dryer	EQ ID Number: 8276
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Manufacturer: Kaeser Compressor	Model No.: ASD40ST
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Technical Specifications

Model	Pressure Range ⁽¹⁾ (psig)	Capacity (acfm) ⁽²⁾	Rated Motor Power (hp)	Sound Level (dB(A)) ⁽³⁾	Standard Air-cooled ⁽⁴⁾ Units		Air-Cooled Units with Integral Dryer	
					Dimensions L x W x H (in.)	Weight (lb.) ⁽⁵⁾	Dimensions L x W x H (in.)	Weight (lb.) ⁽⁵⁾
ASD 25	125	112	25	66		1345		1555
ASD 30	125	132	30	67		1369		1579
	175	110						
ASD 40S	125	162	40	67	57 ¹ / ₂ x 35 ¹ / ₂ x 60 ¹ / ₄	1537	69 ⁵ / ₈ x 35 ¹ / ₂ x 60 ¹ / ₄	1747
	175	127						
	217	106						
ASD 40	125	191	40	69		1570		1779
	175	159						
	217	123						



8637 Equipment Datasheet

Manufacturer:		Manchester Tank				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		302433				Equipment		36 dia.		---		101			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	42	Above	24	
									Right	24	Back	24	Below	---	
DISCIPLINE COORDINATION:															
Architectural		Coordinate size of housekeeping pad with equipment.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y					
Structural		Unit weight: 783 pounds				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		Y					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		---		---		---	
								Voltage		---		---		---	
								Phase		---		---		---	
								Horsepower (HP)		---		---		---	
								Amps		---		---		---	
						Connection Type		---							
Plumbing		Floor sink adjacent to compressor, dryer, and receiver to oil separator. 1 inch NPT drain connection.				Domestic Water		Connection (inches)		---					
										Flow Rate (GPM)		---			
										Capacity (PSI)		---			
						Natural Gas				Connection (inches)		---			
										Capacity (BTU)		---			
						Drain				Floor Sink (Y/N)		Y			
												Connection (inches)		---	
						Compressed Air		Volume (CFM)		---					
								Capacity (PSI)		---					
Equipment Description:										EQ ID Number:					
Receiver, vertical mounted, 400 gallon										8637					

8637 Equipment Cutsheet

Equipment Description:

Receiver, vertical mounted, 400 gallon

EQ ID Number:

8637

Manufacturer:

Manchester Tank

Model No.: 302433



9315 Equipment Datasheet

Manufacturer:		Unilube Systems					Dimensions		Length (inches)		Width (inches)		Height (inches)	
Model No.:		Pit Guard, Pit Cover					Equipment		38		40-1/2		2	
Provided:	Cutsheet	Y	Functional Model	N	Design Details	Y	Operational Clearance	Left	1/2	Front	0	Above	0	
							Right	1/2	Back	0	Below	0		
DISCIPLINE COORDINATION:														
Architectural		Coordinate clearances and design with structural.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Structural		Pit guard cover will sit on rails the entire length of pit; Provide support for pit guard; Reference Manufacturer's Equipment Design Details.					Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)			N		
Mechanical		---					Venting		Connection (inches)			---		
									Volume (CFM)			---		
Electrical		---					Connection Size		Requirements			---	---	---
									Voltage			---	---	---
									Phase			---	---	---
									Horsepower (HP)			---	---	---
									Amps			---	---	---
							Connection Type		---					
Plumbing		---					Domestic Water		Connection (inches)			---		
									Flow Rate (GPM)			---		
									Capacity (PSI)			---		
							Natural Gas		Connection (inches)			---		
									Capacity (BTU)			---		
							Drain		Floor Drain (Y/N)			N		
							Compressed Air		Connection (inches)			---		
									Volume (CFM)			---		
									Capacity (PSI)			---		
Equipment Description:										EQ ID Number:				
Cover, safety, metal										9315				

9315 Equipment Cutsheet

Equipment Description:

Cover, safety, metal

EQ ID Number:

9315

Manufacturer:

Unilube Systems

Model No.: Pit Guard, Pit Cover



9900 Equipment Datasheet

Manufacturer:		Genfare				Dimensions		Length (inches)		Width (inches)		Height (inches)			
Model No.:		Dualport stationary vault				Equipment		32		36		66			
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	24	Front	60	Above	---	
								Right	24	Back	---	Below	---		
DISCIPLINE COORDINATION:															
Architectural		Coordinate with manufacturer's shop drawings for installation of through wall vault receiver; Coordinate probe and retractor location, if applicable.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Structural		---				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N					
Mechanical		---				Venting		Connection (inches)		---					
								Volume (CFM)		---					
Electrical		---				Connection Size		Requirements		---		---		---	
								Voltage		---		---		---	
								Phase		---		---		---	
								Horsepower (HP)		---		---		---	
								Amps		---		---		---	
						Connection Type		---							
Plumbing		---				Domestic Water		Connection (inches)		---					
								Flow Rate (GPM)		---					
								Capacity (PSI)		---					
						Natural Gas		Connection (inches)		---					
								Capacity (BTU)		---					
						Drain		Floor Sink (Y/N)		N					
						Compressed Air		Connection (inches)		---					
								Volume (CFM)		---					
								Capacity (PSI)		---					
Equipment Description:										EQ ID Number:					
Vault, collection, revenue										9900					

9900 Equipment Cutsheet

Equipment Description: Vault, collection, revenue	EQ ID Number: 9900
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Manufacturer: Genfare	Model No.: Dualport stationary vault
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9910 Equipment Datasheet

Manufacturer:		Genfare				Dimensions		Length (inches)		Width (inches)		Height (inches)		
Model No.:		Garage Data System with accessories				Equipment		---		---		---		
Provided:	Cutsheet	Y	Functional Model	Y	Design Details	N	Operational Clearance		Left	---	Front	---	Above	---
								Right	---	Back	---	Below	---	
DISCIPLINE COORDINATION:														
Architectural		Coordinate location of data probe installation.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Structural		Coordinate location of data probe installation.				Housekeeping Pad		Mounted 6 inch high, steel reinforced (Y/N)		N				
Mechanical		---				Venting		Connection (inches)		---				
								Volume (CFM)		---				
Electrical		Provide one inch conduit from probe to electrical room; Provide one inch conduit for data/control wire from system computer to j-box (up to 1,000 feet).				Connection Size		Requirements		Unit	---	---	---	
								Voltage		120	---	---	---	
								Phase		1	---	---	---	
								Horsepower (HP)		---	---	---	---	
								Amps		20	---	---	---	
						Connection Type		Provide j-box						
Plumbing		---				Domestic Water		Connection (inches)		---				
								Flow Rate (GPM)		---				
								Capacity (PSI)		---				
						Natural Gas		Connection (inches)		---				
								Capacity (BTU)		---				
						Drain		Floor Drain (Y/N)		N				
						Compressed Air		Connection (inches)		---				
								Volume (CFM)		---				
								Capacity (PSI)		---				
Equipment Description:										EQ ID Number:				
Probe, farebox, with software system										9910				

9910 Equipment Cutsheet

Equipment Description:

Probe, farebox, with software system

EQ ID Number:

9910

Manufacturer: Genfare

Model No.: Garage Data System with accessories



GENERAL NOTES

- OCS is only located in the parking areas and certain maintenance bays, as noted.
- Relevant requirements fall in the 2018 criteria (pp 1-5). The remaining information are reference materials that may inform some design decisions.
- LMD shall design a site specific solution, with deviations from the tension requirements outlined in this appendix permitted upon approval by the SFMTA.
- LMD shall take particular note to design an OCS solution for the trolley fleet that anticipates a smooth transition to battery electric bus.

APPENDIX B: SFMTA OCS DESIGN CRITERIA

I. **GENERAL**

These criteria govern the Overhead Contact System (OCS) design, to provide a safe, reliable and efficient system to deliver electrical power to support and Electric Trolleybuses (ETBs).

A. **References**

The latest edition of the applicable standards, codes, and guidelines of the following organizations shall be used for all designs unless otherwise required by this section:

- California Public Utilities Commission (CPUC) General Order No. 95, Rules for Overhead Line Construction
- California Public Utilities Commission (CPUC) General Order No. 128, Rules for Construction of Underground Electric Supply and Communications Systems.
- Muni High Performance Trolley Coach Overhead Wire Minimum Standards
- Design standards and criteria developed on previous Muni projects
- American with Disabilities Act (ADA), 49 CFR parts 27, 37 and 38
- American National Standards Institute (ANSI) C2, National Electric Safety Code
- American Public Transit Association (APTA) – Rapid Transit Standards
- California Code of Regulation (CCR), Title 8, Industrial Relation
- California Code of Regulation (CCR), Title 23, Waters
- California Code of Regulation (CCR), Title 24, Building Standards Code
- California Occupational Safety and Health Association (Cal OSHA)
- City of San Francisco Standard Plans and Specifications
- Code of Federal Regulations, Title 29, Part 1910, Occupational Safety and Health Standards
- Code of Federal Regulations, Title 41, Public Contracts and Property Management
- Code of Federal Regulations, Title 49, Part 212, State Safety Participation Regulations

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- Illuminating Engineering Society (IES) Model Lighting Ordinance (MLO)
- Insulated Cable Engineers Association (ICEA)
- National Electric Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA) Standard 130, Fixed Guideway Transit and Passenger Rail Systems
- Occupational Safety and Health Act of 1970 (OSHA)
- San Francisco County Ordinance Code
- San Francisco Municipal Code
- Telecommunications Industry Association (TIA)
- Underwriters Laboratories (UL)
- Uniform Building Code (UBC)
- Uniform Fire Code (UFC)
- Uniform Plumbing Code (UPC)

Where more than one code, standard, or criterion is applicable, the most restrictive shall govern, except as indicated in this document. The Safety Criteria shall be reviewed in light of new editions and issues of these codes and standards at the beginning of each design phase and shall be amended as appropriate. All materials, equipment, design, manufacturing methods, installation, and testing shall conform to all applicable Federal, State, and local codes and regulations. In addition, Muni standards and established Industry Standards and practices shall govern the design and construction.

II. DESIGN CRITERIA

This section provides the general OCS design criteria. Project specific design criteria addressing the project needs should also be incorporated.

A. Electric Trolley Buses (ETBs)

Overhead hardware used should be products of manufacturers regularly engaged in the production of such material and equipment, and is of the manufacturer's latest design

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approved by Muni. This is to ensure compatibility and interchangeability with the current Muni overhead hardware and spare parts. The followings are specific hardware characteristics for the project:

1. Hardware Criteria
 - i. Overhead Contact System Type - OCS shall be a rigid type system similar to Ohio Brass (OB)/Westinghouse Air Brake Company (WASCO)/Impulse NC, Inc Contact System or a flexible system similar to Kummler & Matter System.
 - ii. Contact Wire- Contact wire shall be bronze, grooved, alloy 80 conforming to ASTM B9-90. The following characteristics shall be used:

Table II.B.1 Trolley System Contact Wire Standards

Description	Min. Standards
Contact Wire for Trolley Vehicles	#4/0 or #2/0
#4/0 Contact Wire Tension @ 60°F	3000 lb per wire
#2/0 Contact Wire Tension @ 60°F	2000 lb per wire
Contact Wire Height	19ft-6in ± 3in
Contact Wire Spacing	2ft
Axis of Trolley wire pair from curb unless otherwise noted	14ft
Maximum Unsupported Contact Wire Span	100ft

- iii. Overhead Components and Trolley Wire Replacement – Replace overhead components and trolley wires that have a service life of less than 50%.
 - iv. Leading Switch -15° Induction Controlled
2. Trolley Wire Alignment shall be in accordance with guidelines and criteria established by Municipal Railway High Performance Trolley Coach Overhead Minimum Standards.

C. Overhead Supports and Foundations

1. OCS Poles

Steel poles shall be in accordance with Muni Standard Drawing CL-7971, Rev. 2. Standard pole Types 761N, 765N, 767 and 770 should be used.

New poles should be in line with property line between adjacent properties and avoid fronting doors, windows, and access ways wherever possible. They should be

Capital Programs & Construction

located within the first flag from the curb (18in to near side face and 24in to center of pole approximately). New poles should be 3ft from low-pressure hydrant and 5ft from high-pressure hydrant from centerline of pole to centerline of hydrant. New poles should be located away from new and existing ADA curb ramps, trees, sub-sidewalk basements, etc.

Where an existing pole is replaced with a new pole, the new pole should be 4ft away (minimum) from the present location. At intersections adjoining side platforms the poles should be as clear of the corner as possible to avoid being hit by right turning trucks. Other overhead utilities might share pole and air space such as PG&E, PAC Bell, TCI and/or Viacom.

Wherever possible, poles should be combined with streetlight and traffic signals to reduce the number of poles. Combination poles should be located within 3ft of perpendicular property line.

Poles with feeder risers inside should not be combined with traffic signals.

2. Poles Foundations

Unless otherwise noted, existing foundations should be removed to a depth of 3ft below the finished grade. Where a pole has to be replaced in place due to space constraint, the existing foundation should be removed entirely and new foundation installed in place.

New standard pole foundations shall be in accordance with Muni Standard Drawing CL-7971, Rev. 2. Where special foundations are required, they shall be designed according to the current codes, regulations and field conditions.

3. Pole Replacement

Replace City-owned wood, segmented, concrete, and/or steel poles that are bending, leaning, deeply pitted, undersized, with exposed rebars, rusted and/or with holes along the shaft or base.

4. Protection Devices

Wood troughs, preformed glass/epoxy shields, or approved apparatus of a custom design if necessary, should be used wherever the overhead support structure shall be protected against possible arcing conditions and in accordance to the GO 95, Rules for Overhead Lines Construction.

Guy wire span supports shall include tree guard or similar item to protect against trolley shoe snags during dewirement from a trolley vehicle.

5. Finish Treatment

Unless otherwise required by urban design requirements or streetscape master plan, new steel pole shall have a galvanized finish (Not Painted). Existing steel trolley pole shall be painted to match galvanizing or existing coating color. Anti-graffiti coating shall be applied to the bottom 8 ft of the pole.

6. All new OCS poles shall be grounded.

Appendices

- 1.** Transmission of Trolley Coach Overhead Wire Guidelines, dated 4/6/89
- 2.** New Muni Overhead Trough Suspension Instructions, 8/4/94



SAN FRANCISCO MUNICIPAL RAILWAY 949 PRESIDIO AVENUE, SAN FRANCISCO, CALIF. 94115 415-673-6264

FINAL

TO: Don Keener
FROM: W. G. Stead *William Stead*
DATE: April 6, 1989
RE: TRANSMISSION OF TROLLEY COACH OVERHEAD WIRE GUIDELINES

Enclosed is a copy of the Municipal Railway High Performance Trolley Coach Overhead Standards. These standards represent MUNI policy on those issues relative to the design of our Trolley Coach Overhead System, and should be followed by UEB designers on MUNI trolley overhead projects. If UEB believes that these standards cannot be applied to a particular circumstance, which will happen, the MUNI project coordinator should be contacted to review the circumstances.

Our staff is prepared to work with your Project Managers and Designers in implementing these guidelines. In particular, we will be providing UEB with explanatory drawings of key concepts contained in the guidelines.

These guidelines should eliminate the need for ad hoc communication between MUNI personnel and UEB designers during the design phase of these projects, and all communication will go through the UEB Project Manager to/from the MUNI Project Coordinator.

cc: J. Ivester
E. Pearson
B. Bernhard
J. Katz
✓ M. Cohn, UEB

Enc.

OVRDGLN



SAN FRANCISCO MUNICIPAL RAILWAY 949 PRESIDIO AVENUE, SAN FRANCISCO, CALIF. 94115 415-673-6864

TO: W. G. Stead
THRU: J. Ivester
B. Bernhard
FROM: John Katz
DATE: April 6, 1989
RE: TROLLEY COACH OVERHEAD DESIGN STANDARDS/SIGN-OFF

Enclosed is the final draft of the Trolley Coach Overhead Design Standards. These standards were drafted by Carl Natvig of the Service Planning Department, and revised by the Trolley Coach Overhead Committee. The members of the committee are Art Curtis (Deputy Superintendent Surface Transportation), Harold Conklin (Manager, Hetch Hetchy Overhead Lines Department), Peter Straus (Director of Service Planning), and Galen Sarno (Chief Electrical Engineer, MRED). All have approved this final draft for use by UEB designers when designing new or reconstructed trolley overhead projects.

These standards incorporate the decision you made, based on the recommendation of Ed Pearson, that Ohio Brass-type suspension should be employed on all tangent wire at this time.

We recommend that you approve these guidelines by signing the enclosed transmission memo to UEB.

We also want to thank Bobbie Chapman for doing such a super job of typing the many drafts of this document in both a professional and pleasant manner.

Enc.

DESGNSTD

MUNICIPAL RAILWAY
 HIGH PERFORMANCE TROLLEY COACH OVERHEAD WIRE
 MINIMUM STANDARDS

**note: @ all cases, use template which has a better visual view of what is really happen.*

I. SWITCHES

regular service switch

from station to route

A. Scheduled Service or Pull-in Pull-out Switches

1. Mechanical Crossing.

-(10 degree switch is awaiting test results)-

- a. Leading Switches. A 10 or 15-degree mechanical crossing with stainless steel or similarly moveable runners shall be used for all regularly used leading switches.
- b. Trailing Switches. A 10 or 15-degree mechanical crossing with stainless steel or similarly durable moveable runners shall be used for all regularly used trailing switches.
- c. Preferred Direction. The runners shall be set to favor the more heavily used direction where use is 50% less and speeds below 15 mph in the less used direction.

2. Inductive Control.

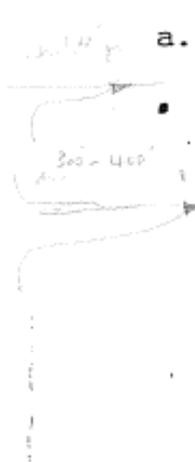
and 10°
 Inductive control shall be provided for all advance 15-degree switches.

