

**Project Manual
For**

CITY OF Somerville

**Somerville Public Safety
Building**

Somerville, Massachusetts

100% SD Set

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BY

context
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SOMERVILLE PUBLIC SAFETY BUILDING

PROJECT MANUAL

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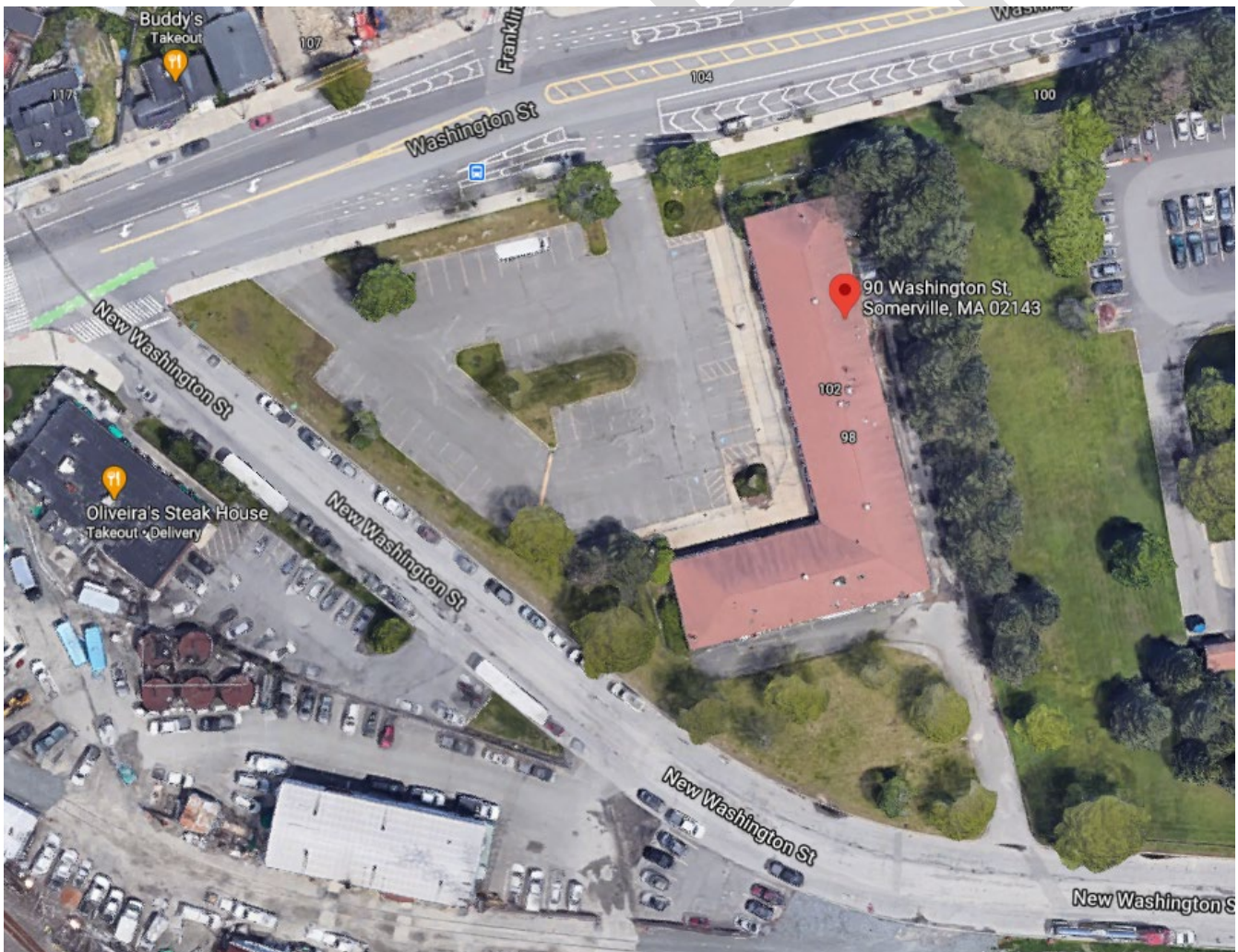
OWNER'S PROJECT REQUIREMENTS



City of Somerville Public Safety Building

Owners Project Requirements

Prepared By: City of Somerville



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Overview and Introduction

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements (OPR) document is defined in ASHRAE Guideline 0-2005, *The Commissioning Process*, as a written document that details the functional requirements of a project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. The purpose of this document is to clarify the Owner's expectations for the project by detailing specific functional requirements for commissioned systems such as:

- Project schedule and budget
- Project documentation requirements
- Owner, User, and O&M requirements
- Environmental and sustainability goals
- Indoor Environmental Quality requirements
- Energy Efficiency requirements
- Systems requirements

The OPR is developed to provide direction to the design and construction teams from programming through construction. The intent of the OPR is to detail the project's sustainability goals, functional requirements of the project and the expectations of the building's use and operation as it relates to commissioned systems. The OPR Document is a required document for commissioning of the building energy systems. It shall be completed by the Owner based on requirements set forth with the design team and input from OPM.

The OPR is considered a "living" document during the design phase of the project, and as such is subject to change as the design progresses, although every effort possible has been put into the completion of this document in order to minimize future changes. The OPR becomes a record by which the City of Somerville, and other parties involved in the project, can judge the degree of success in meeting the owner's defined objectives and criteria. In part, the success of the project will be tracked by the minimization of the need to change core tenets of this document.

Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Owner based on decisions and agreements coordinated with and agreed to by the design team.

The OPR serves three broad vital purposes:

1. Provides the design team with information necessary to develop the Basis of Design (BOD) during program verification and/or schematic design, which serves as a "road map" for development of the design and construction documents. Additionally, the OPR provides a mechanism by which designers can respond to and describe how they are meeting City of Somerville's requirements. As the design progresses additional information will be added to the OPR as needed until the development of the Basis of Design (BOD) and subsequent establishment of the project scope and final approved construction cost.

2. Provides the commissioning (Cx) team with tangible benchmarks to measure success & quality and confirm that the building and systems constructed align with the **Owner's** expectations and requirements.
3. Serves, along with the BOD and contractor deliverables such as "as-built" documents, as the foundation for the Systems Manual outlined below.

As decisions are made during the life of the project, this document shall be updated to reflect the current requirements of Somerville Public Safety Project. The Owner is the **City of Somerville**. Primary users and stakeholders include the **Police, Fire and 311 – Constituent Services Departments**. The entity responsible for project management and delivery is **Colliers International**. The organization responsible for operation and maintenance is the City of Somerville Department of Public Works.

The Somerville Public Safety Building project includes approximately **80,000 (TBD)** gross sq. ft. building area, parking, site amenities and landscaping.

Basis of Design (BOD)

A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and specific assumptions made by the designers during design development phase. The BOD document is updated throughout the design and construction process by the Design Team, as is the OPR document, as design changes and change directives during construction may alter the means by which the OPR requirements are met.

The Basis of Design documents the assumptions made by the design team and the reasoning behind these assumptions for the design to meet the OPR. For any criterion that could not be met, documentation detailing what was done, its impact on the Owner's Project Requirements, and how the Owner's Project Requirements was modified shall be included. The BOD includes, but is not limited to, the following:

- Specific codes, standards, and guidelines considered during design of the facility and designer interpretations of such requirements.
- Information regarding ambient conditions (climatic, geologic, structural, existing construction) used during design
- International Association of Police Chiefs (IACP) – Police Facility Planning Guidelines
- National Fire Protection Association (NFPA)

Applicable Codes and Standards

The facility shall meet or exceed the following standards, guidelines and codes. In some cases, exceeding these standards will be defined elsewhere in this OPR.

- ANSI/ASHRAE/IES Standard 90.1-2016
- ANSI/ASHRAE 55-2017
- ANSI/ASHRAE 62.1-2016
- ASHRAE Standard 189.1-2017

- ASHRAE Guideline 0-2013
- ASHRAE Guideline 1-2017
- Applicable Local, State, and National Building Codes
- ASHRAE Thermal Guidelines for Data Processing Environments
- ASHRAE Advanced Energy Design Guide for Zero Energy Office Buildings
- State and Federal Police Facility Guidelines
- State and Federal Fire Department Standards
- ANSI/IEE Standard C37.2 for electrical power systems

Meets all applicable ANSI standards for all products, services, processes and personnel including but not limited to electrical, mechanical, civil and ASTM.

Project Objectives

The City of Somerville desires to make a statement with this new construction project by exceeding the provisions of ASHRAE's energy and indoor air quality standards. The City of Somerville wants a building that will be restorative, livable, and resilient.

Features like water efficient plumbing and landscape, energy efficient HVAC and lighting systems, as well as the ability to harness on site energy production and be a "net zero ready building" are defined herein as project requirements.

The City of Somerville's objective is to develop a high-quality Public Safety (Fire and Police) building by applying sustainable development principles in a practical, well planned and cost-effective manner that will meet:

- The occupant's needs to fulfill their daily mission.
- Operation and maintenance needs, featuring an easily maintainable and secure facility that has low operations and maintenance costs.
- Excellent indoor environmental quality requirements that facilitate occupants' productivity by providing a comfortable environment, good HVAC system performance, good space utilization, good acoustical qualities, unified interior style and high durability of finishes.
- A building which creates a work environment that enhances the general health, safety, fitness, and wellbeing of the workforce. Some of its requirements are addressed in the building design, most are achieved in the policy and programs offered to the staff.
- A building that is both resistant to disruptions from weather, utility outages and other causes as well as a building that can "bounce" back and be resilient. The level of service during extreme events should be defined ranging from no disruption of operations to the ability for the organization to function at some level during longer interruptions. These features will be integrated into the building envelope, HVAC systems, and through storage and renewable systems.

The Objectives for the project are provided in two categories; mission critical and highly desirable. All mission critical goals are required for the project to be successful and are not listed in the order of priority. The highly desirable goals are listed in order of their priority with the direction that the design and construction teams utilize their collective ingenuity through the design process to meet

as many of the highly desirable requirements as are feasible within the limits of the budget.

Mission Critical Requirements

1. Safety during construction and building operation
2. A building which creates a work environment that enhances the general health, safety, fitness, and wellbeing of the workforce. Some of its requirements are addressed in the building design, most are achieved in the policy and programs offered to the staff.
3. A highly functional Public Safety Building that allows the occupants to complete their working objectives.
4. It is required that the project be designed and built to exhibit the best possible sustainable features affordable and appropriate to the budget and program. The Design and Construction team shall study and advise the City of Somerville throughout the Design Process on the best possible benchmarking of the design against available popular certification programs and provide recommendations on the program(s) recommended for implementation, including impact on professional fees, project and construction cost, schedule and value.
5. Exceed the requirements of ASHRAE Standards 90.1-2016, 62.1-2016, 55-2017
6. All-electric building with the exception of backup generators which can be fossil fueled.

Highly Desirable Requirements (in ranked order)

1. Must adhere to City of Somerville zoning ordinance which require buildings over 50,000sqft to be LEED Platinum Certified.
2. Exceed the requirements of ASHRAE Standard 189.1-2017
3. A maximum or better energy consumption of building (excluding renewables) of 63.5 kBtu/SF/yr. Work with owner to limit maximum daytime plug load to 0.5W/SF, excluding IT rooms and other mission critical spaces eg. Apparatus Bays.
4. Deliver Outside Air at a value of at least 1.3 times the requirements of Std. 62.1 OA to regularly occupied areas and use Demand Controlled Ventilation (DCV) for high occupancy spaces, such as conference and meeting rooms and training center, set at carbon dioxide limit of 400 ppm over ambient, providing a reduction in outside air delivery to these spaces during low or non-occupancy
5. Achieve Spatial Daylighting Autonomy (SDA) which assures the vast majority of occupants have a generous level of daylighting in their work space 55% of the time, This shall be done while maintaining glare to not be objectionable to occupants to the point of distraction.
6. Achieve Resilience at a level established by ASHRAE.
7. Design the project to achieve a Plug Load < 0.4 w/sf
8. Design and construct the building to achieve a demand side EUI < 15 kBtu/SF/yr
9. Flexibility - The building should accommodate future needs as planned by the City of Somerville such as 311 call-in, Parking or other administrative use.

10. Quality and Context - The building should be designed to last 100 years
11. Redundancy - Redundant utilities shall be designed to be brought into the building for communications, power, water, waste and fuel. The building itself shall be designed to incorporate redundancy wherever feasible in the distribution of network access and critical communications systems.

Sustainability and Energy Efficiency

The maximum demand side site EUI for the building shall be 63.5 kBtu/SF/yr consistent with the energy targets in the Advanced Energy Design Guide for Zero Energy Office Buildings and equal to or better the national average for public safety buildings per CBECS. A secondary (or stretch) goal for the project shall achieve an EUI of less than 50.0 kBtu/SF/yr, not including site PV. Once the primary goal is met, this stretch goal shall be considered and included in the energy model for verification of its achievability.

The design team shall investigate opportunities for electrical utility partnering to improve operation of renewable energy systems to be more integrated with the utility daily and annual carbon emissions profile

As part of an overall commitment to sustainability, it's important that this facility also promote environmental quality and resource conservation through sustainable design and construction. As part of that commitment and to demonstrate that the facility was designed and constructed to be energy-efficient and environmentally sustainable this project must be designed, constructed, and commissioned to achieve at minimum LEED certification as issued by the U.S. Green Building Council (USGBC) through its Leadership in Energy and Environmental Design (LEED) process.

Plumbing fixtures shall be selected for Best Available water efficiency. The Design team shall investigate opportunities for recovering water effluent from building systems for potential re-use for building non-potable end-uses. Effluent assets to be investigated, include HVAC condensate, stormwater run-off from the roof and wash-water. Non-potable end uses include cooling tower make-up, if applicable, toilet flushing and irrigation.

Specific, high-priority sustainability goals for this project include:

- Net Zero, carbon neutrality as defined in Somerville Climate Forward and in this document
- All-electric facility, maximizing solar power and/or geothermal as well as any possible REC credits to offset.
- 30% above ASHRAE

The Basis of Design (BOD) shall establish specific plans and strategies for achieving these goals. The construction documents shall include requirements for submittals and sustainable construction practices and techniques.

This should include:

- Narratives of mechanical, electrical, and plumbing systems.
- Design outdoor temperature conditions for Saratoga, California.
- Design indoor temperature conditions.

- Design Noise Criteria (NC) levels for individual zones.
- Ventilation and filtration.
- Energy efficiency strategies to be implemented.
- Low water use strategies to be implemented.
- Energy efficient strategies for plumbing equipment.
- Overview of the indoor and outdoor lighting and lighting controls.
- Overview of the HVAC control system and integration with existing campus infrastructure.
- Electric, gas, and water use metering.
- Procurement and use of low-VOC, regional-available, and high recycled content.
- Daylight modelling, shading strategies

The LEED matrix provides the **City Of Somerville's** estimate of the probability of securing each credit – high, medium, or low. The project team will review and update this spreadsheet in order to firmly establish sustainability goals for the project. The matrix will be continuously maintained by the LEED consultant throughout design and construction as a guideline for achieving LEED certification and tracking progress and action items.

Resiliency

A resilient building is one that is both resistant to disruptions from weather, utility outages and other causes as well as having the ability to recover quickly and return to full operation after such disruptions. The Design Team shall facilitate a resiliency workshop with the client to establish goals for the resiliency of the building and its operations. The level of service during extreme events should be defined ranging from no disruption of operations to the ability for the organization to function at some level during longer interruptions. These features will be evaluated for integration into the building envelope, HVAC systems, and through storage and renewable systems. While a generator may be used for life-safety, it is not considered part of the resistance and resilience.

Building Resiliency Design Objectives to be examined for feasibility shall include the following:

- Design team shall research and determine the effects of severe storms, potential flooding, wildfires and other impacts resulting from a warming climate. If impacts are significant, the building design shall include building elements to address these issues.
- Critical building systems shall be located to withstand flooding and extreme weather events.
- Climatic design conditions shall be based on future conditions (20 years) rather than utilizing past climatic design data.
- Building shall be capable of sustaining occupiable conditions in the event of an extended loss of power. (Acceptable low and high drift temperatures 45 - 90 °F (7 - 32 °C) Define number of hours and/or number of days
- Utilize durable building materials, windows capable of withstanding storm event winds predicted based on future conditions (20 years) and interior finish materials that can dry out in the event they become wet.
- Optimize use of on-site renewable energy systems.
- Recover and reuse water to the extent possible. Rainwater harvesting and condensate collection systems shall be considered. (Gravity fed if feasible. Optimize use of existing

stormwater pond. Consider lake on generator powered pump.)

- Consider redundant water supplies or on-site water storage for use during emergencies. (Potable water: 3 liters per person per day, Non-potable water: 20 liters per person per day.)
- Reuse existing building materials to the extent possible.
- Utilize locally available building materials.
- Utilize building products and materials that do not off-gas or leach hazardous substances in the event of flooding or fire damage.
- Consider redundant electrical service.
- Design should provide for 3 liters of potable water per day and 20 liters of non-potable water per day.
- Automatic Transfer Switches - storm switch in case main generator fails

The Design and Construction team shall study and advise City of Somerville throughout the Design Process on the best possible benchmarking of the design against available popular resiliency certification programs and provide recommendations on the program(s) recommended for implementation, including impact on professional fees, project and construction cost, schedule and value.

Equipment and system expectations, including limitations of operating and maintenance personnel

Design and construction of the building should be done to minimize maintenance requirements. HVAC systems shall be designed to contribute to overall building energy goals as defined in this document. The HVAC systems shall have low life cycle cost and be capable of providing excellent indoor environmental quality to facilitate occupant's productivity while minimizing maintenance requirements. The HVAC system will allow the reconfiguration of office spaces to meet changing needs of the organization without the need for extensive HVAC modification and maintain comfort associated with indoor environmental quality. The City of Somerville recommends consideration of the following:

- HVAC systems shall be designed to provide required cooling and heating load meeting the varying load requirements while maximizing energy efficiency and IEQ and meeting or exceeding the code and standards requirements defined herein.
- HVAC systems shall be zoned to maximize comfort, economical after hours use and minimize cost of construction.
- Provide for humidity control 24/7 such that space relative humidity does not exceed 65% at any time.
- Ventilation to be a minimum level of 30% greater than ASHRAE Standard 62.1- 2016.
- Provide intelligent controls that provide continual performance monitoring. Occupant controls shall be simple and intuitive and operable directly by the occupants in the zone.
- All controls to be native BACnet.
- Individual occupant temperature control by the maximum number of zones which are economically feasible within the confines of the project budget. Favor system selection that maximizes thermal comfort and zoning.

- Implement best practices for server room HVAC, including waste heat recovery and expanded temperature ranges as identified in ASHRAE Thermal Guidelines for Data Processing Environments.
- Building occupancy schedule for HVAC systems will be easily modified by zone.
- The building should be equipped to provide real-time data to building operators and/or occupants. In addition to requirements above, HVAC systems will also be designed to provide energy, demand, and environmental data from the building through web interface accessible to building operations staff.
- Use of VFD drives on all circulator pumps on HVAC units.
- Potable Hot Water Circulation

Functional Uses

Occupancy requirements and schedules

Mechanical systems shall function seamlessly to deliver the performance levels needed to maintain space comfort in excess of the requirements set forth in ASHRAE Standard 55-2017. A goal is to have the HVAC system deliver Outside Air at a value of at least 1.3 times the requirements of Std. 62.1 OA to regularly occupied areas and use Demand Controlled Ventilation (DCV) for high occupancy spaces, such as conference and meeting rooms and training center, set at carbon dioxide limit of 400 ppm over ambient, providing a reduction in outside air delivery to these spaces during low or non-occupancy periods. Humidity levels in the space must always be maintained less than 60% relative humidity during occupied hours and should never be allowed to reach a level over 65% RH or at a level that would allow condensate to form on HVAC equipment or other building elements.

Lighting controls shall be simple and intuitive. All areas should use vacancy sensors which require staff to engage with the lighting system to turn-on lights. Staff can also turn off lights or lights will turn off automatically when spaces are not occupied. HVAC occupancy can be triggered by occupancy or “time-of-day” controls with temporary user overrides. Occupants should be able to adjust temperatures within the comfort range.

HVAC, domestic hot water circulation pumps, and lighting shall only operate during occupied hours in civilian offices unless manually overridden by **building maintenance and Green Building management staff**. The majority of the spaces will be 24/7. Override switches must be provided at entrances to override the interior lighting and provide “ON” status when janitorial staff come in to clean the building during unoccupied hours. Override switches should only be enabled to override the lights “ON” during unoccupied hours. During occupied hours the switches shall not be able to override the lights “OFF”. Override switches should be set to override the lights ON for 2 hours after initiation.

The building security system shall be seamless with occupants requiring only a single access card to enter all gates and doors through which they have permission to travel. The use of BACnet native BAS system shall provide a turnkey solution to machine-to-machine communications and shall be capable of remote access/alarm notification.

Adaptability for future facility changes and expansion

The project is purpose built as a municipal facility housing the Somerville Police Department as well as a Fire Station. The space shall include function specific spaces such as holding cells, processing rooms, sleeping quarters, office space and support space.

Due to the nature of Police and Fire service, the facility will need to be able to facilitate vehicle parking, specialized occupant loading/unloading, vehicle maintenance and vehicle storage.

The facility will be designed with provisions to accommodate additional staff members as directed by the owner and documented in the final Program. Interior spaces should be designed to facilitate reconfiguration of office spaces to meet changing needs of the organization without further renovation work. Interior areas must have the required mechanical and electrical infrastructure to support expansion of business activities.

Future expansion will be based on use of modular design work stations. Electrical and mechanical infrastructure shall accommodate future reconfiguration without major changes.

Systems integration requirements, especially across disciplines

The overall facility shall be served by an electrical infrastructure (telephone/data electricity, intercom, etc.) that can meet the current and future requirements for common areas, conference rooms and office areas. For example, conference rooms used for A/V presentations shall include the ability to dim/turn off the lighting for presentations and a lighting mode to satisfy general occupancy requirements.

All integrated systems should be BACnet communications protocol for building automation and control networks and be able to communicate seamlessly with existing building in the City of Somerville's portfolio.

The electrical and mechanical systems shall be flexible and functional enough to accommodate the facility's future expansion growth and needs; the facility's mechanical and electrical systems shall be designed to permit the easy rearrangement of office space (including cubicles, partition walls, desks, etc.) without adding or tearing down existing systems to accommodate the occupant's needs.

The design of the electrical system for the building shall divide into separate panels lighting, plug, HVAC, and process and provide sub-metering of utilities serving mechanical equipment, plug loads and the lighting system by functional area and floor. Monitoring shall also be compatible with the building automation system (BAS) to allow remote monitoring and data storage. This integration shall allow use of a web monitoring service to monitor key building systems, energy usage, preventative maintenance, schedule, and distribute necessary aspects of this information to staff, outside service providers, and (technical committee) TC members.

Metering shall be provided as follows at a minimum of a 1-minute interval:

Mandatory

- a. HVAC energy
- b. Lighting energy
- c. Plug Loads energy
- d. Whole Building energy
- e. Photovoltaics energy
- f. Domestic Hot Water

Energy Desirable

- g. Domestic Water usage
- h. Cooling Tower water usage
- i. Irrigation Water usage
- j. Domestic Hot Water usage

Note: If an integrated space heating and domestic hot water system is used, these loads do not need to be disaggregated into separate heating and DHW end use categories.

- Energy use and electric power demand of the whole facility including major systems, subsystems, and individual system components/equipment segregated by energy type.
- Conditions such as on/off status, operation mode, temperature, humidity, pressure, and flow rate at numerous points in various systems and equipment.
- Indoor environmental conditions such as air temperature, humidity, CO2 concentration, concentration of other air pollutants, air flow rates, lighting levels, and daylight availability.
- Water consumption by the whole building and targeted end uses such as cooling tower water make-up and irrigation water.
- Outdoor conditions including weather, total and diffuse solar radiation, and air quality.
- Occupant satisfaction information and feedback on features will be established in a post occupancy survey to aid in the fine-tuning process.
- Some of the data will require monitoring in near real time and at relatively short time intervals (approximately 1 minute in some cases). The data acquisition system will have the capability to effectively manage the data collected from the building with minimum active human involvement (labor).

Occupancy and Use

The building will be operated 24 hour day/7 day a week as a primary public safety facility. Civilian offices will also be in the building.

The building will be occupied by approximately 200 staff during the main working hours between 8-4pm. Overnight it is anticipated 25-30 staff will occupy the building. The public will use the building throughout the day and night to conduct business as well as attend trainings and public meetings. 50-60 people may occupy the building for these trainings/meetings.

The project will need to accommodate parking for the staff, public parking needs will be satisfied by public street parking. It is anticipated the building will require approximately 200 staff parking spaces which may need to be housed in a parking structure, significant surface parking is discouraged. 25 Parking spaces to accommodate shift change **is** required.

Dedicated area for well-organized trash and recycle storage and pickup area. Miscellaneous storage for building operations including related supplies/equipment/snow removal equipment.

Indoor environmental requirements

Indoor Lighting and Lighting Controls

- All lighting fixtures should be DLC qualified.
- The lighting control system must be designed to operate as simple as possible while still meet minimum energy code requirements. Complex and lengthy lighting control sequences that go

above and beyond code minimum requirements are not allowed unless otherwise approved by the District.

- Lighting fixtures provided in day lighting zones shall have dimmable ballasts.
- Fixture selection shall take in mind that the **building** does not have excessive storage for numerous bulbs of different wattage and size. Selected fixtures shall be equipped with bulbs that are readily available.
- Interior lighting must utilize the use of occupancy sensors, vacancy sensors, and daylighting controls where appropriate as well as meet requirements as stated by Title 24. Owner training of the lighting control system must sufficiently detailed in the project specifications. The specifications are to require an “as-programmed” sequence of operations as part of the closeout documents.
- Occupancy sensors are not allowed inside IDF rooms or where server racks are placed. The lights in these rooms must be provided with manual on/off switch.
- All interior photocells must be field adjustable and calibrated after the furniture is installed by the Contractor.
- Site pole lighting shall be designed to be controlled by the Roam Lighting Control System the campus is currently using.
- Interior and Exterior lighting controls should be segregated for easy operations.
- Building mounted exterior light fixtures should be controlled by an astronomical time clock or via the network lighting control system.

Thermal Comfort

- The building mechanical design must be able to maintain the building temperature set points of 68 degrees F winter, and 76 degrees F summer within ASHRAE winter and summer outdoor temperature design conditions for Somerville, MA

Ventilation and Filtration

- The building shall be ventilated as required to meet ASHRAE Standard 62.1-2010.
- If energy recover ventilators are included as part of the design, the selected filters must withstand their structural integrity when the filters get damp due to moisture content that is prevalent in the coastal in our area. Consider use of a filter similar to the structural integrity of the Aerostar Nexfil high efficiency mini-pleat air filter.
- The filter differential pressure transducer alarm set point must be field calibrated by the Contractor prior to Owner training. This should be included in the specifications.
- Maintenance access to equipment and associated filters must be provided and exclusively called out for in the design documents.
- Filtration to MERV 13 levels
- Direct capture of exhaust fumes upon startup of fire apparatus/police vehicles in garage bays
- CO monitoring in garage bays.
- Make up air for any cooking/kitchen hood venting equipment.
- All ventilation systems must be updated COVID guidelines as they become available through design and construction.

Noise from HVAC

- Noise from the HVAC should not exceed 45 dB.

During Construction – is this required for OPR?

- Whenever possible, non-toxic caulks, paints, adhesives, sealants and cleaning products shall be used. Ideally, materials with no VOCs will be used. Exceptions

must be preapproved and shall not compromise chosen certification paths. Design teams are encouraged to find solutions that would not be classified as exceptions.

- Smoking, vaping, or the use of smokeless tobacco will be prohibited on the property including during construction.
- Procedures during construction shall be implemented by the contractors to minimize construction-related contaminants in the building. These procedures include activities such as control of moisture, regular space-cleaning activities, and protection of delivered equipment and materials before and after material/equipment installation, start-up of HVAC systems.
- Building materials should be stored in a weather-tight, clean area prior to unpacking for installation.
- Accumulation of water during construction should be avoided and any porous construction materials such as insulation should be protected from moisture.
- Dust in the construction area shall be suppressed with wetting agents or sweeping compounds. Dust shall be cleaned regularly using a damp rag, wet mop, or vacuum equipped with a high efficiency filter or wet scrubber
- The facility shall be positively pressurized. Outside air intakes shall not be accessible from grade.
- Outside Air Intakes shall be located at a minimum as defined in ASHRAE Std. 62.1 and with sufficient separation so that recirculation of pollutants emitted from toilet exhausts, kitchen hoods, flue gas, and any other harmful or noxious emission are not mixed with outside air entering the HVAC system.

Building Site Requirements

- The project shall follow the NPDES Standards and EPA Construction General Permit Criteria.
- 0-lot line All paving material including vehicular hardscape to have a solar reflectance value of at least 0.28 after 3 years.
- The roofing material shall have a solar reflectance value of at least 82.
- All vegetation on site shall be native and adaptive.
- The project shall follow the criteria of Light Pollution Reduction and where possible, specification of BUG compliant fixtures.
- Stormwater needs to be considered as part of adjacent development
- Avoid materials specified on “Red List”

Transportation and Parking Requirements

Transportation to **90 Washington Street** can be achieved via automobile, bus, bicycle, or pedestrian paths. Bicycle parking will be provided outside the **building**.

All onsite parking spots must be EV ready at a minimum.

Building Envelope Requirements

The facility shall be designed to serve and endure for at least 100 years; thus, selection of materials should be based on the ability to provide years of service with minimum maintenance and withstand weather conditions typical in this region.

- The building envelope will be tightened to conform with minimum requirements allowed by ASHRAE Standard 90.1-2016.
- The fenestration and solar transmission shall be controlled and designed in accordance with ASHRAE Standard 90.1-2016 through glazing selection and external shading.
- Designers should consider the utilization of high-performance glazing to minimize solar heat gain and maximize visible light transmittance for day lighting.
- The roofing structure shall minimize the heat island effect (thermal gradient differences between developed and undeveloped areas); roofing structure shall be bridged to support the installment of photovoltaic (PV) array.
- Interior finish shall be highly durable low volatile organic compound emitting materials and require no more than 3 replacements over 75 years. Heavy traffic areas will be designed to have resilient carpet tiles. Easily maintained and low maintenance materials with 25 years life cycle cost will be used for wall and floor coverings.
- The Design Team should address moisture intrusion and impacts of typical snow/ice and freeze/thaw conditions that occur in this region.
- Prevention of moisture intrusion is a high-priority goal applicable to all project team disciplines. Solar transmission shall be controlled and designed in accordance with ASHRAE Standard 90.1-2010 through high-performance, low-e glazing, overhangs and external shading, and other techniques to minimize solar heat gain and maximize light transmittance for day lighting where functionally practical.

Emergency and Backup Power

The building must have an uninterruptable power supply (UPS) to keep emergency fire alarm, security system, emergency lights, and receptacles (to be determined by engineer and Owner) operating upon power failure.

Generator should be tied into BMS system to have monitoring of activations/durations/alarms etc. Generator may need to be sited on roof if exhaust/noise has negative impacts

The building must be outfitted with an emergency generator sized to handle the entire load of the building including HVAC systems. The fuel supply for the emergency generator will be Diesel. The fuel supply shall be capable of continuously running the facility for (48/72) hours.

Telecommunication Systems and Audio/Visual Systems

The City of Somerville IT Department will conduct a performance review of the telecommunication and A/V systems. Any construction related installation, programming, or communication issues must be resolved prior to the end of the equipment and Contractor's warranty period.

Wireless access shall be provided throughout the building.

Security and Access Controls

Access controls are to be provided on all entrances to the building.

24/7 building security monitoring including digital security cameras.

Commissioning

Commissioning shall be performed and completed in accordance with ASHRAE Guideline 0 - 2013 The Commissioning Process and Guideline 1.1-2007 HVAC & R Technical Requirements for the Commissioning Process by an Independent Commissioning Authority hired on behalf of The City of Somerville directly by the PM.

Design Phase

Design phase commissioning will review the mechanical and electrical system designs for compliance with the OPR. The commissioning authority will provide:

- Design phase commissioning report
- Commissioning plan
- Commissioning specifications to the designers incorporating commissioning and operator training requirements into the project
- Specific design and construction checklists to be used by the design and construction team during the delivery of the project
- Specific functional testing procedures for testing commissioned systems to verify system performance and functionality in accordance with contract documents.

General

Review of the drawings and specifications will concentrate on verifying that the designers have met the owner's project requirements as defined in this document.

Mechanical Design Phase Commissioning

The review of the mechanical drawings and specifications will concentrate on design, efficiency, humidity and odor control, safety, and the ability to provide occupant comfort. The commissioning team will assess the ability of the HVAC system to control airflow (and thus pollutants) throughout the building. Evaluations shall be made on equipment sizing and selection, placement of fresh air inlets, filtration, adequacy of the make-up air system to pressurize the building envelopes and their interstitial spaces, balance between make-up air and building exhaust—both internally and externally, environmental and energy management controls, equipment layout, and start-up procedures.

Electrical Design Phase Commissioning

The review of electrical drawings and specifications will concentrate on adequacy and distribution of electrical power, lighting efficiency, illumination levels, and compliance with life safety requirements. The commissioning team will review panel schedules and single-line drawings, interior and exterior lighting layouts, and electrical life safety drawings.

Plumbing Design Phase Commissioning

The review of plumbing system drawings and specifications will concentrate on the design of potable water systems, along with any systems for harvesting non-potable water effluents for re-use. The commissioning team will review fixture selection, pumps and boiler/heater sizing.

Construction Phase Commissioning

The commissioning authority will develop construction checklists and performance testing procedures to be used by the contractors to determine acceptance of the contractor’s work. The following systems will be commissioned:

Commissioning Scope

Systems to be commissioned during Construction Phase

Building Envelope		Plumbing System	
1. Blower door testing post		1. Fixture replacement (if appropriate)	
2. construction Automated shading controls		2. Service water heating (if appropriate)	
		3. Fire Sprinkler & alarm	
HVAC System		Electrical	
1. Air Conditioning systems	8. DOAS Radiant Panel	1. Exterior lighting control	8. GFRCI type receptacles
2. Heating systems	9. Fire and smoke dampers	2. Interior lighting control	9. Elevator
3. Air distribution systems	10. Testing, adjusting, and balancing work	3. Path of egress lighting	10. PV array and control system (potential)
4. General exhaust systems	11. Indoor air quality	4. Occupancy sensors for lighting control	11. Security/CCTV
5. Building automation system, associated hardware, meters, and interfaces		5. Multi-level switching	12. Intercom
6. Make-up air systems		6. Electrical metering system	
7. Air handlers		7. Electrical fixtures/devices/ installation in hazardous locations	

The commissioning authority will facilitate the following tasks:

- Review final operation & maintenance (O&M) manuals prior to turn-over to owner for completeness and as required for system training.
- Facilitate training sessions by coordinating a schedule with the construction team for conducting training in accordance with the training requirements.
- Prepare an Executive Summary of the results of the commissioning program and training session, as well as written documentation verifying that equipment testing is complete and equipment is operating as intended.

Warranty Phase Commissioning

Coordinate and supervise required seasonal (or deferred) testing, deficiency corrections, and provide the final testing documentation for the commissioning record and O&M Manuals. A pressure map of the building to verify that the HVAC system is maintaining the correct internal and external pressurizations will be conducted.

Budget Considerations and Limitations

The design team and City of Somerville shall prioritize based on the prioritized list in the Project Objectives section within this document. Strategies should be identified that meet multiple objectives in order to meet budgetary limitations. An overlying theme is to meet the EUI target within the fixed budget provided. To do this, analysis must be completed to allocate budgets to maximize their value for energy savings and architectural appeal, while meeting the programmatic requirements. Design teams should bring innovation to the effort to show that zero energy ready EUI targets are achievable at market rates such that City of Somerville can show leadership by example.

The renewable energy aspects of the building may be financed through third parties, base renovation budget, or other innovative financing strategies. The cost of renewable energy has made it economically feasible with a wide-range of strategies. Note that additional renewable energy is not an alternative trade-off to increased EUIs. The design team shall investigate any utility incentive programs that might subsidize acquisition of more energy efficiency or equipment that might reduce the facility peak electrical demand.

Construction Completion and Turnover

Inspection, testing, and commissioning culminates in a declaration of Substantial Completion by the Architect. This date establishes the beginning of the warranty period.

Move-in of occupants and their personal belongings will not take place until all Substantial Completion “punchlist” items are completed.

Operation and maintenance of equipment and systems is the responsibility of the Contractor until the date of Final Completion.

Commissioning of the building systems will be ongoing once the building is loaded with staff. The Contractor must accommodate the CxA requests for trend data of the HVAC systems during this post-occupancy period.

Operation and Maintenance

The requirements below should be included in the project specifications.

Prior to Owner training the Contractor shall deliver Operations and Maintenance manuals which should be a single source of information and instructions for proper operation and maintenance of the building architectural, mechanical, electrical, plumbing, low voltage, and landscaping systems. The O&M’s should be specified to be delivered in a format to easily access narrative and technically detailed reference material, descriptions, diagrams, schedules, and other information on stand-alone and, particularly, integrated systems. Digital and hard copies of the report and manual shall be provided to the in a standardized format.

Sequences of operations for packaged and custom programmable systems must be provided in a written “as programmed” or “as implemented” format. Copy/paste from the project specifications or a reference to a manufacturers O&M manual is not acceptable. This should be clearly stated in the project specifications.

Like the OPR and BOD, the Systems Manual should be a living document. Unlike the OPR and BOD, though, the Systems Manual should evolve throughout the life of the building – compiled by the CxA from documentation developed by the owner, design team, contractors, and the Cx process itself, then turned over for perpetual use and upkeep by building operators and future consultants and contractors throughout the building's life.

Owner Training

The following entities within the City of Somerville require training: Building occupants, Dept. of Public Works staff, Capital projects staff, Energy Manager, HVAC and Controls Vendors under City supervision, other staff as directed.

Operator training and users' project documents are required for O&M staff to properly maintain the facility. These documents include: The O&M manual, as-built drawings, and a Systems Manual. Documentation will be tailored to the specific components that are installed. The requirements for City of Somerville Public Safety Building documentation are as follows:

1. The O&M manual should provide the information needed to understand, operate, and maintain the system and/or assemblies and to inform those not involved in the design and construction process about the systems and assemblies. This information shall be included in printed documents as well as embedded in the final 3D CAD drawings for ease of access by operations and other personnel.
2. Record drawings should provide accurate information in an understandable drawing technique which future contractors can easily read and understand to perform construction tasks. Maintain and submit one set of Contract Drawings and as-built drawings. If modifications are made, mark the as-built drawings to show the actual installation when installation varies from that shown on the Contract Drawings. Include a cross reference on the Contract Drawings to identify that a modification has occurred. Identify and date each record drawing. Record and check markups before enclosing concealed installations. Contractor shall maintain a continuously updated set of as-built drawings on site for review by CxA during construction. The Contractor will mark-up record set and scan approved marked-up drawings in PDF format.
3. The Systems Manual will be the repository of information on updates and corrections to systems and assemblies as they occur during the Occupancy and Operations Phases. The Systems Manual expands the scope of the traditional operating and maintenance documentation to include the additional information gathered during the Commissioning Process and to provide a systems-based organization of information.
4. Outside service providers will provide preventative maintenance and necessary repairs. Maintenance supervision will be performed by City of Somerville staff and will require select staff to receive detailed training on the building HVAC systems. The Training provided will educate staff on identified systems and assemblies to be installed in the facility. Training will include the education of multiple members of staff in the proper use of the monitoring system. One member of City of Somerville staff will be responsible for maintaining and updating the building documentation package for easy online reference.
5. Training shall include an overview of system components and descriptions, equipment locations and functions, safety provisions and concerns, normal operating and energy conservation techniques, BAS, etc. Training shall also include a review of the written O&M instructions, discussion of relevant health and safety issues or concerns, discussion of warranties and guarantees, discussion of common troubleshooting problems and solutions, etc. Training shall normally start with orienting facility operations and information technology staff with the facilities infrastructure including location of data ports in the ceilings, valves, and equipment during construction. Classroom sessions for operators followed by hands-on training for each piece of equipment will occur immediately after

start-up of the specific equipment. Classroom sessions may include the use of overhead projection, slides, and training videos from equipment manufacturers as might be appropriate. Hands-on training shall include start-up, operation in all possible modes, (including manual, shut-down and any emergency procedures) and preventative maintenance for all pieces of equipment. Training is a progressive on-going process which will occur during construction, after substantial completion, and prior to final completion. A final training exercise will be conducted on-site after occupancy phase.

The intent of training is to clearly and completely instruct the Owner's Personnel on all capabilities of the control systems, electrical systems, and mechanical systems. It is not typically expected that the trainees will have memorized everything from the training session but that they know where the information is, can find it, and understand sufficiently how to walk through the key steps to troubleshoot a problem and resolve it. Training will be witnessed and documented by the commissioning authority; the contractors will develop and execute the training program. All persons performing tasks related to building operations and maintenance shall receive at least 40 hours of training related to building systems. Training shall be completed prior to Substantial Completion, and all sessions shall be videotaped and converted to DVD format for City of Somerville use.

Building systems that the maintenance entity shall be trained on include but is not limited to:

- Mechanical systems and components including HVAC, electrical and plumbing
- BAS/controls
- Lighting and lighting controls
- Domestic hot water systems
- Security and access control systems
- Fire alarm
- Vertical conveyance systems
- Vehicle Bay Apparatus including rolling doors etc.
- Uninterruptable power supply system
- Emergency Generator
- Automatic Transfer Switches
- Irrigation control system
- Electric, gas and water metering including data collection systems and software.

Building systems that the occupants/users shall be trained on include:

- Lighting controls
- Audio/Visual (A/V) systems

Post Occupancy and Warranty

The requirements below should be included in the specifications:

The CxA, GC and all subcontractors whose systems were commissioned shall support the commissioning process 12 months into the post-occupancy period. This includes conducting seasonal testing of HVAC systems when necessary to verify performance and under load as well as provide tuning of the

commissioned systems and/or components to ensure they operate as intended once the building is occupied.

All issues observed during the commissioning process must be resolved prior to expiration of equipment and the Contractors general warranty.

General equipment and assembly warranty periods provided by manufacturers for building materials and systems are for a period of one year after substantial completion. However, some specific systems have longer warranty periods. Substantial completion is defined according to Section 9.8 of AIA document A201-1997. A representative list of assembly and equipment typically featuring a longer than one-year manufacturer's warranty is listed below:

- Roofing: 20 years for Leakage and Weather
- Windows: 10 years for trim and glass
- Sealants: 2 years
- HVAC Compressors: 5 years parts and labor
- Water Heaters: 5 years
- Elevator: 5 years

Performance Criteria

General

Quality requirements for materials and construction

In order to achieve the objectives for low maintenance and operating costs, ASHRAE has determined that the building exterior should minimize and resist long term degradation from nature. Construction materials selected for the project should be based on long term serviceability, environmental and sustainability goals

System integration requirements, especially across disciplines

The design and construction teams are encouraged to function through the Integrated Design Process. The outcome can be increased in value through optimization, something the traditional project delivery approach cannot provide. Integrative design is distinguished from conventional design by establishing a highly collaborative multidisciplinary team at the project's inception and empowering this team to understand and develop all aspects of the building towards accomplishing the common project goals

Acoustical requirements

Soundproofing and acoustical treatment should be implemented in the design and construction of all private offices to prevent sound transmission to adjacent corridors, offices, and other space. Spaces shall be planned, configured and designed for compliance with the requirements of GSA- P100, as detailed in the document GSA Sound Matters (Dec. 2011).

Vibration requirements

Prevent occupants adjacent to HVAC equipment and corridors from sensing vibrations from structural deflection as a result of occupant traffic, and equipment operation. Vibration isolation for all rotating equipment shall be selected for 95% vibration elimination.

Seismic requirements

Comply with local code requirements.

Accessibility requirements

The building shall be evaluated as to the implications of meeting all Federal, State and Local ADA requirements. An ADA Assessment Report by Nova, Dated October 31, 2018 on the existing building is available for information. The design team shall review the report and provides recommendations on items to be upgraded as appropriate to the budget and needs of the client.

Systems requiring routine maintenance, such as HVAC, shall be designed to provide adequate access and clearance for all maintenance tasks (i.e.: AHU filter access, sufficient space to pull coils, light bulbs, etc.)

Security requirements

Security system shall be capable of being tailored to allow individual users unique access profiles. Security and surveillance provisions at all building entrances and exits will allow approved visitors and employees access to building 24/7. CCTV monitoring system will be provided at the main entrance into the main lobby, at the east entrance to the training center and around the building's exterior. The security system shall keep an access log which records profiles of people entering the building, the time of entrance and exit.

Aesthetics requirements

Private and open offices shall maintain the same interior design attributes as the rest of the building. A goal has been established of maintaining a uniform look throughout the interior of the building. Façade lighting shall follow How-To tips contained in Sections EL-18 to EL-24 in the Energy Advanced Energy Design Guide for Zero Energy Offices.

Constructability requirements

The Construction Manager shall conduct a constructability review of the design at the completion of Design Development and 90% completion point of the Construction Documents to assure the design can be constructed for the owner's budget and within the required timeframe.

Participants at these reviews should include the design team and project manager.

Communication requirements

The building shall be served by a modern phone system and computer network, which could be VOIP. This system is part of the plug loads of the building and must be accounted for in the energy model. All offices, workstations, and conference rooms shall have the capability for a least two (2) telecommunications ports (network and telephone). Conference rooms, corridors, and public spaces shall be configured to accommodate the installation of wireless access points to support both staff and volunteers access to the network and the Internet.

Access to a wireless network shall be possible within all spaces in the building excluding areas known to be problematic to RF communications. Wireless networks shall be maintained to allow secure network access separate from public internet access. The Learning Center occupants shall have wireless network access separate from the network used by ASHRAE staff. Additional information is required from ASHRAE and will be added upon receipt of input.

The building shall be equipped with a public address (PA) system.

The use of BACnet native BAS system shall provide a turnkey solution to machine-to-machine communications and shall be capable of remote access/alarm notification.

Note that all these items should be configured to have low-power modes or off modes when the building is not occupied.

User Requirements

The general requirements for the City of Somerville Public Safety Building include:

Lighting and Daylighting: Daylighting shall be provided via the existing or replaced window system, a case for revised window to wall ratios or reconfigured fenestration can be pursued to improve daylighting. Efficient electric lighting shall be designed to provide the required level of lighting for occupants' use on cloudy days, night time, or when natural lighting is not sufficient. Designers should follow, as a minimum, the lighting and daylighting recommendations from the Advanced Energy Design Guide for Zero Energy Offices (90% draft or later).

Lighting should be based on the tasks that will be performed in each space of the facility. Task based design for meeting/conference rooms would include modes to support the room's use for A/V presentations including the ability to dim/turn off the lighting around a projector screen for presentations; a lighting mode to satisfy general occupancy requirements; a lighting mode to provide adequate lighting for classroom type tasks, and a lighting mode providing minimum illumination for egress purposes. In the event of a power failure, this lighting system shall provide required illumination for egress purposes.

Electrical infrastructure shall be capable of meeting requirements necessary for business activities. The electrical system for the building shall allow separately sub-metering of utilities serving mechanical equipment, lighting systems, and plug loads. The electrical branch circuits in panelboards serving each load category noted above shall be grouped so that the monitoring of the energy usage for these loads can be accomplished. In addition, photovoltaic power generation and use (both on site and sent to the utility grid) shall be monitored. Monitoring shall also be compatible with the BAS to allow remote monitoring.

Dedicated shipping and receiving areas will be of sufficient size such that goods awaiting shipment can be stored therein, without overflow into corridors serving the receiving area.

The staging area within shipping and receiving shall accommodate 18 large crates of materials allowing compiling, checking for readiness, easy conveyance to vehicles, and unloading upon return.

Storage areas shall be designed with sufficient space so that materials stored therein, including files, forms and other such items, may be easily accessed and organized at a central location within the room. Storage rooms should be adequately provided to accommodate departments' uses. The total area to be provided for file and other storage shall be determined and verified via the programming exercise with the owner.

Operations

Training requirements for Owner's personnel

Provide to Owner after all equipment is in operation and at an agreeable time, instructions for the purpose of training Owner's personnel in all phases of operation and maintenance of equipment and systems.

Training sessions when given to the owner's personnel shall be videotaped for future owner reference. Turn one copy over to the owner upon completion.

Warranty requirements

General equipment and assembly warranty periods provided by manufacturers for building materials and systems are for a period of one year after substantial completion. However, some specific systems have longer warranty periods. Substantial completion is defined according to Section 9.8 of AIA document A201-1997. A representative list of assembly and equipment typically featuring a longer than one-year manufacturer's warranty is listed below:

Roofing: 20 years for Leakage and Weather

Windows: 10 years for trim and glass

Sealants: 2 years

HVAC Compressors: 5 years parts and labor

Water Heaters: 5 years

Elevator: 5 years

Operations and Maintenance requirements will be established by the current City of Somerville staff that will monitor the building systems and determine what corrective action is required. The current staff will monitor the preventative maintenance and repairs will be performed by outside contractors. To ensure that maintenance can be easily performed, and the facility's business will not be compromised because of deconstruction due to maintenance, the maintenance criteria shall be adhered to as follows:

- Designers are to ensure sufficient access and clearances are provided by the design to perform routine maintenance tasks.
 - Contractors shall coordinate the installation of building materials and components so as to allow sufficient space for maintenance and service without limited range of motion in the space which would require deconstruction to provide required service space.
 - System manual shall include any changes made to components and systems after substantial completion and shall include the final set points established through the commissioning process.
 - Outside maintenance contractors will have between 10 and 25 years of experience and it is assumed they are conversant in basic maintenance techniques and are computer proficient.
- It is City of Somerville's preference that the Mechanical Contractor selected for construction will also provide maintenance & service for the first three years after occupancy.

Equipment and system maintainability expectations, including limitations of operating and maintenance personnel;

Maintenance and replacement costs must be considered over the life of the facility and selection of materials will be based on minimizing life cycle costs. Design of mechanical, electrical, and plumbing systems shall allow required maintenance and replacements of key system components to be performed without deconstruction. All systems and their components shall be easily accessible for

adjustments to the respective system components. Access to the building exterior shall be provided that allows easy maintenance, repair, and replacement of the building exterior including windows, gutters, and sealants.

Allowable tolerance in facility system operation;

Occupancy sensors shall be installed in office areas, conference rooms, and other public areas to efficiently control lighting usage in accordance with demand.

The City of Somerville Public Safety Building will be designed, constructed and operated in an energy efficient and environmentally sustainable manner that will provide both valuable information to the building operators as well as an example for others to follow. The renovated facility shall be designed and constructed to achieve:

- Deliver Outside Air at a value of at least 1.3 times the requirements of Std. 62.1 OA to regularly occupied areas and use Demand Controlled Ventilation (DCV) for high occupancy spaces, such as conference and meeting rooms and training center, set at carbon dioxide limit of 400 ppm over ambient, providing a reduction in outside air delivery to these spaces during low or non-occupancy
- Provide capability for Indoor Environmental Quality (IEQ) monitoring that includes air temperature, humidity, CO2 concentration, air pollutants concentration (VOC), air-flow rates, ambient noise level, lighting levels, and daylighting availability in sufficient granularity to represent the general office & conference space on the first and second floors.

Systems

Building systems and equipment requirements are left to the design team in order that they may provide the most efficient building possible in order to meet the energy and other goals defined herein.

Quality requirements for materials and construction

- The renovated facility shall be designed to serve and endure for at least 100 years; thus, selection of materials should be based on the ability to provide years of service with minimum maintenance and withstand weather conditions typical in this region.
- The building envelope will be tightened to conform with minimum requirements allowed by ASHRAE Standard 90.1-2016, Section 5.4.3 Air Leakage
- The fenestration and solar transmission shall be controlled and designed in accordance with ASHRAE Standard 90.1-2016 through glazing selection and external shading.
- Interior finish shall be highly durable low volatile organic compound emitting materials and require no more than 3 replacements over 75 years. Heavy traffic areas will be designed to have resilient carpet tiles. Easily maintained and low maintenance materials with 25 years life cycle cost will be used for wall and floor coverings.
- The Design Team should address moisture intrusion and impacts of occasional snow/ice and freeze/thaw conditions that have occurred in this region.
- Mechanical systems shall be designed with required serviceable life as specified in the most current ASHRAE Handbook HVAC Applications, (Chapter 37 – Owning and Operating Costs, Chapter 36 Energy Use and Management and Chapter 41 Building Energy Monitoring).
- HVAC components such as coils and compressors shall be designed to have 20 years serviceable life. The piping and plumbing infrastructure shall be designed to have a serviceable life of 35 years. Lighting systems shall be designed to have 20 years serviceable life. Electrical systems shall be designed to be designed with a serviceable life of between 35 to 50 years. Electrical

systems will allow the replacement of electrical switch and panel boards, conductors and other electrical products as advancements in technology become available.

DRAFT

PROJECT DIRECTORY

PROJECT DIRECTORY



City of Somerville

Public Safety Facility

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NARRATIVE-CIVIL

The SD Civil set locates the new building on Parcel B and shows Parcels A and C. The approximate ROW for the re-aligned New Washington Street is shown. The street lane configuration is shown based on the sketch provided by the City. Approximate locations for the transformer, gas meter bank, underground electric, gas, fire protection line, domestic water line, sanitary sewer and storm drain connections are shown. Approximate location for subsurface infiltration system is shown. Approximate finished floor elevations are shown.

During DD, the location of the utilities will be coordinated with the team. The finished floor will be confirmed. Grading of the lot will be completed. The subsurface infiltration system will be sized and designed and coordinated with McPhail. The plaza areas will be coordinated with the Landscape Architect. Turning movement analysis will be performed for apparatus and other vehicles. Integration of the early site work into the package will be completed.

NARRATIVE-TRAFFIC

As part of the next phase of the project, traffic analysis will be completed in coordination with the City's Mobility Division. Existing traffic data will be collected along Washington Street, both mainline traffic and turning movement data at the intersections of New Washington Street, Franklin Street, and Inner Belt Road. This data will include all modes of transportation, including vehicles, bicycles, and pedestrians.

Comprehensive reports, including a Transportation Impact Study, Mobility Management Plan, and Transportation Access Plan, will be produced, and will include analyses of the intersections, as well as the multimodal transportation options in the area. The reports will also include measures the City will implement to reduce the number of vehicle-trips to and from the site, and include plans detailing multimodal options the project will be providing. These reports will help to determine the effects, if any, the new Somerville Public Safety Building will have on traffic and safety in the area

D.1 CIVIL-SPECIFICATION

SECTION 22 11 13

FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service fire-service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. PA: Polyamide (nylon) plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
- H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

1. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

1.10 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Application" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372.

2.2 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 2. Gaskets: AWWA C111, rubber.
 - a.
- C. Flanges: ASME 16.1, Class 125, cast iron.

2.3 JOINING MATERIALS

- A. Refer to Section 33 05 00 "Common Work Results for Utilities" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.

- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.4 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Kennedy Valve Company; a division of McWane, Inc.
 - b. M & H Valve Company; a division of McWane, Inc.
 - c. Mueller Co.
 - d. NIBCO INC.
2. Nonrising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig .
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.

2.5 CORPORATION VALVES AND CURB VALVES

A. Manufacturers:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Mueller Co.
 - b. Red Hed Manufacturing Company; a division of Everett J. Prescott, Inc.

B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

C. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

D. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.

1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.6 FIRE HYDRANTS

A. Dry-Barrel Fire Hydrants:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Kennedy Valve Company; a division of McWane, Inc.
 - b. M & H Valve Company; a division of McWane, Inc.
 - c. Mueller Co.
2. Description: Freestanding, with one **NPS 4-1/2** and two **NPS 2-1/2** outlets, **5-1/4-inch** main valve, drain valve, and **NPS 6** mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
 - a. Standard: AWWA C502.
 - b. Pressure Rating: **150 psig** minimum .

2.7 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Guardian Fire Equipment, Inc.
 - b. Kidde; Carrier Global Corporation.
 - c. Potter Roemer LLC; a Division of Morris Group International.
2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; **18-inch-** high brass sleeve; and round escutcheon plate.
 - a. Standard: UL 405.
 - b. Connections: Two **NPS 2-1/2** inlets and one **NPS 4** outlet.
 - c. Connections: Three **NPS 2-1/2** inlets and one **NPS 6** outlet.
 - d. Connections: Six **NPS 2-1/2** inlets and one **NPS 6** outlet.
 - e. Inlet Alignment: Inline, horizontal .
 - f. Finish Including Sleeve: Polished chrome-plated .
 - g. Escutcheon Plate Marking: " AUTO SPKR ."

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping **NPS 4 to NPS 8** shall be the following:
 - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.
 - 2. PVC, Schedule socket fittings; and solvent-cemented joints.
 - 3. **NPS 4 and NPS 6 : NPS 6** PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 fittings; and gasketed joints.
 - 4. **NPS 8** : PVC, AWWA Class 200 pipe; fittings; and gasketed joints.
 - 5. Fiberglass, AWWA RTRP, Class ; RTRF; and bonded joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for **NPS 3** and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for **NPS 2** and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Underground Valves, **NPS 3** and Larger: AWWA, cast-iron, nonrising-stem, resilient -seated gate valves with valve box.
 - 2. Underground Valves, **NPS 4** and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Section 33 05 00 "Common Work Results for Utilities" for piping-system common requirements.

3.5 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- B. Make connections larger than **NPS 2** with tapping machine according to the following:
 - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- C. Comply with NFPA 24 for fire-service-main piping materials and installation.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
 2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- E. Bury piping with depth of cover over top at least **60 inches**, with top at least **12 inches** below level of maximum frost penetration, and according to the following:
1. Under Driveways: With at least **60 inches** cover over top.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- H. Sleeves are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- I. Mechanical sleeve seals are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- K. See Section 21 12 00 "Fire-Suppression Standpipes," Section 21 13 13 "Wet-Pipe Sprinkler Systems," and Section 21 13 16 "Dry-Pipe Sprinkler Systems" for fire-suppression-water piping inside the building.
- L. See Section 22 11 16 "Domestic Water Piping" for potable-water piping inside the building.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements for seismic-restraint devices specified in Section 23 05 48 "Vibration and Seismic Controls for HVAC."
- B. Comply with requirements for hangers, supports, and anchor devices specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."
- C. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than **20 feet** long.
 2. Adjustable roller hangers and spring hangers for individual horizontal piping **20 feet** or longer.
 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping **20 feet** or longer, supported on a trapeze.
 4. Spring hangers to support vertical runs.

5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
 6. On PVC piping, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.
- D. Install hangers for copper tubing with maximum spacing and minimum rod diameters to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- E. Install hangers for PVC piping with maximum horizontal spacing and minimum rod diameters to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- F. Install hangers for fiberglass piping with maximum horizontal spacing and minimum rod diameters to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- G. Support horizontal piping within **12 inches** of each fitting and coupling.
- H. Support vertical runs of copper tubing to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- I. Support vertical runs of PVC piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.7 JOINT CONSTRUCTION

- A. See Section 33 05 00 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
1. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools and procedures recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.
 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
 5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
 6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.
 8. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - a. Dielectric Fittings for **NPS 2** and Smaller: Use dielectric unions.
 - b. Dielectric Fittings for **NPS 2-1/2 to NPS 4** : Use dielectric flanges .
 - c. Dielectric Fittings for **NPS 5** and Larger: Use dielectric flange kits.

3.8 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - 3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
 - 4. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.9 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.
- F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.10 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.
- D. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.11 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire department connection to mains.
- B. Install protective pipe bollards on two sides of <Describe arrangement> each fire department connection. Pipe bollards are specified in Section 05 50 00 "Metal Fabrications."

3.12 CONNECTIONS

- A. See Section 33 05 00 "Common Work Results for Utilities" for piping connections to valves and equipment.
- B. Connect water-distribution piping to existing water main. Use service clamp and corporation valve.
- C. Connect water-distribution piping to interior domestic water and fire-suppression piping.
- D. Connect waste piping from concrete vault drains to sanitary sewerage system. See Section 22 13 13 "Facility Sanitary Sewers" for connection to sanitary-sewer piping.
- E. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- F. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.13 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig . Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.14 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 31 20 00 "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Section 33 05 00 "Common Work Results for Utilities" for identifying devices.

3.15 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION

SECTION 22 13 13

FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. PVC pipe and fittings.
 - 2. Nonpressure-type transition couplings.
 - 3. Manholes.
 - 4. Concrete.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe and fittings.
 - 2. Non-pressure and pressure couplings
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.7 FIELD CONDITIONS

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Profile Sewer Piping:

1. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Concrete Pipes: **ASTM C 443**, rubber.
3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
2. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Femco Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company, LLC; a division of MCP Industries.

2.3 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: **ASTM C 478**, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: **48 inches** minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: **6-inch** minimum thickness for floor slab and **4-inch** minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.

5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps or FRP ladder Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches .
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.4 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:

1. Cement: ASTM C 150/C 150M, Type II.
2. Fine Aggregate: ASTM C 33/C 33M, sand.
3. Coarse Aggregate: ASTM C 33/C 33M, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent through manhole.
2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.

- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
1. Reinforcing Fabric: ASTM A1064/A 1064M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 3. Install piping with 36-inch minimum cover.
 4. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 2. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. flexiblecouplings for pipes of same or slightly different OD.
 - b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 - 2. Use pressure pipe couplings for force-main joints.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops **3 inches** above finished surface elsewhere unless otherwise indicated.
- F. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, **18 by 18 by 12 inches** deep. Set with tops **1 inch** above surrounding grade.

- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 22 13 16 "Sanitary Waste and Vent Piping."
- B. Connect force-main piping to building's sanitary force mains specified in Section 22 13 16 "Sanitary Waste and Vent Piping." Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- D. Connect to grease oil and sand interceptors specified in Section 22 13 23 "Sanitary Waste Interceptors."

3.8 IDENTIFICATION

- A. Comply with requirements in Section 31 20 00 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 6. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig .
 - a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
 - b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
 7. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION

SECTION 22 14 13

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Hub-and-spigot, cast-iron soil pipe and fittings.
- 2. Hubless, cast-iron soil pipe and fittings.
- 3. Galvanized-steel pipe and fittings.
- 4. Ductile-iron pipe and fittings.
- 5. Copper tube and fittings.
- 6. ABS pipe and fittings.
- 7. PVC pipe and fittings.

- B. Related Requirements:

- 1. Section 22 14 29 "Sump Pumps" for storm drainage pumps.
- 2. Section 33 44 00 "Stormwater Utility Equipment" for storm drainage piping outside the building.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roof drainage system. Include calculations, plans, and details.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 FIELD CONDITIONS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water .

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.

- B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Class: ASTM A 74, Service class(es).

- C. Gaskets: ASTM C 564, rubber.

- D. Caulking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.

- B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Standard: ASTM A 888 or CISPI 301.

- C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky.
 - b. Femco Inc.
 - c. Ideal Clamp Products, Inc.
2. Couplings shall bear CISPI collective trademark.

3. Standards: ASTM C 1277 and CISPI 310. .
4. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky.
 - b. Ideal Clamp Products, Inc.
2. Standard: ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

E. Cast-Iron, Hubless-Piping Couplings:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Charlotte Pipe and Foundry Company.
 - b. MG Piping Products Company.
2. Standard: ASTM C 1277. .
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 GALVANIZED-STEEL PIPE AND FITTINGS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. Tubular USA.
 2. U.S. Steel.
 3. Wheatland Tube; Zekelman Industries.
- B. Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.
- C. Galvanized-Cast-Iron Drainage Fittings: ASME B16.12, threaded.

2.5 DUCTILE-IRON PIPE AND FITTINGS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. American Ductile Iron Pipe.
 2. McWane Ductile.
 3. U.S. Pipe and Foundry Company.
- B. Ductile-Iron, Mechanical-Joint Piping:
1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.

3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Ductile-Iron, Push-on-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

D. Ductile-Iron, Grooved-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with round-cut-grooved ends according to AWWA C606.
2. Ductile-Iron, Grooved-End Pipe Appurtenances:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
 - 2) Smith-Cooper International.
 - 3) Star Pipe Products.
 - b. Grooved-End, Ductile-Iron Fittings: ASTM A 536, ductile-iron castings with dimensions matching AWWA C110/A21.10, ductile-iron pipe or AWWA C153/A21.53, ductile-iron fittings; complying with AWWA C606 for grooved ends.
 - c. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.6 COPPER TUBE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Mueller Industries, Inc.
 2. Wieland Copper Products, LLC.
- B. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
- C. Copper Drainage Fittings: ASME B16.23, cast-copper fittings or ASME B16.29, wrought-copper, solder-joint fittings.
- D. Hard Copper Tube: **ASTM B 88, Type L**, water tube, drawn temper.
- E. Soft Copper Tube: **ASTM B 88, Type L**, water tube, annealed temper.
- F. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.7 ABS PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Mueller Industries, Inc.

- B. NSF Marking: Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic storm drain and "NSF-sewer" for plastic storm sewer piping.
- C. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40.
- D. Cellular-Core ABS Pipe: ASTM F 628, Schedule 40.
- E. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
- F. Solvent Cement: ASTM D 2235.

2.8 PVC PIPE AND FITTINGS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - 1. Mueller Industries, Inc.
 - 2. National Pipe and Plastic, Inc.
- B. NSF Marking: Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic storm drain and "NSF-sewer" for plastic storm sewer piping.
- C. Solid-Wall PVC Pipe: ASTM D 2665; drain, waste, and vent.
- D. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- E. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- F. Adhesive Primer: ASTM F 656.
- G. Solvent Cement: ASTM D 2564.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 - 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.

2. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
 - C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - E. Install piping to permit valve servicing.
 - F. Install piping at indicated slopes.
 - G. Install piping free of sags and bends.
 - H. Install fittings for changes in direction and branch connections.
 - I. Install piping to allow application of insulation.
 - J. Make changes in direction for piping using appropriate branches, bends, and long-sweep bends.
 1. Do not change direction of flow more than 90 degrees.
 2. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of drainage piping in direction of flow is prohibited.
 - K. Lay buried building piping beginning at low point of each system.
 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 3. Maintain swab in piping and pull past each joint as completed.
 - L. Install piping at the following minimum slopes unless otherwise indicated:
 1. Building Storm Drain: 2 percent downward in direction of flow for piping **NPS 3** and smaller; 1 percent downward in direction of flow for piping **NPS 4** and larger.
 2. Horizontal Storm Drainage Piping: 2 percent downward in direction of flow.
 - M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
 - N. Install steel piping according to applicable plumbing code.
 - O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
 - P. Install aboveground ABS piping according to ASTM D 2661.

- Q. Install aboveground PVC piping according to ASTM D 2665.
- R. Install underground ABS and PVC piping according to ASTM D 2321.
- S. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.
- T. Install underground, ductile-iron, force-main piping according to AWWA C600.
 - 1. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints.
 - 2. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 - 3. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.
- U. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."
 - 1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.
- V. Install force mains at elevations indicated.
- W. Plumbing Specialties:
 - 1. Install backwater valves in storm drainage gravity-flow piping.
 - a. Comply with requirements for backwater valves specified in Section 22 14 23 "Storm Drainage Piping Specialties."
 - 2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping.
 - a. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.
 - b. Comply with requirements for cleanouts specified in Section 22 14 23 "Storm Drainage Piping Specialties."
 - 3. Install drains in storm drainage gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 22 14 23 "Storm Drainage Piping Specialties."
- X. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Y. Install sleeves for piping penetrations of walls, ceilings, and floors.
 - 1. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- Z. Install sleeve seals for piping penetrations of concrete walls and slabs.
 - 1. Comply with requirements for sleeve seals specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- AA. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 - 1. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hub-and-Spigot, Cast-Iron Soil Piping Caulked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.
- C. Hubless, Cast-Iron Soil Piping Coupled Joints:
 - 1. Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.
 - 1. Cut threads full and clean using sharp dies.
 - 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - c. Do not use pipe sections that have cracked or open welds.
- E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
- F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- H. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendices.
 - 3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendices.
- I. Joint Restraints and Sway Bracing:
 - 1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:
 - a. Provide axial restraint for pipe and fittings **5 inches** and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
 - b. Provide rigid sway bracing for pipe and fittings **4 inches** and larger, upstream and downstream of all changes in direction 45 degrees and greater.

- c. Provide rigid sway bracing for pipe and fittings **5 inches** and larger, upstream and downstream of all changes in direction and branch openings.

3.4 VALVE INSTALLATION

- A. General valve installation requirements for general-duty valve installations are specified in the following Sections:
 - 1. Section 22 05 23.12 "Ball Valves for Plumbing Piping."
 - 2. Section 22 05 23.13 "Butterfly Valves for Plumbing Piping."
 - 3. Section 22 05 23.14 "Check Valves for Plumbing Piping."
 - 4. Section 22 05 23.15 "Gate Valves for Plumbing Piping."

3.5 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements for hangers, supports, and anchor devices specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
 - 3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
 - 5. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 6. Install individual, straight, horizontal piping runs:
 - a. **100 Feet** and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than **100 Feet**: MSS Type 43, adjustable roller hangers.
 - c. Longer Than **100 Feet** if Indicated: MSS Type 49, spring cushion rolls.
 - 7. Multiple, Straight, Horizontal Piping Runs **100 Feet** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 8. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install hangers for cast-iron soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Install hangers for ABS piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- D. Support horizontal piping and tubing within **12 inches** of each fitting and coupling.
- E. Support vertical cast-iron to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent, but as a minimum at base and at each floor.
- F. Support vertical ABS piping with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Where installing piping adjacent to equipment, allow space for service and maintenance.
- C. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping **NPS 2** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping **NPS 2-1/2** and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

- A. Identify exposed storm drainage piping.
- B. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
 - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 - 3. Test Procedure:
 - a. Test storm drainage piping, except outside leaders, on completion of roughing-in.
 - b. Close openings in piping system and fill with water to point of overflow, but not less than **10-foot head of water**. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.
- C. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.

2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials.
 - a. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

D. Piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Underground, storm drainage piping NPS 8 and larger shall be the following:
 1. class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless, cast-iron soil pipe and fittings; hubless-piping couplings; and coupled joints.
 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 4. Dissimilar Pipe-Material Couplings, nonpressure transition couplings.

END OF SECTION

SECTION 22 14 23

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Trench drains.

- B. Related Requirements:

- 1. Section 07 62 00 "Sheet Metal Flashing and Trim" for penetrations of roofs.
 - 2. Section 07 84 13 "Penetration Firestopping" for firestopping roof penetrations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 TRENCH DRAINS

- A. Trench Drains:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg Co; a division of Morris Group International.
 - b. Neenah Foundry Company.
 - c. Tyler Pipe; a subsidiary of McWane Inc.
 - 2. Standard: ASME A112.6.3.
 - 3. Body Material: Cast iron .
 - 4. Flange: Anchor.
 - 5. Clamping Device: Not required.

6. Outlet: End.
7. Outlet Type: Inside caulk.
8. Grate Material: Ductile iron .
9. Grate Finish: Painted.
10. Dimensions of Frame and Grate.
11. Top-Loading Classification: Extra-Heavy Duty.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping in accordance with the following instructions unless otherwise indicated:
 1. Use cleanouts the same size as drainage piping up to **NPS 4**. Use **NPS 4** for larger drainage piping unless larger cleanout is indicated.
 2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
 3. Locate cleanouts at minimum intervals of **50 feet** for piping **NPS 4** and smaller and **100 feet** for larger piping.
 4. Locate cleanouts at base of each vertical storm piping conductor.
- B. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.
- C. Install through-penetration firestop assemblies for penetrations of fire- and smoke-rated assemblies.
 1. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 14 13 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 INSTALLATION OF FLASHING

- A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clearing and grubbing.
2. Stripping and stockpiling topsoil.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping or sealing, and removing site utilities.
5. Temporary erosion and sedimentation control.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

C. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

1.2 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Topsoil stripping and stockpiling program.
- B. Burning: Documentation of compliance with burning requirements and permitting of authorities having jurisdiction. Identify location(s) and conditions under which burning will be performed.

1.6 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify Dig Safe System for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- D. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 3. Chip removed tree branches and dispose of off-site .
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Limit height of topsoil stockpiles to 72 inches .
 2. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks pavements.
6. Subbase course and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. for recording preexcavation and earth-moving progress.
2. Section 31 10 00 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 31 50 00 "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.
4. Section 31 63 29 "Drilled Concrete Piers and Shafts" for excavation of shafts and disposal of surplus excavated material.
5. Section 32 92 00 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
6. Section 32 93 00 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Bulk Excavation: Excavation more than **10 feet** in width and more than **30 feet** in length.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material **3/4 cu. yd.** or more in volume that exceed a standard penetration resistance of **100 blows/2 inches** when tested by a geotechnical testing agency, according to ASTM D1586.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
 - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Controlled low-strength material, including design mixture.
 - 2. Warning tapes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D2487.
 - 2. Laboratory compaction curve according to ASTM D698.

1.7 QUALITY ASSURANCE

1.8 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify "Dig Safe System" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 01 50 00 "Temporary Facilities and Controls" and Section 31 10 00 "Site Clearing" are in place.
- E. Do not commence earth-moving operations until plant-protection measures specified in Section 01 56 39 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.

5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than **3 inches** in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a **1-1/2-inch** sieve and not more than 12 percent passing a **No. 200** sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a **1-1/2-inch** sieve and not more than 8 percent passing a **No. 200** sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a **1-1/2-inch** sieve and not more than 12 percent passing a **No. 200** sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a **1-inch** sieve and not more than 8 percent passing a **No. 200** sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a **1-1/2-inch** sieve and zero to 5 percent passing a **No. 8** sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a **1-inch** sieve and zero to 5 percent passing a **No. 4** sieve.
- J. Sand: ASTM C33/C33M; fine aggregate.

- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
 - 1. Portland Cement: ASTM C150/C150M, Type I.
 - 2. Fly Ash: ASTM C618, Class C or F.
 - 3. Normal-Weight Aggregate: ASTM C33/C33M, 3/4-inch nominal maximum aggregate size.
 - 4. Foaming Agent: ASTM C869/C869M.
 - 5. Water: ASTM C94/C94M.
 - 6. Air-Entraining Admixture: ASTM C260/C260M.
- B. Produce low-density, controlled low-strength material with the following physical properties:
 - 1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
 - 2. Compressive Strength: 80 psi, when tested according to ASTM C495/C495M.
- C. Produce conventional-weight, controlled low-strength material with 80-psi compressive strength when tested according to ASTM C495/C495M.

2.3 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. **24 inches** outside of concrete forms other than at footings.
 - b. **12 inches** outside of concrete forms at footings.
 - c. **6 inches** outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. **6 inches** beneath bottom of concrete slabs-on-grade.
 - f. **6 inches** beneath pipe in trenches and the greater of **24 inches** wider than pipe or **42 inches** wide.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.

- a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Cut and protect roots according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to **12 inches** higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: **12 inches** each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. For pipes and conduit less than **6 inches** in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit **6 inches** or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 - 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
 - 4. Excavate trenches **6 inches** deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - 3. Cut and protect roots according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."

3.8 EXCAVATION FOR ELEVATOR CYLINDER

- A. Drill well hole plumb in elevator pit to accommodate installation of elevator-cylinder assembly. Coordinate with applicable requirements for diameter and tolerances in Section 14 24 00 "Hydraulic Elevators."
- B. Provide well casing as necessary to retain walls of well hole.

3.9 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than **15 tons** to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to **3 mph**.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of **2500 psi**, may be used when approved by Architect.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring, bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.13 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.

- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
- D. Backfill voids with satisfactory soil while removing shoring and bracing.
- E. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than **8 inches** in loose depth for material compacted by heavy compaction equipment and not more than **4 inches** in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top **12 inches** of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top **6 inches** below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top **6 inches** below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus **1 inch**.
 - 2. Walks: Plus or minus **1 inch**.
 - 3. Pavements: Plus or minus **1/2 inch**.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of **1/2 inch** when tested with a **10-foot** straightedge.

3.18 SUBSURFACE DRAINAGE

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a **6-inch** course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of **12 inches** of filter material, placed in compacted layers **6 inches** thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least **6 inches**.
 - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.

- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within **12 inches** of final subgrade, in compacted layers **6 inches** thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least **6 inches**.
 - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.
 - 2. Place and compact impervious fill over drainage backfill in **6-inch-** thick compacted layers to final subgrade.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Place base course material over subbase course under hot-mix asphalt pavement.
 - 3. Shape subbase course and base course to required crown elevations and cross-slope grades.
 - 4. Place subbase course and base course **6 inches** or less in compacted thickness in a single layer.
 - 5. Place subbase course and base course that exceeds **6 inches** in compacted thickness in layers of equal thickness, with no compacted layer more than **6 inches** thick or less than **3 inches** thick.
 - 6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698 .
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least **12 inches** wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.20 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Place drainage course **6 inches** or less in compacted thickness in a single layer.
 - 3. Place drainage course that exceeds **6 inches** in compacted thickness in layers of equal thickness, with no compacted layer more than **6 inches** thick or less than **3 inches** thick.
 - 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.21 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Requirements:
 - 1. Section 01 32 33 "Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
 - 2. Section 31 20 00 "Earth Moving" for excavating and backfilling, for controlling surface-water runoff and ponding, and for dewatering excavations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review geotechnical report.
 - 2. Review existing utilities and subsurface conditions.
 - 3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
 - 4. Review proposed excavations.
 - 5. Review proposed equipment.
 - 6. Review monitoring of excavation support and protection system.
 - 7. Review coordination with waterproofing.
 - 8. Review abandonment or removal of excavation support and protection system.

1.4 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
 - 1. Land surveyor.

2. Professional Engineer: Experience with providing delegated-design engineering services of the type indicated, including documentation that engineer is licensed in the state in which Project is located.
- B. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Existing Conditions: Using, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

1.7 FIELD CONDITIONS

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:
 1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
 2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
 3. Compliance with requirements of authorities having jurisdiction.
 4. Compliance with utility company requirements.
 5. Compliance with railroad requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 1. Shore, support, and protect utilities encountered.

3.2 INSTALLATION - GENERAL

- A. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

3.3 SOLDIER PILES AND LAGGING

- A. Install steel soldier piles before starting excavation.
 - 1. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement.
 - 2. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging.
 - 3. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment .
- B. Install wood lagging within flanges of soldier piles as excavation proceeds.
 - 1. Trim excavation as required to install lagging.
 - 2. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

3.4 MAINTENANCE

- A. Monitor and maintain excavation support and protection system.
- B. Prevent surface water from entering excavations by grading, dikes, or other means.
- C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.5 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks weekly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.
 - 1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.

2. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
- B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
- C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.
 1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
 2. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction, and abandon remainder.
 3. Fill voids immediately with approved backfill compacted to density specified in Section 31 20 00 "Earth Moving."
 4. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Hot-mix asphalt paving.

- B. Related Requirements:

- 1. for demolition and removal of existing asphalt pavement.
- 2. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
- 3. Section 32 13 13 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
- 4. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
- 5. Section 32 14 00 "Unit Paving" for bituminous setting bed for pavers and for stone and precast concrete curbs.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

- A. Product Data: Include technical data and tested physical and performance properties.
- B. Hot-Mix Asphalt Designs:

1. Certification, by authorities having jurisdiction, of approval of each hot-mix asphalt design proposed for the Work.
2. For each hot-mix asphalt design proposed for the Work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For paving-mix manufacturer.
- B. Material Certificates: Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
 1. Aggregates.
 2. Asphalt binder.
 3. Asphalt cement.
 4. Cutback prime coat.
 5. Emulsified asphalt prime coat.
 6. Tack coat.
 7. Undersealing asphalt.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 1. Prime Coat: Minimum surface temperature of 60 deg F.
 2. Tack Coat: Minimum surface temperature of 60 deg F.
 3. Asphalt Base Course and Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D692/D692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D242/D242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: ASTM D6373 binder designation PG 58-28.

B. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled asphalt shingles from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.

B. Sand: ASTM D1073, Grade No. 2 or No. 3.

2.4 MIXES

A. [Recycled Content of Hot-Mix Asphalt](#): Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent or more than 15 percent by weight.

1. Surface Course Limit: Recycled content no more than 10 percent by weight.

B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes; designed in accordance with procedures in AI MS-2, "Asphalt Mix Design Methods"; and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

C. Emulsified-Asphalt Slurry: ASTM D3910, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to **3 mph**.
 - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than **15 tons**.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

3.3 SURFACE PREPARATION

- A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
- B. Herbicide Treatment: Apply herbicide in accordance with manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of **0.15 to 0.50 gal./sq. yd.** Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- D. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of **0.10 to 0.30 gal./sq. yd. per inch depth**. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of **0.05 to 0.15 gal./sq. yd.**
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 INSTALLATION OF PAVING GEOTEXTILE

- A. Apply tack coat uniformly to existing pavement surfaces at a rate of **0.20 to 0.30 gal./sq. yd.**
- B. Place paving geotextile promptly in accordance with manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints **4 inches** and transverse joints **6 inches**.
- C. Protect paving geotextile from traffic and other damage, and place hot-mix asphalt overlay the same day.

3.5 HOT-MIX ASPHALT PLACEMENT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course and binder course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at a minimum temperature of **250 deg F.**
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than **10 feet** wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about **1 to 1-1/2 inches** from strip to strip to ensure proper compaction of mix along longitudinal joints.
 - 2. Complete a section of asphalt base course and binder course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of **6 inches**.
 - 3. Offset transverse joints, in successive courses, a minimum of **24 inches**.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method in accordance with AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density, Marshall Test Method: 96 percent of reference laboratory density in accordance with ASTM D6927, but not less than 94 percent or greater than 100 percent.
 2. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041/D2041M, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:
 1. Base Course and Binder Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course and Binder Course : 1/4 inch.
2. Surface Course: 1/8 inch.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549/D3549M.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with ASTM D979/D979M.
 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared in accordance with ASTM D2041/D2041M, and compacted in accordance with job-mix specifications.
 2. In-place density of compacted pavement will be determined by testing core samples in accordance with ASTM D1188 or ASTM D2726/D2726M.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method in accordance with ASTM D2950/D2950M and coordinated with ASTM D1188 or ASTM D2726/D2726M.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes Concrete Paving.

- 1. Driveways.
- 2. Walks.

- B. Related Requirements:

- 1. Section 03 30 53 "Miscellaneous Cast-in-Place Concrete" for general building applications of concrete.
- 2. Section 32 13 16 "Decorative Concrete Paving" for stamped concrete other than stamped detectable warnings.
- 3. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
- 4. Section 32 17 13 "Parking Bumpers."
- 5. Section 32 17 23 "Pavement Markings."
- 6. Section 32 17 26 "Tactile Warning Surfacing" for detectable warning mats.
- 7. Section 32 17 29 "Manufactured Traffic-Calming Devices."

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.

- c. .
2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete paving Subcontractor.
 - e. Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer.
- B. Material Test Reports: For each of the following:
 1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.7 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.8 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with **ACI 301** and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below **90 deg F** at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with **ACI 301** unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
1. Use flexible or uniformly curved forms for curves with a radius of **100 feet** or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Wire: ASTM A1064/A1064M, galvanized.
- B. Epoxy-Coated-Steel Wire: ASTM A884/A884M, Class A; coated, .
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- D. Zinc Repair Material: ASTM A780/A780M.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, gray portland cement Type I/II.
2. Fly Ash: ASTM C618, Class C or Class F.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: **1 inch** nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C94/C94M.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd.** dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Sika Corporation.
 - b. W.R. Meadows, Inc.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to **ACI 301**, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

1. Fly Ash or Pozzolan: 25 percent.
2. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content, **1-1/2-inch** Nominal Maximum Aggregate Size: 5-1/2 percent plus or minus 1-1/2 percent.
 2. Air Content, **1-inch** Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.
 3. Air Content, **3/4-inch** Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Concrete Mixtures: Normal-weight concrete.
1. Compressive Strength (28 Days): **3000 psi**.
 2. Maximum W/C Ratio at Point of Placement: 0.45.
 3. Slump Limit: **4 inches**, plus or minus **1 inch**.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between **85 and 90 deg F**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F**, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to **3 mph**.
 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than **15 tons**.
 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of **1/2 inch** according to requirements in Section 31 20 00 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.
- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963/D3963M.
- G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum **2-inch** overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.

- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of **50 feet** unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than **1/2 inch** or more than **1 inch** below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a **1/4-inch** radius. Repeat grooving of contraction joints after applying surface finishes.
 - a. Tolerance: Ensure that grooved joints are within **3 inches** either way from centers of dowels.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with **ACI 301** requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to **ACI 301** by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.8 SPECIAL FINISHES

- A. Seeded Exposed-Aggregate Finish: Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of **1/16 inch**.
 - 1. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
 - 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 - 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- B. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread **25 lb/100 sq. ft.** of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.

2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 3. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 4. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.
- C. Rock-Salt Finish: After initial floating, uniformly spread rock salt over paving surface at the rate of **5 lb/100 sq. ft.**
1. Embed rock salt into plastic concrete with roller.
 2. Cover paving surface with **1-mil-** thick polyethylene sheet and remove sheet when concrete has hardened and seven-day curing period has elapsed.
 3. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt, thereby leaving pits and holes.
- D. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to paving surface according to manufacturer's written instructions and as follows:
1. Uniformly spread dry-shake hardener at a rate of **100 lb/100 sq. ft.** unless greater amount is recommended by manufacturer to match paving color required.
 2. Uniformly distribute approximately two-thirds of dry-shake hardener over the concrete surface with mechanical spreader; allow hardener to absorb moisture and embed it by power floating. Follow power floating with a second application of pigmented mineral dry-shake hardener, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed hardener by final power floating.
 3. After final power floating, apply a hand-troweled finish followed by a broom finish.
 4. Cure concrete with curing compound recommended by dry-shake hardener manufacturer. Apply curing compound immediately after final finishing.

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h** before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with **12-inch** lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least **12 inches**, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in **ACI 117** and as follows:

1. Elevation: **3/4 inch**.
2. Thickness: Plus **3/8 inch**, minus **1/4 inch**.
3. Surface: Gap below **10-feet-** long; unlevelled straightedge not to exceed **1/2 inch**.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: **1/2 inch per 12 inches** of tie bar.
5. Lateral Alignment and Spacing of Dowels: **1 inch**.
6. Vertical Alignment of Dowels: **1/4 inch**.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: **1/4 inch per 12 inches** of dowel.
8. Joint Spacing: **3 inches**.
9. Contraction Joint Depth: Plus **1/4 inch**, no minus.
10. Joint Width: Plus **1/8 inch**, no minus.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each **100 cu. yd.** or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is **40 deg F** and below and when it is **80 deg F** and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
 - C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 - D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 - F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - G. Concrete paving will be considered defective if it does not pass tests and inspections.
 - H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - I. Prepare test and inspection reports.
- 3.12 REPAIR AND PROTECTION
- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
 - B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
 - C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
 - D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Painted markings applied to asphalt paving.

- B. Related Requirements:

- 1. Section 07 18 00 "Traffic Coatings" for painting whole areas of building floors and pavements with coatings having an integral wearing surface.
- 2. Section 09 91 13 "Exterior Painting" for painting exterior concrete surfaces other than pavement markings.
- 3. Section 09 91 23 "Interior Painting" for painting interior concrete surfaces other than pavement markings.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to marking asphalt paving or concrete surfaces including, but not limited to, the following:
 - a. Asphalt-paving or concrete-surface aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: Include technical data and tested physical and performance properties.

- 1. Pavement-marking paint, latex.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dow Chemical Company (The).
 - 2. Ennis-Flint.
 - 3. General Paint.
 - 4. PPG Paints.
 - 5. Transpo Industries, Inc.
- B. Source Limitations: Obtain pavement-marking paints from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.3 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint, Latex: MPI #97, latex traffic-marking paint.
 - 1. Color: White Yellow Blue.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

- B. Allow asphalt paving or concrete surfaces to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to asphalt paving or concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 32 17 26

TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Detectable warning mats.

- B. Related Requirements:

- 1. Section 32 13 13 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.
 - 2. Section 32 14 00 "Unit Paving" for unit paving installations incorporating detectable warning unit pavers specified in this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

1.5 QUALITY ASSURANCE

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering and wear.
 - b. Separation or delamination of materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.
 - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
- B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 DETECTABLE WARNING MATS

- A. Surface-Applied Detectable Warning Mats: Accessible truncated-dome detectable warning resilient mats, UV resistant, manufactured for adhering to existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of mat, and beveled outside edges.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - a. AlertTile; a division of Cape Fear Systems, II, LLC.
 - 2. Material: Modified rubber compound, UV resistant.
 - 3. Color: As selected by Architect from manufacturer's full range.
 - 4. Shapes and Sizes:
 - a. Rectangular panel, **24 by 60 inches**.
 - 5. Dome Spacing and Configuration: Manufacturer's standard compliant spacing, in square pattern.
 - 6. Mounting: Adhered to pavement surface with adhesive and fastened with fasteners.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Furnish Type 304 stainless-steel fasteners for exterior use.

2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

3.3 INSTALLATION OF DETECTABLE WARNING MATS

- A. Lay out detectable warning mats as indicated and mark concrete pavement at edges of mats.
- B. Prepare existing paving surface by grinding and cleaning as recommended by manufacturer.
- C. Apply adhesive to back of mat in amounts and pattern recommended by manufacturer, and set mat in place. Firmly seat mat in adhesive bed, eliminating air pockets and establishing full adhesion to pavement. If necessary, temporarily apply weight to mat to ensure full contact with adhesive.
- D. Install anchor devices through face of mat and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with mat surface.
- E. Mask mat perimeter and adjacent concrete, and apply sealant in continuous bead around perimeter of mat.
- F. Remove masking, adhesive, excess sealant, and soil from exposed surfaces of detectable warning mat and surrounding concrete pavement using cleaning agents recommended in writing by manufacturer.
- G. Protect installed mat from traffic until adhesive has set.

3.4 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise

approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping joining materials.
 - 2. Transition fittings.
 - 3. Sleeves.
 - 4. Piping system common requirements.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. CPVC: Chlorinated polyvinyl chloride plastic.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

1.5 INFORMATIONAL SUBMITTALS

1.6 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, **1/8-inch** maximum thickness, unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, **1/8 inch** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. PVC Piping: ASTM D2564. Include primer according to ASTM F656.

- H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. AWWA Transition Couplings **NPS 2** and Larger:
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Dresser, Inc.
 - b. Smith-Blair, Inc.
 - c. Viking Johnson.
 - 2. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- C. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - a. Fernco Inc.
 - 2. Description: ASTM C1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. PVC Pipe Sleeves: ASTM D1785, Schedule 40.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.

- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Permanent sleeves are not required for holes formed by removable PE sleeves.
- J. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas **2 inches** above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - a. PVC Pipe Sleeves: For pipes smaller than **NPS 6**.
 - b. Steel Sheet Sleeves: For pipes **NPS 6** and larger, penetrating gypsum-board partitions.
- K. Verify final equipment locations for roughing-in.
- L. Refer to equipment specifications in other Sections for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- E. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.
- F. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D3212.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping **NPS 2** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping **NPS 2-1/2** and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Install dielectric fittings at connections of dissimilar metal pipes.

END OF SECTION

SECTION 33 46 00

SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Perforated-wall pipe and fittings.
 2. Drainage panels.
 3. Geotextile filter fabrics.

1.3 ACTION SUBMITTALS

- A. Product Data:
1. Drainage conduits, including rated capacities.
 2. Drainage panels, including rated capacities.
 3. Geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PE Pipe and Fittings:
1. **NPS 6** and Smaller: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
 2. Couplings: Manufacturer's standard, band type.
- B. Perforated PVC Sewer Pipe and Fittings: ASTM D2729, bell-and-spigot ends, for loose joints.

2.2 DRAINAGE PANELS

- A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, **36 to 60 inches** wide with drainage core faced with geotextile filter fabric.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:

- a. American Wick Drain.
- b. Eljen Corporation.
- c. Sika Greenstreak.
2. Drainage Core: Three-dimensional, nonbiodegradable, molded PP.
 - a. Minimum Compressive Strength: 10,000 lbf/sq. ft. when tested according to ASTM D1621.
 - b. Minimum In-Plane Flow Rate: 2.8 gpm/ft. of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig when tested according to ASTM D4716.
3. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
 - a. Survivability: Class 1.
 - b. Apparent Opening Size: No. 40 sieve, maximum.
 - c. Permittivity: 0.5 per second, minimum.
4. Filter Fabric: Woven geotextile fabric, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation less than 50 percent; complying with the following properties determined according to AASHTO M 288:
 - a. Survivability: Class 1.
 - b. Apparent Opening Size: No. 40 sieve, maximum.
 - c. Permittivity: 0.5 per second, minimum.
5. Film Backing: Polymeric film bonded to drainage core surface.

2.3 SOIL MATERIALS

- A. Soil materials are specified in Section 31 20 00 "Earth Moving."

2.4 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
 1. Survivability: AASHTO M 288 Class 2.
 2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.3 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than **6 inches** deep and **12 inches** wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than **4 inches**.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least **6 inches** on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least **6 inches** on side away from footing and above top of pipe to within **12 inches** of finish grade.
- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least **4 inches**.
- J. Install drainage panels on foundation walls as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article.
 - 3. Separate **4 inches** of fabric at beginning of roll and cut away **4 inches** of core. Wrap fabric around end of remaining core.
 - 4. Attach panels to wall beginning at subdrainage pipe. Place and secure molded-sheet drainage panels, with geotextile facing away from wall.
- K. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding **6 inches**. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least **6 inches** between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Install horizontal drainage panels as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at inside edge of footing.
 - 3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
 - 4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.5 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Foundation Subdrainage: Install piping level and with a minimum cover of 36 inches unless otherwise indicated.
 - 2. Underslab Subdrainage: Install piping level.
 - 3. Lay perforated pipe with perforations down.
 - 4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D2321.

3.6 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings according to ASTM D3212 with loose banded, coupled, or push-on joints.
- B. Join perforated PVC sewer pipe and fittings according to ASTM D3212 with loose bell-and-spigot, push-on joints.

- C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.7 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 33 41 00 "Storm Utility Drainage Piping."
- B. Cleanouts for Foundation and Subdrainage:
 - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
 - 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above grade.
 - 4. Comply with requirements for concrete specified in Section 03 30 00 "Cast-in-Place Concrete."
- C. Cleanouts for Underslab Subdrainage:
 - 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.8 CONNECTIONS

- A. Comply with requirements for piping specified in Section 33 41 00 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.
- C. Where required, connect low elevations of foundation underslab subdrainage to stormwater sump pumps. Comply with requirements for sump pumps specified in Section 22 14 29 "Sump Pumps."

3.9 IDENTIFICATION

- A. Arrange for installation of green warning tapes directly over piping. Comply with requirements for underground warning tapes specified in specified in Section 31 20 00 "Earth Moving."
 - 1. Install PE warning tape or detectable warning tape over ferrous piping.
 - 2. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.10 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION

D.2 LANDSCAPE-SPECIFICATION

Section 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Tree or Plant Protection Fencing as indicated on the Drawings

PART 3 – EXECUTION

Section 11 68 16

PLAYGROUND EQUIPMENT

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Cast-in-Place Concrete Footings
- B. Ages 2-5 Composite Play Structure
- C. Ages 5-12 Composite Play Structure
- D. Timber Steppers
- E. Timber Play Stack

PART 3 – EXECUTION

Section 26 56 00

SITE LIGHTING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Concrete Footings
- B. Bollard Light Fixture
- C. Pedestrian Light Fixture

PART 3 – EXECUTION

Section 31 13 00

TREE PRUNING, REMOVALS, AND TRANSPLANTING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Equipment and Materials
- B. Personnel
- C. Pruning Procedures and Quality Control

PART 3 – EXECUTION

Section 32 13 13

LANDSCAPE CONCRETE PAVEMENT

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Cast-in-Place Concrete Paving, Pads, and Mow Strips
- B. Decorative Finishes and Integral Colorant for Pedestrian Concrete
- C. Detectable Warning Pads at Crosswalks

PART 3 – EXECUTION

Section 32 14 00

UNIT PAVING

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Precast Concrete Unit Pavers

PART 3 – EXECUTION

Section 32 18 16

PLAYGROUND PROTECTIVE SURFACING

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Poured in Place Rubber Safety Surfacing

PART 3 – EXECUTION

Section 32 32 00

SITE WALLS

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Concrete Planter Walls and Seat Walls

PART 3 – EXECUTION

Section 32 33 00

SITE FURNISHINGS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. 6' Metal Bench with Back
- B. 6' Metal Bench without Back
- C. Wall-Mounted Benches
- D. Anchored Tables and Chairs
- E. Movable Chairs
- F. Movable Tables
- G. Bicycle Rack
- H. Bicycle Repair Station
- I. Artist Installation, By Others
- J. Bollard
- K. Flagpole
- L. Trellis
- M. Metal Trash Receptacles and Recycling Receptacles
- N. Tree Grates and Frames

PART 3 – EXECUTION

Section 32 80 00

IRRIGATION

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. General
- B. Point of Connection
- C. PVC Irrigation Pipe
- D. Brass Pipe and Fittings
- E. PVC Pipe Sleeves
- F. Wire Conduit
- G. PVC Irrigation Fittings
- H. Polyethylene Irrigation Pipe
- I. Polyethylene Irrigation Fittings
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- K. Electric Control Valves
- L. Valve Boxes
- M. Automatic Controller
- N. Quick Coupling Valves
- O. Wire
- P. Swing Joints
- Q. Automatic Rain Sensor
- R. Controller Enclosure
- S. Controller Grounding
- T. Spare Parts

PART 3 – EXECUTION

Section 32 90 00

PLANTING AND LAWNS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Topsoil (Loam Borrow), Fine Grading, and Loaming
- B. Soil Additives
- C. Grass Seed
- D. Hydroseeding
- E. Plant Materials
- F. Bark Mulch
- G. Watering Bags for Tree Plantings
- H. Maintenance and Protection of New Plantings and Lawns, Until Final Acceptance

PART 3 – EXECUTION

D.3 ARCHITECTURAL-NARRATIVES

The Somerville Public Safety Building is proposed for the 90 Washington Street parcel at the former location of a retail mall. The site is being divided into three parcels A, B and C with a planned realignment of New Washington Street which will bisect the property into Parcel A, B and Parcel C. Parcels A and C will be developed as separate projects. Parcel B will become the site for the new Public Safety Building.

The new Somerville Public Safety Building will be designed to accommodate Engine 3 Fire Apparatus, Fire Administration Offices, Police Administration Offices and Police Patrol and will include a Community Room among other City offices. The building is a 4-story, Category IV commercial building, approximately 74,000 SF. The proposed building will also include a 3-story, attached open-air parking garage, approximately 57,000 SF which will house police vehicles.

Soil remediation will occur as part of an earlier phase of the project and preliminary preparations for utility trenching and roadway preparation will also occur as part of the Early Site package.

The tail end parcel of Parcel B will be designed to include a below-grade geothermal well field and a public park at grade.

D.3 ARCHITECTURAL-SPECIFICATION

Section 00 01 10

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DIVISION 04 – MASONRY

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05 10 00	Structural Steel (R&G, Structural Narrative)
05 30 00	Steel Decking (R&G, Structural Narrative)
05 41 00	Exterior Metal Framing & Sheathing
05 50 00	Miscellaneous Metals
05 58 13	Column Covers

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

06 10 00	Rough Carpentry
06 20 00	Finish Carpentry
06 61 16	Solid Surfacing Fabrications

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 00 01	Waterproofing Dampproofing and Sealant FSB
07 00 02	Roofing and Flashing FSB
07 14 00	Fluid Applied Waterproofing
07 16 00	Dampproofing
07 21 00	Exterior Thermal Insulation
07 22 00	Acoustic Insulation
07 27 00	Air & Water Resistive Barriers
07 42 00	Wall & Soffit Panels
07 54 23	Thermoplastic (or PVC) Membrane Roofing
07 62 00	Sheet Metal Flashing and Trim
07 76 00	Roof Pavers
07 84 00	Firestopping
07 92 00	Sealants

DIVISION 08 – OPENINGS

08 00 08	Glass & Glazing FSB
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SCHEMATIC OUTLINE SPECIFICATION
8/13/2021

08 00 09	Alum Storefront Window FSB
08 11 13	Hollow Metal Doors & Frames
08 14 16	Flush Wood Doors
08 31 00	Access Doors & Panels
08 33 00	Column Doors & Grilles
08 34 63	Detention Doors & Frame Assemblies
08 36 13	Sectional Overhead Doors
08 41 13	Aluminum Storefront & Framing
08 44 13	Aluminum Curtain Wall & Aluminum Framing
08 51 00	Metal Windows
08 56 19	Bullet Resistant Pass Through Window
08 71 00	Door Hardware
08 80 00	Glass and Glazing
08 90 00	Architectural Louvers and Vents

DIVISION 09 – FINISHES

09 00 03	Tiling, Ceramic & Stone Flooring FSB
09 00 06	Resilient Flooring FSB
09 00 09	Painting FSB
09 22 16	Non-Structural Metal Framing
09 29 00	Gypsum Board
09 30 00	Tiling Ceramic Stone Quarry
09 51 00	Acoustical Ceiling Systems
09 65 13	Rubber Base
09 65 17	Linoleum Flooring
09 65 18	Rubber Flooring and Stair Covering
09 65 66	Synthetic Athletic Flooring
09 67 23	Seamless Epoxy Flooring
09 68 10	Carpet Tile
09 69 00	Access Floor
09 70 00	Wall Finishes
09 81 00	Acoustical Insulation
09 84 00	Acoustical Wall Panels
09 91 00	Painting
09 91 13	Exterior Painting Schedule
09 91 23	Interior Painting Schedule
09 96 99	Water Vapor Emission Control

DIVISION 10 – SPECIALTIES

10 00 00	Miscellaneous Specialties
10 11 00	Visual Display Surfaces
10 14 00	Signage
10 22 19	Partitions
10 21 13	Metal Toilet Compartments
10 28 00	Toilet Accessories
10 44 00	Fire Protection Specialties
10 50 00	Storage Specialties
10 75 16	Flagpoles
10 82 13	Roof Screens

DIVISION 11 – EQUIPMENT

11 12 00	Parking Control Equipment
11 19 20	Security Hardware

11 30 00 Appliances
11 53 00 Laboratory Equipment
11 97 00 Security Equipment

DIVISION 12 – FURNISHINGS

12 24 00 Interior Roller Shades
12 31 00 Metal Manufactured Casework
12 48 00 Mats

DIVISION 14 – CONVEYING EQUIPMENT

14 20 00 Elevator

DIVISION 21 – FIRE SUPPRESSION

21 00 00 Fire Protection Systems- Narrative Report

DIVISION 22 - PLUMBING

22 00 00 Plumbing Systems- Narrative Report
22 11 13 Facility Water Distribution
22 13 13 Facility Sanitary Sewers
22 14 13 Facility Storm Drainage
22 14 23 Storm Drainage Piping Specialties

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

23 00 00 HVAC Systems- Narrative Report

DIVISIONS 26, 27, 28 – ELECTRICAL

26 00 00 Electrical Systems- Narrative Report
28 00 00 Technology Systems- Narrative Report

DIVISION 31 – EARTHWORK

31 10 00 Site Clearing
31 20 00 Earth Moving
31 23 19 Dewatering
31 50 00 Excavation Support and Protection

DIVISION 32 – EXTERIOR IMPROVEMENTS (DCI/CBA)

32 12 16 Asphalt Paving
32 13 13 Concrete Paving
32 17 23 Pavement Markings
32 17 26 Tactile Warning Surfacing

DIVISION 33 – UTILITIES

33 05 00 Common Work Results for Utilities
33 46 00 Subdrainage

Section 04 23 00

REINFORCED MASONRY

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Mortar – Type M, 2500 psi compressive strength
- B. Hollow concrete masonry units - ASTM C90, Type I, grade N-I having an oven-dry weight of over 125 pcf and maximum moisture absorption of 13 pcf.
- C. Grout mixtures: fine grout, low-lift grout, or high-lift grout as scheduled
- D. Horizontal joint reinforcement- hot-dip galvanized steel, 9 gauge in both longitudinal and transverse directions; Lengths for straight runs shall be furnished in flat sections not less than 10 feet long. Factory-formed pieces shall be provided at corners and intersections of walls and partitions.
- E. Control joint keys- Factory-fabricated solid section of natural or synthetic rubber, plastic, or other rubber-like material
- F. Reinforcing steel- ASTM A615 Grade 60 for vertical cell and horizontal bond beam reinforcement. All walls containing reinforcement shall be grouted solid.
- G. Bearing Plates- ASTM A36 for embedded plates receiving related work.

PART 3 – EXECUTION

Section 04 43 00

STONE MASONRY

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Anchored stone masonry veneer granite at base of building in sizes and colors as shown on the Drawings
- B. Anchor system as required

PART 3 – EXECUTION

Section 05 41 00

EXTERIOR METAL FRAMING & SHEATHING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Exterior metal stud framing- 16 ga or 18 ga channel shaped studs, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and other accessories recommended by manufacturer for complete framing system, and as noted on the Drawings. At top of wall, provide deflection runner with continuous channel stiffener (at first knock out below top runner) - Marino or approved equal
- B. Sheathing board- Water-resistant gypsum core per ASTM C 79. Provide ½ inch thick panels; Fiber rock by USG or approved equal.
- C. Fasteners and accessories required for a complete installation as specified below
 - Sheathing tape as recommended by sheathing manufacturer for use inside cavity construction
 - Screw fasteners meeting ASTM C1002, corrosion resistant treated steel, selected for use on the specific framing substrate and acceptable to the sheathing board manufacturer.

PART 3 – EXECUTION

Section 05 50 00

MISCELLANEOUS METALS

PART 1 - GENERAL

PART 2 - PRODUCTS

- A. Steel stair structure complete with all supporting members, railing and guard rails
- B. Stainless steel railings and brackets
- C. Stainless steel splash guards (Jan Clo/ Decon Lockers & Stationware Wash/ SFD WasherDryer)
- D. Stainless steel countertop (Evidence Process/ Booking/ Firearms cleaning/ Decon)
- E. Metal Shelving (Evidence Weapons Sto/ Narcotics Sto/ SPD Assault Sto/ SPD Training Aids Sto/ Firearms cleaning/ SPD Quartermaster sto/ SPD Motorcycle & bike supplies/ SPD Found Property Sto/ SPD Marine Sto/ Fire training aids/Traffic Equip Sto/ Shared Jan Clo/ SFD Bike Sto/ SFD Quartermaster Sto/ SFD Auxiliary Sto)
- F. Heavy-duty galvanized shelving (Hose & Foam)
- G. Stainless steel shelving (Decon, EMS supplies, SFD WasherDryer)
- H. Stainless detention bench (SPD Booking/Detention cells/ Temporary Holding)
- I. Welded steel plate ceiling (Detention cells)
- J. Fire pole & cage
- K. Guard rail support system for exterior glazed terrace rail

PART 3 - EXECUTION

END OF SECTION

Section 05 58 13

COLUMN COVERS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Pre-engineered architectural metal column system including facing material, mounting channel, blocking, trims and reveals. System comes “ready to install” with materials required for a complete assembly. Internal fasteners to be concealed type. – LEVELc Column System by Forms & Surfaces or approved equal (Main entry & Shared Lobby where shown on Drawings)
- B. Material to be satin stainless steel in sizes as shown on the Drawings.

PART 3 – EXECUTION

Section 06 10 00

ROUGH CARPENTRY

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Plywood backboard (NOC/Radio room; Demarc; Elev machine room; Elec rm; Elec clo; IDF clo)
- B. Plywood security liner at GWB (Evidence Technician Office; Evidence Pioneering; Evidence Lab; Evidence, General Storage; Evidence, Assault Sto)
- C. Photo backboard (Booking)

PART 3 – EXECUTION

Section 06 20 00

FINISH CARPENTRY

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Lobby display cases (Shared Lobby; Fire Visitor Lobby)
- B. Lobby pamphlet racks
- C. Chair rails
- D. Coat rods & shelves
- E. Millwork (upper and base cabinets at Community room/ Shared Dispatch/ mail alcove-
Police/ Digital Forensics/ Firearms cleaning/SFD WasherDryer/ SFD Auxiliary
Day_Kitchenette/ Pkg Roll Call)
- F. Wood workbench (SFD Repair shop)
- G. Wall shelving (Dispatch; Fire Admin Sto; SFD Repair shop; Pkg Sign Shop)
- H. Wood wainscot (Pkg Public Waiting)
- I. Transaction counter (Pkg Public Waiting)
- J. Full height premium wood paneling (Shared Public Lobby)
- K. Exterior wood trellis (Roof Garden)

PART 3 – EXECUTION

Section 06 61 16

SOLID SURFACING FABRICATIONS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. 0.50 inch (13 mm) by Wilsonart Gibraltar Solid Surface or approved equal
 - 1. Vanities – countertops with integral bowl (Toilet rooms/mothers' room/ Locker-Shower rooms)
 - 2. Shower room shelving
 - 3. Countertops- (Shared Training Kitchenette/Dispatch break room/ Shared break room/ Shared IT workshop/ Admin conf rm/ Police transaction/ Records office/Traffic conference/ Roll call/ Patrol evidence prep/ Major Case/ Fire Visitor lobby/ SFD WasherDryer/ SFD Auxiliary Sto/ Pkg Admin Conf rm/ Pkg Roll Call/ Pkg Break Room/ Pkg Work rm/)

PART 3 – EXECUTION

Section 07 21 00

EXTERIOR INSULATION

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Below grade foundation wall & under slab insulation: Extruded polystyrene board by Dow Chemical or approved equal
- B. Perimeter foundation wall insulation: Extruded polystyrene board by Dow Chemical or approved equal
- C. Cavity wall insulation: mineral wool fiber insulation, made from basalt rock and slag by Rockwool Cavityrock or approved equal.
- D. Low pressure polyurethane foamed-in-place insulation/air barrier sealant by Dow or approved equal.

PART 3 – EXECUTION

Section 07 22 00

ACOUSTIC INSULATION

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Unfaced thermal batt/blanket glass fiber insulation by Owens Corning Fiberglas Corp or approved equal
- B. Staples, tape, adhesives, fasteners as required.

PART 3 – EXECUTION

Section 07 27 00

AIR & WATER RESISTIVE BARRIERS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Fully-adhered vapor permeable and non-permeable air and water resistive barriers in exterior wall assemblies including flashing, sealants, and related accessories to provide a continuous assembly and transition to adjacent materials and assemblies. Product to be nominal 40 mil thickness consisting of an aluminum-faced cross-laminated high density polyethylene sheet laminated with a styrene-butadiene modified asphalt adhesive, such as CCW 705 FR-A by Carlisle Coatings & Waterproofing
- B. Auxiliary Materials:
- a. Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.
 - b. Counterflashing strip: modified bituminous 40 mil, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, crosslaminated polyethylene film with release liner backing.
 - c. Butyl Strip at Termination with EPDM or TPO Roofing Membrane: Vapor-retarding, 30- to 40- mil-thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive, with release liner backing.
 - d. Modified Bituminous Strip To Cover Cracks and Joints and Terminate Air Barrier to Compatible Roofing Membrane: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- polyethylene film with release liner backing.
 - e. Termination Mastic: Cold fluid-applied elastomeric liquid; trowel grade. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
 - f. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
 - g. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
 - h. Sprayed Polyurethane Foam Sealant to Fill Gaps at Penetrations and Openings: one- or two- component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 - i. Preformed Silicone-Sealant Extrusion to Seal Air Barrier Terminations with Glazing Systems: Pre-cured silicone extrusion consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with manufacturer's recommended sealant for bonding extrusions to substrates.
 - j. Joint Sealant: ASTM C920, single-component, neutral-curing silicone, Class 100/150 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section for Joint Sealants.

PART 3 – EXECUTION

Section 07 42 00

WALL & SOFFIT PANELS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Longoton System terra cotta wall panels with aluminum extrusion clip & girt attachment system (multiple lengths/ 2 colors) - Shildan, Inc. or approved equal. Color and panel sizes as shown on the Drawings.
- B. Longoton System terra cotta coping by to match adjacent wall panels - Shildan, Inc. or approved equal. Color and coping sizes as shown on the Drawings.
- C. Vratsa Limestone Wall Panels with aluminum extrusion clip & girt attachment system (multiple lengths) - Predsednik Ltd. or approved equal. Color and panel sizes as shown on the Drawings.
- D. High pressure laminate (HPL) cladding panels made from wood sourced from sustainably managed PEFC certified forests- with exposed façade fastening system by Prodema or approved equal. Color and panel sizes as shown on the Drawings.
- E. High pressure laminate (HPL) soffit panels made from wood sourced from sustainably managed PEFC certified forests- with exposed façade fastening system by Prodema or approved equal. Color and panel sizes as shown on the Drawings.

PART 3 – EXECUTION

Section 07 54 23

THERMOPLASTIC MEMBRANE ROOFING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Carlisle Syntec SureWeld- 60 mil white; Solar reflectance value of 82 min.
- B. Rigid polyisocyanurate board insulation

PART 3 – EXECUTION

Section 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Sheet metal flashings
- B. Coping caps
- C. Brake metal cornice
- D. Reglet and counterflashing assemblies
- E. Gravel stops and metal edging
- F. Drip flashings
- G. Roof pipe flashings
- H. Provision and installation of metal flashing with or adjacent to wall panels, curtain wall, windows, doors or similar.

PART 3 – EXECUTION

Section 07 76 00

ROOF PAVERS

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Pavers on high tab pedestal system (Hanover Architectural Products Prest-Paver)

PART 3 – EXECUTION

Section 07 84 00

FIRESTOPPING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Firestop mortar: asbestos free, cementitious mortar, such as Tremstop M by Tremco Inc.
- B. Silicone firestop sealant: single component, non-combustible silicone elastomer firestop sealant, such as Tremsil by Tremco Inc.
- C. Intumescent firestop sealant and caulks: acrylic based, water resistant sealant, which will not re-emulsify after drying, such as Tremstop 1A by Tremco Inc.
- D. Firestop putty: stick or pads, such as Fire Barrier Modable Putty by 3M Company
- E. Firestop collars: premanufactured fire protective pipe sleeve, such as Fireshield Firestop Sleeve by 3M Company
- F. Firestop pillows, such as Tremstop P.S. by Tremco Inc.
- G. Wrap strips, such as Tremco W.S. by Tremco Inc.
- H. Mineral wool fiber/ceramic wool non-combustible insulation (fire safing), Fibrex FBX by Fibrex Insulations Inc.
- I. Elastomeric firestopping: Non halogenated latex based elastomeric coating applied by airless spray, such as Spec Seal Elastomeric Firestop Spray by Specified Technologies, Inc.
- J. Accessories
 - 1. Foaming & damming materials: mineral fiberboard or other type as recommended by firestopping manufacturer.
 - 2. Primer, sealant and solvents as recommended by firestopping manufacturer.
 - 3. Woven wire mesh: galvanized 20 ga. woven wire mesh “chicken wire”, 1 inch spacing

PART 3 – EXECUTION

Section 07 92 00

SEALANTS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. General: Sealants and primers must comply with the following limits for VOC content:
 - 1. Architectural Sealants: 250 g/L.
 - 2. Roofing Sealants: 450 g/L.
 - 3. Sealant primer: 250 g/L.
- B. Joint Sealer Type AP (Acrylic painters caulk): One component acrylic latex caulking compound (Interior – plaster to trim)
- C. Joint Sealer Type BP2 (Bitumen modified polyurethane, Multi-component): Pouring grade self-leveling bitumen modified two component urethane sealant (concrete to concrete)
- D. Joint Sealer Type P1 (Polyurethane 1-component): Low modulus single component gungrade polyurethane sealant, non-sagging (Exterior – wood to wood & wood to masonry)
- E. Joint Sealer Type SC (Silicone, general construction): One-part medium modulus, natural cure, synthetic sealant
- F. Joint Sealer Type SS (security sealant)- Two-part epoxy security sealant. (Interior- for use in all Detention areas)
- G. Joint Sealer Type MRS (Mildew resistant, damp or wet locations): Standard mildew resistant (Interior – solid surfacing to GWB/ bath mirror)

PART 3 – EXECUTION

Section 08 11 13

HOLLOW METAL DOORS & FRAMES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Standard hollow metal frames: pressed sheet steel, 2" wide unless noted otherwise; Drywall type with return flange at drywall installations (knock-down type), Steelcraft DW series or equal. Standard type elsewhere, Steelcraft F series or equal. 16 ga at fire rated and exterior construction; 18 ga. typical at interior construction
- B. Standard hollow metal doors: flush-type, roller leveled facing sheets, fully-welded construction, full flush or seamless type. Typical interior doors: heavy duty, 18 ga. face sheets; polyethylene core construction at exterior reinforced doors insulated with R value of 3.4 min.
- C. Typical frame and door face sheet material: commercial-quality carbon steel, cold-rolled for exposed door faces and either hot or cold-rolled for frames.
- D. Hollow metal door manufacturer to provide a cut out for an electronic power transfer (EPT) unit in all frames, with a filler plate for doors not scheduled to receive an EPT unit.

PART 3 – EXECUTION

Section 08 14 16

FLUSH WOOD DOORS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Solid-core doors: solid particleboard or wood stave cores, of 5- or 7-ply construction; with minimum 1/16" thick cross-banding, hardwood edge stiles and rails
- B. Fire doors: same as typical solid-core door, except with solid mineral core
- C. Bullet resistant door between Station officer and Lobby
- D. Door veneer to match wood species specified in FINISH CARPENTRY, slip-matched, for natural wood finish.
- E. Wood to be FSC-certified

PART 3 – EXECUTION

Section 08 33 00

COILING DOORS AND GRILLES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Solid uninsulated rolling door, with 16 ga. galvanized steel curtain, Overhead Door model 610 or approved equal (Parking Garage)
- B. Controls and photo eye sensors

PART 3 – EXECUTION

Section 08 34 63

DETENTION DOORS & FRAME ASSEMBLIES.

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Door and frame units: Bullet-resisting steel with door face sheets not less than 1/8". Doors to be fully welded construction, 1 3/4" thickness. Model #DT by Chicago Bullet Proof Equipment or approved equal
- B. Frames to be mitered and welded. Swinging detention doors to be pre-hung and pre-fit within door & frame assembly.
- C. Glazing to be laminated polycarbonate: Lexgard MPC 500 or equal, transparent armor for door vision panels (1/2" nom.)

PART 3 – EXECUTION

Section 08 36 13

SECTIONAL OVERHEAD DOORS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Glazed sectional aluminum panel overhead doors, and insulated aluminum panel sectional overhead doors – Clopay or approved equal (Fire Investigative Bay; SFD Apparatus Bay)
- B. Solid insulated aluminum panel sectional overhead door – Clopay or approved equal (SALLYPORT)
- C. Controls and photo eye sensors

PART 3 – EXECUTION

Section 08 41 13

ALUMINUM STOREFRONT & FRAMING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Thermal storefront framing (2" x 6 ½") EFCO series 406X
- B. Thermal operable sash in storefront framing as shown in Drawings. See Drawings for swing operation type and direction (eg.,outswing casement or projected awning)
- C. Window glazing to be insulated "Low-E" glass units
- D. Door glazing to be insulated "Low-E" safety glass with tempered glass

PART 3 – EXECUTION

Section 08 44 13

ALUMINUM CURTAINWALL & ALUMINUM FRAMING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. EFCO 5600 series curtainwall system
- B. EFCO E-SHADE- 36” outrigger system
- C. EFCO series WV430 thermal casement outswing window
- D. Insulated Low-E glass unit for window glazing
- E. Insulated Low-E safety glass with tempered glass for door glazing
- F. Spandrel glass where noted on drawing elevations

PART 3 – EXECUTION

Section 08 51 00

METAL WINDOWS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Peerless casement windows at SFD
- B. Interior fixed (see 08 80 00 for transaction windows)- (SFD patrol desk/

PART 3 – EXECUTION

Section 08 56 19

BULLET RESISTANT PASS-THROUGH WINDOW

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Horizontal sliding bullet resistant transaction window (Police Records- with deal tray;
Traffic Office to Police Lobby) – Total Security Solutions, Inc.
- B. Level 3, 1/1/4” laminated glass

PART 3 – EXECUTION

Section 08 80 00

GLASS AND GLAZING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Wall mirrors (Wellness)
- B. Bullet resistant fixed window at Station Officer
- C. Glass shelving at display cabinets (Shared Lobby/ Fire Visitor Lobby)
- D. Partial glass wall (Detectives)
- E. Security shield (Booking)
- F. Impact resistant glass (Temp Detention Holding)

PART 3 – EXECUTION

Section 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Metal furring and framing, including cross bracing and knee bracing, by Clark/Dietrich Building Systems or approved equal
 - 1. “Hat shaped” Furring channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel galvanized steel
 - 2. Resilient furring channels: Roll-formed, hat-shaped, 1/2 x 2-5/8 inch, 26 gage hot-dip galvanized steel
 - 3. Furring channels: ‘Z-shaped’ 1-1/2 inch depth, roll-formed, 25 gage, hot-dip galvanized steel.
 - 4. Studs: ‘C-shaped’ screw studs, hot-dip galvanized steel, 20 gage, of widths indicated on the Drawings.
 - 5. Runners for metal studs: ‘U-shaped’ hemmed, hot-dip galvanized steel track, having 1-1/4 inch leg, provided at tops and bottoms of all studs and at heads of all openings in stud partitions.
 - 6. Internal reinforcement for various stud conditions, and bracing as required: 10 gage, minimum, galvanized steel.
 - 7. Furnish cross bracing and knee bracing, as required to assure a completely rigid assembly on metal stud partitions and furred areas.
- B. Metal ceiling and soffit framing
 - 1. Carrying channels, 2 inches deep, 16 gage cold-rolled channels, galvanized.
 - 2. Support channels: 3/4 inches deep, 16 gage cold-rolled channels, galvanized.
 - 3. Furring Channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel galvanized steel conforming to ASTM C 645.
 - 4. Metal Studs used in soffit and ceiling framing: ‘C-shaped’ screw studs, hot-dip galvanized steel, 25 gage, of widths indicated on the Drawings, or other gages as required under the specified standards to meet fire resistance ratings.
- C. Deflection track assemblies at tops of metal stud partitions
 - 1. Metal sheet plate blocking and bracing, where indicated: 20 ga. galvanized sheet

PART 3 – EXECUTION

Section 09 29 00

GYPSUM BOARD

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Gypsum panel products, taped & sanded with acoustical joint sealant and backing at perimeter of partitions; 5/8 thick, by USG or approved equal- Fire rated where noted on the drawings
- B. Moisture resistant substrate for wall tile, joint accessories, fasteners
- C. Exterior gypsum ceiling and soffit board (5/8" thick)
- D. Bullet resistant (Shared Public lobby/ SPD lobby)
- E. FRP panels (Trash rm) by Glasliner FRP or approved equal
- F. Abuse resistant (Tactical training)

PART 3 – EXECUTION

Section 09 30 00

TILE CERAMIC STONE QUARRY

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Stone tile floors & base where scheduled on Drawings- granite to be 12" x 12" x 3/8" flamed finish, or stone dimensions and patterns as shown in the Drawings. Thresholds of the same granite as the adjacent tile at each transition to dissimilar flooring materials.
- B. Ceramic tile floor at toilet rooms - 20% min. accent color; Tile to be 1/4" thick impervious porcelain ceramic in size and pattern as shown on Drawings. Matching ceramic tile cove base, inside corners, bull-nose termination tiles and other misc matching trim tiles
- C. Ceramic tile walls and wainscot at toilet rooms - 20% min. accent color; wall tile to be 5/16" thick non-vitreous matte glazed porcelain ceramic in size and pattern as shown on Drawings
- D. Marble thresholds at toilet rooms- Class "A" with smooth matte surface finish
- E. Quarry tile floor – 6" x 6" x 1/2" unglazed with slip-resistant abrasive surface flashed – American Olean or equal (SFD Kitchen & Dining)

PART 3 – EXECUTION

Section 09 51 00

ACOUSTICAL CEILING SYSTEMS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. ACT – tegular edge lay-in panels – ¾” NRC 0.75 (typical)
- B. ACT– tegular edge lay-in panels – 1” NRC 0.85 (Shared Community Room/ Shared Training_EOC)
- C. ACT- lay-in panels high NRC (0.90)- (F.A.T.S.)
- D. Specialty ceiling system at shared lobby (Armstrong Baffle)

PART 3 – EXECUTION

Section 09 65 13

RUBBER BASE

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Solid (homogeneous, vulcanized rubber, 4" high unless otherwise indicated, integral colors, non-shrinking, 1/8" thick with matching molded outside corners by Roppe or approved equal.
- B. Water based, low odor type base adhesive

PART 3 – EXECUTION

Section 09 65 17

LINOLEUM FLOORING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Linoleum tile resilient floor covering (Marmoleum Modular by Forbo Industries or approved equal) where scheduled on the Drawings. Provide minimum of three colors: with 60% field color and two additional accent colors.

PART 3 – EXECUTION

Section 09 65 18

RUBBER FLOORING AND STAIR COVERING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. 1/8" thick homogeneous rubber tile, through mottled pattern (Shared Community room storage/ Shared kitchenette/ Shared Workroom)
- B. Stair Covering- extruded rubber treads with 2" wide min. flush integral contrasting color abrasive strips for installation on stairs on configuration indicated; Risers & Skirting- 1/8" thick rubber with exposed edges factory radius molded
- C. Tactile rubber flooring- 1/2" thick max. 100% synthetic rubber studded tile flooring

PART 3 – EXECUTION

Section 09 65 18

RUBBER FLOORING AND STAIR COVERING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Rubber tile flooring: 1/8" thick, homogeneous, through mottled pattern by Nora Rubber Flooring or approved equal
- B. Stair riser and treads system: extruded rubber with 2" wide minimum flush integral contrasting color abrasive strips & 1/8" thick rubber or vinyl risers and skirting by Nora Rubber Flooring or approved equal
- C. Vinyl transition strips wherever edges of flooring materials abut dissimilar flooring, where no thresholds occur by Nora Rubber Flooring or approved equal
- D. Tactile rubber flooring: 100% synthetic rubber studded tile flooring, less than 1/2" thick by Nora Rubber Flooring or approved equal
- E. Crack Filler and Leveling Compound: cementitious type
- F. Concrete Primer
- G. Water based, low odor type adhesive for use with rubber tile
- H. Polymer type floor finish for rubber flooring

PART 3 – EXECUTION

Section 09 65 66

SYNTHETIC ATHLETIC FLOORING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. 9 mm (3/8") thick recycled rubber flooring with colored granules; 48" wide rolled sheets by Encore Commercial Flooring or approved equal (Fitness, F.A.T.S.)

PART 3 – EXECUTION

Section 09 67 23

SEAMLESS EPOXY FLOORING

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Detention floors with integral base (SPD: Cells, Sto, Booking, Holding, Interview; Evidence Lab) – 1/8” system of epoxy-based multi roller applied flooring system with moisture reduction primer, colored quartz aggregate, and urethane topcoat

PART 3 – EXECUTION

Section 09 68 10

CARPET TILE

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. CT-1: 24” modular carpet tile (100% of reclaimed carpet tile can be recycled into carpet tile with recycled content) – Captivate Tile by Shaw or approved equal
- B. CT-2: 24” modular anti-static carpet tile- StaticSmart Mission Control tiles, Discovery Eco Series by Jolie Industries or approved equal (Shared Dispatch)

PART 3 – EXECUTION

Section 09 69 00

ACCESS FLOOR

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Removable modular floor panels, supported on adjustable pedestals and panel corner locking system; Panel construction to be all steel welded pan with cementitious core – ConCore 1250 Panel-24 by Tate Access Floors, inc. or approved equal (Dispatch; NOC)
- B. PosiLock understructure system by ASM Modular System “FS200” or approved equal (Dispatch; NOC)

PART 3 – EXECUTION

Section 09 70 00

WALL FINISHES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Pre-engineered architectural wall cladding including wall panels, mounting extrusions, bases, corners, reveal fins, and perimeter fins. System comes “ready to install” with materials required for a complete assembly.– LEVELr Wall Cladding System by Forms & Surfaces or approved equal (Elevator lobbies where shown on Drawings)
- B. Material to be satin stainless steel in sizes as shown on the Drawings.

PART 3 – EXECUTION

Section 09 84 00

ACOUSTICAL WALL PANELS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Acoustic wall panels, 48" wide and length as shown and located on Drawings, mounted at solid walls. Panels to be $\frac{3}{4}$ " thick, 24 pcf mineral core.
- B. Manufacturers standard panel construction, fully wrapped edges, with panel manufacturers standard full line of fabric. Facing material to be Guilford of Maine FR 701, 100% polyester, or approved equal.
- C. NRC to be 0.50

PART 3 – EXECUTION

Section 09 96 99

WATER VAPOR EMISSION CONTROL

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Water vapor reduction system, product of a single manufacturer, such as KOSTER VAP I 2000 System by KOSTER American Corporation or approved equal.
 - 1. KOSTER VAP I 2000 epoxy coating (100% solid epoxy)
 - 2. KOSTER VAP I 06 Primer (non-porous substrate primer)

PART 3 – EXECUTION

Section 10 11 00

VISUAL DISPLAY SURFACES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Markerboards- LCS white porcelain enamel wiring surface (Claridge) with wood bottom trays for markers where shown on Drawings
- B. Frameless tackboards (to receive custom trim) with ¼” pigmented mounted cork

PART 3 – EXECUTION

Section 10 14 00

SIGNAGE

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Plaques – etched stainless steel 1/4” thick; dedication plaque to include city seal
- B. Room signage- photopolymer tactile graphic signs to be mounted adjacent to doors, with room names plus Braille, as scheduled on the Drawings.
- C. Dimensional letter signage at main lobby – satin stainless steel on mounting studs
- D. Dimensional letter signage at building exterior: Factory finished powder coated aluminum channel letters with integral back-lit LED lighting
- E. Exterior parking and traffic signs as shown on plans

PART 3 – EXECUTION

Section 10 21 13

METAL TOILET COMPARTMENTS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Stainless steel toilet partitions, urinal screens and accessories, flush type, floor and ceiling anchored
- B. Panel construction to be 22 ga facing plates; doors, partitions, and screens to be 1" thick, 1 ¼" at pilasters and stiles
- C. Exposed hardware to be tamper-proof stainless steel.

PART 3 – EXECUTION

Section 10 22 19

PARTITIONS

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Demountable wall partitions (SPD Detectives office)

PART 3 – EXECUTION

Section 10 28 00

TOILET ACCESSORIES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Paper towel dispenser
- B. Waste bin
- C. Accessible changing table
- D. Tilt mirrors
- E. Soap dispensers
- F. Toilet paper dispensers
- G. Grab bars
- H. Shower rods
- I. Mop/broom holder
- J. Detention cell toilet paper holder

PART 3 – EXECUTION

Section 10 50 00

STORAGE SPECIALTIES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Storage lockers & benches (Dispatch)
- B. High density file storage w/recessed tracks (Active Files/ CID Secure Files)
- C. Metal shelving (Traffic equip sto)
- D. Evidence storage lockers with power (SPD Evidence Locker)
- E. Evidence processing pass-through lockers
- F. Gun lockers (Sallyport)
- G. Property lockers (Booking)
- H. Police lockers (Men/Women)
- I. Turn out gear cubicles (Fire TO Gear/ Auxiliary TO Gear)
- J. 18 x 24 lockable storage units with power, USB, and benches (SFD Locker rm)
- K. Gun lockers (Sallyport)

PART 3 – EXECUTION

Section 10 75 16

FLAGPOLES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Flagpoles and fittings- 24' high cone tapered fabricated from extruded aluminum tubing; external halyard with locking cleat and halyard cover; finial ball
- B. Mounting/foundation assemblies – flash collar; anchor bolt mounting
- C. Solar powered light – battery operated LED light with 100 lux illumination, such as Residential Solar Powered Light #96569 by American Flagpole or approved equal.

PART 3 – EXECUTION

Section 10 82 13

ROOF SCREENS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. 24 ga. min. corrugated acoustical metal screen panels fastened to galvanized steel support system by RoofScreen Inc.
- B. Height as shown on drawings.

PART 3 – EXECUTION

Section 11 12 00

PARKING CONTROL EQUIPMENT

PART 1 – GENERAL

PART 2 – PRODUCTS

A. Parking Key and Card Control units

B. Parking Gates

PART 3 – EXECUTION

Section 11 19 20

SECURITY HARDWARE

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Mechanical security hardware for swing doors, medium security, such as Southern Steel 1010A by Southern Folger Detention Equipment or approved equal
- B. Mechanical operation food pass, medium security, such as Southern Steel 1017A by Southern Folger Detention Equipment or approved equal
- C. Mortise lock, minimum and medium, such as Southern Steel 10500 by Southern Folger Detention Equipment or approved equal
- D. Electric security locks for swinging doors:
 - 1. Medium/Maximum, such as Southern Steel 10120 by Southern Folger Detention Equipment or approved equal
 - 2. Minimum/Medium, such as Southern Steel 10600 by Southern Folger Detention Equipment or approved equal
- E. Door Position Switch, such as Southern Steel 200MRS TB by Southern Folger Detention Equipment or approved equal
- F. Hinges, such as Southern Steel 204MMSS TB by Southern Folger Detention Equipment or approved equal
- G. Miscellaneous: raised pull, recessed pull, detention door stop
- H. Security Door Closer/DPS, such as LCN Closer Series 2210DPS or approved equal
- I. Cylinders, Keys, and Keying
- J. Key Cabinet

PART 3 – EXECUTION

Section 11 30 00

APPLIANCES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Microwave (Dispatch break room)
- B. 30” w. refrig. (Shared Training rm Kitchenette/ Dispatch break room/ Mothers room)
- C. 4 Burner range with oven & exhaust hood (Dispatch break room)
- D. Washer & dryer (Decon; SFD WasherDryer)
- E. 6 Burner range with oven, exhaust hood, commercial uc dishwasher, 36” refrig/freezer, microwave/convection oven (SFD Kitchen)
- F. 4 Burner range with oven, exhaust hood, 36” refrig (SFD Auxiliary Day_Kitchenette)

PART 3 – EXECUTION

Section 11 53 00

LABORATORY EQUIPMENT

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Fume Hood, ducted, dual wall construction, with fully adjustable sliding sash and equipped with explosion-proof light by HEMCO or approved equal (SPD Evidence / Firearms Cleaning)
- B. Police Evidence Dusting Station

PART 3 – EXECUTION

Section 11 97 00

SECURITY EQUIPMENT

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Weapons clearing device, with wall or desk mounting brackets as required for location, by APC-200LE by Concept Development Corporation or approved equal

PART 3 – EXECUTION

Section 12 24 00

INTERIOR ROLLER SHADES

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Manually Operated Shades, recess mounted with ceiling pocket- double solar and blackout shade-cloth – Mechoshade or approved equal (Training; Conference rms)
- B. Manually Operated Shades, recess mounted with ceiling pocket- single solar shade-cloth – Mechoshade or approved equal (SFD Dorms)

PART 3 – EXECUTION

Section 12 31 00

METAL MANUFACTURED CASEWORK

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Casework to be constructed of sheet steel (stainless steel), except where reinforcing is required. Manufacturer to be Steel Kitchen Corp, or equal. (SFD Kitchen)
- B. 20 ga min. drawer fronts, back, bodies, closure plates or scribe; 18 ga. min. base pedestals, doors, and interior panels; 16 ga. min. aprons, gussets, legs

PART 3 – EXECUTION

Section 12 48 00

MATS

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. Entrance mats at all passage door entry/exit points of PSB except Booking
- B. At floor surfaces scheduled to be tile, mats to be installed within an aluminum angle frame that is recessed into the tile or in wall-to-wall applications that do not require a frame. All other locations to be surface roll up mats.
- C. Mat in main entry vestibule to be installed within a tapered aluminum angle frame, recessed and matching height of the stone tile border.
- D. Recessed and wall-to-wall mats to be GeoTile 100% solution-dyed low static polypropelene with SBR rubber backing by Mat Inc.
- E. Roll up mats to be heavy duty, vinyl backed, berber pattern polypropylene fiber with vinyl reducer edges (Mats Inc.)

PART 3 – EXECUTION

Section 14 20 00

ELEVATOR

PART 1 – GENERAL

PART 2 – PRODUCTS

- A. AC gearless machine room-less elevator systems, such as EcoSpace traction elevator by KONE, Inc. or approved equal
 - 2500 # load
 - 150 fpm car speed
 - 4 stops
 - Number of openings: one, front entrance
- B. See Drawings for hoist-way size, length of elevator travel, number of landings, pit and machine room size and location.
- C. Finishes: rubber floor; wood walls with stainless trim; stainless steel grab bars, stainless steel ceiling, LED lighting

PART 3 – EXECUTION

D.4 STRUCTURAL-NARRATIVE

ROOME & GUARRACINO, LLC

Consulting Structural Engineers

48 Grove Street Somerville, MA 02144

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Somerville Public Safety Building-Somerville, MA

Structural

This project consists of the design and construction of a new four-story Public Safety Building with adjacent two-story open parking garage, for the City of Somerville. The new building will be irregularly shaped structure of approximately 74,000 sq. ft., that will house both police and fire departments. The adjacent garage will be approximately 9,000 sq. ft., and be separated from the main building with an expansion joint. The buildings will be a Risk Category IV –Essential Facility structures. The first floor will have spaces for the fire departments apparatus bays and offices; police department offices, cells, and for public assembly spaces. The second, third and fourth floors will have offices, areas for fitness and locker rooms, living quarters for the fire department, as well as spaces for mechanicals and training. The first floor will be a slab-on-grade (on improved soils). The second, third, and fourth floors will be composite slab on steel deck with structural steel beams and girders. The roof (steel roof deck supported on structural steel beams and girders) will be flat with mechanical units. Lateral loads will be resisted by structural steel braced frames and moment frames in each direction.

The parking garage will be a two level open garage with a slab-on-grade first floor (on improved soils), and the upper level will be composite slab on steel deck with structural steel beams and girders. Lateral loads will be resisted by structural steel braced frames and moment frames in each direction.

Main Building

2nd, 3rd, and 4th Floor Framing

The slab will be welded wire fabric (6x6-W2.9xW2.9 WWF) reinforced lightweight concrete with a 28 day compressive strength, $f'_c=3,000\text{psi}$. The slab will be 3-1/4 inches thick above 2.0 inch deep, 20 ga. composite steel deck (total =5-1/4 inches deep). Beams and girders will be structural steel rolled shapes made composite with the slabs via 3/4in. dia. by 3.5 in. long welded shear studs. Columns will be ASTM A992 ($f_y=50\text{ksi}$) steel, or tube steel sections.

Roof Framing

Framing will be 3" – 20 ga. galvanized steel roof deck supported on structural steel beams and girders pitched a 1/4"/ft. for drainage.

Facade System

The façade system for the building will consists of masonry and terracotta veneer with 6" light-gage steel stud backup.

Garage

2nd Floor Framing

The slab will have welded wire fabric-6x6-W2.9xW2.9 WWF top reinforcement and # 5 @ 12" c/c bottom reinforcement. It will be normalweight concrete with a 28 day compressive strength, $f'_c=5,000$ psi, and require special concrete additives to help prevent damage from salts. The slab will be 4-1/2 inches thick above 2.0 inch deep, 20 ga. composite steel deck (total =6-1/2 inches deep). Beams and girders will be structural steel rolled shapes made composite with the slabs via 3/4in. dia. by 3.5 in. long welded shear studs. Columns will be ASTM A992 ($f_y=50$ ksi) steel, or ASTM A500 ($f_y=46$ ksi) tube steel sections. All steel should be AESS and hot-dipped galvanized to protect it from the elements, as it will all be exposed.

Canopy Framing

Above the 2nd floor of the garage, there is steel roof canopy framing to support solar panels. The steel framing will consist of ASTM A992 ($f_y=50$ ksi) W sections or ASTM A500 ($f_y=46$ ksi) HSS tube steel. All steel should be AESS and hot-dipped galvanized to protect it from the elements, as it will all be exposed.

Foundation System

Prior to construction of the building foundations, the in-situ soils will need to be improved (densified) by the installation a combination of RAPs (Rammed Aggregate Piers), grouted aggregate piers (GAPS), and/or rigid inclusions. This would occur under the building and garage proper, as well as under any exterior building elements like stairs, ramps, etc. Once the site soils have been improved then conventional reinforced cast-in-place concrete footings, foundation walls, and a slab-on-grade can be constructed. Interior building columns will be supported on individual spread footings, with the allowable bearing capacity of 2 TSF. The exterior columns and the perimeter concrete frost/foundation walls will be supported on spread footings with a similar bearing capacity. All exterior building elements (stairs, ramps, etc.) will need to be constructed on improved soils.

Basis of Design

Massachusetts State Building Code-Ninth Edition (IBC 2015 and ASCE 7-10)

Structural Design Loads

1. Dead loads
 - (A) Weight of building components
2. Live loads
 - (A) Main level (public assembly) – 100 PSF
 - (B) Second, third, fourth floors (office) – 80 PSF (including partition allowance)
 - (C) Roof snow load – 30.0 PSF plus drift
 $P_g=40.0$ PSF; $I_s=1.2$; $C_e=1.0$; $C_t=1.0$
3. Wind loads – Per Mass. Code and ASCE7-10; Rick Category IV;
Wind Speed (Vult)= 139 mph; Exposure B
Directional Design Method
Height Wall (Psf)

0'-15' 24.3 PSF

15'-30' 29.8 PSF

30'-45' 33.5 PSF

4. Earthquake loads- Per Mass. Code and ASCE7-10; Risk Category "IV"
Importance Factor $I=1.5$; Site Class "D"; Seismic Performance Category 'C'
Equivalent Lateral Force Procedure
 $R=3.0$; $C_d=3.0$ (Steel Systems Not Specially Detailed for Seismic Resistance)
 $S_s = .218$; $F_a=1.6$; $SDS=.228g$
 $S_1=.070$; $F_v=2.4$; $SD_1 = .111g$
 $C_s=0.114$ $V=C_s \times W$; $W = \text{Building Wt.} + \text{Partition Allowance}$

Materials

Structural Steel	ASTM A36 and ASTM A992 $F_y=50\text{ksi}$ ASTM A500 $F_y=46\text{ksi}$
Steel Deck	ASTM A611 or ASTM A653 Grade 33
Steel Reinforcement	ASTM A615-Grade 60
Welded Wire Fabric	ASTM A1064
Foundations/SOG	Normalweight Concrete - $f'_c = 4,000$ psi
Slabs on steel deck-Building	Lightweight Concrete - $f'_c = 3,000$ psi
Slabs on steel deck-Garage	Normalweight Concrete - $f'_c = 5,000$ psi

For estimating purposed assume 15 PSF for structural steel.

GENERAL

1. Structural work shall conform to the requirements of "The Massachusetts State Building Code"-9th Edition; "The International Building Code"-IBC 2015; and ASCE 7-10.
2. Examine architectural, mechanical, plumbing and electrical drawings for verification of location and dimensions of chases, inserts, openings, sleeves, washes, drips, reveals, depressions and other project requirements not shown on structural drawings.
3. Verify and coordinate dimensions related to this project.
4. Provide and install necessary material to connect elevator support beams. Location and size of beams and any inserts required shall be determined by the elevator manufacturer.
5. Openings in slabs and walls less than 12" maximum dimension are generally not shown on structural drawings shall not be revised without prior written approval of the architect.
6. Typical details and notes shown on structural drawings shall be applicable to all parts of the structural work except where specifically required otherwise by contract documents.
7. Details not specifically shown shall be similar to those shown for the most nearly similar condition as determined by the architect.
8. The contractor shall submit complete shop drawings for all parts of the work, including description of construction methods and sequencing where applicable. No performance of the work including, but not limited to, construction methods and sequencing, and fabrication or erection of new structural elements, shall commence without review of the shop drawings by the architect.

FOUNDATIONS

1. Foundations for this project consist of spread footings, foundation walls, and slabs-on-grade. The allowable bearing pressure is 2.0 tons per square foot, based on the geotechnical report dated May 24, 2021 and prepared by McPhail Associates. Prior to

placing any foundation concrete, the contractor must improve the soils on the site with “Rammed Aggregate Piers” (RAP’s), grouted aggregate piers (GAPS), and/or rigid inclusions. Provide stamped drawings and calculations for approval before any work may proceed.

2. No responsibility is assumed by the architect for the validity of the subsurface conditions described on the drawings, specifications, test borings or test pits. These data are included only to assist the contractor during bidding and subsequent construction and represent conditions only at these specific locations at the particular time they were made.
3. Foundation units shall be centered under supported structural members, unless noted otherwise on the drawings.
4. Exterior construction shall be carried down below finished exterior grade to a minimum depth of 4’-0”, unless noted otherwise.
5. Provide temporary or permanent supports, whether shoring, sheeting or bracing so that no horizontal movement or vertical settlement occurs to existing structures, streets or utilities adjacent to the project site.
6. Carry out continuous control of surface and subsurface water during construction such that foundation work is done in dry and on undisturbed subgrade material, as applicable.
7. Bottom 3 inches of excavations for footings shall be finished by hand shovel.
8. Backfill under any portion of the structure shall be compacted in 6” lifts.
9. No foundation concrete shall be placed in water or on frozen subgrade material.
10. Protect in-place foundations and slabs from frost penetration until the project is completed.
11. Do not backfill behind foundation walls until permanent lateral structural support system is in place and of full strength.
12. Sheeting, shoring and bracing for the lateral support of excavation shall remain in place until all permanent structural systems below ground level are complete.

CONCRETE

1. Concrete work shall conform to “Building Code Requirements for Reinforced Concrete” (ACI 318-14), and “Specifications for Structural Concrete for Buildings” (ACI 301-14).
2. Concrete shall be controlled concrete, proportioned, mixed and placed in the presence of a representative of an approved testing agency.
3. Unless noted otherwise, concrete shall have a minimum 28 day compressive strength and be of a type as follows:

(A) Footings, tie beams, columns, walls	4000 PSI	(Normal weight)
(B) Framed slabs, slabs-on-grade, beams	4000 PSI	(Normal weight)
(C) Concrete on steel deck-Building	3000 PSI	(Light weight) Dry unit weight 109 to 115 PCF)
(D) Concrete on steel deck-Garage	5000 PSI	(Normal weight)
(E) Topping slabs & housekeeping pads	3000 PSI	(Normal weight)
4. Concrete to be exposed to the weather in the finished project shall be air entrained per specifications requirements.
5. Provide vapor barrier under interior slabs cast on grade.
6. Construction joints shown on drawings are mandatory. Omissions, additions or changes shall not be made except with the submittal of a written request together with drawings of the proposed joint locations for approval of the architect.

7. Where construction joints are not shown or when alternate joint locations are proposed, joints locations and concrete placing sequence shall be submitted to the architect for approval prior to preparation of the reinforcement shop drawings.
8. Size of concrete placements, unless noted otherwise, shall be as follows:

	Max Length (Feet)	Max Area (Sq. Feet)
(A) Footings and walls	30*	-
(B) Slabs on grade	30*	900* place in alt panel
(C) Concrete on steel deck	90	8100

*Exceed only where intermediate contraction joints are provided.

9. Minimum of 72 hours shall elapse between adjacent concrete placements.
10. Concrete shall be placed without horizontal construction joints except where shown or noted. Vertical construction joints and stops in concrete work shall be made at midspan or at points of minimum shear.
11. Concrete slabs, including concrete placed on steel deck, shall be placed so that the slab thickness is at no point less than that indicated on the drawings. (This will require that the slab not be cast dead level where supporting beams or girders have an upward camber.)
12. Structural steel below grade shall be encased in concrete with a minimum cover of 2".

REINFORCEMENT

1. Reinforcement work of detailing, fabrication and erection shall conform to "Building Code Requirements for Reinforced Concrete" (ACI 318-14), "ACI Detailing Manual – 1994" (SP-66), "CRSI Manual of Standard Practice" (MSP 1-97), and "Structural Welding Code – Reinforcing Steel" (AWS D1.4-92).
2. Steel reinforcement, unless noted otherwise, shall conform to the following:

(A) Bars, ties and stirrups	ASTM A615 Grade 60	(FY=60 KSI)
(B) Welded wire fabric (WWF)	ASTM A1064	

3. Provide and schedule on shop drawings the necessary accessories to hold reinforcement securely in position. Minimum requirements shall be: high chairs, 4'-0" O.C. with continuous #5 support bar; slab bolsters, continuous and 3'-6" O.C.; beam bolsters, 5'-0" O.C.
4. Minimum concrete protective covering for reinforcement, unless noted otherwise, shall be as follows:
 - (A) Unformed surfaces cast against and permanently in contact with earth: 3.0"
 - (B) Formed surfaces in contact with earth or exposed to weather:

#6 through #18 bars	2.0"
#5 bars, 5/8" wire and smaller	1.5"

- (C) Surfaces not in contact with earth or exposed to weather - walls, slabs, joists:

#14 and #18 bars	1.5"
#11 bars and smaller	1.0"

Beams, girders and columns – principal reinforcement, ties, stirrups or spirals: 1.5”

5. Where continuous reinforcement is called for, it shall be extended continuously around corners and lapped at necessary splices or hooked at discontinuous ends. Laps shall be Class B tension lap splices, unless noted otherwise.
6. Where reinforcement is not shown on drawings, provide reinforcement in accordance with applicable details as determined by the architect. In no case shall reinforcement be less than the minimum reinforcement permitted by the applicable codes.
7. Where reinforcement is required in section, reinforcement is considered typical wherever the section applies.
8. Where there is a conflict between locations of column vertical bars and beam horizontal bars, the column bars shall remain in their designated positions and beam bar locations shall be adjusted.
9. Reinforcement shall be continuous through construction joints.
10. Dowels shall match bar size and number, unless noted otherwise.
11. Welded wire fabric shall lap 8” or 1-1/2” spaces, whichever is larger and shall be wired together.
12. Reinforcement shall not be tack-welded.
13. Installation of reinforcement shall be completed at least 24 hours prior to the scheduled concrete placement. Notify architect of completion at least 24 hours prior to the scheduled completion of the installation of reinforcement.

STRUCTURAL STEEL

1. Structural steel work shall conform to “Specification for Structural Steel Buildings” (AISC 2011); “Code of Standard Practice for Steel Buildings & Bridges” (AISC 2011); “Seismic Provisions for Structural Steel Buildings” (AISC, 2011); “Specification for Structural Steel Joints Using ASTM A325 and A490 bolts” (AISC 2011), “Structural Welding Code – Steel” (AWS D1.1-96).
2. Structural steel shall be detailed in accordance with “Detailing for Steel Construction (AISC)” and where required, designed in accordance with cited references”.
3. Structural steel details, not specifically shown, shall be taken as being similar to those shown for the most nearly similar condition as determined by the architect.
4. Structural steel shall be new steel conforming to the following:

(A) Unless noted otherwise	ASTM A992	Grade 50 (Fy = 50 KSI)
(B) Angles, channels, T’s, plates, etc.	ASTM A36	(Fy = 36 KSI)
(C) Tubes	ASTM A500	Grade B (Fy = 46 KSI)
(D) Pipes	ASTM AS01	Type E or S, Grade B
	or ASTM A53	
(E) Anchor bolts	ASTM A307 or	F1554 gr. 105
(F) High strength bolts	ASTM A325	
5. Anchor bolts, leveling plates or bearing plates shall be located and built into connecting work, preset by templates or similar methods. Plates shall be set in full beds of non-shrink grout.
6. Bolted connections should be as follows:
 - (A) Minimum bolt diameter – ¾”, two bolts minimum.
 - (B) Standard, oversized or horizontal shorts slotted holes in webs of beams.

- (C) Shear connections for moment connected members – friction type high strength bolts in single shear.
 - (D) Shear connections for other members – simple shear connections with either friction type high strength bolts in single shear or bearing type high strength bolts (threads included in shear plane) in single or double shear.
 - (E) Simple shear connections shall be capable of end rotation per AISC requirements for “Unrestrained Members”.
7. Welded connections shall be made by approved certified welders using filler metal conforming to E70XX or F7X-EXXX with low hydrogen.
 8. Welds shall develop the full strength of the materials being welded, unless noted otherwise, except that fillet welds shall be a minimum of ¼”.
 9. Beam connections, unless noted otherwise, shall provide connection capacity as follows, or as shown on the plans, whichever is larger:
 - (A) Non-composite beams: Non-composite beams: support a reaction “R” equal to ½ the total uniform load capacity of beam for a given shape, span and grade of steel per “Maximum Total Uniform Load” Table 3-6 to 3-9, AISC Manual of Steel Construction, 14th Edition.
 - (B) Composite beams: support a reaction “Rc” = Multiplier x “R” (as defined above):

$R_c = 1.50 \times R$	(for beam depth greater than 21”)
$R_c = 2.00 \times R$	(for beam depth greater than 14” but less than or equal to 21”)
$R_c = 2.25 \times R$	(for beam depth great than 8” but less than or equal to 14”)
 - (C) Add to “R” or “Rc” the loads or reactions of members supported by the beam near supports and/or the vertical components of force in diagonal bracing members framing into the beam.
 10. Ends of columns at splices and at other bearing connections shall be “finished to bear” to complete the true bearing.
 11. Provide stiffeners “finished to bear” under all load concentrations on supporting members, over columns, and where shown on drawings.
 12. Provide temporary erection bracing and supports to hold structural steel framing securely in position. Such temporary bracing and supports shall not be removed until permanent bracing has been installed and concrete for floor slabs has attained 75% of specified concrete strength.
 13. Structural steel framing shall be true and plumb before connections are finally bolted or welded.
 14. Field cutting of structural steel or any field modifications of structural steel shall not be made without prior written approval by architect for each specific case.
 15. Structural steel encased in masonry shall be covered with mastic coating per specifications.
 16. Structural steel members shall be fireproofed per specifications.
 17. Structural steel members and connections exposed to the weather shall be galvanized.
 18. Camber shall be by cold-formed process in conformance with AISC specification and tolerance.

STEEL DECK AND SHEAR CONNECTOR

1. Steel deck and shear connector work shall conform to the “Specification for Design of Light Gage and Cold-Formed Steel Structural Members” (AISC 1989); “Structural Welding Code – Steel” (AWS D1.1-94); and “Structural Welding Code – Sheet Steel” (AWS D1.3-89).
2. Steel deck cross sections are only represented diagrammatically on the drawings.
3. Steel deck panels shall be formed from steel sheets conforming to ASTM A653, Grade 33, with a minimum yield point of 33,000 PSI, ASTM A570 (UNGALV), Grade 33 or ASTM A611 (UNGALV), Grade C with a minimum yield point of 33,000 PSI and a thickness not thinner than 20 gage.
4. Floor construction in general consists of concrete fill cast on steel deck and composite in action with the structural steel beams by means of welded shear connectors.
5. Shear connectors shall conform to ASTM A108, Grades 1010, 1015, 1017 or 1020. Typically, shear connectors shall be $\frac{3}{4}$ ” diameter x 3 $\frac{1}{2}$ ” long headed studs, unless noted otherwise, but in no case shall shear connectors extend less than 1-1/2” above steel deck.
6. The number of shear connectors required per beam is indicated by “(32)”, etc. on the drawings. (see beam explanation diagram) Where no shear connectors are indicated for a beam which supports a concrete slab, provide shear connectors at 24” O.C.
7. Shear connectors shall be equally spaced over the length of the beam. Where the number of steel deck corrugations available is less than the number of shear connectors, use pairs of shear connectors starting from each end of beam and continuing toward the center, until it is possible to return to a single shear connector in each corrugation. Shear connectors shall be spaced not closer than 3” transversely and 4 1-2” longitudinally.
8. Horizontal clearance shall be a minimum of 1” from the edge of any shear connector to the faced of concrete, steel deck rib, or similar adjacency.
9. Edge distance from the center of a shear connector to the edge of a structural steel beam shall preferably be 2”, but in no case less than 1 $\frac{1}{4}$ ”.

MASONRY CONSTRUCTION

1. Clay (brick) and concrete masonry unit (CMU) construction shall conform to “Building Code Requirements for Masonry Structures” (ACI 530-13/ASCE 5-13/TMS402-13), and to “Specifications for Masonry Structures” (ACI 530.1-13/ASCE 6-13/TMS 602-13).
2. Materials strings shall be as follows:
 - (A) Face brick shall conform to ASTM C-215 Grade SW with compressive strength of 5000 PSI.
 - (B) Common brick shall conform to ASTM C-62 Grade SW with compressive strength of 5000 PSI.
 - (C) Concrete masonry units shall conform to ASTM C-90 or C-145 Grade N-1.
 - (D) Mortar shall conform to ASTM C-270, Type M or S.
 - (E) Grout shall conform to ASTM C-476 fine or coarse.
3. Masonry shall have $f'_m = 1500$ PSI. f'_m is the compressive strength of the masonry at 28 days as determined by prism tests. (see specs)
4. Prior to grouting cells, bars and cells must be inspected by the testing agency.
5. The base of each cell in which a bar is placed must have a cleanout hole.
6. The design of reinforced masonry construction is based on allowable stresses predicated on “with inspection” provisions, requiring that qualified masonry inspection take place on a continuous basis whenever masonry is being placed.
7. Reinforced masonry walls shall have bond beams at each floor level. Bond beam reinforcing shall be extended into and be continuous with all intersecting bond beams.

8. Anchors to masonry walls shall be 3/4" diameter expansion bolts or anchor bolts. Bolts shall be 2" shorter than wall thickness.
9. Bonding methods, ties, lintels and accessories shall be approved by the architect.
10. Submit shop drawings, with ample time for architect's review and approval, for structural elements including structural steel.
11. Masonry openings more than 16" wide require approved lintels.
12. Masonry openings for utilities are to be closed up with new brick work around the utility.
13. Provide and install lintels for openings in accordance with the schedule and details on S0.2. Where lintel abuts columns or walls, provide connections to such. (Submit shop drawing of connection detail for approval.)
14. Provide 1-#5 vertical reinforcing at 24" OC. This reinforcing shall be continuous full height.
15. Masonry block cells containing vertical reinforcing shall be grouted solid. Filling cells with mortar is unacceptable. The compressive strength of grout at the end of 28 days shall be 3000 PSI minimum.
16. Reinforced masonry walls shall have a #9 GA. Wire ladders (ladder or truss type) at 16" OC horizontal reinforcement.
17. Provide 2-#5 continuous horizontal bars in the top course (bond beam) of walls below the each floor and at the roof and fill continuously with grout.
18. Provide 1-#5 additional vertical reinforcing bar at each corner, door or window jamb, and at any discontinuity in the wall.

STRUCTURAL LIGHT GAGE METAL FRAMING:

1. All steel studs, joist, headers, tracks, and accessories shall be formed steel from steel conforming with ASTM A446 and be hot-dipped galvanized in accordance with ASTM A653/A63M-G60.
2. All framing, including but not limited to studs, floor and ceiling joists, headers, sills, tracks, accessories and connections, shall be designed by the supplying subcontractor in accordance with the latest edition of AISI'S "Specification For The Design of Cold-Formed Steel Structural Members." All design shall be performed and be submitted to the Architect/Engineer for dimensional review only. The governing building code shall be referred to for determining dead and live load requirements. The contract documents shall be referred to for additional loading conditions (if any). Member sizes and connections shown in the contract documents are to be considered schematic only, unless noted otherwise.
3. Submit shop drawings, which shall include dimensioned erection plans, member loadings and sizes, layout of walls, ceilings, floors and openings, connections and temporary and permanent bracing requirements, all of which shall be stamped and signed by a professional engineer registered in the state in which the project is located.
4. Studs exposed to wind pressure or suction forces (i.e. exterior walls, ceilings, soffits and roofs) shall be 18 gauge minimum and spaced at 16" maximum.
5. All members shall be proportioned with the following deflection limits:
 - (A) L/600; Masonry back-up for wind loads.
 - (B) L/360; Non-masonry back-up for wind loads.
 - (C) L/360; Floor live loads.
 - (D) L/360; Snow live loads.
 - (E) L/240; Total dead and live loads.
6. A deflection track shall be provided at all stud wall framing coming up under beams, girders, decking and the like that are subject to live load deflection. The deflection track

shall allow for a deflection of $\frac{3}{4}$ " or the maximum deflection as defined herein, whichever is greater.

D.5 MECHANICAL-NARRATIVE

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HVAC SYSTEMS NARRATIVE

SCHEMATIC DESIGN DRAFT REPORT

The following is the HVAC Systems narrative, which defines the proposed scope of work and capacities of the HVAC Systems, as well as the Basis of Design.

1. **CODES**

All work installed under Section 230000 shall comply with the Massachusetts State Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

2. **DESIGN INTENT**

All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Mechanical work and all items incidental thereto, including commissioning and testing.

3. **MECHANICAL SYSTEM LIFE CYCLE ANALYSIS**

As part of the schematic design phase, a building energy model and life cycle cost analysis shall be performed to determine the most cost effective HVAC system for the building in terms of overall life cycle cost of a study period of 30 years. The following options will be studied in comparison to a Baseline HVAC system.

4. **BASELINE (FOSSIL FUEL FREE – ELECTRIC HEATING) HVAC SYSTEM:** The following HVAC system represents the ASHRAE 90.1-2019 Electric Heating Baseline System consisting of the following features.

A. **Air Handling Systems:** Multiple air handling units shall be provided to serve the different building zones as described below. AHUs shall be a combination of roof mounted packed direct expansion (DX) electric cooling and heat pump units or indoor units equipped with split air-cooled heat pump condensing units located on the roof. All air handling units shall be equipped with supply air fans with VFDs, supplemental electric heating, DX heat pump cooling/heating sections, and MERV-13 filters. Energy recovery ventilation shall be provided for AHUs with large outdoor air requirements in which energy recovery is code required. AHUs shall be capable of variable air volume operation and shall deliver heated air conditioned supply air (with percentage of outdoor ventilation air meeting the minimum ventilation code requirements) to the building areas via an insulated overhead galvanized sheetmetal ductwork distribution system equipped with terminal VAV (variable air volume) boxes with electric heating coils. A combination of electric resistance type radiation, radiant panels, convectors and unit heaters shall be provided for heating only areas. It is estimated that HVAC air handling equipment with the following capacities shall be required:

- 1) The Police Department Areas shall be served by a central ventilation air handling unit (AHU-1) that shall have a capacity of approximately 15,800 CFM (53 Ton cooling coil capacity & 610 MBH heating capacity).

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- 2) The Police Department Holding / Prisoner Processing Area central ventilation system will include an air handling unit (AHU-5) of the re-circulation design with 100% outdoor air economizer and energy recovery ventilation capability. It is estimated the AHU shall have a capacity of 2,400 CFM (10 Ton cooling capacity & 200 MBH heating capacity).
- 3) The Locker Room area shall be served by an air handling unit (AHU-4) of the re-circulation design with 100% outdoor air economizer and energy recovery ventilation capability. It is estimated the AHU shall have a capacity of 4,800 CFM (18 Ton cooling capacity & 260 MBH heating capacity).
- 4) The Public Lobby and Corridor areas, Shared Office Spaces, COHR, Traffic, Community and Wellness areas shall be served by an AHU (AHU-3) with a capacity of 19,800 CFM (67 Ton cooling capacity & 760 MBH heating capacity).
- 5) The Fire Department Administration, Living Area and Dormitory areas shall be served by an AHU (AHU-2) with a capacity of 10,200 CFM (38 Ton cooling capacity & 400 MBH heating capacity).
- 6) The Fire Department Apparatus Bay and Support areas shall be provided with an energy recovery make-up ventilation air unit (AHU-6). The AHU shall have a capacity of 9,000 CFM (400 MBH heating capacity).
- 7) The air handling units (AHUs) will be provided with MERV 13 filters, DX cooling coils (except for Apparatus Bay which shall not be air conditioned), supply and exhaust fans with variable frequency drives, supplemental electric heating, and energy recovery wheels (where code required). The units will provide conditioned supply air to each space through a fiberglass-insulated galvanized sheet-metal distribution system. Return air from each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will be filtered, heated or air conditioned and re-circulated to the supply air-stream.
- 8) The AHUs' supply air distribution system will consist of overhead insulated galvanized sheetmetal distribution system equipped with variable air volume terminal boxes with electric reheat coils and sound attenuators. The VAV boxes will vary the supply airflow based on the zones' temperature and ventilation requirements. CO2 demand ventilation controls shall be provided for AHU systems where code required (such as large meeting rooms with high anticipated occupant densities).

B. Apparatus Bay and Sally Port Areas:

- 1) The Apparatus Bay and Sally Ports areas of the building shall be provided with electric unit heaters. The Fire Department Apparatus Bay and Apron shall also be provided with an electric radiant floor slab heating system. The Apparatus Bay shall be provided with a vehicle source-capture exhaust system and general exhaust air systems with gas monitoring controls. The Sallyport shall be provided with an exhaust air system with gas monitoring controls.

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- C. Supplemental Air Conditioning Systems:
 - 1) The Buildings IT Head End Server Rooms shall be equipped with dedicated split heat pump AC systems which will provide the cooling needs for the space. Ventilation will be provided from the air handling unit serving that area. It is estimated that two (2) 5 ton computer room AC units shall be required to serve each of the IT Head End Room.
 - 2) It is estimated that the Communication Dispatch Center be served by redundant (2) 7.5 ton dedicated split air cooled heat-pump systems.
 - 3) IDF Rooms shall be served by ductless split AC units (estimated 2.5 ton capacity).
 - 4) Elevator machine room shall be served by a 1.5 ton ductless split AC unit.
 - D. Exhaust Systems: Building general, custodial closets, utility room and specialty exhaust air systems (including Armory gun cleaning hood exhaust, fingerprint fume hood exhaust and drug storage room exhaust air fan systems) shall be provided. A commercial kitchen exhaust air fan system shall be provided for the Fire Department Kitchen.
 - E. Automatic Temperature Controls (DDC): Automatic Temperature Controls will be of the low-voltage direct digital control (DDC) design for the operation of all HVAC equipment, input sensors, and valve/damper actuators. A central communication network will be provided for the monitoring of all space temperatures, system set points, and overall control for the entire HVAC system. A central front-end workstation PC will also be provided as a user interface for access to the entire automatic temperature control (ATC) system. The ATC control system shall be web accessible and shall be capable of being integrated into a City Wide building energy management system.
5. HVAC SYSTEM OPTION 1 – HIGH EFFICIENCY VAV SYSTEM (ELECTRIC HEATING)
- A. Summary: This option shall be similar to the Baseline system with the following differences:
 - 1) Energy recovery ventilation shall be provided for all air handling units, including AHU-1,2,3 which would not require energy recovery under the Code Baseline Option.
 - 2) CO2 demand ventilation controls shall be provided for all air handling systems and VAV zones.
 - 3) All air handling unit's heat pump sections and ductless AC condensing units shall be current industry standard high efficiency option compared to the Code Baseline Option equipment efficiencies.

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6. HVAC SYSTEM OPTION 2 – AIR SOURCE VRF SYSTEM

A. Summary:

- 1) Under this option, a high-efficiency Air Source Variable Refrigerant Flow (VRF) heat recovery system shall provide simultaneous heating and cooling capabilities to all regularly-occupied spaces via a combination of fan coil, ductless wall and/or ductless ceiling cassette type VRF terminal air handling units. Air conditioning will be generated by outdoor roof or grade mounted heat recovery type air source heat pump condensing units that shall be connected to indoor air handling units and terminal heating and cooling units. The HVAC system including air handling unit heating/cooling and terminal heating/cooling systems (excluding supplemental AC systems) shall have a total estimated cooling and heating capacity of 200 tons. The outdoor VRF heat pump condensing units will be sized and located according to AHU and terminal equipment zones capacity requirements and VRF system piping length limitations. Therefore, multiple VRF outdoor heat pump condensing units shall be required.
- 2) It is estimated that a combined total capacity for the outdoor air cooled heat recovery heat pump condensing units is 75 tons to serve the indoor VRF units.
- 3) Ventilation shall be provided to building areas via dedicated outdoor air systems (DOAS) air handling units as described below. Indoor air handling units shall be provided with split cooling/heating coils connected to remote heat pump units and outdoor air handling units shall be packaged heat pump units. Both remote condenser and packaged type units' heat pump sections will include inverter based compressor technology similar to the VRF system for improved energy efficiency.
- 4) Heating for Entryways, Storage Rooms, Apparatus Bay and Sally Port areas will be generated by a combination of electric resistance type unit heaters, convectors, radiant panels and fin tube radiation.