3. Single-coil. A single-coil with mechanical reset shall be employed with inductive control switches.

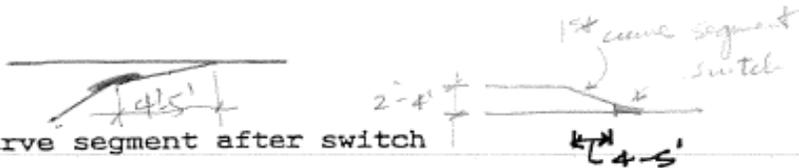
min. - not prefer double-coil.



4. Advance Switch Spacings. All regularly used leading switches shall be located in advance of the intersection as follows:



- a. Leading switch to intersection nearside stop line
 - (1) Left or right-hand - one or two lanes in each direction90-110 feet (one span)
 - (2) Left-turn - three or more lanes in direction of travel300-400 feet (three or four spans)
 - (3) Left-turn - unique condition (auto queues, etc.)as specified by MUNI



b. First curve segment after switch

First curve segment to advance switch
.....4-5 feet

(From the trailing tip of the switch crossing plate or insulated runner assembly to the leading tip of the curve segment.)
(To minimize forward acceleration on poles.)

- c. Inductive antenna to leading switch
.....40 feet
 - d. Inductive antenna to indicator light
.....170 to 240 feet
(i.e. second span from switch or as specified by MUNI)
5. Indicator Lights. Indicator lights (see reference drawing) shall have the following characteristics:
- a. 8 inch lenses.
 - b. Masked for 1-1/2 by 6 inches.
 - c. Double filament lamps if available.
 - d. Straight indication on top, diagonal turn indication below.
 - e. Pole-mounted wherever possible. Guy mounts may be used where there are visual obstructions or when requested by MUNI.
 - f. 8 inch hood.
 - g. Lamp voltage and series resistance designed for minimum 2-year life.
 - h. A micro-switch as specified by MUNI shall be used for the light switch.

6. Control Wiring.



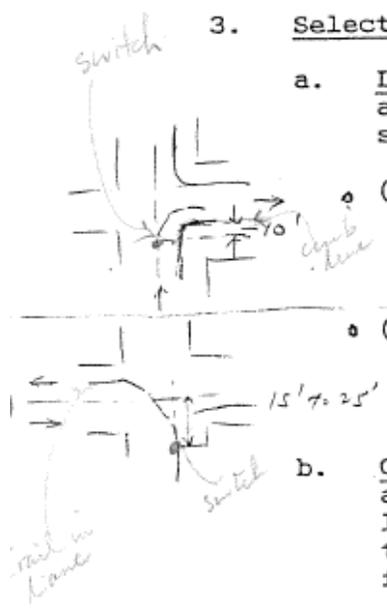
- a. Control wiring shall be suspended from a separate messenger wire of 3/16 inch diameter at least 2 feet above the contact wire level.
- b. Control wire cable shall be multi-conductor, color coded, single jacket. *in spec.*

7. Y-Switches. A 10 or 15-degree Y-switch shall be used where the dominant direction of travel is in the turning direction.



mostly 30° (NON REVENUE ROUTE)
B. Emergency Switches (NON REVENUE ROUTE)

1. 30-Degree Switches. *Lead* Selectric 30-degree switches shall be employed for all right turns and for all left turns with the exception of left turns where there is more than one lane in the direction of travel. (No 23-degree switches shall be used.)
2. Advance Switches. Advance, left-hand, inductive 10 or 15-degree switches shall be employed for left turns on streets with more than one lane on the lead-in street.
3. Selectric Switch and Curve Segment Location.



- a. Leading Selectric Switch. The following standards are intended to prevent the false activation of selectric switches:
 - (1) Right-turns. The leading switch frogs shall be located approximately 10 feet before the curb line of the trail-in street for right turns.
 - (2) Left-turns. The leading switch frogs shall be located approximately 15 to 25 feet before the traffic dividing line of the trail-in street for left turns.
- b. Curve Segment. The first curve segment shall have a spacing of 0-5 feet from the trailing tip of the leading selectric switch to the leading tip of the curve segment for right turns and 0-10 feet for left turns.
- c. Trailing Switch. The trailing switch shall be located over the center-rear of turning coaches wherever possible.
- d. Selectric Switch Alignment. Selectric switch layouts need not be aligned over the inside rear corner of turning coaches.

use len plate instead of these guidelines
shall be a straight crossing always

8. Combination Curve-Crossings. No combination curve-crossings shall be used unless specifically approved by MUNI. Additional curve segments shall be used to avoid use of combination curve-crossings.

9. Tangent Clamps. A maximum of 1.25 degrees per foot of curve runner or per HS-type clamp shall be used.
use if angle less than 5°

10. Curve Alignment. All curve segments shall be located over the inside rear corner of the turning coach as determined by field tests. The location of coach stops should be considered in determining the typical path of a turning coach.

a. Right Turns. The contact wire axis shall be 2-3 feet from the curb at the apex of right turns; and the ~~apex~~ and last curve segments shall be 8 to 11 feet from the curb unless specified otherwise by MUNI. *Second*

b. Left Turns. As a general rule, the left turn wire should pass over the two intersecting points of the stop lines and the traffic dividing lines in the path of the turning coach (on two-way, one lane per direction streets). *Second*

11. Guying in Turns. Curve segments shall be located in such manner axially and laterally within plus or minus \pm 2 feet of the path of the inner rear corner of the turning coach to minimize the amount of guying required to support the curve segments.

stop line
striping
path of coach

B. Emergency Routes

1. Curvature. A maximum of 30 degrees per curve segment shall be used.

2. Long Radius Turns. For turns with a radius of 50 feet or greater, additional curve segments shall be used as needed.

3. Combination Curve-Crossings. No combination curve-crossings shall be used unless specifically approved by MUNI. Additional curve segments shall be used to avoid use of combination curve-crossings.

4. Curve Alignment. (The same as for regularly used turns with the exception of selectric switch turn lay-outs.)

III. SECTION INSULATORS
(No. Bos, Breakers, Insulated Runners)

- A. Far-Side Crossings. Insulated runners shall be in the far-side crossing for each direction of coach travel at intersections.
- B. Section Insulators. Insulated runners between circuits shall be located in non-accelerating locations if a far-side crossing is not available.
- C. Switches. Insulated runners in switches shall be in the turn-out direction in leading and trailing switches.
- D. Exceptions. Exceptions to the location of insulated runners shall be employed only when specified by MUNI. Possible exceptions may be as follows:
 - 1. Some crossings in left-turns.
 - 2. Some crossing locations with steep up-hill grades on narrow streets with heavy traffic.
 - 3. Some switches where the turning direction is the dominant direction of travel.
 - 4. Emergency routes will generally have all the insulated runners when crossing revenue routes.
- E. Magnetic Blowout. Magnetic blowouts of a type approved by MUNI (a permanent magnet type is now used) shall be used on the first insulated runner of switches, crossings, and section insulators.

IV. TANGENT WIRE

- A. Tangent Wire Suspension. OB type or equivalent suspension system will be used on all tangent runs.
- B. Concave and Convex Vertical Curves. All vertical curves shall be designed for 25 mph or the typical speed of traffic, whichever is greater, with a maximum of 1.25 degrees of curvature per foot of runner. (A lower design speed may be used where coaches turn sharply at the vertical curve.) Vertically curved K & M clamp-type curve runners (with rigid suspension), K & M copper tubing with passage clamps, or equivalent clamp-type runner shall be used.
- C. Single-Track. Bracket arms or davit poles with flexible suspension shall be used for single-track runs except: concave vertical curves; where distances between the curb and wire locations are more than 18 feet; or where trolley poles are already in place.
- D. Tangent Wire Axis. The following wire axis to curb distances shall be used:
 - 1. One or two lanes per direction.
 - a. For streets narrower than 48 feet:
-14 feet OR center of traffic lane - whichever is greater.
Center of trolley wires to curb line
 - b. For streets wider than 48 feet:
-16 feet OR center of traffic lane - whichever is greater.
 - 2. Three lanes per direction.
.....center of traffic lane plus 3 feet
-18 feet maximum
 - 3. Three lanes per direction with loading bulbs
-20 feet
(only where all stops have bulbs)

* Poleman = 450 - 18' CLEARANCE | according to
60° - 19' CLEARANCE. | DPT/OPW?
Criteria?

VII. INTERSECTIONS

- A. Network Guys. A maximum of three guys shall be attached to bull rings on the high tension side of curve segment support networks. A greater effort to network and reduce guys should be employed in residential areas than in industrial areas.
- B. Brail Wires. Brail wires shall be used primarily on the inside of turn layouts and be located a minimum of 3 feet from parallel contact wires.
- C. Constant-Carbon-Contact. Constant-carbon-contact for all crossing plates and switches shall be used. Fabricated OB deep-runner crossing plates shall not be used. ?
- D. Design Life. Adequate minimum runner depth in flangeways of crossing plates and switch plates shall be employed to allow for a clearance of 1-3/8 inches after 2 million carbon trolley shoe passages (with a pressure of 28 pounds). Flangeways shall be configured to allow easy passage of bent poles.
- E. Pole Location. Generally, trolley support poles should be located to minimize the total length of guy wires. Generally, no more than 2 poles per corner should be used. Generally, advance switches should be located one span from the adjacent intersection, the main tension guy (head guy) attached to the switch should be attached to a pole or poles one span from the switch.
- F. Eyebolts. Eyebolts shall be employed wherever practical to install and if buildings of suitable strength are available. (City policy requires that all new buildings of adequate strength along existing or proposed trolley coach routes must provide eyebolts.)
- G. Traffic Signal Pre-empts. Traffic signal pre-empts shall be provided at signalized intersections as specified by MUNI (in consultation with other City departments). New signalized intersections shall be provided as specified by MUNI (in consultation with other City departments).

OVHDSTDS

9/18/85
Revised 11/28/86
Revised 5/17/88
Revised 9/15/88
Revised 11/2/88
Revised 3/20/89
Revised 4/5/89



POWER, SIGNALS & ELECTRONICS, 2502 ALAMEDA ST., SAN FRANCISCO, CA 94103

Appendix 2



August 4, 1994

T O : John Katz
F R O M : Vic Lameyse *VL*
S U B J E C T : NEW MUNI OVERHEAD TROUGH SUSPENSION INSTRUCTIONS

Attached is the new instruction on our overhead trough suspension. Also included is a drawing detailing the suspension.

If you have any comments, please let me know at 554-9201.

cc: Ray Favetti
Draw Howard
William Wong

PUBLIC UTILITIES COMMISSION CITY AND COUNTY OF SAN FRANCISCO



MUNI OVERHEAD TROUGH SUSPENSION INSTRUCTION

The trough for Muni Overhead suspension should be made of hardwood and it should be waterproof for outside use. But if it has to be installed inside a building or in an enclosure, then the wood need not be necessarily be waterproof. All troughs should be designed in a way that will enable the crew to reach the top above the trough during maintenance so that you can repair insulators that support the overhead in the trough.

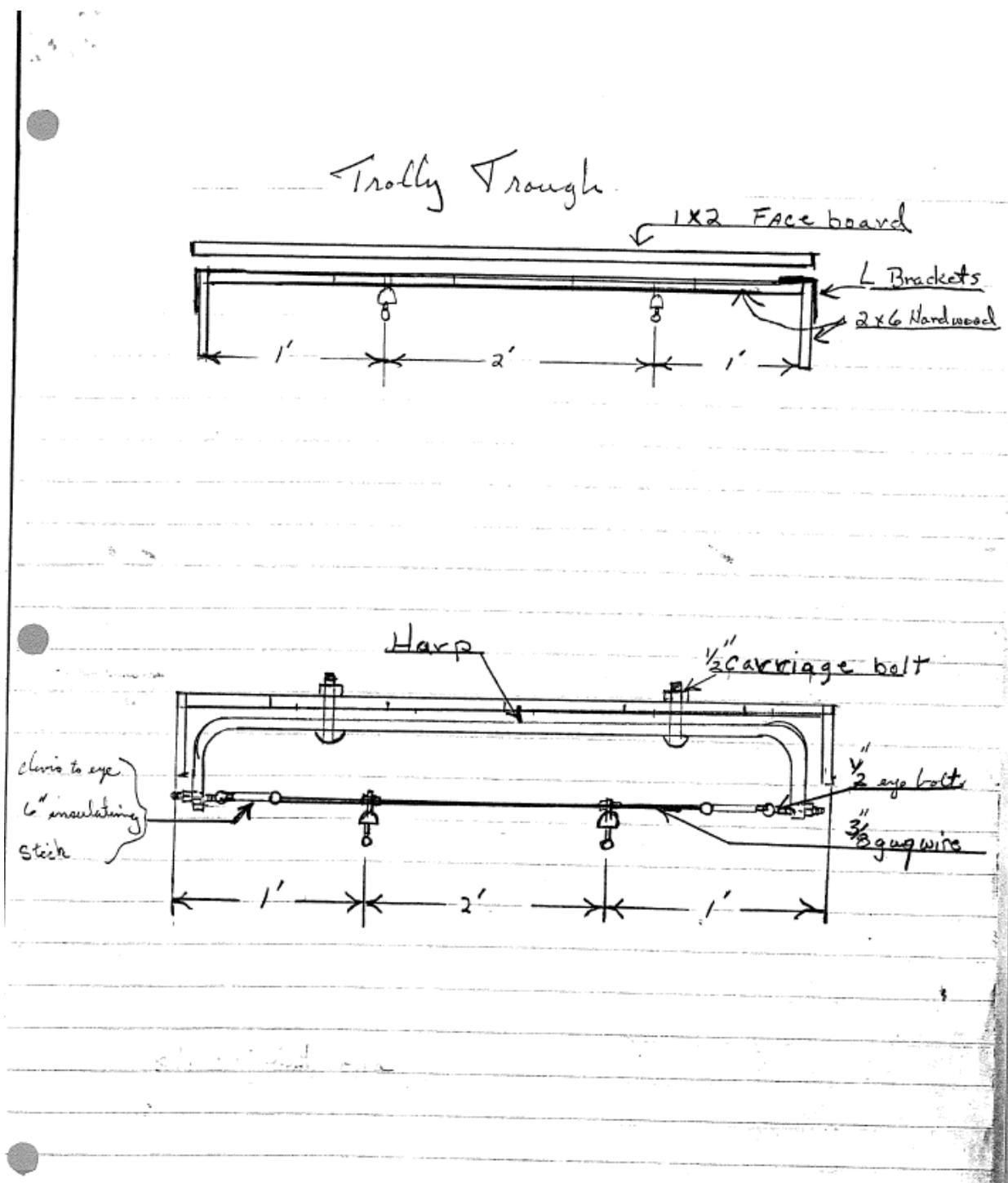
The wood should run parallel with the wire and be made of 2" x 6" as well as the kickboard on the sides. On each side of the outside wire, should have a 1 foot clearance between the wire and kickboard. A 1" x 2" board should be installed on the face of the trough to prevent the wood from splitting from poles hitting it. An "L" bracket should be installed to strengthen the kickboard from pulling apart. The trough should extend 2 feet passed the ends of the structure so we can mount a harp if needed.

Harps should be installed where the nearest tangent support wire is more than 60 feet from either end of the trough. Harps are made of steel channel iron 6" x 1" and have 2 clevis to eye 6" stick, with threaded eye bolt to adjust tension on harp. Harps should be 4 feet long (see attached drawing on Harp).

Splice joints should be made of channel iron 2" x 6" to give support to splices in trough so it would not sag.

Also, lags and wood screws should not be used because they will only pull apart. When putting together splices and attachments always use nuts, bolts, lock washers and flat washers.

USE 1/2" CARTRIDGE BOLT



525. 24 : 08 '87

WORKING PROPERTIES OF COMMON WOODS

Name of Wood	General Characteristics							Machining					Remarks
	Weight per Cu. Ft. (1)	Hardness	Strength (2)	Stability (3)	Gluing	Nailing (4)	Steam Bending	Planing and Jointing (5)	Turning (6)	Sanding (7)	Shaping	Mortising (8)	
Ash	35	Med.	Med.	Best	Fair	Good	Good	Good 10-25		Best 2/0			Tough - Hard to work with hand tools.
Basswood	24	Soft	Weak	Good	Best	Best	Poor	Good 20-30	Poor	Poor	Poor	Fair	Excellent for trays, drafting boards.
Beach	39	Hard	Med.	Poor	Poor	Poor	Good	Fair 10-20	Fair	Good 4/0	Fair	Best	Not durable outside. Hard on tools because of mineral deposits.
Birch	40	Hard	Strong	Fair	Fair	Poor	Good	Good 15-20	Good	Fair 4/0	Best	Best	Excellent for furniture, turning, dowels, handles.
Butternut	25	Soft	Weak	Best	Good	Fair	Poor	Good 10-25	Good	Fair 4/0	Fair	Fair	Furniture—Perfect for walnut imitation.
Cherry	36	Med.	Med.	Good	Best	Fair	Poor	Best 10-25	Best	Best 4/0	Best	Best	Furniture, hand trim, novelties.
Chestnut	27	Soft	Weak	Best	Best	Good	Fair	Good 15-20	Best	Best 3/0	Good	Good	Stains badly in contact with wet iron. Very dusty in all machining ops.
Cottonwood	27	Soft	Weak	Fair	Best	Best	Poor	Poor 5-20	Poor	Poor 4/0	Poor	Fair	Excellent for boxes & other nailing jobs—wears very well for soft wood.
Cypress	29	Soft	Med.	Good	Fair	Fair	Poor	Good 15-25	Poor	Fair 2/0	Poor	Poor	Tends to splinter. Most durable of Amer. woods for outdoor & soil expos.
Elm (Southern)	34	Med.	Med.	Poor	Fair	Best	Good	Poor 15-20	Poor	Good 2/0	Poor	Good	Very durable under paint. A good furn. wood despite diff. in machining.
Gum (Red)	33	Med.	Med.	Poor	Best	Good	Fair	Fair 10-20	Best	Fair 4/0	Fair	Fair	One of the most used furn. woods for imitations of walnut & mahogany.
Hickory	42	Hard	Strong	Good	Good	Poor	Good	Good 10-25	Good	Best 2/0	Fair	Best	Excellent for furniture & steam bending, tool handles, wheels.
Poplar	30	Soft	Weak	Fair	Best	Best	Best	Good 5-15	Fair	Good 4/0	Good	Poor	Excellent for steam bending. Often marketed as poplar.
Mahogany	35	Med.	Med.	Best	Best	Good	Poor	Good 5-25	Best	Good 4/0	Best	Best	One of the best furniture woods
Mahogany (Phil.)	33	Med.	Med.	Best	Best	Good	Poor	Good 5-25	Good	Poor 3/0	Fair	Fair	Generally coarser & softer than true mahogany. Furn., boat planking, trim
(9) Maple (Hard)	41	Hard	Strong	Good	Fair	Poor	Fair	Fair 15-20	Good	Good 4/0	Best	Best	Fine furn., flooring, turnings, bowling pins. One of the best hardwoods.
Maple (Soft)	31	Med.	Med.	Fair	Good	Fair	Fair	Poor 10-15	Fair	Good 4/0	Fair	Poor	Some uses as hard maple but an inferior wood. Difficult to mach. smth.
Oak (Red)	39	Hard	Strong	Best	Good	Good	Best	Best 10-25	Good	Best 2/0	Fair	Best	Substitute for white oak in cheaper work.
Oak (White)	40	Hard	Strong	Best	Good	Good	Best	Best 10-20	Good	Best 2/0	Good	Best	Interior trim, floors, furniture. One of the most used American woods.
Pine (White)	25	Soft	Weak	Good	Best	Best	Poor	Good 10-25	Good	Fair 2/0	Good	Fair	Best all around soft wood. Excellent for paint.
Pine (Yellow)	38	Hard	Strong	Fair	Fair	Poor	Poor	Good 10-25	Poor	Fair 2/0	Good	Good	Main uses—house construction, trim, floors.
Poplar	29	Soft	Weak	Good	Best	Best	Fair	Good 5-20	Good	Poor 4/0	Poor	Fair	Excellent for carvings, toys, corestock.
Redwood	29	Soft	Med.	Best	Best	Good	Poor	Good 10-25	Fair	Poor 2/0	Good	Poor	Excellent for outdoor furniture, window sills, etc.
Sycamore	35	Med.	Med.	Poor	Good	Best	Poor	Poor 5-15	Good	Poor 3/0	Poor	Best	Interior trim, furniture. Difficult to mach. but excellent appearance.
Walnut	36	Med.	Strong	Best	Best	Fair	Good	Good 15-20	Best	Best 4/0	Good	Best	Has every good feature for furniture and cabinet work.

NOTES: Data in this chart is largely from extensive tests made by U.S. Forest Products Laboratory, with some additions.

- 1. Pounds per cubic foot, dry. All woods vary in weight, even in the same tree from trunk to top. A variation of 10% over or under average should be allowed.
- 2. Composite strength value. Woods rated weak are strong enough for all average work.
- 3. Rated on unrestrained warp. Most woods are quite stable if properly seasoned and cared for.
- 4. Rated on ability to take nails near end without splitting.
- 5. Rated on flat grain stock, shallow cut. Rating is average from runs at 15, 20 and 25-degree cutting angles. Bottom figure is best knife angle for smooth cutting.
- 6. Rated on smooth cutting and ability to hold detail. Not much difference between best and good.
- 7. Rated on freedom from fuzz. Bottom figure is
- 8. Rated on smoothness of cut. Work speed decreases with hardness of wood and this factor might be of more importance than smoothness in production work.
- 9. Sugar, white or hard maple. Should be distinguished from silver, red, big-leaf or soft maple, which is an inferior machining wood although often marketed simply as "maple."

Please file with your Trolley Overhead Standards



SAN FRANCISCO MUNICIPAL RAILWAY 949 PRESIDIO AVENUE, SAN FRANCISCO, CALIF. 94115 415-673-6864



TO: DICK BRANDT

FROM: JOHNNY B. STEIN *Johnny B Stein*

DATE: JANUARY 31, 1994

RE: AMENDMENTS TO TROLLEY OVERHEAD DESIGN STANDARDS

The enclosed document is a set of amendments to the High Performance Trolley Overhead Standards originally transmitted to you in 1989. While the original standards have been extremely helpful in designing improved and consistent overhead projects, they were incomplete in some areas and need revisions in others.

Therefore the purpose of the enclosed amendments is to set standards in areas that were not covered by the original guidelines (tensioning and support), or to make changes in other areas (guy wire, control wiring).

Since these standards were worked out in meetings between our overhead committee and your overhead design staff they should be easy to understand and implement. In fact some of these concepts are being incorporated on a project by project basis but have not yet been codified as a set of amendments to the standards.

Please call John Katz if you have any questions about the content of these standards. Thank you.

cc: Phil Chin
Phil Adams
Kathy Gilbert
John Katz
Hoy Wong
Vic Lameyse
Peter Straus
Art Curtis
Carl Natvig

VIII. TENSIONING AND SUPPORT



- A. Head Guy. Only the head guy wire should be held with great tension.
- B. Side Guys.
 - 1. All side guys should be attached lightly to special work, usually about 200-300 lbs. tension.
 - 2. All side guy wires should be hung from the highest point on the pole so they will not interfere with other guy wires or contact wire.
- C. Tangent Span Tension.
 - 1. Tangent spans are installed to support the trolley wire weight only, except where there are significant grade slopes.
 - 2. In most cases tension on tangent spans should be not more than 500 lbs.
- D. Curve Segment Guy Strands. Where possible each curve segment guy strand should be supported independently of the other curve segments. Multiple guying to several segments in the opposing corner and/or special work should be avoided. The exception to this is where parallel turns can be supported by one guy wire.
- E. Final Contractor Adjustment. After initial installation but prior to final acceptance of the job the contractor should adjust pole band heights of guy wire in order to avoid guy wire interference coming within one foot of contact wire. This can be done by having the contractor leave a 2' tail on the end of the guy wire at the pole. The remaining tail should be cut off at the completion of the final adjustment.

IX. GUY WIRE SIZE AND TYPE

- A. Type. Use 3/8" utilities guy wire rated at least utilities grade 4. Do not use fiber guys. (replaces section VI-E)
- B. Securing Guy Wire. Preforms and dead end automatic will be used to secure guy wire. Do not use crimp on sleeves for dead ending.
- C. Do Not Use Thimbles. Thimbles for securing guy wire are not used and should be eliminated from all future material lists.

tools can do by spec.

X. CONTROL CABLE AND WIRING
(Replaces existing section 1-A-6.)

- A. Type. Multiple Control Cable should be seven (7), #14 wire single jacket with messenger.
- B. Messenger Wire. Messenger wire should be 1/4 inch diameter, suspended at least 2 feet above contact wire.
- C. Color Code. Muni will provide the color coding for control wiring for switches and multiple control cable. The contractor should not proceed with installation unless the wire colors are consistent with Muni color coding.
- D. All control wire should be installed with fuse protection.

OVHDGID2

PUBLIC UTILITIES COMMISSION
CITY AND COUNTY OF SAN FRANCISCO



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RICHARD E. BRANDT, MANAGER

MUNICIPAL RAILWAY
WATER DEPARTMENT
HETCH HETCHY
WATER AND POWER

February 22, 1994

MEMORANDUM

TO: Johnny B. Stein
FROM: Richard E. Brandt *R.E.B.*
SUBJECT: Trolley Overhead Design Standards

Thank you for your update of the Trolley Overhead Design Standards of January 31, 1994.

This update formalizes the current design practice being used as agreed by the Overhead Committee.

It should be remembered that these are general guidelines which sometimes have to be varied to meet site specific conditions.

For example, MUNI has advised as that esthetics and minimizing the impact on views are important considerations in the design of the overhead along the Embarcadero. If we were to follow VIII D literally and not use multiple guying, the additional poles and individual guy wires would block views and result in an unesthetic design.

bcc: M File
W. Neilson
W. Wong
Overhead Section

ja-STANDRDS.WN

SECTION

OVERHEAD WIRE SYSTEM

1. GENERAL:

The overhead trolley wires will provide electrical power to streetcars at 615 VDC. The PCC and other historic streetcars will be equipped with trolley poles to take power from overhead trolley wires. Contact wire will be installed over each track by means of carbon wipers.

Current will be returned through the rails in the street.

2. DESIGN CRITERIA:

a. CONTACT WIRE:

The contact wire will be supported by span wires. The following characteristics will be used:

Material	Alloy 80 Bronze
Type	Round, grooved ASTM B9-47
Size	# 4/0 AWG
Height	18'-6" to 19'-0"
Supports	110 ft <i>100 ft</i>
Design Voltage	615 VDC
Design Tension	3,000 lbs

b. SPECIAL TRACKWORK & CURVE CONSTRUCTION:

At rail line crossovers and turnouts, the overhead system will be designed to maintain contact between the wire and the PCC trolley shoe.

Overhead system construction at the curves will require the ~~contact~~ ^{contact} wire to be offset (~~pulled off~~) to maintain continuity of contact between the cars and the contact wire. Each curve radius will require evaluation of the following parameters to determine the pull off spacing. *Pull-off will be spaced per drawing K-41, "Location of Contact Wire Above Track For Pole And Pantograph Operation"*

- minimum curve radius
- radius of spiral curve entering
- radius of spiral curve leaving
- curve super elevation

c. SWITCHES:

Leading and trailing switches shall be 15° mechanical crossings with stainless steel or similarly durable moveable runners used for all regularly used switches.

Capital Programs & Construction

d. TURNS:

Curvature: Curve segment shall not exceed 3.125° per foot of runner on 90° turns.

VI-20

e. Poles: Number of poles will be minimized by combining trolley, streetlight and traffic signal poles where feasible. Poles will be ATEA 700 series.

DESIGN CODES AND GUIDELINES

Design codes and guidelines applicable to this project are as follows:

Trolley Overhead

Muni High Performance Trolley Coach Overhead Wire Minimum Standards. Revised 03/20/89.

General Order No. 95 of the Public Utilities Commission of the State of California, March 1981.

Design standards and criteria developed on previous trolley overhead projects.

Safety - Cal/OSHA

Pole - American Transit Engineering Association (ATEA, Section DT5-57). Revised and approved as standard 1957.

Foundation and Concrete

City and County of San Francisco DPW Standard Specification (Section 800.11), July 1986.

American Concrete Institute (ACI 318-83) November 1983.

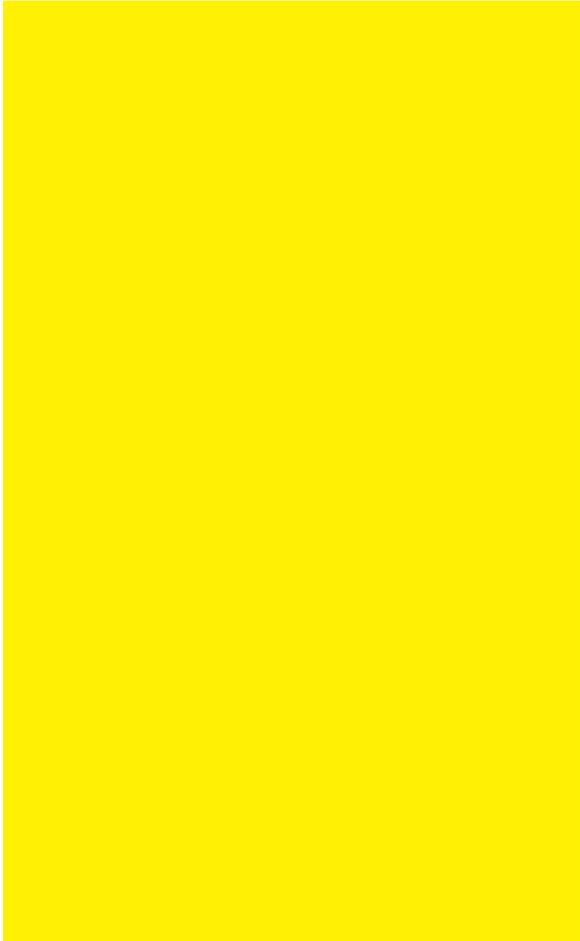
Capital Programs & Construction

Others (Latest Edition)

- Public Works Code Electrical Code, Traffic Code and other applicable ordinances of the City and County of San Francisco. July 1986
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electric Industries Association (EIA)
- Insulated Cable Engineers Association (ICEA)
- Institute of Electrical and Electronic Engineers (IEEE)
- National Electrical Manufacturers Association (NEMA)
- Regulations for Working in San Francisco Streets, Department of Public Works, City and County of San Francisco. July 1986
- Underwriter Laboratories, Inc. (UL)
- General Order 128 of the Public Utilities Commission of the State of California.



APPENDIX C:
SFPUC APPLICATION FOR
ELECTRICAL SERVICE



Potrero Yard Modernization Project

2500 Mariposa Street

SF Public Utilities Commission (PUC)

Wholesale Distribution Tariff (WDT) Application for Power Service

Enclosed Application Materials:

1. Feeder 1 Application (Industrial Load)	3
2. Feeder 2 Application (Mixed Use Load)	15
3. Single Line Diagram Feeder 1	27
4. Single Line Diagram Feeder 2	29
5. Floor Plan	31
6. Site Survey	33
7. Electrical Plans	35

1. FEEDER 1 APPLICATION (INDUSTRIAL LOAD)

This application covers the bus facility load and a portion of the battery electric bus charging load. NFPA70 Article 625 Sec42 states automatic load management system can be used for feeder rating. Based on modeling, estimated peak load with load management is 9,941kW. Designs include automatic load management and intelligent switchgear that can function as a backup to the load management limiting peak demand to 9,941kW. Second service requested for remainder of chargers & site load.

The total peak BEB charging load is ~12.7MW, split between two feeders. Feeder 1 is all BEB and anticipated to peak around 9.9 MW. Feeder 2 is mixed between BEB charging, residential, bus operations, and commercial uses. This totals 3MW peak for residential, 5MW for commercial/bus yard ops, and 2.8 MW for BEB charging. The connected load is higher than the peak load for BEBs because automatic load management systems should be used per NEC code Article 625 section 42.



Hetch Hetchy POWER

APPLICATION FOR ELECTRIC SERVICE

Refer to the [Application Checklist](#) to complete this form. Submit separate forms for temporary construction power and permanent power.

Project Information

Project Name

Potrero Yard Modernization Project

Address *

2500 Mariposa St, SF, CA 94110

Nearest cross street

Bryant Street

City *

San Francisco

Supervisorial District

10

Project Type

New Service

Load Type *

- Residential
- Light Commercial
- Commercial (industrial secondary)
- Industrial (industrial primary)
- Mixed Use
- Other

Service Type

- Underground
- Overhead

Service Duration *

- Permanent
- Temporary

Will property be all electric? *

- Yes
- No

Buy America Requirements/Federal
Funding Restrictions?

- Yes
- No

Date Electrical Service Requested

06/01/2023

Construction Start Date

Anticipated Contractor Bid Date

Number of Buildings

1

Number of Stories

13

Total Building Area

1300000

Existing Meter No.

Meter Room No. and Location

Number of Independent
Electric Services

Number of Residential Units

Avg. Sq. Foot per
Residential Unit

702

	Hours /Day	Days/Week	Months/Year	Business Hours
Summer Operating Hours	24	7	12	0:00 to 24:00
Winter Operating Hours	24	7	12	0:00 to 24:00

Description *

Brief description of the project and electric load type below. Please include the supply details, such as "irrigation pump" or "temporary construction power for new affordable housing development."

The Potrero Yard Modernization Project will demolish existing uses and construct a new 3-level bus maintenance and storage facility, equipped with battery electric bus infrastructure, up to 575 housing units, and ground floor retail as an integrated mixed-use development

Contact Information

Application submitted by

- Owner/developer
- Electrical engineer
- Electrical contractor
- General contractor
- Architect
- Other

Applicant Information

Company/Agency Name

San Francisco Public Works

Contact Name & Title *

Rachel Alonso, Project Manager

Invoice For:

- Construction Charges
- Electricity

Email *

rachel.alonso@sfdpw.org

Business Mailing Address *

49 South Van Ness, 10th floor
San Francisco, CA 94103

Daytime

Phone *

628-271-2838

Cell

Phone *

805-452-3125

Owner/Developer Information (if different from Applicant)

Company/Agency Name

SFMTA

Contact Name & Title

Licinia Iberri

Invoice For:

- Construction Charges
- Electricity

Business Mailing Address

1 South Van Ness, 8th floor
San Francisco, CA 94103

Daytime
Phone

415-646-2715

Cell
Phone

###-###-####

Representative Information (if different from Applicant/Owner)

Company/Agency Name

Contact Name & Title

Invoice For:

- Construction Charges
- Electricity

Email

Business Mailing Address

Daytime
Phone

###-###-####

Cell
Phone

###-###-####

Electric Load Information

Complete one Load Summary for each Service Point. Add additional service points to Notes

Service Equipment Rating (amps)

600

Meter Disconnect Rating (amps)

600

Voltage

- 120/208 Volt, 3-wire, 1φ
- 120/240 Volt, 3-wire, 1φ
- 208/120 Volt, 4-wire, 3φ
- 240/120 Volt, 4-wire, 3φ
- 480/277 Volt, 4-wire, 3φ
- Primary Voltage (>or equal 2,400 Volts)
- Other

Single Phase Circuit

Service Point Description/Location

	Quantity	Load Each (kVA)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Lighting	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="0"/>	0
Receptacles	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="0"/>	0
Electric Water Heating	<input type="text"/>	<input type="text"/>	0	0
Electric Heating	<input type="text"/>	<input type="text"/>	0	0
Commercial Cooking	<input type="text"/>	<input type="text"/>	0	0
Refrigeration	<input type="text"/>	<input type="text"/>	0	0
Resistance Welders	<input type="text"/>	<input type="text"/>	0	0
Arc Welders (Largest Unit)	<input type="text"/>	<input type="text"/>	0	0
EV Charging Station	<input type="text"/>	<input type="text"/>	0	0
Other 1 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Other 2 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Total (kVA)	<input type="text" value="NA"/>	<input type="text" value="NA"/>	0	0

"Other 1" Description

"Other 2" Description

Single Phase Horsepower

(Note: hp will be converted to kVA at 0.746)

	Quantity	Load Each (hp)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Air Conditioning	<input type="text"/>	<input type="text"/>	0	0.000
Elevators	<input type="text"/>	<input type="text"/>	0	0.000
Fire Pump	<input type="text"/>	<input type="text"/>	0	0.000

	Quantity	Load Each (hp)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Other (Describe)	<input type="text"/>	<input type="text"/>	0	0.000
Total (hp)	NA	NA	0	0.000

"Other" Description

	Largest Motor:	Motors 40 hp & above:
Type	<input type="text"/>	<input type="text"/>
Rated hp	<input type="text"/>	<input type="text"/>
Locked-rotor current (amps)	<input type="text"/>	<input type="text"/>
Motor Use	<input type="text"/>	<input type="text"/>

Three Phase Circuit

Service Point Description/Location

Feeder #1

	Quantity	Load Each (kVA)	3 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Lighting	<input type="text"/>	<input type="text"/>	<input type="text"/>	0
Receptacles	<input type="text"/>	<input type="text"/>	<input type="text"/>	0
Water Heating	<input type="text"/>	<input type="text"/>	0	0
Electric Heating	<input type="text"/>	<input type="text"/>	0	0
Commercial Cooking	<input type="text"/>	<input type="text"/>	0	0
Refrigeration	<input type="text"/>	<input type="text"/>	0	0
Resistance Welders	<input type="text"/>	<input type="text"/>	0	0
Arc Welders (Largest Unit)	<input type="text"/>	<input type="text"/>	0	0
EV Charging Station	90	205	18450	6457.5
Other 1 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Other 2 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Total (kVA)	NA	NA	18450	6457.5

"Other 1" Description

"Other 2" Description

Three Phase Horsepower

(Note: hp will be converted to kVA at 0.746)

	Quantity	Load Each (hp)	3φ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Air Conditioning	<input type="text"/>	<input type="text"/>	0	0.000
Elevators	<input type="text"/>	<input type="text"/>	0	0.000
Fire Pump	<input type="text"/>	<input type="text"/>	0	0.000
Other (Describe)	<input type="text"/>	<input type="text"/>	0	0.000
Total (hp)	NA	NA	0	0.000

"Other" Description

	Largest Motor:	Motors 40 hp & above:
Type	<input type="text"/>	<input type="text"/>
Rated hp	<input type="text"/>	<input type="text"/>
Locked-rotor current (amps)	<input type="text"/>	<input type="text"/>
Motor Use	<input type="text"/>	<input type="text"/>

Ramp Up Schedule

When will the load reach the below percentages of total forecast?