- B. Ventilation System: The ventilation system shall include a combination of indoor and rooftop air handling units of the 100% outside air dedicated outdoor air system (DOAS) design. The DOAS units shall be provided with MERV 13 filters, heat pump cooling/heating coil section (air source integral heat pump condensers for outdoor units and split air source heat pump condensers for indoor units), supply and exhaust fans with variable frequency drives or EC motors, supplemental electric heating coils, total energy recovery wheel, and a sensible reheat wheel or hot gas re-heat coil for dehumidification. The DOAS units shall provide ventilation air to each occupied building area through a fiberglass insulated galvanized sheet-metal distribution system. Airflow from each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will pass through an energy recovery wheel which will transfer heat from the exhaust air stream to the outside air intake stream for preheating or vice-versa for pre-cooling. The DOAS system distribution shall include variable air volume terminal boxes equipped with CO2 demand ventilation controls that will control the amount of ventilation airflow to each space. The units will operate at reduced capacity during the unoccupied periods if unoccupied space set points are not maintained. It is estimated that units with the following capacities shall be required:

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- 1) The Police Department Areas shall be served by a central ventilation air handling unit (AHU-1) that shall have a capacity of approximately 7,700 CFM (32 Ton cooling capacity & 340 MBH heating capacity).
 - 2) The Police Department Holding / Prisoner Processing Area central ventilation system will include an air handling unit (AHU-5) shall have a capacity of 2,400 CFM (10 Ton cooling capacity & 200 MBH heating capacity).
 - 3) The Locker Room area shall be served by an air handling unit (AHU-4) that shall have a capacity of 4,800 CFM (18 Ton cooling capacity & 260 MBH heating capacity).
 - 4) The Public Lobby and Corridor areas, Shared Office Spaces, COHR, Traffic, Community and Wellness areas shall be served by an AHU (AHU-3) with a capacity of 9,800 CFM (40 Ton cooling capacity & 440 MBH heating capacity).
 - 5) The Fire Department Administration, Living Area and Dormitory areas shall be served by an AHU (AHU-2) with a capacity of 4,800 CFM (22 Ton cooling capacity & 230 MBH heating capacity).
 - 6) The Fire Department Apparatus Bay and Support areas shall be provided with an energy recovery make-up ventilation air unit (AHU-6). The unit shall have a capacity of 9,000 CFM (400 MBH heating capacity).
 - 7) The air handling units (AHUs) will be provided with MERV 13 filters, cooling and heating sections, supply and exhaust fans with variable frequency drives, supplemental electric heating coils, and energy recovery wheels. The units will provide conditioned supply air to each space through a fiberglass-insulated galvanized sheet-metal distribution system. Return air from each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will be filtered, heated or air conditioned and re-circulated to the supply air-stream.
 - 8) The AHUs' supply air distribution system will consist of overhead insulated galvanized sheetmetal distribution system equipped with variable air volume terminal boxes with sound attenuators. The VAV boxes will vary the supply airflow based on the zones' ventilation requirements utilizing CO2 demand ventilation controls.
- C. Police Department Office, Fire Department office and Dormitory, COHR, Wellness, Shared Office, and Public Areas - Space Heating and Air Conditioning:
- 1) Heating and air-conditioning of the individual heated and air-conditioned occupied areas will be through the combination of supply air distributed to terminal variable air volume (VAV) boxes and space VRF terminal air handling units. The VAV boxes will modulate the airflow to each zone as required to maintain proper code-required ventilation. A CO2 demand ventilation control system shall also be provided for areas with dense occupancies as required by code. The VRF air handling units shall operate as required to maintain space temperature setpoint control.

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- 2) Ceiling mounted return air registers will be installed in each occupied room which will return air back to the ventilation system air handling unit where it will pass through a unit mounted energy recovery wheel or re-circulate to the supply air-stream.
- 3) The IT Server Head End Room shall be equipped with dedicated split system AC units which will provide the cooling needs for the space. Ventilation will be provided from the air handling unit serving that area. It is estimated that two (2) 5 ton computer room AC units shall be required to serve the IT Server Head End Room.
- 4) The Dispatch Centers will each be served by 7.5 ton dedicated split heat-pump systems and associated air cooled condensing units. Ventilation air shall be provided from the zone air handling unit.
- 5) The Elevator machine room shall be air conditioned by a ductless split system with associated air cooled heat pump condensing unit. Estimated capacity is 1.5 tons.
- 6) Perimeter ceiling-mounted electric radiant heating panels shall be provided where required for supplemental and/or backup heating.

D. Police Department Detention and Prisoner Processing Areas:

- 1) The Detention, Prisoner processing and adjacent areas will be provided with a dedicated energy recovery ventilation air handling unit as noted above. Ventilation air will be provided from the DOAS air handling unit. Heating and cooling along with the AHU ventilation air will be provided through VAV boxes and ceiling-mounted overhead diffusers. Cell areas will be served by overhead security type grilles.

E. Locker, Toilet, Shower Rooms:

- 1) Heating, cooling and ventilation air will be provided through ceiling-mounted overhead diffusers that are served by VAV terminal boxes. Supplemental heating/cooling requirements above what the ventilation system can provide shall be provided by VRF indoor air handling units.
- 2) Toilet areas and shower areas will be provided with exhaust ductwork for removal of moisture-laden air & odors from these spaces. Aluminum exhaust ductwork and grilles will be provided for shower areas.
- 3) Perimeter ceiling-mounted electric radiant panels will provide supplemental heating.

F. Exhaust Systems: Exhaust air fans systems shall be provided for custodial closets, utility room and specialty exhaust air systems (including Armory gun cleaning hood exhaust, fingerprint fume hood exhaust and drug storage room exhaust air fan systems). A commercial kitchen exhaust air fan system shall be provided for the Fire Department Kitchen.

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G. Sallyport:

- 1) Ceiling suspended horizontal electric unit heaters located in front of each overhead door will be provided with a dedicated wall mounted thermostat, these units will be utilized as the primary source of heating.
- 2) The area will also be provided with a carbon monoxide/carbon dioxide monitoring and control system which will automatically energize an exhaust air fan system as levels rise throughout the space.

H. Apparatus Bay:

- 1) The Apparatus bay shall be served by a vehicle source-capture exhaust air system.
- 2) The Apparatus bays shall also be served by a general exhaust air ventilation and make-up air system served by an energy recovery ventilation air handling unit as described above. Gas monitoring (CO/NO₂ sensors) system shall be provided to modulate the general exhaust fan and associated make-up air system.
- 3) Apparatus Bay Heating Plant: An electric boiler plant shall be provided to supply hot water heating for the Apparatus Bay and Apron floor slab heating system. It is estimated that boiler size shall be 160 kw. The hot water system will be provided with a mixture of propylene glycol and water to prevent freezing at a concentration of approximately 30% by weight. Heating hot water will be distributed from the boiler to the radiant heating system manifolds through a fiberglass insulated copper distribution system. The boiler plant will include a primary and standby in-line circulator equipped with EC motors. The floor slab radiant heating system shall consist of underslab PEX piping, manifolds, control valves and sensors.
- 4) The Apparatus Bay shall also be heated by ceiling suspended hot water unit heaters to provide supplemental heating when the Apparatus bay doors are open during the winter heating season.

- I. Automatic Temperature Controls (DDC): Automatic Temperature Controls will be of the low-voltage direct digital control (DDC) design for the operation of all HVAC equipment, input sensors, and valve/damper actuators. A central communication network will be provided for the monitoring of all space temperatures, system set points, and overall control for the entire HVAC system. A central front-end workstation PC will also be provided as a user interface for access to the entire automatic temperature control (ATC) system. The ATC control system shall be web accessible and shall be capable of being integrated into a City Wide building energy management system.

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7. PROPOSED HVAC SYSTEM - OPTION 3 – CHILLED BEAM SYSTEM (ELECTRIC HEATING)

- A. Summary: Under this option, a ceiling mounted air induction system utilizing a 4 pipe to 2 pipe fiberglass insulated copper hot water and chilled water distribution system is proposed for this option. Hot and chilled water supply and return mains shall be provided, and branch dual temperature piping equipped with a pair of 3-way (or single 6-way valve) shall be provided to connect to the induction units. The 3-way (or 6-way) valves will allow for simultaneous heating or cooling operation whenever the building boiler and chiller plants are operational. Primary air will be generated by central indoor air handling units and roof-mounted air handling units that shall be ducted to each induction unit through a central distribution system with 100% outside air. Heating hot water and Chilled water for cooling will be generated by a roof mounted high-efficiency air cooled heat recovery heat pump chiller equipped with a supplemental electric boiler plant. Hot water and chilled water shall be distributed by end suction chilled water pumps equipped with VFD drives. Automatic temperature controls will be of the direct digital low-voltage type communicating with all HVAC equipment.
- B. Heating and Cooling Plants:
- 1) The primary equipment located in the Mechanical Room will include a 250 ton modular heat pump chiller (consisting of five (5) 50 ton modules; one module shall be redundant). The hot and chilled water systems will be provided with a mixture of propylene glycol and water to prevent freezing at a concentration of approximately 30% by weight. A supplemental electric boiler plant with an approximate capacity of 400KW, consisting of (2) 200KW electric boilers manifolded together, shall be provided to inject hot water into the heat pump condenser water side when outdoor air temperatures are below 30 deg F (adj).
 - 2) Heating hot water will be distributed throughout the building through a fiberglass-insulated steel/copper distribution system which will include primary and standby pad-mounted pumps equipped with variable frequency drives.
 - 3) Chilled water will be distributed throughout the building to the various air-handling units at 43°F (adj.) through a fiberglass insulated copper distribution system which will include a primary and standby pad-mounted circulator pump, each at approximately 500 GPM. A compensated chilled water loop shall be provided to distribute chilled water throughout the building to the various induction units at 55°F through a fiberglass insulated copper distribution system. The compensated chilled water loop shall include primary and standby pad-mounted circulator pumps equipped with variable frequency drives.

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C. Ventilation System:

- 1) The central ventilation system will include air handling units of the 100% outside air design. The air handling units will be provided with MERV 13 filters, chilled water cooling coil discharging (55°F to 60°F adj.) air, supply and exhaust fan with variable frequency drives, hot water coil with modulating control valve, total energy recovery wheel, and a hot water re-heat coil for reheat purposes. The units will provide ventilation air to each induction unit through a fiberglass insulated galvanized sheet-metal distribution system. 100% of the supply air to each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will pass through an energy recovery wheel which will transfer heat from the exhaust air stream to the outside air intake stream for pre-heating and vice-versa for pre-cooling. It is estimated that units with the following capacities shall be required:
 - a. The Police Department Areas shall be served by a central ventilation air handling unit (AHU-1) that shall have a capacity of approximately 7,700 CFM (32 Ton cooling capacity & 340 MBH heating capacity).
 - b. The Police Department Holding / Prisoner Processing Area central ventilation system will include an air handling unit (AHU-5) that shall have a capacity of 2,400 CFM (10 Ton cooling capacity & 200 MBH heating capacity).
 - c. The Locker Room area shall be served by an air handling unit (AHU-4) that shall have a capacity of 4,800 CFM (18 Ton cooling capacity & 260 MBH heating capacity).
 - d. The Public Lobby and Corridor areas, Shared Office Spaces, COHR, Traffic, Community and Wellness areas shall be served by an AHU (AHU-3) with a capacity of 9,800 CFM (40 Ton cooling capacity & 440 MBH heating capacity).
 - e. The Fire Department Administration, Living Area and Dormitory areas shall be served by an AHU (AHU-2) with a capacity of 4,800 CFM (22 Ton cooling capacity & 220 MBH heating capacity).
 - f. The Fire Department Apparatus Bay and Support areas shall be provided with an energy recovery make-up ventilation air unit (AHU-6). The unit shall have a capacity of 9,000 CFM (400 MBH heating capacity).
 - g. The air handling units (AHUs) will be provided with MERV 13 filters, cooling and heating sections, supply and exhaust fans with variable frequency drives, supplemental electric heating coils, and energy recovery wheels. The units will provide conditioned supply air to each space through a fiberglass-insulated galvanized sheet-metal distribution system. Return air from each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will be filtered, heated or air conditioned, and re-circulated to the supply air-stream.

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h. The AHUs' supply air distribution system will consist of overhead insulated galvanized sheetmetal distribution system equipped with variable air volume terminal boxes with sound attenuators. The VAV boxes will vary the supply airflow based on the zones' ventilation requirements. CO2 demand ventilation controls shall be provided for AHU systems where code required (such as large meeting rooms with high anticipated occupant densities).

D. Police Department Office, Fire Department office and Dormitory, COHR, Wellness, Shared Office, and Public Areas - Space Heating and Air Conditioning:

- 1) Heating and air-conditioning of the individual heated and air-conditioned occupied areas will be through the combination of supply air distributed to terminal variable air volume (VAV) boxes and space VRF terminal air handling units. The VAV boxes will modulate the airflow each zone as required to maintain proper code-required ventilation. A CO2 demand ventilation control system shall also be provided for areas with large occupancies as required by code. The VRF air handling units shall operate as required to maintain space temperature setpoint control.
- 2) Ceiling mounted return air registers will be installed in each occupied room which will return air back to the ventilation system air handling unit where it will pass through a unit mounted energy recovery wheel or re-circulate to the supply air-stream.
- 3) The IT Server Head End Room shall be equipped with dedicated split system AC units which will provide the cooling needs for the space. Ventilation will be provided from the air handling unit serving that area. It is estimated that two (2) 5 ton computer room AC units shall be required to serve the IT Server Head End Room. IDF rooms shall typically be served with 2.5 ton ductless AC systems.
- 4) The Dispatch Center will be served by redundant (2) 7.5 ton dedicated split heat-pump systems and associated air cooled condensing unit. Ventilation air shall be provided from the zone air handling unit.
- 5) The Elevator machine room shall be air conditioned by a ductless split system with associated air cooled heat pump condensing unit. Estimated capacity is 1.5 tons.
- 6) Perimeter ceiling-mounted electric radiant heating panels shall be provided where required for supplemental and/or backup heating.

E. Police Department Detention and Prisoner Processing Areas:

- 1) The Detention, Prisoner processing and adjacent areas will be provided with a dedicated energy recovery ventilation air handling unit as noted above. Ventilation air will be provided from the DOAS air handling unit. Heating and cooling along with the AHU ventilation air will be provided through VAV boxes with hot water reheat coils and ceiling-mounted overhead diffusers. Cell areas will be served by overhead security type grilles.

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F. Locker Rooms:

- 1) Heating, cooling and ventilation air will be provided through ceiling-mounted overhead diffusers that are served by VAV terminal boxes. Supplemental heating/cooling requirements above what the ventilation system can provide shall be provided by VRF indoor air handling units.
- 2) Toilet areas and shower areas will be provided with exhaust ductwork for removal of moisture-laden air & odors from these spaces. Aluminum exhaust ductwork and grilles will be provided for shower areas.
- 3) Perimeter ceiling-mounted electric radiant panels will provide supplemental heating.

G. Exhaust Systems: Exhaust air fans systems shall be provided for custodial closets, utility room and specialty exhaust air systems (including Armory gun cleaning hood exhaust, fingerprint fume hood exhaust and drug storage room exhaust air fan systems). A commercial kitchen exhaust air fan system shall be provided for the Fire Department Kitchen.

H. Sallyport:

- 1) Ceiling suspended horizontal electric unit heaters located in front of each overhead door will be provided with a dedicated wall mounted thermostat, these units will be utilized as the primary source of heating.
- 2) The area will also be provided with a carbon monoxide/carbon dioxide monitoring and control system which will automatically energize an exhaust air fan system as levels rise throughout the space.

I. Apparatus Bay:

- 1) The Apparatus bay shall be served by a vehicle source-capture exhaust air system.
- 2) The Apparatus bays shall also be served by a general exhaust air ventilation and make-up air system served by an energy recovery ventilation air handling unit as described above. Gas monitoring (CO/NO2 sensors) system shall be provided to modulate the general exhaust fan and associated make-up air system.
- 3) Apparatus Bay Radiant Floor: Hot water from the heat recovery chiller plant shall be provided to supply hot water heating for the Apparatus Bay and Apron floor slab heating system. Heating hot water will be distributed from the heat recovery chiller to the radiant heating system manifolds through a fiberglass insulated copper distribution system. Radiant floor system will include an in-line circulator equipped with EC motor. The floor slab radiant heating system shall consist of underslab PEX piping, manifolds, control valves and sensors.
- 4) The Apparatus Bay shall also be heated by ceiling suspended hot water unit heaters to provide supplemental heating when the Apparatus bay doors are open during the winter heating season.

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- J. Automatic Temperature Controls (DDC): Automatic Temperature Controls will be of the low-voltage direct digital control (DDC) design for the operation of all HVAC equipment, input sensors, and valve/damper actuators. A central communication network will be provided for the monitoring of all space temperatures, system set points, and overall control for the entire HVAC system. A central front-end workstation PC will also be provided as a user interface for access to the entire automatic temperature control (ATC) system. The ATC control system shall be web accessible and shall be capable of being integrated into a City Wide building energy management system.
8. HVAC SYSTEM - OPTION 4 – GROUND SOURCE VRF SYSTEM
- A. Summary: The building HVAC distribution system for this option shall be similar to Option 2 VRF system, with the following differences:
- B. Heating and Cooling Plant: Option 2 high efficiency air source outdoor heat pump condenser units and the electric boiler plant shall be replaced with ground source water cooled heat recovery heat pump equipment.
- C. Air handling units shall be equipped with hot water heating and chilled water cooling supplied from a ground water source heat recovery heat/pump chiller plant.
- 1) The ground source heat recovery heat pump chiller plant shall consist of five (5) 30 ton modular heat recovery heat pump chillers. Each module shall contain a minimum of 2 compressors and refrigeration circuits. The heat recovery heat pump chiller shall be capable of producing chilled water and hot water simultaneously while being able to supply hot water for reheat purposes when a module(s) is in cooling mode. One (1) 30-ton module shall be redundant.
- D. Indoor VRF units shall be served by ground source water to refrigerant VRF heat recovery units. Ground source water shall be distributed between the wellfield and water source VRF heat pump units, and refrigerant piping shall be distributed between the water source VRF heat pumps and the indoor VRF air handling equipment. It is estimated that the following ground water source VRF heat pump equipment is required:
- 1) Five ground water to refrigerant VRF heat pump units with average capacity of 20 tons each. One module shall be redundant.
- E. Ground source water shall be provided for the both the AHU system heat pump chiller/heater and water to refrigerant VRF heat pump equipment from a closed loop geothermal well field. Ground source water shall be distributed to the equipment via a primary secondary condenser water pump system including (2) primary and standby primary loop condenser water pumps, (2) heat pump chiller/heater condenser secondary loop pumps and (2) water to refrigerant VRF condenser water secondary loop pumps. All pumps shall be equipped with variable speed drives or EC motors. Ground water source side hydronic accessories including expansion tank, filter and an air separator shall be provided. The AHU heat pump chiller/heater equipment shall be located in the lower level mechanical room in the Police Station and the Water to refrigerant VRF heat pump units shall be located within mechanical closets adjacent to the VRF indoor air handling units.

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- F. The ground source well field shall consist of approximately twenty (20) 900 ft deep vertical close loop wells constructed of HDPX piping (similar to Rygan). Lateral piping shall be constructed of HDPE piping. Each well shall require a capacity of approximately 10 tons each (based on 200 tons total heating/cooling capacity). Well field quantity and depths are estimates only. Actual well field quantity, depth and capacity of wells shall be determined by Ground Source Wellfield Consultant.

9. HVAC SYSTEM - OPTION 5 – GROUND SOURCE CHILLED BEAM (INDUCTION) SYSTEM

- A. Summary: The building HVAC distribution system for this option shall be similar to Option 3 chilled beam (induction) system, with the following exceptions:
- B. Heating and Cooling Plant: Option 3 high efficiency air cooled heat pump chiller and supplemental electric boiler plants shall be replaced with a high efficiency ground source water cooled heat recovery heat pump chiller/heater plant that shall be capable of producing hot water heating and chilled water cooling for the building HVAC air handling and terminal heating/cooling equipment.
- C. The ground source heat recovery heat pump chiller plant shall consist of five (5) 50 ton modular heat recovery heat pump chillers. Each module shall contain a minimum of 2 compressors and refrigeration circuits. The heat recovery heat pump chiller shall be capable of producing chilled water and hot water simultaneously while being able to supply hot water for reheat purposes when a module(s) is in cooling mode. One module shall be redundant.
- D. Ground source water from a closed loop geothermal well field shall be distributed to and from the heat pump chiller/heater plant via a primary and standby condenser water pump set equipped with variable speed drives. Ground water source side hydronic accessories including expansion tank, filter and an air separator shall be provided. The heat pump chiller/heater equipment shall be located in the lower level mechanical room in the Police Station.
- E. The ground source well field shall consist of approximately twenty (20) 900 ft deep vertical close loop wells constructed of HDPX piping (similar to Rygan). Lateral piping shall be constructed of HDPE piping. Each well shall require a capacity of approximately 10 tons each (based on 200 tons total heating/cooling capacity). Well field quantity and depths are estimates only. Actual well field quantity, depth and capacity of wells shall be determined by Ground Source Wellfield Consultant.

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10. **BASELINE (GAS HEATING) HVAC SYSTEM:** The following HVAC system represents the ASHRAE 90.1-2019 Gas Heating Baseline System consisting of the following features.
- A. **Air Handling Systems:** Multiple air handling units shall serve the different zones of the building as described below. AHUs shall be a combination of roof mounted hot water heating, direct expansion electric cooling units and indoor hot water heating units equipped with direct expansion cooling coils (DX) connected to split air cooled condenser units located on the roof or grade. All air handling units shall be equipped with supply air fans with VFDs, hot water heating, DX cooling sections, and MERV-13 filters. Energy recovery ventilation shall be provided for AHUs with large outdoor air requirements in which energy recovery is code required. AHUs shall be capable of variable air volume operation and shall deliver air conditioned supply air (with percentage of outdoor ventilation air meeting the minimum ventilation code requirements) to the building areas via an insulated overhead galvanized sheetmetal ductwork distribution system equipped with terminal VAV (variable air volume) boxes with hot water heating coils. A combination of hot water fin tube radiation, convectors and unit heaters shall be provided for heating only areas. It is estimated that HVAC equipment with the following capacities shall be required:
- 1) The Police Department Areas shall be served by a central ventilation air handling unit (AHU-1) that shall have a capacity of approximately 16,000 CFM (54 Ton cooling coil capacity & 620 MBH heating capacity).
 - 2) The Police Department Holding / Prisoner Processing Area central ventilation system will include an air handling unit (AHU-5) of the re-circulation design with 100% outdoor air economizer and energy recovery ventilation capability. It is estimated the AHU shall have a capacity of 2,000 CFM (10 Ton cooling capacity & 200 MBH heating capacity).
 - 3) The Locker Room area shall be served by an air handling unit (AHU-4) of the re-circulation design with 100% outdoor air economizer and energy recovery ventilation capability. It is estimated the AHU shall have a capacity of 4,800 CFM (18 Ton cooling capacity & 260 MBH heating capacity).
 - 4) The Public Lobby and Corridor areas, Shared Office Spaces, COHR, Traffic, Community and Wellness areas shall be served by an AHU (AHU-3) with a capacity of 19,800 CFM (67 Ton cooling capacity & 760 MBH heating capacity).
 - 5) The Fire Department Administration, Living Area and Dormitory areas shall be served by an AHU (AHU-2) with a capacity of 10,200 CFM (38 Ton cooling capacity & 400 MBH heating capacity).
 - 6) The Fire Department Apparatus Bay and Support areas shall be provided with an energy recovery make-up ventilation air unit (AHU-6). The AHU shall have a capacity of 9,000 CFM (400 MBH heating capacity).

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- 7) The air handling units (AHUs) will be provided with MERV 13 filters, DX cooling coils (except for Apparatus Bay which shall not be air conditioned), supply and exhaust fans with variable frequency drives, gas fired heating, and energy recovery wheels. The units will provide conditioned supply air to each space through a fiberglass-insulated galvanized sheet-metal distribution system. Return air from each space will be returned through a separate galvanized sheet-metal return air system back to the air handling units where it will be filtered, heated or air conditioned and re-circulated to the supply air-stream.
- 8) The AHUs' supply air distribution system will consist of overhead insulated galvanized sheetmetal distribution system equipped with variable air volume terminal boxes with hot water heating coils and sound attenuators. The VAV boxes will vary the supply airflow based on the zones' temperature and ventilation requirements. CO2 demand ventilation controls shall be provided for AHU systems where code required (such as large meeting rooms with increased occupant densities).

B. Hot Water Heating Plant:

- 1) A code compliant 80% efficiency gas fired hot water heating plant shall be provided to distribute hot water to the building air handling units, VAV hot water heating coils and hot water heating equipment.
- 2) The boiler plant shall consist of two (2) 2400 MBH input, 1920 MBH output gas fired boilers.
- 3) A set of two (2) base mounted end suction hot water pumps shall distribute hot water through an insulated steel/copper hot water piping distribution system.

C. Apparatus Bay and Sally Port Areas:

- 1) The Apparatus Bay and Sally Ports areas of the building shall be provided with hot water unit heaters. The Fire Department Apparatus Bay and Apron shall also be provided with a hot water radiant floor slab heating system. The Apparatus Bay shall be provided with a vehicle source capture exhaust system and general exhaust air systems with gas monitoring controls. The Sallyport shall be provided with hot water unit heaters and an exhaust air system with gas monitoring controls.

D. Supplemental Air Conditioning Systems:

- 1) The IT Server Areas and Head End Server Room shall be equipped with dedicated split heat pump AC systems which will provide the cooling needs for the space. Ventilation will be provided from the air handling unit serving that area. It is estimated that two (2) 5 ton computer room AC units shall be required to serve each of the IT Head End Room.
- 2) It is estimated that the Dispatch Center be served by redundant (2) 7.5 ton dedicated split air cooled heat-pump systems.
- 3) IDF Rooms shall be served by ductless split AC units (estimated 2.5 ton capacity).

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- 4) Elevator machine room shall be served by a 1.5 ton ductless split AC unit.
 - E. Exhaust Systems: Building general, custodial closets, utility room and specialty exhaust air systems (including Armory gun cleaning hood exhaust, fingerprint fume hood exhaust and drug storage room exhaust air fan systems) shall be provided. A commercial kitchen exhaust air fan system shall be provided for the Fire Department Kitchen.
 - F. Automatic Temperature Controls (DDC): Automatic Temperature Controls will be of the low-voltage direct digital control (DDC) design for the operation of all HVAC equipment, input sensors, and valve/damper actuators. A central communication network will be provided for the monitoring of all space temperatures, system set points, and overall control for the entire HVAC system. A central front-end workstation PC will also be provided as a user interface for access to the entire automatic temperature control (ATC) system. The ATC control system shall be web accessible and shall be capable of being integrated into a City Wide building energy management system.
11. TESTING, ADJUSTMENT, AND BALANCING REQUIREMENTS:
- A. The mechanical contractor shall provide testing of the following systems with the owner and owner's representative present:
 - 1) Geothermal plant system
 - 2) VRF heat pump condensing unit plant system
 - 3) Hot water booster heat exchanger system
 - 4) VRF terminal evaporator units
 - 5) Indoor Air Handling Units
 - 6) Terminal heating and cooling devices
 - 7) Automatic temperature control and building energy management system
 - B. Testing reports shall be submitted to the engineer for review and approval before providing to the owner.
12. OPERATION MANUALS AND MAINTENANCE MANUALS: When the project is completed, the mechanical contractor shall provide operation and maintenance manuals to the owner.
13. RECORD DRAWINGS AND CONTROL DOCUMENTS: When the project is completed, an as-built set of drawings, showing all mechanical system requirements from the contract and addendum items will be provided to the owner.
14. COMMISSIONING: The project shall be commissioned per the project Commissioning Agent's (CxA) specifications.

D.5 REPORTS: ENGINEERING ECONOMIC ANALYSIS



Garcia, Galuska & DeSousa
 Consulting Engineers Inc.
 375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258

Somerville Public Safety Building - Design System Options Payback Summary

Baseline	System	Gross Capital Investment*	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual CO2 Emissions (MTCO2e)	Annual Maint. Cost	20 Year Exterior Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings**	Total Life-Cycle Savings***	Discounted Payback (Years)****
2	1. VRF System w/ Air-Source Heat Recovery Condensing Units 2. Heat Pump VAV Dedicated Outdoor Air Systems (DOAS) w/ DCV & ERV 3. Supplemental Electric Heating	\$5,908,091	1,627,425	\$256,319	\$2.76	59.8	390	\$72,415	\$406,900	\$328,734	-	-	-

Option	System	Gross Capital Investment*	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual CO2 Emissions (MTCO2e)	Annual Maint. Cost	20 Year Exterior Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings**	Total Life-Cycle Savings***	Discounted Payback (Years)****
5	1. Chilled/Hot Water Chilled Beam Induction Units 2. Chilled/Hot Water VAV DOAS Units w/ DCV & ERV 3. Supplemental Hot Water Heating 4. Geothermal Ground-Source Energy Recovery Heat Pump Chiller/Heater Plant	\$7,666,539	1,542,280	\$242,913	\$2.61	56.6	369	\$63,555	\$0	\$306,468	\$22,265	-\$747,007	Not Reached *****

* Gross capital investment based upon in-house cost estimate utilizing cost data from similar past projects and industry standard estimating references. Costs have been estimated for system comparison purposes only and do not incorporate all supplemental/independent HVAC system costs which would be required for all systems studied (i.e. vehicle exhaust systems, overhead and profit).

** Combined expense savings is the difference between the combined annual expense of the baseline and system in comparison.

*** Total life-cycle savings is based on a 30 year study period.

**** Discounted payback years is based upon BLCC5 Life Cycle Analysis.

***** Discounted payback never reached within 30 year study period.

***** Discounted payback never reached because system is more efficient and/or less expensive than baseline system.

NIST BLCC 5.3-20: Comparative Analysis

Consistent with Federal Life Cycle Cost Methodology in OMB Circular A-94

Base Case: Option 2 - VRF System

Alternative: Option 5 - Geothermal Induction Unit System

General Information

File Name: C:\Users\keith_lane.GGDMAIL\BLCC 5.3-20\projects\Somerville Public Safety Building.xml
Date of Study: Thu Aug 12 07:12:47 EDT 2021
Project Name: Somerville Public Safety Building
Project Location: Massachusetts
Analysis Type: OMB Analysis, Non-Energy Project
Analysis Purpose: Public Investment or Regulatory Analysis
Analyst: Keith Lane
Base Date: September 1, 2022
Service Date: September 1, 2022
Study Period: 30 years 0 months(September 1, 2022 through August 31, 2052)
Discount Rate: 2.5%
Discounting Convention: End-of-Year

Comparison of Present-Value Costs

PV Life-Cycle Cost

	Base Case	Alternative	Savings from Alternative
Initial Investment Costs:			
Capital Requirements as of Base Date	\$5,908,091	\$7,666,539	-\$1,758,448
Future Costs:			
Energy Consumption Costs	\$7,565,711	\$7,169,882	\$395,829
Energy Demand Charges	\$0	\$0	\$0
Energy Utility Rebates	\$0	\$0	\$0
Water Costs	\$0	\$0	\$0
Recurring and Non-Recurring OM&R Costs	\$2,384,693	\$1,769,082	\$615,611
Capital Replacements	\$0	\$0	\$0
Residual Value at End of Study Period	\$0	\$0	\$0
	-----	-----	-----
Subtotal (for Future Cost Items)	\$9,950,405	\$8,938,964	\$1,011,441
	-----	-----	-----
Total PV Life-Cycle Cost	\$15,858,496	\$16,605,503	-\$747,007

Net Savings from Alternative Compared with Base Case

PV of Non-Investment Savings \$1,011,441

- Increased Total Investment \$1,758,448

Net Savings -\$747,007

Savings-to-Investment Ratio (SIR)

SIR = 0.58

SIR is lower than 1.0; project alternative is not cost effective.

Adjusted Internal Rate of Return

AIRR = 0.63%

AIRR is lower than your discount rate; project alternative is not cost effective.

Payback Period

Estimated Years to Payback (from beginning of Service Period)

Simple Payback never reached during study period.

Discounted Payback never reached during study period.

Energy Savings Summary

Energy Savings Summary (in stated units)

Energy Type	----Average Base Case	Annual Alternative	Consumption---- Savings	Life-Cycle Savings
Electricity	1,627,425.0 kWh	1,542,280.0 kWh	85,145.0 kWh	2,554,233.4 kWh

Energy Savings Summary (in MBtu)

Energy Type	----Average Base Case	Annual Alternative	Consumption---- Savings	Life-Cycle Savings
Electricity	5,553.0 MBtu	5,262.5 MBtu	290.5 MBtu	8,715.4 MBtu

Emissions Reduction Summary

Energy Type	----Average Base Case	Annual Alternative	Emissions---- Reduction	Life-Cycle Reduction
Electricity				
CO2	1,063,906.03 kg	1,008,243.70 kg	55,662.34 kg	1,669,793.92 kg
SO2	5,360.98 kg	5,080.50 kg	280.48 kg	8,414.03 kg
NOx	1,587.79 kg	1,504.72 kg	83.07 kg	2,492.02 kg
Total:				
CO2	1,063,906.03 kg	1,008,243.70 kg	55,662.34 kg	1,669,793.92 kg
SO2	5,360.98 kg	5,080.50 kg	280.48 kg	8,414.03 kg

NOx	1,587.79 kg	1,504.72 kg	83.07 kg	2,492.02 kg
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D.7 ELECTRICAL-NARRATIVE

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ELECTRICAL SYSTEMS

NARRATIVE REPORT

The following is the Electrical system narrative, which defines the scope of work and capacities of the Power and Lighting system, as well as, the Basis of Design.

1. CODES

All work installed under Section 260000 shall comply with the Massachusetts State Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

2. DESIGN INTENT

All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the electrical work and all items incidental thereto, including commissioning and testing.

Capacities of systems and equipment are as specified on the drawings and schedules.

A. Power Distribution:

Electrical power will be brought into the site via underground medium voltage cables from the utility company network. A pad mounted step-down transformer will be located at grade adjacent to the building. Service entrance and distribution switchgear will be located in the Electrical room, along with lighting, power distribution, and mechanical equipment panels. The service capacity will be sized for 2000 amperes at 277/480V, 3Ø, 4 wire.

A diesel powered 750kW emergency generator will be provided with sound attenuating weatherproof enclosure, critical grade exhaust silencer, and automatic starting and safety controls. The generator will include two (2) service breakers: one (1) for life safety equipment and one (1) for optional standby equipment.

The generator will be sized for 100% of all loads.

The emergency power distribution system will consist of two (2) automatic transfer switches, one (1) for life safety equipment and one (1) for optional stand-by systems. A kirk key interlock system will be provided for a roll up back-up generator for additional redundancy. A manual transfer switch with cam-lock connections for a roll-up generator will be provided on the life safety side in compliance with NEC 700.3 (F).

B. Uninterruptible Power Sully (UPS):

1. One (1) 45 KW, three (3) phase centralized UPS System will be provided with thirty minutes of battery back-up.

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2. The system will provide conditioned power to sensitive electronic loads, telecommunication systems, bridge over power interruptions of short duration and allow an orderly shutdown of servers and communication systems during a prolonged power outage.
3. The UPS system will also be connected to the stand-by generator.

C. Interior Lighting System:

1. General Offices and Meeting Room lighting fixtures will consist of recessed 2'x4' LED luminaires with dimming drivers. The fixtures will be wired for automatic dimming where natural day light is available and also for multi-level switching.
2. Corridors and other functional lighting fixtures will consist of acrylic recessed direct fixtures with LEDs and dimmable drivers.
3. Lighting in Cells will be vandal proof fixtures corner mounted LED. Each Cell will be separately switched. Selected fixtures in Cell areas will have integral emergency ballasts for instant lighting upon power failure.
4. Lighting in the Communications Dispatch Center will be indirect dimmable LED with consideration of LED dimmable down lights over each position.
5. The Apparatus Bay will be provided with high output LED pendant luminaires with dimming drivers. Fixtures will be located between the vehicles for access. Fixtures will be designed for rough service.
6. Lighting in the Watch Room will be direct dimmable LED source fixtures.
7. Dorm Rooms will be provided with dual level lighting with low level lighting to be automatically activated by the building's alerting system.
8. Storage, Mechanical, Sallyport, etc. will be provided with LED industrial wraparound fixtures with acrylic lens.
9. Lighting in the Parking Garage will be low profile LED luminaires specifically designed for parking garages with integral occupancy sensors.
10. Exit signs will be of the energy efficient, long life LED type.
11. All fixtures will be dimmable LED type.
12. Each area will be locally switched and designed for multi-level controls. Each Office space and Toilet Room will have an occupancy sensor to turn lights off when unoccupied.
13. The entire facility will be controlled with an addressable automatic lighting control system for programming lights on and off.

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14. Selected area lighting, including corridors, stairwells, and apparatus bay will also be automatically active by the building's alerting system.

D. Site Lighting System:

1. Fixtures for area lighting will be pole mounted LED luminaries in the Parking area and Roadways. The exterior lighting will be controlled by photocell 'on' and schedule 'off' operation, via wireless communication to the buildings automated lighting control system.
2. Building perimeter fixtures will be wall mounted LED luminaries over exterior doors.
3. All fixtures will be of the dark sky compliant cut-off type.

E. Wiring Devices:

1. Offices will generally have one (1) duplex outlet per wall. At each workstation, a double duplex receptacle will be provided.
2. Corridors will have a cleaning receptacle at approximately 25-foot intervals.
3. Exterior weatherproof receptacles will be installed at exterior doors.
4. A system of computer grade panelboards with double neutrals and transient voltage surge suppressors will be provided for receptacle circuits.
5. Receptacles in Garage, Apparatus Bay and Sallyport spaces will be GFI type weatherproof covers mounted at 48 inches above floor.

F. Fire Alarm System:

1. A fire alarm and detection system will be provided with battery back-up. The system will be of the addressable type where each device will be identified at the control panel and remote annunciator by device type and location to facilitate search for origin of alarms.
2. Smoke detectors will be provided in open areas, corridors, stairwells outside of cells and other egress ways. Elevator recall will be provided.
3. The sprinkler system will alarm on water flow and provide supervisory on valves.
4. Speaker/strobes will be provided in egress ways, assembly spaces, open areas and other large spaces. Strobe only units will be provided in single toilets and conference rooms.
5. Manual pull stations will be provided within 5 feet of all Exit doors.

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G. Security System:

1. An addressable security system will be provided. The system will be integrated with the card access and closed-circuit TV (CCTV) system.
2. Position switches will be provided at all exterior doors.
3. A UL Listed Closed Circuit TV system will be provided. The system consists of computer servers with image software, computer monitors, and IP based closed circuit TV cameras. The head end server shall be located in the Server room and will be rack mounted. The system can be accessed from any PC within the facility or externally via an IP address. Each camera can be viewed independently. The Stored Appliance Network (SAN) will store this information for 45 days at 30 images per second.
4. The location of the cameras is generally in corridors, secure areas, and exterior building perimeter. The exterior cameras are multi-sensor 360, 270, or 180-degree cameras. The site shall be 100% covered.
5. The system shall fully integrate with the Access Control System to allow viewing of events from a single alarm viewer. Camera images and recorded video shall be linked to the access system to allow retrieval of video that is associated with the event.
6. The system includes a card access controller, door controllers, and proximity readers/keypads. The electrical hardware for each door is provided by the Hardware Contractor. Proximity readers will be located at various locations as shown on the security drawings. Motorized gates and overhead doors into garages and restricted parking areas will be provided with LPR technology and proximity readers for access. The purpose is to only allow access to authorized personnel at all times. Each proximity reader will have a distinctive code to identify the user and a log will be kept in memory. The log within the panel can be accessed through a computer.
7. The alarm condition shall also initiate real time recording on the integral CCTV system that is included as part of this submission. The system is programmed with graphic maps allowing the end-user to quickly identify alarm conditions and lock/unlock doors.
8. The system shall be tested, and complete documentation shall be provided to the Owner on the operational and programming functions available. The system may be easily expanded to accommodate any additional devices that may be added in the future.
9. A graphic cell door release control panel will be located at Prisoner Processing allowing the Officer in Charge to release each cell individually as needed.
10. The System will be included with a site license to accommodate future expansion to include the entire district. This will allow the Quincy Public Safety Building to have a centralized solution that may be managed at a central location and expanded to other Town Buildings.

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H. Renewable Energy System Provisions:

1. The base project will include:

- a. Electrical provisions will be made for a roof mounted and a canopy mounted (over parking garage) Renewable Energy System for a grid connected Photovoltaic (PV) System intended to reduce the facilities demand for power.

I. Level 2 AC Dual Electric Vehicle Charging Equipment (EVSE):

1. Provide nineteen (19) EVSE stations fed with 40 ampere feeders back to the building for charging electric vehicles. Two protective bollards will be installed at each charging station.

J. Lightning Protection System:

1. A system of lightning protection will be provided. The system will be installed in compliance with the provisions of the latest "Code for Protection Against Lightning" for buildings as adopted by the National Fire Protection Association and the Underwriters' Laboratories, Inc. for UL Master Label System.
2. The lightning protection equipment will include air terminals, conductors, conduits, fasteners, connectors, ground rods, etc.
3. The lightning protection system will be installed for the new police facility.

3. TESTING REQUIREMENTS

A. The Electrical Contractor shall provide testing of the following systems with the Owner and Owner's Representative present:

1. Lighting and power panels for correct phase balance.
2. Emergency generator.
3. Lighting control system (interior and exterior).
4. Fire alarm system.
5. Security systems.

B. Testing reports shall be submitted to the Engineer for review and approval before providing to the Owner.

4. OPERATION MANUALS AND MAINTENANCE MANUALS:

A. When the project is completed, the Electrical Contractor shall provide operation and maintenance manuals to the Owner.

5. RECORD DRAWINGS AND CONTROL DOCUMENTS:

A. When the project is completed, an as-built set of drawings, showing all lighting and power requirements from contract and addendum items will be provided to the Owner.

D.7 PLUMBING-NARRATIVE

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PLUMBING SYSTEMS

NARRATIVE REPORT

The following is the Plumbing system narrative, which defines the scope of work and capacities of the Plumbing system as well as the Basis of Design. The Plumbing Systems shall be designed and constructed for **LEED v4** where indicated on this narrative.

1. CODES

- A. All work installed under Section 220000 shall comply with the MA Building Code, MA Plumbing Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

2. DESIGN INTENT

- A. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Plumbing work and all items incidental thereto, including commissioning and testing.

3. GENERAL

- A. The Plumbing Systems that will serve the project are cold water, hot water, tempered water, sanitary waste and vent system, garage waste system and storm drain system.
- B. The Building will be serviced by Municipal water and Municipal sewer system.
- C. All Plumbing in the building will conform to Accessibility Codes and to Water Conserving sections of the Plumbing Code.

4. DRAINAGE SYSTEM

- A. Soil, Waste, and Vent piping system is provided to connect to all fixtures and equipment. System runs from 10 feet outside building and terminates with stack vents through the roof.
- B. A separate Garage Waste System starting with connection to an exterior concrete oil/water separator running thru the Apparatus and Garage floor drains, and terminating with a vent terminal through the roof. A separate garage waste system with exterior concrete oil/water separator will be provided for the Parking Garage upper deck for Storm.
- C. Storm Drainage system is provided to drain all roofs with roof drains piped through the building to a point 10 feet outside the building.
- D. Drainage system piping will be service weight cast iron piping; hub and spigot with gaskets for below grade; no hub with gaskets, bands and clamps for above grade 2 in. and larger. Waste and vent piping 1-1/2 in. and smaller will be type 'L' copper.

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5. WATER SYSTEM

- A. New 4 inch domestic water service from the municipal water system will be provided. A meter and backflow preventer, if required, will be provided.
- B. Cold water distribution main is provided. Non-freeze wall hydrants with integral back flow preventers are provided along the exterior of the building.
- C. Domestic hot water will be provided with electric, point-of-use, instantaneous water heaters.
- D. Water piping will be type 'L' copper with wrought copper sweat fittings, silver solder or press-fit system. All piping will be insulated with 1 in. thick high density fiberglass.
- E. Tepid (70 deg. F – 90 deg. F) water will be provided to the emergency shower/eyewash fixtures in Science Classrooms as required by code.

6. FIXTURES **LEED v4**

- A. Furnish and install all fixtures, including supports, connections, fittings, and any incidentals to make a complete installation.
- B. Fixtures shall be the manufacturer's guaranteed label trademark indicating first quality. All acid resisting enameled ware shall bear the manufacturer's symbol signifying acid resisting material.
- C. Vitreous china and acid resisting enameled fixtures, including stops, supplies and traps shall be of one manufacturer by Kohler, American Standard, or Eljer, or equal. Supports shall be Zurn, Smith, Josam, or equal. All fixtures shall be white. Faucets shall be Speakman, Chicago, or equal.
- D. Fixtures shall be as scheduled on drawings.
 - 1. Water Closet: High efficiency toilet, 1.28 gallon per flush, wall hung, vitreous china, siphon jet. Manually operated 1.28 gallon per flush-flush valve.
 - 2. Penal Combi Toilet: Acorn Model 1418-FA-AL/AR-2-BP-4-1.6GPF-M-PBH-SPS-SW, suicide skirt, 18" wide lav/toilet, penal fixture combination, fabricated of type 304, #14 gage Stainless steel, seamless welded construction. Fixture is supplied with domestic hot and cold water.
 - 3. Penal Combi ADA Toilet: Acorn Model No. 1432-ADA-AL/AR-2-DMS-4-1.6GPF-PBH-SPS-SW with rear spud, floor mounted wall outlet blowout jet stainless steel institutional water closet less grab bar, elongated bowl, integral stainless steel seat, suicide skirt, seamless construction, complete with vandal proof mounting hardware. Fixture is supplied with domestic hot and cold water.
 - 4. Urinal: High efficiency 0.13 gallon per flush urinal, wall hung, vitreous china. Manually operated 0.13 gallon per flush-flush valve.
 - 5. Lavatory: Wall hung/countertop ADA lavatory with 0.5 GPM metering mixing faucet.

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6. Sink: MAAB/ADA stainless steel countertop sink with gooseneck faucet and 0.5 GPM aerator.
7. Drinking Fountain: Barrier free hi-low wall mounted electric water cooler, stainless steel basin with bottle filling stations.
8. Janitor Sink: 24 x 24 x 10 Terrazo mop receptor Stern-Williams or equal.
9. Shower: Aquatic Bath Model 48-ACS acrylic shower stall or Aquatic Bath 6036-BSFCMA barrier free acrylic shower stall with integral soap shelf and seat. Center drain location and slip resistant, textured bottom. Symmons Safetymix shower trim, concealed pressure balanced shower valve with lever handle, integral checkstops, factory pre-set temperature limit stops, 2.5 GPM flow restrictor.
10. Detention Area Hose Bibb: Acorn Series 8109 hot and cold water hose bibb, cast bronze valve body, vacuum breaker, screw driver stops, recessed stainless steel mounting box with locking door.

7. DRAINS

- A. Drains are cast iron, caulked outlets, nickaloy strainers, and in waterproofed areas and roofs shall have galvanized iron clamping rings with 6 lb. lead flashings to bond 9 in. in all directions. Drains shall be Smith, Zurn, Josam, or equal.

8. VALVES

- A. Locate all valves so as to isolate all parts of the system. Shutoff valves 3 in. and smaller shall be ball valves, solder end or screwed, Apollo, or equal.

9. INSULATION

- A. All water piping shall be insulated with snap-on fiberglass insulation Type ASJ-SSL, equal to Johns Manville Micro-Lok HP.

10. CLEANOUTS

- A. Cleanouts shall be full size up to 4 in. threaded bronze plugs located as indicated on the drawings and/or where required in soil and waste pipes.

11. ACCESS DOORS

- A. Furnish access doors for access to all concealed parts of the plumbing system that require accessibility. Coordinate types and locations with the Architect.

D.7 FIRE PROTECTION-NARRATIVE

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FIRE PROTECTION SYSTEMS

NARRATIVE REPORT

The following is the Fire Protection system narrative, which defines the scope of work and capacities of the Fire Protection system, as well as, the Basis of Design.

1. CODES

- A. All work installed under Section 210000 shall comply with the MA Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

2. DESIGN INTENT

- A. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Fire Protection work and all items incidental thereto, including commissioning and testing.

3. GENERAL

- A. In accordance with the provisions of the Massachusetts Building Code and MA General Law, the building must be protected with an automatic sprinkler system.

4. DESCRIPTION

- A. The new building will be served by a new 6-inch fire service, double check valve assembly, wet alarm valve complete with electric bell, and fire department connection meeting local thread standards.
- B. System will be a combined standpipe/sprinkler system with control valve assemblies to limit the sprinkler area controlled to less than 52,000 s.f. as required by NFPA 13-2013. There shall be a total of four (4) wet type sprinklers zones. One zone for each and one for detention cell area.
- C. Control valve assemblies shall consist of a supervised shutoff valve, check valve, flow switch and test connection with drain. Standpipes meeting the requirements of NFPA 14-2013 shall be provided in the egress stairwells.
- D. All areas of the building, including all finished and unfinished spaces, combustible concealed spaces, all electrical rooms and closets will be sprinklered.
- E. All sprinkler heads will be quick response, pendent in hung ceiling areas and upright in unfinished areas.
- F. Open parking garage will be equipped with a manual dry standpipe.

5. BASIS OF DESIGN

- A. The mechanical rooms, kitchen, and storage rooms are considered Ordinary Hazard Group 1; Vehicle storage areas including Sallyport are considered Ordinary Hazard Group 2. All other areas are considered light hazard.

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B. Required Design Densities:

Light Hazard Areas	0.10 GPM over 1,500 s.f.
Ordinary Hazard Group 1	0.15 GPM over 1,500 s.f.
Ordinary Hazard Group 2	0.20 GPM over 1,500 s.f.

C. Sprinkler spacing (max.):

Light Hazard Areas:	225 s.f.
Ordinary Hazard Areas:	130 s.f.

D. A hydrant flow test will need to be performed. This will determine if a fire pump will be required.

6. DOUBLE CHECK VALVE ASSEMBLY

A. Double check valve assembly shall be MA State approved, U.L./F.M. approved, with iron body bronze mounted construction complete with supervised OS & Y gate valves and test cocks. Furnish two spare sets of gaskets and repair kits.

B. Double check valve detector assembly shall be of one of the following:

1. Watts Series 757-OSY
2. Wilkins 350A-OSY
3. Conbraco Series 4S-100
4. Or equal

7. PIPING

A. Sprinkler piping 1-1/2 in. and smaller shall be ASTM A-53, Schedule 40 black steel pipe. Sprinkler/standpipe piping 2 in. and larger shall be ASTM A-135, Schedule 10 black steel pipe.

8. FITTINGS

A. Fittings on fire service piping, 2 in. and larger, shall be Victaulic Fire Lock Ductile Iron Fittings conforming to ASTM A-536 with integral grooved shoulder and back stop lugs and grooved ends for use with Style 009-EZ or Style 005 couplings. Branch line fittings shall be welded or shall be Victaulic 920/920N Mechanical Tees. Schedule 10 pipe shall be roll grooved. Schedule 40 pipe, where used with mechanical couplings, shall be roll grooved and shall be threaded where used with screwed fittings. Fittings for threaded piping shall be malleable iron screwed sprinkler fittings.

9. JOINTS

A. Threaded pipe joints shall have an approved thread compound applied on male threads only. Teflon tape shall be used for threads on sprinkler heads. Joints on piping, 2 in. and larger, shall be made up with Victaulic, or equal, Fire Lock Style 005, rigid coupling of ductile iron and pressure responsive gasket system for wet sprinkler system as recommended by manufacturer.

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10. SPRINKLERS

- A. All sprinklers to be used on this project shall be Quick Response type.
- B. Furnish spare heads of each type installed located in a cabinet along with special sprinkler wrenches. The number of spares and location of cabinet shall be in complete accord with NFPA 13-2013.
- C. Sprinklers shall be manufactured by Tyco, Victaulic, Viking, or equal.
- D. Upright sprinkler heads in areas with no ceilings shall be Tyco Model "TY-FRB" Quick Response, upright natural brass finish heads. Include heavy duty sprinkler guards in all mechanical rooms and storage rooms.
- E. Sidewall heads shall be Tyco Model "TY-FRB" Quick Response with white polyester head and escutcheon.
- F. Pendent wet sprinkler heads shall be Tyco Model "TY-FRB" Quick Response recessed adjustable escutcheon, white polyester finish.
- G. Concealed heads shall be Tyco Model "RFII" Quick Response concealed type, 1-1/2 inch adjustment white cover plate. In special areas, as may be noted on the Drawings, provide alternate cover plate finishes.
- H. Sprinkler heads located in the detention portion of the project shall be Tyco Model "Raven" Quick Response Institutional Automatic Sprinkler Heads furnished in bright chrome plated finish, tamper proof mounting, and anti-suicide heat sensors.
- I. Use of flexible stainless steel hose with fittings for fire protection service that connect sprinklers to branch lines in suspended ceilings is acceptable. Flexible hoses shall be UL/FM approved and shall comply with NFPA 13 standards. Hose assemblies shall be type 304 stainless steel with minimum 1-inch true-bore internal hose diameter. Ceiling bracket shall be galvanized steel and include multi-port style self-securing integrated snap-on clip ends that attach directly to the ceiling with tamper resistant screws.

D.9 GEOTHERMAL-NARRATIVE



Memorandum

Date: August 6, 2021

Recipient: Context Architecture
Mr. Jeff Shaw, AIA

Sender: Jonathan W. Patch, P.E.

Project: Somerville Public Safety Building; Somerville, Massachusetts

Project No: 7088.2.TA

Subject: Preliminary Evaluation/Feasibility Study of Geothermal Well System

This memorandum summarizes our preliminary evaluation/feasibility study of using a geothermal well system to heat and cool the proposed building. Refer to the Project Location Plan, **Figure 1**, for the general site location. This memorandum was prepared in accordance with our proposal dated January 4, 2021 and the subsequent authorization of Context Architecture.

Existing Conditions

The proposed building site is located immediately east of the intersection of Washington Street and New Washington Street in East Somerville. The project site is bounded by Washington Street to the north, New Washington Street to the west and south, and a multi-family residential property to the east. Currently, the central portion of the site is occupied by the remains (at-grade concrete slab and foundations) of a recently demolished 12,550-square-foot, L-shaped one-story brick strip mall building with at-grade paved parking lots located to the west and access lanes located to the south and east. The areas to the south and east of the former building beyond the access lanes are occupied by landscaped margins, including an approximate 8-foot-high elevated landscaped feature or "mound" along the site's eastern boundary. Existing grades across the site are relatively level, varying from about Elevation +16 to Elevation +17, with the exception of the above-described landscaped mound and a second mound near the site's southern boundary where the site grades rise to about Elevation +24 to Elevation +25.

Proposed Development

The proposed site development is in the preliminary stage and is currently understood to consist of the construction of a 2 to 4-story public safety building with no occupied below-grade space that will include approximately 77,000 gross square feet of occupied space. A network of vertical geothermal wells servicing ground source heat pumps may be installed as part of the project to either partially or fully heat and cool the proposed building. Currently, an approximate 32,500 square-foot irregularly-shaped area at the southeastern portion of the project site that borders New Washington Street is being considered as the location for a potential geothermal well field. The potential well field site currently consists



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of a raised grassed area with several mature trees. The proposed landscape site plan indicates the area would consist of a park with walkways and numerous trees. Additional discussion regarding existing and proposed trees in relation to the well field is included below. The proposed location of the geothermal well field is indicated on the attached **Figure 2**.

Geothermal Overview

Geothermal systems take advantage of the ground's relatively stable temperature to provide heating/cooling. For heating, geothermal systems extract heat from the ground and utilize heat pumps to boost the temperature then release it inside the space to be heated. For cooling, heat pumps absorb heat from the space to be cooled and release it deep underground. Thus, heat is drawn from the ground during the winter and deposited into the ground during the summer. Typically, geothermal systems work best when there is an annual balance between heating and cooling needs. Buildings that are not air-conditioned, or that have an extreme imbalance of loads are usually not good candidates for geothermal systems. But it is common for buildings with moderate load imbalances to utilize a supplemental boiler or cooling device to handle peak or seasonal imbalances, and most of the heating and cooling is handled by the geothermal system.

The following are several potential advantages of geothermal systems:

- Environmentally friendly
 - Uses electricity rather than fossil fuel, compatible with potential other renewable energy systems such as solar and/or wind.
 - Do not create significant amounts of pollution.
 - Sustainable. Utilize a renewable energy source.
 - Lower carbon footprint than conventional systems.
- Contribute to energy efficiency LEED credits.
- Significantly more efficient than conventional air-source or variable refrigerant flow systems.
- Less fluctuation in annual operating costs.
- No exposed outdoor equipment.
 - Minimize or eliminate the need for cooling towers and condensing units, since most of the heat rejection to the environment occurs in the well field.
 - This may have the added benefit of increasing the available roof area for solar arrays.
 - Can eliminate the need for flue stacks and ventilation (required for fuel burning equipment).
 - No noise associated with outdoor equipment.
 - Equipment resistant to extreme weather conditions, more reliable HVAC system.
- Lower maintenance than conventional systems
 - Closed-loop systems require minimal maintenance. Systems that use antifreeze require loop fluid testing. If antifreeze or corrosion inhibitors are used, yearly testing is recommended to verify that the fluid is not



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experiencing degradation, which is uncommon, but may occur if systems are operating for long periods of time outside the design temperature ranges.

- Longevity:
 - The materials associated with closed-loop systems, namely HDPE and HPGX (Rygan) piping, come with a 50-year manufacturer's warranty. It is expected that the piping will outlive the warranty with no capacity degradation overtime.
 - Conversely, the outdoor cooling equipment typically has a 15-year expected useful life. Therefore, three (3) replacements will be required before the loop warranty expires.
- Access: Permanent access is not required for either the vertical well heads or the horizontal circuit piping that runs from well to well and to the manifold in the mechanical room. This makes installation of a closed-loop within the building footprint feasible, if required.

The following are several potential disadvantages:

- Higher first cost compared to a conventional boiler/chiller system.
- Need a large area to construct the well field.
- Schedule
 - Installation of the geothermal wells and ground loop piping could add months to the construction duration depending how construction logistics are managed.
- Installation impacts
 - Noise and vibrations from well drilling could be disruptive to abutters.

Geologic Conditions

A detailed description of subsurface conditions encountered within geotechnical borings is contained in the Foundation Engineering Report dated May 24, 2021, prepared for this project by McPhail. In general, the surface treatments are underlain by successive soil deposits of fill, organics, marine sand, marine clay, glaciomarine and glacial till that overly bedrock. Groundwater was observed at depths varying from about 6 to 16 feet below ground surface.

Bedrock was not encountered in the geotechnical explorations but is anticipated to be present at a depth of approximately 60 feet below the existing ground surface based on a review of information from nearby sites. Based on the United States Geologic Survey (USGS) Bedrock Geology Map of New England and our review of boring logs from nearby sites, bedrock is anticipated to consist of Cambridge Argillite, which is a type of siltstone. Published values of the thermal conductivity of siltstone by ASHRAE range from 1.2 to 2.0 Btu/hr-ft.-°F. In addition, the formation thermal conductivity of test wells located in the vicinity of the project site in argillite range from about 1.7 to 2.0 Btu/hr-ft.-°F.



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Note that thermal conductivity values do not directly translate into the number of feet per ton (i.e., the number of tons expected per well or the total number of wells which will be required for the project). The number of wells required is determined based on the results of a well field analysis using ground energy transfer software programs which include the hourly or monthly heating and cooling loads provided by the project mechanical engineer or energy modeling consultant.

Closed-Loop Geothermal Systems

In general, there are two main types of geothermal systems: closed-loop and open-loop. In consideration of the operations and maintenance which would be required for an open-loop system, along with the potential risks associated with permitting and water quality, an open-loop system is not recommended for the project.

Closed-loop wells circulate a water or water-antifreeze solution in a continuous closed piping loop through the heat pumps and mechanical equipment and return the water or a water-antifreeze solution to the well field. Closed-loop systems are often more reliable, require less maintenance in the long term, and have negligible potential environmental impacts versus an open-loop system which directly pumps groundwater. However, closed-loop systems generally have a higher upfront installation cost versus open-loop systems, which results in a longer delay for return on the initial investment. Permanent access to the well heads or piping for a closed-loop system do not need to be maintained.

Conventional closed-loop geothermal wells with U-bends are typically installed to depths of about 400 to 600 feet below ground surface and spaced a minimum of 20 feet on-center.

Quad-loop wells (double U-bend) and High-Performance GeoXchange (HPGX) (aka proprietary Rygan) wells are typically installed to depths of 600 to 900 feet below ground surface and spaced at a minimum of 25 feet on-center.

Deeper Rygan wells on the order of 1,200 to 1,500 linear feet are also technically feasible, but these require a greater minimum spacing between wells (50 feet compared to 25 feet), are expensive to drill due to the need of an additional booster to be able to clear the hole of drill cuttings and may have issues with maintaining vertical tolerance which could result in the bottom portion of the wells being drilled beyond the property line.

Permitting Requirements and Other Considerations

The Massachusetts Department of Environmental Protection (MassDEP) categorizes closed-loop geothermal wells as Class V closed-loop wells but no longer requires the filing of an Underground Injection Control (UIC) Registration application with MassDEP provided that the well is installed and operated in accordance with MassDEP's *Guidelines for Ground Source Heat Pumps Wells*.



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Using the Massachusetts online mapping tool, the site is understood to not be located within a Zone I area of a public water supply well (MassDEP Wellhead Protection Area) which is required by MassDEP for geothermal wells. Furthermore, the site is not located within a Zone II area either.

Other key permitting requirements outlined in the MassDEP UIC "Guidelines for Ground Source Heat Pump Wells" dated December 2013 include the following:

- Wells are required to be located at least 25 feet from "existing and potential sources of contamination including, but not limited to septic tanks/fields, lagoons, livestock pens, and oil or hazardous materials storage tanks."
- Various design and setback requirements must be followed. Setback requirements include minimum distances as follow:
 - 10 feet from potable water and sewer lines
 - 50 feet from private potable water supply wells
 - 10 feet from surface water bodies
 - 10-foot setback from property lines without the expressed written permission of the abutter
- The anticipated well field location is not in a wetland buffer zone and therefore is not anticipated to be subject to the Wetlands Protection Act regulations which would be governed by the local Conservation Commission.
- Per MassDEP guidelines, closed-loop wells are required to be fully grouted and have a permanent steel casing installed a minimum of 15 feet into competent, unweathered bedrock.

A Well Construction Permit is anticipated to be required from the Somerville Board of Health based on a review of the Somerville Private Water Supply Regulations. In addition, the Somerville regulations require "the well casing should be sealed with a watertight grouting extending from the surface of the ground to a depth of ten (10) feet."

The Somerville regulations also contain setback requirements from potential sources of contamination. At present, it is not known if the setback requirements apply to geothermal wells and are only applicable to private water wells. Regardless, these setback requirements include minimum distances as follow:

- 5 feet from property lines [MassDEP requirement of 10 feet is more stringent]
- 25 feet from roadways
- 100 feet from leaching facilities [Not anticipated to be applicable]
- 50 feet from septic or pump tanks [Not anticipated to be applicable]
- 100 feet from underground storage tanks [Not anticipated to be applicable]
- 50 feet from building or public sewers [more stringent than MassDEP requirement of 10 feet]
- 25 feet from subsurface drains



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As indicated in our January 8, 2021 memorandum entitled "Preliminary Geotechnical and Geoenvironmental Engineering Evaluation", the site is a MassDEP listed release site under Release Tracking Number (RTN) 3-31102. The contaminants of concern (COCs) in soil include PCBs, Extractable Petroleum Hydrocarbons (EPH), and the polynuclear aromatic hydrocarbon (PAH) target compounds acenaphthylene, 2-methylnaphthalene, naphthalene, and as well as the volatile organic compounds (VOCs) chlorobenzene and 1,4-dichlorobenzene and semi volatile organic compounds (SVOCs) 2,4-dinitrotoluene and 1,4 dichlorobenzene. These COCs have not been detected in groundwater at concentrations that required notification of the MassDEP. Hence, the release condition is limited to soil. In addition, the proposed well field location is understood to be outside the area of RTN-23246, which consists of a release of chlorinated volatile organic compounds (CVOCs) to deep groundwater in bedrock.

Lastly, as indicated above, the proposed well field location is to be located within an existing area that contains several mature trees and will be a future park which is currently planned to contain numerous trees. The location and future size of the existing and proposed trees will need to be coordinated with the well field design. In general, large trees should be avoided near the well field as the roots could potentially damage the horizontal circuit piping. Ornamental trees and bushes near the well field would be acceptable. It is possible that several of the existing trees may need to be removed to install the well field.

Preliminary Loading Information

The project MEP engineer, Garcia Galuska DeSousa (GGD), provided the preliminary estimated peak load in heating and cooling for the proposed building which is 200 tons. Hourly or monthly heating and cooling loads have not been developed and will not be available until the design development (DD) phase. Based on a cursory review of the "HVAC System Option Energy Modeling Report" dated August 4, 2021 prepared by AKF, the total annual heating and cooling loads appear to be relatively balanced. As indicated above, geothermal systems work best when there is an annual balance between heating and cooling needs and buildings that have an extreme imbalance of loads are usually not good candidates for geothermal systems. If the building did have a moderate load imbalance, a supplemental boiler or cooling device could be used to handle peak or seasonal imbalances to allow the load on the geothermal system to be more balanced and hence, more efficient.

Preliminary Well Field Sizing Analysis

Since an hourly or monthly heating and cooling load profile was unavailable, accurate modeling using ground energy transfer software programs was not able to be performed. As such, rules of thumb were used to develop preliminary geothermal well system alternates, including estimated number and length of wells, based on the provided peak load.

We determined that for the **20 and 25-foot well spacings, approximately 74 and 47 wells**, respectively, could potentially fit within the limits of the proposed park while keeping 10 feet from the property line. However, this does not consider potential conflicts with large trees, underground utilities or other items which are anticipated to reduce the availability of space



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for the well field. Assuming an approximate 1/3rd reduction in available space due to conflicts, for the 20 and 25-foot well spacings we estimate that approximately 49 and 31 wells, respectively, may fit on the project site.

Based on the above, it is anticipated that conventional single U-bends at 20-foot spacing are not a viable option for this project as an estimated 66 to 80 wells would be required based on an assumed 3 and 2.5 tons per well (165 and 200 feet/ton), respectively.

Quad-loops (double U-bends) that were 600, 700, 800 and 900 feet in length were evaluated assuming a lower bound capacity of 150 feet/ton and an upper bound capacity of 125 feet/ton. Using the lower bound capacity per well it appears that quad-loops may not be feasible based on the estimated 33 to 50 wells that would be required at a 25-foot spacing. Conversely, 800 and 900-foot quad loops may be feasible based on the estimated 31 and 28 wells required, respectively, based on the upper bound capacity per well.

The use of a proprietary HPGX well-type like Rygan that were 600, 700, 800 and 900 feet in length were evaluated assuming a lower bound capacity of 110 feet/ton and an upper bound capacity of 135 feet/ton. Using the lower bound capacity per well it appears that only 900-foot deep HPGX wells would be feasible based on the estimated 30 wells that would be required. Conversely, 700, 800 and 900-foot HPGX wells may be feasible based on the estimated 31, 28 and 24 wells required, respectively, based on the upper bound capacity per well.

In summary, the following well types and lengths may be feasible:

<i>Well Type</i>	<i>Well Depth</i>	<i>Estimated Well Count for SD</i>	
	<i>[Feet]</i>	<i>Minimum</i>	<i>Maximum</i>
HPGX (aka Rygan)	700	31	42*
	800	28	34*
	900	24	30
Quad-Loop (Double U-Bend)	800	31	38*
	900	28	33*

*Exceeds estimated maximum number of wells that may fit on site at 25-foot spacing.

Conclusions and Recommendations

The following are our conclusions and recommendations:

- A geothermal well system is technically viable for the project.
- Modeling using ground energy transfer software programs and the hourly or monthly heating and cooling loads is recommended to be performed during the DD phase to refine the estimated well quantities to verify that a geothermal well system is technically valid.



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- Additional coordination to understand the relationship between existing and proposed trees and the proposed well field will be required to determine how many wells could be installed and where.
- To better inform the well field pricing and feasibility, it is recommended that an up to 900-foot-deep test hole be drilled to determine the depth to bedrock, the quality of bedrock, rock fractures, groundwater production and borehole stability. If a high quantity of water is encountered which inhibits the drilling production and requires the use of a booster, then the test hole may be terminated at a shallower depth.
- Based on the test hole information and modeling results, the test hole could be completed by installing a quad-loop or HPGX piping and grouting, and performance of a 48-hour duration thermal conductivity test on the completed well. The average formation thermal conductivity, the formation thermal diffusivity, and an estimate of the undisturbed soil temperature will be obtained from the test results. This information will be utilized during the design phase to determine the size of the permanent well field.
- M.G.L. c. 149 and 149a requires that material specifications for public bid construction projects be written to provide for full competition for each item of material required for construction. However, if there are "sound reasons in the public interest" to restrict competition to one product, manufacturer or producer, the request to carry a proprietary item must be reasonably investigated and approved by the Awarding Authority. As indicated above, the Rygan HPGX is a proprietary product. If the project proceeds with the Rygan HPGX, to comply with the requirements of M.G.L. c. 149 and 149a, the Project Team would need to request approval for its use.

Closing

We trust that the above is sufficient for your present requirements. Should you have any questions, please do not hesitate to call us.

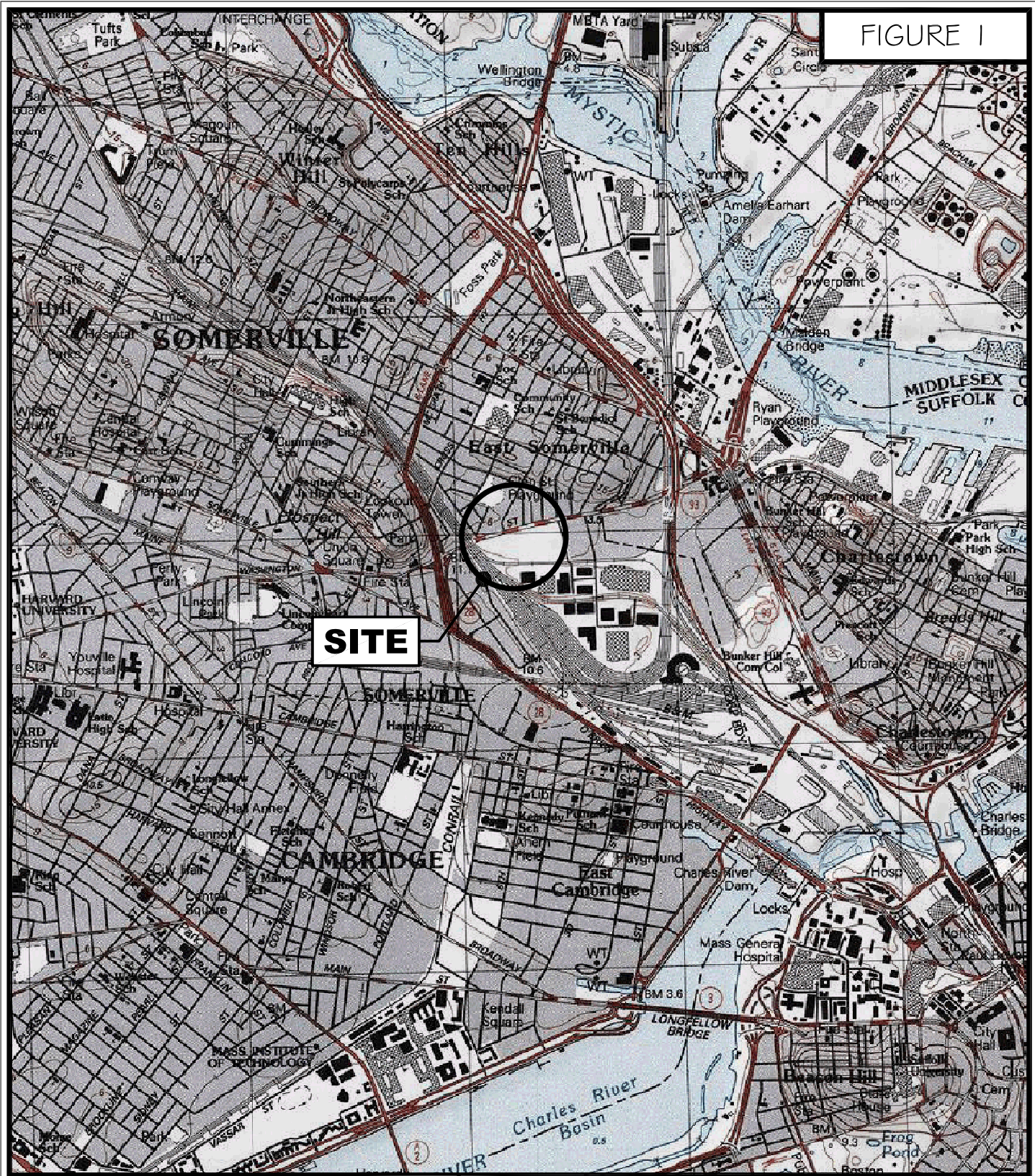
Attachments:

- Figure 1
- Figure 2

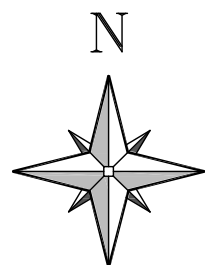
\\McPhail-fs2\McPhail\Working Documents\Reports\7088-SomervillePSB_SDGeothermalFeasibilityMemo-080621.docx

JWP/jgl

FIGURE I



Geotechnical and
 Geoenvironmental Engineers
 2269 Massachusetts Avenue
 Cambridge, MA 02140
 617/868-1420
 617/868-1423 (Fax)
 www.mcphailgeo.com



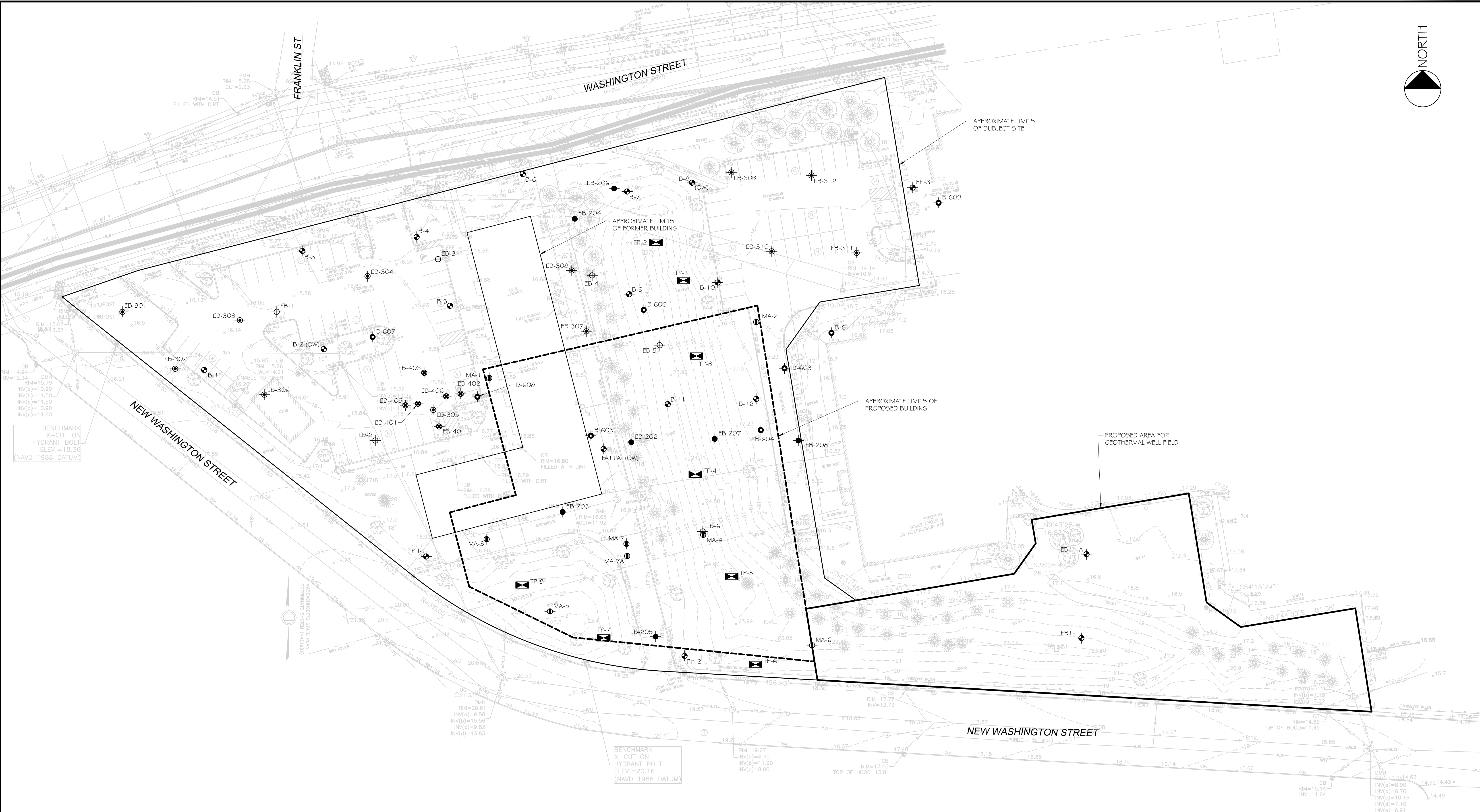
SCALE 1:25,000

PROJECT LOCATION PLAN

90 WASHINGTON STREET

SOMERVILLE

MASSACHUSETTS



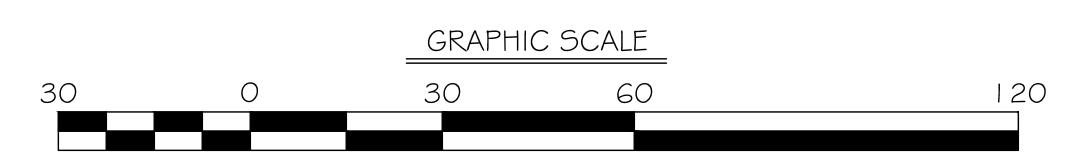
BENCHMARK
X-CUT ON
HYDRANT BOLT
ELEV. = 18.36
(NAVD 1988 DATUM)

BENCHMARK
X-CUT ON
HYDRANT BOLT
ELEV. = 20.16
(NAVD 1988 DATUM)

LEGEND

- ⊕ — APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY CARR-DEE CORP. DURING THE PERIOD OF OCTOBER 15 THROUGH OCTOBER 25, 2012 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
- ⊕ — APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
- ⊕ — APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON FEBRUARY 18, 2014 FOR EBI CONSULTING
- ⊕ — APPROXIMATE LOCATION OF TEST PIT PERFORMED BY MASTERTSON CONSTRUCTION ON FEBRUARY 19, 2014 FOR EBI CONSULTING
- ⊕ — APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON MARCH 26, 2014 FOR EBI CONSULTING
- ⊕ — APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY CRAWFORD DRILLING ON AUGUST 22, 2014 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY GEOSearch, INC. BETWEEN APRIL 14 AND APRIL 23, 2021 FOR McPHAIL ASSOCIATES, LLC
- (OW) — INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "TOPOGRAPHIC PLAN" DATED MARCH 14, 2012 BY R.E. CAMERON & ASSOCIATES, INC.




Geotechnical and
Geoenvironmental Engineers
2269 Massachusetts Avenue
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617/868-1423 (Fax)
www.mcphailgeo.com

90 WASHINGTON STREET			
SOMERVILLE		MASSACHUSETTS	
SUBSURFACE EXPLORATION PLAN			
FOR			
CONTEXT ARCHITECTURE			
BY			
McPHAIL ASSOCIATES, LLC			
Date: AUGUST 2021	Dwn: F.G.P.	Chkd: J.W.P.	Scale: 1" = 30'
Project No:	7088	FIGURE 2	

FILE NAME: \\McPhail\522\McPhail\Kca\10857088\Geothermal\7088-C02-Cowl3D.dwg

D.10 RADIO COMMUNICATIONS-NARRATIVE

CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

1. Introduction

Langone & Associates as a subconsultant to Context Architecture will be assisting the City with planning for the new Somerville PSB. The primary systems identified in this document include communications center specialized dispatch furniture, radio equipment at the PSB to connect to the remote radio site infrastructure, antenna systems and municipal fire alarm systems. Other facility related systems (Network, data systems, cameras, intercom, access control, monitors sallyport doors etc.) that may interact with the primary systems for space, monitoring and electrical interface will be identified. Otherwise, those system requirements will be identified by other project team members.

The new PSB will be the primary PSAP for the City and will receive all calls for service and dispatch all calls for fire, medical and police response. The current FD communications center at FD HQ will be moved to the new PSB.

Somerville's alternate PSAP is the City of Chelsea Police.

Somerville is exploring if a backup PSAP will be needed in the City and its location.

The City's project team shall review the information in this document and make any necessary changes which may impact the construction issues such as power, empty conduit locations and size etc.

2. Current Radio System Background Information

The City operates the following citywide radio systems:

- Fire 1 – HUB equipment and Communications Center at FD HQ
- Fire 2 – HUB equipment and Communications Center at FD HQ
- Police 1 – HUB equipment and Communications Center at PD HQ
- Police 2 – HUB equipment and Communications Center at PD HQ
- DPW Main – HUB equipment at FD HQ
- DPW Admin – HUB equipment at FD HQ
- Traffic & Parking – HUB equipment at FD HQ

These systems include radio equipment that is at End of Life (EOL) with parts increasingly difficult to obtain. In addition to FD HQ and PD HQ, the systems include transmit and receive equipment at the following radio infrastructure locations throughout the City:

- 125 Lowell St - Private
- 252 Medford St – SHA (Somerville Housing Authority)
- 15 Weston Ave - SHA
- 114 Highland Ave - SHA
- 13 Warren Ave - SHA
- Davis Square MBTA Station Underground

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

These radio systems are in the process of being connected to their respective HUB and Communications Centers by COMCAST Metro Ethernet. The Ethernet connection replaces the unreliable Verizon leased copper lines.

The City has undertaken a plan to replace the current radio system infrastructure. The new radio system infrastructure will be installed at the existing FD HQ and PD HQ communications centers and radio sites before the PSB is completed. This will require a transition plan to identify the equipment required to move to the PSB and whether some equipment will be located at a backup communications center such as FD HQ. The City will need to identify the level of public safety communications redundancy required. The City has been working with Motorola to develop new radio systems to replace those identified above.

The intent of this document is to identify the requirements for the PSB to accept the radio system components since the new radio system will be operating before the PSB is completed. The current plan is to consolidate the Fire and Police communications centers into one communications center at the PSB. The following sections will identify those construction items that provide the necessary power, low voltage and associated conduits and pathways for the technology radio and related system's cabling.

3. PSB Radio and Related System Requirements

This section will outline the requirements for the radio system components in the PSB.

The new radio system will include new equipment located at multiple locations throughout the City to improve radio coverage and redundancy. However, our focus will be only on the PSB equipment.

A. Communications Center

The Communications Center will require:

- Specialized Furniture that provides space for all the technology required to be at the Fire, Police and Supervisor operating positions
- Wall Monitors (# TBD) for displaying information for:
 - Weather
 - Local TV Broadcast
 - National Broadcast
 - Building and Cell Cameras
 - School Cameras
 - City Road Intersection Cameras
 - Other TBD

CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

This furniture must provide the staff with an ergonomically designed work environment. All primary system displays must be in easy reach of the operator. Cabling access to the furniture will be through the floor in the communications center room. Primary computer screens and equipment panels must be located within arm's reach of the operator. Workstations will be located under the work surface.

The City shall develop layouts and specifications for the operating positions and seek drawings and quotes from manufacturers such as Eaton/WrightLine, Watson, Evans, Xybix etc. See attached fire and police position templates in the Appendix.

It is assumed that the communications center will include the following operator/dispatch positions:

- Two (2) Fire positions
- Four (4) Police positions
- Supervisor position
- Telephone answering positions (# TBD) for the City's 10-digit non-emergency numbers

The furniture and equipment layout shall provide flexibility in assigning call takers, fire dispatchers and police dispatchers by shift.

The communications center furniture for each position shall include:

- Curved furniture with an ~8-ft x ~8-ft footprint
- Sit to Stand motorized work surface with control
- Motorized keyboard surface with control
- 4 over 4 Monitor (24") Tree with Focal Adjust
 1. 911 Monitor 1 – subject to State 911 guidelines for number TBD of positions
 2. 911 Monitor 2 – subject to State 911 guidelines for number of positions
 3. QED monitor 1 with CJIS access – police position only
 4. QED monitor 2
 5. Radio monitor – see below for details
 6. TRX 50 monitor – fire position only
 7. Admin workstation monitor
 8. Spare

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

- Workstation storage for the above systems
- Task lights (2)
- 24/7 intensive use chair
- Comfort controls for heat and cooling
- Other Space in the Room for:
 - Wall Maps
 - Notes
 - Bulletins
 - Binders

The communications Center will include the following radio equipment:

- All Fire and Police dispatch positions will include:
 - Radio monitor, workstation and mouse/trackball with resource icons to access the following radio systems:
 - PD 1 (direct connect to infrastructure with dispatcher priority)
 - PD 2 (direct connect to infrastructure with dispatcher priority)
 - FD 1 (direct connect to infrastructure with dispatcher priority)
 - FD 2 (direct connect to infrastructure with dispatcher priority)
 - DPW Main (direct connect to infrastructure with dispatcher priority)
 - DPW Admin (direct connect to infrastructure with dispatcher priority)
 - Traffic & Parking (direct connect to infrastructure with dispatcher priority)
 - UHF fire radio control stations for monitoring local departments
 - UHF for police radio control stations for monitoring local departments
 - BAPERN radio control station
 - MetroFire radio control station

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

- Cataldo Ambulance radio control station
- UASI radio control station
- State 800 Network radio control station
- Controls on the radio console for low voltage external devices such as:
 - Traffic light
 - Elevator access for visitors
 - Selected doors within the building (momentary or latching) requires interface with access control system; access control wiring demarc to be provided adjacent to console back-room equipment rack (LIST DOOR #S)
 - Sallyport doors (up-down-stop) requires interface with overhead door electronics; demarc to be provided adjacent to the console back-room equipment rack; requires camera surveillance of doors (LIST DOOR #S)
 - Co-located fire station overhead doors; requires camera surveillance of doors (LIST DOOR #S)
 - Remote fire station overhead doors; requires camera surveillance of doors (LIST DOOR #S)
- Radio desk set connected to 7 independent control stations for backup to the radio console; desk set to be located at each operator position
- The police radio position is currently connected to the State Core in Boston that allows the police position to access many other radio resources. The City shall investigate the option of remaining connected to the Core or having individual control stations at the PSB

B. Municipal Fire Alarm System

A meeting is scheduled with LW Bills on 8/24/21 to discuss the plan to move or create a second location for the monitoring of the municipal fire alarm systems (100ma & RF boxes)

This system consists of the 100MA circuits and Radio Fire Alarm Boxes at commercial and City buildings. Currently, all the equipment to support this system is located at FD HQ and includes:

- Form 4 Digitize circuits and control panel
- Batteries
- TRX 50 monitor, workstations and servers

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

One plan is to keep the current circuits and related equipment at the FD HQ. Equipment will be added to the FD HQ to retransmit alarm signals to the PSB TRX50 system. LW Bills is reviewing the necessary antenna height required at the PSB for a reliable radio signal.

C. Fire Station Alert System

Fire Station Alert System allows the dispatch to alert the individual fire stations and control lights, doors, PA system etc. Fiber connectivity is required to each station. This replaces the existing mechanical switch system at FD HQ with a workstation and monitor.

D. Equipment Rooms

Space, location, power, grounding and rack layouts need to be coordinated for the communications center, IT/Server (IDF/MDF) and radio rooms.

E. Roof Antenna Mounting Structure

The PSB will require an antenna mounting structure for the antennas connected to the radio equipment located in the equipment room. This structure will be located on the roof and no self-supporting tower is planned. It is assumed that each radio will have a dedicated antenna. The possibility of reducing the number antennas by using a control station combiner is under consideration. The following is the list of the assumed radios requiring these antennas:

1. SFD 1 back up control station bypasses the console electronics and uses an independent deskset shared by all positions
2. SFD 2 back up control station bypasses the console electronics and uses an independent deskset shared by all positions
3. SPD 1 back up control station bypasses the console electronics and uses an independent deskset shared by all positions
4. SPD 2 back up control station bypasses the console electronics and uses an independent deskset shared by all positions
5. DPW Main control station bypasses the console electronics and uses an independent deskset shared by all positions
6. DPW Admin control station bypasses the console electronics and uses an independent deskset shared by all positions
7. Traffic & Parking control station bypasses the console electronics and uses an independent deskset shared by all positions
8. BAPERN radio control stations – new replaces existing unit at the current PD HQ
9. MetroFire White radio control station – new replaces existing unit at FD HQ

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

10. MetroFire xxxx radio control station – new replaces existing unit at FD HQ
11. UASI radio control station – new replaces existing unit at FD HQ
12. State 800 network radio control station - new
13. Fire Mutual Aid control station
14. Police Mutual Aid control station
15. Radio fire alarm receiver 1 - new replaces existing unit at FD HQ
16. Radio fire alarm receiver 2 - new replaces existing unit at FD HQ
17. Cataldo Ambulance radio control station – new replaces existing unit at FD HQ
18. Fire and Police BDA - new
19. Multi-cell carrier BDA – new
20. PSNet Microwave 1 new; non-obstructed microwave path must be field verified
21. PSNet Microwave 2 new; non-obstructed microwave path must be field verified

See information on the roof mounted antenna structure in the Appendix.

F. Generator and Master UPS

It is assumed that the complete building will be on generator with a remote status display in the communications center.

It is assumed that all critical equipment will be connected to a master UPS with a remote status display in the communications center.

G. Co-located Fire Station

What radio communications and fire station alert systems will be required?

H. Remote Fire Stations

Need to determine if any existing radio communications and fire station alert systems will be upgraded.

I. EOC

Need to determine if any radio communications will be required.

J. Mobile and Portable Radios

7

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Langone & Associates – Subconsultant to Context Architecture – 8/9/21

CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

This equipment has no impact on the PSB other than a location for the portable radio chargers (120V outlets) and storage of spare radios.

4. Construction Requirements for Radio and Related Equipment

The following is general information on the power, conduit access between rooms and other related items that shall be included in the construction drawings. Some rooms may be combined.

Vendors will supply and install the necessary cables to connect their equipment using the conduit access identified.

- **Grounding and Surge Protection shall follow the R-56 Guidelines for all critical equipment**
- **State 911 Equipment Room (Equipment Vendor – State 911 – Design-Build)**
 - One enclosed cabinet 7.5-ft Hx30” Wx30” D
 - Wall space 4-ftWx6-ftH
 - Conduit access to the local power panel with a spare 2 pole 30A breaker
 - Conduit access for power and low voltage cables to each operating position in the communications center
 - Conduit access for low voltage to the radio room to connect selected radio channels to the 911 recorder
 - Connected to the LAN for access by selected computers
 - State will supply and install all power and low voltage wiring necessary
 - All costs for equipment and labor are paid by the state
- **Demarc Room for Services Terminated for: (Equipment Vendor – Various)**
 - Radio system Comcast Metro Ethernet; diverse routing TBD
 - Conduit access to radio equipment room racks
 - Verizon service for 911
 - Administrative Telephone
 - Comcast service for 911
 - Comcast/Verizon service for City/PSB LAN and Internet
 - Comcast/Verizon service for State CJIS and NCIC

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

- **Radio and Fire Alarm Equipment Room (Equipment Vendor – Radio Motorola – Design-Build & Municipal Fire Alarm LW Bills – Design-Build)**
 - Ceiling mounted (96” AFF) cable tray 24” W
 - Plywood ¾” on all walls and painted fire-retardant gray
 - Radio – 5 ea 7.5-ft H x 2-ft W x 2-ft D open rack with dedicated power (TBD load) for each rack
 - Fire alarm – 2 ea cabinets with dedicated power (TBD load) for each rack
 - Demarc for selected inside, outside and overhead doors for connection to the radio console relays to allow door controls on the radio console display; cabling and termination provided by door vendors
 - Surge protection devices (Polyphasers) grounded to terminate the antenna cables
 - Master ground bar

- **Communications Center (Equipment Vendor – Radio Motorola – Design-Build & Console Furniture TBD)**
 - Each dispatch/operating position requires 3 ea 120V/20A dedicated quad outlets which will be field mounted in the furniture; each operating position shall have 8 ea 4-inch access holes field installed in the floor after the furniture is installed; this is only for the radio dispatch console equipment
 - Conduit access for low voltage cable routing for the operating positions shall be through the floor for radio equipment, fire alarm equipment, network room and the other systems
 - Ground bar for each console position connected to a second ground bar and connected to a master ground bar

- **Roof Mounted Antenna Structure (Equipment Vendor – Structure – GC & Antennas/Cables – Motorola/LW Bills)**
 - Antenna structure mounted on the roof and connected to support flanges from building steel
 - Weatherproof housing to protect conduits and cables for access to the radio room
 - 19 whip antennas (each with a ½” LDF cable and 2 microwave antennas (each with a 7/8” LDF cable) have been identified for mounting to the roof structure
 - Refer to the Appendix for additional information

- **EOC - TBD**

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CITY OF SOMERVILLE
PUBLIC SAFETY BUILDING
RADIO AND RELATED SYSTEMS
SCHEMATIC DESIGN INFORMATION

- **Collocated Fire Station – TBD**
- **Existing Remote Fire Stations - TBD**

APPENDICES

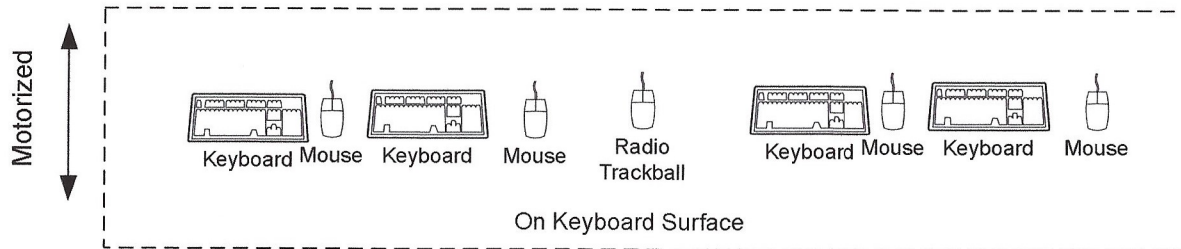
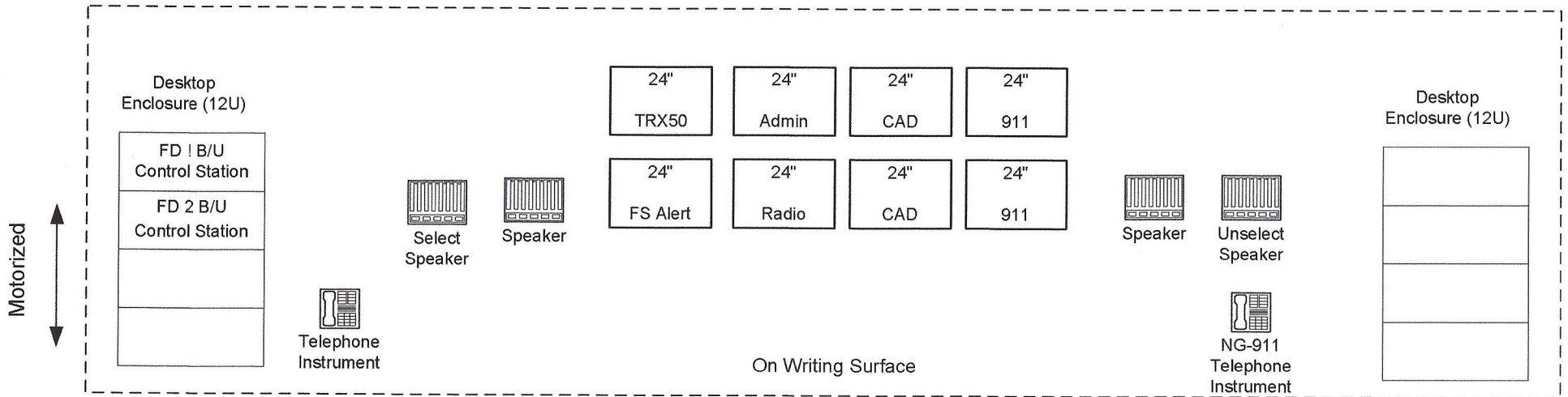
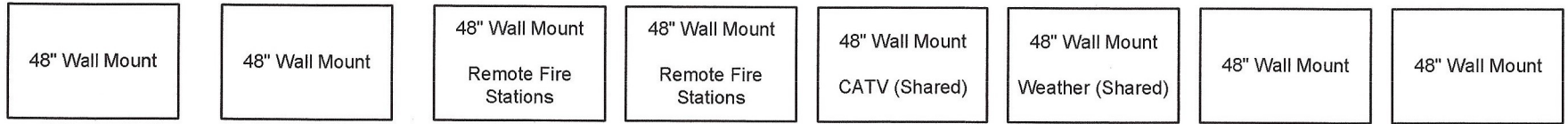
1. Fire and Police Operating Position Template – 2 Pages
2. Roof Mount Antenna Structures and QwikPort Picture – 1 Page
3. Roof Mount Antenna Structure and QwikPort – 2 Pages
4. QwikPort Specifications and Installation – 2 Pages
5. Equipment Room Antenna Cable Terminations, Ground Bar and Polyphasers Picture – 1 Page

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FIRE POSITION

Console Functional Layout Front View With 4 Over 4 Monitor Tree



Local Control Station

Task Light

Comfort Controls

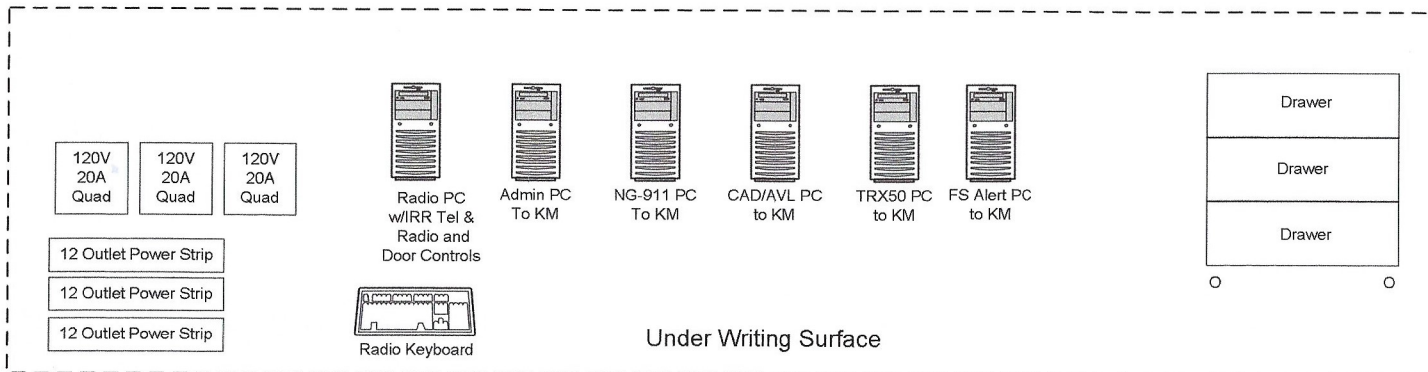
Status Tree Light

Rotating Resource

Master UPS

Individual UPS

Generator



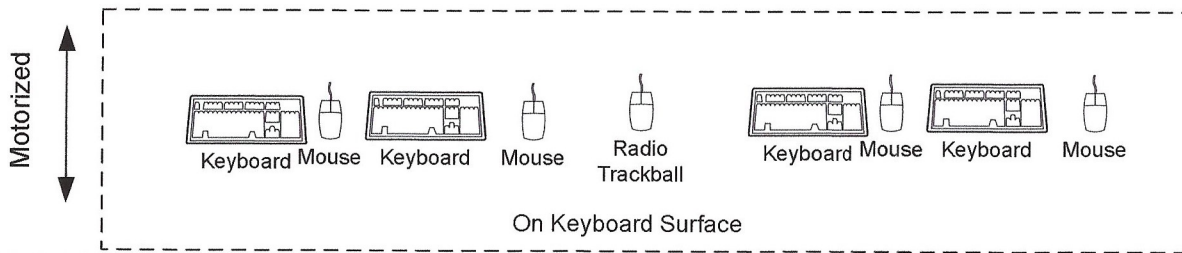
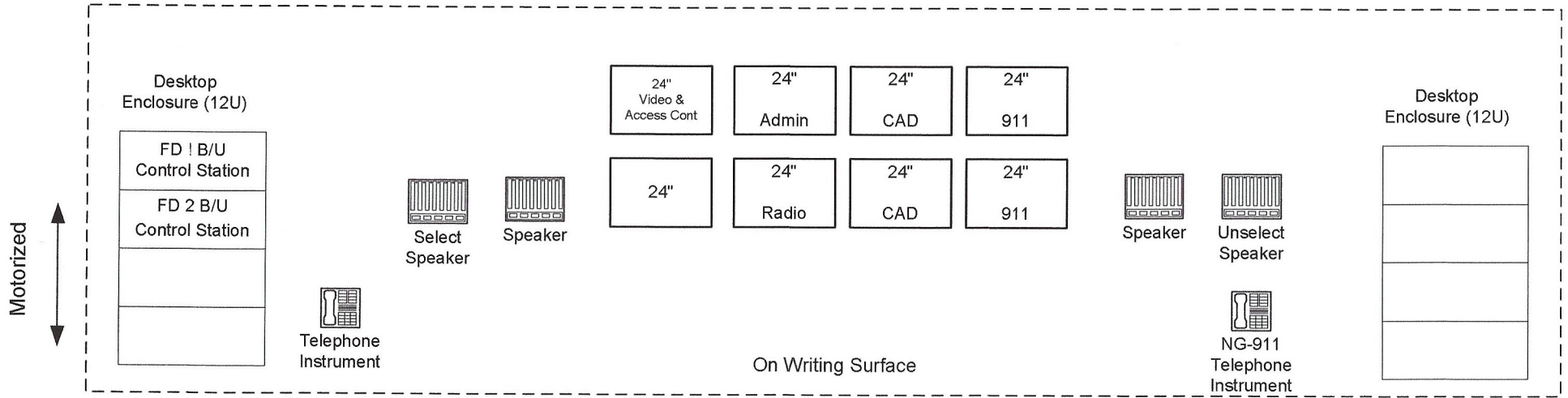
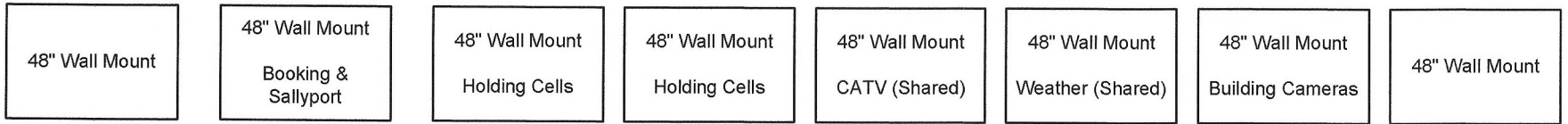
Extended Cables
Monitor
Keyboard
Mouse

Video Cards per Workstation
1 unless noted
CAD
Security

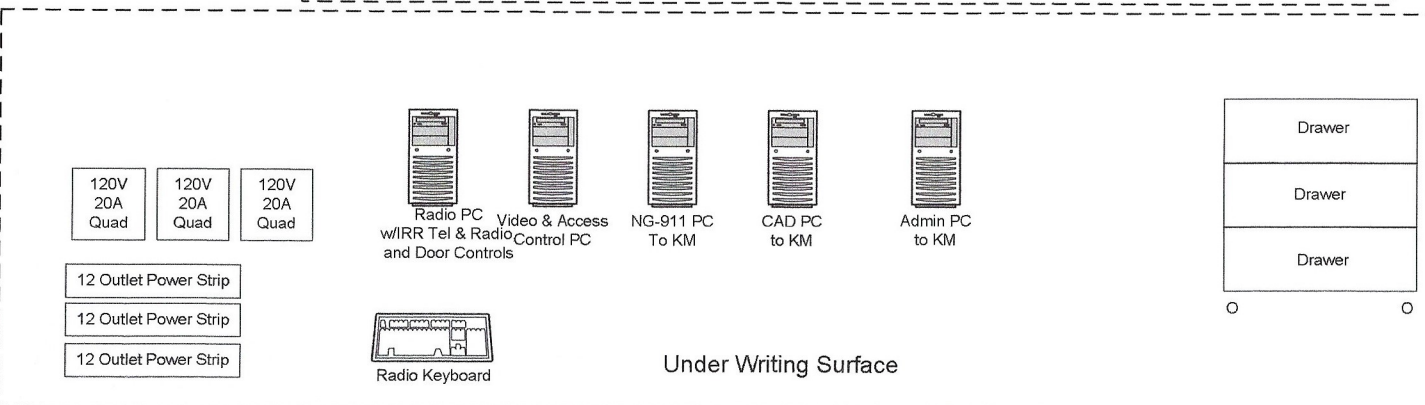
HDMI Converters (pairs)

POLICE POSITION

Console Functional Layout Front View With 4 Over 4 Monitor Tree



- Local Control Station
- Task Light
- Comfort Controls
- Status Tree Light
- Rotating Resource
- Master UPS
- Individual UPS
- Generator



- Extended Cables
- Monitor
- Keyboard
- Mouse
- Video Cards per Workstation
- 1 unless noted
- CAD
- Security
- HDMI Converters (pairs)



Structure is 10'x10' and mounted on 4 footings that are connected to building steel

06/09/2020 12:33

Roof Antenna Structure

Top View

X - Antenna Locations

1 to 5



6 to 10



11 to 15



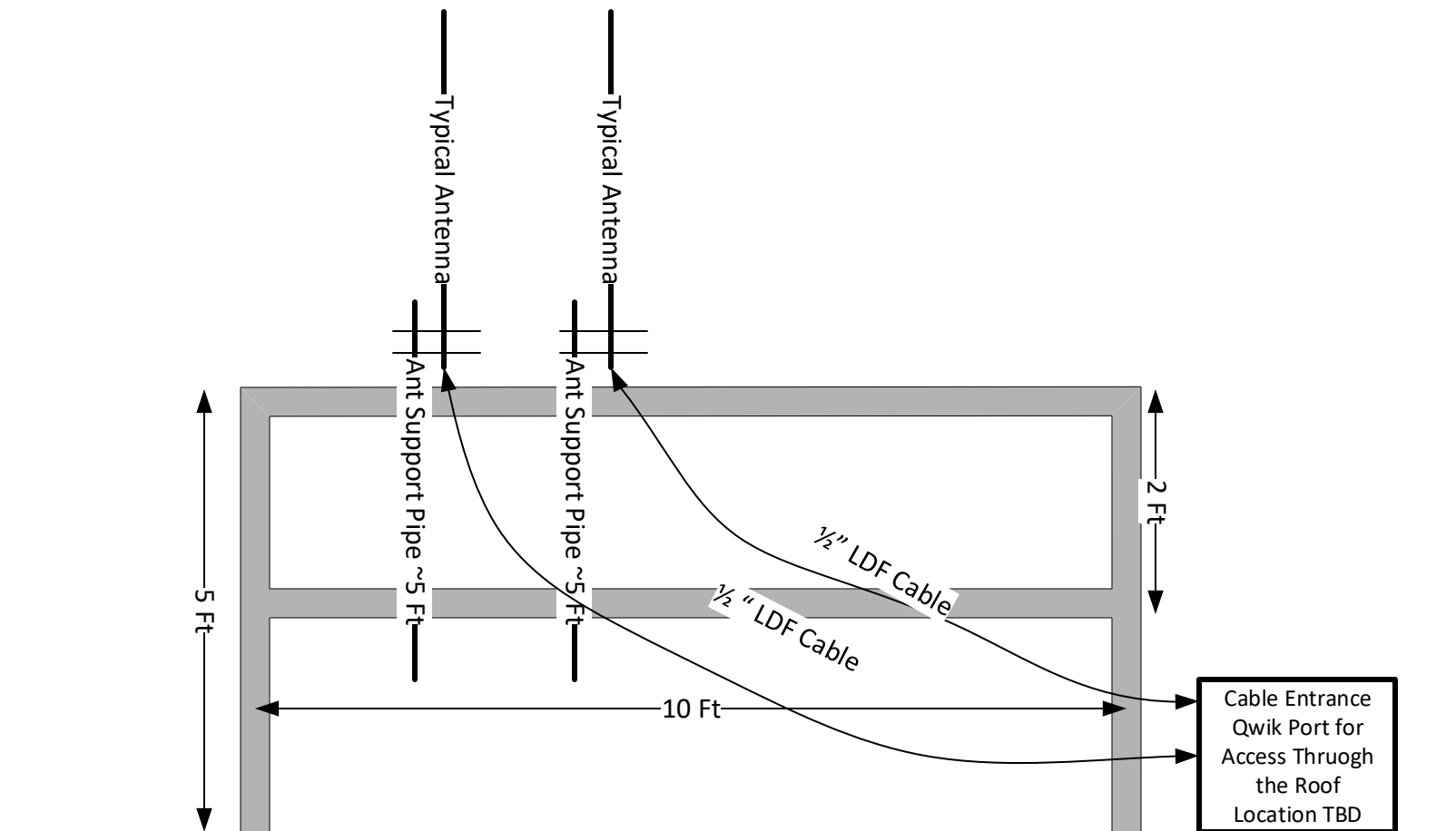
16 to 20



21 to 25



- Overall Dimensions are 10 ft x 10 ft
- Antenna spacing shown is ~2.5 Ft apart but depends on the total number of antennas.
- The horizontal pipes are 2" galvanized steel supplied and installed by the radio vendor.



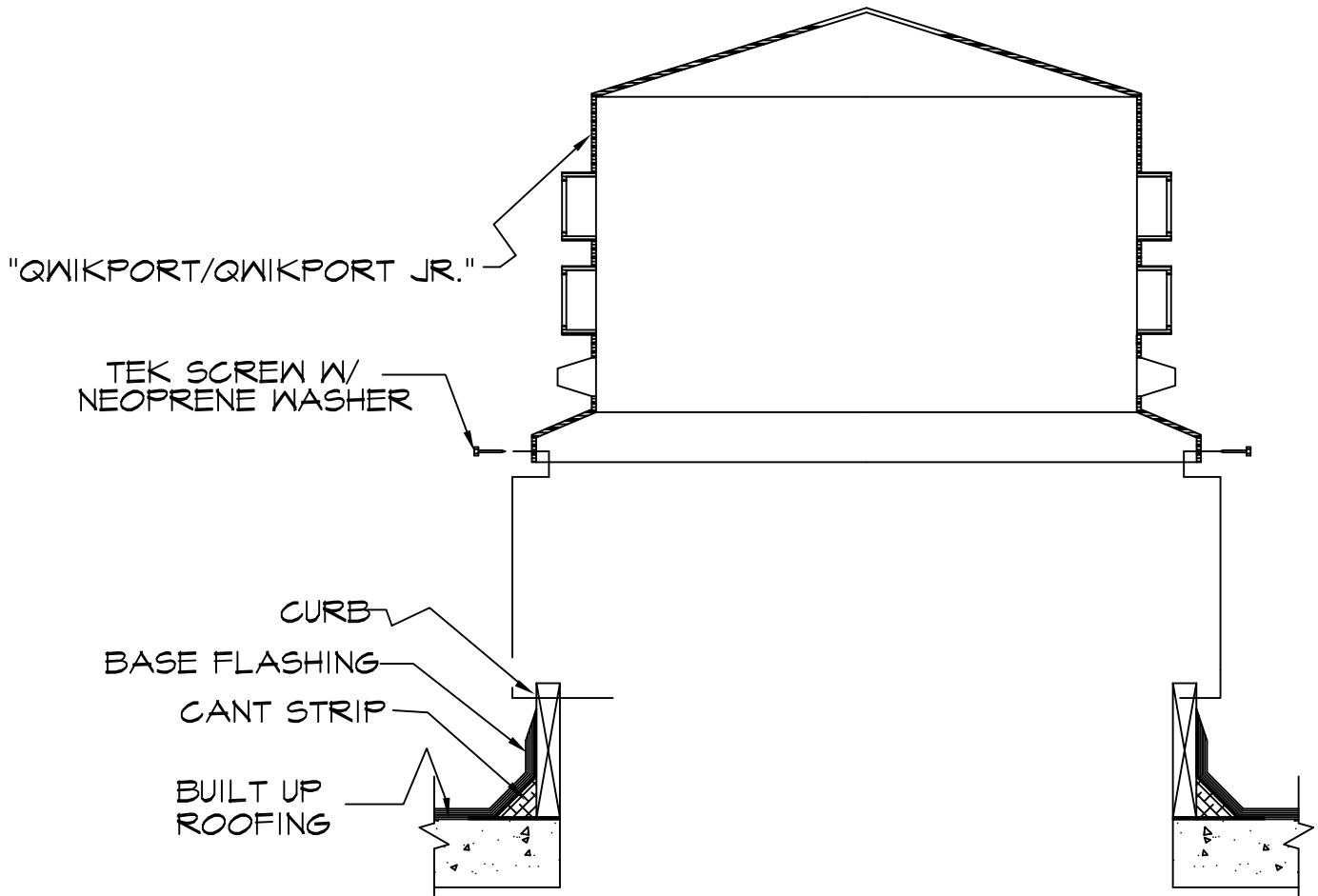
Roof Antenna Structure Side View

- The 4 vertical post are 4" galvanized pipe mounted to the roof by the GC.
- The QuikPort (Doghouse) will be supplied and installed by the GC.
- Antenna spacing depends on the number of antennas.
- The horizontal pipes are 2" galvanized steel supplied and installed by the radio vendor.
- The antennas, support pipes, mounts, coax and connectors supplied and installed by the radio vendor.

QWIKPORT/QWIKPORT JR.
INSTALLATION



CONSULT A LICENSED ARCHITECT
FOR EACH INSTALLATION



INSIDE FLASHING DIMENSIONS

QWIKPORT: 27" x 39 1/4"

QWIKPORT JR.: 26" x 36"

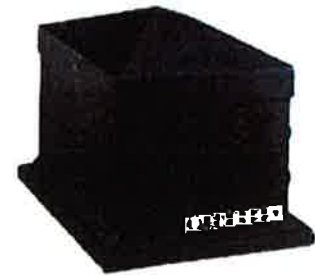


Manufacturer of Wireless Site Components Product Highlights

QWIKPORT & QWIKPORT JR.

The Qwikport is a lightweight, seamless roof cable entry with 24 integral entry ports. Why use a heavy, expensive steel roof cable entry that requires separate entry ports? The Qwikport can be carried by one man up an elevator to a rooftop. Seamless construction provides protection against leakage. The 24 four-inch entry ports are part of the unit, rather than an expensive add-on. The ports are completely sealed until opened with the hole saw which is included with each unit, so unused ports can never leak. 12 ports are located on opposite sides to eliminate the need for 180 degree cable bends. The opposing ports are also offset for ease of installation. (Ports accept standard four-inch boots – not included.) Built-in flashing reduces the time required to install the roof entry. Unlike competing products which have a small hole in the side for hand access, the entire top of the Qwikport is easily removed for cable installation.

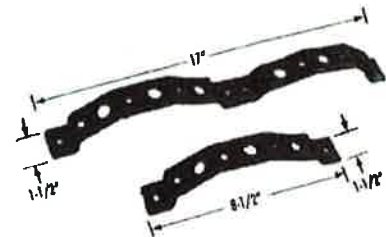
A 20" ground bus bar is provided on each port side to ground the coax lines. Also available is the Qwikport Jr. with 12 four-inch entry ports. (13" bus bar included.)



Part #	Description	Overall Height
QWKPR	Qwikport (24 ports)	38"
QWKPR-JR	Qwikport, Jr. (12 ports)	27-1/2"

ROUND MEMBER COAX SUPPORT

Available in two configurations (6 hole and 3 hole), these hot-dip galvanized steel brackets are used to support any multiple of three cables on large diameter round members. All brackets have both 3/8" and 3/4" holes to allow use of either snap-in or bolt-in hangers. They are punched to allow mounting to a wood pole with lag bolts, and are slotted to allow mounting to round members of any size with up to 1/2" banding material.



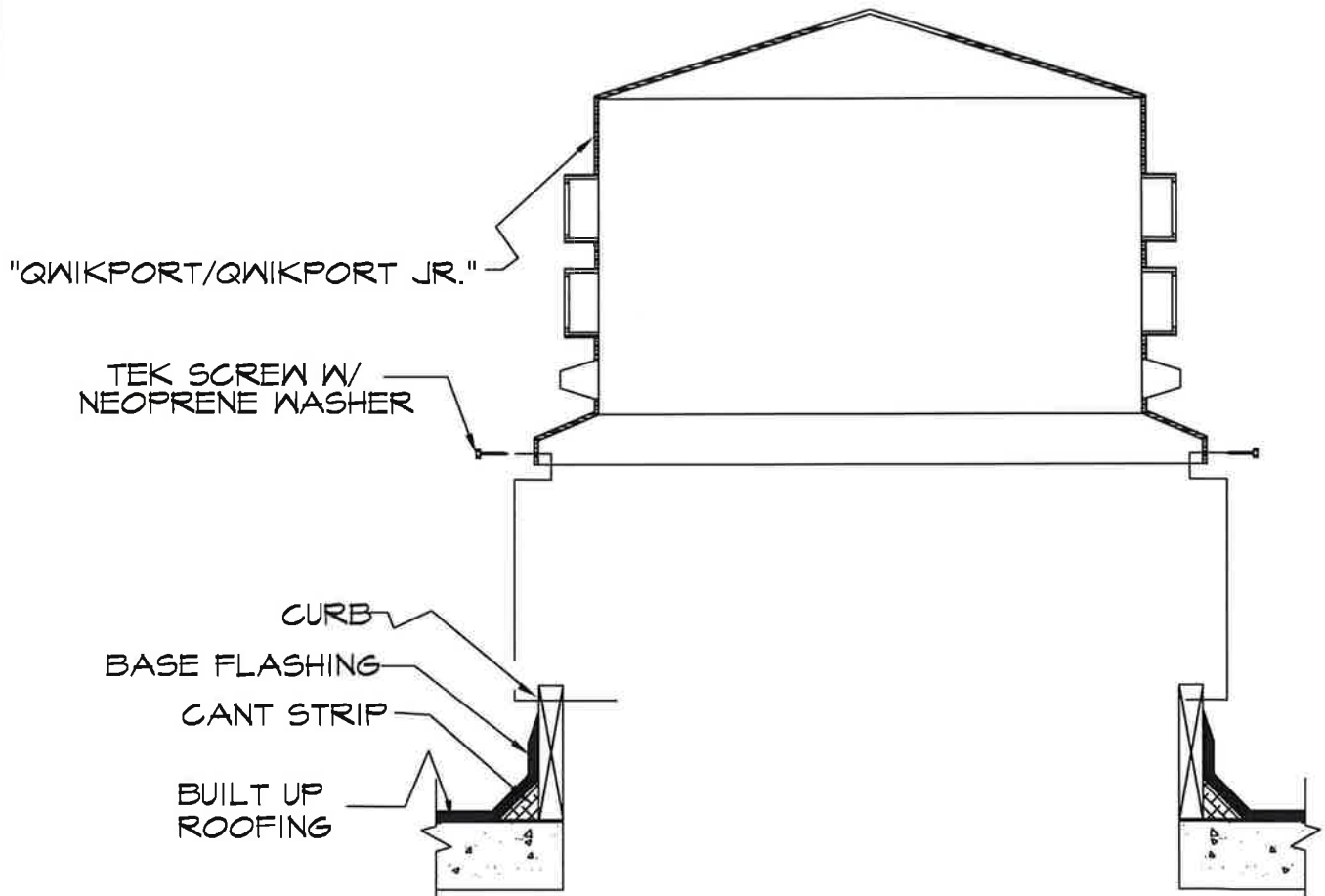
Pkg. Qty.	Part #	Description
10	RM-3	3 Hole Coax Support
10	RM-6	6 Hole Coax Support

Phone: 775.832.2523 • Fax: 775.548.9801 • ComsiteHardware.com
P.O. Box 7722 • Incline Village, Nevada 89452

QWIKPORT/QWIKPORT JR.
INSTALLATION



CONSULT A LICENSED ARCHITECT
FOR EACH INSTALLATION



INSIDE FLASHING DIMENSIONS

QWIKPORT: 27" x 39 1/4"

QWIKPORT JR.: 26" x 36"



comsitehardware.com

The Qwikport and Qwikport Jr. cable entry ports are designed with several built-in advantages:

- Seamless construction
- 24 (Qwikport) or 12 (Qwikport Jr.) built-in entry ports
- All entry ports are molded closed to protect from water intrusion
- Entry ports will accommodate standard 4" boots or bulkhead fittings (not included)
- Entry ports are offset on opposite sides to provide for large cable bends
- Ground bars are attached
- Flashing is an integral part of the unit
- Full access through the top for cable installation
- Cable grip support bracket installed

INSTALLATION:

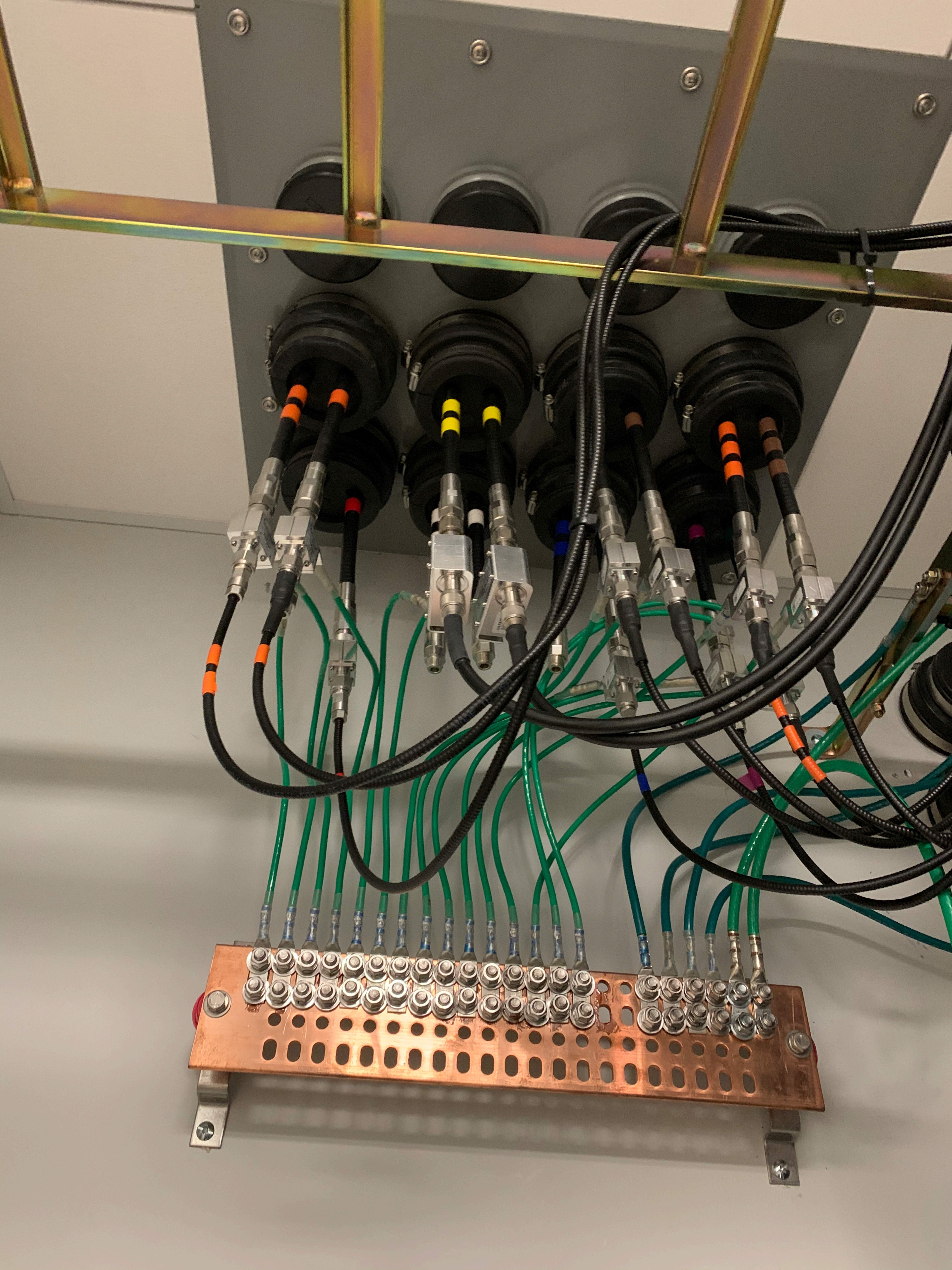
After roof penetration, installation of the Qwikport (Jr.) is quite simple and can be quickly accomplished with the included hardware. Typical flashing details are included with each Qwikport (Jr.) and are available at the factory.

Each unit includes:

- 1 ea. Qwikport (Jr.) enclosure (cable grip support bracket and ground bars installed)
- 1 lot Tamper resistant stainless steel hardware for attaching lid to housing
- 1 ea. 3" diameter Hole saw for opening sealed entry ports
- 1 lot Stainless Steel screws and rubberized washers for attaching unit to curbing
- 1 ea. Tube, silicone sealant

GENERAL SPECIFICATIONS:

Material:	1/4" Crosslinked High Density Polyethylene
Weathering Characteristics:	Exceeds 20 years
Tensile @ Yield Strength:	2800 PSI
Vicat Softening Temperature:	248° Fahrenheit
Brittleness Temperature:	< -130° Fahrenheit
Entry Ports:	24 (Qwikport) or 12 (Qwikport Jr.), 4" OD
Unit Weight: (Shipping)	105 (Qwikport) or 62 (Qwikport Jr.) pounds
Usable dimensions: (Qwikport)	23" w x 35" l x 28" h (add 5 1/2" for lid)
Usable dimensions: (Qwikport Jr.)	21 1/2" w x 26" l x 18" h (add 4 1/2" for lid)



D.11 ENVELOPE DESIGN-NARRATIVE



**EXTERIOR ENCLOSURE NARRATIVE
SOMERVILLE PSB
90 WASHINGTON STREET
SOMERVILLE, MA**

CLIENT:

Context Architecture
68 Harrison Avenue
Boston, MA 02111

DATE:

9 August 2021

3iVE LLC
334 Washington Street
Somerville, MA 02143
www.3iVE.com

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- Insulation Values As It Relates To EUI And Energy Performance
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- Ongoing Review Of Details As They Are Developed In DD
- Commissioning Process

III. SUMMARY NOTES

I. INTRODUCTION

3iVE LLC (3iVE) was contracted by Context Architecture to serve as the Exterior Enclosure Consultant for the Somerville Public Safety Building project. On 9 August 2021, we completed a summary review of three schematic options dated 3 August 2021 for the proposed four-story structure developed by Context. We found each of the options workable in terms of the Owner's Project Requirements as we understand them at this point in the process. Each of the proposed options is based upon a rain screen cladding system featuring a mix of fenestration types including masonry, metal panel, and panelized stone. The three options are each capable of meeting the OPR requirements with a similar degree of difficulty; no options stands out as significantly more complex in terms of assembly. The following narrative describes the project goals as well as our intended process moving forward.

II. DESIGN GOALS AND PROCESS

a. **Develop a Robust Enclosure Design Meeting Owner's Project Requirements**

3iVE will continue to participate in project meetings with the Architect and Owner to learn and help codify the Owner's Project Requirements. 3iVE will work with Context by reviewing drawings, narratives, details, and specifications, and we will meet with Context at targeted times during the design process to provide detailed ideas and feedback to help ensure that the Design Intent expressed in the drawings is aligned with the OPR.

b. **Durable Materials and Assemblies**

3iVE will assist Context in its selection of materials and its configuration of assemblies to help ensure that the PSB has materials and details that will endure for the intended lifetime of the building, or which can be regularly maintained to achieve durability requirements.

c. **Maintaining Thermal Consistency/Eliminating Thermal Break**

3iVE will review and provide feedback for representative and unique details for thermal consistency and minimal thermal breaks in the PSB's enclosure.

d. **Continuity In Envelope Air And Vapor Barrier, Minimizing Air Leakage**

3iVE will review and provide feedback for representative and unique details to ensure a continuous air and vapor building are represented in way that is both appropriate and achievable. 3iVE will also assist Context by providing mockup and testing specifications that will serve to monitor the effectiveness of the air and vapor barrier for ground, wall, and roof conditions.

e. **Establishing Performance Plane At Openings, Breaks, Etc.**

3iVE will review large scale details provided by Context to help ensure a sensible and consistent performance barrier is present around the building.

f. **Effective Rain Screen and Wall Drainage**

3iVE will review large scale rainscreen and flashing details provided by Context to ensure the drainage and pressure-equalized rainscreen details achieve moisture management goals.

g. Insulation Values As It Relates To EUI And Energy Performance

3iVE will review the projects insulation and thermal isolation strategy against the building's thermal goals. This will include fenestration, cladding, roofing, and girt and tie systems.

h. Establishing Envelope Commissioning Baseline Metrics

3iVE will provide testing protocols and metric goals consistent with the PSB's OPR to ensure the project has appropriate target goals as well as a means to measure and confirm them.

i. Ongoing Review Of Details As They Are Developed In DD

3iVE will maintain a presence throughout design, construction, and occupancy to help ensure that the OPR is achieved in terms of both Design Intent as well as constructed results. Eive will also assist in developing target goals as well as a means to measure and confirm them.

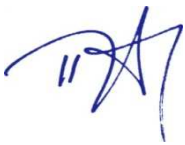
j. Commissioning Process

3iVE will advise Context and the Owner on an exterior commissioning process that will provide further assurance that the project's OPR and the Architect's Basis of Design are being achieved as the project progresses. We will be available to review proposals from qualified vendors.

III. SUMMARY NOTES

Each of the options Context Architecture is exploring stand to meet the Owner's Project Requirements. 3iVE will work throughout the design and construction process to offer commentary, expertise, and advice to help the design team produce a clear and constructible set of Construction Documents that will meet or exceed the agreed upon requirements and goals for the project's exterior enclosure.

Sincerely,

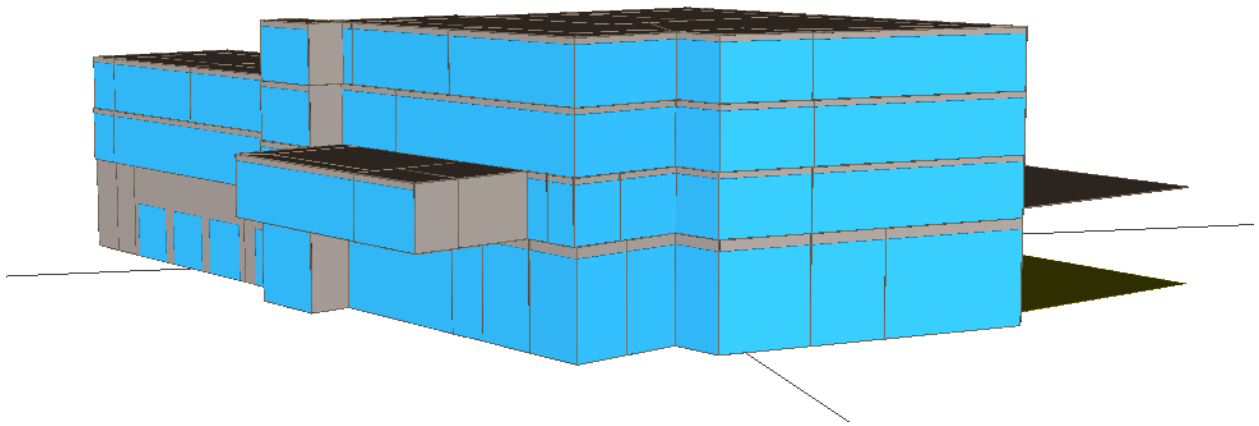
A handwritten signature in blue ink, appearing to read 'David de Sola', with a stylized flourish at the end.

David de Sola, AIA LEED AP BD+C
3iVE LLC

D.12 NET ZERO DESIGN-NARRATIVE



HVAC System Option Energy Modeling Report



Somerville Public Safety Building

Somerville, MA

August 4, 2021
AKF Project No. 201522

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1. EXECUTIVE SUMMARY
2. ENERGY MODEL RESULTS
3. ENERGY MODEL INPUTS

1. EXECUTIVE SUMMARY

The Somerville Public Safety Building is a proposed new construction building located in Somerville, Massachusetts. The building is approximately 77,000 square feet and features a variety of program areas including a Police Station, Fire station & quarters, dispatch center, and community center. There is an additional parking structure of 15,000 square feet.

The purpose of this energy report is to compare different mechanical design options. Each design option was modeled based on the HVAC Systems Narrative provided by GGD Consulting Engineers. The following HVAC Designs were modeled.

- Baseline (Fossil Fuel Free – Electric Heating)
- Option 1 – High Efficiency VAV System (Electric Heating)
- Option 2 – Air Source VRF System
- Option 3 – Chilled Beam System (Electric Heating)
- Option 4 – Ground Source VRF System
- Option 5 – Ground Source Chilled Beam (Induction) System

The following tables provides the modeled results including the total annual energy cost, consumption, and carbon equivalent for each energy model.

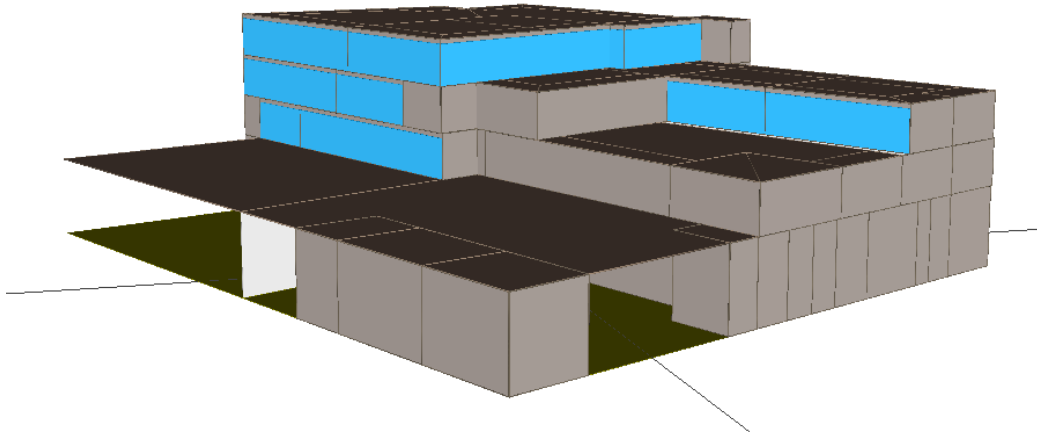
	<u>EUI</u> (<u>kBTU/sf</u>)	<u>Annual</u> <u>Energy</u> <u>Cost (\$)</u>	<u>Total Energy</u> <u>Consumption</u> (<u>kWh</u>)	<u>Total Energy</u> <u>Consumption</u> (<u>MMBtu</u>)	<u>Energy</u> <u>Savings (%)</u>	<u>CO2e</u> <u>Emissions</u> (<u>MTCO2e</u>)
Baseline	98.1	\$420,869	2,672,195	9,120	-	640
Option 1 High Eff. VAV Sys	71.1	\$304,940	1,936,156	6,608	27.54	463
Option 2 A.S. VRF	59.7	\$256,319	1,627,425	5,554	39.10	390
Option 3 A.S. CHW Beam	58.9	\$252,862	1,605,411	5,479	39.92	384
Option 4 G.S. VRF	58.7	\$251,798	1,598,652	5,456	40.17	383
Option 5 G.S. CHW Beam	56.6	\$242,913	1,542,280	5,264	42.28	369

Notes:

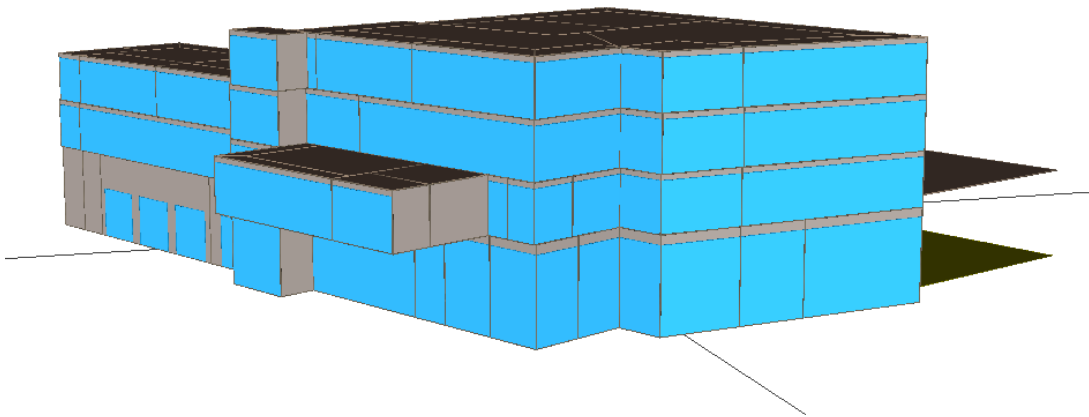
- All design options are electric only buildings.

- CO2e Emissions determined based on ENERGY STAR Portfolio Manager GHG Emission Factors for electricity in the U.S.

Energy Model Images



North Corner View



South Corner View

Energy Modeling Disclaimer

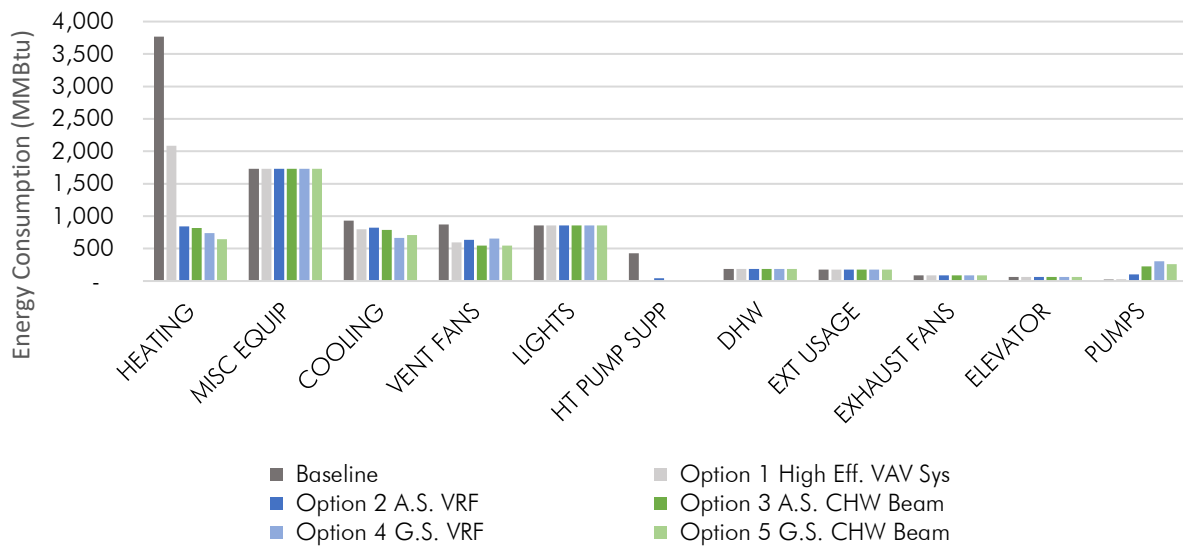
Building energy modeling is a comparative tool used for understanding the relative impact of alternate strategies and systems on annual energy use and cost. Energy modeling is not an absolute predictor of actual energy use or cost and shall not be relied on to predict actual building performance. Changes in construction, variable weather conditions, operational characteristics, end-user input, miscellaneous electrical and gas loads, controls alterations and other unpredictable metrics prevent energy models from predicting the actual annual energy consumption of any facility.

2. ENERGY MODEL RESULTS

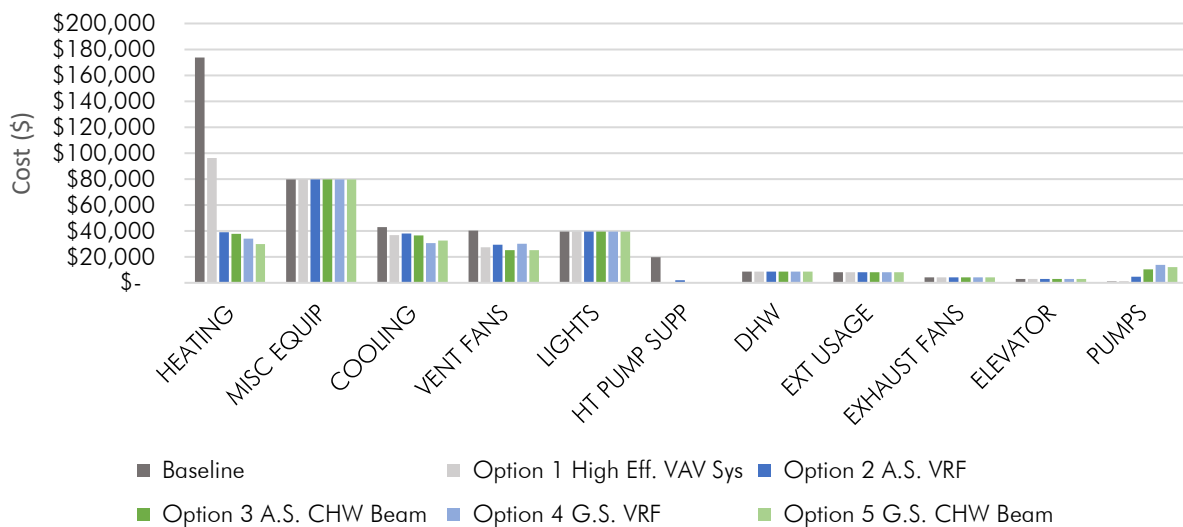
General

The below charts show annual energy end-use breakdown for the modeled design options.

Annual Energy Consumption by End-Use (MMBtu)

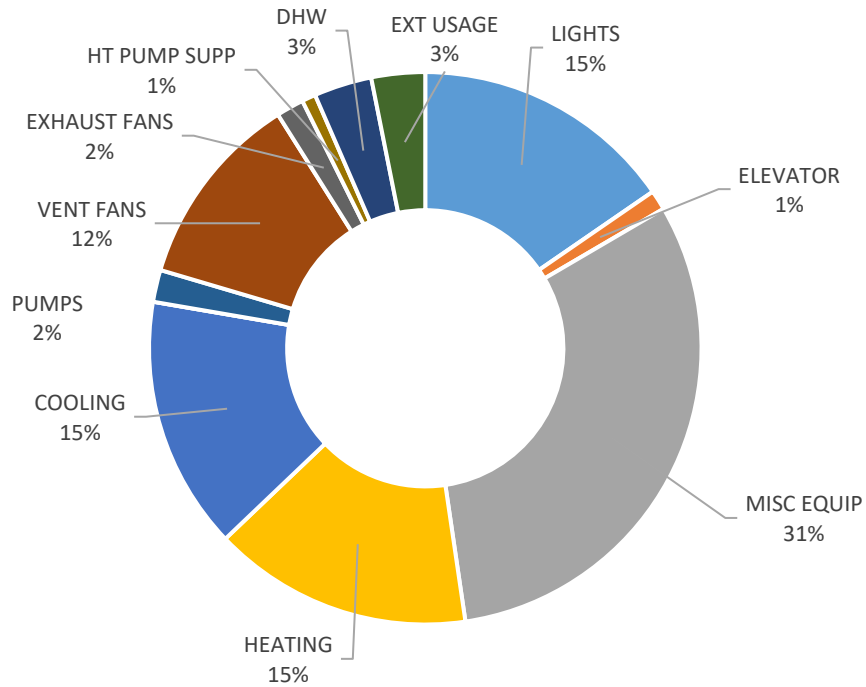


Annual Energy Consumption by Cost (\$)



The following figure represent the energy end use breakdown for Option 2 – Air Source VRF.

Option 2 - Air Source VRF End Use Energy Breakdown



ENERGY MODEL INPUTS

Project and Site Information

Weather	TMY3\MA_Boston_Logan_Intl_Arp.bin
Orientation	Plan North = North
ASHRAE Climate Zone	5A

Utility Rate Structure

Electricity	EIA Default – Massachusetts Commercial <ul style="list-style-type: none"> • \$0.1575/kWh
Natural Gas	EIA Default – Massachusetts Commercial <ul style="list-style-type: none"> • \$1.03/Therm

Geometry and Architecture

Zoning	Based on Energy Model Plans dated 07/09/2021
Gross Area	<p>Building Area: 77,302 sf Parking Area: 15,607 sf</p> <p>Building Area by Space Type:</p> <ul style="list-style-type: none"> ▪ Police Station: 22,833 sf ▪ Back-of-House: 9,726 sf ▪ Fire Apparatus: 9,560 sf ▪ Locker Rooms: 7,154 sf ▪ Fire Quarters: 5,313 sf ▪ Office: 4,723 sf ▪ Wellness: 2,639 sf ▪ Prison: 2,526 sf ▪ Corridor: 2,413 sf ▪ Dispatch: 2,358 sf ▪ Family: 2,114 sf ▪ Storage: 2,098 sf ▪ Lobby: 2,071 sf ▪ Community: 1,293 sf ▪ Misc. Space: 474 sf

Floor to Floor Heights	Floor-to-Floor Height: <ul style="list-style-type: none"> ▪ First: 24' ▪ Second – Fourth: 14'
-------------------------------	---

Occupants

Occupant quantities are equal in both models and based on ASHRAE 90.1 User's Manual and ASHRAE 62.1-2010 default occupant density

Space Type	Proposed and Baseline (sf/person)
Police Station	275
Parking Garage	No Regular Occupancy
Back-of-House	750
Fire Apparatus	500
Locker Rooms	300
Fire Quarters	250
Office	275
Wellness	300
Cell	300
Corridor	No Regular Occupancy
Dispatch	275
Family	300
Storage	750
Lobby	250
Community	50
Misc. Space	No Regular Occupancy

Building Envelope Performance

	Proposed Design – Per information provided by Context Architecture
Window-to-Wall Ratio	48%
Glazing Performance (assembly values)	U-Value: 0.25 SHGC: 0.33
Skylight Performance	None
Above Grade Walls	U-Value: 0.0470 R-21.25 continuous (5" X 4.25 R-value) insulation
Sub-grade Walls	N/A
Slab-on-Grade	N/A
Roof – Insulation entirely above deck	U-Value: 0.02 R-48 continuous insulation

Equipment Loads

Equipment (Includes Diversity)	Proposed Design(s)
Equipment Power Density (W/sf)	Police Station: 0.75 w/sf Parking Garage: None Back-of-House: 0.25 w/sf Fire Apparatus: 0.5 w/sf Locker Rooms: 0.25 w/sf Fire Quarters: 0.25 w/sf Office: 0.75 w/sf Wellness: 0.25 w/sf Prison: 0.25 w/sf Corridor: 0.25 w/sf Dispatch: 0.75 w/sf Family: 0.25 w/sf Storage: 0.25 w/sf Lobby: 0.25 w/sf Community: 0.25 w/sf Misc. Space: None
IT Closets / Loads	IT Loads are based on GGD's HVAC System Narrative. IT Loads are assumed to be 65% of redundant capacity for the dispatch and head end server rooms. The IDF rooms do not have redundancy. Dispatch: 17.15 kW Head End Server Room: 11.12 kW IDF Rooms (3 Total): 2 kW each
General/Exhaust Fans	4 kW @ 75% Diversity
Elevators	10 kW @ 30% Diversity between 6 a.m. & 7 p.m., 10% Diversity all other hours

Internal Electrical Loads

	Proposed Design(s)
Lighting (Space-by-Space Method)	<p>Lighting power densities based on IECC 2018.</p> <p>Police Station: 0.64 w/sf Parking Garage: 0.15 w/sf Back-of-House: 0.51 w/sf Fire Apparatus: 0.56 w/sf Locker Rooms: 0.52 w/sf Fire Quarters: 0.41 w/sf Office: 0.64 w/sf Wellness: 0.97 w/sf Prison: 0.66 w/sf Corridor: 0.41 w/sf Dispatch: 0.66 w/sf Family: 0.97 w/sf Storage: 0.51 w/sf Lobby: 0.84 w/sf Community: 0.97 w/sf Misc. Space: None</p>
Exterior Lighting	10 kW peak (estimated), 0% from 8am-6pm, 100% otherwise
Daylighting	Automatic Daylighting Controls for Primary Side lighted Areas per ASHRAE 90.1-2016.
Lighting Controls	Occupancy Sensors in all areas required by code.

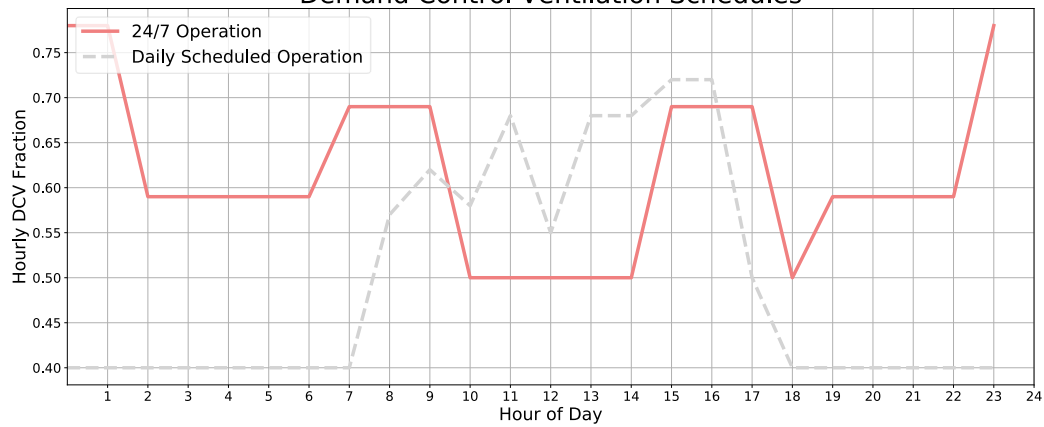
General HVAC

	Proposed Design
ASHRAE Climate Zone	Climate Zone 5A
Thermostat Setpoints	74°F / 70°F occupied, 65°F heating setback & 80 °F cooling setback
HVAC Design Options	All Design options were modeled based on GGD HVAC Systems Narrative

Airside HVAC Summary

	Proposed Design
System(s)	<ul style="list-style-type: none"> ▪ System Fan Power Based on IECC 2018 requirements ▪ 65% Supply Fan Power / 35% Return Fan Power where applicable ▪ Efficiency values based on IECC 2018 requirements ▪ Fans assumed to operate 24 / 7. Local VRF & CHB Cycle to maintain setpoint
DCV	DCV modeled based on occupancy schedules. Minimum outdoor air turndown set to 40% of design flow. See figure below.
Energy Recovery	Energy Recovery 55% Sensible / 55% Latent effectiveness

Demand Control Ventilation Schedules

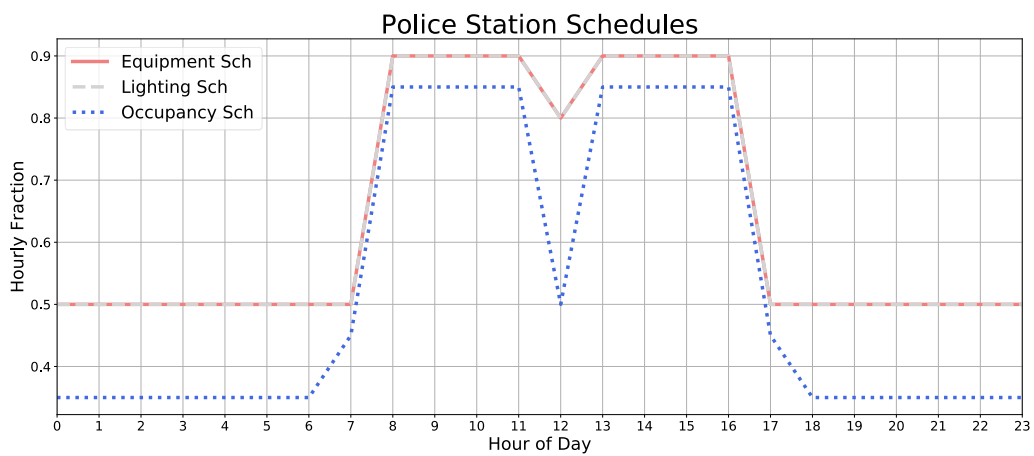
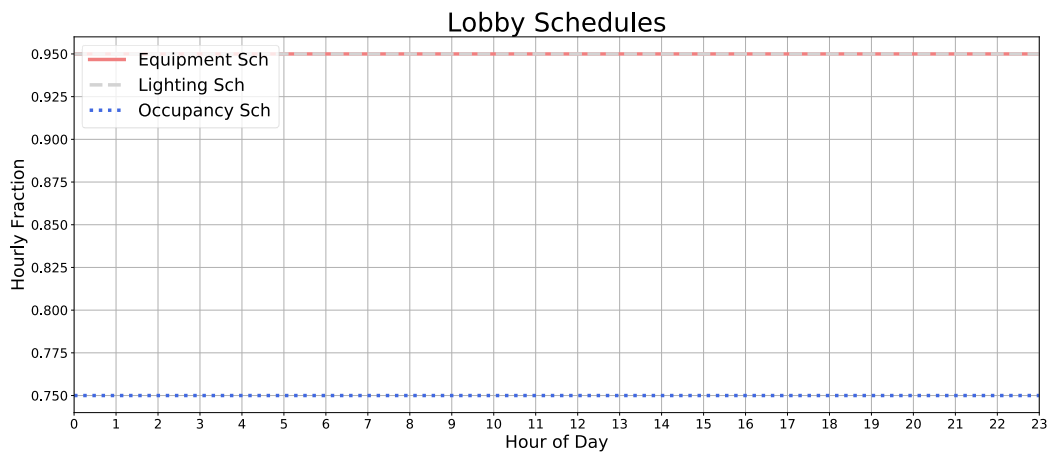


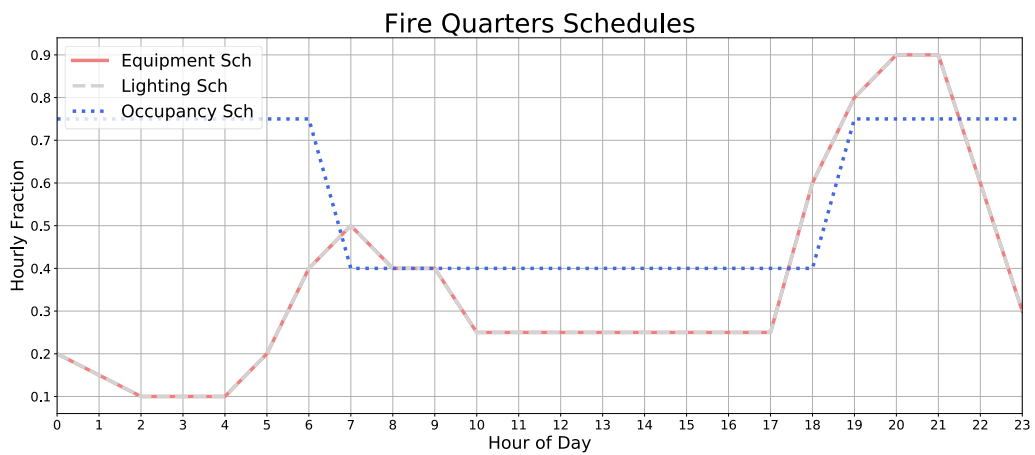
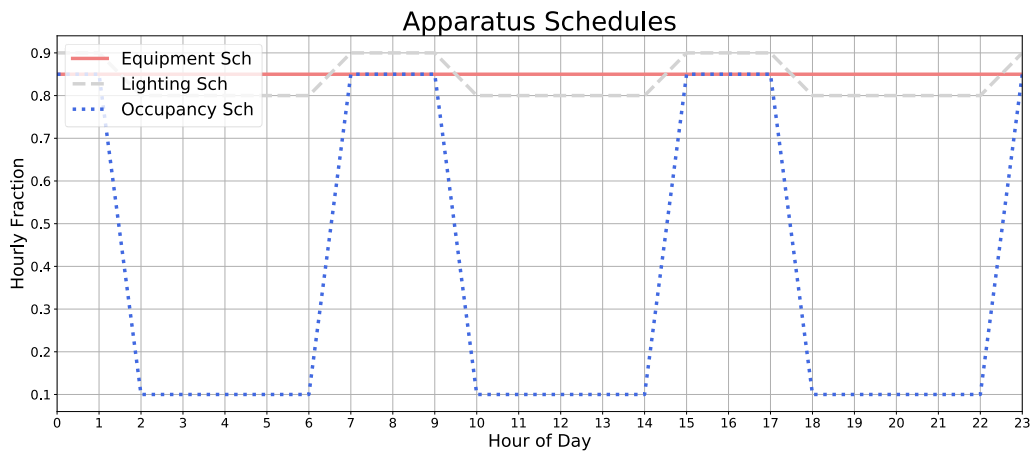
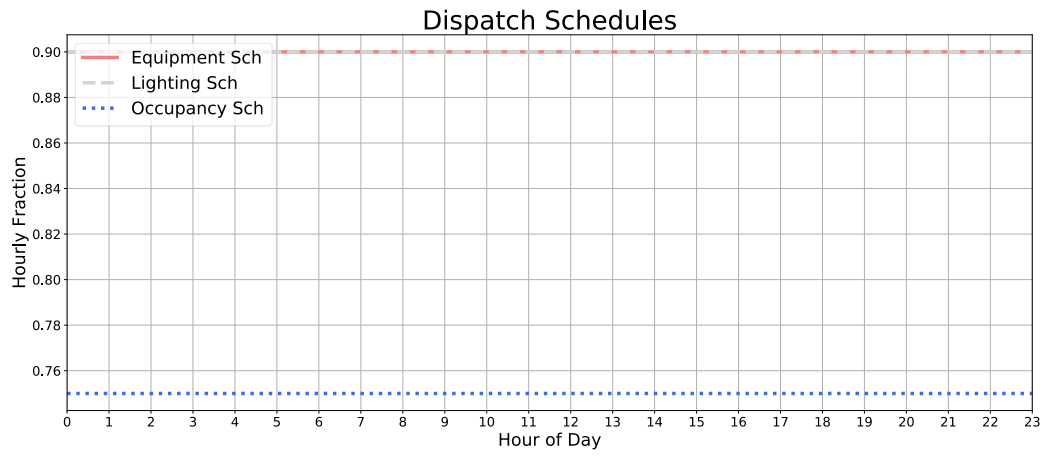
Domestic Hot Water

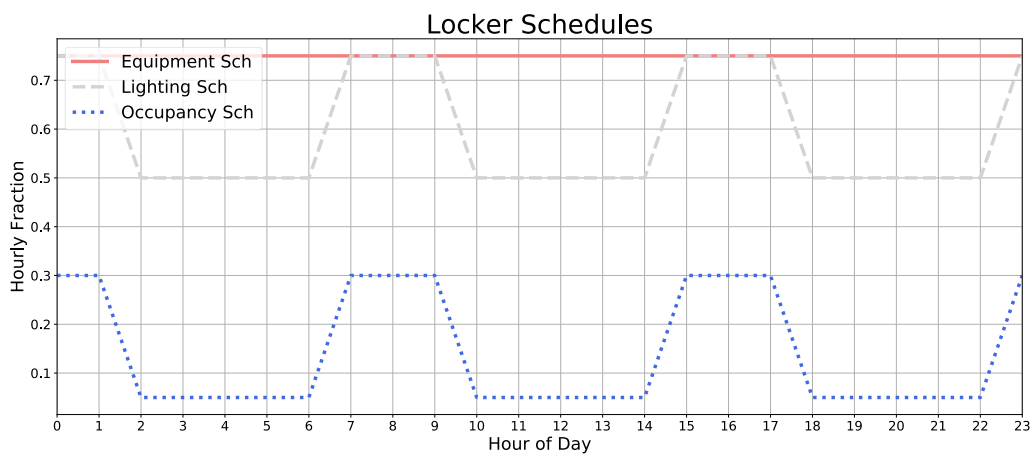
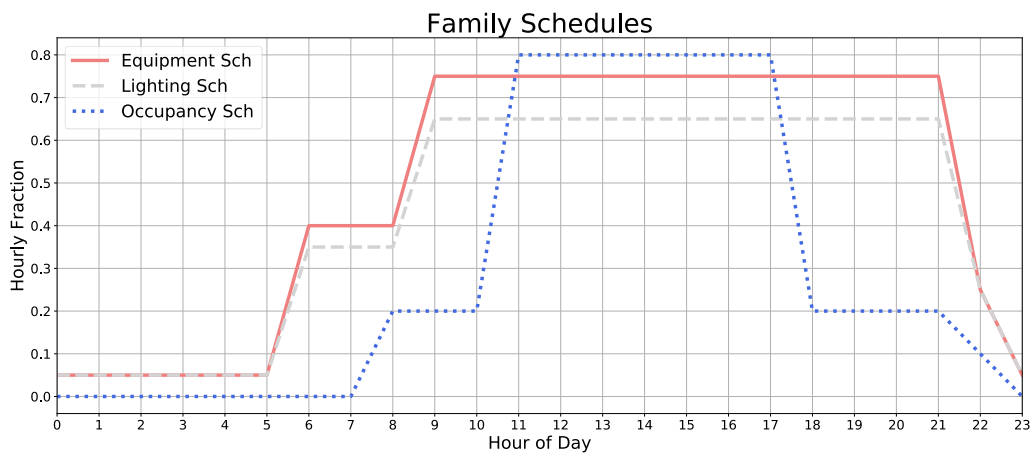
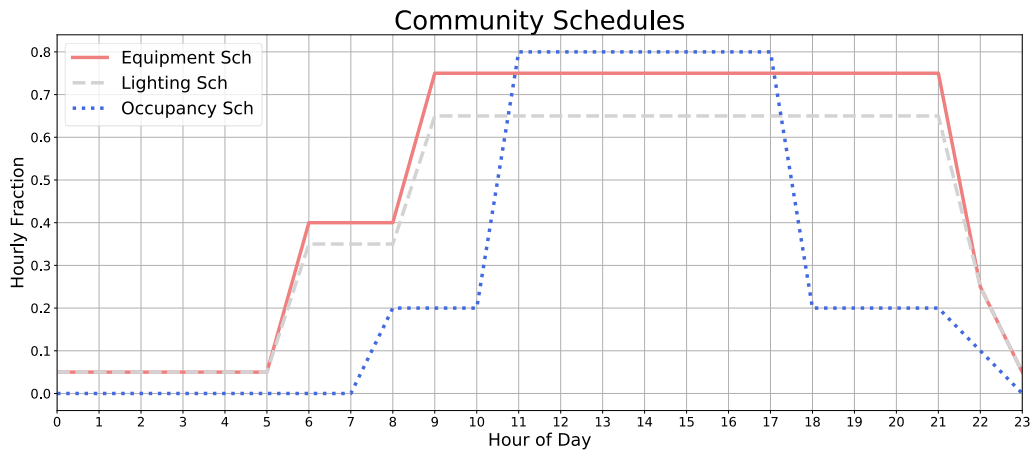
	Proposed Design
General Usage	Electric Resistance Domestic hot water heaters 1.92 Peak GPM Efficiency – 100%
Recirculating System	Yes

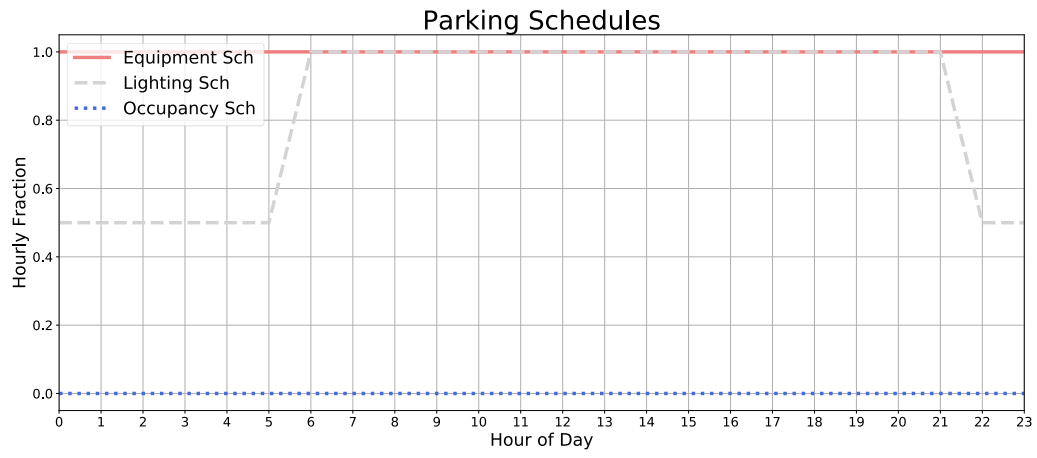
Schedule and Occupancy

The schedules of use are defined based on ASHRAE 90.1 User’s Manual typical schedules. Adjustments were made to the schedules to capture expected occupancy per each space type. These schedules will be further refined. The building occupancy schedules are shown below.



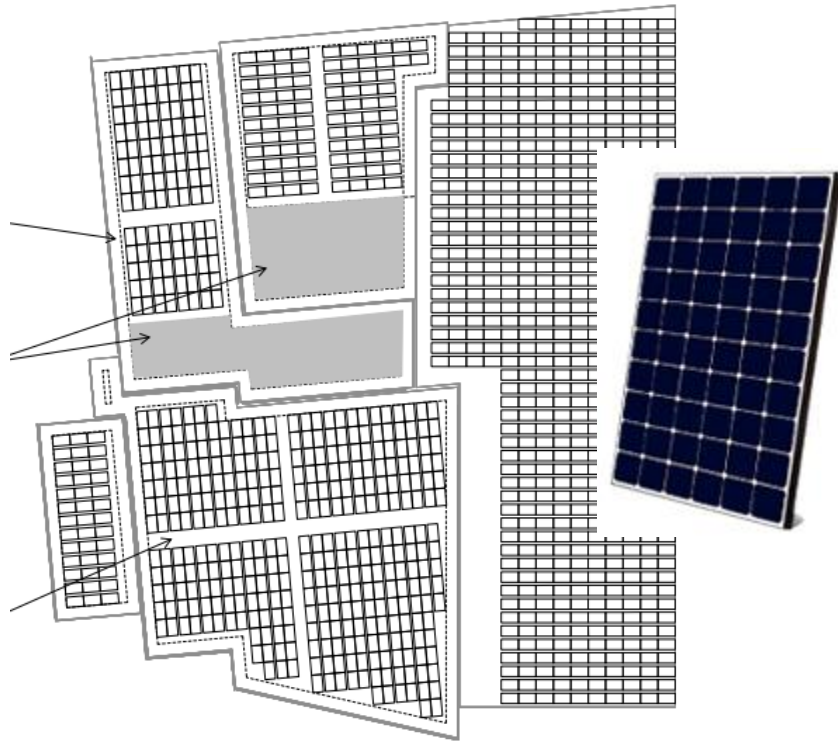








PV Systems Report



Somerville Public Safety Building Somerville, MA

August 10, 2021
AKF Project No. 201522

SCHEMATIC DESIGN SYSTEM SUMMARY:

Analysis was completed during the schematic design phase for the Somerville Public Safety Building to determine a maximum potential energy generation using a photovoltaic (PV) system. The design was based on a 405W PV panel from LG Solar. The flat roof racking was based on spacing from Unirac's Roofmount line of ballasted flat roof systems. Those roof surfaces that receive more east or west shading from other parts of the building were laid out facing due south at a 5 degree tilt and use the spacing from the RM5 racking system with the wider row to row spacing. The wider spacing was selected since Somerville, MA is at 42 deg. North latitude and has lower sun angles. The roof surfaces with no anticipated east or west shading were laid out using the RMDT system with PV panels mounted facing east and west at an 8 degree tilt. This system layout allows for additional PV panels to be mounted on the roof surface. Overall it was assumed that the PV could be mounted with in 4 feet of the roof each as allowed by NFPA. In order for the building to comply with OSHA regulations clip in points for a safety harness will need to be provided on the roof. Additional circulation pathways were also included to comply with NFPA requirements. Roof areas that were determined to receive significant shading from other parts of the building were not covered with PV panels and are available for mechanical systems equipment and building vent piping.