	Estimated Week from Service Energization:
25% of Electrical Load	<input type="text" value="104"/> *
50% of Electrical Load	<input type="text" value="104"/> *
75% of Electrical Load	<input type="text" value="234"/> *
100% of Electrical Load	<input type="text" value="234"/> *

Street/Sidewalk Improvement

Does the project include any street/sidewalk improvement along public streets?

- No
- Yes

If yes, contact slengineering@sfwater.org .

Customer Self Generation and Net Energy Metering

This Application form is for electric service only. The installation and interconnection of self-generation equipment, including photovoltaic systems, requires the submission of an interconnection application and SFPUC approval. Please contact hhpower@sfwater.org for more assistance.

Do you plan to install onsite self-generation equipment?

- Yes
- No

Generation type:

Total output in kWAC

Attachments

A. Site Plan(s)

Drawn to scale, indicating proposed locations of electric metering (including any sprinkler controller meter), switchgear, and (if applicable) transformers. Show easements, rights-of-way, property lines, grading, roads, road names, sidewalks, driveways. Indicate location of fire hydrants and other structures, drains (water, sewer, storm) and proposed future improvements. **Minimum 300 dpi, include relevant directional, scale, legend, and context information.** Upload at least one file. *

Potrero Yard - 2500 Mariposa - floor plan.pdf Upload a different file

Potrero Yard - 2500 Mariposa - site survey.pdf Upload a different file

No file chosen

B. Building floor plans and exterior elevations

Minimum 300 dpi, Include relevant directional, scale, legend, and context information.

No file chosen

No file chosen

No file chosen

C. Electrical Drawings

Electrical drawings and schedules with complete breakdown of equipment, including electric switchboard drawings. Minimum 300 dpi, include relevant directional, scale, legend, and context information. Upload at least one file. *

Potrero Yard - 2500 Mariposa - electrical drawings.pdf Upload a different file

No file chosen

No file chosen

D. Single Line Diagrams

Single line diagram showing the meter, customer main service panel (and its main switch size), transformers (if any), poles, vaults, and /or junction boxes (if any). Minimum 300 dpi, include relevant directional, scale, legend, and context information. Upload at least one file. *

Potrero Yard - 2500 Mariposa - single line diagram feeder 1.pdf Upload a different file

No file chosen

No file chosen

E. Street Light and Traffic Signal Plans (if applicable)

If applicable. Minimum 300 dpi, include relevant directional, scale, legend, and context information.

No file chosen

No file chosen

F. Department of Building Inspection permit (if applicable)

No file chosen

G. Request for Unmetered Service (if applicable)

No file chosen

H. Proposed Joint Trench Agreement (if applicable)

No file chosen

Other Notes or Requests

Additional information, such as existing active WDT Application

This application covers the bus facility load and a portion of the battery electric bus charging load. NFPA70 Article 625 Sec42 states automatic load management system can be used for feeder rating. Based on modeling, estimated peak load with load management is 9,941kW. Designs include automatic load management and intelligent switchgear that can function as a backup to the load management limiting peak demand to 9 941kW. Second service requested for remainder of chargers

Acknowledgement

The applicant hereby applies to the SFPUC for electric service. Applicant acknowledges that this Application is subject to the SFPUC's *Rules and Regulations Governing Electric Service* that can be found at <https://sfwater.org/ElectricRules> .

By clicking "Submit" below, I agree that the information contained in this Application is correct to the best of my knowledge. I understand that any changes made to the above information or attached documents may increase the time and costs required for SFPUC to provide electric service at the requested service address and that I will be responsible for any increased costs resulting from such changes.

I understand that service will be engineered and installed based in part upon the information provided here. The SFPUC will provide the Applicant with a service agreement estimating the Applicant's cost responsibility. Subject to entering into a service agreement with the SFPUC, I agree to pay SFPUC for all work SFPUC performs and all costs SFPUC incurs to provide the service requested by this Application. SFPUC may cancel this project if I do not proceed with the project and it becomes inactive for 12 months. If the project is cancelled, by either party, I will pay SFPUC for all such work and costs incurred by SFPUC prior to the cancellation.

I have read and agree to the terms above.

Contact Name & Title *

Rachel Alonso, Project Manager

Hidden Fields for Record Transfer to Salesforce (INTERNAL USE)

This is the default information for the required fields in Salesforce.

Opportunity Type

WDT Application

Close Date

06/01/2023

Stage

Pre-Application

Total Connected

18450

Reserve Capacity
6457.5

Summer Demand

	Residential	Light Commercial	Commercial	Industrial
1:00 AM				5628.650570865
2:00 AM				5538.270832605
3:00 AM				5457.51133578
4:00 AM				5439.2611815675
5:00 AM				5518.6666956225
6:00 AM				5761.193444685
7:00 AM				6066.5730559875
8:00 AM				6145.9886243695
9:00 AM				6245.81212059
10:00 AM				6295.6619477325
11:00 AM				6382.8269164795
12:00 PM				6419.647878525
1:00 PM				6430.5134488345
2:00 PM				6427.6270173675
3:00 PM				6457.0436743045
4:00 PM				6420.2402702025
5:00 PM				6457.5
6:00 PM				6415.0976657245
7:00 PM				6375.2459212575
8:00 PM				6297.4351772325
9:00 PM				6136.528503105
10:00 PM				6002.52988923
11:00 PM				5843.304354195
12:00 AM				5695.510156875

Winter Demand

	Residential	Light Commercial	Commercial	Industrial
1:00 AM				5457.51133578
2:00 AM				5439.2611815675
3:00 AM				5518.6666956225
4:00 AM				5761.193444685
5:00 AM				6066.5730559875
6:00 AM				6145.9886243695
7:00 AM				6245.81212059

	Residential	Light Commercial	Commercial	Industrial
8:00 AM				6295.6619477324
9:00 AM				6382.8269164799
10:00 AM				6419.647878525
11:00 AM				6430.5134488349
12:00 PM				6427.6270173674
1:00 PM				6457.0436743049
2:00 PM				6420.2402702024
3:00 PM				6457.5
4:00 PM				6415.0976657249
5:00 PM				6375.2459212574
6:00 PM				6297.4351772324
7:00 PM				6136.528503105
8:00 PM				6002.52988923
9:00 PM				5843.304354195
10:00 PM				5695.510156875
11:00 PM				5628.650570865
12:00 AM				5538.270832605

Submit

[Contact Information](#)

2. FEEDER 2 APPLICATION (MIXED USE LOAD)

This application covers housing and retail loads and a portion of the battery electric bus charging load. NFPA70 Article 625 Sec42 states automatic load management system can be used for feeder rating. Based on modeling, estimated peak load with load management is 2.8MW BEB chargers. New service estimate 5MW commercial, 3MW residential and 2.8MW BEB Chargers. Designs have automatic load management & intelligent switchgear that function as backup limiting peak demand to 10.8MW.

The total peak BEB charging load is ~12.7MW, split between two feeders. Feeder 1 is all BEB and anticipated to peak around 9.9 MW. Feeder 2 is mixed between BEB charging, residential, bus operations, and commercial uses. This totals 3MW peak for residential, 5MW for commercial/bus yard ops, and 2.8 MW for BEB charging. The connected load is higher than the peak load for BEBs because automatic load management systems should be used per NEC code Article 625 section 42.



Hetch Hetchy POWER

APPLICATION FOR ELECTRIC SERVICE

Refer to the [Application Checklist](#) to complete this form. Submit separate forms for temporary construction power and permanent power.

Project Information

Project Name

Potrero Yard Modernization Project

Address *

2500 Mariposa Street, SF, CA 94110

Nearest cross street

Bryant Street

City *

San Francisco

Supervisorial District

10

Project Type

New Service

Load Type *

- Residential
- Light Commercial
- Commercial (industrial secondary)
- Industrial (industrial primary)
- Mixed Use
- Other

Service Type

- Underground
- Overhead

Service Duration *

- Permanent
- Temporary

Will property be all electric? *

- Yes
- No

Buy America Requirements/Federal
Funding Restrictions?

- Yes
- No

Date Electrical Service Requested

06/01/2023

Construction Start Date

Anticipated Contractor Bid Date

Number of Buildings

1

Number of Stories

13

Total Building Area

1300000

Existing Meter No.

Meter Room No. and Location

Number of Independent
Electric Services

Number of Residential Units

Avg. Sq. Foot per
Residential Unit

702

	Hours /Day	Days/Week	Months/Year	Business Hours
Summer Operating Hours	24	7	12	0:00 to 24:00
Winter Operating Hours	24	7	12	0:00 to 24:00

Description *

Brief description of the project and electric load type below. Please include the supply details, such as "irrigation pump" or "temporary construction power for new affordable housing development."

The Potrero Yard Modernization Project will demolish existing uses and construct a new 3-level bus maintenance and storage facility, equipped with battery electric bus infrastructure, up to 575 housing units, and ground floor retail as an integrated mixed-use development

Contact Information

Application submitted by

- Owner/developer
- Electrical engineer
- Electrical contractor
- General contractor
- Architect
- Other

Applicant Information

Company/Agency Name

San Francisco Public Works

Contact Name & Title *

Rachel Alonso, Project Manager

Invoice For:

- Construction Charges
- Electricity

Email *

rachel.alonso@sfdpw.org

Business Mailing Address *

49 South Van Ness, 10th floor
San Francisco, CA 94103

Daytime

Phone *

628-271-2838

Cell

Phone *

805-452-3125

Owner/Developer Information (if different from Applicant)

Company/Agency Name

SFMTA

Contact Name & Title

Licinia Iberri

Invoice For:

- Construction Charges
- Electricity

Business Mailing Address

1 South Van Ness, 8th floor
San Francisco, CA 94103

Daytime
Phone

415-646-2715

Cell
Phone

###-###-####

Representative Information (if different from Applicant/Owner)

Company/Agency Name

Contact Name & Title

Invoice For:

- Construction Charges
- Electricity

Email

Business Mailing Address

Daytime
Phone

###-###-####

Cell
Phone

###-###-####

Electric Load Information

Complete one Load Summary for each Service Point. Add additional service points to Notes

Service Equipment Rating (amps)

600

Meter Disconnect Rating (amps)

600

Voltage

- 120/208 Volt, 3-wire, 1 ϕ
- 120/240 Volt, 3-wire, 1 ϕ
- 208/120 Volt, 4-wire, 3 ϕ
- 240/120 Volt, 4-wire, 3 ϕ
- 480/277 Volt, 4-wire, 3 ϕ
- Primary Voltage (>or equal 2,400 Volts)
- Other

Single Phase Circuit

Service Point Description/Location

	Quantity	Load Each (kVA)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Lighting	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="0"/>	0
Receptacles	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="0"/>	0
Electric Water Heating	<input type="text"/>	<input type="text"/>	0	0
Electric Heating	<input type="text"/>	<input type="text"/>	0	0
Commercial Cooking	<input type="text"/>	<input type="text"/>	0	0
Refrigeration	<input type="text"/>	<input type="text"/>	0	0
Resistance Welders	<input type="text"/>	<input type="text"/>	0	0
Arc Welders (Largest Unit)	<input type="text"/>	<input type="text"/>	0	0
EV Charging Station	<input type="text"/>	<input type="text"/>	0	0
Other 1 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Other 2 (Describe)	<input type="text"/>	<input type="text"/>	0	0
Total (kVA)	<input type="text" value="NA"/>	<input type="text" value="NA"/>	0	0

"Other 1" Description

"Other 2" Description

Single Phase Horsepower

(Note: hp will be converted to kVA at 0.746)

	Quantity	Load Each (hp)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Air Conditioning	<input type="text"/>	<input type="text"/>	0	0.000
Elevators	<input type="text"/>	<input type="text"/>	0	0.000
Fire Pump	<input type="text"/>	<input type="text"/>	0	0.000

	Quantity	Load Each (hp)	1 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Other (Describe)	<input type="text"/>	<input type="text"/>	0	0.000
Total (hp)	NA	NA	0	0.000

"Other" Description

	Largest Motor:	Motors 40 hp & above:
Type	<input type="text"/>	<input type="text"/>
Rated hp	<input type="text"/>	<input type="text"/>
Locked-rotor current (amps)	<input type="text"/>	<input type="text"/>
Motor Use	<input type="text"/>	<input type="text"/>

Three Phase Circuit

Service Point Description/Location

Feeder 2

	Quantity	Load Each (kVA)	3 ϕ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Lighting	<input type="text"/>	<input type="text"/>	500.40	500.4
Receptacles	<input type="text"/>	<input type="text"/>	460.14	57.5175
Water Heating	<input type="text"/>	<input type="text"/>	0	0
Electric Heating	23	68.10	1566.3	1174.725
Commercial Cooking	<input type="text"/>	<input type="text"/>	0	0
Refrigeration	<input type="text"/>	<input type="text"/>	0	0
Resistance Welders	<input type="text"/>	<input type="text"/>	0	0
Arc Welders (Largest Unit)	<input type="text"/>	<input type="text"/>	0	0
EV Charging Station	26	205	5330	1865.4999999999
Other 1 (Describe)	23	107.52	2472.96	865.536
Other 2 (Describe)	576	5.21	3000.96	1050.336
Total (kVA)	NA	NA	13330.7599999999	5514.0145

"Other 1" Description

Commercial

"Other 2" Description

Residential

Three Phase Horsepower

(Note: hp will be converted to kVA at 0.746)

	Quantity	Load Each (hp)	3φ Load Total (kVA)	CALCULATIONS FOR INTERNAL USE: Reserve Capacity (kVA)
Air Conditioning	<input type="text"/>	<input type="text"/>	0	0.000
Elevators	<input type="text"/>	<input type="text"/>	0	0.000
Fire Pump	<input type="text"/>	<input type="text"/>	0	0.000
Other (Describe)	<input type="text"/>	<input type="text"/>	0	0.000
Total (hp)	NA	NA	0	0.000

"Other" Description

	Largest Motor:	Motors 40 hp & above:
Type	<input type="text"/>	<input type="text"/>
Rated hp	<input type="text"/>	<input type="text"/>
Locked-rotor current (amps)	<input type="text"/>	<input type="text"/>
Motor Use	<input type="text"/>	<input type="text"/>

Ramp Up Schedule

When will the load reach the below percentages of total forecast?

	Estimated Week from Service Energization:
25% of Electrical Load	<input type="text" value="4"/> *
50% of Electrical Load	<input type="text" value="8"/> *
75% of Electrical Load	<input type="text" value="12"/> *
100% of Electrical Load	<input type="text" value="104"/> *

Street/Sidewalk Improvement

Does the project include any street/sidewalk improvement along public streets?

- No
- Yes

If yes, contact slengineering@sfwater.org .

Customer Self Generation and Net Energy Metering

This Application form is for electric service only. The installation and interconnection of self-generation equipment, including photovoltaic systems, requires the submission of an interconnection application and SFPUC approval. Please contact hhpower@sfwater.org for more assistance.

Do you plan to install onsite self-generation equipment?

- Yes
- No

Generation type:

Total output in kWAC

Attachments

A. Site Plan(s)

Drawn to scale, indicating proposed locations of electric metering (including any sprinkler controller meter), switchgear, and (if applicable) transformers. Show easements, rights-of-way, property lines, grading, roads, road names, sidewalks, driveways. Indicate location of fire hydrants and other structures, drains (water, sewer, storm) and proposed future improvements. **Minimum 300 dpi, include relevant directional, scale, legend, and context information.** Upload at least one file. *

Potrero Yard - 2500 Mariposa - floor plan.pdf Upload a different file

Potrero Yard - 2500 Mariposa - site survey.pdf Upload a different file

No file chosen

B. Building floor plans and exterior elevations

Minimum 300 dpi, Include relevant directional, scale, legend, and context information.