An additional PV array was laid out over the roof of the parking garage. These panels would need to be mounted on a canopy system and be mounted over parking and drive aisle. Due to the amount of western shading from the adjacent building in the afternoon, the PV was laid out facing due south at the same 5 degree tilt as the panels on the roof. The panels were also not located in the zone adjacent to the 4 story portion of the building as the shading from the building will be significant.

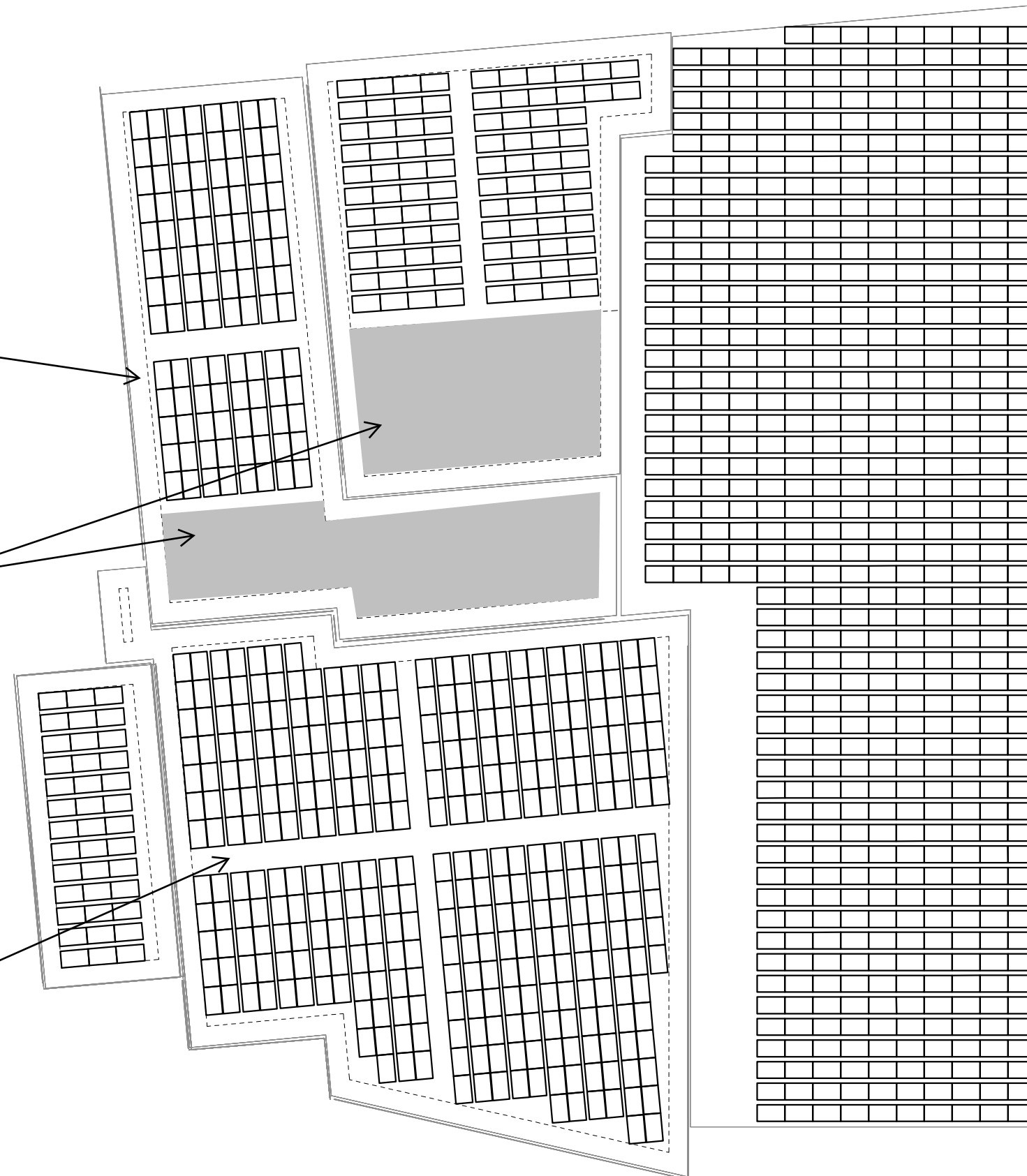
Based on the layout provided in sketch SKE-PV the current design can support 575 PV panels or 233kW of PV on the roof and an additional 604 PV panels or 244 kW of PV over the parking garage roof. This will generate and estimated 579,000 kWh annually. Given the current projected energy usage the building is not currently projecting to achieve net zero energy. The current baseline case estimates 2,762,195 kWh in annual energy usage so the PV only offsets 21% of the estimated energy used. The current lowest estimated annual energy case uses the geothermal wells with chilled beam. This low energy case uses an estimated 1,542,280 kWh annually so our PV array would only offsets 37.5% of the estimated annual energy used.

If there is a desire to improve the energy generation potential of the project, in future evolutions of the design attention should be given to ways to minimize self-shading in the building form.

4' CLEAR PERIMETER
REQUIRED FOR PV ON
ROOF (TYPICAL ALL ROOFS)

AREA NOT USED DUE TO
BUILDING SHADOW CAST

CODE REQUIRED PATHWAYS
(TYPICAL ALL ROOFS)



SKETCH NOTES:

1. PV PANEL BASIS OF DESIGN IS LG 405W PANEL.
2. PV LOCATED ON ROOF IS SELF BALLASTED. BASIS OF DESIGN RACKING SYSTEM IS UNIRAC ROOF MOUNT SYSTEMS.
3. INVERTER LOCATIONS NOT YET DETERMINED. BASIS OF DESIGN INVERTERS ARE SMA 50KW TRIPOWER CORE1.

PV ARRAY ON ROOF OF PARKING
GARAGE MOUNTED ON CANOPY OVER
ROOF LEVEL PARKING.



Project SOMERVILLE PUBLIC SAFETY BUILDING
Title PRELIMINARY PV ARRAY LAYOUT
Project No. 201522 Date 8/4/2021 Chkd By _____

Sketch No. SKE-PV
Scale N.T.S

D.13 LEED-NARRATIVE AND SCORECARD

Somerville Public Safety Building

Sustainability Narrative

August 6, 2021

Prepared by:
Soden Sustainability



sodensustainabilityconsulting
charting your path to *EFFICIENT* and *HEALTHY* buildings

Sustainability Narrative Somerville Public Safety Building

90 Washington Street Somerville, MA

Sustainability/Green Building Design Approach

The Project will demonstrate compliance with the LEED Requirements for LEED v4 Building Design and Construction Criteria. Further study over the coming weeks and months will determine and confirm final credit achievement. At this stage in the Project, we are tracking 70 YES credits and 21 Maybe credits.

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The Project embraces the opportunity to positively influence the urban environment. Its urban location takes advantage of existing infrastructure while access to public transit will reduce dependence on single-occupancy vehicle trips and minimize transportation impacts.

The LEED v4 for Building Design and Construction (BD&C) rating system tracks the sustainable features of a Project by achieving points in following categories: Integrative Process; Location & Transportation; Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process.

Location and Transportation

The Location and Transportation credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, and smart transportation choice.

The Project site has been previously developed, meeting the criteria for the sensitive land protection credit. The site also has a history of use that assumes some level of soil contamination is likely and will need to be remediated.

The Project achieves a Walk Score of 86, and is achieving all 5 points of the Surrounding Density and Diverse Uses credit. The Project is earning 5 Quality Transit points as it only has access to the numerous busses and the new green line extension.

The Project earns the Reduced Parking Footprint credit with over a 50% reduction. The City of Somerville is evaluating the requirements for number of vehicles charging spaces and bike racks which will likely exceed the numbers for LEED compliance therefore both of these credits will be achieved.

Sustainable Sites

The development of sustainable sites is at the core of sustainable design. Sustainable Site design provides quality open space with active landscape elements that can both mitigate stormwater and provide shade and thermal comfort for the building occupants.

The Project will incorporate green infrastructure approaches into the design such as rain gardens, permeable pavers, and increased landscaping. Subsurface infiltration systems will be used to further promote stormwater infiltration. The Project will infiltrate runoff in a volume equivalent to 1.5 inches times the impervious area within the Project Site.

The building roof and all hardscape material will comply with the SRI standards set forth by LEED and achieve both Heat Island credits. All exterior lighting fixtures will comply with the Light Pollution Reduction credit.

As required by LEED, the Project will create and implement an erosion and sedimentation control plan for all construction activities associated with the Project. The plan will conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent.

The Project is developing the site assessment credit that will demonstrate the relationships between the Project site features and topics, Topography, Hydrology, Climate, Vegetation, Soils, Human use.

Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural re-source while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, both inside and outside.

Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Indoor Water Use Reduction Prerequisite and credit, the Project will incorporate water conservation strategies that include low-flow plumbing fixtures for water closets and faucets. To satisfy the requirements of the Outdoor Water Use Reduction Prerequisite and credit, the landscape will be designed to eliminate potable water use and the design will only have plant material that is native and adaptive.

The Project is targeting significant indoor water use reduction from the baseline. All newly installed toilets, lavatory faucets, kitchen sinks and showerheads that are eligible for labeling will be low-flow and have the Water Sense label. The Project is currently tracking over 35% reduction in potable water use for plumbing fixtures.

The Project will install permanent water meters that measure the total potable water use for the building and associated grounds in addition to water meters for two or more of the following water sub-systems, as applicable to the Project: irrigation, indoor plumbing fixtures and fittings, domestic hot water and the boiler for additional metering.

Metering data will be compiled into monthly and annual summaries, and the resulting whole-project water usage data will be shared with USGBC.

Energy & Atmosphere

According to the U.S. Department of Energy, buildings use 39 percent of the energy and 74 percent of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and lighting; the use of renewable and clean sources of energy, generated on-site or off-site; and other innovative practices.

Fundamental Commissioning and Enhanced Commissioning will be pursued for the Project. Envelope Commissioning and Monitoring Based Commissioning will also be evaluated.

A whole-building energy simulation was performed for the Project for the various options. We will provide an update once the HVAC design is selected. Currently we are tracking a 32% energy cost reduction. (13 points)

The Project will evaluate installing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc.).

The Project is also evaluating solar with an update provided by AKF.

As required by LEED, the Project will not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. The Project will target the use of refrigerants used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The Enhanced Refrigerant calculation will be completed for the permit submission.

The Proponent is evaluating engaging in a contract for 100% of the Project's energy from green power, carbon offsets, or renewable energy certificates (RECs).

Materials & Resources

During both construction and operations, buildings generate tremendous waste and use many materials and resources. The Materials & Resources credit category encourages the selection of sustainable materials, including those that are harvested and manufactured locally, contain high-recycled content, and are rapidly renewable. It also promotes the reduction of waste through building and material reuse, construction waste management, and ongoing recycling programs.

As required by LEED, the Project will provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials will include mixed paper, corrugated cardboard, glass, plastics, and metals. The Project will also take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.

To comply with both the prerequisite and credit requirements related to construction waste management, the Project will develop and implement a construction and demolition waste management plan that will identify at least five materials (both structural and nonstructural) targeted for diversion and approximate a percentage of the overall Project waste that these materials represent. The Project will divert a minimum of 75 percent of the total construction and demolition material; diverted materials will include at least four material streams.

Careful material selection will be performed for the Project. The Project will evaluate products that have Environmental Product Declarations (EPDs), Sourcing of Raw Materials and Material Ingredients disclosures to meet the LEED Criteria.

Indoor Environmental Quality

The U.S. Environmental Protection Agency estimates that Americans spend about 90 percent of their day in-doors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

As required by LEED, the Project will meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent. Also, during building operations the Proponent will institute a No Smoking Policy to prohibit the use of all tobacco products inside the building and within 25 feet of the building entrance, air intakes, and operable windows.

The Project will develop and implement an indoor air quality (IAQ) management plan for the construction and pre-occupancy phases of the building, meeting or exceeding all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. The Project will follow strict IAQ guidelines and protect absorptive materials stored on-site from moisture damage. The Project will also consider performing a flush out.

The Project will meet the thermal comfort criteria both for controllability and the ASHRAE 55 standards along with the interior lighting criteria. Additionally, the Quality Views credit and Daylight are being evaluated for benefits for the occupants.

Along with the walk off mats at the entries, MERV 13 filtration, and chemical exhaust, the project is targeting the Low Emitting Materials credit to further increase occupant health.

Innovation and Design Process

The Innovation in Design and Innovation in Operations credit categories provide additional points for projects that use new and innovative technologies, achieve performance well beyond what is required by LEED credits, or utilize green building strategies that are not specifically addressed elsewhere in LEED. This credit category also rewards projects for including a LEED Accredited Professional on the team to ensure a holistic, integrated approach to design, construction, operations and maintenance. The following credits are being pursued and/or evaluated for the Project:

- Innovation in Design- Low Mercury/Sustainable Purchasing Lights
- Innovation in Design: Exemplary Performance- Heat Island
- Innovation in Design: Green Housekeeping & Integrated Pest Management
- Innovation in Design: Safety First: Cleaning and Disinfecting Your Space
- Innovation in Design: Education/ Tenant Manual
- Innovation in Design: LEED Accredited Professional

Regional Priority

The Project is eligible for the following regional priority credits.

- Regional Priority: Optimize Energy Performance (yes)
- Regional Priority: Rainwater Management (yes)
- Regional Priority: High Priority Site (yes)
- Regional Priority: Renewable Energy Production (yes)

Minimum Program Requirements										Soft Cost	Hard Cost		
Project Information		Arch/Owner/Soder	<ul style="list-style-type: none"> Upload: Site plan Upload: Provide a site plan identifying the LEED project boundary. Upload: Photos, renderings, or drawings Upload: Floor plans Provide representative floor plans for the project. Upload: Sections/elevations Provide project sections/elevations. Upload: Mechanical schedules, plans and/or drawings Provide mechanical schedules and plans and/or drawings. 							Cross Credit Project - Total Gross SF: Total Reg occupied gross FTE - Full time, per line, students, transients Days of operation Budget			
Yes	??	??	No										
1				Credit	Integrative Process	1	Arch/Owner/Soder	<ul style="list-style-type: none"> Establish an energy performance target no later than the schematic design phase. The target must be established using one of the following metrics: <ul style="list-style-type: none"> kWh per square foot-year (kWh per square meter-year) of site energy use kWh per square foot-year (kWh per square meter-year) of source energy use pounds per square foot-year (kg per square meter-year) of greenhouse gas emissions energy cost per square foot-year (cost per square meter-year) Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads in the building, reduce the burden on municipal supply or wastewater treatment systems, and accomplish related sustainability goals. Assess and estimate the project's potential non-potable water supply sources and water demand volumes, including the following, as applicable: 		Develop a schematic energy model Continue water use evaluation			
Yes	??	??	No										
16 0 0 0 Location and Transportation										32	Resp.	Requirements	
1				Credit	LEED for Neighborhood Development Location	16		Option 1. Locate the development footprint on land that has been previously developed.					
2				Credit	Sensitive Land Protection	1	Soder	Option 2. Priority designation (1 point BD+C except Core and Shell, 2 points Core and Shell) Locate the project on one of the following: a site listed by the EPA National Priorities List; a Federal Employment Zone site; a Federal Enterprise Community site; a Federal Renewal Community site;		Contamination and remediation			
5				Credit	High Priority Site	2	Soder	Option 1. Surrounding Density (2-3 points BD+C except Core and Shell, 2-4 points Core and Shell) Locate on a site whose surrounding existing density within a 1/2-mile (400-meter) offset of the project boundary meets the values in Table 1.		Soder to document the services available			
5				Credit	Surrounding Density and Diverse Uses	5	Soder	Path 1. Access to Public Transit Service (1 to 5 points BD+C, except Core and Shell, 1 to 5 points Core and Shell) Locate any functional entry of the project within a 1/2-mile (400-meter) walking distance of existing or planned bus, streetcar, or informal		Soder to document the transit available			
5				Credit	Access to Quality Transit	5	Soder	Bicycle Network Design or locate the project such that a functional entry or bicycle storage is within a 200-yard (180-meter) walking distance or bicycling		need current qty of racks (FTE and Visitor)			
1				Credit	Bicycle Facilities	1	Soder	Option 1. No Parking or Reduce Parking (1 point) Do not exceed the minimum local code requirements for parking capacity. Provide parking capacity that is a 30% reduction below the base ratios for parking spaces, by building		Soder to confirm final number of spaces			
1				Credit	Reduced Parking Footprint	1	Soder	Option 1. Electric Vehicle Charging (1 point) Install electrical vehicle supply equipment (EVSE) in 2% of all parking spaces used by the project or at least two spaces, whichever is greater. Clearly identify and reserve these spaces for the use by plug-in electric vehicles.		Review approach to EV charging and infrastructure			
1				Credit	Green Vehicles	1	Soder						
Yes	??	??	No										
7 0 0 3 Sustainable Sites										10	Resp.	Requirements	0.00
Y				Prereq	Construction Activity Pollution Prevention	Required	Chal	Requirements Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Projects must apply the CGP regardless of size. The plan must describe the measures implemented.		Chal confirmed we need to meet this requirement per CA standards			
1				Credit	Site Assessment	1	LSA	Requirements Complete and document a site survey or assessment that includes the following information: Topography, contour mapping, unique topographic features, slope stability risks. Hydrology, flood hazard areas, delineated wetlands, lakes, streams, shorelines, rainwater collection and reuse opportunities, TR-55 initial water storage capacity of the site (or local equivalent) for projects outside the U.S., Climate: Solar exposure, heat island effect potential, seasonal sun angles, prevailing winds, monthly precipitation and temperature ranges. Vegetation, Primary vegetation types, greenfield areas, significant tree mapping, threatened or endangered species, unique habitat, invasive plant species. Soils: Natural Resources Conservation Service soils delineation, U.S. Department of Agriculture prime farmland, healthy soils, previous development, disturbed soils (local equivalent standards may be used for projects outside the U.S.). Human use: Views, adjacent transportation infrastructure, adjacent properties, construction materials with recycling or reuse potential. Human health effects, Proximity of vulnerable populations, adjacent physical activity opportunities, proximity to major sources of air pollution.		LSA to confirm we can meet the criteria			
				Credit	Site Development - Protect or Restore Habitat	2	Soder/Owner	Option 2. Financial support (1 point) Provide financial support equivalent to at least \$0.20 per square foot (US\$2 per square meter) for the total site area (including the building footprint).		Soder to present cost to Owner			
				Credit	Open Space	1	LSA	Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy.		LSA to provide total site area, vegetation, and areas of interest			
3				Credit	Rainwater Management	3	Chal	Percentile of Rainfall Events (1-3 points except Healthcare, 1-2 points Healthcare 2-3 points) In a manner best replicating natural site hydrology processes, manage rain (i.e., infiltrate, evapotranspire, or collect and reuse) on site the runoff from the developed site for, at minimum, the 80th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure (GI) practices. GI and LID strategies can be either structural or non-structural. 80% 1st 80% 1st 90% 1st		Chal to confirm with calculations			
2				Credit	Heat Island Reduction	2	Arch/LSA	Nonroof measures Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf. Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines. Provide shade with architectural devices or structures that have a three-year aged solar reflectance (SRI) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SRI of at least 0.28 at installation. Provide shade with vegetated structures. Use paving materials with a three-year aged solar reflectance (SRI) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SRI of at least 0.33 at installation. Use an open-grid pavement system (at least 50% unbound). High-reflectance roof Use roofing materials that have an SRI equal to or greater than the values in Table 1. Meet the three-year aged SRI value. If three-year aged value information is not available, use materials that meet the initial SRI value.		Soder & Context to incorporate into the specification			
1				Credit	Light Pollution Reduction	1	MEP	Option 1. BUG rating method Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the		Confirmation BUG Method will be pursued			

Yes	NA	No	Water Efficiency		11	Resp.	Requirements	0.00	
Y			Prereq	Outdoor Water Use Reduction	Required	LSA	Option 2. Reduced irrigation Reduce the project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.	We will meet with drip irrigation	
Y		0	Prereq	Indoor Water Use Reduction	Required	MEP	BUILDING WATER USE For the fixtures and fittings listed in Table 1, as applicable to the project scope, reduce aggregate water consumption by 20% from the baseline. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled (or a local equivalent for projects outside the U.S.).	We will meet with proper fixture selection	
Y			Prereq	Buildig Level Water Metering	Required	MEP	Option 1. No Parking or Reduce Parking (1 point) Do not exceed the minimum local code requirements for parking capacity. Provide parking capacity that is a 30% reduction below the base ratios for parking spaces, by building type found in Appendix 4, Table 1: Base Ratios for Parking. Alternatively, projects may demonstrate alternative and reduced parking capacity ratios for spaces for the most appropriate land use found in the code.	Owner commitment	
2		0	Credit	Outdoor Water Use Reduction	2	LSA	Option 2. Reduced irrigation Reduce the project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.	LSA to complete (EPA) WaterSense Water Budget Tool	
2	2	0	2	Credit	Indoor Water Use Reduction	6	MEP	25%-1, 30%-2, 35%-3, 40%-4	Confirm Owner is ok that the kitchen sink is less than 1 gallon per minute.
	1	0	1	Credit	Cooling Tower	2	MEP	Option 1. Cooling Tower and Evaporative Condenser Cycles of Concentration (1-2 points except CS, 1-3 points CS) For cooling towers and evaporative condensers, conduct a one-time potable water analysis, measuring at least permanent water meters for two or more of the following water subsystems, as applicable to the project: Irrigation. Meter water systems serving at least 80% of the irrigated landscaped area. Calculate	MEP to confirm
1		0	Credit	Water Metering	1	MEP		MEP to confirm	

Yes	Partially	No	Energy and Atmosphere		33	Resp.	Requirements	0.00
Y						Owner	<p>Develop the OPR. Develop a BOD. The commissioning authority (CA) must do the following: Review the OPR, BOD, and project design. Develop and implement a Cx plan. Confirm incorporation of Cx requirements into the construction documents. Develop construction checklists. Develop a system test procedure. Verify system test execution. Maintain an issues and benefits log throughout the Cx process. Prepare a final Cx process report. Document all findings and recommendations and report directly to the owner throughout the process. The review of the exterior enclosure design may be performed by a qualified member of the design or construction team (or an employee of that firm) who is not directly responsible for design of the building envelope.</p>	Discuss Cx Scope with Owner
Y						MEP / Arch	<p>Requirements Option 1. Whole-building energy simulation Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1-2010, Appendix G, with credits for a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model.</p>	Develop a preliminary energy model before the end of Schematic Design Team to evaluate all Energy Conservation measures considered for the project. Team to evaluate the plugs that can be shutdown
Y						MEP	<p>Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC/R) systems. When reusing existing HVAC/R equipment, complete a comprehensive CFC phase-out conversion before project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.</p>	Confirmed By the MEP
3	3				6	Owner	<p>Option 1. Enhanced systems commissioning (3-4 points) Path 1. Enhanced commissioning (3 points) Complete the following commissioning process (CxP) activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC/R systems, as they relate to energy, water, indoor environmental quality, and durability. The commissioning authority must do the following: Review contractor submittals. Verify inclusion of systems manual requirements in construction documents. Verify inclusion of operator and occupant training requirements in construction documents. Verify systems manual updates and delivery. Verify operator and occupant training delivery and effectiveness. Verify seasonal testing. Review building operations 10 months after substantial completion. Develop an on-going commissioning plan. Include all enhanced commissioning tasks in the OPR and BOD. OR Path 2. Enhanced and monitoring-based commissioning (4 points) Achieve Path 1. AND Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems. Include the procedures and measurement points in the commissioning plan. Address the following: Roles and responsibilities; Measurement requirements (meters, points, metering systems, data access); The points to be tracked, with frequency and duration for trend monitoring.</p>	Discusses Cx Scope with Owner- no added for Enhanced Cx, MBcx is nominal. Envelope needs a proposal
13	5				18	MEP	<p>Option 1. Whole-building energy simulation (1-18 points except Schools and Healthcare, 1-16 points Schools, 1-20 points Healthcare) Analyze efficiency measures during the design process and account for the results in design decision making. Use energy simulation of efficiency opportunities, past energy simulation analyses for similar buildings, or published data (e.g., Advanced Energy Design Guides) from analyses for similar buildings. Analyze efficiency measures, focusing on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility. Project potential energy savings and holistic project cost implications related to all affected systems. Project teams pursuing the Integrative Process credit must complete the basic energy analysis for that credit before conducting the energy simulation. Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline. Points are awarded according to Table 1.</p>	Develop a preliminary energy model before the end of schematic design. Team to evaluate all Energy Conservation measures considered for the project.
1					1	MEP	<p>Install advanced energy metering for the following: All energy sources used in the tenant space, and Any individual energy end uses that represent 10% or more of the total annual consumption of the tenant space. The advanced energy metering must have the following characteristics: Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location. Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate. The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure. The system must be capable of storing all meter data for at least 18 months. The data must be remotely accessible. All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use</p>	MEP to confirm
	2				2	MEP	<p>Case 1. Demand response program available (2 points) Participate in an existing demand response (DR) program and complete the following activities. Design a system with the capability for real-time, fully-automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice. Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the estimated peak electricity demand. Peak demand is determined under EA Prerequisite Minimum Energy Performance. Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event. Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan.</p>	MEP to assist in plan development
3					3	MEP	<p>Use tenant renewable energy systems to offset the project's energy cost. Calculate the project's percentage of renewable energy by the following equation: Renewable energy ÷ Equivalent cost of usable energy produced by renewable energy system ÷ Total building annual energy cost Use the project's annual energy cost, calculated in EA Prerequisite Minimum Energy Performance. If Option 1 was pursued, otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) dataContext to estimate energy use and cost. The use of solar gardens or community renewable energy systems is allowed if both of the following requirements are met: The project owns the system or has signed a lease agreement for a period of at least 10 years. The system is located with the same utility service area as the facility claiming the use.</p>	Owner and team to evaluate on-site solar options
	1				1	MEP	<p>OPTION 2. CALCULATION OF REFRIGERANT IMPACT (1 POINT) Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC/R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. Percentage of total energy addressed by green power, RECs, and/or offsets Points 20% 100% 2 Use the project's annual energy consumption, calculated in EA Prerequisite Minimum Energy Performance. If Option 1 was pursued, otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) dataContext to estimate energy use.</p>	MEP to run preliminary calculations once systems are selected
2					2	Owner / SSC	<p>Percentage of total energy addressed by green power, RECs, and/or offsets Points 20% 100% 2 Use the project's annual energy consumption, calculated in EA Prerequisite Minimum Energy Performance. If Option 1 was pursued, otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) dataContext to estimate energy use.</p>	Soden to obtain quotes once a preliminary energy model is complete

Yes	7+	3+	No						
4	2	3	4	Materials and Resources	13	Resp.	Requirements		0.00
Y				Storage and Collection of Recyclables	Required	Arch/SSC	Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Consider dedicated storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.		Team to allocate space for recycling Soden to review how recycling is handled
Y				Construction and Demolition Waste Management Plan	Required	CM	Develop and implement a construction and demolition waste management plan: Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion, approximate a percentage of the overall project wastes that these materials represent. Specify whether materials will be segregated or commingled and describe the diversion strategies planned for the project. Describe where the materials will be taken and how the recycling facility will process the material. Provide a final report detailing all major waste streams generated, including disposal and diversion rates. Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.		CWM criteria will be incorporated in the spec
		1	4	Building Life Cycle Impact	5	Arch/SSC	OPTION 1. INTERIOR REUSE (2 POINTS) Reuse or salvage interior nonstructural elements for at least 50% of the surface area. Hazardous materials that are remediated as a part of the project must be excluded from the calculation. AND/OR OPTION 2. FURNITURE REUSE (1 POINT) Reuse, salvage, or refurbish furniture and furnishings for at least 30% of the total furniture and furnishings cost. AND/OR OPTION 3. DESIGN FOR FLEXIBILITY (1 POINT COMMERCIAL, INTERIORS AND HOSPITALITY, 2 POINTS RETAIL) Conduct an integrative planning process to increase the useful life of the project space. Increase project space flexibility, ease of adaptive use, and recycling of building materials while considering differential durability and premature obsolescence over building design life and individual component service lives. Use at least three of the following strategies: 1. Install accessible systems (floor or ceiling) for at least 50% of the project floor area to allow for flexible use of space and access to systems (under floor distribution systems) not entangled with other building systems.		Soden & Context to determine which options are available to the project
	1		1	Building Product Disclosure and Optimization - Environmental Product Declarations	2	Arch/SSC	Option 1. environmental product declaration (EPD) (1 point) Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below. Product-specific declaration: Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one quarter (1/4) of a product for the purposes of credit achievement calculation. Environmental Product Declaration which conforms to ISO 14025, 14040, 14044, and EN 15804 or ISO 21500 and have at least a cradle to gate scope. Option 2. Multi-attribute optimization (1 point) Products that comply with one of the criteria below for 50%, by cost, of the total value of permanently installed products in the project. Products will be valued as below. Third-party certified products that demonstrate impact reduction below industry average in at least three of the following categories are valued at 100% of their cost for credit achievement calculations.		Soden & Context to incorporate into the specification
		1	1	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2	Arch/SSC	Option 1. raw material source and extraction reporting (1 point) Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, to reducing environmental impacts from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria. Products sourced from manufacturers with self-declared reports are valued as one half (1/2) of a product for credit achievement calculation. Acceptable CSR frameworks include the following: Global Reporting Initiative (GRI) Sustainability Report Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises U.N. Global Compact, Communication of Progress ISO 26000, 2010 Guidance on Social Responsibility USGBC approved program. Other USGBC approved programs meeting the CSR criteria. AND/OR Option 2. leadership extraction practices (1 point) Use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project.		Soden & Context to incorporate into the specification
	1		1	Building Product Disclosure and Optimization - Material Ingredients	2	Arch/SSC	To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts. Option 1. material ingredient reporting (1 point) Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm). Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines: A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) Materials defined as trade secret or intellectual property may withhold the name and/or CASRN but must disclose role, amount and Green Screen benchmark, as defined in Green Screen v1.2. Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard. Cradle to Cradle. The end use product has been certified at the Cradle to Cradle v2 Basic level or Cradle to Cradle v3 Bronze level. USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria. AND/OR Option 2. Material ingredient optimization (1 point) Use products that document their material ingredient optimization using the paths below for at least 25%, by cost, of the total value of permanently installed products in the project. Green Screen v1.2 Benchmark. Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards. If any ingredients are assessed with the Green Screen List Translator, value these products at 100% of cost. If all ingredients are assessed with a full Green Screen Assessment, value these products at 150% of cost. Cradle to Cradle Certified. End use products are certified Cradle to Cradle. Products will be valued as follows: Cradle to Cradle v2 Gold, 100% of cost Cradle to Cradle v2 Platinum, 150% of cost Cradle to Cradle v3 Silver, 100% of cost Cradle to Cradle v3 Gold or Platinum, 150% of cost International Alternative Compliance Path - REACH Optimization. End use products and materials that do not contain substances that meet REACH criteria for substances of very high concern. If the product contains no ingredients listed on the REACH Authorization or Candidate list, value at 100% of cost. USGBC approved program. Products that comply with USGBC approved building product optimization criteria. AND/OR Option 3. Product Manufacturer Supply Chain Optimization (1 point) Use building products for at least 25%, by cost, of the total value of permanently installed products in the project that: Option 1. diversion (1-2 points) Path 1. divert 50% and three material streams (1 point) Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams. OR Path 2. divert 75% and four material streams (2 points) Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.		Soden & Context to incorporate into the specification
	2			Construction and Demolition Waste Management	2	CM	Use building products for at least 25%, by cost, of the total value of permanently installed products in the project that: Option 1. diversion (1-2 points) Path 1. divert 50% and three material streams (1 point) Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams. OR Path 2. divert 75% and four material streams (2 points) Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.		Soden & Context to incorporate into the specification

Yes	7	2	No					
5	7	2	2	Indoor Environmental Quality	16	Resp.	Requirements	
Y				Minimum Indoor Air Quality Performance	Required	MEP	Option 1. ASHRAE Standard 62.1-2010 Determine the minimum outdoor air intake flow for mechanical ventilation systems using the verification rate procedure from ASHRAE 62.1-2010 or a local equivalent, whichever is more stringent and meet the minimum requirements of ASHRAE Standard 62.1-2010, Sections 4-7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.	Will be meeting ASHRAE 62.1-2013
Y				Environmental Tobacco Smoke Control	Required	Owner/Arch	Locate the project in a building that prohibits smoking by all occupants and users both inside the building and outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes. If the requirement to prohibit smoking within 25 feet (7.5 meters) cannot be implemented because of code, provide documentation of these regulations. Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.	Context & Soden to review signage requirements
2				Enhanced Indoor Air Quality Strategies	2	MEP	Option 1. Enhanced IAQ strategies (1 point) Comply with the following requirements, as applicable: Electrically ventilated spaces: A. entryway systems; B. interior cross-contamination prevention; and C. filtration. Option 2. Additional enhanced IAQ strategies (1 point) Comply with the following requirements, as applicable. Mechanically ventilated spaces (select one): A. exterior contamination prevention; B. increased ventilation; C. carbon dioxide monitoring; or D. additional source control and monitoring.	Context & Soden to review copiers and chemical storage spaces MEP to determine if increased ventilation is an option MEP, Context, Soden to review all locations requiring CO2 sensors
1	1	1		Low-Emitting Materials	3	Arch/SSC	Category Threshold Emissions and content requirements Interior paints and coatings applied on site At least 90%, by volume, for emissions; 100% for VOC content General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings VOC content requirements for wet applied products Interior adhesives and sealants applied on site (including flooring adhesive) At least 90%, by volume, for emissions; 100% for VOC content General Emissions Evaluation VOC content requirements for wet applied products Flooring 100% General Emissions Evaluation Composite wood 100% not covered by other categories Composite Wood Evaluation Ceilings, walls, thermal, and acoustic insulation 100% General Emissions Evaluation Furniture At least 90%, by cost Furniture Evaluation	Soden & Context to incorporate into the specification
1				Construction Indoor Air Quality Management Plan	1	CM	Develop and implement an indoor air quality (IAQ) management plan for the construction and pre-occupancy phases of the building. The plan must address all of the following. During construction, meet or exceed all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSISMACNA 008-2008, Chapter 3. Protect absorbent materials stored on-site and installed from moisture damage.	Soden & Context to incorporate into the specification
		2		Indoor Air Quality Assessment	2	Owner/CM/SSC	Option 1. Flush-out (1 point) Path 1. Before occupancy Install low filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot (4,287,140 liters of outdoor air per square meter) of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%. Path 2. During occupancy If occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot (1,066,260 liters of outdoor air per square meter) of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per square foot of outdoor air (1.5 liters per second per square meter of outdoor air) for the design minimum outdoor air rate determined in EC The requisite Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air (4,270 liters of outdoor air per square meter) has been delivered to the space. Option 2. Air testing (2 points) After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods listed in Table 1 for all occupied spaces. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated. Laboratories that conduct the tests for chemical analysis of formaldehyde and volatile organic compounds must be accredited under ISO/IEC 17025 for the test methods they use. Flush out 1- AQ testing 2 WELL-testing required	MEP to run calculations for a pre and post occupancy flushout
			1	Thermal Comfort	1	MEP	OPTION 1. ASHRAE STANDARD 55-2010 Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2010, Thermal Comfort Conditions for Human Occupancy, with errata or a local equivalent. For restaurants, demonstrate compliance with ASHRAE HVAC Applications Handbook, 2011 edition, Chapter 5, Places of Assembly, Typical Restaurant Design Conditions, with errata. Thermal Comfort Control Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multi-occupant spaces.	Evaluate raised flooring system throughout Soden & Context to lay out plans for regularly occupied spaces along with multi/single occupant spaces
			1	Interior Lighting	2	MEP/Arch	Requirements Select one or both of the following two options. Option 1. Lighting control (1 point) For at least 80% of individual occupant spaces, provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel is 30% to 70% of the maximum illumination level (not including daylight contributions). For all shared multi-occupant spaces, meet all of the following requirements: Have in place multiple control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel). Lighting for any presentation or projection wall must be separately controlled. Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires. AND/OR Option 2. Lighting quality (1 point) Choose four of the following strategies. For all regularly occupied spaces, use light fixtures with a luminance of less than 2,500 cd/m ² between 45 and 90 degrees from radii. Exceptions include washdown fixtures properly aimed at walls, as specified by manufacturer's data, indirect lighting fixtures, provided there is no view down into these lights from a regularly occupied space above, and any other specific applications (i.e. adjustable fixtures). For the entire project, use light fixtures with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, or other special use. For 75% of the total connected lighting load, use light sources that have a rated life (or L70 for LED sources) of at least 24,000 hours (at 3-hour per cent, if applicable). Use direct-only overhead lighting for 25% or less of the total connected lighting load for all regularly occupied spaces. For 80% of the regularly occupied floor area, meet the following thresholds for area-weighted average surface reflectance: 85% for ceilings, 80% for walls, and 25% for floors. If furniture is included in the scope of work, select furniture finishes to meet the following thresholds for area-weighted average surface reflectance: 45% for work surfaces, and 50% for movable partitions. For 70% of the regularly occupied floor area, meet ratio of average wall surface luminance (excluding fenestration) to average work plane (or surface, if defined) luminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of 80% for walls. For 70% of the regularly occupied floor area, meet ratio of average ceiling luminance (excluding fenestration) to work surface luminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of 85% for ceilings.	Soden & Context to lay out plans for regularly occupied spaces along with multi/single occupant spaces MEP, OMA, Context to determine the light quality options
			1	Daylight	3	Arch	Table 1. Points for daylight floor area. Spatial daylight autonomy sDA for regularly occupied floor area) Points 55% 2 75% 3 AND Demonstrate through annual computer simulations that annual sunlight exposure 1000,250 (ASE1000,250) of no more than 10% is achieved. Use the regularly occupied floor area that is daylight per the sDA3000/50% simulations. Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. Vision glazing must provide a clear image of the exterior, not obstructed by frits, filters, patterned glazing, or added glazing.	Context to advise on scope for daylight modeling Glazing – floor to ceiling – meet comfort conditions – make sure we don't have too much glare coming in (photochromatic glass, electrochromic glass, shading devices, etc.)
			1	Quality Views	1	Arch	Additionally, 75% of all regularly occupied floor area must have at least two of the following four kinds of views: Multiple lines of sight to vision glazing in different directions at least 90 degrees apart. Views that include at least two of the following: (1) trees, plants or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing. Undisturbed views located within the distance of three times the head height of the vision glazing; and Views with a view factor of 3 or greater, as defined in "Windows and Offices: A Study of Office Worker Performance and the Indoor Environment."	Context and Soden to review areas that will not have views and % of compliant areas

1	Credit	Acoustic Comfort	1	Acoustical	<p>HVAC Background Noise</p> <p>Achieve maximum background noise levels from heating, ventilating, and air conditioning (HVAC) systems per 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1, ANSI Standard 885-2008, Table 15; or a local equivalent. Calculate or measure sound levels. For measurements, use a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation, or a local equivalent.</p> <p>Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed in ASHRAE 2011 Applications Handbook, Table 6; or a local equivalent.</p> <p>Sound Isolation</p> <p>Meet the composite sound transmission class (STC) ratings listed in Table 1, or local building code, whichever is more stringent.</p> <p>Table 1. Minimum composite sound transmission class ratings for adjacent spaces</p> <p>Adjacency combinations STCC Residence (within a multifamily residence), hotel or motel room Residence, hotel or motel room 55 Residence, hotel or motel room Common hallway, stairway 50 Residence, hotel or motel room Retail 60 Retail 50 Standard office Standard office 45 Executive office Executive office 50 Conference room Conference room 50 Office, conference room Hallway, stairway 50 Mechanical equipment room Occupied area 60 Reverberation Time goes further in having several optimization and preconditions, check the noise criteria: open office=40NC, enclosed office 35 NC, teleconference 20NC.</p>	5		Acoustical to weigh in on credit viability.
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									Requirements					
1	1	1	1	1	1	Credit 1.1	Low Mercury Lighting	1	MEP					
1	1	1	1	1	1	Credit 1.2	Education	1	Arch/SSC/Owner					
1	1	1	1	1	1	Credit 1.3	Biophilia	1	Arch/SSC/Owner					
1	1	1	1	1	1	Credit 1.4	TBD	1	Arch/SSC/Owner					
1	1	1	1	1	1	Credit 1.5	TBD	1	Arch/SSC/Owner					
1	1	1	1	1	1	Credit	LEED Accredited Professional	1	SSC					
				Yes	?	?	No							
4	0	0	0	Regional Priority				4						
1	0	0	0	1	1	Credit	Regional Priority: Optimize Energy (8pts)	1	SSC					
1	0	0	0	1	1	Credit	Regional Priority: Renewable (2pts)	1	SSC					
1	0	0	0	1	1	Credit	Regional Priority: Rainwater (2pts)	1	SSC					
1	0	0	0	1	1	Credit	Regional Priority: High Priority Site (2pts)	1	SSC					
70	23	5	12	TOTALS				126						



LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Somerville Public Safety Building
Date: 8/8/2021

Y ? N

1			Credit	Integrative Process	1
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16	0	16	Location and Transportation		16
		16	Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

7	0	3	Sustainable Sites		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
		1	Credit	Open Space	1
3			Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

5	3	3	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
3	1	2	Credit	Indoor Water Use Reduction	6
	1	1	Credit	Cooling Tower Water Use	2
	1		Credit	Water Metering	1

22	11	0	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	3		Credit	Enhanced Commissioning	6
13	5		Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1
	2		Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

4	4	5	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	1	4	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	1	1	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

5	10	1	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
1	2		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
	2		Credit	Indoor Air Quality Assessment	2
	1		Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
	2	1	Credit	Daylight	3
	1		Credit	Quality Views	1
	1		Credit	Acoustic Performance	1

6	0	0	Innovation		6
5			Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

4	0	0	Regional Priority		4
1			Credit	Regional Priority: Optimize Energy (8)	1
1			Credit	Regional Priority: Renewable	1
1			Credit	Regional Priority: Indoor Water 4, Rainwater 2, High Priority Site 2	1
1			Credit	Regional Priority: High Priority Site	1

70	28	28	TOTALS	Possible Points: 110
Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110				

D.14 GEOTECHNICAL-REPORTS



FOUNDATION ENGINEERING REPORT

SOMERVILLE PUBLIC SAFETY BUILDING

SOMERVILLE, MASSACHUSETTS

MAY 24, 2021

Prepared For:

CONTEXT ARCHITECTURE
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Boston, MA 02111

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PROJECT NO. 7088.2.00



May 24, 2021

Context Architecture
68 Harrison Avenue
Boston, MA 02111

Attention: Mr. Jeff Shaw, AIA

Reference: Somerville Public Safety Building; Somerville, Massachusetts
Foundation Engineering Report

Ladies and Gentlemen:

This report documents the results of our subsurface exploration program and foundation design study for the proposed Somerville Public Safety Building to be located in Somerville, Massachusetts. Refer to the Project Location Plan, **Figure 1**, for the general site locus.

This report was prepared in accordance with our revised proposal dated March 24, 2021 and the subsequent authorization of Context Architecture. These services are subject to the limitations contained in **Appendix A**.

Purpose and Scope

The purposes of our subsurface exploration program and geotechnical design study are to define the subsurface soil and groundwater conditions at the site as they pertain to foundation design and, based on these conditions, to provide engineering recommendations for safe and economical foundation design for the proposed building. Foundation construction considerations are also addressed herein.

Our foundation design recommendations include foundation support for the proposed building and the lowest level slab, treatment of the lowest level slab in consideration of groundwater, and seismic design considerations in accordance with the provisions of the Massachusetts State Building Code (Code).

Available Information

Information provided to McPhail Associates, LLC (McPhail) by Context Architecture included an undated, uncredited drawing entitled "Test Fit B3 Parking Option," showing a conceptual building footprint overlaid on satellite imagery of the site. Additionally, McPhail utilized information from our records of previous projects at the site location, including the following:

- An existing conditions survey drawing entitled "Topographic Plan," dated March 14, 2012 and prepared by R.E. Cameron and Associates, Inc.; and
- A report entitled "Revised Foundation Engineering Report: Proposed Redevelopment of Cobble Hill Center," dated February 28, 2014 and prepared by McPhail.



Elevations presented herein are in feet and are referenced to the City of Somerville Vertical Datum, which is approximately 6.2 feet below the North American Vertical Datum of 1988 (NAVD 88).

Existing Conditions and Proposed Development

The proposed building site is located immediately east of the intersection of Washington Street and New Washington Street in East Somerville. Currently, the central portion of the site is occupied by the remains (at-grade concrete slab and foundations) of a recently demolished 12,550-square-foot, L-shaped one-story brick strip mall building with at-grade paved parking lots located to the west and access lanes located to the south and east. The areas to the south and east of the former building beyond the access lanes are occupied by landscaped margins, including an approximate 8-foot-high elevated landscaped feature or "mound" along the site's eastern boundary. The project site is bounded by Washington Street to the north, New Washington Street to the west and south, and a multi-family residential property to the east. Existing grades across the site are relatively level, varying from about Elevation +16 to Elevation +17, with the exception of the above-described landscaped mound and a second mound near the site's southern boundary where the site grades rise to about Elevation +24 to Elevation +25.

The proposed site development is in the preliminary stage and is currently understood to consist of the construction of a 3- to 4-story public safety building with no occupied below-grade space. The lowest level will include apparatus bays for the fire department and an approximately 10,000-square-foot parking area. It is assumed that the two "mounds" will both be removed so that the majority of the site will be at approximately Elevation +17 and the building's lowest level slab will be approximately level with the final surrounding grades which will not be raised as part of the proposed construction. The approximate location and limits of the proposed building footprint is indicated on the enclosed Subsurface Exploration Plan, **Figure 2**.

Previous Subsurface Explorations

Previously completed subsurface explorations were conducted at the project site during the period of 2012 through 2014. The procedures and logs of these explorations are documented in the February 2014 report indicated in the "Available Information" section of this report. Explorations particularly relevant to geotechnical design of this project include geoprobe EBI-307 and borings B-9 through B-12 and PH-2. Boring B-11A(OW) was completed as a groundwater observation well. The logs of previous explorations are contained in **Appendix C** and the approximate locations of previous explorations are indicated on the enclosed Subsurface Exploration Plan, **Figure 2**.

Recent Subsurface Explorations

A recent subsurface exploration program, consisting of seven (7) borings designated as MA-1 through MA-7A, was performed at the project site during the period of April 14 through April 23, 2021 by Geosearch, Inc. of Sterling, Massachusetts under contract to



McPhail. The approximate locations of the borings are indicated on the enclosed **Figure 2**. Boring logs prepared by McPhail are contained in **Appendix B**.

The borings were performed using truck- and ATV-mounted drill rigs and were advanced utilizing either wet rotary drilling techniques in conjunction with NW and HW casing or 2-1/4-inch ID hollow-stem augers. Standard 1-3/8-inch I.D. split-spoon samples and standard penetration tests were generally obtained at 5-foot intervals in accordance with the standard procedures described in ASTM D1586. The borings were terminated at depths of 18 to 54.5 feet below the existing ground surface.

The subsurface explorations were monitored by a representative of McPhail who performed field layout, prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the completed explorations, made minor adjustments to the exploration locations, and determined the required exploration depths based upon the actual subsurface conditions encountered.

Field locations of the subsurface explorations were determined by taping from existing site features and the existing ground surface elevation at each boring location was determined by a level survey performed by McPhail utilizing vertical control indicated on the existing conditions survey drawing.

Additionally, a subsurface exploration program consisting of geoprobes was performed at the project site during the same period for geoenvironmental purposes. The recent geoenvironmental explorations were terminated at a maximum depth of 12 feet and did not penetrate the fill layer. Logs of the recent geoprobes will be included in a separate Soil Management Plan.

Subsurface Conditions

A detailed description of the subsurface conditions encountered within the explorations is documented on the logs contained in **Appendix B** and **Appendix C**. The following is a discussion of the generalized subsurface conditions across the site which are inferred primarily from the recent explorations, previously completed borings PH-2 and B-9 through B-12, and previously completed geoprobe EBI-307, but also from the remainder of the previous explorations conducted within the subject property, our knowledge of local site geology, and our foundation design and construction experience in the site area. A contour plan of the surface elevation of the natural marine sand deposit is presented on **Figure 3**. The contours were created by linear interpolation of the elevation of the top of the marine sand deposit observed in the recent and selected previous explorations.



<i>Stratum</i>	<i>Thickness¹ (feet)</i>	<i>Elevation of Surface¹ (feet)</i>	<i>Explorations Where Stratum Was Encountered</i>
Asphalt/Concrete	0.3 to 0.5	+15.8 to +18.3	MA-1, MA-2, MA-3, MA-7A, B-11A(OW), EBI-307
Topsoil	0.2 to 0.5	+16.8 to +25.3	MA-4 to MA-6, B-9, B-10, B-12, PH-2
Fill	5.8 to 17.5	+15.5 to +24.8	MA-1 to MA-7A, B-9 to B-12, EBI-307, PH-2
Organic Deposit	0.1 to 4	+4.9 to +12.2	MA-1, MA-5, MA-7A, B-9, B-10, B-12
Marine Sand	3.5 to 24	+4.0 to +6.8	MA-1 to MA-3, MA-5 to MA-7A, B-9 to B-12, EBI-307, PH-2
Marine Clay	7 to 19	-16.5 to +3.6	MA-1 to MA-3, MA-5 to MA-7A, B-9, B-10, B-12
Glaciomarine Deposit	6	-18.3	MA-3
Glacial Till	NP ²	-26.5 to -22.2	MA-3, MA-6, B-10, B-12
Groundwater	N/A	+6.3 to +12.3	MA-1, MA-3, MA-5, MA-7A, B-9 to B-12, EBI-307, PH-2

Notes: ¹Where encountered and penetrated. ²“NP” indicates stratum not penetrated.

The following are generalized descriptions of the subsurface strata that were encountered:

- Fill** – Loose to very dense, gray to brown to black sand and gravel with some silt, varying to a well-graded mixture of silt, sand, and gravel. The fill was also observed to contain varying amounts of brick, wood, glass, metal, concrete rubble, and ash and cinders. A reinforced concrete slab was encountered within the fill in boring MA-7A between 7.5 and 8 feet below the existing grade. Concrete was also encountered within the fill in boring B-7 between 5.7 and 8 feet below the existing grade. Additional unknown obstructions, identified through sampler and/or auger refusal, were encountered within the fill in borings B-11, EBI-1, and PH-1 and in geoprobes EB-2 and EB-401 at depths ranging from 3.5 to 13 feet below ground surface. Additionally, test pits TP-3 through TP-8 encountered practical refusal on various rubble within the fill, including sections of concrete slabs, at depths ranging from 5 to 9 feet below ground surface. Grain size distributions of samples of the fill are presented on the enclosed **Figure 4**.
- Organic Deposit** – Very soft to firm, black organic silt with varying amounts of sand and peat fibers.
- Marine Sand** – Compact to very dense, light gray to brown sand with trace to some silt and gravel. Grain size distributions of samples of the marine sand are presented on the enclosed **Figure 5**.
- Marine Clay** – Very soft to very stiff, blue to gray clay with some silt varying to silty clay.
- Glaciomarine Deposit** – Compact, blue to gray well-graded mixture of silt, sand, and gravel with some clay.



- **Glacial Till** – Dense to very dense, gray, silty sand and gravel, varying to sand with some silt and gravel, varying to gravel with some sand and trace silt. The glacial till deposit was also observed to contained cobbles.

Groundwater encountered in the recently completed boreholes was typically observed at depths ranging from 6 to 16 feet below the existing ground surface, corresponding to Elevation +6.3 to +12.3. The depth to groundwater within the three (3) observation wells installed during the previous subsurface exploration program (B-2(OW), B-8(OW), and B-11A(OW)) were measured to range from about 6.8 to 11.5 feet below the existing ground surface, corresponding to Elevation +5.9 to +9.3. Groundwater monitoring reports for the observation wells are contained in **Appendix D**. It is anticipated that future groundwater levels across the site may vary from those reported herein due to factors such as normal seasonal changes, periods of heavy precipitation, and alterations of existing drainage patterns or may become perched on the relatively impervious organic deposit.

Foundation Design Recommendations

Based upon the results of subsurface explorations, the project site is underlain by fill and an intermittent organic deposit which extend to depths ranging from approximately 10 to 18 feet below the existing ground surface and is underlain by a natural, compact to very dense marine sand deposit. The marine sand deposit was not encountered in some of the previous explorations located outside of the building footprint but was encountered in each of the recent explorations that penetrated the fill, previously completed borings PH-2 and B-9 through B-12, and previously completed geoprobe EBI-307. Therefore, the marine sand deposit is anticipated to be continuously present within the building footprint.

Based on our experience with similar scope projects and soil conditions, the use of ground improvement techniques in conjunction with a conventional spread footing foundation system and a soil-supported slab-on-grade is recommended for support of the proposed building.

In general, ground improvement methods would consist of the installation of a combination of rammed aggregate piers (RAPs), grouted aggregate piers (GAPs), and/or rigid inclusions (RIs, a.k.a. GeoConcrete Columns, or GCCs). These three types of ground improvement element consist of "columns" of compacted aggregate (with or without grout) or concrete, typically about 15 to 30 inches in diameter, which extend through unsuitable soils into the natural bearing surface (marine sand deposit). The installation process utilized to install/create of the elements increases the lateral stress in the soil matrix beneath the proposed building. Thus, the potential for large settlements is reduced by improving the unsuitable soils to a stiffer composite soil matrix. Based on the results of the explorations, the ground improvement elements would extend into the top of the marine sand deposit and would likely range up to about 15 to 20 feet in length.

Since ground improvement techniques are provided by a design-build consultant, detailed design calculations should be submitted to the Architect for review prior to the beginning of construction. The design-build consultant should specify which ground improvement types will be used in specific areas of the site. A detailed explanation of the design parameters for capacity and settlement calculations should be included in the design submittal. The design



submittal should also include a testing program to demonstrate that the design capacity of each type of ground improvement element utilized in the design is being achieved. All calculations and drawings should be prepared and sealed by a Professional Engineer licensed in the Commonwealth of Massachusetts and retained by the Contractor who is to perform the work.

The following general criteria should be utilized in the design of ground improvement elements:

1. Elements should extend into the surface of the marine sand deposit;
2. The maximum allowable bearing pressure supported on a reinforced ground surface which extends into the marine sand deposit should be equal to or less than 4 kips per square-foot (ksf);
3. Estimated long-term settlement for footings should be less than 1-inch;
4. Estimated long-term differential settlement of adjacent footings should be less than 1/2-inch; and
5. A modulus load test should be performed on at least one element of each utilized type to 150 percent of the maximum design stress.

The maximum thickness of the marine clay deposit observed in the recent and selected previous explorations was 20 feet. While the marine clay was generally firm to very stiff and is considered to be overconsolidated, it should be noted that at one isolated location (boring MA-3) the lower 12-foot zone of the marine clay deposit was documented to be very soft to soft.

The lowest level slab should be designed as an economical slab-on-grade supported on the existing site soils after ground improvement elements are installed in a grid pattern below the slab. The slab should be underlain by a polyethylene vapor barrier placed over a minimum 12-inch layer of an off-site gravel borrow. In areas where a flexible asphalt parking surface will be installed instead of a concrete slab, ground improvement may not be required.

Perimeter and interior foundations located adjacent to non-heated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior foundations within heated areas should be located such that the top of the foundation concrete is a minimum of 6 inches below the underside of the lowest level slab. All foundations should be located such that they are below a theoretical line drawn upward and outward at 2 to 1 (horizontal to vertical) from the bottom exterior edge of all adjacent footings, structures, and utilities. Since it is assumed that the proposed development does not include any occupied below-grade space, underslab and/or perimeter foundation drainage is not anticipated to be necessary. If the proposed lowest level slabs will be located below-grade, the proposed grading plan should be provided to McPhail for review to determine if foundation drainage is required. All localized depressions in the lowest level slab should be provided with properly tied continuous waterstops in all construction joints and cementitious waterproofing installed on properly prepared interior surfaces for protection against groundwater intrusion.

Gravel borrow should consist of an off-site, well-graded, natural sand and gravel containing less than eight (8) percent passing the No. 200 sieve. Reuse of the on-site soil as ordinary



fill and structural fill is discussed in more detail in the "Geotechnical Construction Considerations" section of this report.

Lateral forces can be considered to be transmitted from the structure to the soil by passive pressure against the foundation walls utilizing an equivalent fluid density of 120 pounds per cubic-foot providing that the walls are designed to resist these pressures. Lateral force can also be considered to be transmitted from the structure to the soil by friction on the base of footings using a coefficient of 0.4, to which a safety factor of 1.5 should be applied.

Seismic Design Considerations

For the purposes of determining parameters for structural seismic design, this site is considered to be a Site Class D as defined in Chapter 20 of American Society of Civil Engineers (ASCE) Standard 7-10 "Minimum Design Loads for Buildings and Other Structures". The bearing strata on the proposed site are not considered to be subject to liquefaction during an earthquake based on these criteria.

Foundation Construction Considerations

Foundation construction considerations include removal of existing below grade utilities and structures, monitoring ground vibrations, reuse of existing on-site fill material, preparation of the foundation bearing surfaces, construction dewatering, and off-site disposal of excess excavated material.

It is anticipated that removal of obstructions consisting of former structures and below grade utilities will be required prior to and during the installation of the aggregate piers. Excavations to remove former foundations and former and existing below grade utilities and structures where they interfere with the installation of the ground improvement elements and new foundations should be backfilled with ordinary fill. The ordinary fill should be replaced in maximum 2-foot lifts and tamped with the excavator bucket to facilitate future ground improvement installation. Excavated on-site fill material is considered suitable for use as ordinary fill.

The installation of the ground improvement elements will likely result in some ground vibrations and noise which may be disruptive to occupants of the nearby Cobble Hill Apartments and could potentially cause cosmetic damage to nearby existing structures, including the Cobble Hill Apartments and the restaurant building across New Washington Street from the site. Therefore, it is recommended that ground vibration monitoring be performed with the use of seismographs during the installation of the ground improvement elements. Additionally, a pre-construction condition survey should be performed of the nearby structures.

Portions of the existing on-site fill material were observed to contain a relatively high silt content. Hence, it is emphasized that this soil can become unsuitable for reuse as fill if it becomes too wet. Therefore, it is recommended that stockpiles of excavated material intended for reuse be protected against increases in moisture content by securely covering



the stockpiles prior to and during precipitation events. The placement and compaction of the on-site fill should be completed during relatively dry and non-freezing conditions.

The on-site fill is considered suitable for use as ordinary fill for backfilling up to within about 12 inches of the finish ground surface along the exterior side of the new foundations in landscaped areas and up to within about 6 inches in areas where the finished exterior surface consists of asphalt or concrete.

Portions of the existing on-site fill material containing less than 30 percent passing the No. 200 sieve may be suitable for use as structural fill along the interior side of new foundations up to the subgrade of the 12-inch layer of off-site gravel borrow, provided it is excavated during non-freezing and relatively dry conditions, is maintained in a dry condition, and can be properly compacted. Protection of all materials from increases in moisture content is considered to be the responsibility of the Contractor. Prior to re-using the fill material on-site as structural fill, it will be necessary to cull out all material in excess of 4 inches in largest dimension.

All structural fill and gravel borrow placed within the footprint of the proposed building for support of the footings and slabs-on-grade should be placed in lifts having a compacted thickness of 6 inches and be compacted to a minimum of 95 percent of the material's maximum modified Proctor dry density. The placement and compaction of structural fill and gravel borrow should be monitored by a registered professional engineer or his designated representative in accordance with the provisions of the Code.

Excavation to the proposed bottom of footing elevations should be performed utilizing a smooth-edged or "toothless" excavator bucket to avoid disturbance of the composite bearing surface. Immediately following excavation to the final footing subgrade, a minimum 4-inch thickness of compacted 3/4-inch crushed stone should be placed over the footing subgrade to protect the bearing surface from disturbance during forming activities and to facilitate dewatering if required.

In consideration that groundwater was encountered in the borings during the subsurface exploration program at depths of 6 feet or more below the existing ground surface, it is not anticipated that groundwater will impact the proposed construction. However, following periods of heavy precipitation, surface water may accumulate within the building excavation and may necessitate localized sumping. It is anticipated that dewatering by conventional sumping should suffice for surface water control and that pumped surface water can be recharged on the site.

Based on the current understanding of proposed site regrading, excess excavated fill material will be generated and will be required to be removed from the site. McPhail has been retained to perform pre-characterization chemical analysis of the excess soil in order to conform with the regulations and policies of Massachusetts Department of Environmental Protection (MA DEP). The results of the chemical analyses will be included in a separate Soil Management Plan.



Context Architecture
May 24, 2021
Page 9

Final Comments

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

A handwritten signature in blue ink that reads "Eric S. Hinds". The signature is written in a cursive style.

Eric S. Hinds

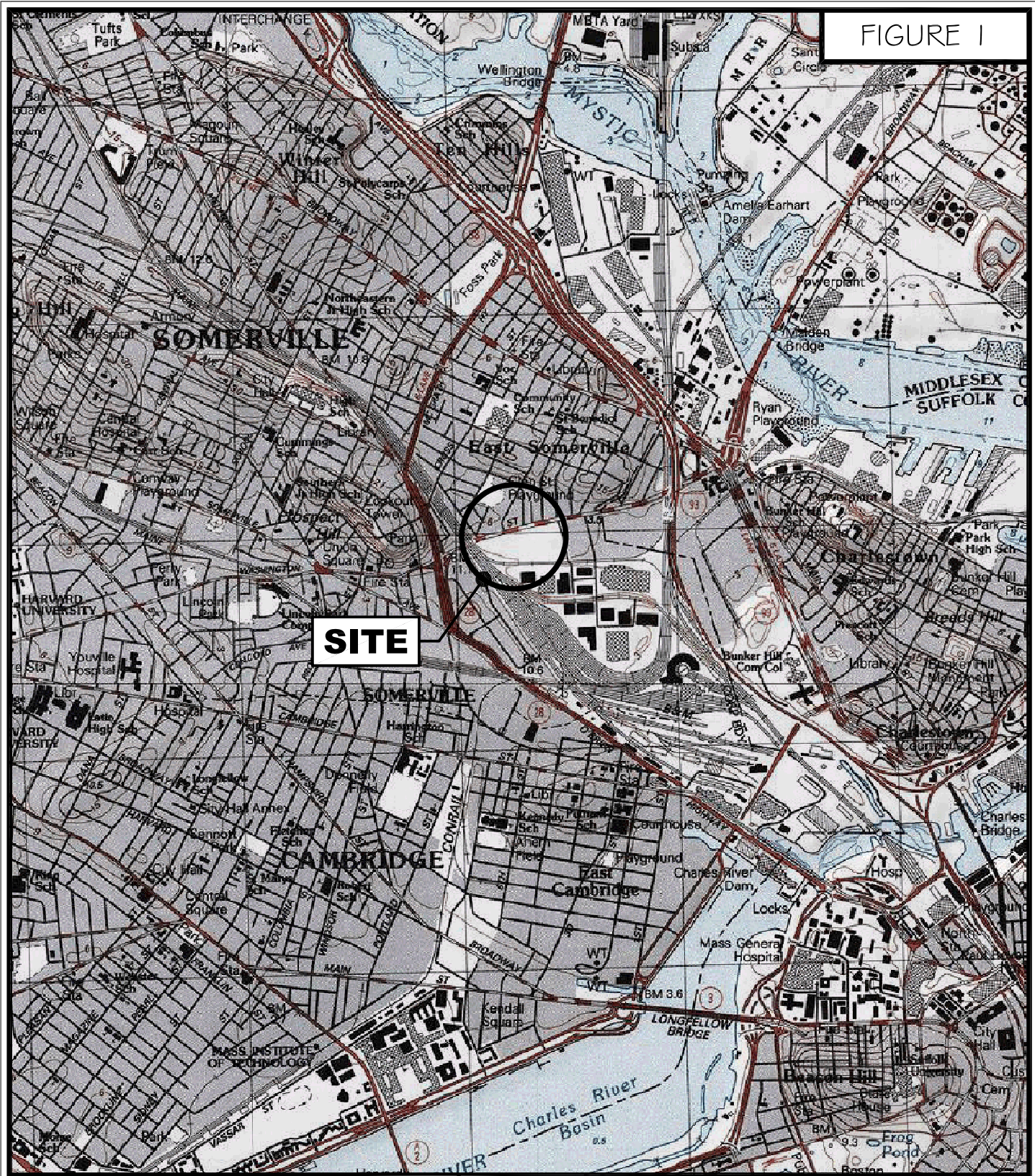
A handwritten signature in blue ink that reads "Chris M. Erikson". The signature is written in a cursive style.

Chris M. Erikson, P.E.

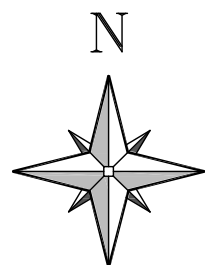
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ESH/cme

FIGURE I



Geotechnical and
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www.mcphailgeo.com



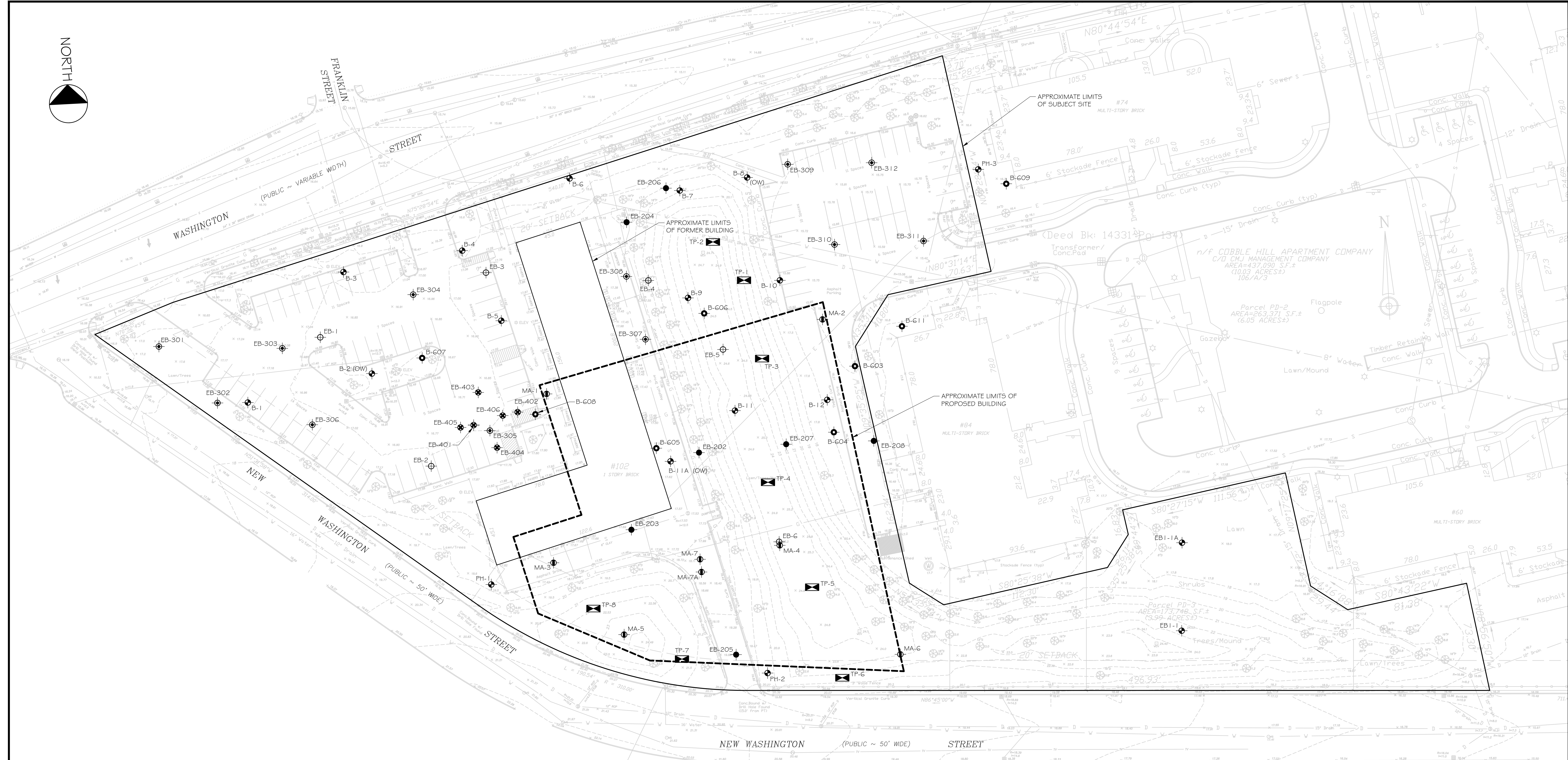
SCALE 1:25,000

PROJECT LOCATION PLAN

90 WASHINGTON STREET

SOMERVILLE









MASSACHUSETTS



BENCHMARK
3/4" DIA. WESTERLY
LOWER BOLT
ON HYDRANT
ELEV. = 21.08'
SOMERVILLE DATUM



LEGEND

-  APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY CARR-DEE CORP. DURING THE PERIOD OF OCTOBER 15 THROUGH OCTOBER 25, 2012 FOR McPHAIL ASSOCIATES, LLC
-  APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
-  APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
-  APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY BRONSON DRILLING ON FEBRUARY 18, 2014 FOR EBI CONSULTING
-  APPROXIMATE LOCATION OF TEST PIT PERFORMED BY MASTERSON CONSTRUCTION ON FEBRUARY 19, 2014 FOR EBI CONSULTING
-  APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON MARCH 26, 2014 FOR EBI CONSULTING
-  APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY CRAWFORD DRILLING ON AUGUST 22, 2018 FOR McPHAIL ASSOCIATES, LLC
-  APPROXIMATE LOCATION OF BORING PERFORMED BY GEOSearch, INC. BETWEEN APRIL 14 AND APRIL 23, 2021 FOR McPHAIL ASSOCIATES, LLC
- (OW) — INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

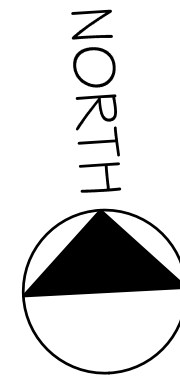
REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "TOPOGRAPHIC PLAN" DATED MARCH 14, 2012 BY R.E. CAMERON & ASSOCIATES, INC.



Geotechnical and Geoenvironmental Engineers
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90 WASHINGTON STREET			
SOMERVILLE		MASSACHUSETTS	
SUBSURFACE EXPLORATION PLAN			
FOR			
CONTEXT ARCHITECTURE			
BY			
McPHAIL ASSOCIATES, LLC			
Date: MAY 2021	Dwn: F.G.P.	Chkd: K.D.J.	Scale: 1" = 30'
Project No:	7088		FIGURE 2

FILE NAME: \\McPhail\422\McPhail\Kca\108517088\FER\7088-F02.dwg



BENCHMARK:
3/4" DIA. WESTERLY
LOWER BOLT
ON HYDRANT
ELEV. = 21.08'
SOMERVILLE DATUM



LEGEND

- ⊕ — APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY CARR-DEE CORP. DURING THE PERIOD OF OCTOBER 15 THROUGH OCTOBER 25, 2012 FOR McPHAIL ASSOCIATES, LLC
- ⊙ — APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON FEBRUARY 18, 2014 FOR EBI CONSULTING
- ⊖ — APPROXIMATE LOCATION OF BORING PERFORMED BY GEOSearch, INC. BETWEEN APRIL 14 AND APRIL 23, 2021 FOR McPHAIL ASSOCIATES, LLC
- (OW) — INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

- +7.5— CONTOUR ELEVATION OF TOP OF MARINE SAND (REFER TO NOTE 1)
- (+7.7) — ELEVATION OF TOP OF MARINE SAND ENCOUNTERED AT EXPLORATION LOCATION
- (NE) — INDICATES TOP OF MARINE SAND NOT ENCOUNTERED AT EXPLORATION LOCATION

NOTES:
 1. CONTOURS PRESENTED ARE BASED ON LINEAR INTERPOLATION BETWEEN EXPLORATIONS. THE ACTUAL FIELD CONDITIONS MAY VARY FROM THE INDICATED CONTOURS.
 2. LINEAR INTERPOLATION TO PRODUCE CONTOURS DOES NOT ACCOUNT FOR EXPLORATION LOCATIONS WHERE MARINE SAND WAS NOT ENCOUNTERED.

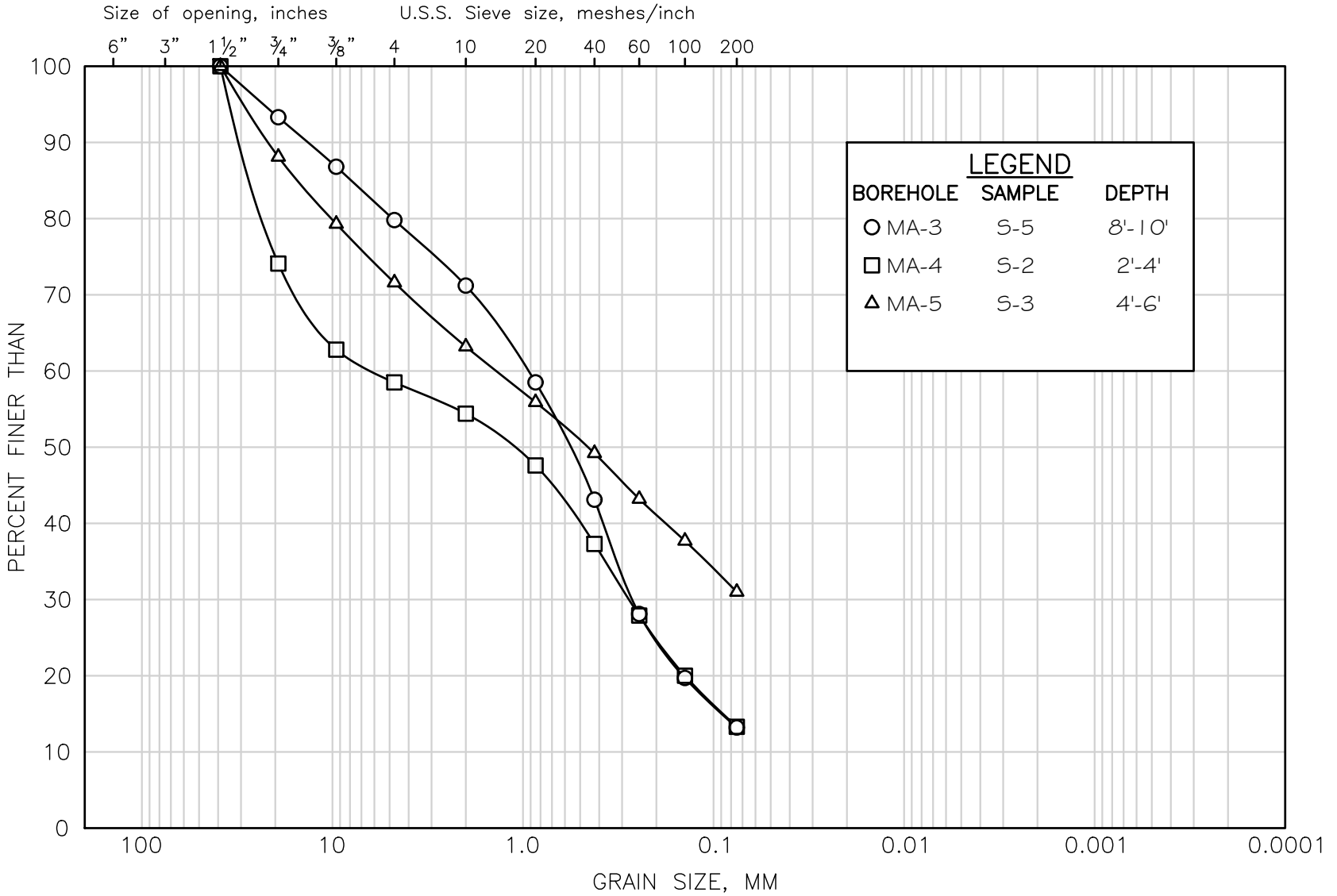
REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "TOPOGRAPHIC PLAN" DATED MARCH 14, 2012 BY R.E. CAMERON & ASSOCIATES, INC.



90 WASHINGTON STREET			
SOMERVILLE		MASSACHUSETTS	
TOP OF MARINE SAND CONTOUR PLAN			
FOR			
CONTEXT ARCHITECTURE			
BY			
McPHAIL ASSOCIATES, LLC			
Date: MAY 2021	Dwn: F.G.P.	Chkd: K.D.J.	Scale: 1" = 30'
Project No:	7088	FIGURE 3	

FILE NAME: N:\Mcphail\0957086\FER7086-F03_Contour.dwg

M.I.T. GRAIN SIZE SCALE



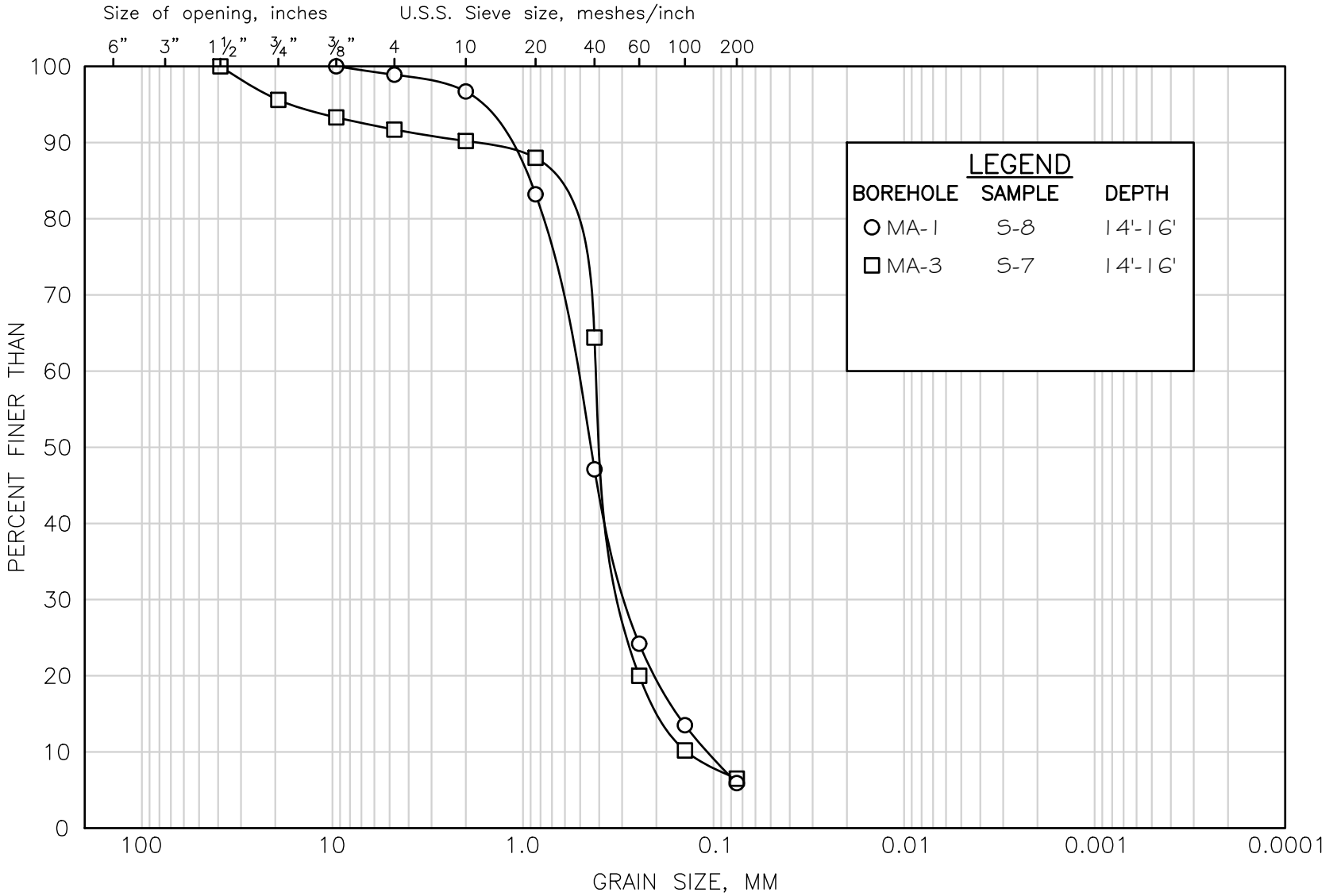
COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE				

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION
FILL

FIGURE 4

M.I.T. GRAIN SIZE SCALE



LEGEND		
BOREHOLE	SAMPLE	DEPTH
○ MA-1	S-8	14'-16'
□ MA-3	S-7	14'-16'

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION
MARINE SAND

FIGURE 5



**APPENDIX A:
LIMITATIONS**



LIMITATIONS

This report has been prepared on behalf of and for the exclusive use of Context Architecture for specific application to the proposed Somerville Public Safety Building development to be located in Somerville, Massachusetts in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made.

In the event that any changes in nature or design of the proposed construction are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by McPhail Associates, LLC.

The analyses and recommendations presented in this report are based upon the data obtained from the subsurface explorations performed at the approximate locations indicated on the enclosed plan. If variations in the nature and extent of subsurface conditions between the widely spaced explorations become evident during the course of construction, it will be necessary for a re-evaluation of the recommendations of this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations.



APPENDIX B:

**BORING LOGS MA-1 THROUGH MA-7A
PREPARED BY MCPHAIL**

Project: Somerville Public Works Building **Job #:** 7088
Location: 90 Washington St. **Date Started:** 4-14-21
City/State: Somerville, MA **Date Finished:** 4-14-21

Boring No.