No file chosen

No file chosen

No file chosen

C. Electrical Drawings

Electrical drawings and schedules with complete breakdown of equipment, including electric switchboard drawings. Minimum 300 dpi, include relevant directional, scale, legend, and context information. Upload at least one file. *

Potrero Yard - 2500 Mariposa - electrical drawings.pdf Upload a different file

No file chosen

No file chosen

D. Single Line Diagrams

Single line diagram showing the meter, customer main service panel (and its main switch size), transformers (if any), poles, vaults, and /or junction boxes (if any). Minimum 300 dpi, include relevant directional, scale, legend, and context information. Upload at least one file. *

Potrero Yard - 2500 Mariposa - single line diagram feeder 2.pdf Upload a different file

No file chosen

No file chosen

E. Street Light and Traffic Signal Plans (if applicable)

If applicable. Minimum 300 dpi, include relevant directional, scale, legend, and context information.

No file chosen

No file chosen

F. Department of Building Inspection permit (if applicable)

No file chosen

G. Request for Unmetered Service (if applicable)

No file chosen

H. Proposed Joint Trench Agreement (if applicable)

No file chosen

Other Notes or Requests

Additional information, such as existing active WDT Application

NOTE: This application covers housing and retail loads and a portion of the battery electric bus charging load. NFPA70 Article 625 Sec42 states automatic load management system can be used for feeder rating. Based on modeling, estimated peak load with load management is 2.8MW BEB chargers. New service estimate 5MW commercial, 3MW residential and 2.8MW BEB Chargers. Designs have automatic load management & intelligent switchgear that function as backup limiting

Acknowledgement

The applicant hereby applies to the SFPUC for electric service. Applicant acknowledges that this Application is subject to the SFPUC's *Rules and Regulations Governing Electric Service* that can be found at <https://sfwater.org/ElectricRules> .

By clicking "Submit" below, I agree that the information contained in this Application is correct to the best of my knowledge. I understand that any changes made to the above information or attached documents may increase the time and costs required for SFPUC to provide electric service at the requested service address and that I will be responsible for any increased costs resulting from such changes.

I understand that service will be engineered and installed based in part upon the information provided here. The SFPUC will provide the Applicant with a service agreement estimating the Applicant's cost responsibility. Subject to entering into a service agreement with the SFPUC, I agree to pay SFPUC for all work SFPUC performs and all costs SFPUC incurs to provide the service requested by this Application. SFPUC may cancel this project if I do not proceed with the project and it becomes inactive for 12 months. If the project is cancelled, by either party, I will pay SFPUC for all such work and costs incurred by SFPUC prior to the cancellation.

I have read and agree to the terms above.

Contact Name & Title *

Rachel Alonso, Project Manager

Hidden Fields for Record Transfer to Salesforce (INTERNAL USE)

This is the default information for the required fields in Salesforce.

Opportunity Type

WDT Application

Close Date

06/01/2023

Stage

Pre-Application

Total Connected

13330.759999999998

Reserve Capacity
5514.0145

Summer Demand

	Residential	Light Commercial	Commercial	Industrial
1:00 AM				
2:00 AM				
3:00 AM				
4:00 AM				
5:00 AM				
6:00 AM				
7:00 AM				
8:00 AM				
9:00 AM				
10:00 AM				
11:00 AM				
12:00 PM				
1:00 PM				
2:00 PM				
3:00 PM				
4:00 PM				
5:00 PM				
6:00 PM				
7:00 PM				
8:00 PM				
9:00 PM				
10:00 PM				
11:00 PM				
12:00 AM				

Winter Demand

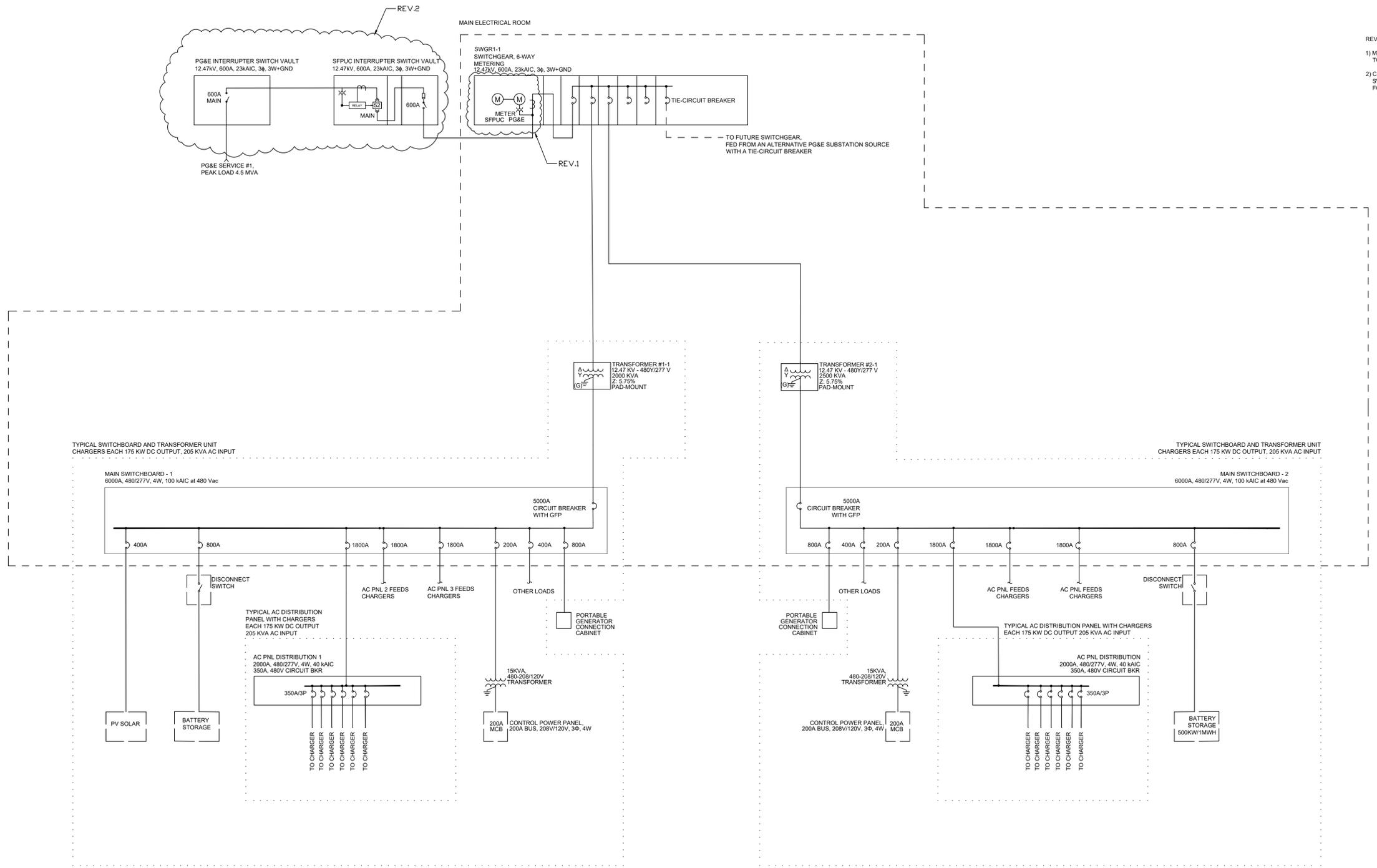
	Residential	Light Commercial	Commercial	Industrial
1:00 AM				
2:00 AM				
3:00 AM				
4:00 AM				
5:00 AM				
6:00 AM				
7:00 AM				
8:00 AM				
9:00 AM				
10:00 AM				
11:00 AM				

	Residential	Light Commercial	Commercial	Industrial
12:00 PM				
1:00 PM				
2:00 PM				
3:00 PM				
4:00 PM				
5:00 PM				
6:00 PM				
7:00 PM				
8:00 PM				
9:00 PM				
10:00 PM				
11:00 PM				
12:00 AM				

Submit

[Contact Information](#)

3. SINGLE LINE DIAGRAM FEEDER 1



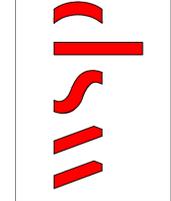
REVISION NOTES:
 1) MOVED PRIMARY PG&E AND SFPUC METERS TO MAIN MV SWITCHGEAR IN ELECTRICAL ROOM
 2) CHANGED GRAPHICAL DEPICTION OF INTERRUPTER SWITCHES TO CLEARLY DELINEATE SEPARATE VAULTS FOR PG&E AND SFPUC INTERRUPTERS.

PROJECT NO.	189247
DRAWN BY	VGG Systems
DATE	08/04/21
SCALE	NTS

PROJECT TITLE
**SFTMA ZE FACILITY
 PLAN**



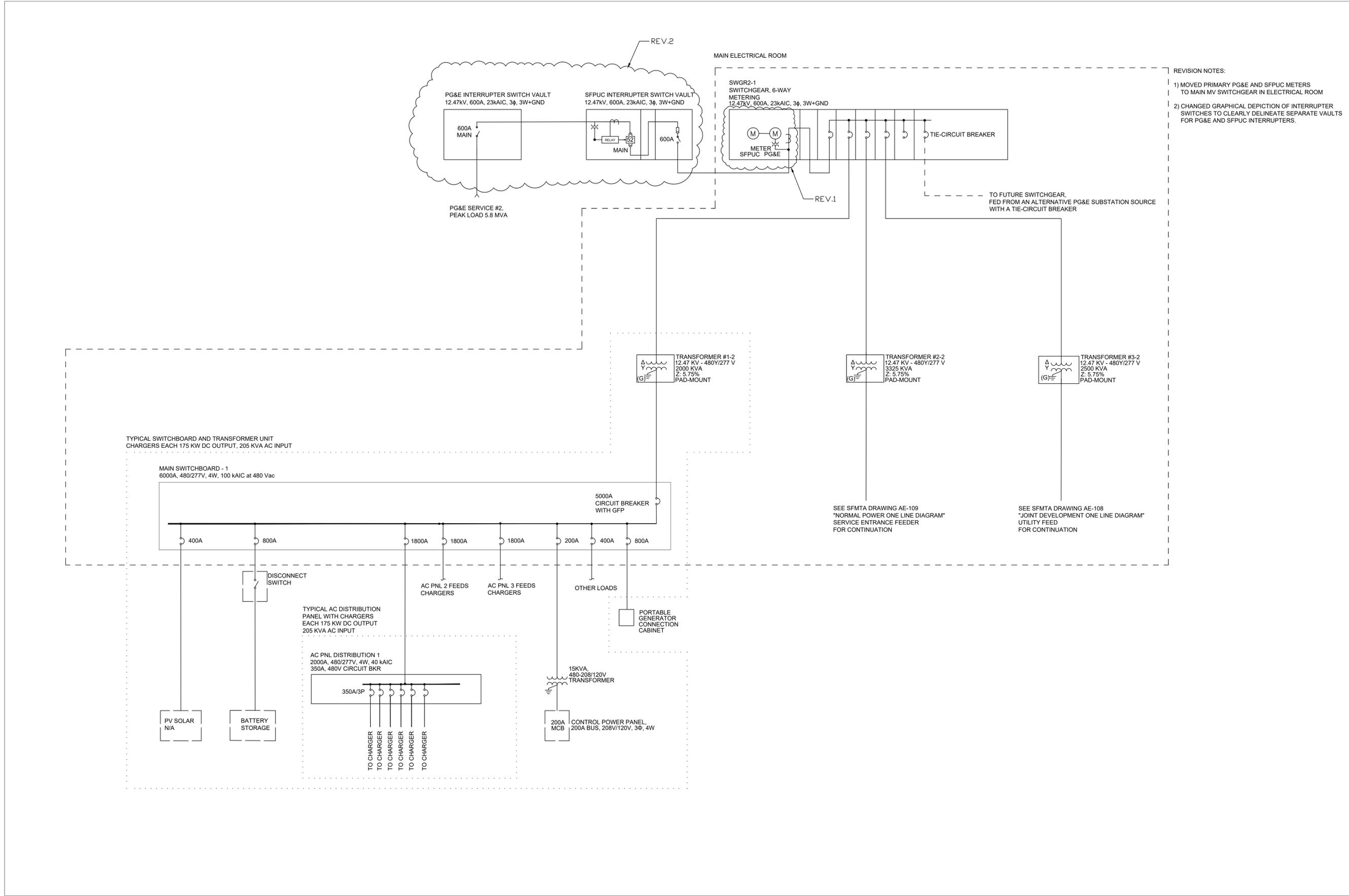
WSP USA, Inc.
 18200 PARK ROW
 SUITE 200
 HOUSTON, TEXAS 77084
 TEL: (281) 589-5900
 FAX: (281) 759-5164



DRAWING TITLE
**SINGLE-LINE DIAGRAM
 POTRERO YARD,
 SERVICE #1**

DRAWING NUMBER
E.T.

4. SINGLE LINE DIAGRAM FEEDER 2

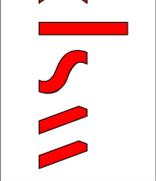


PROJECT NO.	189247
DRAWN BY	VGG Systems
DATE	08/04/21
SCALE	NTS

PROJECT TITLE
**SFTMA ZE FACILITY
PLAN**



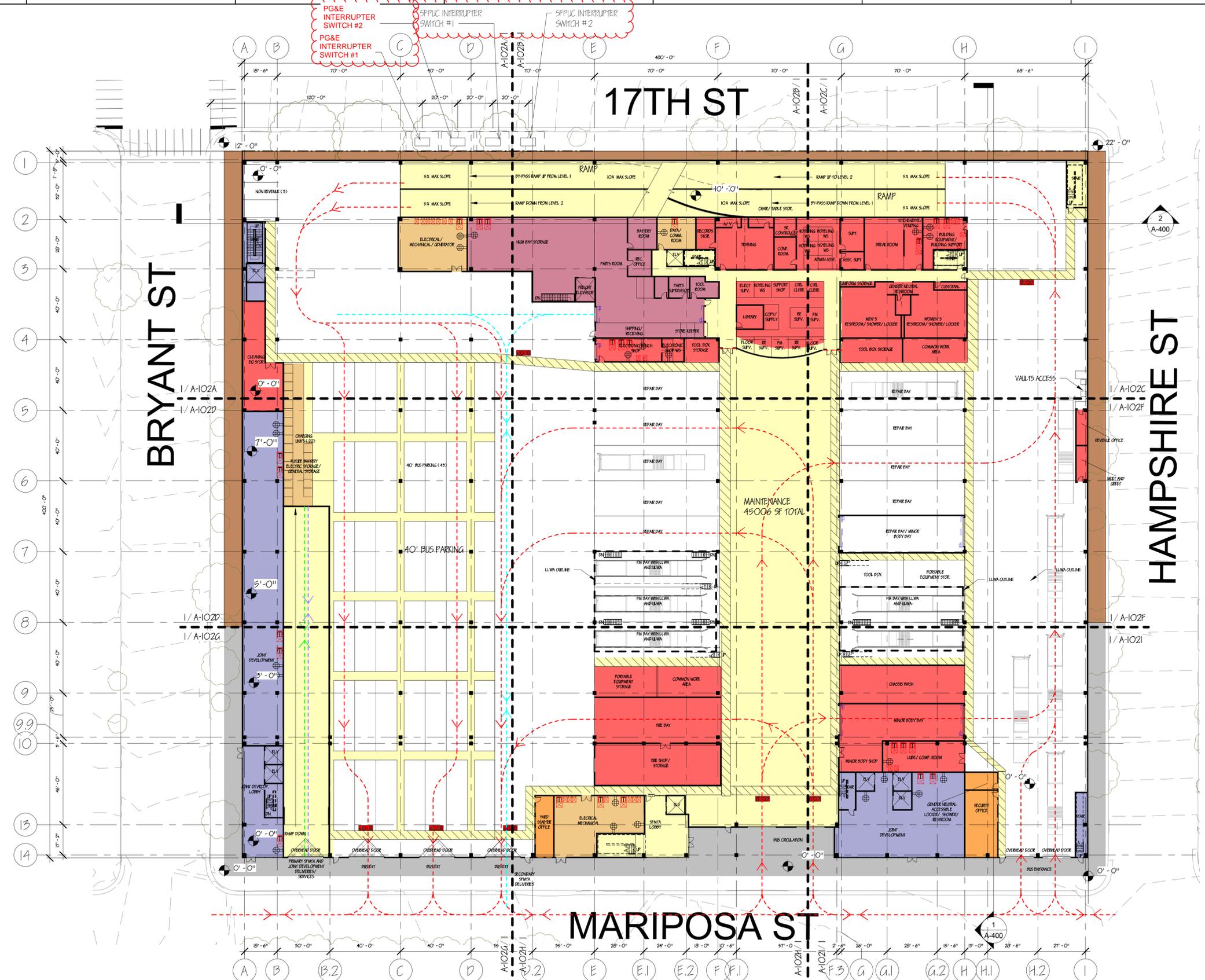
WSP USA, Inc.
18200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164



DRAWING TITLE
**SINGLE-LINE DIAGRAM
POTRERO YARD,
SERVICE #2**

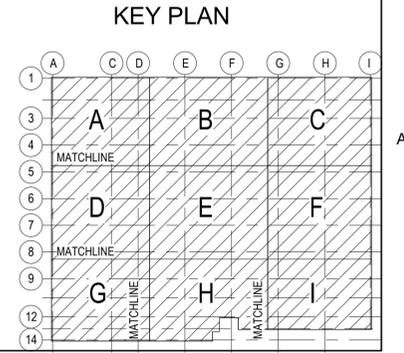
DRAWING NUMBER
E.T.