MA-1

Contractor: GeoSearch **Casing Type:** 4 1/4" HSA
Driller/Helper: Chris/Mike **Casing Hammer (lbs)/Drop (in):** N/A
Logged By/Reviewed By: Julian Finney **Sampler Size/Type:** 24" Split Spoon
Surface Elevation (ft): 17.5 **Sampler Hammer (lbs)/Drop (in):** 140lb/30"

Groundwater Observations			
Date	Depth	Elev.	Notes
4-14-21	8.5	9.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes	
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft		
	17		0.5 / 17.0	CONCRETE							
1	16	[Cross-hatched symbol]		FILL	14	S1	18/6	0.5-2.0	3 7 10	Compact, brown SAND and GRAVEL, some silt, w/ brick (FILL).	
2	15				11	S2	24/16	2.0-4.0	7 6 5 5	Compact, brown SAND and GRAVEL, some silt, varying to gray to brown, silty gravelly SAND, w/ wood (FILL).	
3	14										
4	13				10	S3	24/12	4.0-6.0	3 5 5 5	Loose to compact, gray to brown SAND, some gravel, some silt, w/ wood and mild petroleum odor and staining (FILL).	
5	12										
6	11				7	S4	24/10	6.0-8.0	4 4 3 3	Loose, brown SAND, some gravel, trace silt, w/ wood and mild petroleum odor and staining (FILL).	
7	10										
8	9				11	S5	24/0	8.0-10.0	5 6 5 2	Compact, gray to brown SAND, some gravel, trace silt, w/ petroleum odor and sheen (FILL). Note: No recovery on first sample attempt, driller probed spoon around hole for 4" recovery on second attempt. Spoon wet at 8.5'.	
9	8										
10	7				7	S6	24/4	10.0-12.0	2 4 3 5	Loose, gray-brown, SAND, some gravel, trace silt, w/ petroleum odor and sheen (FILL). Note: Approximately 1" of organic silt in spoon tip.	
11	6		11.9 / 5.6 12.0 / 5.5	ORGANIC DEPOSIT							
12	5	[Dotted symbol]		MARINE SAND	28	S7	24/18	12.0-14.0	9 13 15 15	Compact, light gray to brown SAND and GRAVEL, trace silt, varying to SAND, trace gravel, trace silt (MARINE SAND).	
13	4										
14	3				14	S8	24/12	14.0-16.0	4 6 8 9	Compact, gray SAND, some gravel, some silt, w/ mild petroleum odor (MARINE SAND).	
15	2										
16	1				24	S9	24/22	16.0-18.0	9 12 12 14	Compact, gray SAND, some gravel, some silt, w/ mild petroleum odor (MARINE SAND).	
17	0										
18	-1										
19	-2										
20	-3				17	S10	24/2	20.0-22.0	8 9 8 9	Compact, gray to brown SAND, some gravel, some silt, w/ petroleum odor and staining (MARINE SAND). Note: Rock stuck in spoon tip.	
21	-4										
22	-5										
23	-6										
24	-7										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:
Weather: Partly Sunny



McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project: Somerville Public Works Building	Job #: 7088	Boring No.
Location: 90 Washington St.	Date Started: 4-14-21	MA-1
City/State: Somerville, MA	Date Finished: 4-14-21	

Contractor: GeoSearch	Casing Type: 4 1/4" HSA	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-14-21	8.5
Surface Elevation (ft): 17.5	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes
		9.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes
					N-Value	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft	
					RQD					
26	-8		27.0 / -9.5	MARINE SAND	17	S11	24/12	25.0-27.0	5	Compact, gray SAND, some gravel, some silt, w/ petroleum odor (MARINE SAND).
	-9								6	
									11	
27									9	
28	-10		29.0 / -11.5	MARINE CLAY	5	S12	24/14	27.0-29.0	3	Firm, gray to blue CLAY, some silt (MARINE CLAY).
	-11								2	
									3	
29									4	
30	-12			Bottom of borehole 29 feet below ground surface.						
31	-13									
32	-14									
33	-15									
34	-16									
35	-17									
36	-18									
37	-19									
38	-20									
39	-21									
40	-22									
41	-23									
42	-24									
43	-25									
44	-26									
45	-27									
46	-28									
47	-29									
48	-30									
49	-31									
	-32									

GRANULAR SOILS		SOIL COMPONENT		
BLOWS/FT.	DENSITY	DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
0-4	V.LOOSE	"TRACE"	0-10%	
4-10	LOOSE	"SOME"	10-20%	
10-30	COMPACT	"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
30-50	DENSE	"AND"	35-50%	
>50	V.DENSE			

COHESIVE SOILS		Notes:
BLOWS/FT.	CONSISTENCY	
<2	V.SOFT	Weather: Partly Sunny
2-4	SOFT	
4-8	FIRM	
8-15	STIFF	
15-30	V.STIFF	
>30	HARD	



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 CAMBRIDGE, MA 02140
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Page 2 of 2

Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-15-21	MA-2
City/State: Somerville, MA	Date Finished: 4-15-21	

Contractor: GeoSearch	Casing Type: N/A	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	Elev.	Notes
Surface Elevation (ft): 15.8	Sampler Hammer (lbs)/Drop (in): 140lb/30"		

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes	
					N-Value	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft		
					RQD						
			0.3 / 15.5	ASPHALT							
1	15	[Cross-hatched symbol]		FILL	25	S1	18/8	0.5-2.0	10 15 14	Compact, black to brown silty gravelly SAND, w/ brick (FILL).	
2	14										
3	13				24	S2	24/6	2.0-4.0	11 10 14 9	Compact, dark brown SAND and GRAVEL, some silt (FILL).	
4	12				100+	S3	10/1	4.0-4.8	8 100/3"	Note: Rock in spoon tip for 1" recovery. Spoon refusal at 4.8'. Hole ended.	
5	11		4.8 / 11.0	Bottom of borehole 4.8 feet below ground surface.							
6	10										
7	9										
8	8										
9	7										
10	6										
11	5										
12	4										
13	3										
14	2										
15	1										
16	0										
17	-1										
18	-2										
19	-3										
20	-4										
21	-5										
22	-6										
	-7										

GRANULAR SOILS		SOIL COMPONENT		
BLOWS/FT.	DENSITY	DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
0-4	V.LOOSE	"TRACE"	0-10%	
4-10	LOOSE	"SOME"	10-20%	
10-30	COMPACT	"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
30-50	DENSE	"AND"	35-50%	
>50	V.DENSE			
COHESIVE SOILS		Notes:		
BLOWS/FT.	CONSISTENCY	Weather: Partly Sunny		
<2	V.SOFT			
2-4	SOFT			
4-8	FIRM			
8-15	STIFF			
15-30	V.STIFF			
>30	HARD			



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 2269 MASSACHUSETTS AVENUE
 CAMBRIDGE, MA 02140
 TEL: 617-868-1420
 FAX: 617-868-1423

Page 1 of 1

Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-14-21	MA-3
City/State: Somerville, MA	Date Finished: 4-14-21	

Contractor: GeoSearch	Casing Type: 4" Casing	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): 300lb/24"	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-14-21	6
Surface Elevation (ft): 17.7	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes
		11.7	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes			
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft				
			0.3 / 17.4	ASPHALT									
1	17	[Symbol: Diagonal Hatching]			19	S1	24/8	0.5-2.5	2 5 14 11	Compact, dark brown, silty gravelly SAND, w/ brick, glass, and ash and cinders (FILL).			
2	16				14	S2	18/6	2.5-4.0	6 7 6	Compact gravelly SAND, some silt (FILL).			
3	15				11	S3	24/10	4.0-6.0	5 6 5 9	Compact, brown gravelly SAND, trace silt (FILL).			
4	14				14	S4	24/10	6.0-8.0	13 8 6 5	Compact, brown gravelly SAND, trace silt (FILL). Note: Spoon wet at 6'.			
5	13				12	S5	24/6	8.0-10.0	7 6 6 7	Compact, brown SAND, some gravel, trace silt (MARINE SAND).			
6	12				14	S6	24/4	10.0-12.0	8 5 9 15	Compact, gray to brown gravelly SAND, trace silt (MARINE SAND).			
7	11												
8	10												
9	9												
10	8					10.0 / 7.7	MARINE SAND	24	S7	24/12	14.0-16.0	10 11 13 18	Compact, gray SAND, trace gravel, trace silt (MARINE SAND).
11	7	[Symbol: Dotted]											
12	6												
13	5												
14	4												
15	3												
16	2												
17	1					17.0 / 0.7	MARINE CLAY	10	S8	24/22	19.0-21.0	2 4 6 6	Very stiff, blue to gray CLAY, some silt (MARINE CLAY).
18	0												
19	-1												
20	-2												
21	-3												
22	-4												
23	-5												
	-6												

GRANULAR SOILS		SOIL COMPONENT	
BLOWS/FT.	DENSITY	DESCRIPTIVE TERM	PROPORTION OF TOTAL
0-4	V.LOOSE	"TRACE"	0-10%
4-10	LOOSE	"SOME"	10-20%
10-30	COMPACT	"ADJECTIVE" (eg SANDY, SILTY)	20-35%
30-50	DENSE	"AND"	35-50%
>50	V.DENSE		

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

COHESIVE SOILS		Notes:
BLOWS/FT.	CONSISTENCY	
<2	V.SOFT	Weather: Partly Sunny
2-4	SOFT	
4-8	FIRM	
8-15	STIFF	
15-30	V.STIFF	
>30	HARD	



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Project: Somerville Public Works Building	Job #: 7088	Boring No.
Location: 90 Washington St.	Date Started: 4-14-21	MA-3
City/State: Somerville, MA	Date Finished: 4-14-21	

Contractor: GeoSearch	Casing Type: 4" Casing	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): 300lb/24"	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-14-21	6
Surface Elevation (ft): 17.7	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes			
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft				
25	-7			MARINE CLAY	3	S9	24/24	24.0-26.0	WOH 1 2 2	Soft, blue to gray CLAY, some silt (MARINE CLAY).			
26	-8												
27	-9												
28	-10												
29	-11												
30	-12							2	S10	24/10	29.0-31.0	WOH 2 3	Very soft to soft, blue to gray CLAY, some silt (MARINE CLAY).
31	-13												
32	-14												
33	-15												
34	-16												
35	-17				0	S11	24/14	34.0-36.0	WOH WOH WOH WOH	Very soft, blue to gray CLAY, some silt (MARINE CLAY).			
36	-18		36.0 / -18.3										
37	-19			GLACIOMARINE	11	S12	24/12	36.0-38.0	23 3 8 6	Compact, blue to gray, well-graded mixture of SILT, SAND, and GRAVEL, some clay (GLACIOMARINE DEPOSIT).			
38	-20												
39	-21							21	S13	24/1	38.0-40.0	6 9 12 8	Compact, gray, well-graded mixture of SILT, SAND, and GRAVEL, trace clay (GLACIOMARINE DEPOSIT).
40	-22												
41	-23												
42	-24					42.0 / -24.3							
43	-25												
44	-26												
45	-27				38	S14	24/8	44.0-46.0	14 15 23 29	Dense, gray silty SAND and GRAVEL, w/ cobbles (GLACIAL TILL).			
46	-28		46.0 / -28.3										
47	-29												
	-30												

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V. LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V. DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V. SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V. STIFF
>30	HARD

Notes:
Weather: Partly Sunny



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Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-23-21	MA-4
City/State: Somerville, MA	Date Finished: 4-23-21	

Contractor: GeoSearch	Casing Type: 3" Casing	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4">Groundwater Observations</th> </tr> <tr> <th>Date</th> <th>Depth</th> <th>Elev.</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Groundwater Observations				Date	Depth	Elev.	Notes												
Groundwater Observations																							
Date	Depth			Elev.	Notes																		
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A																						
Logged By/Reviewed By: Luke Espindola	Sampler Size/Type: 24" Split Spoon																						
Surface Elevation (ft): 25.3	Sampler Hammer (lbs)/Drop (in): 140lb/30"																						

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Boring Notes		
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)		Blows/6" Min/ft	
1	25		0.5 / 24.8	TOPSOIL	100/1"	S1	12/12	0.0-1.0	3 5 100/1"	Loose to compact, dark brown SAND, some gravel, trace silt (FILL). Augered past cobble at 1' below ground surface.	
2	24										
3	23								9 9 10 21	Compact, brown silty gravelly SAND (FILL).	
4	22					19	S2	24/11	2.0-4.0		
5	21					8	S3	12/7	4.0-5.0	5 3	Loose, brown silty gravelly SAND (FILL).
6	20					7	S3A	12/6	5.0-6.0	3 4	Firm, gray CLAY, trace silt (FILL).
7	19					22	S4	24/12	6.0-8.0	6 8 14 11	Compact, brown silty SAND, some gravel (FILL).
8	18										
9	17				FILL						
10	16										
11	15										
12	14										
13	13										
14	12										
15	11										
16	10										
17	9					100/1"	S5	13/0	16.0-17.1	7 8 100/1"	No recovery. Refusal on cobble or boulder, presumably within fill. Hole ended.
18	8		17.1 / 8.2	Bottom of borehole at 17.1 feet below ground surface.							
19	7										
20	6										
21	5										
22	4										
	3										

GRANULAR SOILS		SOIL COMPONENT	
BLOWS/FT.	DENSITY	DESCRIPTIVE TERM	PROPORTION OF TOTAL
0-4	V.LOOSE	"TRACE"	0-10%
4-10	LOOSE	"SOME"	10-20%
10-30	COMPACT	"ADJECTIVE" (eg SANDY, SILTY)	20-35%
30-50	DENSE	"AND"	35-50%
>50	V.DENSE		

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

COHESIVE SOILS		Notes:
BLOWS/FT.	CONSISTENCY	
<2	V.SOFT	
2-4	SOFT	
4-8	FIRM	
8-15	STIFF	
15-30	V.STIFF	
>30	HARD	Weather: Partly Sunny

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Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-15-21	MA-5
City/State: Somerville, MA	Date Finished: 4-15-21	

Contractor: GeoSearch	Casing Type: 4 1/4" HSA	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-15-21	16
Surface Elevation (ft): 24.3	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes
		8.3	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes			
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft				
1	24	[Symbol: Diagonal Hatching]	0.5 / 23.8	TOPSOIL	22	S1	24/14	0.0-2.0	6 11 11 10	Compact, brown silty gravelly SAND, w/ brick (FILL).			
2	23												
3	22										Compact, brown silty gravelly SAND, w/ cobbles (FILL).		
4	21						19	S2	24/6	2.0-4.0	9 8 11 9		
5	20											Very dense, light brown silty SAND and GRAVEL (FILL).	
6	19						52	S3	24/14	4.0-6.0	8 18 34 25		
7	18					FILL	141	S4	24/20	6.0-8.0	72 81 60 40	Very dense, black to dark brown, well-graded mixture of SILT, SAND, and GRAVEL, w/ petroleum odor and staining, cobbles, brick and ash and cinders (FILL).	
8	17												
9	16							26	S5	24/12	8.0-10.0	16 17 9 9	Compact, dark brown, well-graded mixture of SILT, SAND, and GRAVEL, w/ petroleum odor, brick, and ash and cinders (FILL).
10	15												
11	14							7	S6	24/6	10.0-12.0	3 4 3 5	Loose, black silty SAND, some gravel, w/ petroleum odor and staining and ash and cinders (FILL).
12	13												
13	12							10	S7	24/4	12.0-14.0	3 5 5 5	Loose to compact, black silty SAND, some gravel, w/ petroleum odor and staining and ash and cinders (FILL).
14	11												
15	10		14.0 / 10.3	ORGANIC DEPOSIT	1		S8	24/18	14.0-16.0	WOH WOH 1 3	Very soft, black ORGANIC SILT, trace sand, w/ trace peat fibers (ORGANIC DEPOSIT).		
16	9												
17	8				4	S9	18/12	16.0-17.5	2 2 2	Soft to firm, black ORGANIC SILT, trace sand, w/ trace peat fibers (ORGANIC DEPOSIT).			
18	7		17.5 / 6.8	MARINE SAND	10	S9A	6/4	17.5-18.0	5	Loose to compact, gray silty SAND, some gravel (MARINE SAND).			
19	6												
20	5					25	S10	24/12	19.0-21.0	12 10 15 15	Compact, gray to brown SAND, some silt, some gravel (MARINE SAND).		
21	4		21.0 / 3.3	MARINE CLAY									
22	3					25	S11	24/12	21.0-23.0	12 12 13 21	Very stiff, blue to gray silty CLAY (MARINE CLAY).		
23	2												
24	1		23.0 / 1.3										
24	0			Bottom of borehole 23 feet below ground surface.									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:
Weather: Partly Sunny



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Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-23-21	MA-6
City/State: Somerville, MA	Date Finished: 4-23-21	

Contractor: GeoSearch	Casing Type: 3" Casing	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Luke Espindola	Sampler Size/Type: 24" Split Spoon	Elev.	Notes
Surface Elevation (ft): 23.5	Sampler Hammer (lbs)/Drop (in): 140lb/30"		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes		
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft			
1	23	[Symbol]	0.5 / 23.0	TOPSOIL	19	S1	24/11	0.0-2.0	3 9 10 6	Compact, brown to dark brown silty SAND, some gravel (FILL).		
2	22		[Symbol]		FILL							
3	21					17	S2	24/16	2.0-4.0	16 9 8 5	Compact, dark brown silty SAND, some gravel (FILL).	
4	20											
5	19					20	S3	24/19	4.0-6.0	7 7 13 11	Compact, dark brown silty SAND, some gravel (FILL).	
6	18											
7	17					20	S4	24/20	6.0-8.0	3 8 12 6	Compact, dark brown silty SAND, some gravel, w/ brick (FILL).	
8	16											
9	15					9	S5	24/2	8.0-10.0	3 4 5 3	Stiff, dark brown to light brown sandy SILT, some gravel (FILL).	
10	14											
11	13					29	S6	24/12	10.0-12.0	5 5 24 15	Very stiff, dark brown sandy SILT, some gravel (FILL).	
12	12											
13	11					11	S7	24/12	12.0-14.0	10 6 5 6	Compact, dark brown gravelly SAND (FILL).	
14	10											
15	9					3	S8	24/8	14.0-16.0	5 2 1 1	Very loose, brown GRAVEL, some sand (FILL).	
16	8					16.0 / 7.5	MARINE SAND					
17	7					7		S9	24/9	16.0-18.0	3 4 3 8	Loose, gray SAND, trace silt (MARINE SAND).
18	6											
19	5											
20	4			31	S10	24/14		19.0-21.0	12 15 16 16	Dense, gray SAND, trace silt (MARINE SAND).		
21	3											
22	2											
	1											

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:
Weather: Partly Sunny



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Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-23-21	MA-6
City/State: Somerville, MA	Date Finished: 4-23-21	

Contractor: GeoSearch	Casing Type: 3" Casing	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Luke Espindola	Sampler Size/Type: 24" Split Spoon	Elev.	Notes
Surface Elevation (ft): 23.5	Sampler Hammer (lbs)/Drop (in): 140lb/30"		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes	
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft		
24	0			MARINE SAND							
25	-1				10	S11	24/12	24.0-26.0	2 5 5 6	Loose to compact, gray SAND, trace silt (MARINE SAND).	
26	-2										
27	-3										
28	-4										
29	-5										
30	-6					11	S12	24/14.5	29.0-31.0	3 5 6 8	Compact, gray SAND, trace silt, trace clay (MARINE SAND).
31	-7										
32	-8										
33	-9										
34	-10										
35	-11					13	S13	24/15	34.0-36.0	4 7 6 9	Compact, brown SAND, trace silt (MARINE SAND).
36	-12										
37	-13										
38	-14										
39	-15										
40	-16		40.0 / -16.5		8	S14	12/6	39.0-40.0	3 5	Loose, gray SAND, trace silt (MARINE SAND).	
41	-17			MARINE CLAY	14	S15	12/7	40.0-41.0	9 5	Stiff, gray silty CLAY, trace sand (MARINE CLAY).	
42	-18										
43	-19										
44	-20										
45	-21					13	S16	24/14	44.0-46.0	2 6 7 23	Stiff, gray silty CLAY (MARINE CLAY).
	-22										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:
Weather: Partly Sunny



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Project: Somerville Public Works Building	Job #: 7088	Boring No.:
Location: 90 Washington St.	Date Started: 4-23-21	MA-6
City/State: Somerville, MA	Date Finished: 4-23-21	

Contractor: GeoSearch	Casing Type: 3" Casing	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Luke Espindola	Sampler Size/Type: 24" Split Spoon	Elev.	Notes
Surface Elevation (ft): 23.5	Sampler Hammer (lbs)/Drop (in): 140lb/30"		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes
					N-Value	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6"	
					RQD				Min/ft	
47	-23		47.0 / -23.5	MARINE CLAY						
48	-24			GLACIAL TILL	43	S17	24/19	48.0-50.0	24	Dense, gray SAND, some clay, some gravel (GLACIAL TILL). Roller bit encountered cobble at 51' below ground surface.
49	21									
50	22									
51	38									
52	-27									
53	-28									
54	-29									
55	-30								30	Very dense, gray SAND, some clay, some gravel (GLACIAL TILL). Sampler refusal at 54.5' below ground surface.
56	-31		54.5 / -31.0		51	S18	18/16	53.0-54.5	27	
57	-32			Bottom of borehole at 54.5 feet below ground surface.					24	
58	-33								100/1"	
59	-34									
60	-35									
61	-36									
62	-37									
63	-38									
64	-39									
65	-40									
66	-41									
67	-42									
68	-43									
	-44									
	-45									

GRANULAR SOILS		SOIL COMPONENT	
BLOWS/FT.	DENSITY	DESCRIPTIVE TERM	PROPORTION OF TOTAL
0-4	V. LOOSE	"TRACE"	0-10%
4-10	LOOSE	"SOME"	10-20%
10-30	COMPACT	"ADJECTIVE" (eg SANDY, SILTY)	20-35%
30-50	DENSE	"AND"	35-50%
>50	V. DENSE		
COHESIVE SOILS		Notes:	
BLOWS/FT.	CONSISTENCY	Weather: Partly Sunny	
<2	V. SOFT		
2-4	SOFT		
4-8	FIRM		
8-15	STIFF		
15-30	V. STIFF		
>30	HARD		



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Project: Somerville Public Works Building	Job #: 7088	Boring No.
Location: 90 Washington St.	Date Started: 4-15-21	MA-7
City/State: Somerville, MA	Date Finished: 4-15-21	

Contractor: GeoSearch	Casing Type: 4 1/4" HSA	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-15-21	6
Surface Elevation (ft): 18.3	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes
		12.3	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft	
	18		0.3 / 18.0	ASPHALT						
1	17			FILL	28	S1	18/10	0.5-2.0	7 12 16	Compact, light brown gravelly SAND, trace silt, varying to black to gray silty SAND, some gravel (FILL).
2	16				19	S2	24/16	2.0-4.0	11 11 8 5	Compact, black to gray silty SAND, some gravel, w/ brick, ash and cinders, and glass (FILL).
3	15				2	S3	24/12	4.0-6.0	WOH 1 1 9	Very loose, gray to blue to black SILT and SAND, some gravel, w/ petroleum odor and staining from 5' to 6' (FILL).
4	14		6.0 / 12.3	REINFORCED CONCRETE						
5	13		6.1 / 12.2		n/a	S4	1/1	6.0-6.1	100/1"	Very dense, gray to brown SILT and SAND, some gravel, w/ concrete in the spoon tip (FILL). Note: Auger refusal at 7' below ground surface due to reinforced concrete layer.
6	12			Bottom of borehole 6.1 feet below ground surface.						
7	11									
8	10									
9	9									
10	8									
11	7									
12	6									
13	5									
14	4									
15	3									
16	2									
17	1									
18	0									
19	-1									
20	-2									
21	-3									
22	-4									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:

Weather: Partly Sunny



McPHAIL ASSOCIATES, LLC
 2269 MASSACHUSETTS AVENUE
 CAMBRIDGE, MA 02140
 TEL: 617-868-1420
 FAX: 617-868-1423

Page 1 of 1

Project: Somerville Public Works Building	Job #: 7088	Boring No.
Location: 90 Washington St.	Date Started: 4-15-21	MA-7A
City/State: Somerville, MA	Date Finished: 4-15-21	

Contractor: GeoSearch	Casing Type: 4 1/4" HSA	Groundwater Observations	
Driller/Helper: Chris/Mike	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Julian Finney	Sampler Size/Type: 24" Split Spoon	4-15-21	6
Surface Elevation (ft): 18.3	Sampler Hammer (lbs)/Drop (in): 140lb/30"	Elev.	Notes
		12.3	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample					Sample Description and Boring Notes	
					N-Value RQD	No.	Pen./Rec. (in)	Depth (ft)	Blows/6" Min/ft		
1	18		0.3 / 18.0	ASPHALT							
2	17			FILL							
3	16										
4	15										
5	14										
6	13										
7	12										
8	11		7.5 / 10.8	CONCRETE							
9	10		8.0 / 10.3	FILL	5	S1	24/10	8.0-10.0	3 2 3 8	Loose, dark brown silty SAND, some gravel, w/ concrete from 8' to 8.2' (FILL). Roller bit advanced through concrete from 7.5' to 8' below ground surface.	
10	9										
11	8		10.0 / 8.3								
12	7			ORGANIC DEPOSIT	7	S2	24/2	10.0-12.0	6 1 WOH WOH	Very soft to soft, black to gray ORGANIC SILT, w/ trace peat fibers and petroleum odor and sheen (ORGANIC DEPOSIT).	
13	6					n/a	S3	24/8	12.0-14.0	WOH WOH WOH WOH	Very soft, black to gray, ORGANIC SILT, some clay, w/ trace peat fibers and petroleum odor and sheen (ORGANIC DEPOSIT).
14	5		14.0 / 4.3	MARINE SAND							
15	4					13	S4	24/10	14.0-16.0	1 2 11 13	Compact, blue to gray, SAND, trace gravel, trace silt, w/ faint petroleum odor (MARINE SAND).
16	3										
17	2					34	S5	24/16	16.0-18.0	17 16 18 25	Dense, blue to gray, SAND, some silt, trace gravel, w/ faint petroleum odor (MARINE SAND).
18	1										
19	0		19.0 / -0.7	MARINE CLAY							
20	-1					15	S6	24/10	19.0-21.0	6 8 7 7	Stiff to very stiff, blue to gray silty CLAY, some sand (MARINE CLAY).
21	-2										
22	-3										
23	-4				10	S7	24/18	21.0-23.0	4 5 5 6	Stiff, blue to gray silty CLAY (MARINE CLAY).	
24	-5		23.0 / -4.7								
	-6			Bottom of borehole 23 feet below ground surface.							

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

SOIL COMPONENT		
DESCRIPTIVE TERM	PROPORTION OF TOTAL	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

Notes:
Weather: Partly Sunny



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Page 1 of 1



APPENDIX C:
PREVIOUS EXPLORATION LOGS

CARR-DEE CORP.

37 LINDEN STREET

P.O. BOX 67

MEDFORD, MA 02155-0001

Telephone (781) 391-4500

To: MCPHAIL ASSOCIATES, LLC, 2269 MASS. AVE., CAMBRIDGE, MA

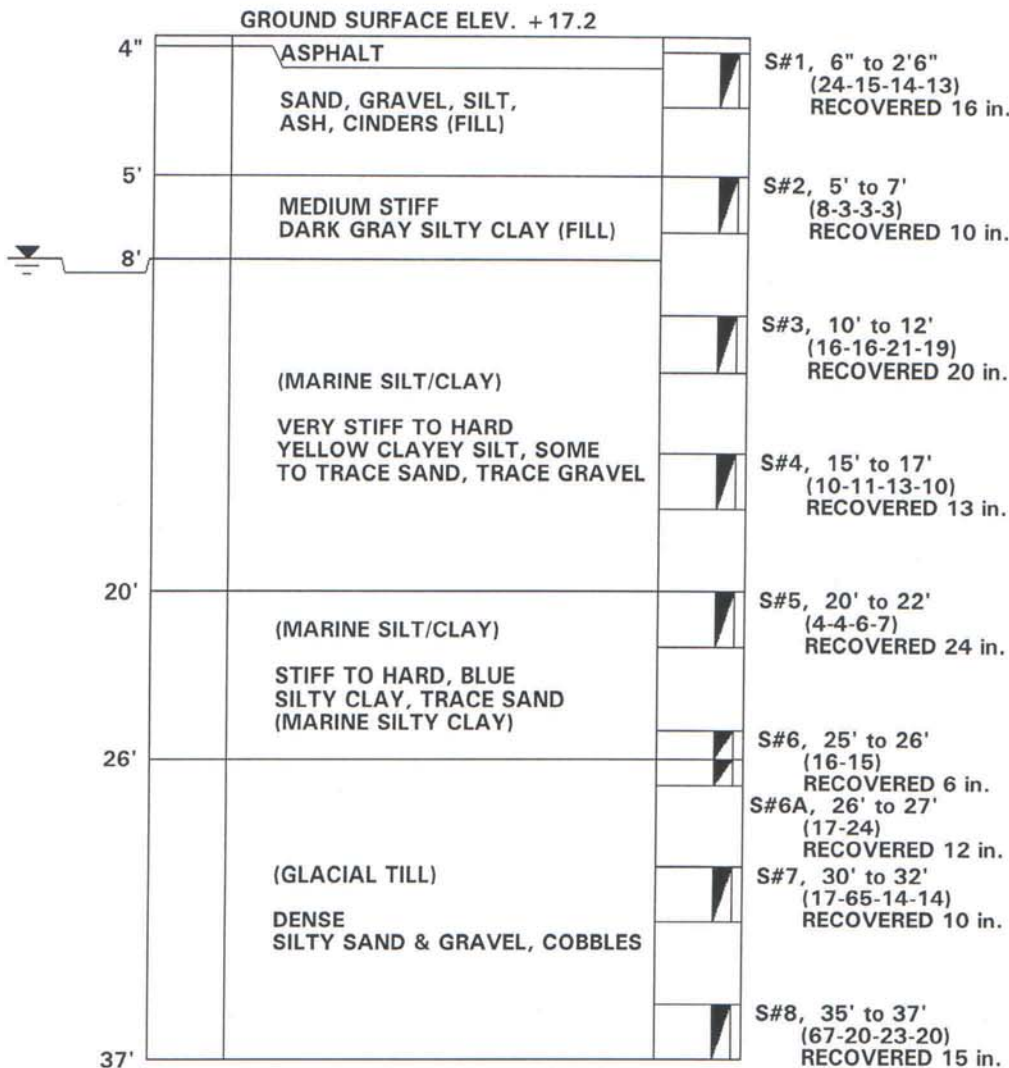
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-1



WATER LEVEL 8'
 SIZE OF CASING: NW, LENGTH: 10'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-18-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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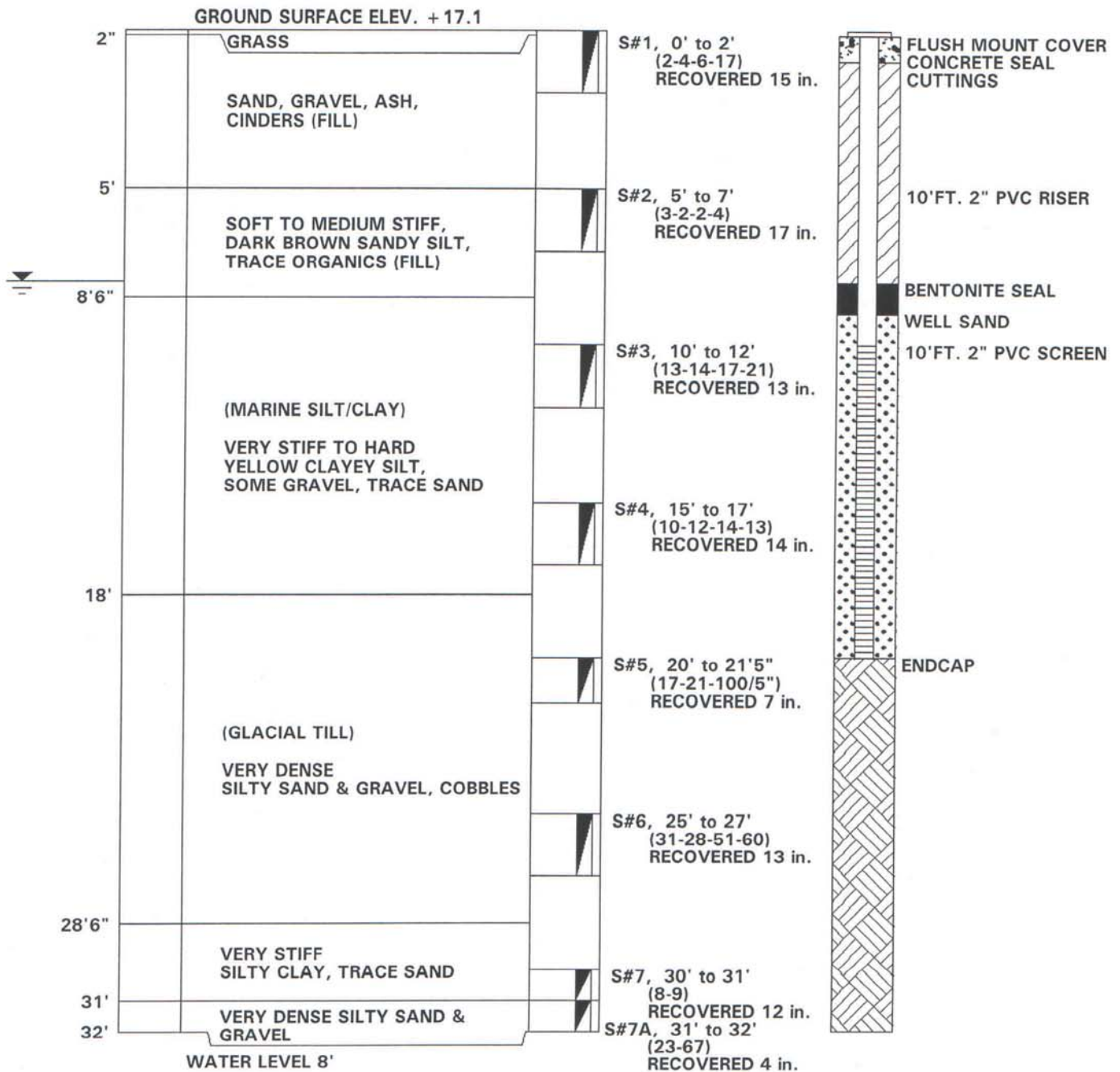
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 5 ft.

BORING B-2



SIZE OF CASING: NW, LENGTH: 25'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-19-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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Date: _____

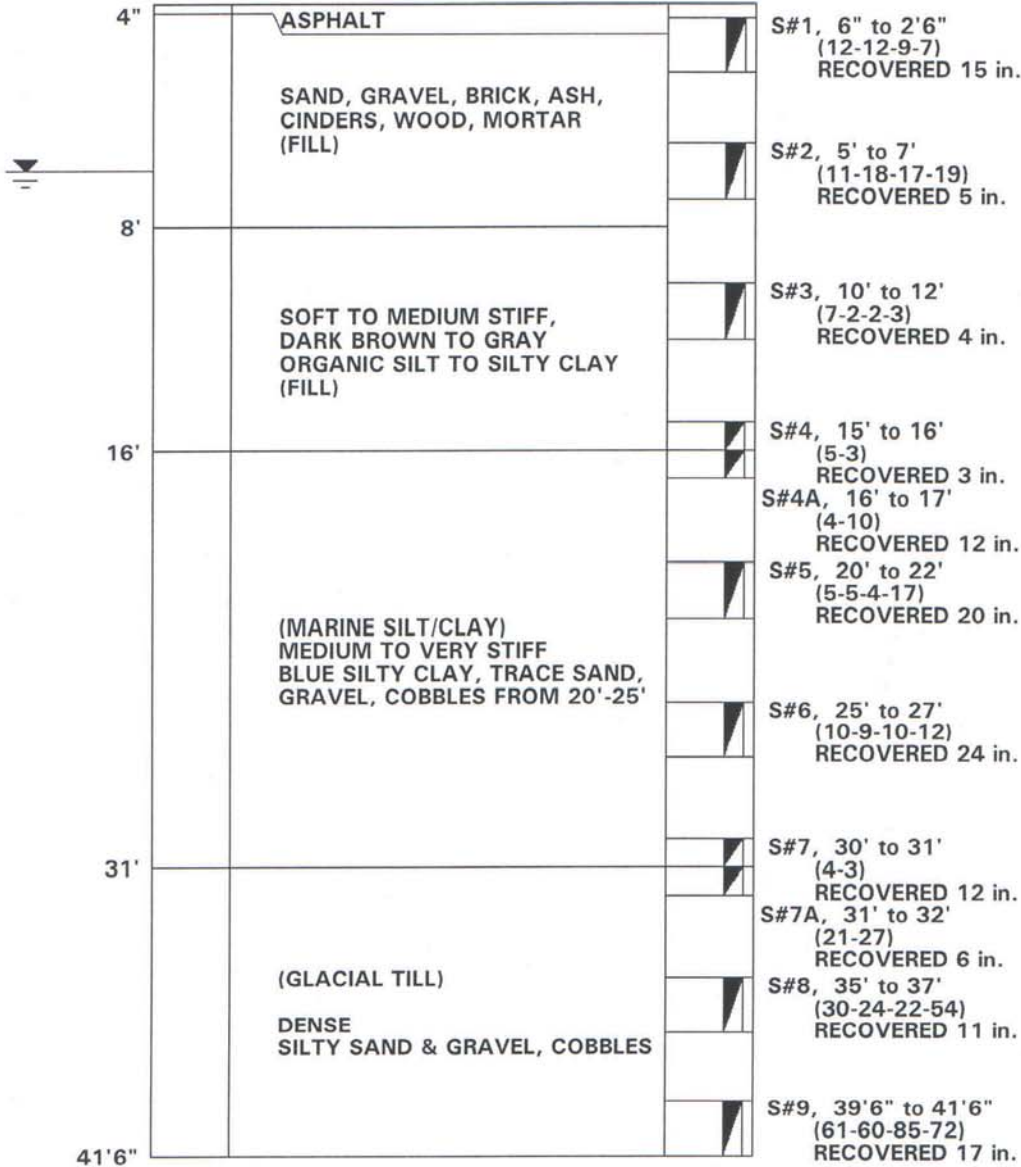
Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-3

GROUND SURFACE ELEV. + 17.0



WATER LEVEL 6'
 SIZE OF AUGERS: 3-3/4" ID, LENGTH: 10'0"
 SIZE OF CASING: NW, LENGTH: 25'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-18-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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Date: _____

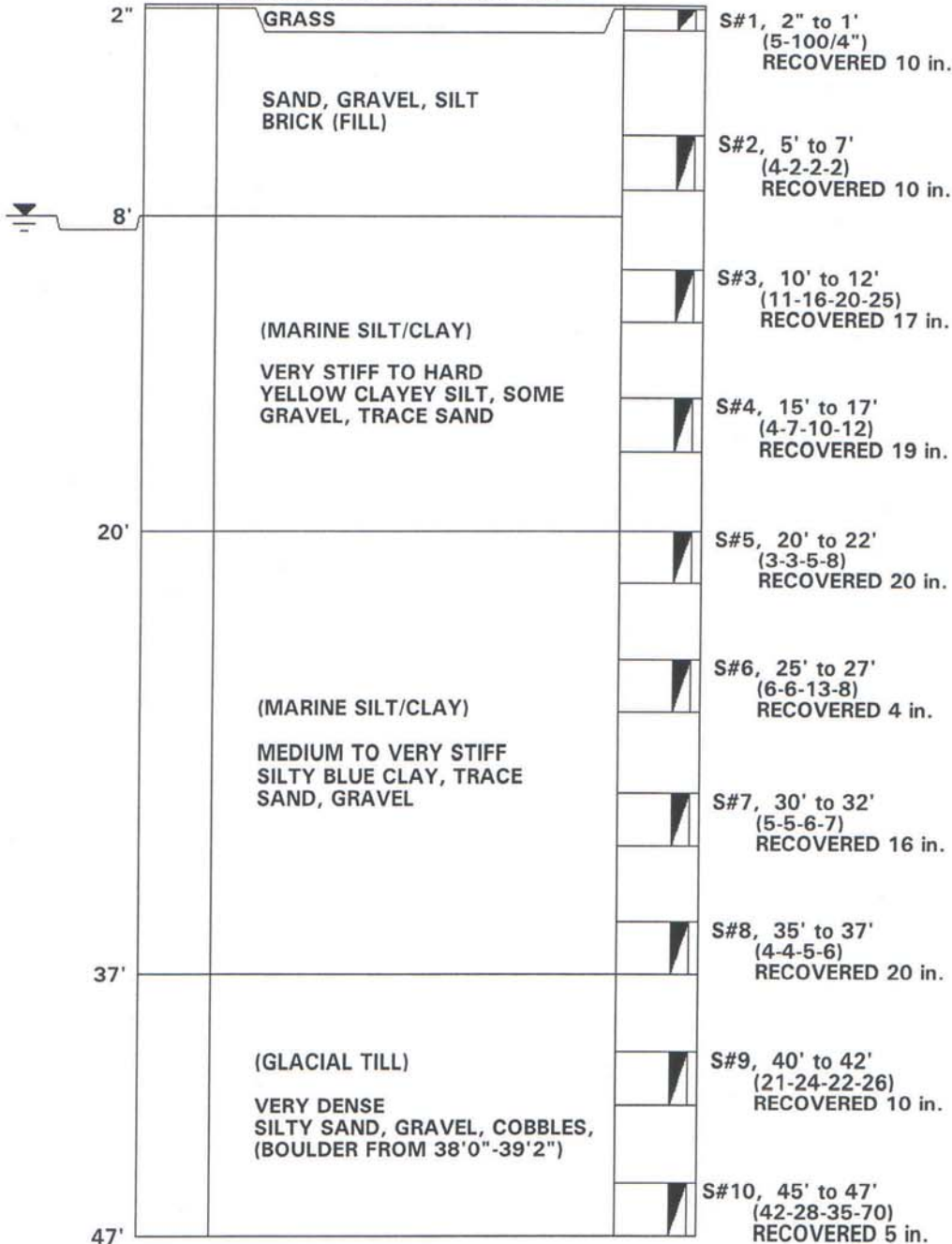
Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-4

GROUND SURFACE ELEV. + 17.2



WATER LEVEL 8'
 SIZE OF CASING: NW, LENGTH: 30'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-19-22-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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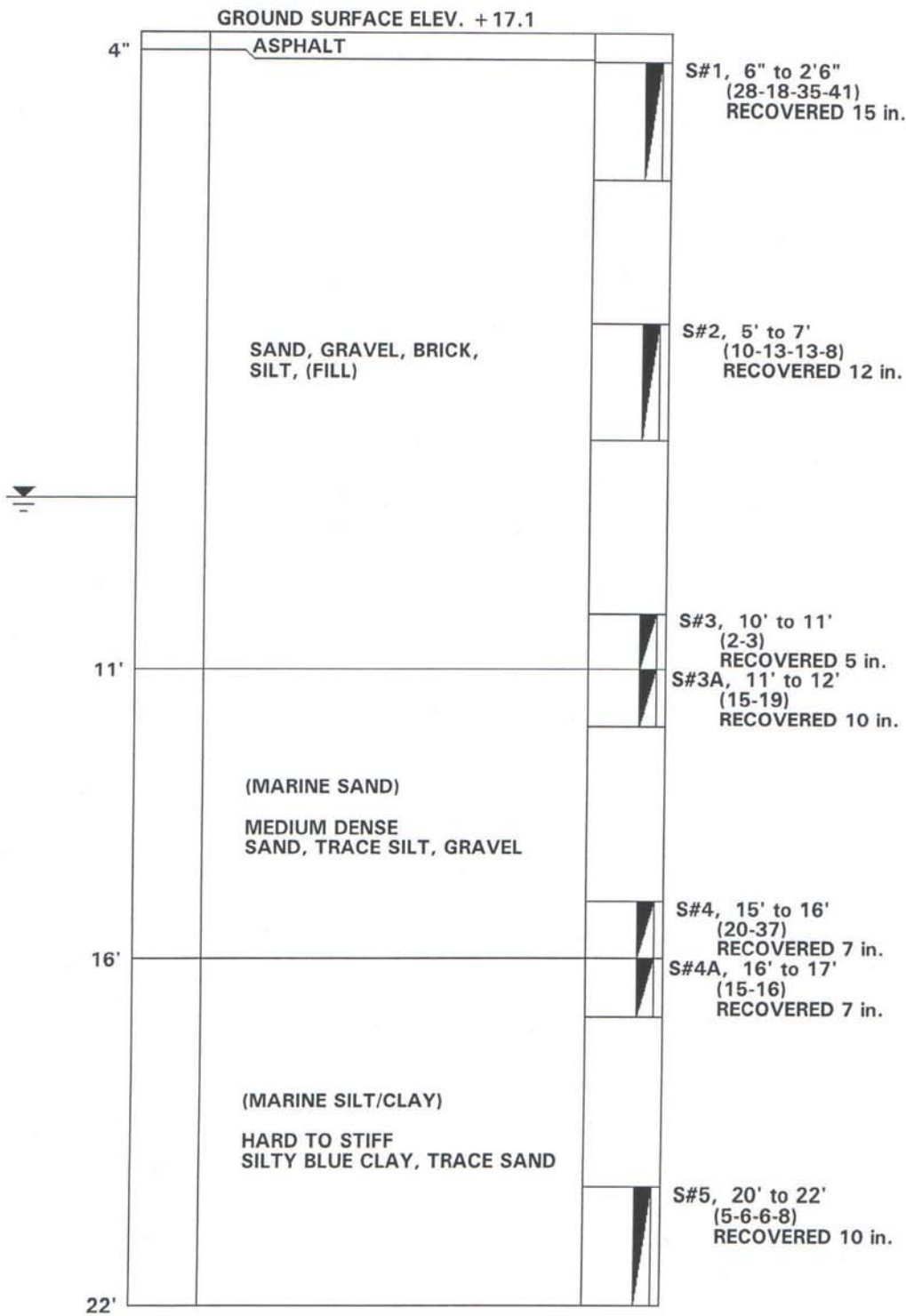
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING B-5



WATER LEVEL 8'

SIZE OF CASING: NW, LENGTH: 18'0"

DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS

DATE STARTED & COMPLETED: 10-25-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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Date:

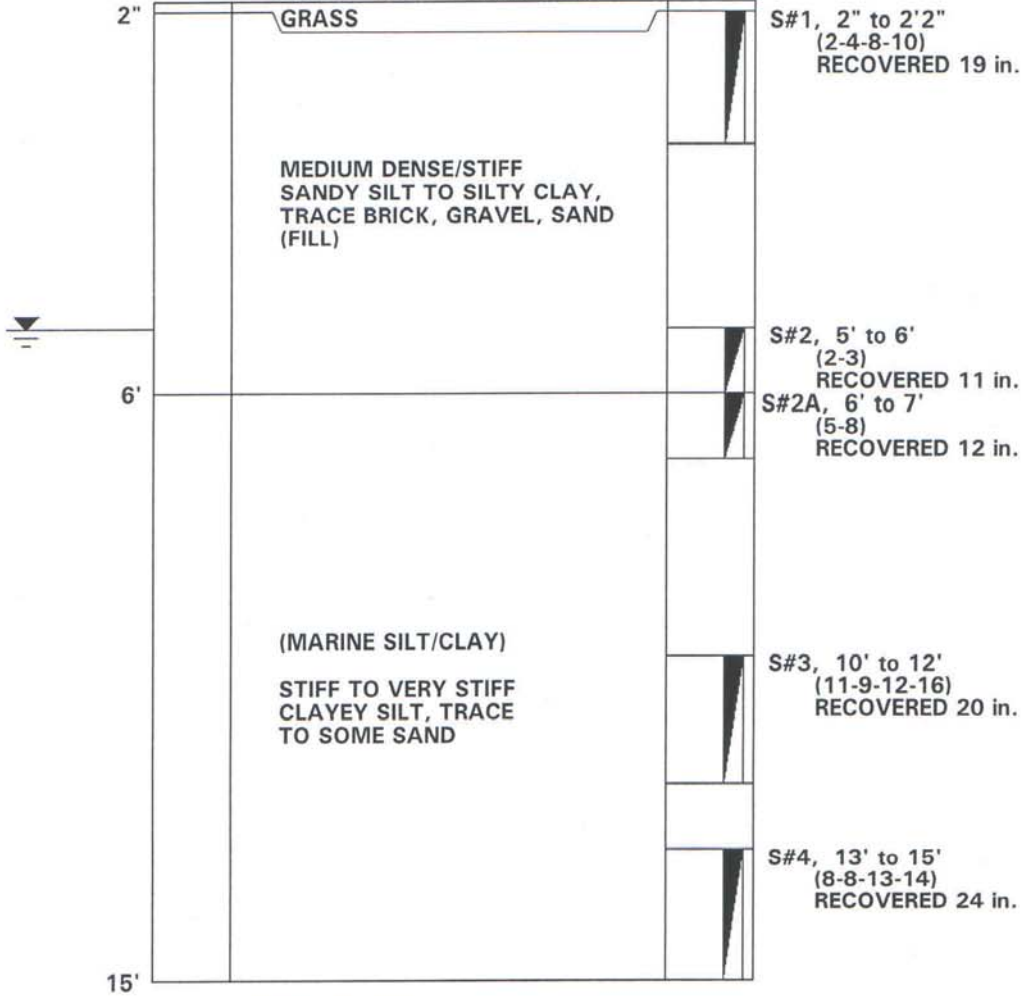
Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING B-6

GROUND SURFACE ELEV. +16.3



WATER LEVEL 5'

SIZE OF AUGERS: 3-3/4" ID, LENGTH: 13'0"

DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS

DATE STARTED & COMPLETED: 10-23-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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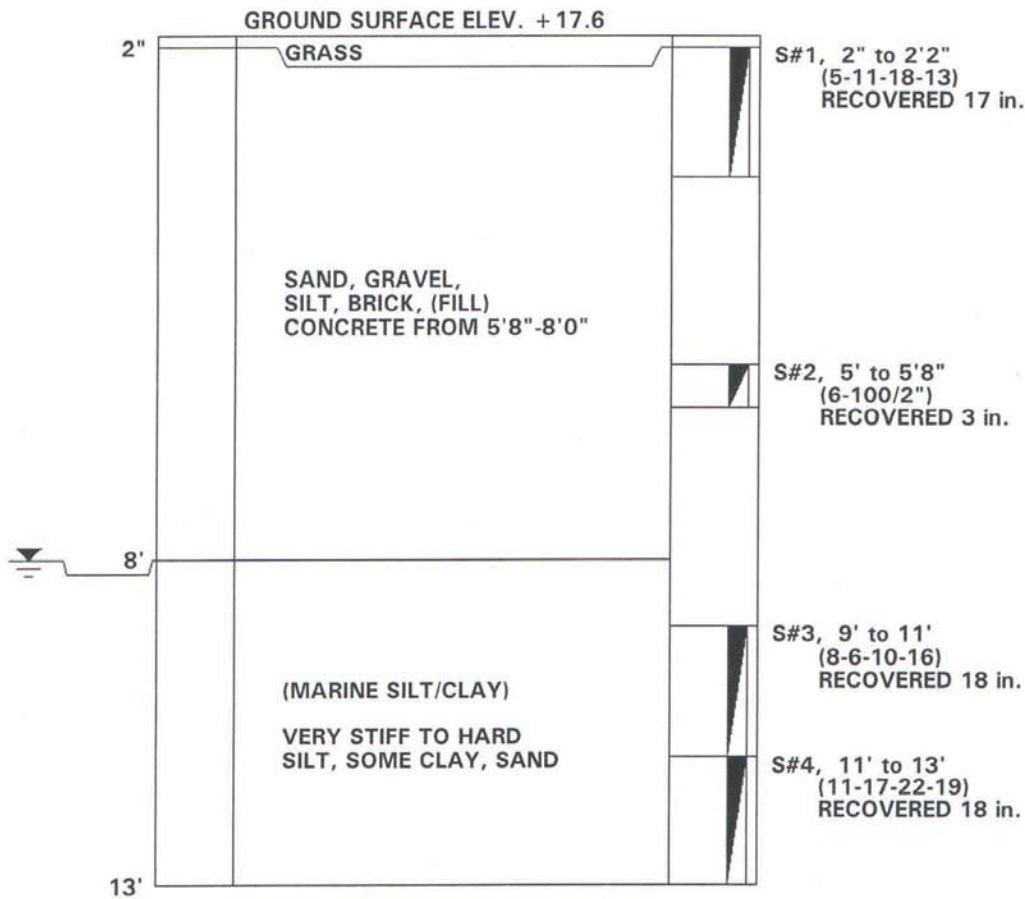
Date:

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING B-7



WATER LEVEL 8'

SIZE OF AUGERS: 3-3/4" ID, LENGTH: 9'0"

DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS

DATE STARTED & COMPLETED: 10-23-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (\pm). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (\pm).

CARR-DEE CORP.

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MEDFORD, MA 02155-0001

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Date: _____

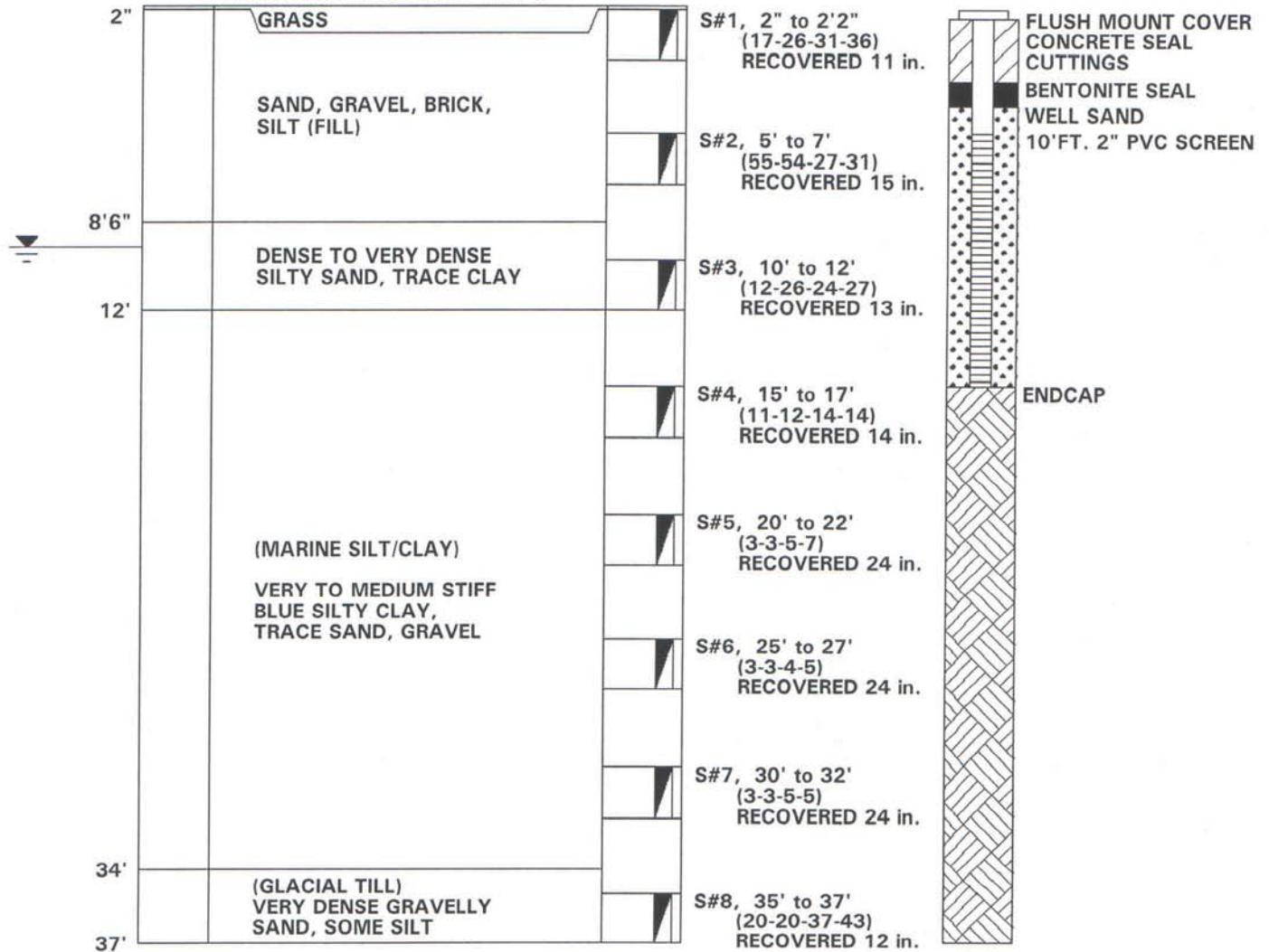
Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-8

GROUND SURFACE ELEV. +17.8



WATER LEVEL 9'6"

SIZE OF CASING: NW, LENGTH: 15'0"
 DRILLER: G. SMITH, INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-22-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

37 LINDEN STREET

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MEDFORD, MA 02155-0001

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To: MCPHAIL ASSOCIATES, LLC, 2269 MASS. AVE., CAMBRIDGE, MA

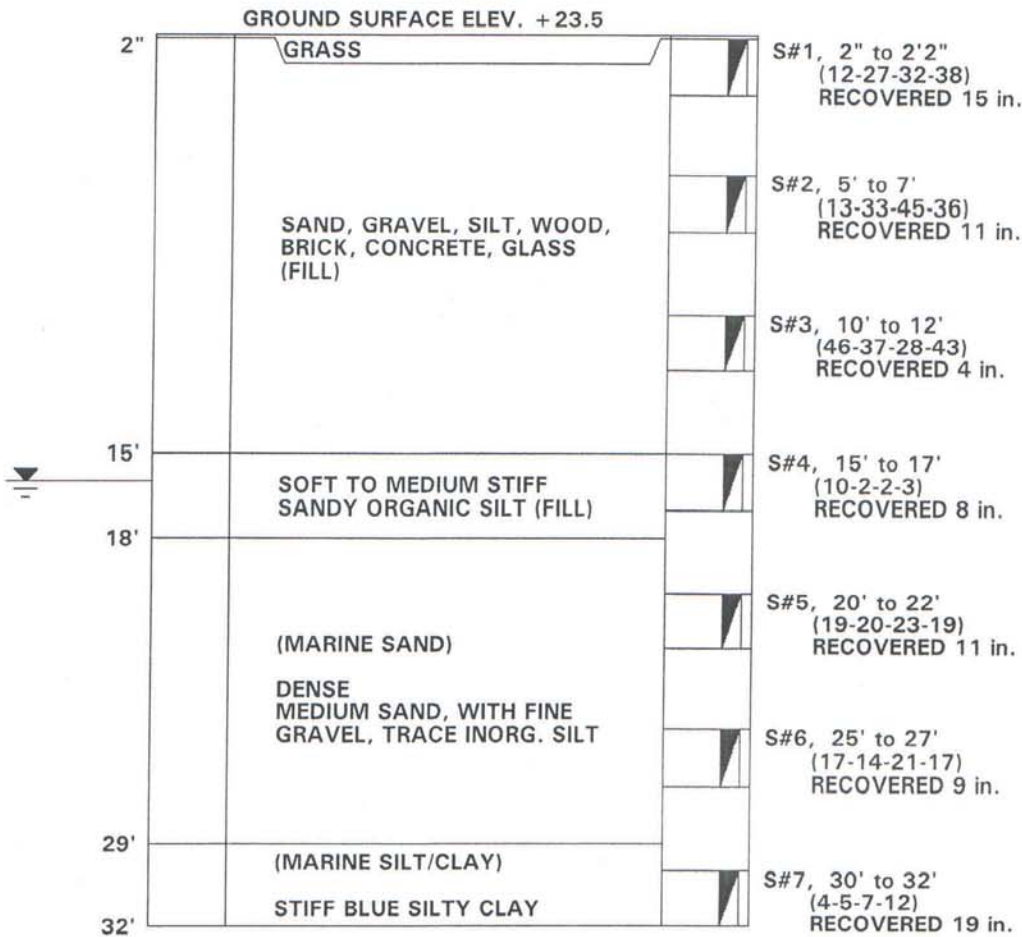
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-9



WATER LEVEL 16'
 SIZE OF CASING: NW, LENGTH: 30'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-22-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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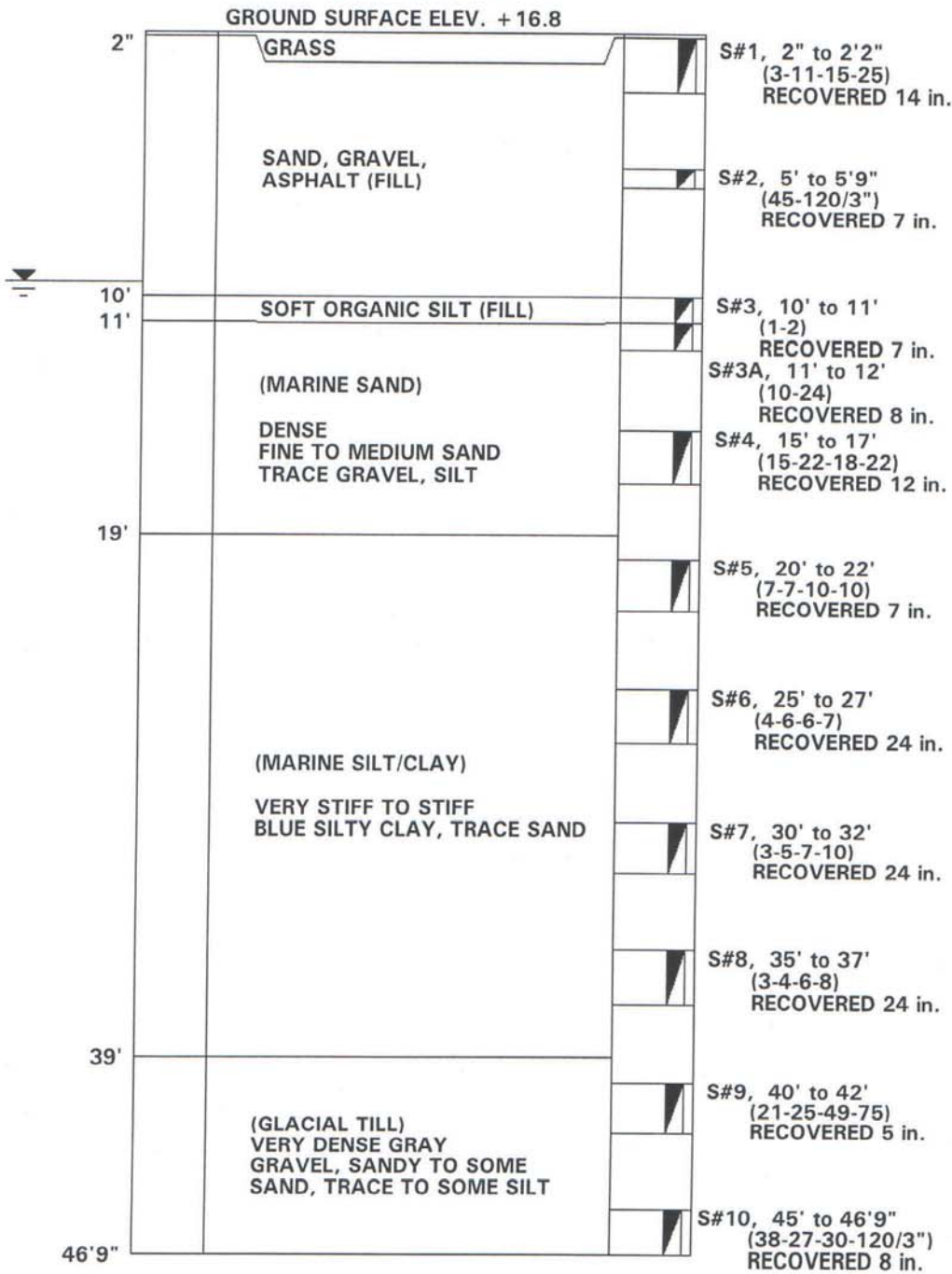
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-10



WATER LEVEL 9'6"
 SIZE OF CASING: NW, LENGTH: 20'0"
 DRILLER: G. SMITH, INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-19-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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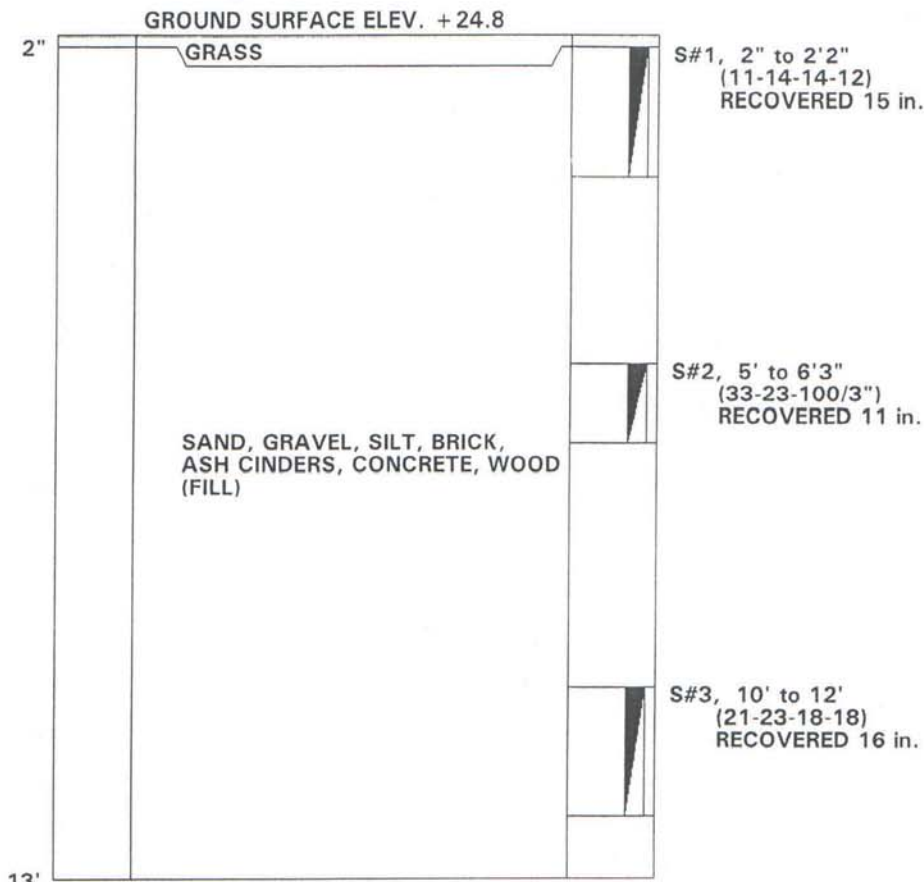
Date:

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING B-11



- REFUSAL -
NO PENETRATION WITH AUGERS
NO WATER ENCOUNTERED
SIZE OF AUGERS: 2-1/4" ID, LENGTH: 13'0"
DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
DATE STARTED & COMPLETED: 10-24-2012
NOTE: MADE TWO ALTERNATES, MOVED 5' SOUTH REFUSAL @ 3'0",
MOVED 40' SOUTH ROLLER BIT REFUSAL @ 4'6"

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

37 LINDEN STREET

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MEDFORD, MA 02155-0001

Telephone (781) 391-4500

To: MCPHAIL ASSOCIATES, LLC, 2269 MASS. AVE., CAMBRIDGE, MA

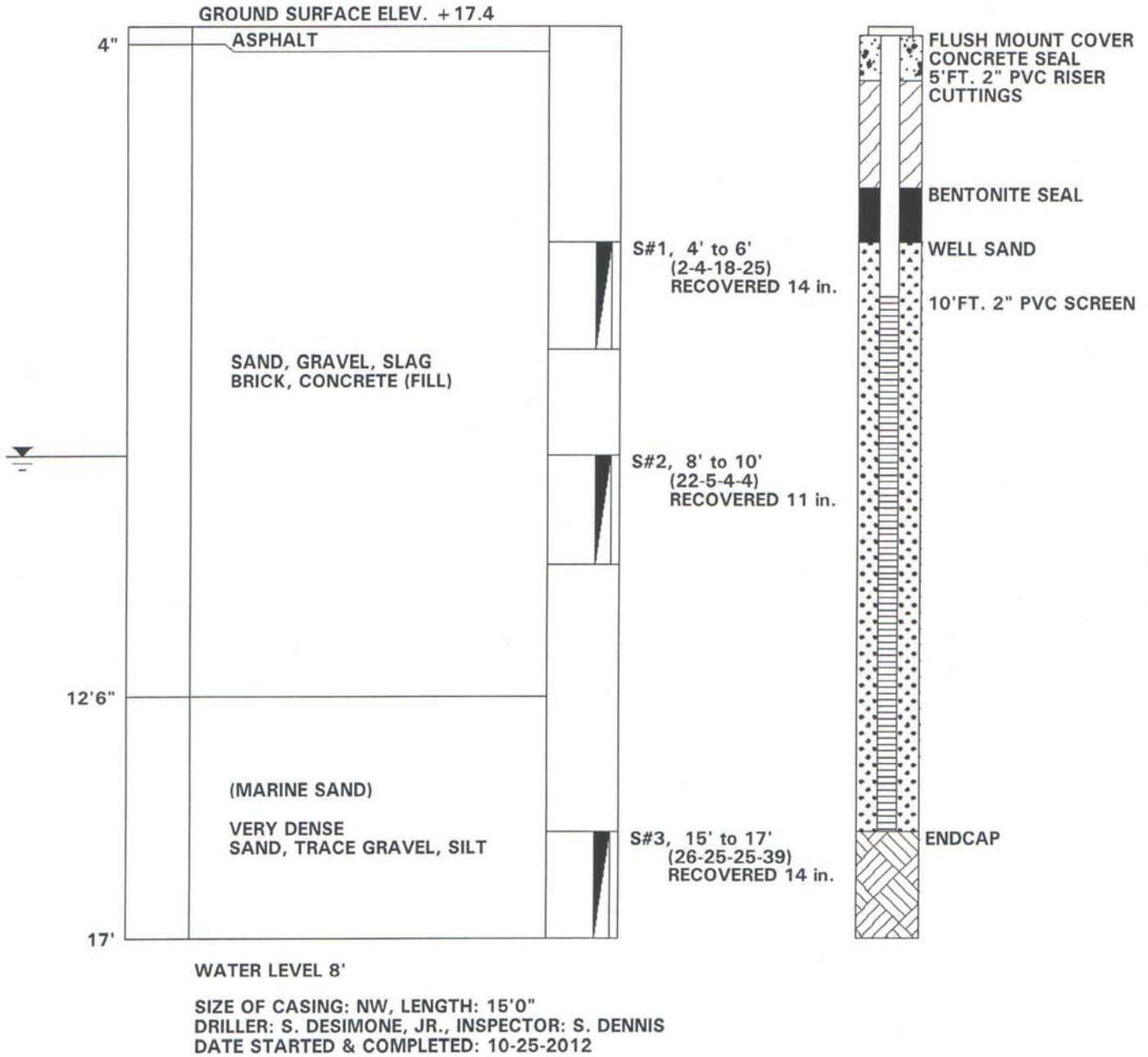
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING B-11A



All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

37 LINDEN STREET

P.O. BOX 67

MEDFORD, MA 02155-0001

Telephone (781) 391-4500

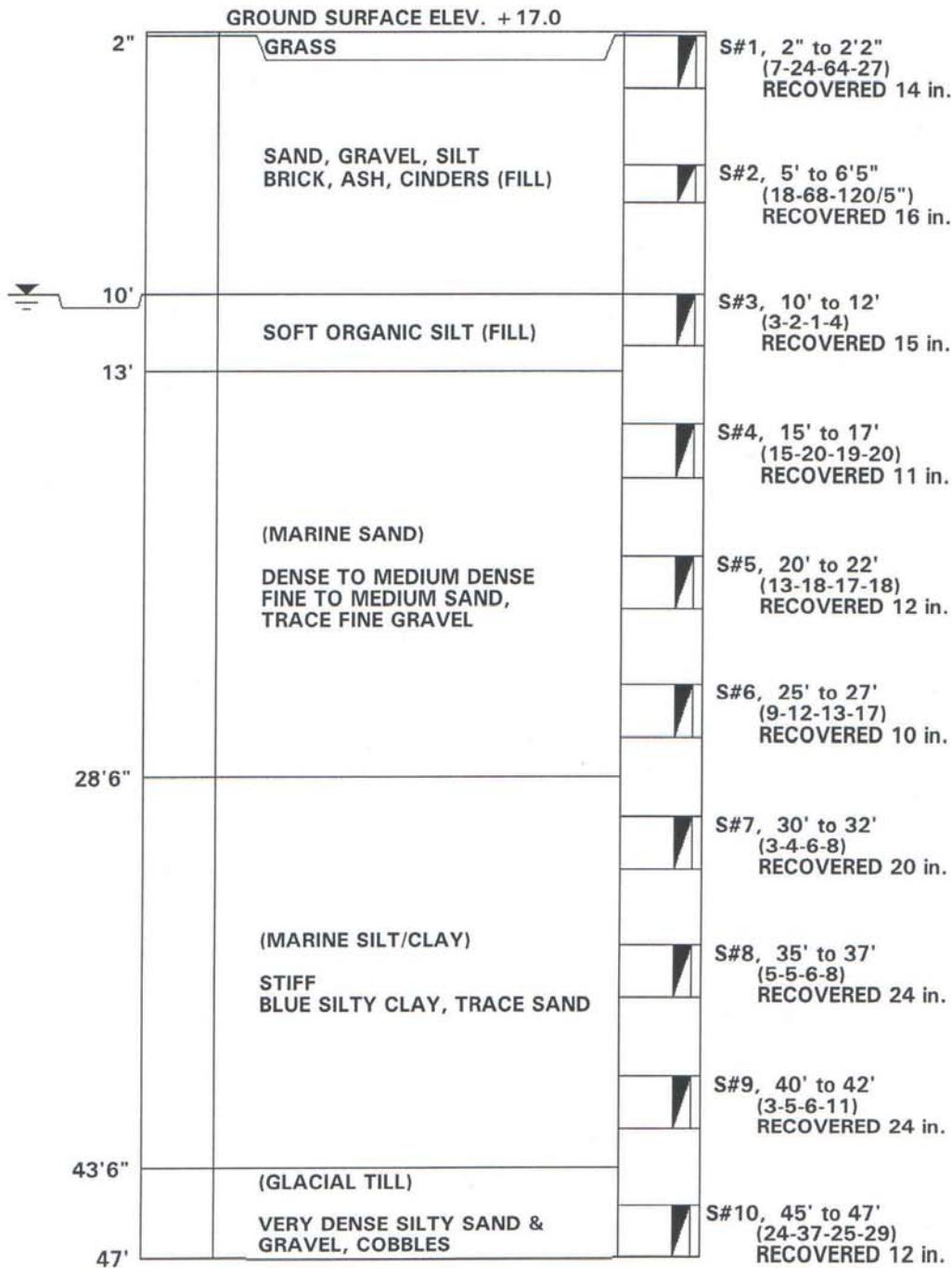
To: MCPHAIL ASSOCIATES, LLC, 2269 MASS. AVE., CAMBRIDGE, MA

Date: _____ Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 7 ft.

BORING B-12



WATER LEVEL 10'
 SIZE OF CASING: NW, LENGTH: 30'0"
 DRILLER: G. SMITH, INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-19-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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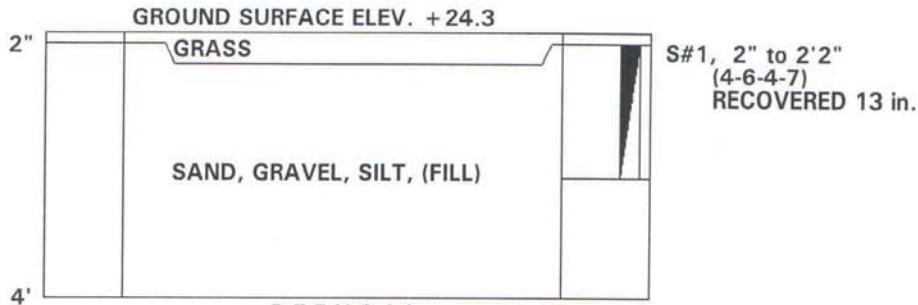
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING EBI-1



- R E F U S A L -
NO PENETRATION WITH AUGERS
NO WATER ENCOUNTERED
SIZE OF AUGERS: 2-1/4" ID, LENGTH: 3'0"
DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
DATE STARTED & COMPLETED: 10-24-2012
NOTE: MADE 3 ALTERNATES, MOVED 5' SOUTH REFUSAL @ 2'0",
MOVED 30' NORTH REFUSAL @ 4'0", MOVED 30'NORTH & 3'WEST REFUSAL @ 2'0"

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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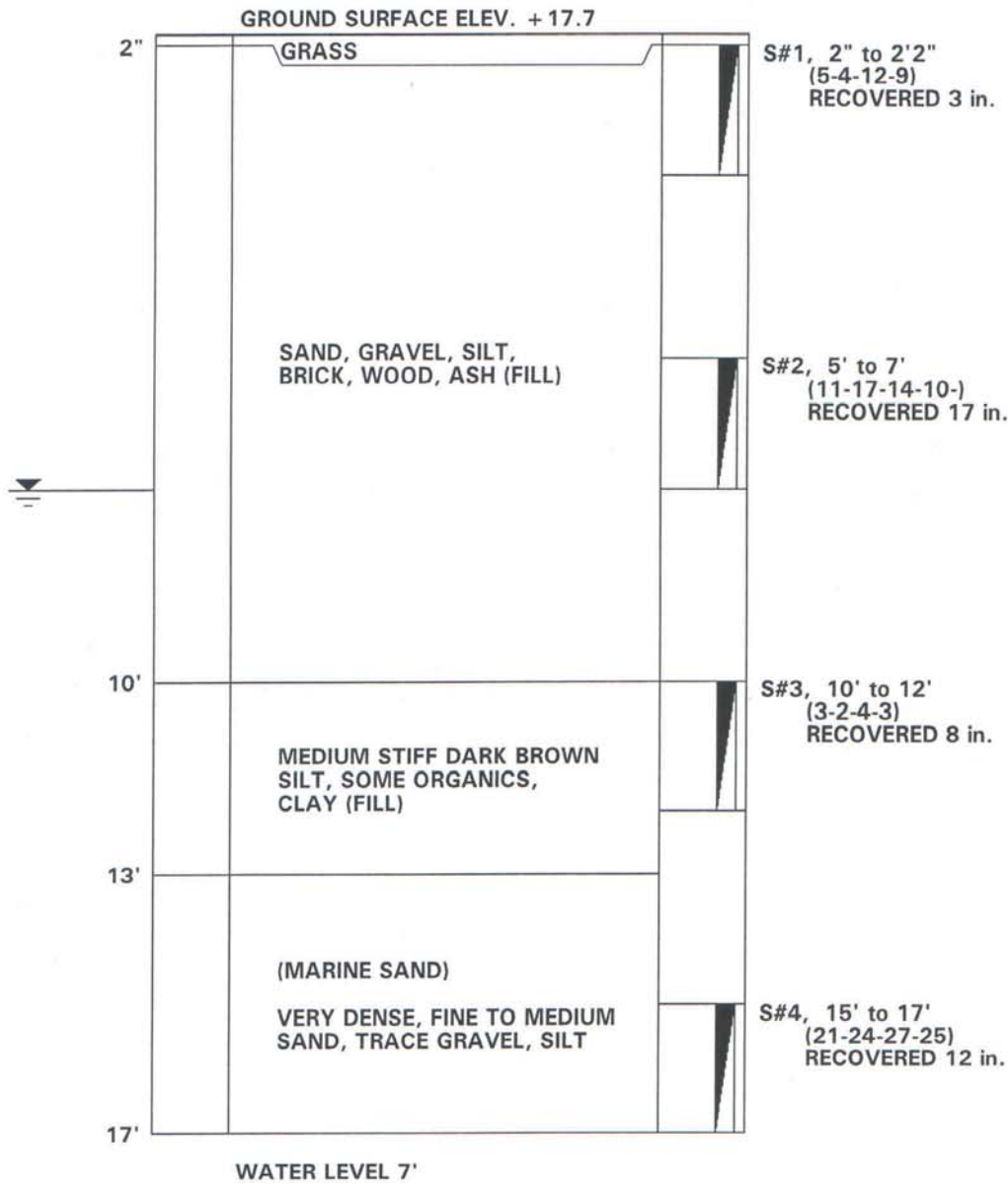
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING EBI-1A



SIZE OF CASING: NW, LENGTH: 15'0"
 DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
 DATE STARTED & COMPLETED: 10-25-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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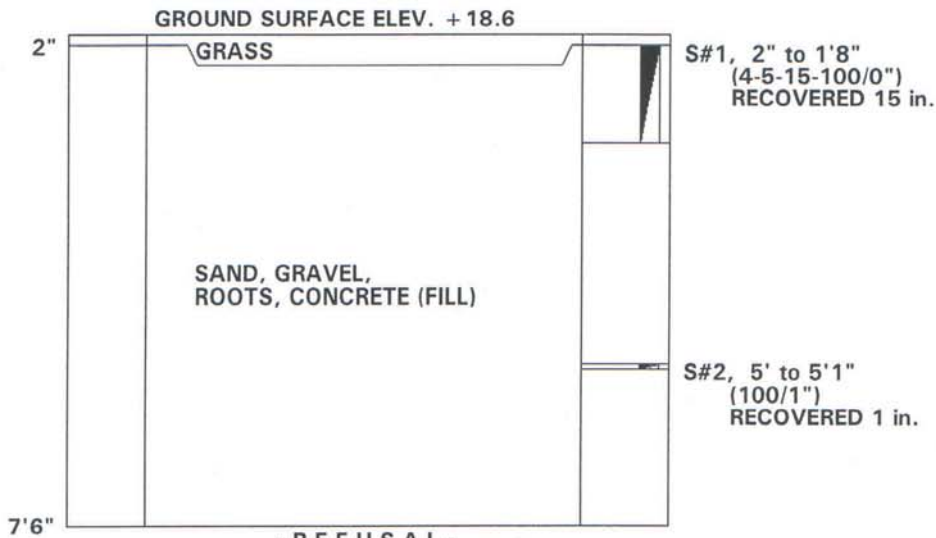
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING PH-1



- REFUSAL -
NO PENETRATION WITH AUGERS
NO WATER ENCOUNTERED
SIZE OF AUGERS: 2-1/4" ID, LENGTH: 7'6"
DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
DATE STARTED & COMPLETED: 10-24-2012
NOTE: MADE 2 ALTERNATES, MOVED 15' SOUTH REFUSAL @ 2'6"
MOVED 18' SOUTH REFUSAL @ 2'0"

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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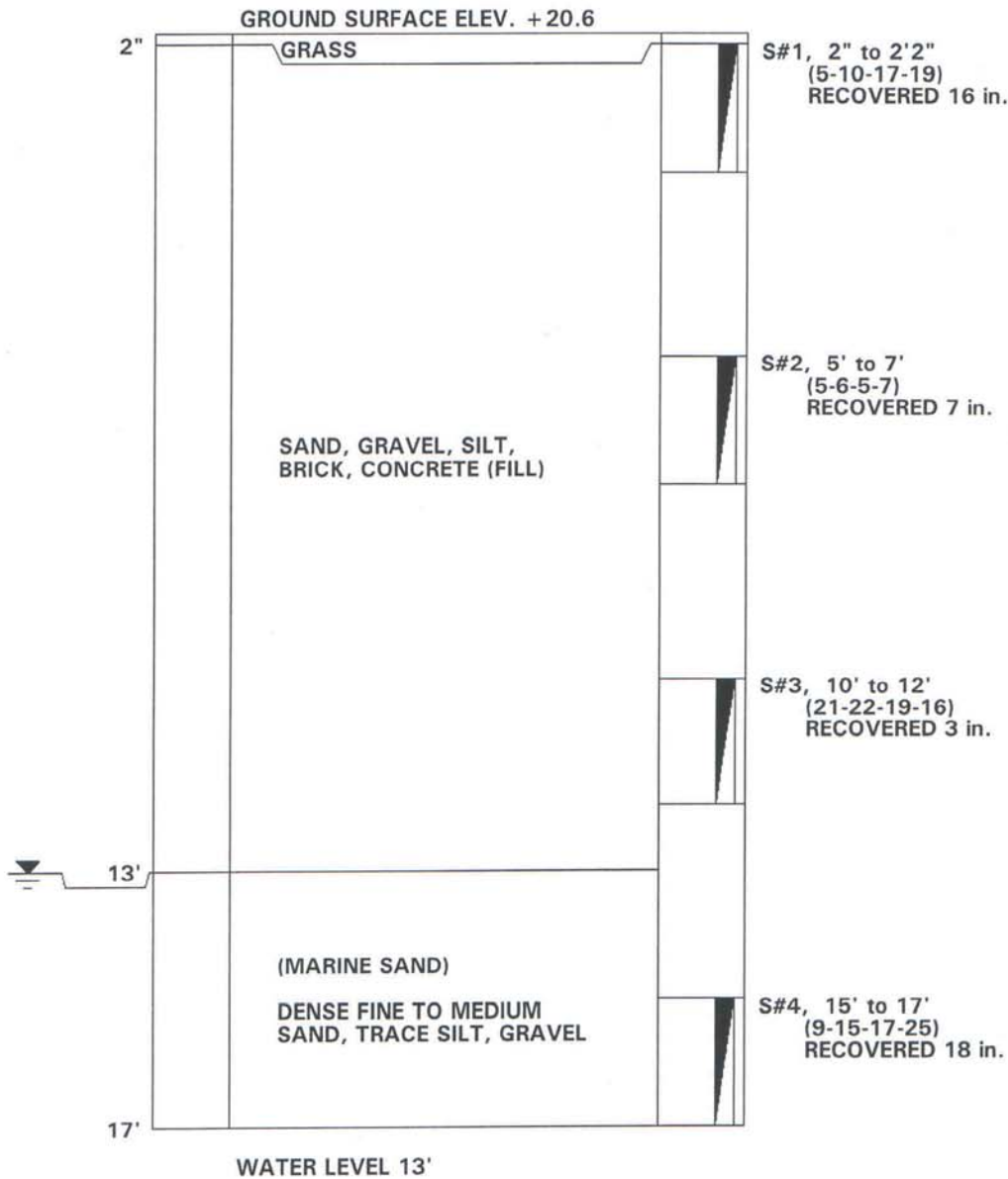
Date:

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING PH-2



SIZE OF AUGERS: 3-3/4" ID, LENGTH: 17'0"
DRILLER: S. DESIMONE, JR., INSPECTOR: S. DENNIS
DATE STARTED & COMPLETED: 10-23-2012

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

37 LINDEN STREET

P.O. BOX 67

MEDFORD, MA 02155-0001

Telephone (781) 391-4500

To: MCPHAIL ASSOCIATES, LLC, 2269 MASS. AVE., CAMBRIDGE, MA

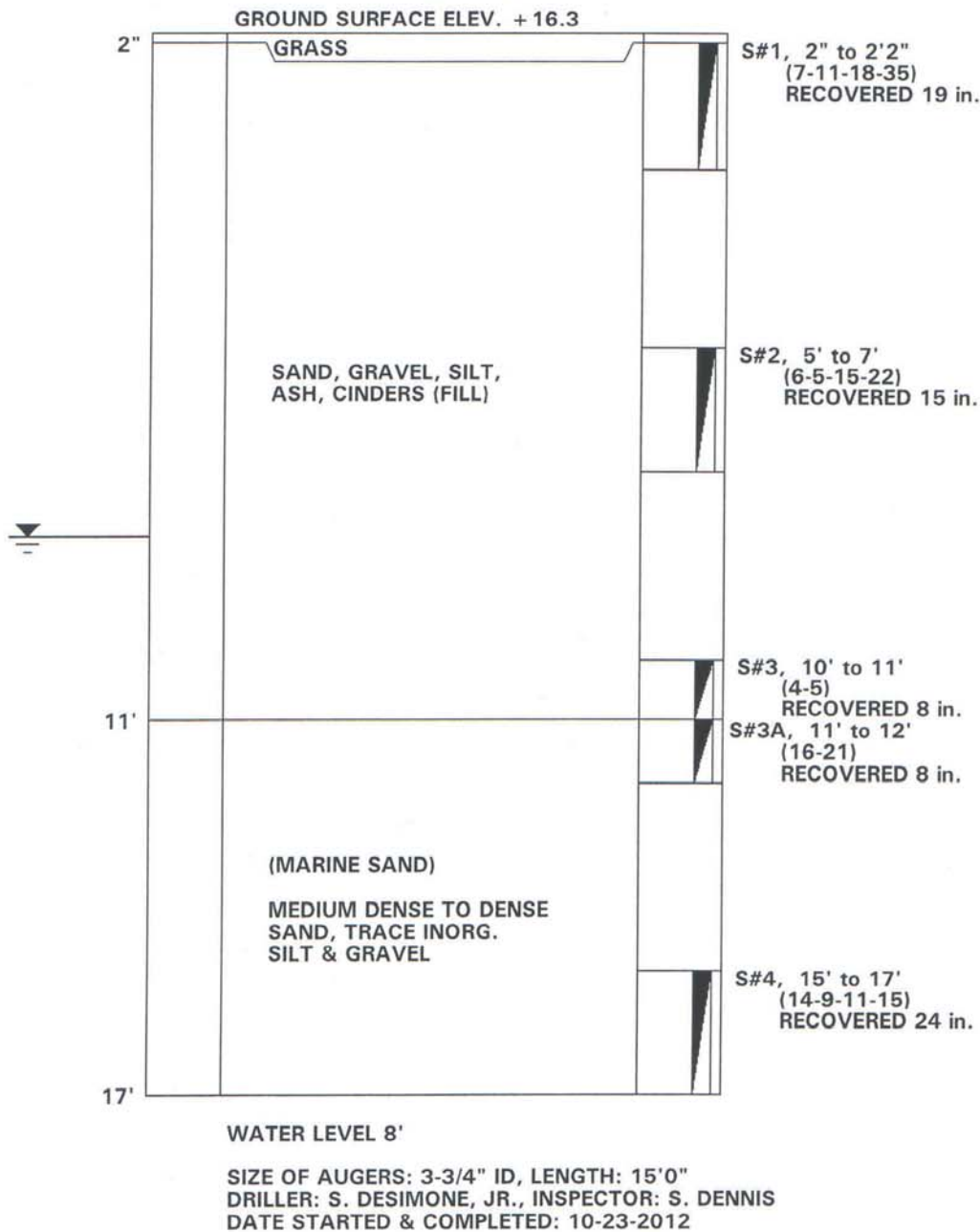
Date: _____

Job No.: 2012-154

Location: COBBLE HILL REDEVELOPMENT, SOMERVILLE, MA

Scale: 1 in. = 3 ft.