5. FLOOR PLAN



REVISION NOTES:
 1) RENAMED INTERRUPTER SWITCH LOCATIONS FOR CLARITY
 2) PRIMARY METERS TO BE LOCATED IN MAIN SWITCHGEAR IN MAIN ELECTRICAL ROOM
 3) THERE ARE A TOTAL OF FOUR (4) UNDERGROUND VAULTS NEEDED FOR ELECTRICAL SERVICE. THERE ARE TWO (2) NEW SERVICES PLANNED AND EACH SERVICE REQUIRES TWO (2) INTERRUPTER VAULTS: ONE FOR THE PG&E INTERRUPTER AND ONE FOR THE SFPUC INTERRUPTER.
 4) INTERRUPTER VAULT LOCATIONS ARE FIXED. LOCATION OF ALL ELECTRICAL WORK DOWNSTREAM OF THE INTERRUPTERS, INCLUDING THE LOCATION OF THE MAIN ELECTRICAL ROOM, IS AT THE DISCRETION OF THE DESIGNER.

- | | |
|--|--|
| OPEN SPACE | JOINT DEVELOPMENT |
| MECH./ SERVICE | PARTS |
| SERVICE AND CLEAN | PARKING |
| OPERATIONS | CIRCULATION |
| MAINTENANCE | TRAINING |
| --- SFMTA DELIVERY PRIMARY | --- JOINT DEVELOPMENT STORAGE/ SERVICE |
| --- SFMTA BUS/ TROLLEY | --- SFMTA DELIVERY SECONDARY |



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ISSUE	DATE	DESCRIPTION
3	March 13, 2020	Submittal
2	June 14, 2019	Draft Submittal
1	February 20, 2019	Draft Submittal

PROJECT MANAGER

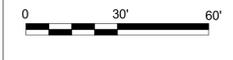
TEAM 1	Don Leidy
TEAM 2	Sheena Zimmerman
TEAM 3	Justin Kraegel
TEAM 4	Sara Jandaghi Jafari
TEAM 5	Jialing Sun
TEAM 6	Kashfi Kalam
TEAM 7	F. M. LAST

PROJECT NUMBER 10093201

**PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING**

**SFMTA POTRERO
SCENARIO 2
(3-LEVEL)**

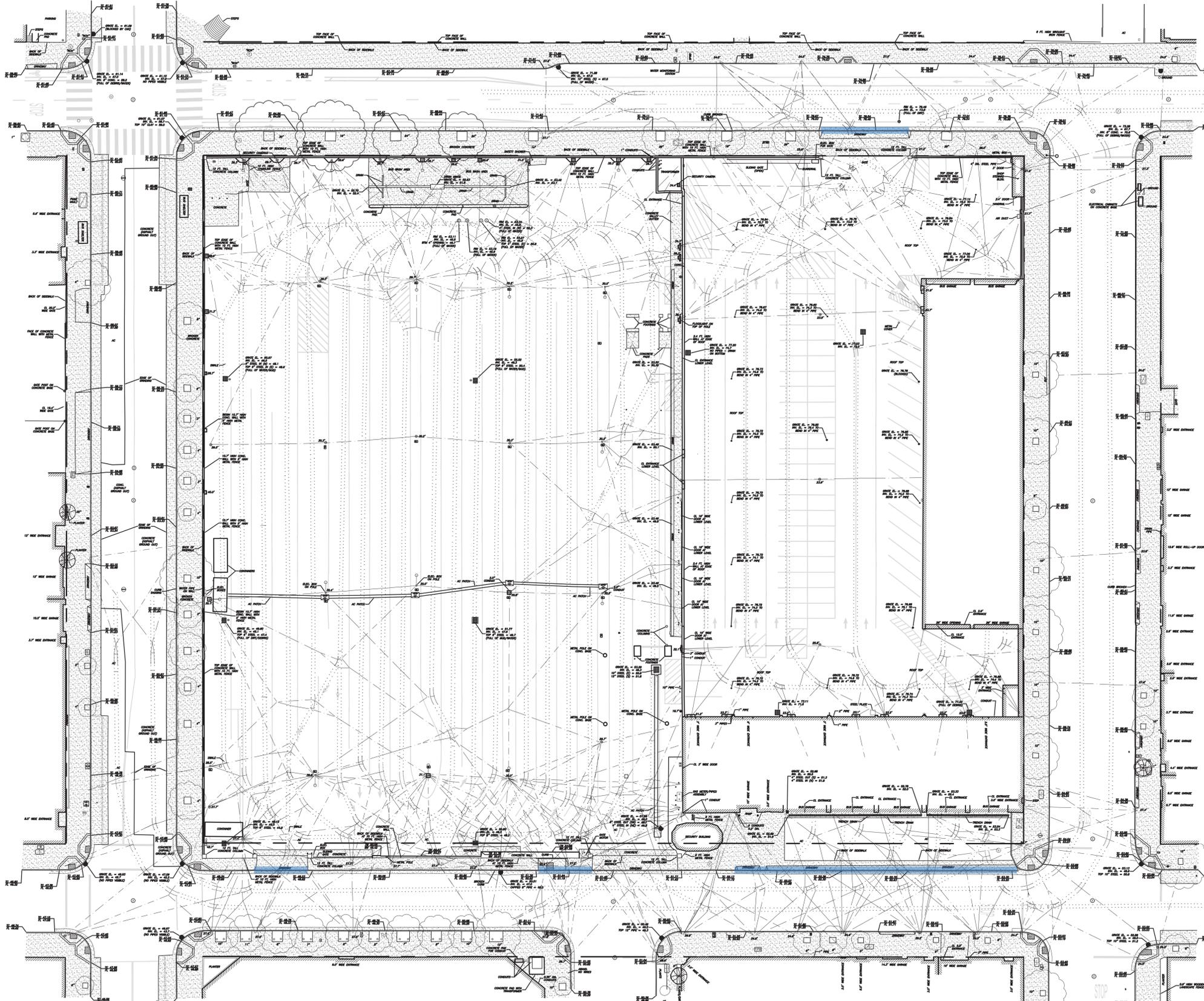
**GROUND LEVEL-
1ST FLOOR OVERALL PLAN**



FILENAME SFMTA_Potrero_AR_2018_3
 SCALE 1" = 30'
 SHEET A-102

6. SITE SURVEY

Site Survey/ Existing Site Plan



LEGEND

- BENCH MARK
- △ SURVEY CONTROL POINT
- ⊞ BIKE RACK
- BOLLARD
- AREA DRAIN
- ⊞ CATCH BASIN
- ⊞ DRAIN
- CONDUIT
- ⊞ ELECTRIC VAULT
- ⊞ ELECTROLIER
- ⊞ FIRE ALARM BOX
- ⊞ FIRE HYDRANT
- ⊞ FLOOD LIGHT
- ⊞ HPFS HYDRANT
- ⊞ HPFS VALVE
- ⊞ FIRE HYDR VALVE
- ⊞ GAS VALVE
- GATE POST
- GUY POLE
- GUY WIRE
- ⊞ MUNI GUYPOLE
- ⊞ MUNI GUYPOLE+LIGHT
- ⊞ GROUND LIGHT
- ⊞ MAIL BOX
- ⊞ MAIL BOX RELAY
- ⊞ MH ELEC
- ⊞ MH HETCH HETCHY
- ⊞ MH SEWER
- ⊞ MH TELEPHONE
- ⊞ MH UNKNOWN
- ⊞ PG&E VAULT
- PIPE
- POWER POLE
- ⊞ POWER POLE WITH COBRA LIGHT
- ⊞ PULL BOX DTIS
- ⊞ PULL BOX UNKNOWN
- ⊞ PULL BOX CABLE TV
- ⊞ PULL BOX ELECTRIC
- ⊞ PULL BOX PG&E
- ⊞ PULL BOX SHELTER
- ⊞ PULL BOX STREET LIGHT
- ⊞ PULL BOX TELEPHONE
- ⊞ PULL BOX TV
- ⊞ PULL BOX WATER
- ⊞ SECURITY CAMERA
- ⊞ SEWER CLEAN OUT
- ⊞ SEWER
- SIGN POLE
- SIGN POLES
- STAND PIPE
- TELEPHONE POLE
- ⊞ TELEPHONE VAULT
- ⊞ TRASH CAN
- ⊞ UNKNOWN UTILITIES
- ⊞ WATER METER
- ⊞ WATER VALVE
- ⊞ TREE WITH DRIP LINE
- ⊞ TRUNCATED DOME

- MUNI OVERHEAD TRANSMISSION CABLES
- MUNI TENSION CABLES
- RIGHT OF WAY
- ⊞ CONCRETE
- ⊞ BRICK
- ⊞ BUILDING
- MAJOR CONTOUR
- MINOR CONTOUR

ABBREVIATIONS

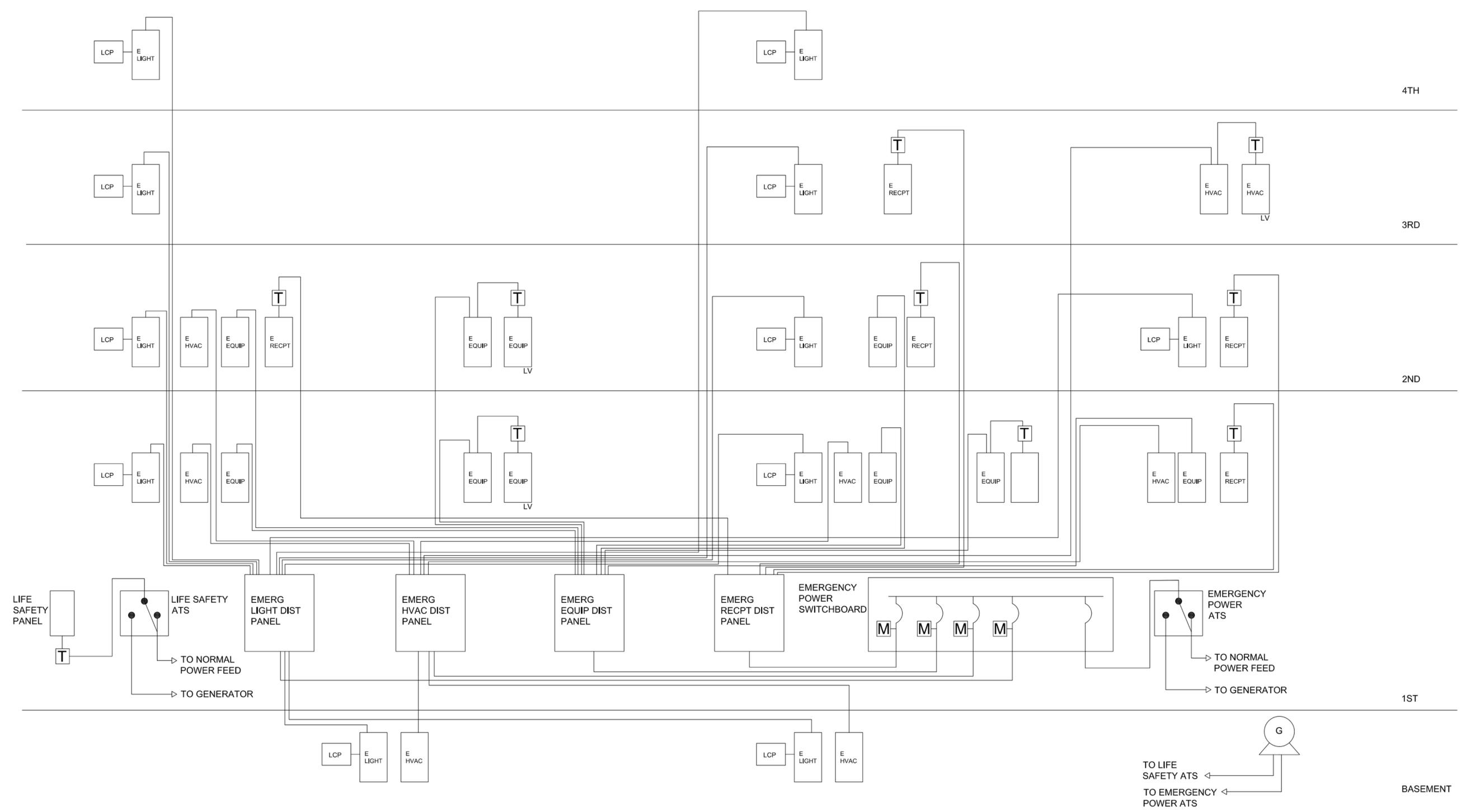
- AC = ASPHALT
- BW = BOTTOM OF WALL
- FL = FLOW LINE
- TC = TOP OF CURB
- TW = TOP OF WALL

Prepared by	Bureau of Street Use and Mapping
Project Address	2500 Mariposa St, San Francisco, CA 94110
Date	11/20/2019
Scale	1"=30"
Sheet Number	02

Site survey by Bureau of Street Use and Mapping San Francisco, City and County of San Francisco, 06/05/2017. Provided by SFMTA.



7. ELECTRICAL PLANS



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ISSUE	DATE	DESCRIPTION
3	March 13, 2020	Submittal
2	June 14, 2019	Draft Submittal
1	February 20, 2019	Draft Submittal

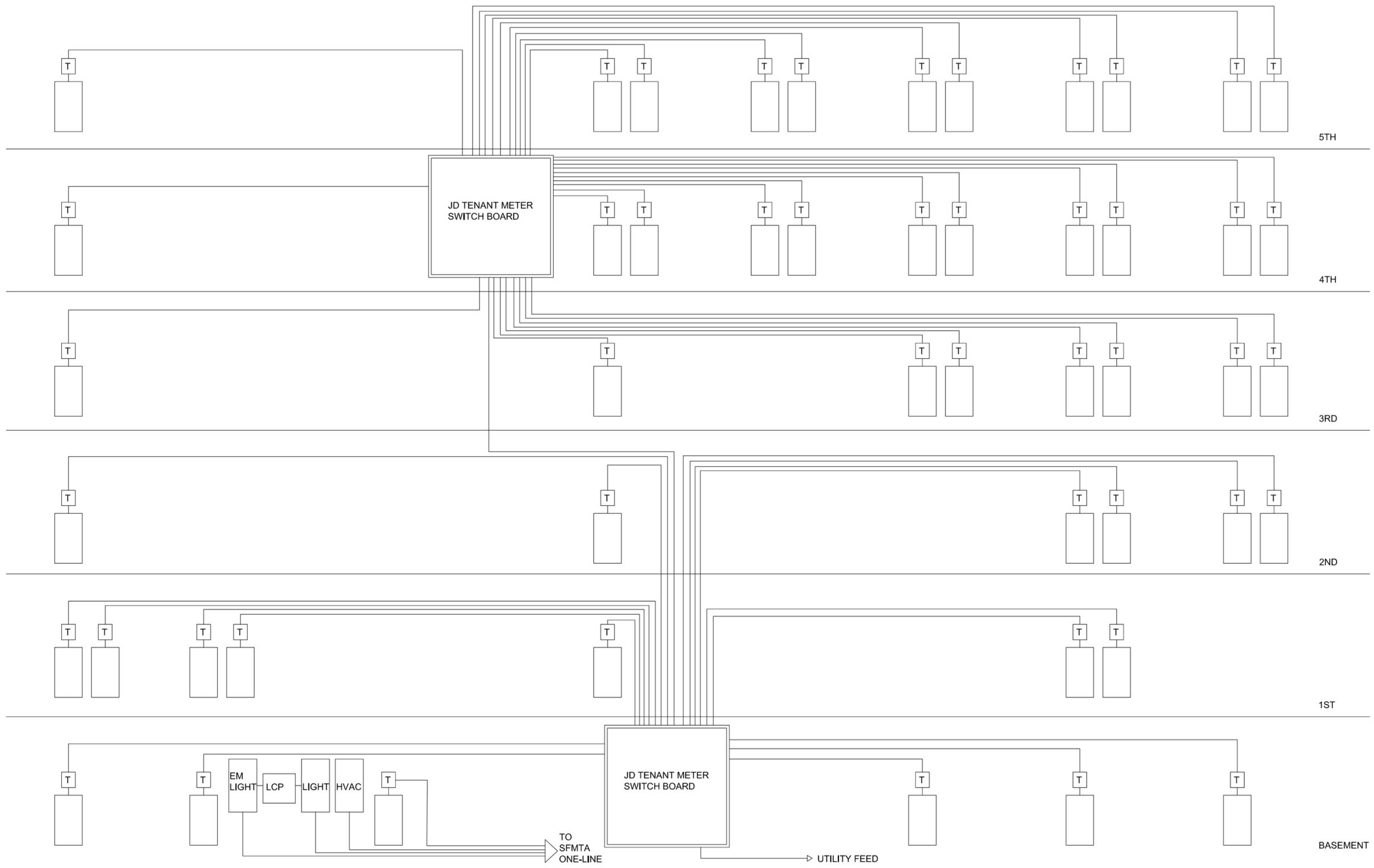
PROJECT MANAGER	
TEAM 1	Don Leidy
TEAM 2	Sheena Zimmerman
TEAM 3	Justin Kraegel
TEAM 4	Sara Jandaghi Jafari
TEAM 5	Jialing Sun
TEAM 6	Kashfi Kalam
TEAM 7	F. M. LAST
PROJECT NUMBER	10093201

**PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING**

**SFMTA POTRERO
SCENARIO 2
(3-LEVEL)**

**EMERGENCY POWER ONE LINE
DIAGRAM- NTS**

FILENAME	SFMTA_Potrero_AR_2018_3_Level	SHEET	AE-107
SCALE			



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ISSUE	DATE	DESCRIPTION
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PROJECT MANAGER	
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TEAM 6	Kashfi Kalam
TEAM 7	F. M. LAST
PROJECT NUMBER	10093201

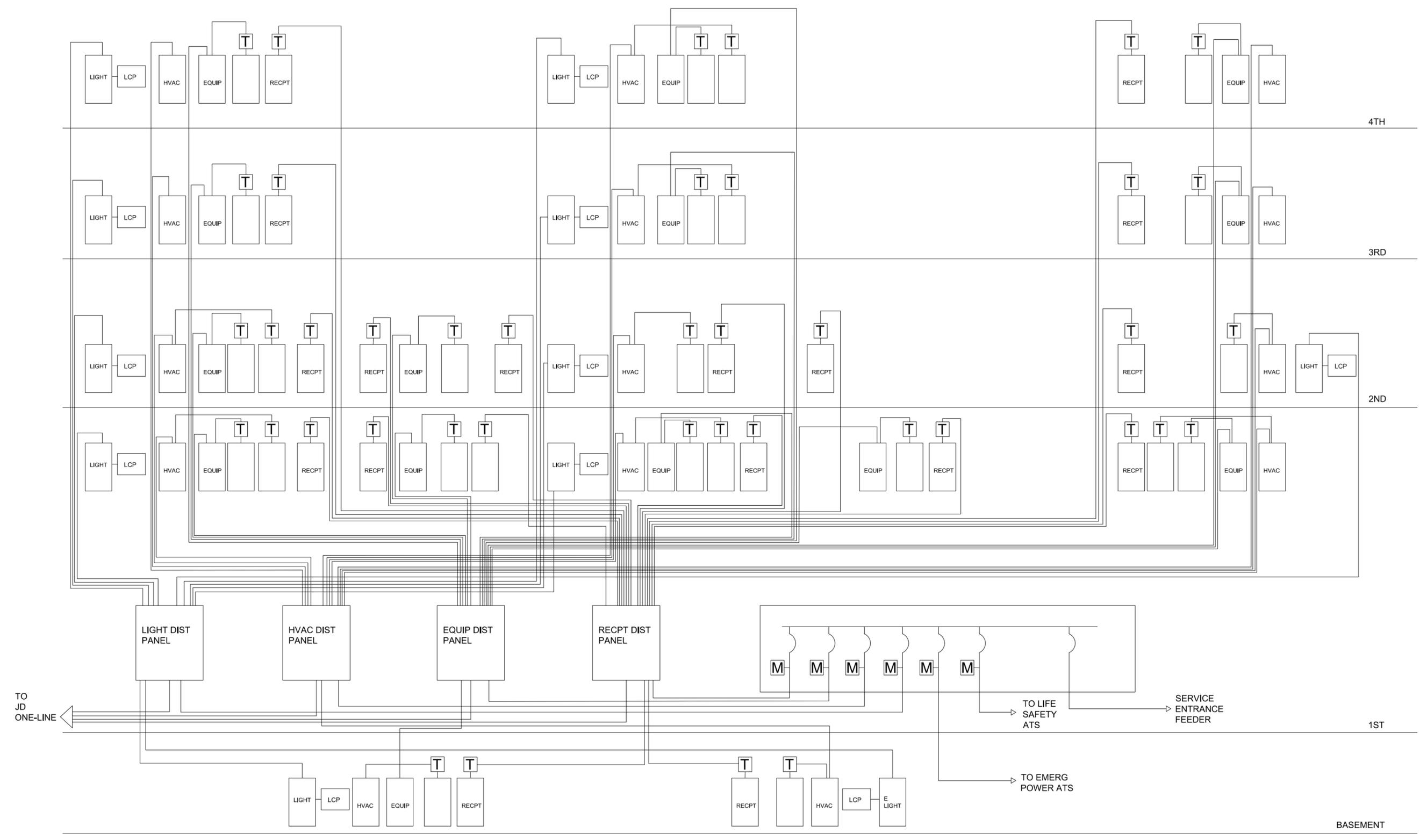
**PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING**

**SFMTA POTRERO
SCENARIO 2
(3-LEVEL)**

**JOINT DEVELOPMENT ONE LINE
DIAGRAM- NTS**



FILENAME	SFMTA_Potrero_AR_2018_3_LevelC	SHEET	AE-108
SCALE			



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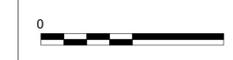
ISSUE	DATE	DESCRIPTION
3	March 13, 2020	Submittal
2	June 14, 2019	Draft Submittal
1	February 20, 2019	Draft Submittal

PROJECT MANAGER	
TEAM 1	Don Leidy
TEAM 2	Sheena Zimmerman
TEAM 3	Justin Kraegel
TEAM 4	Sara Jandaghi Jafari
TEAM 5	Jialing Sun
TEAM 6	Kashfi Kalam
TEAM 7	F. M. LAST
PROJECT NUMBER	10093201

**PRELIMINARY
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CONSTRUCTION
OR
RECORDING**

**SFMTA POTRERO
SCENARIO 2
(3-LEVEL)**

**NORMAL POWER ONE LINE DIAGRAM-
NTS**



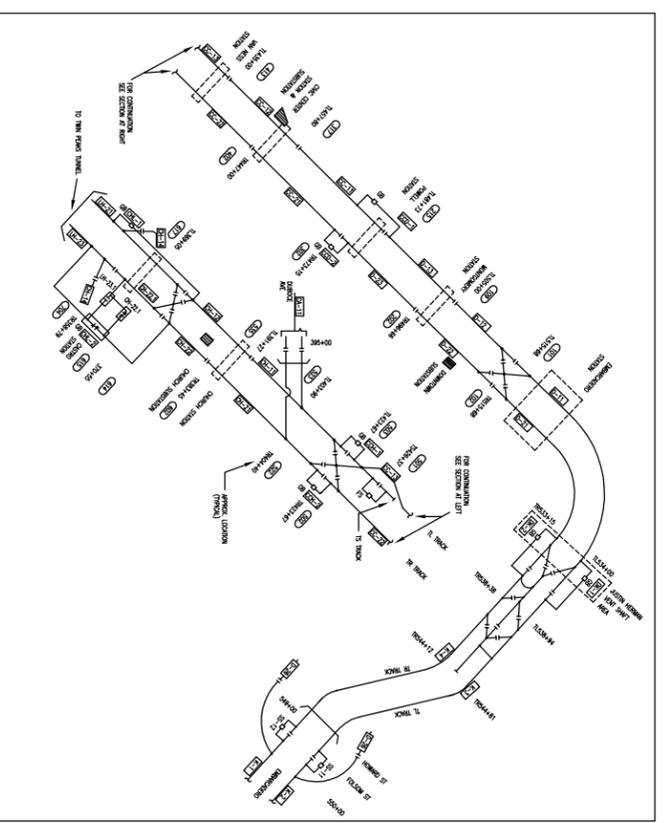
FILENAME: SFMTA_Potrero_AR_2018_3 Level
SCALE: _____ SHEET: AE-109



APPENDIX D:
TRACTION POWER FEEDER MAP



SYMBOLS	
	CONNECTION BETWEEN TROLLEY WIRES
	NO CONNECTION BETWEEN TROLLEY WIRES
	TROLLEY SECTION BREAK
	NO ELECTRICAL CONNECTION
	MANUAL SWITCH NUMBER
	SECTIONALIZING SWITCH NUMBER
	SECTIONALIZING BREAKER NUMBER
	TROLLEY SECTION BREAK WITH JUMPER
	GAP BREAKER
	CIRCUIT BREAKER NUMBER
	SURVEY STATION
	LOCATION SIGN
	FUTURE INSTALLATION



- NOTES:
1. ONLY POSITIVE WIRES ARE SECTIONALIZED. ALL NEGATIVE WIRES, CABLES AND RAILS ARE CONNECTED IN COMMON.
 2. FIGURES IN RECTANGLES THIS:
 - 0-11 INDICATES FEED FROM DOWNTOWN SUBSTATION, FDR. BRG. NO. 11
 - RM-2 INDICATES FEED FROM RICHMOND SUBSTATION, FDR. BRG. NO. 2

SUBSTATIONS		
CODE	NAME	LOCATIONS
B	BRYANT	2502 ALAMEDA, EAST OF BRYANT
BA	BALBOA	682 32nd AVE AT BALBOA
BE	BENAL (676-1085)	425 ANDOVER, SOUTH OF CORTLAND
CA	CARL	823 CLAYTON, NORTH OF CARL
CC	CIVIC CENTER	1150 MARKET, WEST OF CHURCH
CH	CHURCH	2120 MARKET, WEST OF CHURCH
D	DOWNTOWN	79 STINSON, EAST OF 2nd
E	STATION E	200 LENOX, AT 19th
F	FILLMORE	1825 FILLMORE, NORTH OF SUTTER
GP	GLEN PARK	100 RANDALL, AT MISSION OR SAN JOSE
I	ILINOS	555 ILINOS STREET AT WARDROCK ST
J	STATION J	520 SACRAMENTO, AT LEBESGOREFF
JU	JUDAH	2710 JUDAH, WEST OF 32nd AVE
K	KING	2 BERRY STREET, AT KING ST.
KE	KEITH	3400 KEITH ST. AT LE CONTE
LH	LAGUNA HONDA	375 LAGUNA HONDA, AT LAUNDRY BLDG.
M	MARINA	1575 NORTH POINT, EAST OF BUCHANAN
MI	MICHIGAN	M&E FACILITY BY 25th ST & MICHIGAN
N	STATION N	1437 - 9th AVE., SOUTH OF JUDAH
OM	OUTER MISSION	98 RUSSIA, AT LONDON
P	PHELPS	702 PHELPS ST AT HUDSON
RA	RANDOLPH	8 BYRSEE, NORTH OF RANDOLPH
RI	RICHMOND	435 - 8th AVE., SOUTH OF GEARY
SI	SAN JOSE	2200 SAN JOSE, AT OCEAN
T	TARVAL	3027 TARVAL, WEST OF 40th AVE.
WP	WEST PORTAL	145 LENOX, NORTH OF ULLA

IN EMERGENCY NOTIFY: POWER CONTROL CENTER 554-9204
CENTRAL CONTROL 759-4431

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC TRANSPORTATION DEPARTMENT
TRANSIT POWER FACILITIES

MUNICIPAL RAILWAY
TROLLEY SECTIONS

REC'D	BY	DATE	APPROVED	DATE
REC'D	BY	DATE	APPROVED	DATE
REC'D	BY	DATE	APPROVED	DATE

APPROVED: L. M. PERSON / RAY QUINN

APPROVED: A. O. OLSON

WORKSHEET NO. 2005-2008

FILE NO. / DRAWING NO. / SHEET NO. / TOTAL SHEETS

D-2200

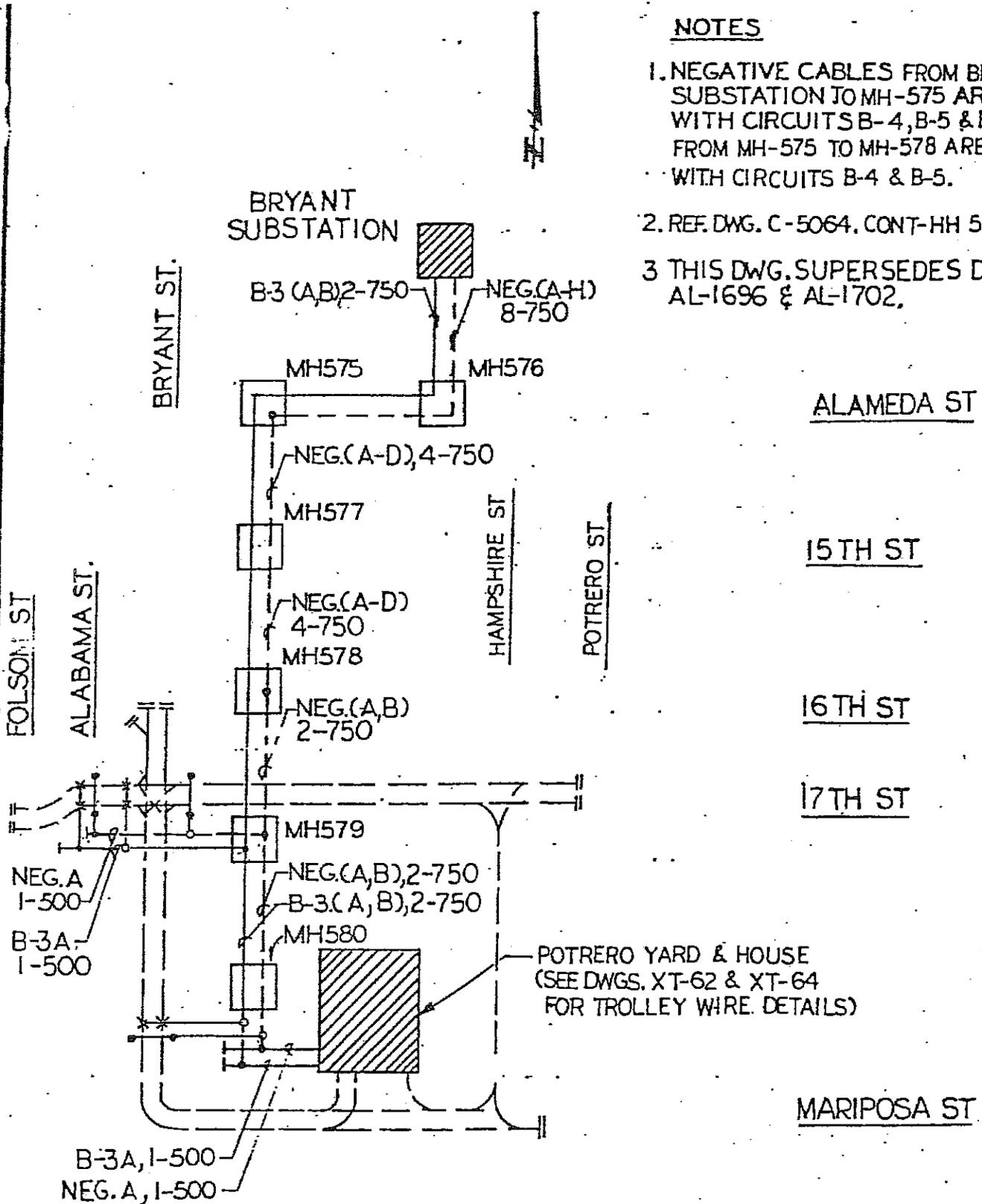
NO.	DATE	DESCRIPTION	REVISIONS	NO.	DATE	DESCRIPTION	REVISIONS
1	12/21/79	ISSUED FOR CONSTRUCTION		1	12/21/79	ISSUED FOR CONSTRUCTION	
2	12/21/79	ISSUED FOR CONSTRUCTION		2	12/21/79	ISSUED FOR CONSTRUCTION	
3	12/21/79	ISSUED FOR CONSTRUCTION		3	12/21/79	ISSUED FOR CONSTRUCTION	
4	12/21/79	ISSUED FOR CONSTRUCTION		4	12/21/79	ISSUED FOR CONSTRUCTION	
5	12/21/79	ISSUED FOR CONSTRUCTION		5	12/21/79	ISSUED FOR CONSTRUCTION	
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10	12/21/79	ISSUED FOR CONSTRUCTION		10	12/21/79	ISSUED FOR CONSTRUCTION	

FEEDER B-3

<u>MANHOLE #</u>	<u>LOCATION</u>	<u>COMMENTS</u>
MH 576	IFO Bryant Substation	
MH 575	Alameda & Bryant	
MH 577	N/E 15th St. & Bryant	
MH 578	N/E 16th St. & Bryant	
MH 579	W/S Bryant S/O 17th St.	
MH 580	IFO Abbet Electric	

NOTES

1. NEGATIVE CABLES FROM BRYANT SUBSTATION TO MH-575 ARE SHARED WITH CIRCUITS B-4, B-5 & B-6, AND FROM MH-575 TO MH-578 ARE SHARED WITH CIRCUITS B-4 & B-5.
2. REF. DWG. C-5064, CONT-HH 586.
- 3 THIS DWG. SUPERSEDES DWGS. AL-1696 & AL-1702.



CITY AND COUNTY OF SAN FRANCISCO

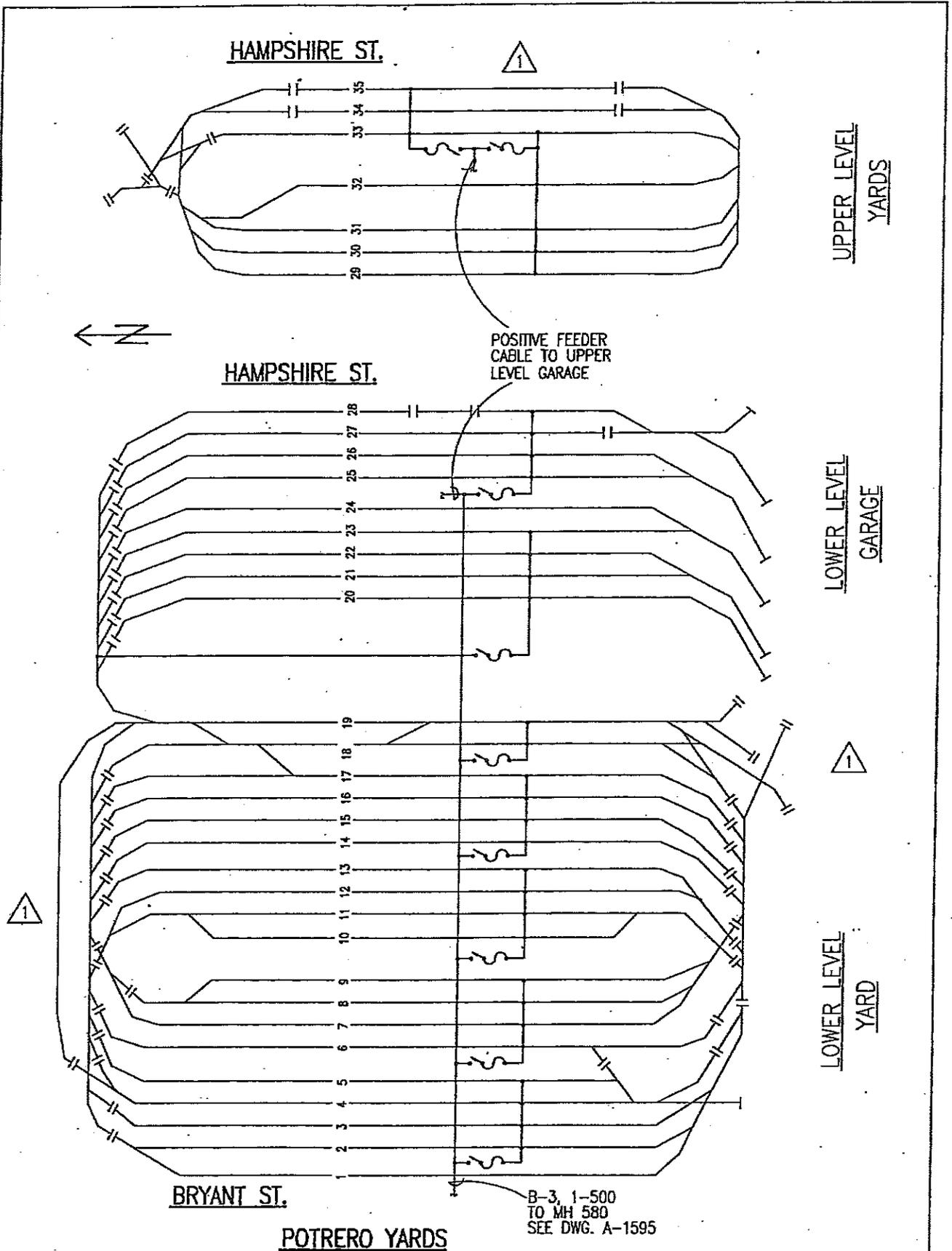
PUBLIC UTILITIES COMMISSION

HETCH HETCHY WATER AND POWER

MUNICIPAL RAILWAY FEEDER DIAGRAM

FEEDER B-3

BY TBQ	TR.	APPROVED <i>[Signature]</i>	SCALE NONE	DATE AUG. 1980	LATEST REVISION
DR.	CH.	APPROVED	APPROVED	DRAWING NO.	REVISION NO.