BORING PH-3



All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches (\pm). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (\pm).

Drilling Company: *Harvey Associates*

Date Started: 5/9/2012

Log of Borehole: EB-1

Drilling Foreman: *Doug*

Date Ended: 5/9/2012

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120128*

Burlington, MA

Borehole Diameter: 2"

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
							100 300	
0	Asphalt							
0	Tan, f. SAND and SILT, dry							
1	Black/gray, fn. SAND and SILT, crs sand, gravel, brick, dry		S-1	3.5	NA	Core	0	
2								
3								
4	Black/gray, fn. SAND and SILT, crs sand, gravel, brick, dry							
5	Sample collected: 6-8'							
6			S-2	2	NA	Core	0	
7								
8	Gray, CLAY, damp, petroleum odor							
9								
10			S-3	3	NA	Core	0	
11								
12								
13								
14								

Temp well set at 12'

Drilling Company: *Harvey Associates*

Date Started: 5/9/2012

Log of Borehole: EB-3

Drilling Foreman: *Doug*

Date Ended: 5/9/2012

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120128*

Burlington, MA

Borehole Diameter: 2"

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
							100 300	
0	Asphalt							
1	Brown, fn. SAND and SILT, gravel, clay, cobbles, dry							
2		S-1	4	NA	Core	0		
3								
4	Black/gray, CLAY, fn. sand, some coal, dry							
6		S-2	3.5	NA	Core	0		
7								
8	Gray, CLAY, petroleum odor, damp Sample collected: 8-10'							
10		S-3	4	NA	Core	0		
11								
12	Tan, CLAY, dense, damp Refusal @ 15'							
13		S-4	3	NA	Core	0		
14								
15								

Drilling Company: *Harvey Associates*

Date Started: 5/9/2012

Log of Borehole: **EB-6**

Drilling Foreman: *Doug*

Date Ended: 5/9/2012

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: 12120128

Burlington, MA

Borehole Diameter: 2"

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Grass						100 300	
1	Black/brown, fn.-med. SAND, silt, gravel, brick, concrete, coal, wood, cobbles, dry							
2			S-1	3	NA	Core	0	
3								
4	Black/brown, fn.-med. SAND, silt, gravel, brick, concrete, coal, wood, cobbles, wet @ 8'							
5								
6	sample collected: 6-8'		S-2	2	NA	Core	0	
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-202

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction
Depth	Description	Strata	No.	Rec.	SPT Blows	Type	
							100
0	Brown, fn.-med. SAND, some gravel, dry						
1	Crushed concrete						
2	Black/gray, fn. SAND, some silt, dense, asphalt, rock, concrete, dry, petroleum odor		S-1	3	NA	Core	4
3	sample collected: 3-5'						
4	Black/gray, fn. SAND, some silt, dense, asphalt, rock, concrete, dry						
5	Boring refusal @ 5.5'		S-2	2	NA	Core	2
6							
7							
8							
9							
10							
11							
12							
13							
14							

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-203

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction
Depth	Description	Strata	No.	Rec.	SPT Blows	Type	
							100
0	Brown, fn.-med. SAND, trace gravel, dry						
1	Crushed stone, asphalt						
2	Black, fn.-med. SAND, some silt, tr. clay, asphalt, cobbles, dry		S-1	3	NA	Core	0
3	sample collected: 2-4'						
4	Black/gray, fn. SAND, some silt, some clay, dry						
5							
6			S-2	2	NA	Core	0
7	Black, fn. SAND, some silt, wet @ 8'						
8	Sample B: 6-8'						
9							
10							
11							
12							
13							
14							

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-204

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
							100 300	
0	Brown, fn.-med. SAND, trace silt, dry							
1	Gray/black, fn. SAND, some silt, tr. gravel, slight petro odor							
2	sample: 2-4'		S-1	2	NA	Core	0	
3								
4	Brown, fn. SAND, some silt, damp @ 7'							
5								
6			S-2	2	NA	Core	0	
7								
8								
9								
10								
11								
12								
13								
14								

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-205

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Asphalt						100 300	
	Brown, fn. SAND, tr. gravel, dry							
1	Crushed stone, brick							
2	Gray, fn. SAND, some silt, tr. clay, asphalt, brick, dry		S-1	3	NA	Core	0	
3								
4	Gray, fn. SAND, some silt, tr. clay, asphalt, brick, damp @ 6'							
5	sample collected: 4-6'		S-2	2	NA	Core	0	
6								
7								
8								
9								
10								
11								
12								
13								
14								

Drilling Company: *Harvey Associates*

Date Started: 10/16/2012

Log of Borehole: **EB-206**

Drilling Foreman: *Doug*

Date Ended: 10/16/2012

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: 12120277

Burlington, MA

Borehole Diameter: 2"

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Grass						100 300	
	Dark brown, fn. SAND, some silt, dry							
1	Black, crs. SAND, some gravel, rock, asphalt, ash, coal							
2			S-1	3	NA	Core	0	
3								
4	Black, crs. SAND, some gravel, rock, asphalt, ash, coal							
5	sample collected: 3-5'							
6	Crushed stone		S-2	2	NA	Core	0	
7	Brown, fn.-med. SAND, some silt, damp							
8								
9								
10								
11								
12								
13								
14								

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-207

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Grass							
	Dark brown, fn. SAND, some silt, dry							
1	Crushed brick							
2	Black, fn. SAND, some silt, tr. crs. sand, brick, gravel, dry		S-1	3	NA	Core	0	
3								
4	Black, fn. SAND, some silt, tr. crs. sand, brick, gravel, wood, asphalt, dry							
5								
6			S-2	3	NA	Core	0	
7								
8	Black, fn. SAND, some silt, tr. crs. sand, brick, gravel, wood, asphalt, damp @ 12'							
9	sample collected: 8-10'							
10			S-3	3	NA	Core	0	
11								
12								
13								
14								

Drilling Company: *Harvey Associates*

Date Started: *10/16/2012*

Log of Borehole: EB-208

Drilling Foreman: *Doug*

Date Ended: *10/16/2012*

EBI Consulting

EBI Geologist/Scientist: *B. White*

Project Location: *Somerville, MA*

21 B Street

Drilling Method: *Directpush*

Project Number: *12120277*

Burlington, MA

Borehole Diameter: *2"*

Sheet: *1 of 1*

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
							100 300	
	Grass							
	Brown, fn. SAND, dry							
1								
2	Black/gray, fn.-med. SAND, some silt, some crs. sand, gravel, concrete, cobbles, asphalt, dry		S-1	3	NA	Core	0	
3								
4								
5	Black/gray, fn.-med. SAND, some silt, some crs. sand, gravel, concrete, cobbles, asphalt, dry							
6			S-2	3	NA	Core	0	
7	Black, crs. SAND, gravel, ash, concrete, dry							
8								
9	Black, crs. SAND, gravel, ash, concrete, dry							
10	sample collected: 8-10'							
10	Gray, CLAY, damp		S-3	3	NA	Core	0	
11								
12								
13								
14								

Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-301
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 17.3	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
	17		0.5 / 16.8	TOPSOIL					
1	16			FILL		P1	48/48	0.0-4.0	0' - 0.5': LOOSE, DARK BROWN SILTY SAND, TRACE GRAVEL, ROOTS. 0.5' - 4': LOOSE TO COMPACT, DARK BROWN TO GRAY GRAVELLY SAND, TRACE TO SOME SILT.
2	15								
3	14								
4	13		4.0 / 13.3						
	13			END OF EXPLORATION 4'					
5	12								
6	11								
7	10								
8	9								
9	8								
10	7								
11	6								
12	5								
13	4								
14	3								
15	2								

<u>SOIL COMPONENT</u>	<u>PROPORTION OF TOTAL</u>	<u>DESCRIPTIVE TERM</u>
SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"	0-10%	"TRACE"
	10-20%	"SOME"
	20-35%	"ADJECTIVE" (eg SANDY, SILTY)
	35-50%	"AND"

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Page 1 of 1

Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-302
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 18.2	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
18									
17									
2	16			FILL		P1	48/38	0.0-4.0	LOOSE TO COMPACT, BROWN TO GRAY SILTY SAND, SOME GRAVEL.
3	15								
4	14		4.0 / 14.2	END OF EXPLORATION 4'					
5	13								
6	12								
7	11								
8	10								
9	9								
10	8								
11	7								
12	6								
13	5								
14	4								
15	3								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Page 1 of 1

Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-303
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	8
Surface Elevation (ft): 17.1	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
			9.1

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes		
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)			
			0.3 / 16.9	ASPHALT (3")							
1	16			FILL		P1	48/24	0.0-4.0	COMPACT, BROWN TO GRAY TO RED SAND AND GRAVEL, TRACE SILT, BRICK.		
2	15										
3	14										
4	13										
5	12										
6	11							P2	48/24	4.0-8.0	4' - 7': COMPACT, GRAY TO RED, WELL GRADED MIXTURE OF SAND, GRAVEL, AND BRICK, TRACE SILT. 7' - 8': LOOSE, GRAY TO BLACK SILTY FINE SAND, TRACE WOOD. PETROLEUM STAINING AND ODOR NOTED.
7	10										
8	9				8.0 / 9.1						
9	8			MARINE SILT/CLAY		P3	48/48	8.0-12.0	STIFF, LIGHT BROWN SANDY SILT, SOME CLAY, TRACE TO SOME GRAVEL.		
10	7										
11	6										
12	5				12.0 / 5.1						
13	4			END OF EXPLORATION 12'							
14	3										
15	2										

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Page 1 of 1

Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-304
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	7
Surface Elevation (ft): 17.0	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
			10.0

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
1	16		0.3 / 16.8	ASPHALT (3")					
2	15			FILL		P1	60/60	0.0-5.0	COMPACT, GRAY TO BLACK, SAND AND GRAVEL, TRACE SILT, BRICK.
3	14								
4	13								
5	12								
6	11		6.5 / 10.5	MARINE SILT/CLAY					
7	10					P2	60/60	5.0-10.0	5' - 6.5': COMPACT, DARK BROWN SAND, SOME SILT, TRACE GRAVEL, ASH AND CINDERS.
8	9								6.5' - 10': FIRM TO STIFF, GRAY TO 9', BROWN 9' - 10', CLAYEY SILT TO SILT WITH SOME CLAY, SOME SAND, TRACE GRAVEL.
9	8								
10	7		10.0 / 7.0	END OF EXPLORATION 10'					
11	6								
12	5								
13	4								
14	3								
15	2								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No. EBI-305
Location: 90 Washington Street	Date Started: 2-18-14	
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 17.1	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
1	16		0.3 / 16.9	ASPHALT (3")					
2	15			FILL		P1	48/45	0.0-4.0	COMPACT, BROWN TO BLACK SAND AND GRAVEL, TRACE TO SOME SILT, TRACE BRICK.
3	14								
4	13		4.0 / 13.1	END OF EXPLORATION 4'					
5	12								
6	11								
7	10								
8	9								
9	8								
10	7								
11	6								
12	5								
13	4								
14	3								
15	2								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Page 1 of 1

Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-306
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	7
Surface Elevation (ft): 17.2	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		10.2	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
	17		0.3 / 17.0	ASPHALT (3")					
1	16								
2	15					P1	60/54	0.0-5.0	COMPACT, BROWN TO GRAY TO BLACK SAND, SOME GRAVEL, SOME SILT, TRACE BRICK.
3	14								
4	13								
5	12								
6	11			FILL					
7	10					P2	60/36	5.0-10.0	STIFF TO FIRM, DARK BROWN SANDY SILT, TRACE BRICK.
8	9								
9	8								
10	7								
11	6								
12	5								
13	4		13.0 / 4.2			P3	60/36	10.0-15.0	10' - 13': SOFT TO FIRM, DARK BROWN SILT AND SAND, TRACE GRAVEL. 13' - 15': FIRM TO STIFF, BROWN TO GRAY SANDY SILT, TRACE TO SOME CLAY, TRACE GRAVEL.
14	3			MARINE SILT/CLAY					
15	2		15.0 / 2.2	END OF EXPLORATION 15'					

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-307
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	10
Surface Elevation (ft): 17.3	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		7.3	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
	17		0.3 / 17.1	ASPHALT (3")					
1	16								
2	15					P1	60/60	0.0-5.0	COMPACT, BROWN TO BLACK SAND AND GRAVEL, TRACE TO SOME SILT.
3	14								
4	13								
5	12								
6	11			FILL					
7	10					P2	60/50	5.0-10.0	COMPACT, BROWN TO BLACK, GRAVELLY SAND, SOME ASH AND CINDERS, TRACE SILT.
8	9								
9	8								
10	7								
11	6								
12	5		12.0 / 5.3						
13	4			MARINE SAND		P3	60/54	10.0-15.0	10' - 12': COMPACT, BROWN TO BLACK SAND, SOME GRAVEL, TRACE ASH AND CINDERS, SILT. 12' - 15': COMPACT, GRAY FINE TO MEDIUM GRAINED SAND, TRACE SILT. MEDIUM TO COARSE GRAINED SAND FROM 14' - 15'.
14	3								
15	2		15.0 / 2.3						
				END OF EXPLORATION 15'					

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-308
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	10
Surface Elevation (ft): 17.2	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		7.2	

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
	17		0.3 / 17.0	ASPHALT (3")					
1	16			FILL		P1	60/60	0.0-5.0	COMPACT, BROWN TO GRAY SAND AND GRAVEL, TRACE SILT, ASH AND CINDERS.
2	15								
3	14								
4	13								
5	12								
6	11					P2	36/36	5.0-8.0	COMPACT, BROWN TO DARK BROWN SAND, SOME SILT, GRAVEL.
7	10								
8	9								
9	8								
10	7					P3	48/40	8.0-12.0	8' - 10.5': SOFT, DARK BROWN SILT, SOME SAND, TRACE CLAY.
11	6		10.5 / 6.7	MARINE SAND					10.5' - 12': COMPACT, BROWNISH GRAY FINE TO MEDIUM GRAINED SAND, TRACE SILT.
12	5		12.0 / 5.2	END OF EXPLORATION 12'					
13	4								
14	3								
15	2								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-309
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	8
Surface Elevation (ft): 16.0	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
			0.3 / 15.8	ASPHALT (3")					
1	15	[Cross-hatch symbol]		FILL					
2	14				P1	60/36	0.0-5.0	COMPACT, BROWN TO BLACK SILTY SAND, SOME GRAVEL, TRACE SILT.	
3	13								
4	12								
5	11								
6	10								
7	9					P2	60/40	5.0-10.0	5' - 9': SOFT TO FIRM, DARK BROWN SANDY SILT, TRACE GRAVEL.
8	8								9' - 10': COMPACT, LIGHT GRAY, FINE TO MEDIUM GRAINED SAND, TRACE SILT.
9	7		9.0 / 7.0						
10	6		10.0 / 6.0	MARINE SAND					
				END OF EXPLORATION 10'					
11	5								
12	4								
13	3								
14	2								
15	1								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No. EBI-310
Location: 90 Washington Street	Date Started: 2-18-14	
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 15.7	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
			0.3 / 15.5	ASPHALT (3")						
1	15	[Cross-hatched symbol]								
2	14									
3	13				FILL		P1	60/36	0.0-5.0	COMPACT, LIGHT BROWN TO DARK GRAY SAND, SOME GRAVEL, TRACE SILT.
4	12									
5	11			5.0 / 10.7	END OF EXPLORATION 5'					
6	10									
7	9									
8	8									
9	7									
10	6									
11	5									
12	4									
13	3									
14	2									
15	1									

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No.
Location: 90 Washington Street	Date Started: 2-18-14	EBI-311
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 15.6	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
1	15		0.3 / 15.4	ASPHALT (3")					
2	14					P1	60/36	0.0-5.0	COMPACT, LIGHT BROWN TO BLACK SAND, SOME GRAVEL, TRACE SILT.
3	13			FILL					
4	12								
5	11		5.0 / 10.6	END OF EXPLORATION 5'					
6	10								
7	9								
8	8								
9	7								
10	6								
11	5								
12	4								
13	3								
14	2								
15	1								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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Project: Redevelopment of Cobble Hill Center	Job #: 5471	Geoprobe No. EBI-312
Location: 90 Washington Street	Date Started: 2-18-14	
City/State: Somerville, MA	Date Finished: 2-18-14	

Contractor: Bronson Drilling	Casing Type/Depth (ft): 3"	Groundwater Observations	
Driller/Helper: Daniel Bronson	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: Scott Dennis	Sampler Size/Type: N/A	2-18-14	NE
Surface Elevation (ft): 15.7	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		0.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
1	15		0.3 / 15.5	ASPHALT (3")					
2	14			FILL		P1	36/24	0.0-3.0	COMPACT, LIGHT TO DARK BROWN SAND AND GRAVEL, TRACE SILT.
3	13		3.0 / 12.7	END OF EXPLORATION 3'					
4	12								
5	11								
6	10								
7	9								
8	8								
9	7								
10	6								
11	5								
12	4								
13	3								
14	2								
15	1								

SOIL COMPONENT

<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	

Notes:

Total Volatile Organic Compounds (TVOC) Measured with PID Model:
 TVOC Background: ppm
 Weather: Snow Temperature:



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JOB NO. 5471

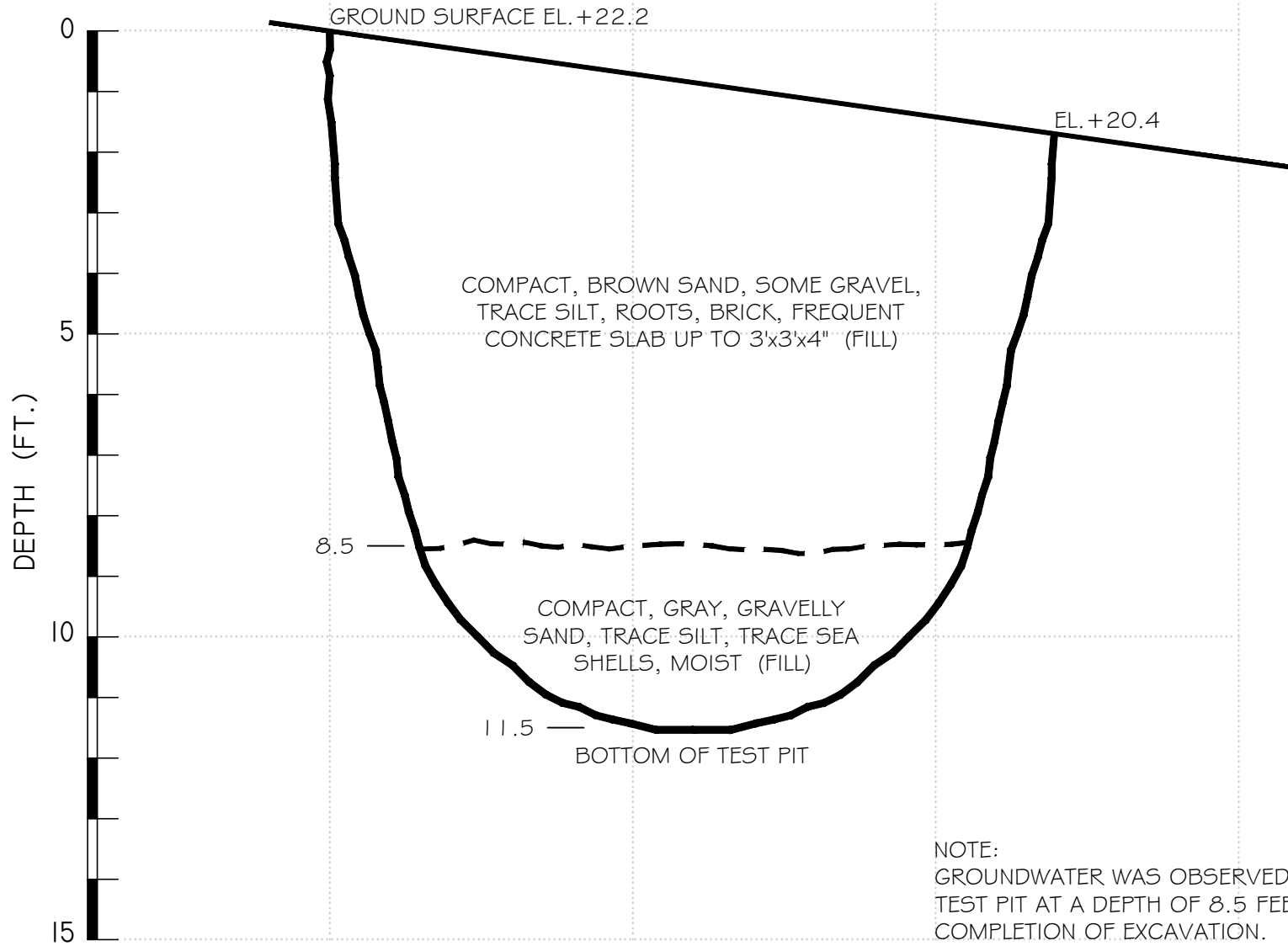
DATE FEBRUARY 18, 2014

TEST PIT LOG

TEST PIT NO. 1



MCPHAIL ASSOCIATES, LLC



NOTE:
GROUNDWATER WAS OBSERVED IN OPEN
TEST PIT AT A DEPTH OF 8.5 FEET UPON
COMPLETION OF EXCAVATION.

JOB NO. 5471

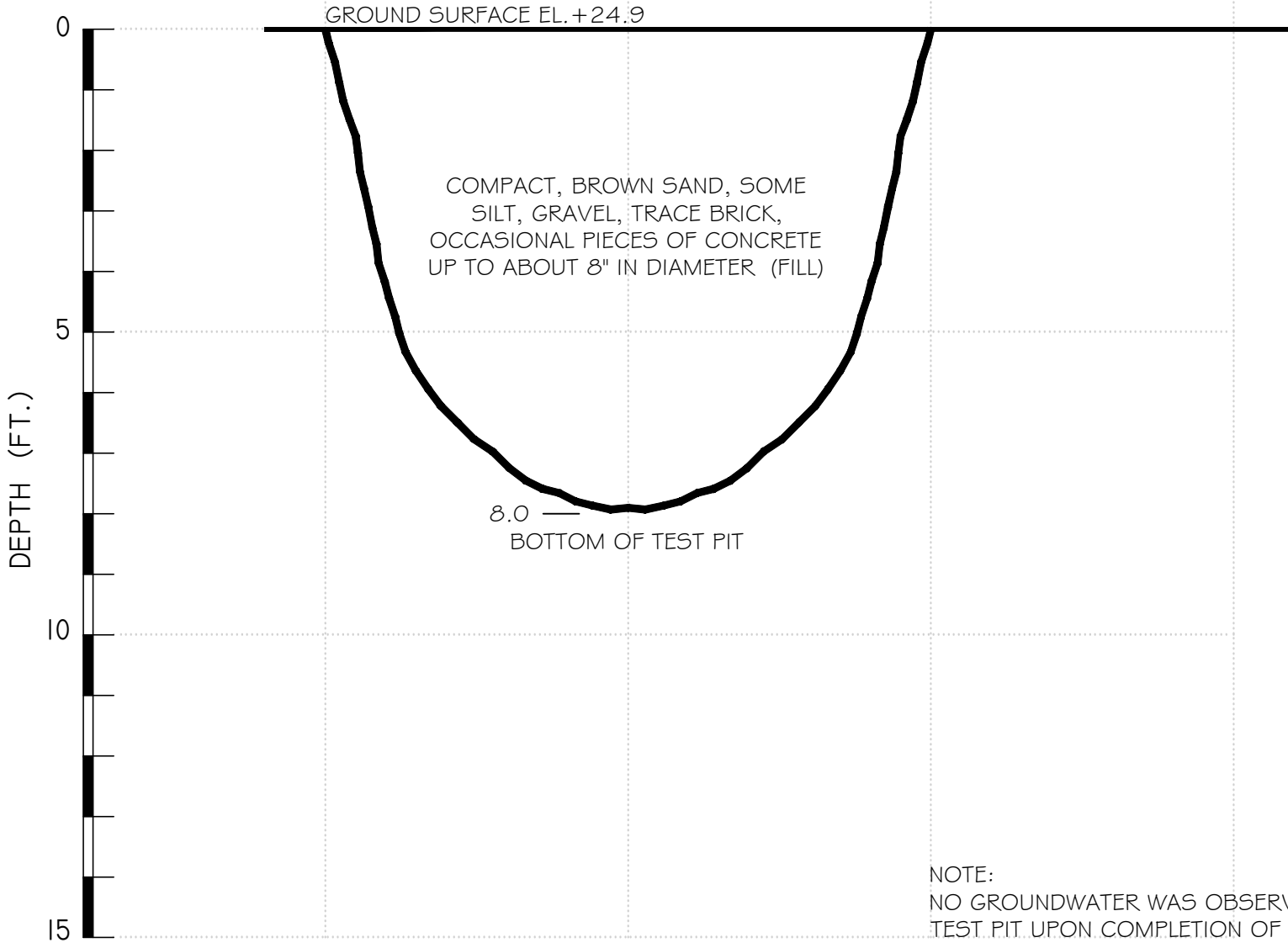
DATE FEBRUARY 19, 2014

TEST PIT LOG

TEST PIT NO. 2



McPHAIL ASSOCIATES, LLC



NOTE:
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 5471

TEST PIT LOG

TEST PIT NO. 3

DATE FEBRUARY 18, 2014

0 5 10 15 FT.

WEST ←

→ EAST

0

GROUND SURFACE EL. +22.7

EL. +21.4

COMPACT, BROWN TO GRAY, GRAVELLY SAND, SOME SILT, TRACE BRICK, WOOD, GLASS, BOTTLES, ALUMINUM CANS, REFUSE, OCCASIONAL CONCRETE SLABS UP TO ABOUT 3'x3'x4" (FILL)

5

9.0

REFUSAL AT 9 FEET

10

15

DEPTH (FT.)

McPHAIL ASSOCIATES, LLC

NOTE:
GROUNDWATER WAS OBSERVED IN OPEN TEST PIT AT A DEPTH OF 6 FEET UPON COMPLETION OF EXCAVATION.

Project Number: 12140021

Excavating Co: J. Masterson

Project Location: Cobble Hill
84 & 90 Washington Street
Somerville Massachusetts

Equipment: Cat 370D

Date: 02/19/2014

EBI Scientist: Daniel Bellucci

TP-04	
Scale in Feet	Description
0 to 7	Fill material- Major components include SAND (Fine to coarse), large gravel; large concrete Minor components include potential coal/wood ash, wood/organic matter, metal wires and coal slag *Note- Excavation terminated at 7 feet bgs- Large concrete pieces

bgs- below ground surface

Project Number: 12140021

Excavating Co: J. Masterson

Project Location: Cobble Hill
84 & 90 Washington Street
Somerville Massachusetts

Equipment: Cat 370D

Date: 02/19/2014

EBI Scientist: Daniel Bellucci

TP-05	
Scale in Feet	Description
0 to 8	Fill material- Major components include SAND (Medium), gravel, brick and concrete fragments and topsoil Minor components include potential coal/wood ash, metal fragments, glass, organic material (roots) and coal *Note- Excavation terminated at 8 feet bgs- Large concrete pieces and boulders

bgs- below ground surface

Project Number: 12140021

Excavating Co: J. Masterson

Project Location: Cobble Hill
84 & 90 Washington Street
Somerville Massachusetts

Equipment: Cat 370D

Date: 02/19/2014

EBI Scientist: Daniel Bellucci

TP-06	
Scale in Feet	Description
0 to 7.5	Fill material- Major components include mostly brick with medium SAND, large gravel and concrete fragments Minor components include potential coal/wood ash, organic material (roots), plastic conduit and Belgian Block pavers *Note- Strong petroleum odor (No. 2 Fuel Oil) first 4 feet of excavation: PID= 22.7 ppm (0-4 feet bgs) **Note- Excavation terminated at 7.5 feet bgs- Dense material, cannot excavate further

bgs- below ground surface

Project Number: 12140021

Excavating Co: J. Masterson

Project Location: Cobble Hill
84 & 90 Washington Street
Somerville Massachusetts

Equipment: Cat 370D

Date: 02/19/2014

EBI Scientist: Daniel Bellucci

TP-07	
Scale in Feet	Description
0 to 7	Fill material- Major components include SAND (medium to coarse), large gravel, concrete and brick Minor components include potential coal/wood ash, wood/organic matter, glass, coal fragments and Belgian Block pavers *Note- Slight petroleum odor (No. 2 Fuel Oil) throughout: PID= 1.0 ppm (6-7 feet bgs) **Note- Excavation terminated at 7 feet bgs- Dense material, cannot excavate further

bgs- below ground surface

Project Number: 12140021

Excavating Co: J. Masterson

Project Location: Cobble Hill
84 & 90 Washington Street
Somerville Massachusetts

Equipment: Cat 370D

Date: 02/19/2014

EBI Scientist: Daniel Bellucci

TP-08	
Scale in Feet	Description
0 to 5	Fill material- Major components include SAND (medium to coarse), large gravel, concrete and brick Minor components include topsoil, potential coal/wood ash, glass, coal slag, metal fragments, asphalt and Belgian Block pavers *Note- Slight petroleum odor (No. 2 Fuel Oil) throughout: PID= 0.7 ppm (0-4 feet bgs) **Note- Excavation terminated at 5 feet bgs- Dense material, cannot excavate further

bgs- below ground surface

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-401

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Consulting

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

21 B Street

Drilling Method: Direct Push

Project Number: 12140021

Burlington, MA

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID Readings (ppm)
								100
	Asphalt							
1	Fill material comprised of fine to coarse SAND with some CLAY, gravel, concrete and brick; grey; dry							
2			S-1	3/3.5	NA	Core	18	
3								
4	Equipment refusal (Concrete) encountered at 3.5 feet bgs							

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-402

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Consulting

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

21 B Street

Drilling Method: Direct Push

Project Number: 12140021

Burlington, MA

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID Readings (ppm)
								100
	Asphalt							
1	Fill material comprised of mostly gravel with CLAY, fine to coarse SAND and concrete; grey; dry							
2			S-1	2/3.5	NA	Core	10	
3								
4	Equipment refusal (Concrete) encountered at 3.5 feet bgs							

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-403

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

EBI Consulting

21 B Street

Burlington, MA

Drilling Method: Direct Push

Project Number: 12140021

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Asphalt						100 300	
1	Fill material comprised of CLAY with fine to coarse SAND, gravel, asphalt and concrete; grey; dry							
2			S-1	4/4	NA	Core	151	
3								
4	Fill material comprised of CLAY with fine to coarse SAND, gravel, asphalt and concrete; black; dry; petroleum odor							
5	Fill material comprised of fine SAND with some CLAY, gravel and brick; black; dry; petroleum odor							
6			S-2	3/4	NA	Core	267	
7	Native fine SAND and CLAY; grey; dry; petroleum odor							
8	Boring terminated at 8 feet bgs							
9								

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-404

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

EBI Consulting

21 B Street

Burlington, MA

Drilling Method: Direct Push

Project Number: 12140021

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID Readings (ppm)
								100 300
	Asphalt							
1	Fill material comprised of fine to coarse SAND with some CLAY, gravel and brick, grey; dry							
2			S-1	3/4	NA	Core	6	
3	Fill material comprised of CLAY with some gravel; grey; moist							
4	Fill material comprised of fine to medium SAND with some CLAY, gravel and brick; grey; moist							
5								
6	CLAY with some medium to coarse SAND and gravel; black; moist; slight petroleum odor		S-2	3/4	NA	Core	30	
7								
8	Boring terminated at 8 feet bgs							
9								

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-405

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Consulting

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

21 B Street

Drilling Method: Direct Push

Project Number: 12140021

Burlington, MA

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Asphalt						100 300	
1	Fill material comprised of CLAY with some fine to coarse SAND, gravel, brick and concrete; grey; dry							
2			S-1	3/4	NA	Core	5	
3								
4	Fill material comprised of CLAY with some fine to coarse SAND, gravel, brick and concrete; grey; dry; slight petroleum odor							
5			S-2	1/2	NA	Core	23	
6	Equipment refusal encountered at 6 feet bgs							
7								

Drilling Company: Bronson Drilling

Date Started: 02/18/2014

Log of Borehole: EB-406

Drilling Foreman: Dan Bronson

Date Ended: 03/25/2014

EBI Geologist/Scientist: Daniel Bellucci

Project Location: Somerville, MA

EBI Consulting

21 B Street

Burlington, MA

Drilling Method: Direct Push

Project Number: 12140021

Borehole Diameter: 2.25-inch

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE				Well Construction	
Depth	Description	Strata	No.	Rec.	SPT Blows	Type		FID/PID
								Readings (ppm)
	Asphalt						100 300	
	Fill material comprised of fine to coarse SAND with some CLAY and gravel; grey; moist; slight petroleum odor							
1	Fill material comprised of fine to coarse SAND with some CLAY and gravel; grey; dry; slight petroleum odor							
2			S-1	3/3.5	NA	Core	6	
3								
4	Equipment refusal (Concrete) encountered at 3.5 feet bgs							

Project: 90 Washington St	Job #: 5471	Geoprobe No.
Location:	Date Started: 8-22-18	B-603
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 16.3	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
	16		0.5 / 15.8	ASPHALT						
1	15			GRANULAR FILL	7.9	S1	27/20	0.3-2.6	Brown/black, fine to medium SAND, some asphalt (Granular Fill).	
2	14									
3	13					5.5	S2	30/20	2.5-5.0	Black, SILT, some sand, with asphalt (Granular Fill).
4	12			COHESIVE FILL						
5	11		5.0 / 11.3			2.0	S3	30/25	5.0-7.5	Black/dark brown, SILT, with wood/peat fibers, trace ash&cinders (Cohesive Fill).
6	10									
7	9									
8	8				0.8	S4	30/25	7.5-10.0	Black, SILT, with ash&cinders (Cohesive Fill).	
9	7									
10	6		10.0 / 6.3							
11	5			Bottom of borehole 10 feet below ground surface.						
12	4									
13	3									
14	2									
15	1									
16	0									
17	-1									
18	-2									
19	-3									
20	-4									
21	-5									
22	-6									

<u>SOIL COMPONENT</u>		
<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		
Weather: Clear Temperature: 25		



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Project: 90 Washington St	Job #: 5471	Geoprobe No.
Location:	Date Started: 8-22-18	B-604
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 17.3	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
	17		0.5 / 16.8	TOPSOIL						
1	16			GRANULAR FILL	3.0	S1	30/25	0.5-3.0	Brown/black, SILTY SAND, with brick and ash&cinders (Granular Fill).	
2	15									
3	14				10.3	S2	30/25	2.5-5.0	Black/gray, SILTY SAND, some clay, with ash&cinders (Granular Fill).	
4	13									
5	12									
6	11				5.3	S3	30/20	5.0-7.5	Brown/black, SILTY SAND, with asphalt (Granular Fill).	
7	10									
8	9									
9	8				2.9	S4	30/20	7.5-10.0	Black, SILTY SAND, with asphalt, appeared to have a sheen to it (Granular Fill).	
10	7		10.0 / 7.3							
11	6			Bottom of borehole 10 feet below ground surface.						
12	5									
13	4									
14	3									
15	2									
16	1									
17	0									
18	-1									
19	-2									
20	-3									
21	-4									
22	-5									

<u>SOIL COMPONENT</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
<u>DESCRIPTIVE TERM</u>		
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		
Weather: Clear Temperature: 25		



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Project: 90 Washington St	Job #: 5471	Geoprobe No.
Location:	Date Started: 8-22-18	B-605
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 17.9	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev. to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
			0.3 / 17.6	ASPHALT						
1	17	[Cross-hatched symbol]		GRANULAR FILL	1.5	S1	27/15	0.3-2.6	Brown, SILTY SAND (Granular Fill).	
2	16									
3	15									
4	14				123.1	S2	30/15	2.5-5.0	Brown, fine to coarse SAND, trace silt (Granular Fill).	
5	13									
6	12				2.5	S3	30/15	5.0-7.5	Brown, fine to coarse SAND, trace silt, with dark brown cobbles (Granular Fill).	
7	11									
8	10									
9	9				17.5	S4	30/15	7.5-10.0	Brown, fine to coarse SAND, trace silt, petroleum odor (Granular Fill).	
10	8					10.0 / 7.9				
11	7			Bottom of borehole 10 feet below ground surface.						
12	6									
13	5									
14	4									
15	3									
16	2									
17	1									
18	0									
19	-1									
20	-2									
21	-3									
22	-4									

<u>SOIL COMPONENT</u>	<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	<u>SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"</u>
"TRACE"		0-10%	
"SOME"		10-20%	
"ADJECTIVE" (eg SANDY, SILTY)		20-35%	
"AND"		35-50%	

Notes:

Weather: Rain Temperature: 25



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Project: 90 Washington St	Job #: 5471	Geoprobe No. B-606
Location:	Date Started: 8-22-18	
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 22.9	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev to Strata Change (ft)	Stratum	Sample				Sample Description and Notes			
					TVOC (ppm)	No.	Pen. /Rec. (in)	Depth (ft)				
			0.5 / 22.4	TOPSOIL								
1	22	☒		GRANULAR FILL	22.3	S1	24/20	0.5-2.5	Brown, SILTY SAND and GRAVEL, with brick (Granular Fill).			
2	21											
3	20											
4	19							20.2	S2	30/20	2.5-5.0	Black, SILT, trace sand, with asphalt and brick (Granular Fill).
5	18											
6	17							6.8	S3	30/15	5.0-7.5	Black, SILT, trace sand, with asphalt (Granular Fill).
7	16											
			7.5 / 15.4									
8	15	☒		COHESIVE FILL	1.4	S4	30/15	7.5-10.0	Brown/black, SILT and SAND, some clay, with brick (Cohesive Fill).			
9	14											
10	13											
			10.0 / 12.9									
11	12			Bottom of borehole 10 feet below ground surface.								
12	11											
13	10											
14	9											
15	8											
16	7											
17	6											
18	5											
19	4											
20	3											
21	2											
22	1											

<u>SOIL COMPONENT</u>		
<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		
Weather: Cloudy Temperature: 25		



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Project: 90 Washington St	Job #: 5471	Geoprobe No. B-607
Location:	Date Started: 8-22-18	
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 17.3	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
	17		0.5 / 16.8	TOPSOIL						
1	16			GRANULAR FILL	3.1	S1	24/20	0.5-2.5	Brown/black/gray, SILTY SAND, trace clay, with brick, wood, cobbles and ash (Granular Fill).	
2	15									
3	14									
4	13									
5	12									
			5.0 / 12.3							
6	11			COHESIVE FILL	11.9	S3	30/25	5.0-7.5	Brown/black, SILT, some sand, with roots, petroleum odor (Cohesive Fill).	
7	10									
			7.5 / 9.8							
8	9			MARINE CLAY	2.1	S4	30/25	7.5-10.0	Gray/blue, mottled, stratified CLAY, some silt (Marine Clay).	
9	8									
			10.0 / 7.3							
10	7			Bottom of borehole 10 feet below ground surface.						
11	6									
12	5									
13	4									
14	3									
15	2									
16	1									
17	0									
18	-1									
19	-2									
20	-3									
21	-4									
22	-5									

<u>SOIL COMPONENT</u>	<u>PROPORTION OF TOTAL</u>	
<u>DESCRIPTIVE TERM</u>		
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		



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Weather: Rain Temperature: 25

Project: 90 Washington St	Job #: 5471	Geoprobe No. B-608(OW)
Location:	Date Started: 8-22-18	
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	8-22-18	7
Surface Elevation (ft): 17.1	Sampler Hammer (lbs)/Drop (in): N/A	Elev.	Notes
		10.1	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
			0.5 / 16.6	ASPHALT					
1	16			GRANULAR FILL	7.4	S1	24/20	0.5-2.5	Brown/gray, SILTY SAND, with brick (Granular Fill).
2	15				152.4	S2	30/20	2.5-5.0	Brown/gray/black, SILTY SAND, with brick and ash&cinders, petroleum odor (Granular Fill).
3	14				14.6	S3	30/20	5.0-7.5	Brown/gray, SILTY SAND, with brick and ash&cinders (Granular Fill).
4	13				42.0	S4	30/20	7.5-10.0	Brown/gray, SILTY SAND, with brick and ash&cinders (Granular Fill).
5	12				240.2	S5	30/25	10.0-12.5	Black/brown, SILTY SAND, with trace organic fibers (Granular Fill).
6	11				620.6	S6	30/25	12.5-15.0	Brown, SAND, trace silt, petroleum odor
7	10								OW installed at 15', with 10' screen.
8	9								
9	8								
10	7								
11	6								
12	5								
13	4								
14	3								
15	2		15.0 / 2.1						
16	1			Bottom of borehole 15 feet below ground surface.					
17	0								
18	-1								
19	-2								
20	-3								
21	-4								
22	-5								

<u>SOIL COMPONENT</u>	<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
	"TRACE"	0-10%	
	"SOME"	10-20%	
	"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
	"AND"	35-50%	

Notes:

Weather: Rain Temperature: 25



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Project: 90 Washington St	Job #: 5471	Geoprobe No.
Location:	Date Started: 8-22-18	B-609
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 16.3	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev to Strata Change (ft)	Stratum	Sample				Sample Description and Notes	
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)		
	16		0.5 / 15.8	TOPSOIL						
1	15	[Cross-hatch symbol]		GRANULAR FILL	3.1	S1	24/20	0.5-2.5	Brown/black, SILT and SAND, with brick (Granular Fill).	
2	14									
3	13									
4	12									
5	11		5.0 / 11.3	MARINE SAND						
6	10	[Dotted symbol]			1.9	S3	30/20	5.0-7.5	Light brown, fine to coarse SAND, some silt (Marine Sand).	
7	9									
8	8									
9	7					0.8	S4	30/20	7.5-10.0	Light brown, fine to coarse SAND, some silt (Marine Sand).
10	6		10.0 / 6.3	Bottom of borehole 10.5 feet below ground surface.						
11	5									
12	4									
13	3									
14	2									
15	1									
16	0									
17	-1									
18	-2									
19	-3									
20	-4									
21	-5									
22	-6									

<u>SOIL COMPONENT</u>		
<u>DESCRIPTIVE TERM</u>	<u>PROPORTION OF TOTAL</u>	
"TRACE"	0-10%	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		
Weather: Clear Temperature: 25		



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Project: 90 Washington St	Job #: 5471	Geoprobe No. B-611
Location:	Date Started: 8-22-18	
City/State: Somerville, MA	Date Finished: 8-22-18	

Contractor: Crawford	Casing Type/Depth (ft): N/A	Groundwater Observations	
Driller/Helper: Ryan	Casing Hammer (lbs)/Drop (in): N/A	Date	Depth
Logged By/Reviewed By: KEH	Sampler Size/Type: 5' Plastic Sleeve	Elev.	Notes
Surface Elevation (ft): 17.4	Sampler Hammer (lbs)/Drop (in): N/A		

Depth (ft)	Elev. (ft)	Symbol	Depth/Elev to Strata Change (ft)	Stratum	Sample				Sample Description and Notes
					TVOC (ppm)	No.	Pen./Rec. (in)	Depth (ft)	
	17		0.5 / 16.9	TOPSOIL					
1	16		10.0 / 7.4	GRANULAR FILL	0.2	S1	24/20	0.5-2.5	Brown/black, SILTY SAND, some gravel, with brick (Granular Fill).
2	15				0.3	S2	30/20	2.5-5.0	Brown, coarse to medium SAND, some silt, with organics (Granular Fill).
3	14				0.0	S3	30/30	5.0-7.5	Brown, fine to medium SAND, some silt, with some organic silt with peat (Granular Fill).
4	13				30.1	S4	30/30	7.5-10.0	Brown, fine to medium SAND, some silt (Granular Fill).
5	12								
6	11								
7	10								
8	9								
9	8								
10	7			Bottom of borehole 10 feet below ground surface.					
11	6								
12	5								
13	4								
14	3								
15	2								
16	1								
17	0								
18	-1								
19	-2								
20	-3								
21	-4								
22	-5								

<u>SOIL COMPONENT</u>	<u>PROPORTION OF TOTAL</u>	SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"
<u>DESCRIPTIVE TERM</u>		
"TRACE"	0-10%	
"SOME"	10-20%	
"ADJECTIVE" (eg SANDY, SILTY)	20-35%	
"AND"	35-50%	
Notes:		
Weather: Rain Temperature: 25		



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APPENDIX D:
GROUNDWATER MONITORING REPORTS

D.15 GEOENVIRONMENTAL-REPORTS



Memorandum

Date: June 8, 2021

Recipient: Context Architecture

Attention: Mr. Jeff Shaw; Ms. Angela Campbell

Sender: Joseph G. Lombardo, Jr., L.S.P.; Kevin D. Jordan

Project: Somerville Public Safety Building; Somerville, MA

Project No: 7088.9.T3

Subject: Soil Removal Cost Estimate – Parcels A & C, New Roadway, and Tail Parcel

This memorandum has been prepared at the request of Context Architecture (Context) and the City of Somerville (the "City"). The purpose of this memorandum is to provide a summary of our assumptions and exclusions used in preparation of the attached cost estimate. The cost estimate was prepared by request to approximate costs associated with characterizing and removing excess soil during redevelopment activities at the 90 Washington Street property located in Somerville, Massachusetts (the "subject site"). Assumptions made as part of this cost estimate were based primarily on our discussions during a conference call with the City, Context, and DCI (project civil engineer) on June 3, 2021. This estimate is separated into four sections related to Parcel A, Parcel C, the New Roadway, and the Tail Parcel. The subject site and locations of the respective parcels are shown on the attached **Figure 2**.

Assumptions

The following assumptions were made in preparation of this cost estimate:

- Soil removal volumes for Parcel A and Parcel C were based on the excavation and off-site disposal of the top 3 feet of fill material based on existing surface grades. Soil removal volumes for Parcel B were based on assumptions used during April 2021 pre-characterization activities, which assumed the removal of the "soil mound" at the eastern portion of the site, as well as the lowest level slab of the proposed building being located at Elevation +17. The soil removal volume for the Tail Parcel was based on the construction of a paved parking lot at Elevation +18, which assumed an excavation for a pavement and base course section of 18 inches, down to Elevation +16.5. As suggested by DCI, soil removal volumes associated with the New Roadway were based on the assumption that 400-foot-long trenches would be required for each type of utility. Specifically, trench dimensions of 400 feet by 3 feet by 5 feet, 400 feet by 3 feet by 6 feet, 400 feet by 8 feet by 12 feet, and 400 feet by 3 feet by 5 feet were assumed for the natural gas, electrical, sewer/drain, and water trenches, respectively. Three (3) 8-foot by 8-foot by 12-foot structures were also assumed for both the drain line and the sewer line.



Memorandum

- Estimated percentages regarding soil characterization classifications (i.e. Unlined Landfill, Lined Landfill, Asphalt Batch Plant, Out-of-State Non-Hazardous) were based on an average of existing soil data located at the subject site.
- "Low end" and "high end" unit prices for soil transportation and disposal were utilized based on recent costs for similar McPhail projects. Soil tonnage was calculated using a 1.65 ton per cubic yard multiplier.
- The number of assumed soil pre-characterization samples needed was based on obtaining data at a frequency of one sample per 500 cubic yards of soil, plus additional samples relative to the amount of Out-of-State Non-Hazardous soil assumed, which requires a frequency of one sample per 125 cubic yards.
- Backfilling of each excavation area with "clean" imported ordinary fill material was included as part of this estimate. It is possible that less imported fill would be needed based currently unknown details regarding future redevelopment activities and the possibility of reusing existing fill on-site.
- It was assumed that groundwater treatment and off-site discharge would not be necessary.

Exclusions

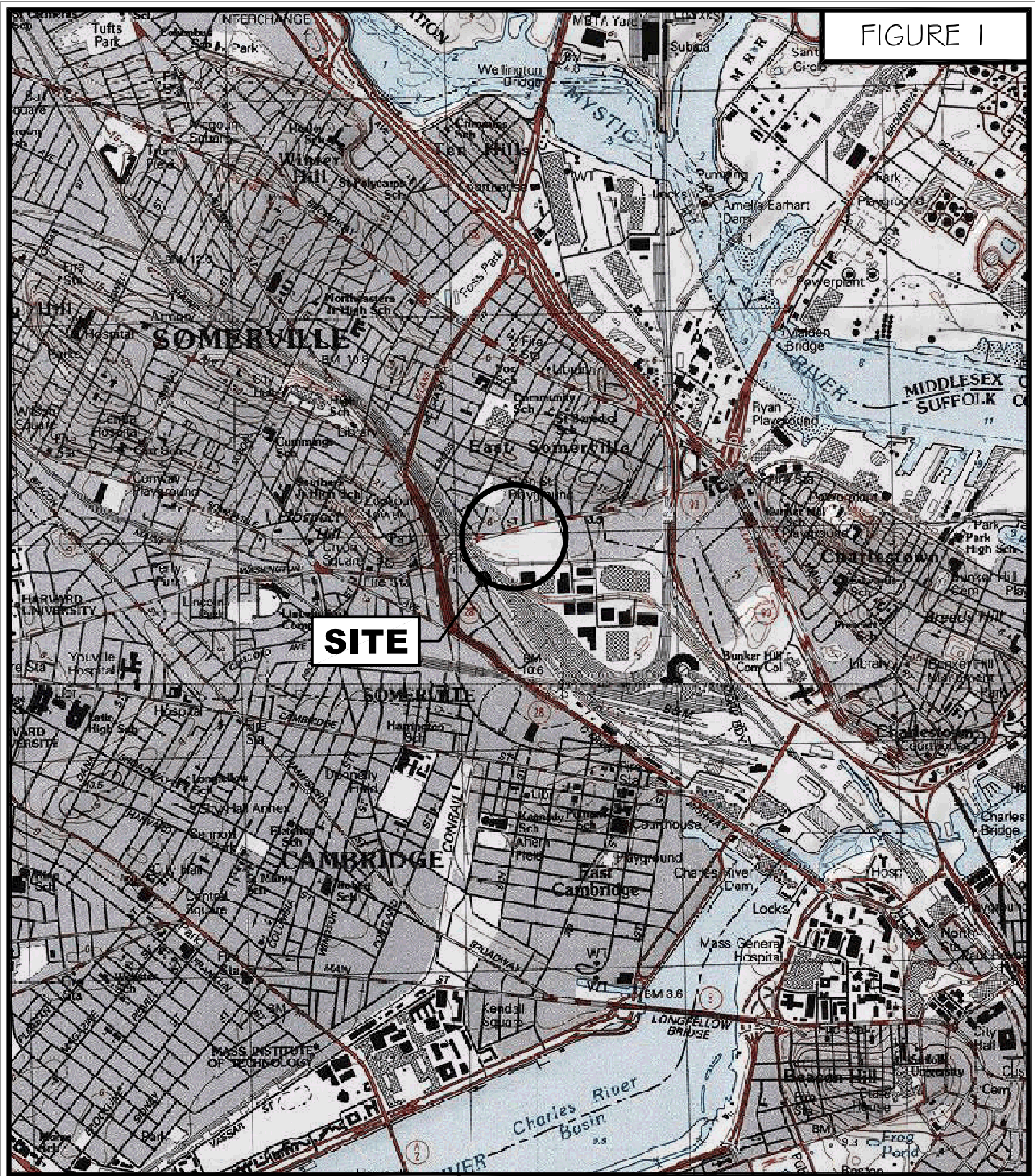
This estimate excludes costs for the following:

- Consulting fees and mark-ups on McPhail subcontractors;
- Dewatering, groundwater treatment, sampling, and off-site discharge;
- Removal and disposal of asphalt and solid waste;
- Earth support, including temporary earth support associated with soil excavation;
- Contractor fees not specified herein;
- Additional soil pre-characterization sampling beyond the assumed sampling frequency;
- Soil marker barriers which may be placed between existing fill material and "clean" imported fill; and
- Any other costs not specifically state as being included in this cost estimate.

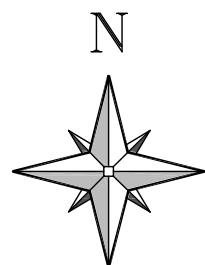
We trust that the above is sufficient for your present requirements. If you have any questions concerning the information herein, please do not hesitate to contact us.

KDJ/jgl

FIGURE I



Geotechnical and
 Geoenvironmental Engineers
 2269 Massachusetts Avenue
 Cambridge, MA 02140
 617/868-1420
 617/868-1423 (Fax)
 www.mcphailgeo.com



SCALE 1:25,000

PROJECT LOCATION PLAN

90 WASHINGTON STREET

SOMERVILLE

MASSACHUSETTS



Approximate footprint of proposed building

BENCHMARK
3/4" DIA. WESTERLY
LOWER BOLT
ON WIDENANT
ELEV. = 21.08'
SOMERVILLE DATUM



LEGEND

- APPROXIMATE LOCATION OF TEST PIT PERFORMED BY MASTERSON CONSTRUCTION ON FEBRUARY 19, 2014 FOR EBI CONSULTING
- APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY CARR-DEE CORP. DURING THE PERIOD OF OCTOBER 15 THROUGH OCTOBER 25, 2012 FOR McPHAIL ASSOCIATES, LLC
- APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
- APPROXIMATE LOCATION OF BOREHOLE PERFORMED BY HARVEY ASSOCIATES ON OCTOBER 16, 2012
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON FEBRUARY 18, 2014 FOR EBI CONSULTING
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY BRONSON DRILLING ON MARCH 26, 2014 FOR EBI CONSULTING
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY HARVEY ASSOCIATES ON MAY 7, 2014 FOR EBI CONSULTING
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY CRAWFORD DRILLING ON AUGUST 22, 2018 FOR McPHAIL ASSOCIATES, LLC
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY GEOSSEARCH, INC. BETWEEN APRIL 14 AND APRIL 23, 2021 FOR McPHAIL ASSOCIATES, LLC
- APPROXIMATE LOCATION OF GEOPROBE PERFORMED BY GEOSSEARCH, INC. BETWEEN APRIL 14 AND APRIL 23, 2021 FOR McPHAIL ASSOCIATES, LLC
- (OW) — INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "TOPOGRAPHIC PLAN" DATED MARCH 14, 2012 BY R.E. CAMERON & ASSOCIATES, INC.

2269 Massachusetts Avenue
Cambridge, MA 02140
617/868-1420
617/868-1423 (Fax)
www.mcphailgeo.com

90 WASHINGTON STREET			
SOMERVILLE		MASSACHUSETTS	
SUBSURFACE EXPLORATION PLAN			
FOR			
CONTEXT ARCHITECTURE			
BY			
McPHAIL ASSOCIATES, LLC			
Date: MAY 2021	Dwn: F.G.P.	Chkd: K.D.J.	Scale: 1" = 30'
Project No:	7088	FIGURE 2	

FILE NAME: N:\Mcphail\06570829\7088-F02.dwg

Table 1 - Soil Disposal Cost Estimate - June 8, 2021 (Rev. 1)

90 Washington Street, Somerville, MA
McPhail Job No. 7088

Estimated Soil Excess Volume (CY)		6,600					
Soil Type:	Urban Fill	Fill Qty (CY)	Fill Qty (Tons)	Unit Price Range (\$/ton)		Cost (low end)	Cost (high end)
Depth (ft):	3						
Unregulated	0%	0	0	\$3.50		\$0.00	\$0.00
<RCS-1	0%	0	0	\$19.00	\$25.00	\$0.00	\$0.00
<RCS-2	0%	0	0	\$22.00	\$28.00	\$0.00	\$0.00
Unlined Landfill	20%	1,320	2,178	\$45.00	\$52.00	\$98,010	\$113,256
Lined Landfill	10%	660	1,089	\$47.00	\$55.00	\$51,183.00	\$59,895.00
Asphalt Batch Plant	40%	2,640	4,356	\$55.00	\$75.00	\$239,580	\$326,700
Regulated Non-Hazard	30%	1,980	3,267	\$75.00	\$90.00	\$245,025	\$294,030
Hardous Soil for TCLP lead treatment	0%	0	0	\$16.00	\$20.00	\$0.00	\$0.00
Sub Totals	100%	6,600	10,890			\$683,799	\$804,881

Estimated Soil Excess Volume (CY)		10,400					
Soil Type:	Urban Fill	Fill Qty (CY)	Fill Qty (Tons)	Unit Price Range (\$/ton)		Cost (low end)	Cost (high end)
Depth (ft):	3						
Unregulated	0%	0	0	\$3.50		\$0.00	\$0.00
<RCS-1	0%	0	0	\$19.00	\$25.00	\$0.00	\$0.00
<RCS-2	0%	0	0	\$22.00	\$28.00	\$0.00	\$0.00
Unlined Landfill	20%	2,080	3,432	\$45.00	\$52.00	\$154,440	\$178,464
Lined Landfill	10%	1,040	1,716	\$47.00	\$55.00	\$80,652.00	\$94,380.00
Asphalt Batch Plant	40%	4,160	6,864	\$55.00	\$75.00	\$377,520	\$514,800
Regulated Non-Hazard	30%	3,120	5,148	\$75.00	\$90.00	\$386,100	\$463,320
Hardous Soil for TCLP lead treatment	-	500	825	\$16.00	\$20.00	\$13,200.00	\$16,500.00
Sub Totals	100%	10,400	17,160			\$998,712	\$1,250,964

Estimated Soil Excess Volume (CY)		9,500					
Soil Type:	Urban Fill	Fill Qty (CY)	Fill Qty (Tons)	Unit Price Range (\$/ton)		Cost (low end)	Cost (high end)
Depth (ft):	3						
Unregulated	0%	0	0	\$3.50		\$0.00	\$0.00
<RCS-1	0%	0	0	\$19.00	\$25.00	\$0.00	\$0.00
<RCS-2	0%	0	0	\$22.00	\$28.00	\$0.00	\$0.00
Unlined Landfill	20%	660	1,089	\$45.00	\$52.00	\$49,005	\$56,628
Lined Landfill	10%	330	545	\$47.00	\$55.00	\$25,591.50	\$29,947.50
Asphalt Batch Plant	40%	1,320	2,178	\$55.00	\$75.00	\$119,790	\$163,350
Regulated Non-Hazard	30%	990	1,634	\$75.00	\$90.00	\$122,513	\$147,015
Hardous Soil for TCLP lead treatment	0%	0	0	\$16.00	\$20.00	\$0.00	\$0.00
Sub Totals	100%	9,500	15,446			\$346,904	\$407,556

Estimated Soil Excess Volume (CY)		4,300					
Soil Type:	Urban Fill	Fill Qty (CY)	Fill Qty (Tons)	Unit Price Range (\$/ton)		Cost (low end)	Cost (high end)
Average Depth (ft):	3.18						
Unregulated	0%	0	0	\$3.50		\$0.00	\$0.00
<RCS-1	0%	0	0	\$19.00	\$25.00	\$0.00	\$0.00
<RCS-2	0%	0	0	\$22.00	\$28.00	\$0.00	\$0.00
Unlined Landfill	20%	860	1,419	\$45.00	\$52.00	\$63,855	\$73,788
Lined Landfill	10%	430	710	\$47.00	\$55.00	\$33,346.50	\$39,022.50
Asphalt Batch Plant	40%	1,720	2,838	\$55.00	\$75.00	\$156,090	\$212,850
Regulated Non-Hazard	30%	1,290	2,129	\$75.00	\$90.00	\$159,638	\$191,565
Hardous Soil for TCLP lead treatment							
Sub Totals	100%	4,300	7,986			\$2,640.00	\$3,300.00

Estimated Soil Excess Volume (CY)		2,700					
Soil Type:	Urban Fill	Fill Qty (CY)	Fill Qty (Tons)	Unit Price Range (\$/ton)		Cost (low end)	Cost (high end)
Depth (ft):	N/A (Various utility trenches)						
Unregulated	0%	0	0	\$3.50		\$0.00	\$0.00
<RCS-1	0%	0	0	\$19.00	\$25.00	\$0.00	\$0.00
<RCS-2	0%	0	0	\$22.00	\$28.00	\$0.00	\$0.00
Unlined Landfill	20%	540	891	\$45.00	\$52.00	\$40,095	\$46,332
Lined Landfill	10%	270	446	\$47.00	\$55.00	\$20,938.50	\$24,502.50
Asphalt Batch Plant	40%	1,080	1,782	\$55.00	\$75.00	\$98,010	\$133,650
Regulated Non-Hazard	30%	810	1,337	\$75.00	\$90.00	\$100,238	\$120,285
Hardous Soil for TCLP lead treatment	0%	0	0	\$16.00	\$20.00	\$0.00	\$0.00
Sub Totals	100%	2,700	4,455			\$259,281	\$324,770

Estimated Soil Removal Total		12,600	20,790			\$ 1,622,907	\$ 2,032,817
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Soil Quantity & Cost based on Percentage Breakdown of Facility Types
(See memorandum dated June 8, 2021 for assumptions and exclusions)

Table 2 - Soil Disposal Cost Estimate - June 8, 2021 (Rev. 1)

90 Washington Street; Somerville, MA
McPhail Job No. 7088

	Description	Rate	Number	Estimated Cost
Parcel A	Soil Pre-Characterization Samples*			
	Geoprobe Soil Sampling/Well install (8hr day)	\$2,000	2	\$4,000
	Mob/Demob, DigSafe, Disposables	\$1,250	1	\$1,250
				<i>Drilling Subtotal</i>
				\$5,250
	Laboratory Analysis - Soil Samples*			
	Soil Pre-Characterization Samples (Incl. TCLP Lead)	\$1,450	24	\$34,800
				<i>Analytical Subtotal</i>
				\$34,800
	Remedial Soil Excavation Activities*			
	Mobilization/Demobilization and Site Prep	\$3,000	1	\$3,000
	Excavate/Load contaminated soil (per cu yd)	\$15	6600	\$99,000
	Backfilling with imported material (per cu yd)	\$53	6600	\$349,800
				<i>Remedial Excavation Subtotal</i>
			\$451,800	
Soil Transportation & Disposal (See Table 1 for Details)*				
Low Estimate			\$633,798	
High Estimate			\$793,881	
			Parcel A Estimated Total (Low End): \$1,129,848	
			Parcel A Estimated Total (High End): \$1,497,761	

	Description	Rate	Number	Estimated Cost
Parcel B	Soil Pre-Characterization Samples*			
	Geoprobe Soil Sampling/Well install (8hr day)	\$2,000	1	\$2,000
	Mob/Demob, DigSafe, Disposables	\$1,000	1	\$1,000
				<i>Drilling Subtotal</i>
				\$3,000
	Laboratory Analysis - Soil Samples*			
	Soil Pre-Characterization Samples (Incl. TCLP Lead)	\$1,450	6	\$8,700
				<i>Analytical Subtotal</i>
				\$8,700
	Remedial Soil Excavation Activities*			
	Mobilization/Demobilization and Site Prep	\$3,000	1	\$3,000
	Excavate/Load contaminated soil (per cu yd)	\$15	10400	\$156,000
				<i>Remedial Excavation Subtotal</i>
				\$159,000
Soil Transportation & Disposal (See Table 1 for Details)*				
Low Estimate			\$998,712	
High Estimate			\$1,250,964	
			Parcel B Estimated Total (Low End): \$1,169,412	
			Parcel B Estimated Total (High End): \$1,421,664	

	Description	Rate	Number	Estimated Cost
Parcel C	Soil Pre-Characterization Samples*			
	Geoprobe Soil Sampling/Well install (8hr day)	\$2,000	1	\$2,000
	Mob/Demob, DigSafe, Disposables	\$1,000	1	\$1,000
				<i>Drilling Subtotal</i>
				\$3,000
	Laboratory Analysis - Soil Samples*			
	Soil Pre-Characterization Samples (Incl. TCLP Lead)	\$1,450	13	\$18,850
				<i>Analytical Subtotal</i>
				\$18,850
	Remedial Soil Excavation Activities*			
	Mobilization/Demobilization and Site Prep	\$3,000	1	\$3,000
	Excavate/Load contaminated soil (per cu yd)	\$15	3300	\$49,500
	Backfilling with imported material (per cu yd)	\$53	3300	\$174,900
				<i>Remedial Excavation Subtotal</i>
			\$227,400	
Soil Transportation & Disposal (See Table 1 for Details)*				
Low Estimate			\$316,899	
High Estimate			\$396,941	
			Parcel C Estimated Total (Low End): \$576,149	
			Parcel C Estimated Total (High End): \$646,191	

	Description	Rate	Number	Estimated Cost
"Tail" Parcel	Soil Pre-Characterization Samples*			
	Geoprobe Soil Sampling/Well install (8hr day)	\$2,000	2	\$4,000
	Mob/Demob, DigSafe, Disposables	\$1,250	1	\$1,250
				<i>Drilling Subtotal</i>
				\$5,250
	Laboratory Analysis - Soil Samples*			
	Soil Pre-Characterization Samples (Incl. TCLP Lead)	\$1,450	17	\$24,650
				<i>Analytical Subtotal</i>
				\$24,650
	Remedial Soil Excavation Activities*			
	Mobilization/Demobilization and Site Prep	\$3,000	1	\$3,000
	Excavate/Load contaminated soil (per cu yd)	\$15	4300	\$64,500
				<i>Remedial Excavation Subtotal</i>
				\$67,500
Soil Transportation & Disposal (See Table 1 for Details)*				
Low Estimate			\$412,929	
High Estimate			\$517,226	
			Tail Parcel Estimated Total (Low End): \$510,329	
			Tail Parcel Estimated Total (High End): \$614,626	

	Description	Rate	Number	Estimated Cost
New Roadway	Soil Pre-Characterization Samples*			
	Geoprobe Soil Sampling/Well install (8hr day)	\$2,000	1	\$2,000
	Mob/Demob, DigSafe, Disposables	\$1,000	1	\$1,000
				<i>Drilling Subtotal</i>
				\$3,000
	Laboratory Analysis - Soil Samples*			
	Soil Pre-Characterization Samples (Incl. TCLP Lead)	\$1,450	11	\$15,950
				<i>Analytical Subtotal</i>
				\$15,950
	Remedial Soil Excavation Activities*			
	Mobilization/Demobilization and Site Prep	\$3,000	1	\$3,000
	Excavate/Load contaminated soil (per cu yd)	\$15	2700	\$40,500
	Backfilling with imported material (per cu yd)	\$53	2700	\$143,100
				<i>Remedial Excavation Subtotal</i>
			\$186,600	
Soil Transportation & Disposal (See Table 1 for Details)*				
Low Estimate			\$259,281	
High Estimate			\$324,770	
			New Roadway Estimated Total (Low End): \$464,831	
			New Roadway Estimated Total (High End): \$530,320	

Total (Low End):	\$3,326,040
Total (High End):	\$4,498,531

*See attached memorandum dated June 8, 2021 for assumptions and exclusions

E. SPACE NEEDS REPORT

PUBLIC SAFETY COMPLEX SPACE NEEDS STUDY

SOMERVILLE, MASSACHUSETTS

FIFTH DRAFT

JULY 21, 2021

context

ARCHITECTURE

68 HARRISON AVENUE BOSTON, MA 02111
TEL 617 423 1400 WEB CONTEXTARC.COM

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STAFFING PROJECTIONS

Police	Current	Future to 2050			Total
	Total	Shifts:	8 - 4	4-12	
Command					
Chief	1		1		1
Deputy Chief	2		2		2
Professional Standards Lieutenant	1		1		1
Professional Standards Sergeant	1		1		1
Chief's Administrative Sergeant	1		1		1
	6		6		6
Administration Division					
Captain Administration	1		1		1
Special Operations Lieutenant	1		1		1
Special Operations Sergeant	1		1		1
Homeland Security Sergeant	1		1		1
K-9 Officer	1		1		1
Training Lieutenant	1		1		1
Financial Services Analyst	1		1		1
Financial Services Clerk	1		1		1
Administrative Assistant	1		1		1
Detail Office Manager	1		1		1
Detail Administrator	1		1		1
Records Clerks	1.5		5		5
Public Information Lieutenant	1		0		0
IT Specialists	2		2		2
Animal Control Officers	2		2		2
Community Outreach Director	2		2		2
Jail Diversion Coordinator	1		1		1
CIT Project Assistant	1		1		1
Law Enforcement Partnership Coordinator	1		1		1
COHR Staff	6		11		11
	40.5		48		48
Criminal Investigation Division					
Captain Detectives / Commander	1		1		1
Lieutenant Detectives	0		1		1
Sergeant Detectives	2		1		1
Detectives	6		5		6
Detective Clerk	1		1		1
Crime Scene Detective	1		1		1
FBI Liason Detective - Off Site	1		1		1
School Resources Detective	1		1		1
Juvenile Detective	1		1		1
Family Services Sergeant Detective	1		1		1
Family Services Detectives	2		2		2
Victim/Witness Advocate	1		1		1
Drug Unit Sergeant Detective	1		1		1
Drug Unit Detectives	5			3	3
DEA Liason Detective - Off Site	1		1		1
Licensing Sergeant - Off Site	1		1		1
Mayor's Officer	1		1		1

STAFFING PROJECTIONS

Police	Current Total	Shifts:	Future to 2050			Total
			8 - 4	4-12	12-8	
Court Sergeant Detective	1		1			1
Court Detectives	1		1			1
Evidence Detective	1		1			1
Crime Scene Analyst	2		2			2
	32		26			30
Operations Division						
Captain Patrol / District Commander	1		2			2
Patrol Lieutenants	5		1	1	1	3
Patrol Sergeants	8		2	2	2	6
Patrol Officers	42		10	10	10	30
Alpha Unit	1		1			1
Substation Clerks - Off Site	2		2			2
Citywide Administration Lieutenant	1		1			1
NPO Supervisor Sergeant	1		1			1
NPO Officers	7		7			7
Crime Prevention Officer	1		1			1
Traffic Lieutenant / Commander	1		1	1		2
Traffic Sergeant	2		2	2		4
Accident Investigation Officers	5		8	8		16
Citation Clerk	1		1			1
Safety Officer	1		1			1
	79		41			78
TOTAL STAFF ON SITE						
	157.5		121			162
Other (Part-Time)						
Matron	on-call		on-call			on-call
Crossing Guards	?		?			?
TOTAL STAFF						
	157.5		121			162

Police	Current Total	Shifts:	Future to 2050			Total
			8 - 4	4-12	12-8	
Command						
Chief	1		1			1
Deputy Chief	2		2			2
Professional Standards Lieutenant	1		1			1
Professional Standards Sergeant	1		1			1
Chief's Administrative Sergeant	1		1			1
	6		6			6
Administration Division						
Captain Administration	1		1			1
Special Operations Lieutenant	1		1			1
Special Operations Sergeant	1		1			1

STAFFING PROJECTIONS

Fire	Current Single Shift	Future to 2050	
		Single Shift	Total All Shifts
Headquarters Staff			
Chief	1	1	1
Assistant Chief	1	1	1
Administrative Lieutenant	1	1	1
Fire Analyst	1	1	1
Administrative Assistant (civ)	1	1	1
Senior Clerk (civ)	1	1	1
Training Deputy Chief	1	1	1
Homeland Security Lieutenant	1	1	1
Homeland Security Coordinator	1	1	1
Fire IT	0	1	1
Fire Investigation			
Fire Investigator	1	1	1
Staff	(3)*	0*	0*
* Firefighters with dual role, not incl. in totals			
Engine #3			
Officer	1	2	8
Firefighters / EMTs	3	6	24
TOTAL STAFF			
	14	19	43
Other (Part-Time)			
Auxilliary	20	20	20
TOTAL STAFF			
	34	39	63

PARKING NEEDS SUMMARY

Department	Present (day shift)		Future (day shift)		
	Surface	Garaged	Surface	Garaged	Off-Site
Police Department					
Assigned Department Vehicles	33	0	19	14	0
Unassigned Department Vehicles	13	0	3	10	0
Patrol Cruisers (unassigned)	16	0	0	16	0
Motorcycles (Sp Ops & Traffic)	0	7	0	7	0
Boat on 40' Trailer (stored off site)	0	0	0	0	1
NEMLEC, SWAT & SRT	0	3	0	3	0
Incident Command Van	0	1	0	1	0
Animal Control Van	0	1	0	1	0
Crime Scene Van	0	1	0	1	0
Gator	0	2	0	2	0
Impounded Vehicles	0	0	0	2	0
Sub-total	62	15	22	57	1
Fire Department					
Marked Vehicles	3	0	3	12	0
Administration	3	0	3	0	0
Front Line Apparatus	0	5	0	3	0
Reserve Apparatus	0	7	0	3	0
Investigation	0	2	0	2	0
Auxilliary	0	2	0	0	0
Sub-total	6	16	6	20	0
Total	68	31	28	77	1

Shared Site Features

Back-up Generator
Dumpster / Trash Enclosure
Flagpole
Emergency Generator
Secure hardening of front entry from vehicle crash / bomb protection

Training Features

Hydrant Training
Stair Tower
Wall / Ladder Training
Confined Space Training
Trench Prop (Extraction)

SPACE NEEDS SUMMARY

Prgm No.	Space Type Description	Needed Space Size				Tot. Needed	Proposed Floor Level				CoS Standard
		Qty	Width	Length	NASF		1st	2nd	3rd	4th	
SHARED SPACE											
1.0	Public Space										
1.1	Main Vestibule	1	12	16	192	192	192				
1.2	Public Lobby	1	40	20	800	800	800				
1.3	Public Toilets - Men	1	10	18	180	180	180				
1.4	Public Toilets - Women	1	10	18	180	180	180				
1.5	Shared Toilet	4	6.5	7.5	49	195	49	49	49	49	
1.6	Shared Shower	4	6.5	11	72	286	72	72	72	72	
1.7	Mothers Room	1	10	10	100	100	100				M1
1.8	Public Interview Room	2	10	12	120	240	240				C4
1.9	Community Room	1	28	42	1,176	1,176	1,176				
1.10	Community Room Storage	1	12	12	144	144	144				
2.0	Shared Space										
2.1	Training Room - EOC (40ppl)	1	32	40	1,280	1,280				1,280	
2.2	Coat Closet	1	8	10	80	80					80
2.3	Kitchenette	1	16	10	160	160					160
2.4	Wellness Room (14 ppl)	1	50	60	3,000	3,000			3,000		
2.5	Dispatch (7ppl)	1	36	50	1,800	1,800			1,800		
2.6	Dispatch Locker Room	1	12	18	216	216			216		
2.7	Dispatch Break Room	1	12.5	20	250	250			250		K2
2.8	Dispatch Toilet	1	7.5	6	45	45			45		
2.9	Shared Break Room	3	20	18	360	1,080		360	360	360	K3
2.10	Shared Work Room	4	10	15	150	600	150	150	150	150	W2
2.11	Shared IT Office (2p, 1f)	1	14	20	280	280		280			3x WS2
2.12	Shared IT Workshop	1	10	14	140	140		140			
3.0	Building Support										
3.1	Network Operations (incl 911/radio/security)	1	20	30	600	600			600		
3.2	Radio Room	1	10	14	140	140				140	
3.3	Demarc	2	6	8	48	96	96				
3.4	Janitor's Closets	4	6	5	30	120	30	30	30	30	
3.5	Bulk Storage & Custodian Office	1	20	20	400	400		400			ST4
3.6	Building / Grounds Equipment Storage	1	12	16	192	192	192				
3.7	Trash & Recycling Room	1	16	16	256	256	256				
3.8	2 Passenger Elevators (Stops)	8	10	8	80	640	160	160	160	160	
3.9	Elevator Machine Room	1	10	8	80	80				80	
3.10	Mechanical Room	1	20	30	600	600		600			
3.11	Sprinkler / Water Service	1	8	14	112	112	112				
3.12	Main Electrical Room	1	16	30	480	480		480			
3.13	Electrical Closets	3	4	6	24	72	24		24	24	
3.14	IDF Closets	3	4	8	32	96	32	32		32	
3.15	Automatic Transfer Switch	1	8	4	32	32	32				
SHARED Subtotal (Net Square Footage)						16,340	4,216	2,752	6,755	2,616	
Grossing Factor (walls, corridors, chases, etc.) @ 35%						5,719	1,476	963	2,364	916	
Subtotal						22,059	5,692	3,715	9,119	3,532	

SPACE NEEDS SUMMARY

Prgm No.	Space Type Description	Needed Space Size				Tot. Needed	Proposed Floor Level				CoS Standard
		Qty	Width	Length	NASF		1st	2nd	3rd	4th	
POLICE DEPARTMENT											
4.0	Administration										
4.1	Police Chief	1	11	15	165	165				165	PO1
4.2	Deputy Chief	2	8	12	96	192				192	PO3
4.3	Administrative Conference Room (14ppl)	1	12	23	276	276				276	C2
4.4	Police Visitor Lobby & Waiting Area	1	14	16	224	224				224	
4.5	Support Staff	1	11	14	154	154				154	2x WS2
4.6	Financial Services/Payroll (3ppl)	1	14	21	294	294				294	3x WS2
4.7	Captain, Administration	1	8	12	96	96				96	PO3
4.8	Special Operations & Training (4ppl)	1	14	28	392	392				392	4x WS2
4.9	Detail Office (2ppl)	1	11	14	154	154				154	2x WS2
4.10	Pro. Standards, Accreditation & Chief's Liaisor	1	17	20	340	340				340	4x WS2
4.11	Active Files	1	10	16	160	160				160	
4.12	Admin Coat/Storage	1	10	8	80	80				80	
5.0	Community Services & Public Information										
5.1	Firearms Licensing Clerk	1	8	12	96	96		96			TBD
5.2	Records Office (7ppl)	1	20	30	600	600		600			7x WS2
5.3	COHR Clinical Supervision	1	10	10	100	100		100			
5.4	COHR Offices (10ppl)	1	30	28	840	840		840			10x WS2
5.5	COHR Director	1	8	12	96	96		96			PO3
5.6	COHR Conference	1	12	16	192	192		192			C3
5.7	Family Services Waiting	1	12	12	144	144			144		
5.8	Family Services Conference/Interview	1	14	12	168	168			168		
5.9	Family Services Office (2ppl)	1	12	14	168	168			168		2x WS2
6.0	Patrol Division										
6.1	Station Officer (2ppl)	1	14	18	252	252	252				
6.2	Shift Commander	1	8	12	96	96	96				PO3
6.3	Street Commander (2ppl)	1	18	20	360	360		360			2x WS2
6.4	Neighborhood Policing Supervisor	1	8	12	96	96		96			PO3
6.5	Patrol Open Office (20ppl)	1	40	40	1,600	1,600		1,600			20x WS2
6.6	Traffic Conference & Interview (4ppl)	1	10	12	120	120		120			C4
6.7	Traffic Files	1	10	14	140	140		140			
6.8	Traffic Equipment Storage Room	1	10	14	140	140		140			
6.9	Roll Call (16 ppl)	1	20	28	560	560	560				
6.10	Mail Alcove	1	2	20	40	40	40				
6.11	Report Writing (4ppl)	1	10	16	160	160	160				
6.12	Patrol Evidence Prep.	1	12	14	168	168	168				
6.13	Patrol Gear Storage	1	10	12	120	120		120			
6.14	SRT Gear Storage	1	10	16	160	160		160			
6.15	Animal Control (2ppl)	1	11	14	154	154				154	2x WS2