NOTE:
1. THIS DWG. SUPERSEDES
DWG. AL-1702

CITY AND COUNTY OF SAN FRANCISCO											
HETCH HETCHY WATER AND POWER											
TRANSIT POWER DIVISION											
FEEDER B-3 (YARD)											
NO.	DATE	DESCRIPTION	BY	APPRD.	CHK.	DATE	SCALE	LATEST REVISION	REVISION NO.		
1	JAN/95	ADDED MORE LANES	AZ	CJM	RK	APR. 83					

Mar 7 07: 15...



APPENDIX E:
SAMPLE ROUTE SCHEDULES



SEE PAGE 9 FOR 30 LINE THAT NEED TO PULL OUT FROM PRESIDIO
SEE PAGE 10 FOR 6 & 22 LINE THAT NEED TO PULL OUT FROM PRESIDIO

SIGNUP : 2018 SPRING

EFFECTIVE: 02-24-2018

FOR _____ 20____

DAY DATE

DIVISION: POTRERO

COACH ASSIGNMENT, OPERATOR REPORT
 AND COACH MILEAGE RECORD

SERVICE : WEEKDAY

PAGE 1 OF 10

C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	R U N N U M	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
104	1401		TC60		356A	128X			301		A			
103	501		TC60		419A	1259X			304		B			
102	1402		TC60		426A	1058P			306		C			
101	1403		TC60		436A	628P			308		D			
100	502		TC60		439A	948P			309		E			
99	2201		ET40		440A	755P			310		A			
98	1404		TC60		441A	1010P			311		F			
97	1405		TC60		447A	822P			313		G			
96	503		TC60		450A	1041P			314		H			
95	2202		ET40		453A	810P			315		B			
94	1406		TC60		456A	1013P			318		I			
93	504		TC60		456A	834P			319		J			
92	1407		TC60		503A	1046P			321		I			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
91	2203		ET40		506A	825P			322		C			
90	601		ET40		508A	811P			317		D			
89	1408		TC60		509A	213X			323		J			
88	3021		TC60		511A	707P			326		A			
87	3301		ET40		515A	743P			327		E			
86	1409		TC60		516A	151X			328		B			
85	1410		TC60		517A	746P			330		C			
84	505		TC60		517A	853P			329		D			
83	2204		ET40		518A	840P			332		F			
82	3009		ET40		518A	837P			331		G			
81	1411		TC60		521A	1034P			334		E			
80	602		ET40		522A	722P			324		H			
79	1412		TC60		524A	846P			335		F			
78	2205		ET40		530A	1032P			336		I			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
77	603		ET40		534A	737P			333		J			
76	3302		ET40		535A	110X			338		A			
75	1413		TC60		536A	254X			339		G			
74	506		TC60		538A	905P			340		H			
73	2206		ET40		542A	718P			342		B			
72	3022		TC60		542A	753P			343		I			
71	507		TC60		545A	923P			345		J			
70	3304		ET40		546A	1250X			346		C			
69	604		ET40		546A	1101A			337		D			
68	3303		ET40		550A	140X			347		E			
67	1414		TC60		551A	806P			348		A			
66	2207		ET40		551A	918P			350		F			
65	605		ET40		551A	105X			341		G			
64	2208		ET40		557A	910P			352		H			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
63	606		ET40		557A	136X			344		I			
62	2209		ET40		600A	933P			354		J			
61	2210		ET40		603A	741P			356		A			
60	3306		ET40		603A	1014P			357		B			
59	508		TC60		603A	1133P			355		B			
58	3305		ET40		606A	120X			359		C			
57	509		TC60		606A	750P			360		C			
56	607		ET40		609A	847P			351		D			
55	3023		TC60		613A	650P			362		D			
54	608		ET40		618A	115X			358		E			
53	3012		ET40		622A	807P			363		F			
52	2211		ET40		623A	115X			365		G			
51	510		TC60		623A	957P			364		E			
50	609		ET40		624A	135X			361		H			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
49	511		TC60		625A	118X			366		F			
48	1415		TC60		626A	1046A			367		G			
47	512		TC60		631A	1015P			369		H			
46	1416		TC60		634A	809P			370		I			
45	3307		ET40		636A	1111P			372		I			
44	2212		ET40		639A	1134P			373		J			
43	513		TC60		639A	910P			374		J			
42	2213		ET40		640A	1155P			375		A			
41	3024		TC60		641A	701P			376		A			
40	610		ET40		641A	854P			368		B			
39	514		TC60		646A	129X			377		B			
38	2214		ET40		654A	810P			378		C			
37	515		TC60		656A	1030P			380		C			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
36	3025		TC60		704A	725P			381		D			
35	3014		TC60		706A	655P			382		E			
34	1417		TC60		707A	836P			383		F			
33	611		ET40		708A	1235X			379		D			
32	2215		ET40		710A	646P			384		E			
31	516		TC60		717A	1053P			385		G			
30	2216		ET40		718A	1223X			386		F			
29	3309		ET40		725A	754P			387		G			
28	3308		ET40		735A	703P			388		H			
27	3026		TC60		739A	759P			390		H			
26	2217		ET40		740A	1023A			501		I			
25	612		ET40		748A	949P			389		J			
24	1418		TC60		803A	929P			391		I			
23	3015		TC60		842A	719P			392		J			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
22	3016		TC60		859A	736P			393		A			
21	3017		TC60		907A	741P			394		B			
20	3018		TC60		934A	804P			395		C			
19	3019		TC60		939A	644P			396		D			
18	1431		TC60		139P	240X			375		E			
17	2252		ET40		158P	656P			386		B			
16	551		TC60		157P	743P			398		F			
15	1432		TC60		225P	1231X			373		G			
14	2253		ET40		235P	730P			371		B			
13	552		TC60		249P	837P			364		H			
12	1433		TC60		251P	750P			399		I			
11	553		TC60		328P	720P			389		J			
10	554		TC60		348P	810P			397		A			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
9	2291		ET40		858P	506X			486		C			
8	591		ET40		904P	527X			487		D			
7	1491		ET40		910P	608X			488		E			
6	2292		ET40		913P	536X			489		F			
5	1492		ET40		921P	554X			490		G			
4	592		ET40		924P	557X			491		H			
3	1494		ET40		949P	524X			492		I			
2	1493		ET40		950P	538X			493		J			
1	2293		ET40		1013P	606X			494		A			

PULL OUT FROM PRE

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
14	3001		ET40		408A	747P			302		A			
13	3002		ET40		418A	111X			303		B			
12	3003		ET40		425A	131X			305		C			
11	3004		ET40		434A	151X			307		D			
10	3005		ET40		444A	929P			312		E			
9	3006		ET40		454A	211X			316		F			
8	3007		ET40		502A	730P			320		G			
7	3008		ET40		510A	1009P			325		H			
6	3010		ET40		551A	855P			349		I			
5	3011		ET40		600A	713P			353		J			
4	3013		ET40		635A	116X			371		A			

PULL OUT FROM PRE

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
3	2251		ET40		156P	1000P			444		B			
2	651		ET40		226P	717P			394		C			
1	652		ET40		343P	821P			411		D			

SEE PAGE 7 FOR 30 LINE THAT NEED TO PULL OUT FROM PRESIDIO

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
81	501		TC60		418A	108X			311		K			
80	502		TC60		438A	822P			314		L			
79	1401		TC60		442A	1014P			313		M			
78	3001		ET40		447A	754P			312		K			
77	2201		ET40		454A	1031P			315		L			
76	503		TC60		457A	922P			325		N			
75	504		TC60		458A	1031P			316		O			
74	1402		TC60		459A	115X			326		P			
73	1403		TC60		507A	601P			323		Q			
72	601		ET40		507A	1242X			317		M			
71	2202		ET40		514A	725P			322		N			
70	3301		ET40		516A	1111P			329		O			
69	505		TC60		516A	1046P			353		R			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
68	1405		TC60		521A	1022P			332		K			
67	1404		TC60		523A	1242X			335		L			
66	602		ET40		525A	134X			328		P			
65	2203		ET40		534A	923P			336		Q			
64	1406		TC60		537A	946P			337		M			
63	603		ET40		545A	716P			333		R			
62	3302		ET40		546A	853P			339		K			
61	3303		ET40		546A	148X			341		L			
60	2204		ET40		551A	116X			343		M			
59	1407		TC60		601A	807P			346		N			
58	1408		TC60		601A	706P			347		O			
57	604		ET40		604A	137X			342		N			
56	2205		ET40		606A	823P			350		O			
55	506		TC60		612A	123X			354		P			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
54	1409		TC60		620A	202X			351		Q			
53	605		ET40		624A	1257X			352		P			
52	507		TC60		634A	714P			359		R			
51	2206		ET40		635A	658P			360		Q			
50	508		TC60		655A	1103P			344		K			
49	1410		TC60		658A	1122P			361		L			
48	607		ET40		707A	117X			357		R			
47	510		TC60		713A	804P			363		M			
46	2207		ET40		716A	757P			368		K			
45	606		ET40		726A	949P			367		L			
44	1411		TC60		729A	732P			370		N			
43	3008		ET40		730A	941P			369		M			
42	509		TC60		733A	1022P			375		O			
41	511		TC60		738A	135X			373		P			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
40	3304		ET40		744A	1255X			371		N			
39	2208		ET40		751A	1023P			372		O			
38	3013		TC60		818A	700P			382		Q			
37	3010		ET40		819A	710P			384		P			
36	608		ET40		819A	729P			381		Q			
35	2209		ET40		823A	908P			380		R			
34	1412		TC60		825A	937P			391		R			
33	3015		TC60		832A	708P			394		K			
32	3017		TC60		841A	717P			395		L			
31	512		TC60		841A	734P			392		M			
30	3019		TC60		847A	734P			396		N			
29	3014		TC60		853A	615P			397		O			
28	2210		ET40		854A	1133P			399		K			
27	3016		TC60		903A	624P			398		P			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
26	3018		TC60		913A	633P			400		Q			
25	3020		TC60		923A	642P			403		R			
24	2211		ET40		924A	611P			406		L			
23	1413		TC60		927A	227X			376		K			
22	3305		ET40		927A	1013P			407		M			
21	3021		TC60		933A	651P			408		L			
20	609		ET40		937A	750P			405		N			
19	3306		ET40		943A	121X			404		O			
18	610		ET40		950A	749P			411		P			
17	513		TC60		953A	853P			414		M			
16	1414		TC60		955A	150X			410		N			
15	1415		TC60		1003A	255X			416		O			
14	3022		TC60		1006A	725P			420		P			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S	P U L L O U T	P U L L I N	C A R C O A C H	T B R E A K C O D E	R U N N U M	O P E R A T O R R E P O R T	C O D E A C S	V E H I C L E M I L E E X C E P T	L P O	E P I
13	2212		ET40		1013A	1227X			417		Q			
12	3307		ET40		1023A	119X			422		R			
11	3023		ET40		1111A	152X			361		K			
10	2213		ET40		1131A	1159P			347		L			
9	1491		ET40		839P	539X			488		M			
8	2291		ET40		859P	507X			486		N			
7	591		ET40		901P	534X			487		O			
6	1492		ET40		907P	527X			490		P			
5	2292		ET40		914P	537X			489		Q			
4	1493		ET40		915P	609X			492		R			
3	592		ET40		921P	604X			491		K			
2	1494		ET40		943P	557X			493		L			
1	2293		ET40		1014P	607X			494		M			

30 LINE THAT NEED TO PULL OUT FROM PRESIDIO

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
9	3002		ET40		504A	617P			320		K			
8	3003		ET40		524A	1049P			334		L			
7	3004		ET40		541A	904P			348		M			
6	3005		ET40		630A	915P			356		N			
5	3006		ET40		705A	728P			364		O			
4	3007		ET40		715A	132X			365		P			
3	3009		ET40		749A	212X			378		Q			
2	3011		ET40		840A	113X			393		R			
1	3012		ET40		921A	811P			402		K			

SEE PAGE 7 FOR 30 LINE THAT NEED TO PULL OUT FROM PRESIDIO

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
81	501		TC60		418A	108X			311		S			
80	502		TC60		438A	822P			314		T			
79	1401		TC60		442A	1014P			313		U			
78	3001		ET40		447A	754P			312		S			
77	2201		ET40		454A	1031P			315		T			
76	503		TC60		457A	922P			325		V			
75	504		TC60		458A	1031P			316		W			
74	1402		TC60		459A	115X			326		X			
73	1403		TC60		507A	601P			323		Y			
72	601		ET40		507A	1242X			317		U			
71	2202		ET40		514A	725P			322		V			
70	3301		ET40		516A	1111P			329		W			
69	505		TC60		516A	1046P			353		Z			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
68	1405		TC60		521A	1022P			332		S			
67	1404		TC60		523A	1242X			335		T			
66	602		ET40		525A	134X			328		X			
65	2203		ET40		534A	923P			336		Y			
64	1406		TC60		537A	946P			337		U			
63	603		ET40		545A	716P			333		Z			
62	3302		ET40		546A	853P			339		S			
61	3303		ET40		546A	148X			341		T			
60	2204		ET40		551A	116X			343		U			
59	1407		TC60		601A	807P			346		V			
58	1408		TC60		601A	706P			347		W			
57	604		ET40		604A	137X			342		V			
56	2205		ET40		606A	823P			350		W			
55	506		TC60		612A	123X			354		X			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
54	1409		TC60		620A	202X			351		Y			
53	605		ET40		624A	1257X			352		X			
52	507		TC60		634A	714P			359		Z			
51	2206		ET40		635A	658P			360		Y			
50	508		TC60		655A	1103P			344		S			
49	1410		TC60		658A	1122P			361		T			
48	607		ET40		707A	117X			357		Z			
47	510		TC60		713A	804P			363		U			
46	2207		ET40		716A	757P			368		S			
45	606		ET40		726A	949P			367		T			
44	1411		TC60		729A	732P			370		V			
43	3008		ET40		730A	941P			369		U			
42	509		TC60		733A	1022P			375		W			
41	511		TC60		738A	135X			373		X			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
40	3304		ET40		744A	1255X			371		V			
39	2208		ET40		751A	1023P			372		W			
38	3013		TC60		818A	700P			382		Y			
37	3010		ET40		819A	710P			384		X			
36	608		ET40		819A	729P			381		Y			
35	2209		ET40		823A	908P			380		Z			
34	1412		TC60		825A	937P			391		Z			
33	3015		TC60		832A	708P			394		S			
32	3017		TC60		841A	717P			395		T			
31	512		TC60		841A	734P			392		U			
30	3019		TC60		847A	734P			396		V			
29	3014		TC60		853A	615P			397		W			
28	2210		ET40		854A	1133P			399		S			
27	3016		TC60		903A	624P			398		X			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
26	3018		TC60		913A	633P			400		Y			
25	3020		TC60		923A	642P			403		Z			
24	2211		ET40		924A	611P			406		T			
23	1413		TC60		927A	227X			376		S			
22	3305		ET40		927A	1013P			407		U			
21	3021		TC60		933A	651P			408		T			
20	609		ET40		937A	750P			405		V			
19	3306		ET40		943A	121X			404		W			
18	610		ET40		950A	749P			411		X			
17	513		TC60		953A	853P			414		U			
16	1414		TC60		955A	150X			410		V			
15	1415		TC60		1003A	255X			416		W			
14	3022		TC60		1006A	725P			420		X			

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C O U N T	TRAIN	HOLD	T Y P E	P A N D S O	PULL OUT	PULL IN	CAR COACH	T B R E A R C T K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
13	2212		ET40		1013A	1227X			417		Y			
12	3307		ET40		1023A	119X			422		Z			
11	3023		ET40		1111A	152X			361		S			
10	2213		ET40		1131A	1159P			347		T			
9	1491		ET40		839P	539X			488		U			
8	2291		ET40		859P	507X			486		V			
7	591		ET40		901P	534X			487		W			
6	1492		ET40		907P	527X			490		X			
5	2292		ET40		914P	537X			489		Y			
4	1493		ET40		915P	609X			492		Z			
3	592		ET40		921P	604X			491		S			
2	1494		ET40		943P	557X			493		T			
1	2293		ET40		1014P	607X			494		U			

30 LINE THAT NEED TO PULL OUT FROM PRESIDIO

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C O U N T	TRAIN	HOLD	T Y P E	P A N D T S O	PULL OUT	PULL IN	CAR COACH	T B R E A K H	RUN NUM	OPERATOR REPORT	CODE ACS	VEH MILE EXCP	LPO	EPI
9	3002		ET40		504A	617P			320		S			
8	3003		ET40		524A	1049P			334		T			
7	3004		ET40		541A	904P			348		U			
6	3005		ET40		630A	915P			356		V			
5	3006		ET40		705A	728P			364		W			
4	3007		ET40		715A	132X			365		X			
3	3009		ET40		749A	212X			378		Y			
2	3011		ET40		840A	113X			393		Z			
1	3012		ET40		921A	811P			402		S			