SPACE NEEDS SUMMARY

Prgm No.	Space Type Description	Needed Space Size				Tot. Needed	Proposed Floor Level				CoS Standard
		Qty	Width	Length	NASF		1st	2nd	3rd	4th	
7.0	Criminal Investigation Division (CID)										
7.1	Detective Open Office	1	40	40	1,600	1,600				1,600	20x WS2
7.2	Narcotics Offices (7ppl)	1	18	34	612	612				612	7x WS2
7.3	Interrogation	2	10	10	100	200				200	
7.4	Major Case	1	12	23	276	276				276	C2
7.5	CID Secure Files	1	16	20	320	320				320	
7.6	CID Equipment Storage	1	10	8	80	80				80	
7.7	Digital Forensics (3ppl)	1	14	20	280	280				280	3x WS2
7.8	Evidence Locker	1	10	10	100	100				100	
7.9	Evidence Technician Office (2ppl)	1	14	16	224	224				224	2x WS2
7.10	Evidence Processing	1	12	18	216	216				216	
7.11	Evidence Lab	1	16	20	320	320				320	
7.12	Evidence, General Storage	1	26	37	962	962				962	
7.13	Evidence, Weapons Storage	1	10	20	200	200				200	
7.14	Evidence, Narcotics Storage	1	14	18	252	252				252	
7.15	Evidence, Assault Storage	1	14	20	280	280				280	
7.16	Evidence Garage Bay	1	18	48	864	864		864			
8.0	Detention										
8.1	Sallyport	1	20	32	640	640		640			
8.2	Booking	1	32	30	960	960		960			
8.3	Detention Cells (1 pods of 4; + 4 ind.)	8	8	9	72	576		576			
8.4	Detention Storage Room	1	8	8	64	64		64			
8.5	Temporary Holding	2	8	8	64	128		128			
8.6	Interview	1	8	10	80	80		80			
8.7	Matron	1	8	8	64	64		64			
8.8	Matron, Toilet	1	7.5	6	45	45		45			
9.0	Support Facilities										
9.1	Training Aids Storage	1	8	10	80	80			80		
9.2	Men's Lockers & Showers (125)	1	50	66	3,300	3,300			3,300		
9.3	Women's Lockers & Showers (30)	1	26	42	1,092	1,092			1,092		
9.4	Firearms Training Simulation (F.A.T.S.)	1	25	28	700	700			700		
9.5	Tactical Training	1	30	30	900	900			900		
9.6	Firearms Cleaning	1	10	14	140	140		140			
9.7	Firearms Storage	1	10	20	200	200		200			
9.8	Quartermaster Storage	1	14	10	140	140		140			
9.9	Inactive Record Storage	1	22	40	880	880				880	
9.10	Association	2	8	12	96	192		192			PO3
9.11	Motorcycles (6)	1	30	34	1020	1,020	garage				
9.12	Motorcycle & Bicycle Supplies	1	8	10	80	80	garage				
9.13	SPD Bicycles (12)	1	20	20	400	400	garage				
9.14	ATV (2) & Trailers (4)	3	30	25	750	2,250	garage				
9.15	Found Property Storage	1	10	10	100	100		100			
9.16	Marine Storage Room	1	8	6	48	48		48			
	POLICE Subtotal (Net Square Footage)					29,962	1,276	8,901	6,552	9,483	
	Grossing Factor (walls, corridors, chases, etc.)		@	35%		10,486	447	3,115	2,293	3,319	
	Subtotal					40,448	1,723	12,016	8,845	12,802	

SPACE NEEDS SUMMARY

Prgm No.	Space Type Description	Needed Space Size				Tot. Needed	Proposed Floor Level				CoS Standard
		Qty	Width	Length	NASF		1st	2nd	3rd	4th	
FIRE DEPARTMENT											
10.0	Administration										
10.1	Fire Chief	1	11	15	165	165				165	PO3
10.2	Assistant Fire Chief	1	8	12	96	96				96	PO3
10.3	Fire Open Office	1	20	38	760	760				760	8x WS2
10.4	Fire Visitor Lobby & Waiting Area	1	8	10	80	80				80	
10.5	Fire Training Aids Storage	1	8	10	80	80				80	
10.6	Conference Room	1	12	23	276	276				276	C2
10.7	Admin Storage	1	6	8	48	48				48	
10.8	Active Records Storage	1	12	16	192	192				192	
11.0	Apparatus and Support										
11.1	Apparatus Room	1	58	74	4,292	4,292	4,292				
11.2	Fire Investigation Bay	1	18	60	1,080	1,080	1,080				
11.3	Turn-out Gear	1	20	28	560	560	560				
11.4	Hose & Foam Storage	1	10	10	100	100	100				
11.5	Decon	1	12	22	264	264	264				
11.6	Decon Showers	4	12	6	72	288	288				
11.7	Decon Lockers & Stationware Washing	1	8.5	16	136	136	136				
11.8	EMS Supplies	1	10	12	120	120	120				
11.9	Gear Supply	1	10	12	120	120	120				
11.10	Firefighter Toilet	1	8	6	48	48	48				
11.11	Patrol Desk	1	12	12	144	144	144				
11.12	Repair Shop	1	12	10	120	120	120				
11.13	Fire Pole (Landings)	2	4	9	36	72	36	36			
11.14	Fire Bike Patrol Storage	1	14	25	350	350	garage				
12.0	Firefighter Quarters										
12.1	Kitchen & Dining	1	16	24	384	384		384			
12.2	Day Room	1	20	22	440	440		440			
12.3	Showers	3	6.5	12	78	234		234			
12.4	Officer's Dorm	2	10	22	220	440		440			
12.5	Officer Shower Room	1	6.5	10	65	65		65			
12.6	Firefighter Dorm Rooms	6	12	8	96	576		576			
12.7	Locker Room	1	10	27.5	275	275		275			
12.8	Washer / Dryer	1	14	8	112	112		112			
12.9	Quartermaster Storage	1	10	8	80	80		80			
13.0	Auxilliary										
13.1	Auxilliary Bay	1	18	60	1,080	1,080	1,080				
13.2	Auxilliary Storage	1	14	18	252	252	252				
13.3	Auxiliary Day / Kitchenette	1	16	20	320	320	320				
13.4	Auxiliary Turn-out Gear	1	20	20	400	400	400				
13.5	Shower	1	8	11	88	88	88				
FIRE DEPARTMENT Subtotal (Net Square Footage)						14,137	9,448	2,642	0	1,697	
Grossing Factor (walls, corridors, chases, etc.) @ 35%						4,947	3,307	925	0	594	
Subtotal						19,084	12,755	3,567	0	2,291	

SPACE NEEDS SUMMARY

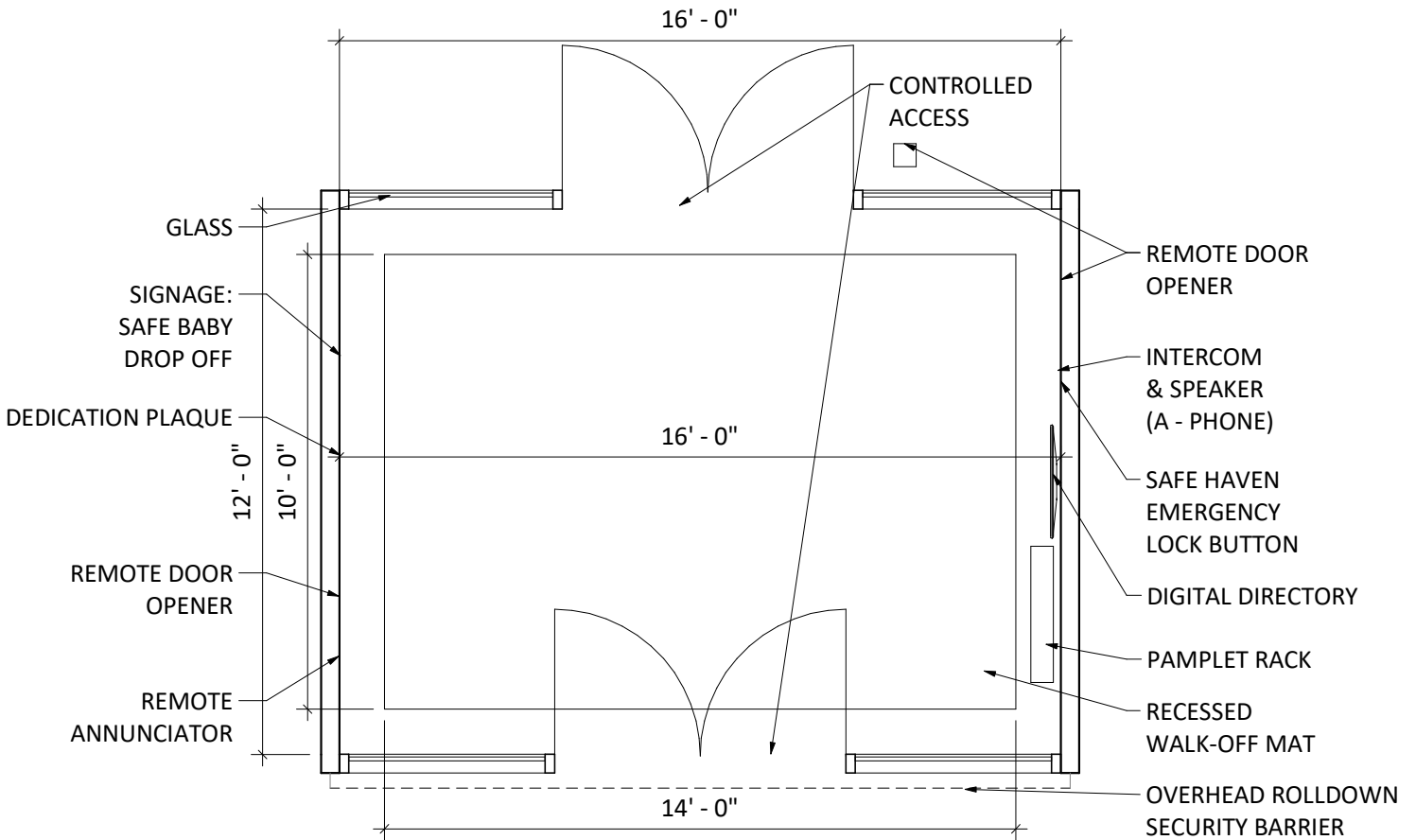
Prgm No.	Space Type Description	Needed Space Size				Tot. Needed	Proposed Floor Level				CoS Standard
		Qty	Width	Length	NASF		1st	2nd	3rd	4th	
14.1	Director of Emergency Management	1	8	12	96	96			96		PC3
14.2	Emergency Management Office (2 ppl)	1	11	14	154	154			154		WS1&2
EM. MAN. Subtotal (Net Square Footage)						250	0	0	250	0	
Grossing Factor (walls, corridors, chases, etc.) @ 35%						87	0	0	88	0	
Subtotal						337	0	0	338	0	
GRAND TOTAL SQUARE FOOTAGE						81,928	20,170	19,298	18,302	18,625	

Shared Space Needs

SHARED SPACE

1.1 MAIN VESTIBULE

Adjacency Requirement	Adjacent to Public Lobby & Exterior
Public Access	High
Security Requirements	Controlled entry after hours
Contract Millwork / Equipment	Dedication plaque, pamphlet rack
Floor	Epoxy terrazzo, stone or other durable material, walk-off mat (Recessed)
Walls	GWB, painted & glazing
Ceiling	GWB, painted
Lighting / Electrical	Bright, direct
HVAC / Plumbing	A/C
Special Needs	Controlled Entry/Exit
Owner supplied Furn. / Equip.	None

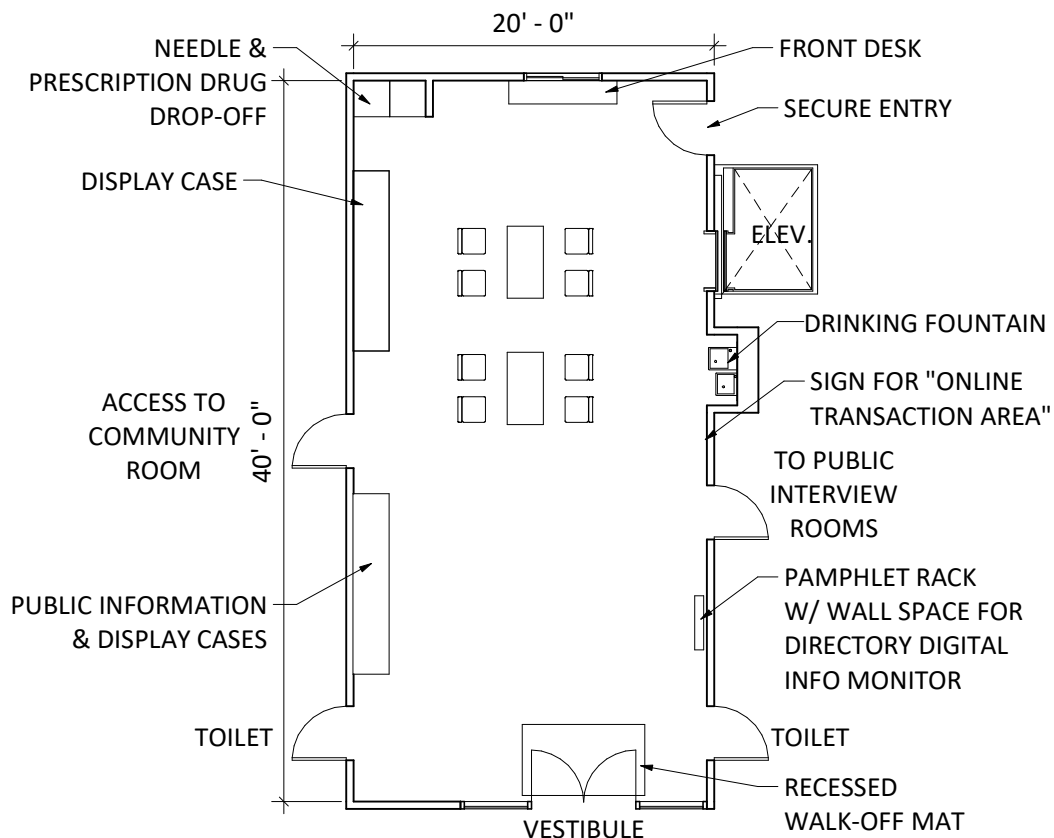


MAIN VESTIBULE
1/4" = 1'-0"

SHARED SPACE

1. 2 PUBLIC LOBBY

Adjacency Requirement	Adjacent to Community Room, Public Interview Room, Public Toilets.
Public Access	High
Security Requirements	Access controlled exit from lobby to the rest of the building.
Contract Millwork / Equipment	Tack board for public notices, large pamphlet rack, wood wainscoting, transaction counter (ADA height), 10' of glass enclosed display cases for historical artifacts (both Police & Fire), Area for drop off of needles & prescription drugs
Floor	Epoxy, terrazzo or stone tile
Walls	GWB, painted, bullet resistant board at all walls to ceiling including soffits
Ceiling	ACT upgrade
Lighting / Electrical	Bright indirect; accent lighting; CCTV, digital information display
HVAC / Plumbing	A/C; two level drinking fountain
Special Needs	Good visibility from front desk. Durable finishes.
Owner supplied Furn. / Equip.	Durable seating for 8 & low tables

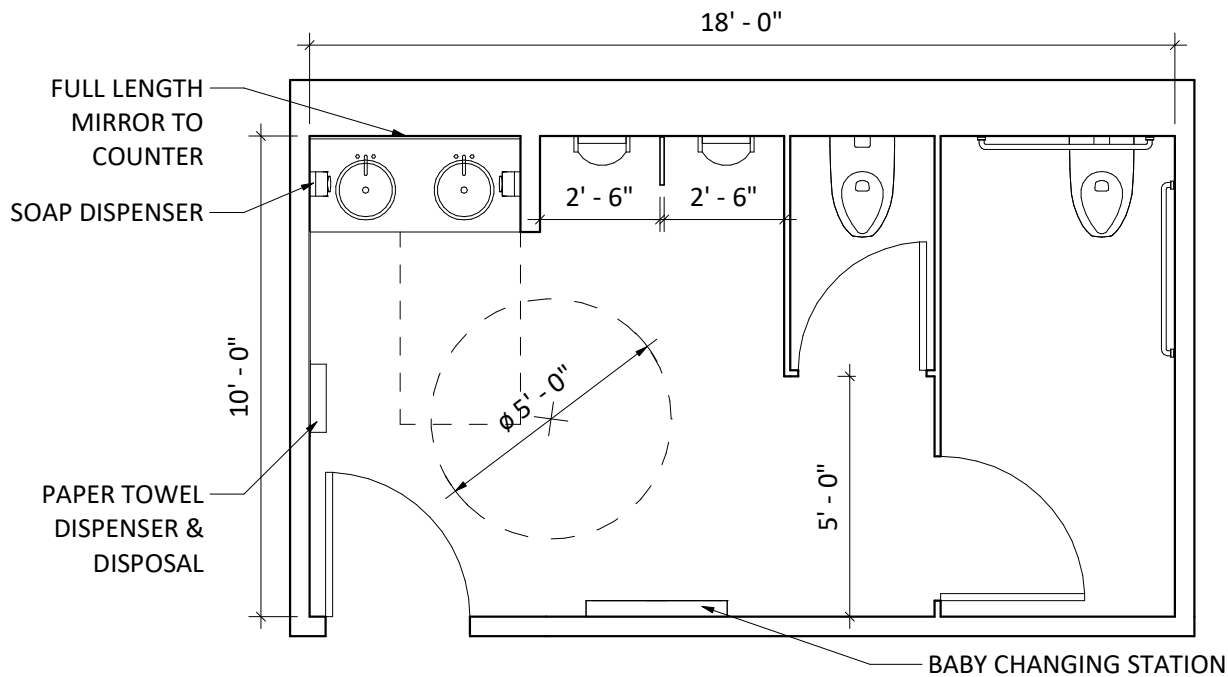


PUBLIC LOBBY
3/32" = 1'-0"

SHARED SPACE

1.3 PUBLIC TOILETS - MEN

Adjacency Requirement	Public Toilets off the Public Lobby
Public Access	High
Security Requirements	Lock controlled from Front Desk.
Contract Millwork / Equipment	Bathroom accessories, changing table, solid surface lavatory counter.
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls, painted GWB above
Ceiling	ACT
Lighting / Electrical	LED on sensor
HVAC / Plumbing	Good exhaust; wall mounted toilet: drop - in sink.
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	Bathroom accessories

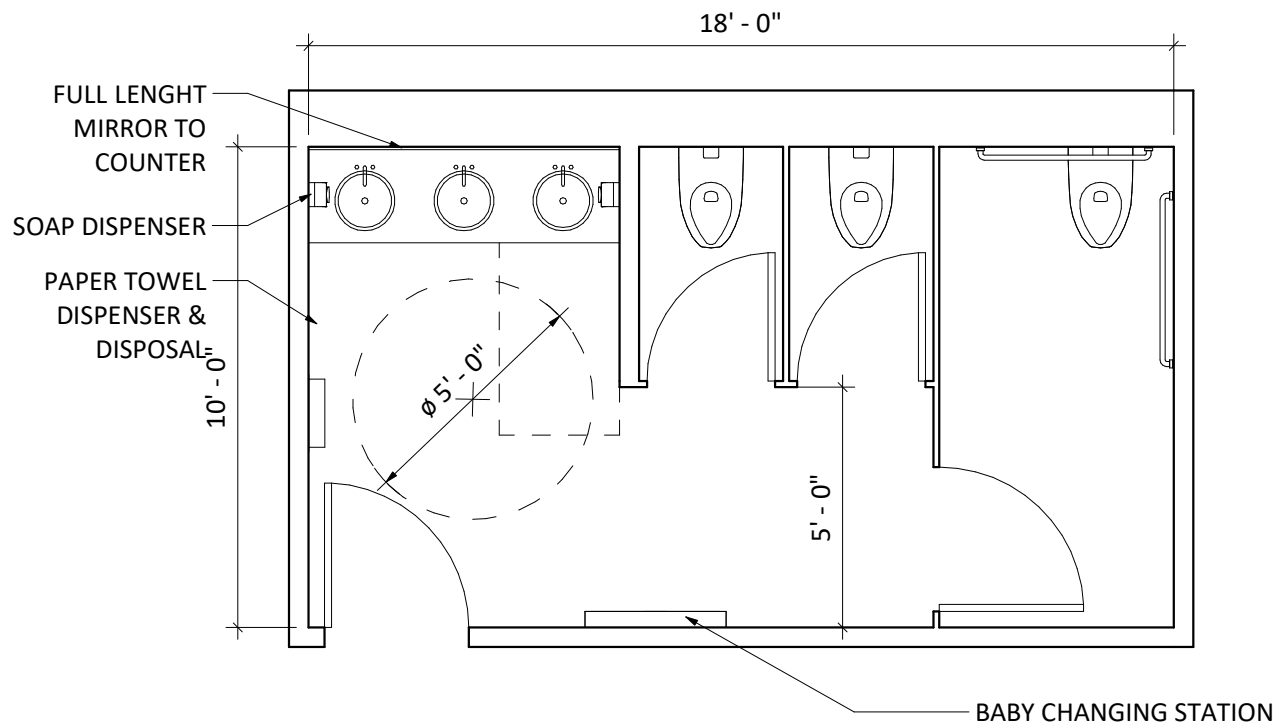


 **PUBLIC TOILETS - MEN**
1/4" = 1'-0"

SHARED SPACE

1.4 PUBLIC TOILETS - WOMEN

Adjacency Requirement	Public Toilets off the Public Lobby
Public Access	High
Security Requirements	Lock controlled from Front Desk.
Contract Millwork / Equipment	Bathroom accessories, changing table, solid surface lavatory counter.
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls, GWB painted above.
Ceiling	ACT
Lighting / Electrical	LED on sensor
HVAC / Plumbing	Good exhaust; wall mounted toilet: drop-in sink.
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	Bathroom accessories

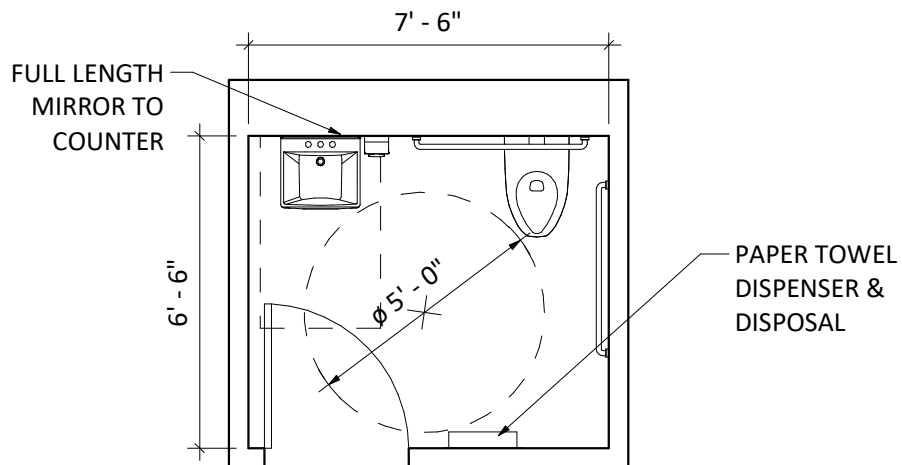


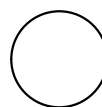
 PUBLIC TOILETS - WOMEN
1/4" = 1'-0"

SHARED SPACE

1.5 SHARED TOILET

Adjacency Requirement	Upper floor Public Toilets
Public Access	High
Security Requirements	None
Contract Millwork / Equipment	Bathroom accessories, solid surface lavatory counter.
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls, painted GWB above.
Ceiling	ACT
Lighting / Electrical	LED on sensor
HVAC / Plumbing	Good exhaust; wall mounted toilet: sink.
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	Bathroom accessories

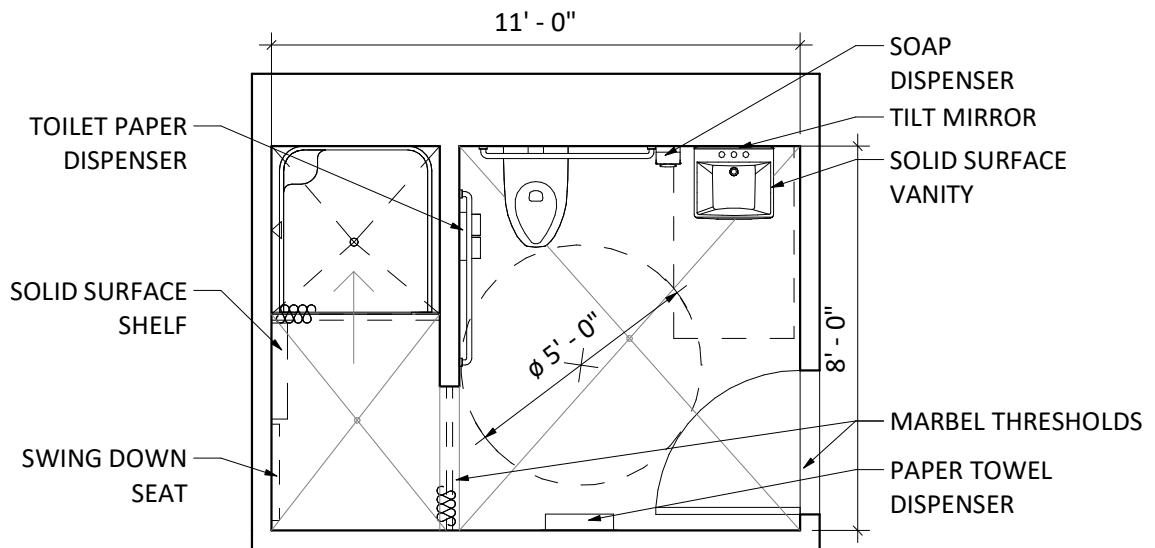


 **SHARED TOILET**
1/4" = 1'-0"

SHARED SPACE

1.6 SHARED SHOWER

Adjacency Requirement	Upper floor
Public Access	Card Access
Security Requirements	None
Contract Millwork/ Equipment	Solid surface vanity, toilet accessories, swing down seat for changing, solid surface shelf
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls, full height tile around shower unit
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust; toilet, sink, floor drains, 42" accessible shower unit
Special Needs	None
Owner supplied Furn./ Equip.	None

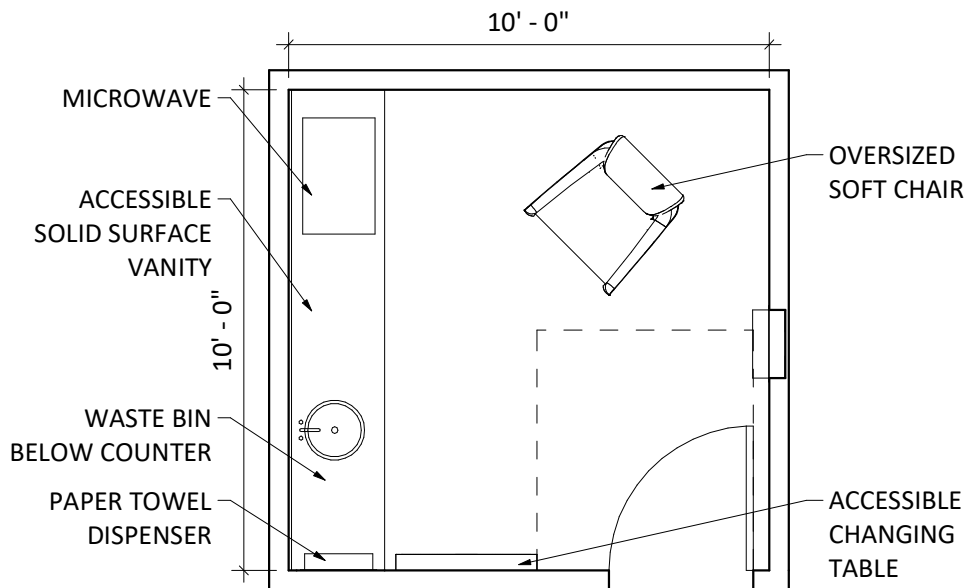


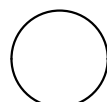
○ SHARED SHOWER
1/4" = 1'-0"

SHARED SPACE

1.7 MOTHERS ROOM

Adjacency Requirement	Centrally located
Public Access	Medium
Security Requirements	Privacy Lock
Contract Millwork / Equipment	Solid surface vanity w/ integral sink, mirror, changing table
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, power w/ USB required at multiple locations near seating
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: M1
Owner supplied Furn. / Equip.	Oversized soft chair, microwave

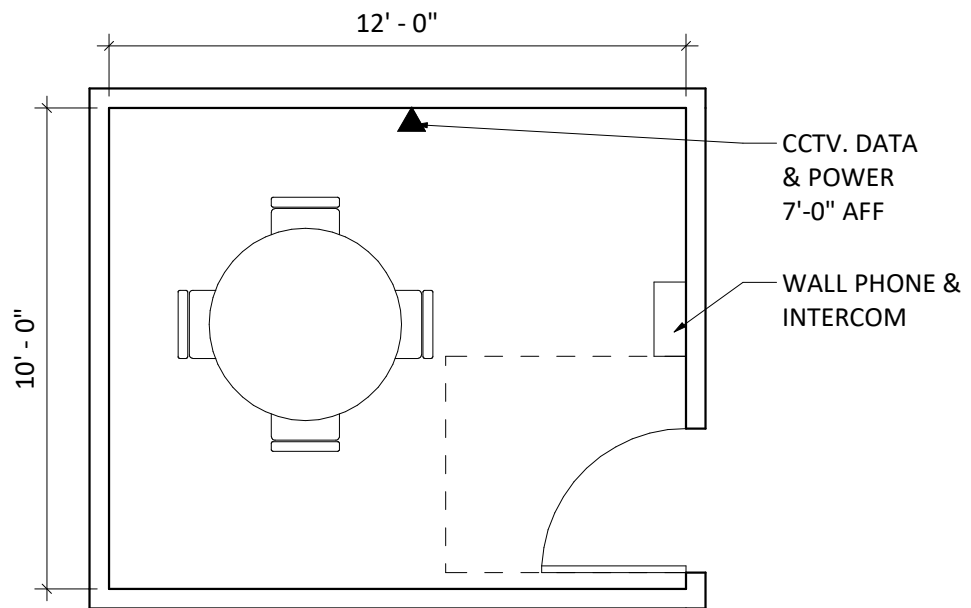


 **MOTHERS ROOM**
1/4" = 1'-0"

SHARED SPACE

1.8 PUBLIC INTERVIEW ROOM

Adjacency Requirement	Access from Lobby
Public Access	High
Security Requirements	Access controlled from Front Desk
Contract Millwork / Equipment	Chair rail
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; pleasant, not glaring, intercom to Dispatch; CCTV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: C4
Owner supplied Furn. / Equip.	4' table, (4) chairs

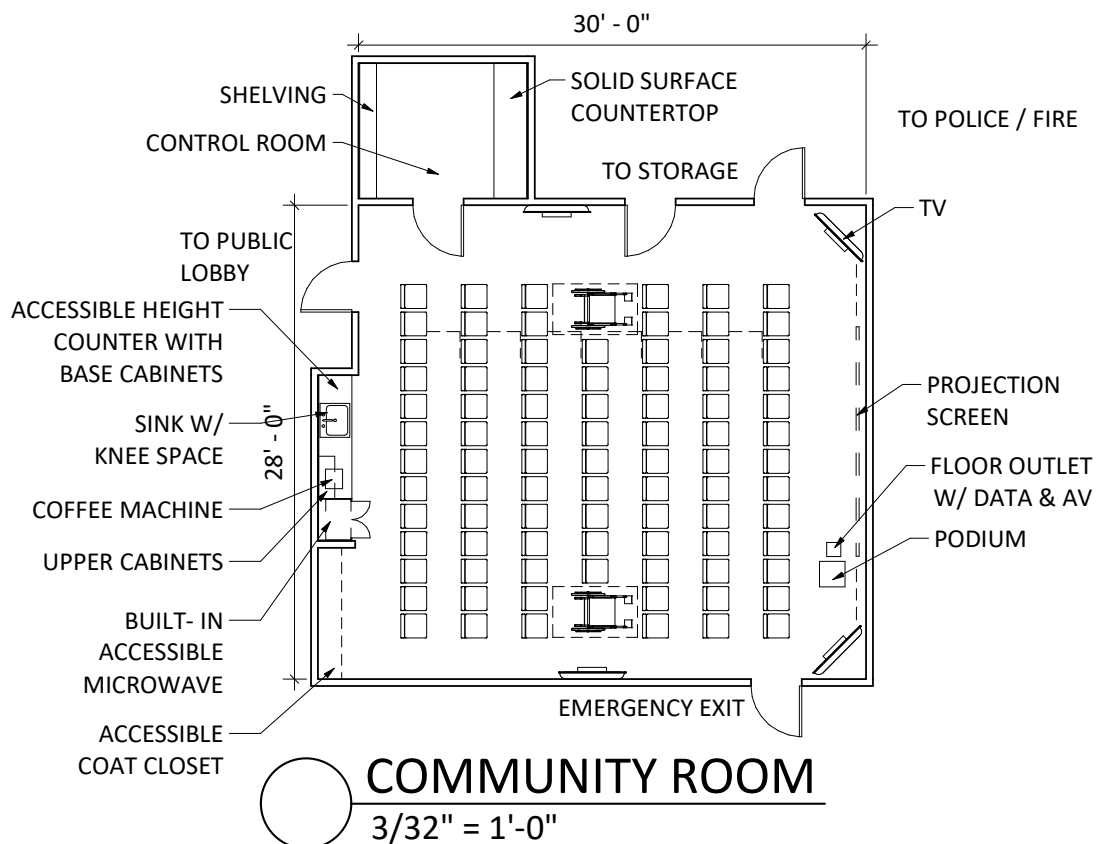


 **PUBLIC INTERVIEW ROOM**
1/4" = 1'-0"

SHARED SPACE

1.9 COMMUNITY ROOM

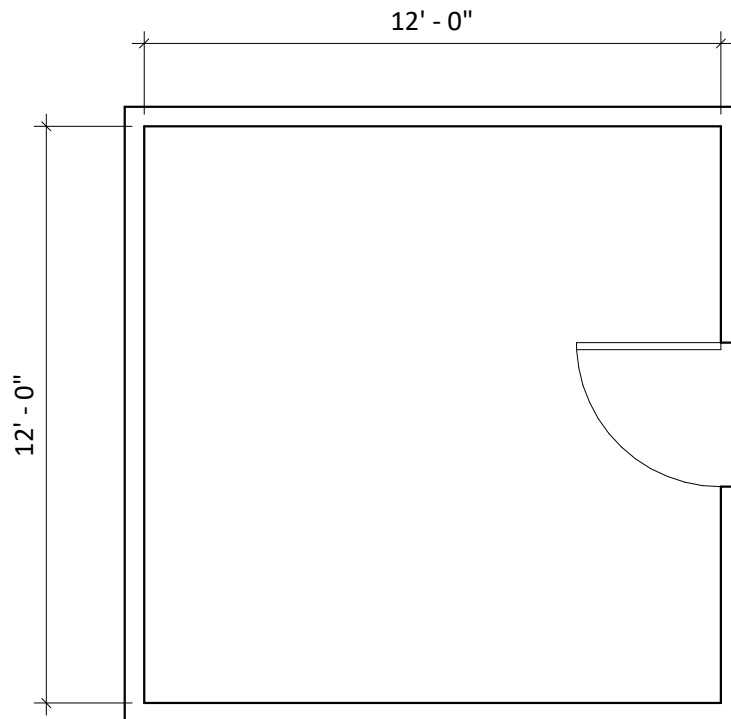
Adjacency Requirement	Easily accessible from Lobby. Adjacent to Storage Closet. Also used for Fire Department Training.
Public Access	Moderate; controlled
Security Requirements	Card Access
Contract Millwork / Equipment	8' markerboard, fabric covered tackable surfaces; coat rod & shelf. Coffee counter w/ sink, motorized projection screen
Floor	Carpet tile
Walls	GWB, painted w/ chair rail
Ceiling	ACT upgrade
Lighting / Electrical	Numerous power & wireless data outlets at walls and floor boxes. Indirect LED, glare free, dimmable. Speaker system, Wireless data system, CATV, fiber drop; cable Access TV camera's, Exterior Broadcast Equipment Hookup Panel
HVAC / Plumbing	A/C w/ good exhaust system
Special Needs	Ability to telecast from the space, 2 TV's, projector, seating for (25) people at 13 training tables or 76 people seated without tables, podium, 4 accessible seating areas; wireless assistive listening system (with signage)
Owner supplied Furn. / Equip.	None



SHARED SPACE

1.10 COMMUNITY ROOM STORAGE

Adjacency Requirement	Off Community Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	No A/C
Special Needs	Storage for 100% of chairs and tables (stacked on carts), podium, voting and misc public information supplies
Owner supplied Furn. / Equip.	None

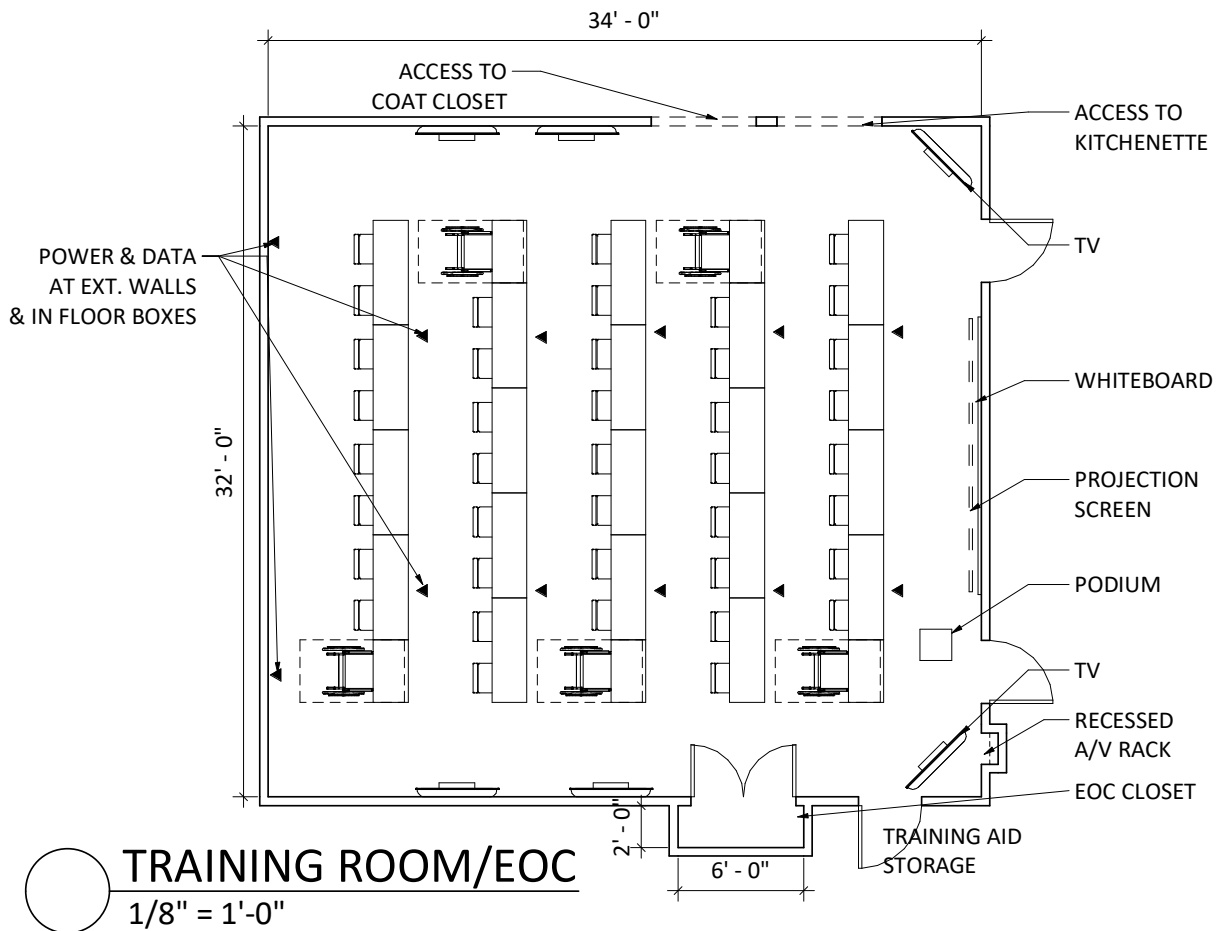


 **COMMUNITY ROOM STORAGE**
1/4" = 1'-0"

SHARED SPACE

2.1 TRAINING ROOM / EOC

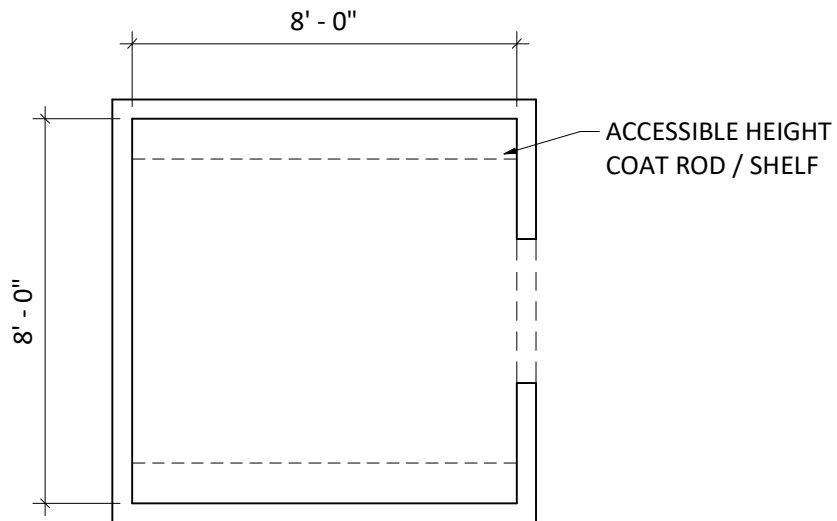
Adjacency Requirement	Accessible from Fire & Police Department secure spaces, adjacent to training aid storage rooms
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	8' markerboard, fabric covered tackboard, whiteboard, counter w/ base cabinets.
Floor	Carpet tile
Walls	GWB, painted w/ chair rail
Ceiling	ACT upgrade
Lighting / Electrical	Numerous power & data outlets, indirect LED, glare free, dimmable, speaker system, wireless assistive listening system, CATV
HVAC / Plumbing	A/C w/ good exhaust system
Special Needs	Ability to telecast from the space. Space to be adaptable for use as the Emergency Operation Center (EOC). EOC Closet (for phones), 4 accessible seating areas.
Owner supplied Furn. / Equip.	Seating for (44) people at training tables, podium, motorized projection screen, projector & 2 TV's



SHARED SPACE

2.2 COAT CLOSET

Adjacency Requirement	Access from Training Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Coat rods & shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Direct LED
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None

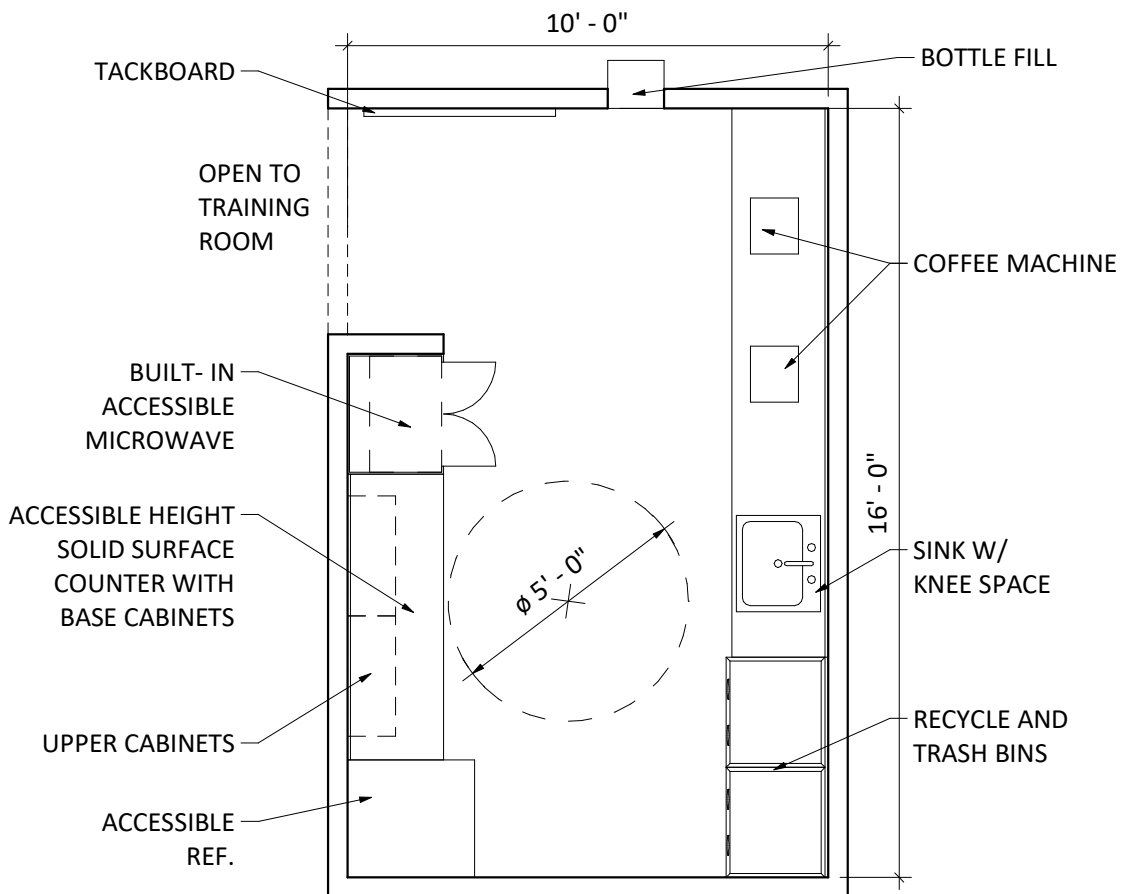


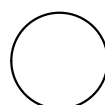
○ **COAT CLOSET**
1/4" = 1'-0"

SHARED SPACE

2.3 KITCHENETTE

Adjacency Requirement	Access from Training Room
Public Access	None
Security Requirements	None
Millwork	Solid surface countertop with base and upper cabinets, tackboard, 30" deep refrigerator
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED & under counter lighting
HVAC / Plumbing	A/C w/ good exhaust system, sink, bottle fill
Special Needs	Handicap accessible
Furniture / Equipment	Microwave, (2) coffee machines, recycle and trash bins

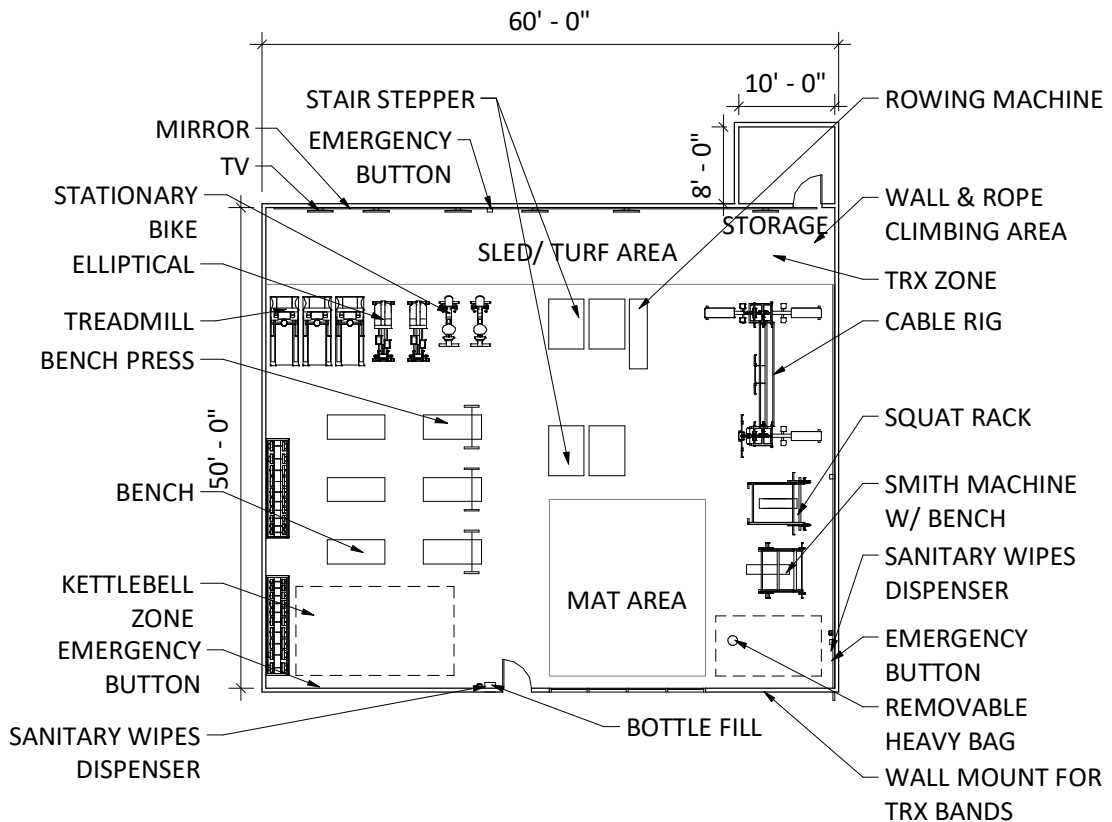


 **KITCHENETTE**
1/4" = 1'-0"

SHARED SPACE

2.4 WELLNESS ROOM

Adjacency Requirement	Shared only between Police & Fire; separate access for Police & Fire. Possible use for cadet training, self defense programs.
Public Access	None
Security Requirements	Card access to each department
Contract Millwork / Equipment	None
Floor	Rubber sports flooring.
Walls	GWB, painted, 5'x6' wall mirrors
Ceiling	ACT; 10' high
Lighting / Electrical	LED direct, CATV for wall mounted TV, ceiling speakers; emergency button on (3) walls
HVAC / Plumbing	A/C w/ good exhaust, bottle fill station
Special Needs	Used by 12 people at once, include storage closet, room will serve as Defensive Tactics Training
Owner supplied Furn. / Equip.	(3) treadmills, (4) stair steppers, (2) elliptical, (2) bikes, bench press, squat rack, cable rig, removable heavy bag, dumbbell rack and bench area, floor mats, 6 TV's, (2) sanitary wipe dispensers, TRX system storage.

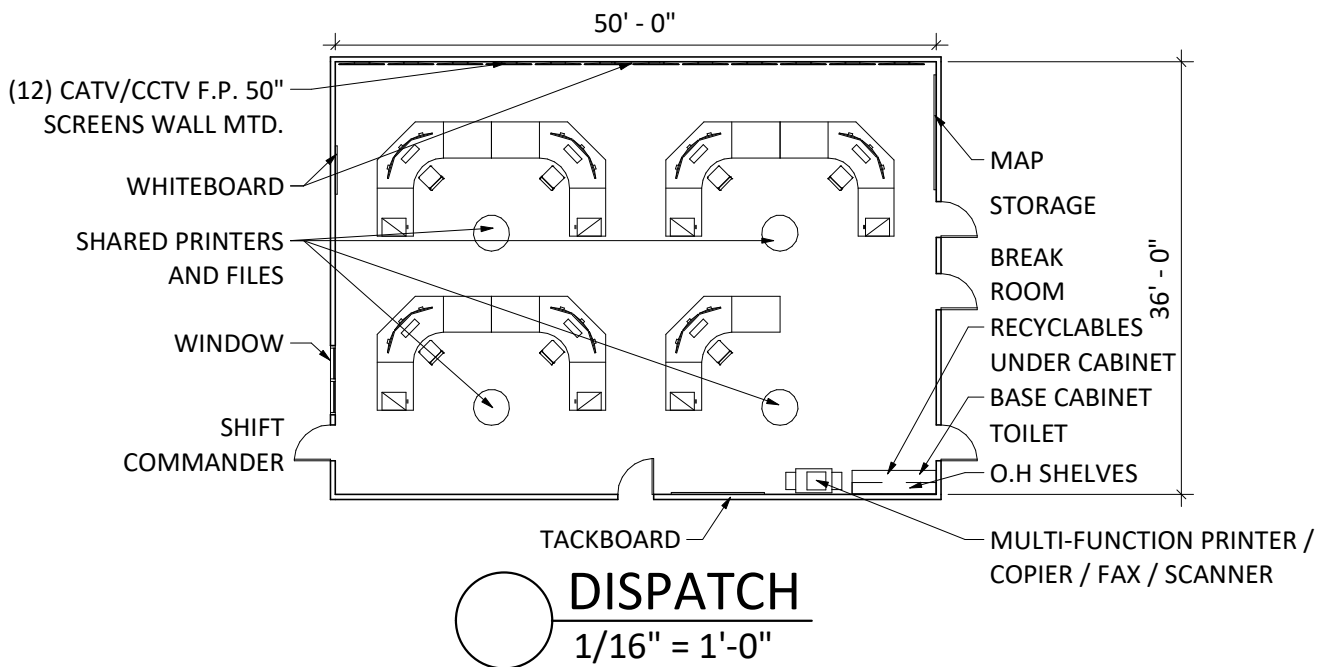


WELLNESS ROOM
1" = 20'-0"

SHARED SPACE

2.5 DISPATCH

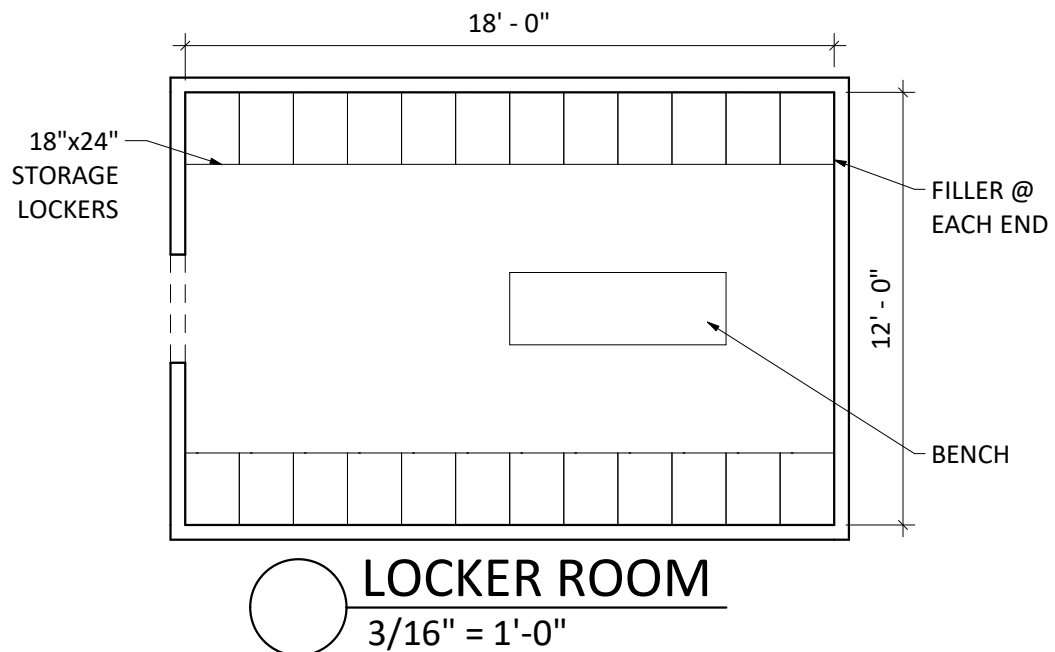
Adjacency Requirement	Adjacent to Shift Commander, Adjacent to Dispatch Supervisor, Dispatch Break Room and Toilet
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Countertop with base and upper cabinets, wall map, (2) whiteboard, tackboard
Floor	Carpet tile
Walls	GWB, painted, acoustic wall panels at all walls
Ceiling	ACT
Lighting / Electrical	Indirect LED, power and data to cubicles, task lighting, controls for alarm and zetron, CATV, CCTV, electric release and intercom, electric door release for cell doors
HVAC / Plumbing	A/C on emergency generator
Special Needs	Raised access floor, access windows
Owner supplied Furn. / Equip.	(7) dispatch console positions, each with/ rear access and high-intensity use chairs, 24" 2-drawer files, (5) 42"4-drawer lateral files, (12) 50" display screens, shared printers and files station



SHARED SPACE

2.6 DISPATCH LOCKER ROOM

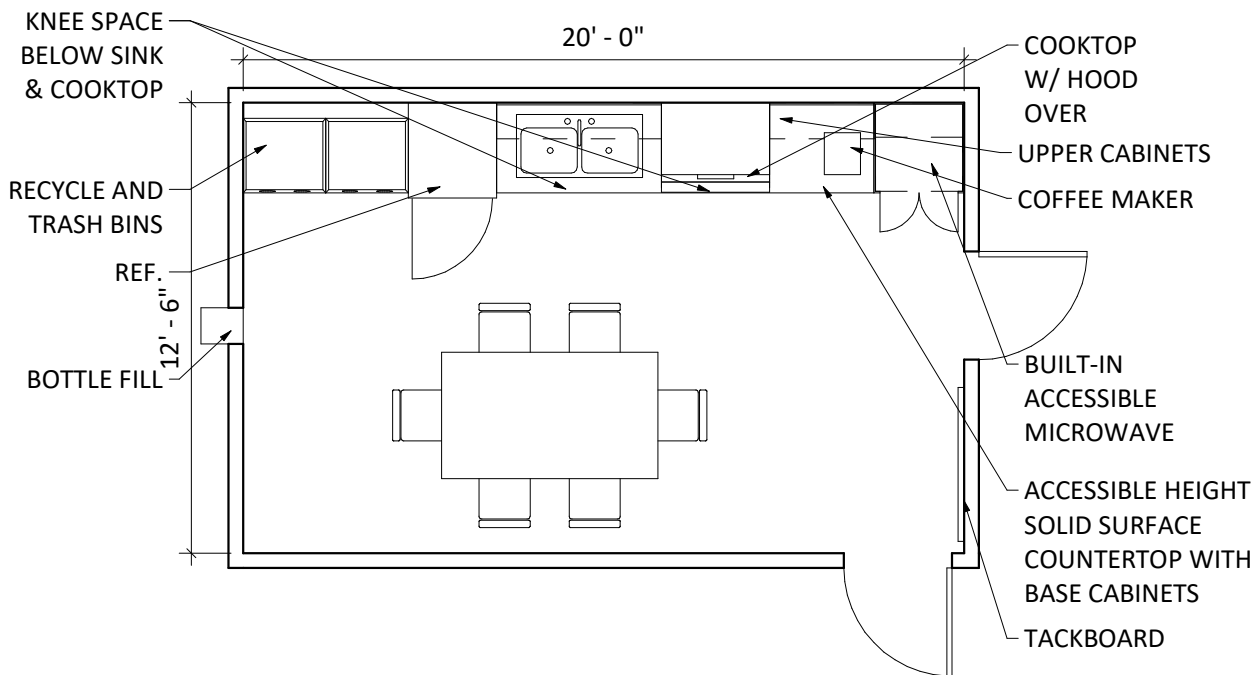
Adjacency Requirement	Access from Dispatch
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(24) 18"x24"x72" Lockable storage units
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Good ventilation
Special Needs	None
Owner supplied Furn. / Equip.	Bench



SHARED SPACE

2.7 DISPATCH BREAK ROOM

Adjacency Requirement	Access from Dispatch
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface countertop with base & upper cabinets, 30" wide refrigerator, 4 burner range w/ oven, exhaust hood, tackboard, built-in microwave
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, under cabinet lighting
HVAC / Plumbing	A/C w/ good exhaust system, sink, bottle fill, hood
Special Needs	Handicap accessible, Somerville Space Standard: K12
Owner supplied Furn. / Equip.	Coffee maker, recycle and trash bins, (1) tables, (6) chairs

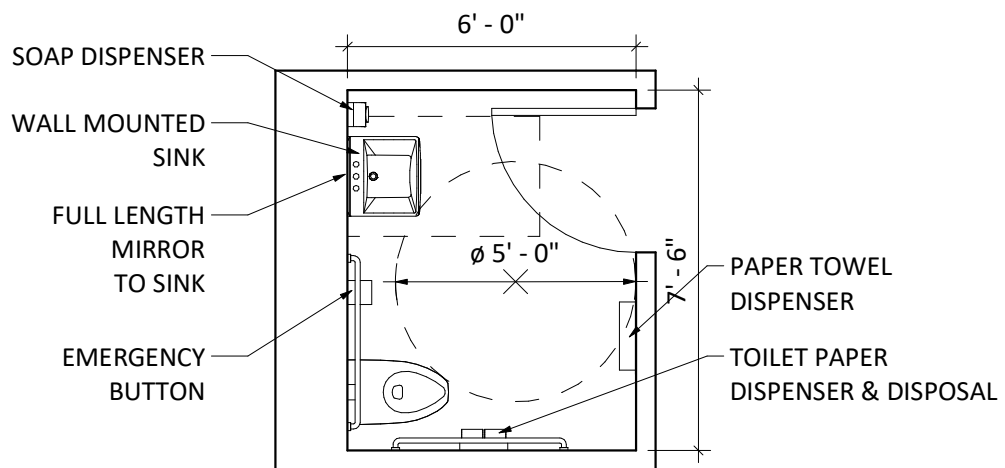


○ DISPATCH BREAK ROOM
3/16" = 1'-0"

SHARED SPACE

2.8 DISPATCH TOILET

Adjacency Requirement	Access from Dispatch
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	Toilet accessories
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls w/ painted GWB above
Ceiling	ACT
Lighting / Electrical	LED, Emergency button
HVAC / Plumbing	Good exhaust; (1) toilet and (1) sink
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	None

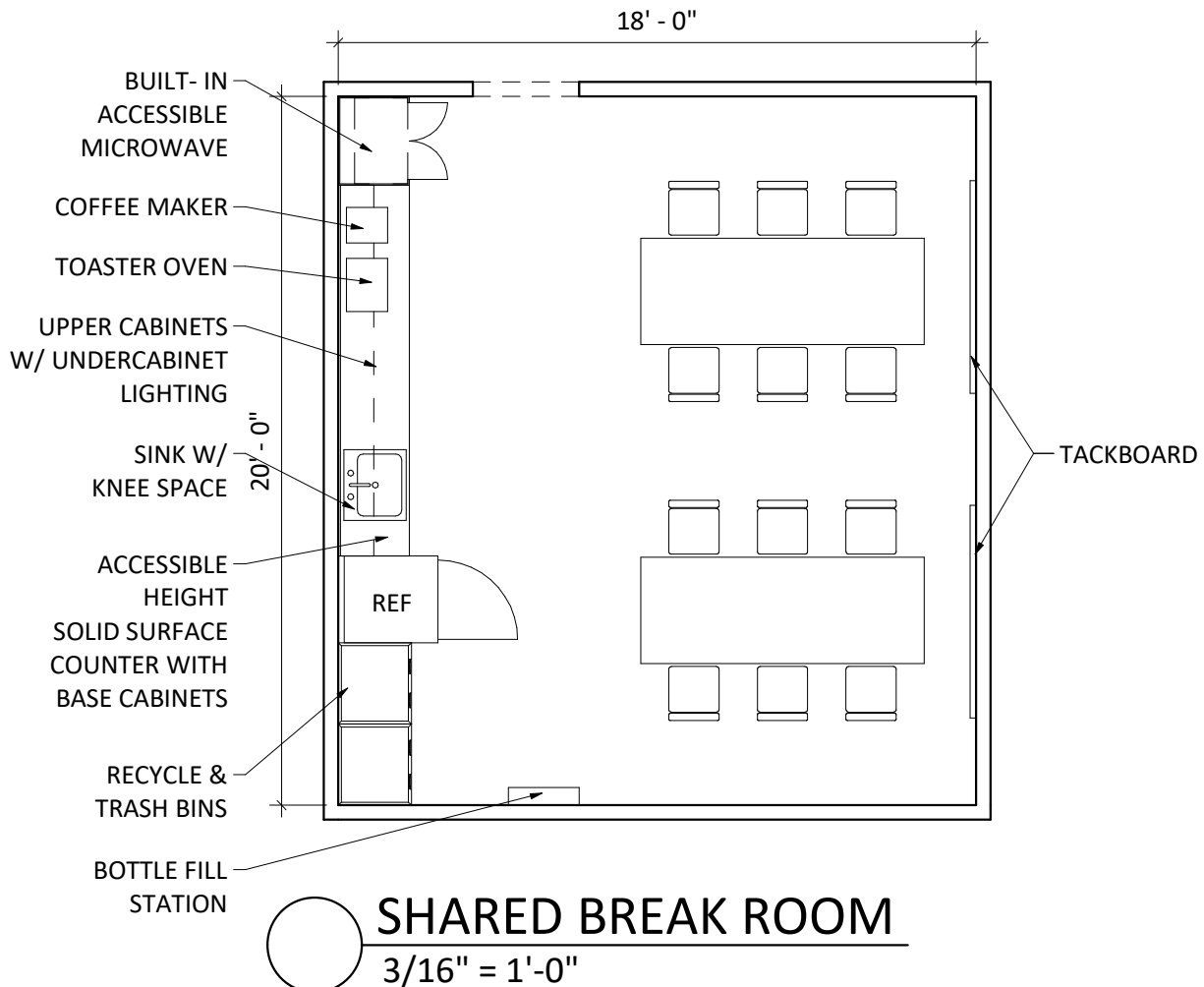


○ DISPATCH TOILET ROOMS
1/4" = 1'-0"

SHARED SPACE

2.9 SHARED BREAK ROOM

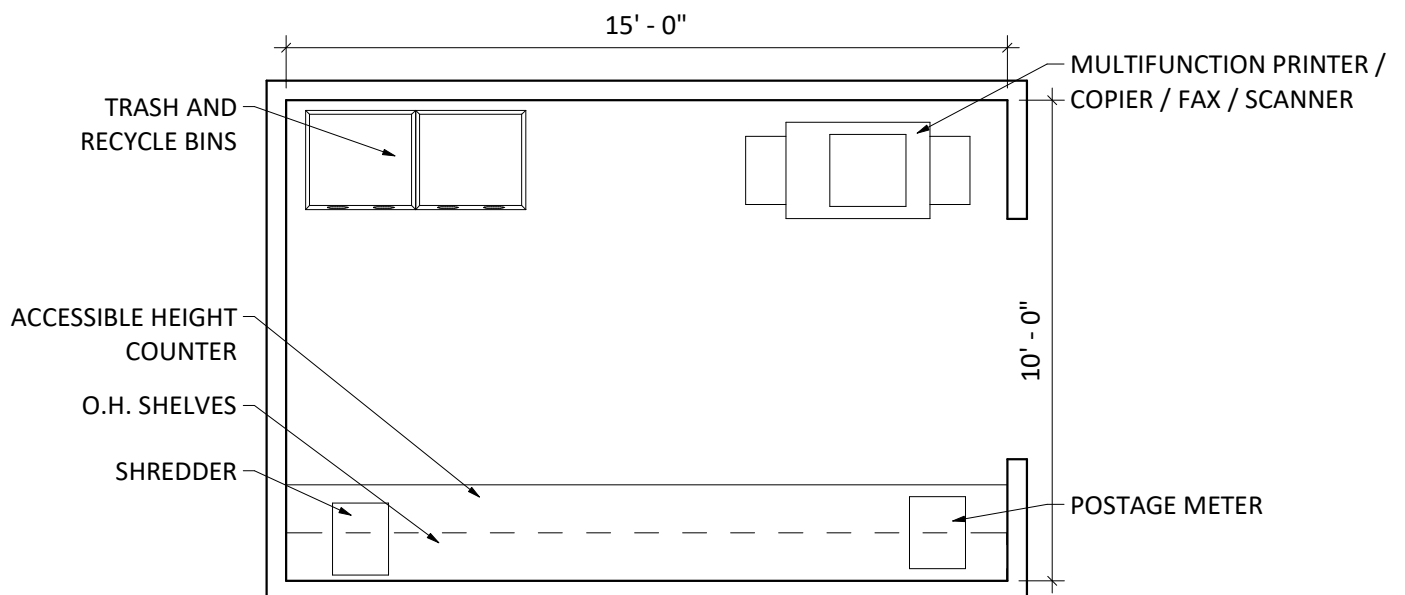
Adjacency Requirement	Good internal access to all departments
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface countertop with base and upper cabinets, 30" wide refrigerator, (2) tackboards, built-in microwave
Floor	Resilient flooring or rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under cabinet lighting
HVAC / Plumbing	A/C, sink, grease trap, bottle fill
Special Needs	Somerville Space Standard: K3
Owner supplied Furn. / Equip.	Coffee maker, (2) tables, (12) chairs, trash and recycle bins

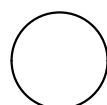


SHARED SPACE

2.10 SHARED WORK ROOM

Adjacency Requirement	Accessible to most, 1 per floor
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid Surface countertop with base and upper cabinets
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under counter lighting, confidential fax line, power for laptop, charging station
HVAC / Plumbing	A/C, Exhaust
Special Needs	Somerville Space Standard: W2
Owner supplied Furn. / Equip.	Multi-function printer / copier / fax / scanner, postage meter, shredder, recycle and trash bins, storage for laptop and charging station

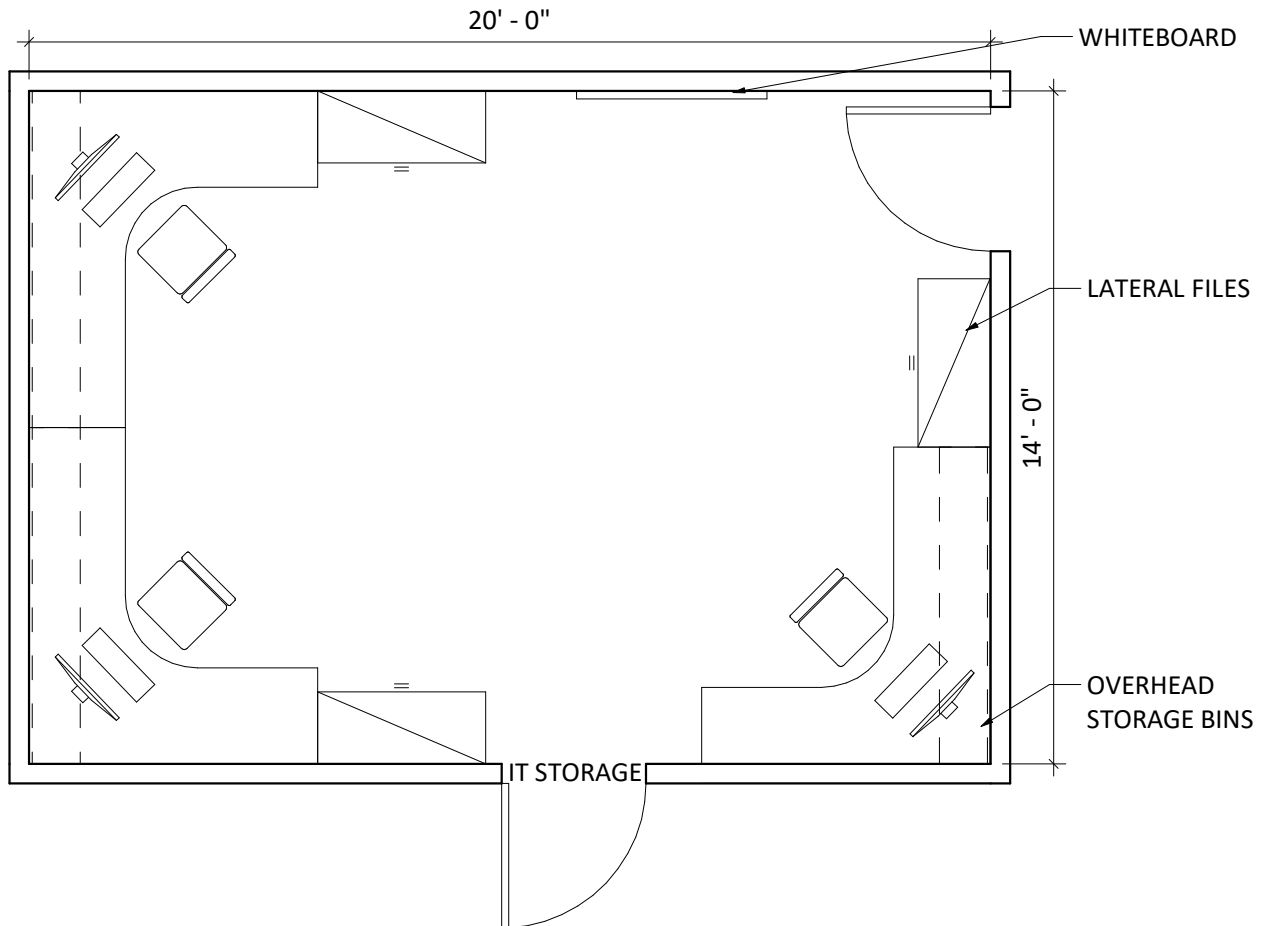


 **SHARED WORK ROOM**
1/4" = 1'-0"

SHARED SPACE

2.11 SHARED IT OFFICE

Adjacency Requirement	Adjacent to IT Storage, near Network Room
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: WS2
Owner supplied Furn. / Equip.	3 Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file and desk chair

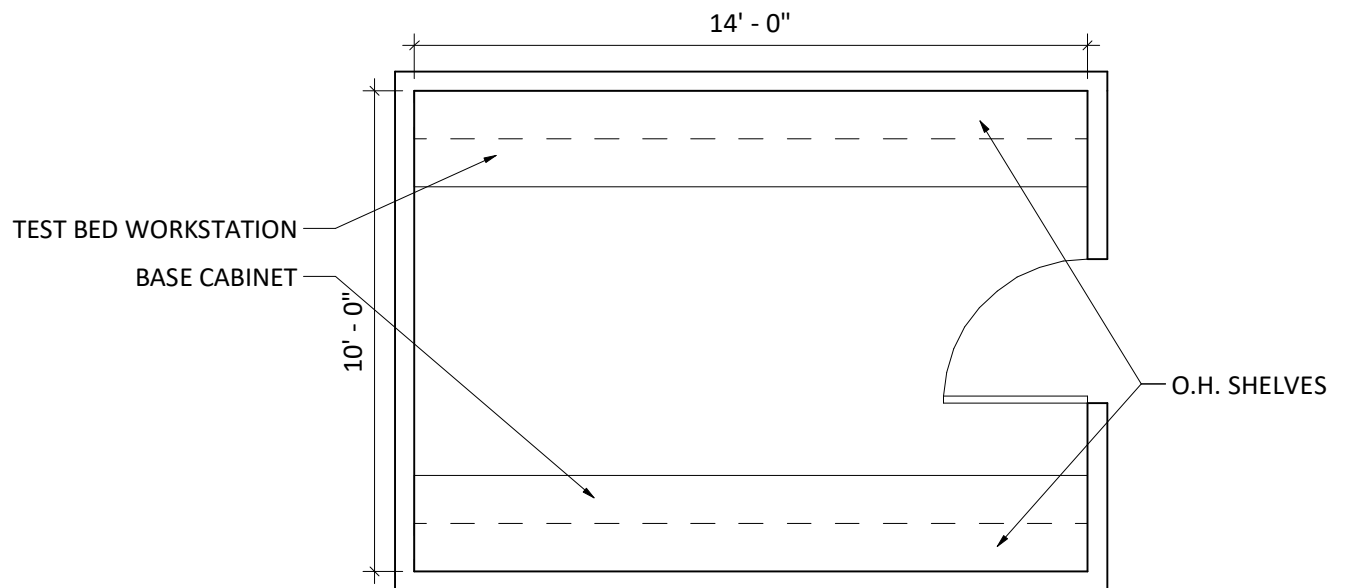


○ SHARED IT OFFICE
1/4" = 1'-0"

SHARED SPACE

2.12 SHARED IT WORKSHOP

Adjacency Requirement	Access from IT Offices
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface countertop with base and upper cabinets
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under counter lighting, wiremold
HVAC / Plumbing	A/C, Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	Test-bed with fiber for network switch

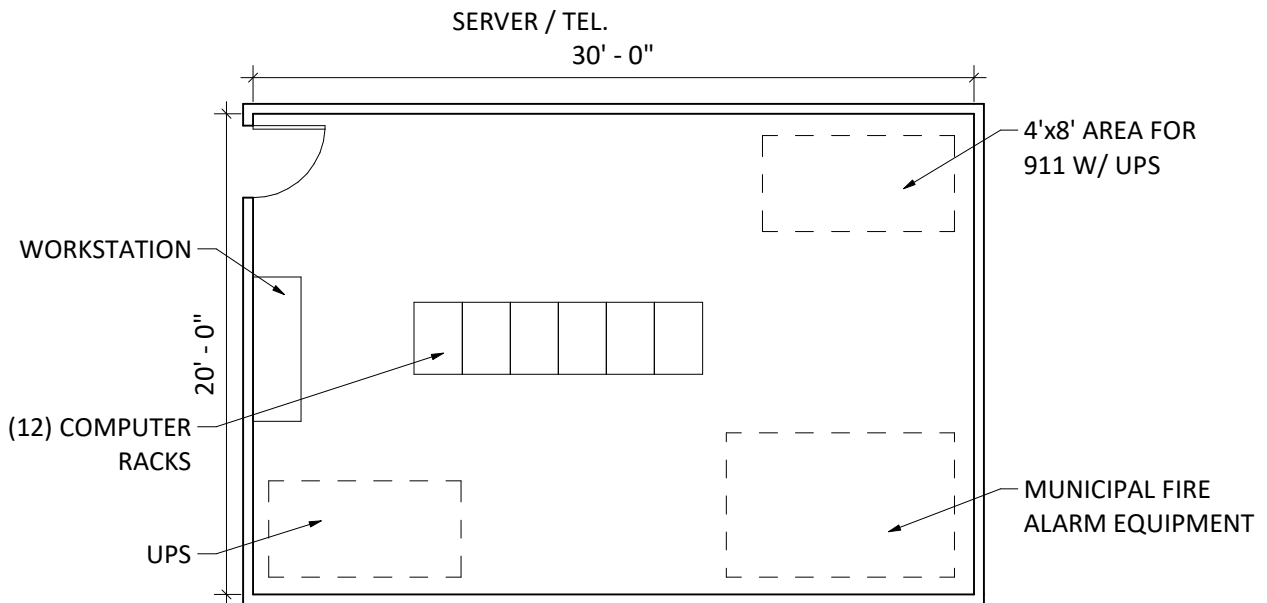


 **SHARED IT WORKSHOP**
1/4" = 1'-0"

SHARED SPACE

3.1 NETWORK OPERATIONS CENTER

Adjacency Requirement	Centrally located, upper floor
Public Access	Controlled (Vendors)
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood on all walls
Floor	Rubber or Linoleum, access flooring if next to Dispatch
Walls	GWB, painted
Ceiling	ACT, min 9' ceiling height for tray clearance
Lighting / Electrical	LED, O.H. cable trays.
HVAC / Plumbing	Independent A/C, pre-action type sprinkler system
Special Needs	Separate Demarc Room on an exterior wall
Owner supplied Furn. / Equip.	Computer racks, E911, security. UPS & battery backup. Workstation console.

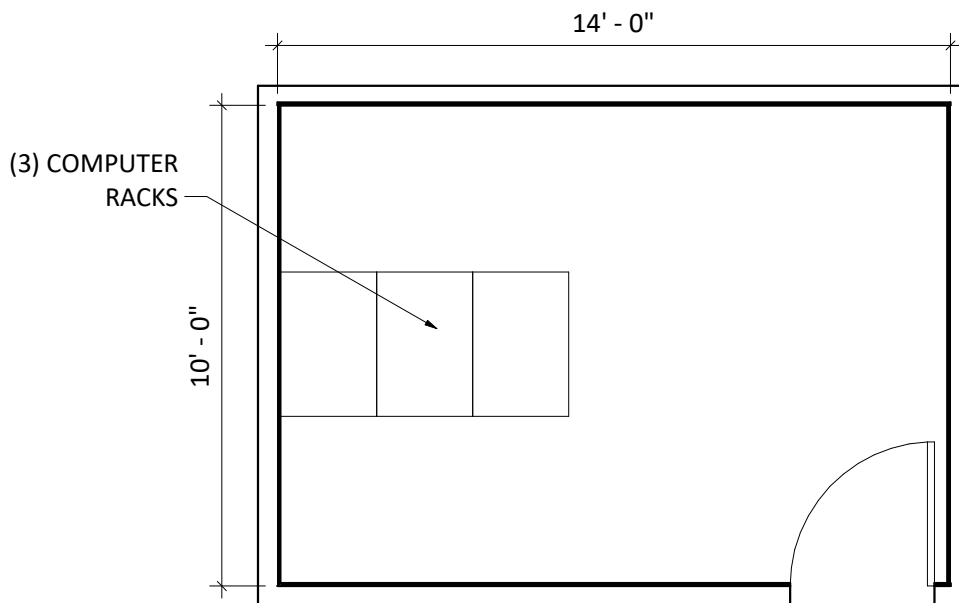


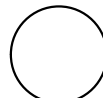
NETWORK OPERATIONS CENTER
1/8" = 1'-0"

SHARED SPACE

3.2 RADIO ROOM

Adjacency Requirement	Highest floor, near radio tower
Public Access	Controlled (Vendors)
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood on all walls
Floor	Rubber or Linoleum
Walls	GWB, painted
Ceiling	Exposed, painted
Lighting / Electrical	LED
HVAC / Plumbing	Heat only
Special Needs	None
Owner supplied Furn. / Equip.	None

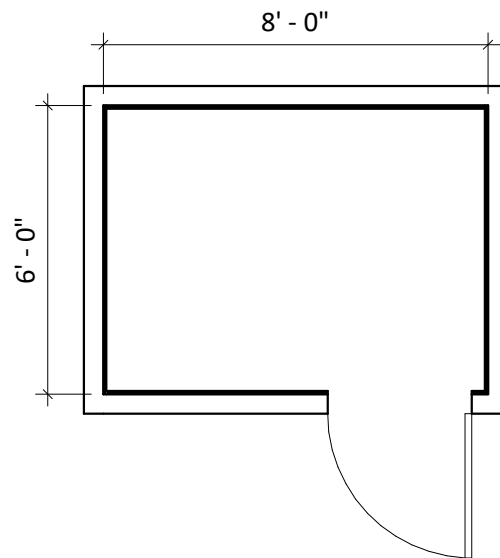


 **RADIO ROOM**
1/4" = 1'-0"

SHARED SPACE

3.3 DEMARC

Adjacency Requirement	At exterior lowest level, redundant room for connection to backup tel/com
Public Access	Controlled (Vendors)
Security Requirements	Card access, no access from this space to remainder of building
Contract Millwork / Equipment	8' high fire rated painted plywood on all walls
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	Exposed, painted
Lighting / Electrical	LED
HVAC / Plumbing	Heat only
Special Needs	None
Owner supplied Furn. / Equip.	None

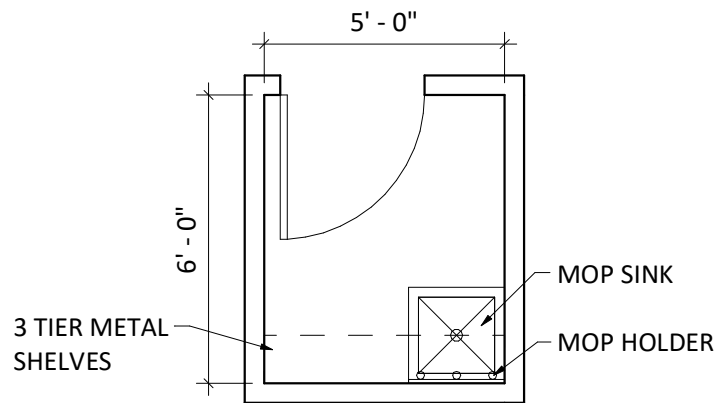


○ DEMARC
1/4" = 1'-0"

SHARED SPACE

3.4 JANITOR'S CLOSETS

Adjacency Requirement	Good access to elevator. Centrally located on each floor.
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Mop holder w/metal shelf along one wall above sink basin, stainless steel splash guards on walls at sink.
Floor	Rubber
Walls	FRP (full height)
Ceiling	ACT
Lighting / Electrical	LED, Utility
HVAC / Plumbing	Exhaust only. Floor sink & wall faucet. Spray head & 6' hose.
Special Needs	None
Owner supplied Furn. / Equip.	Janitor cart



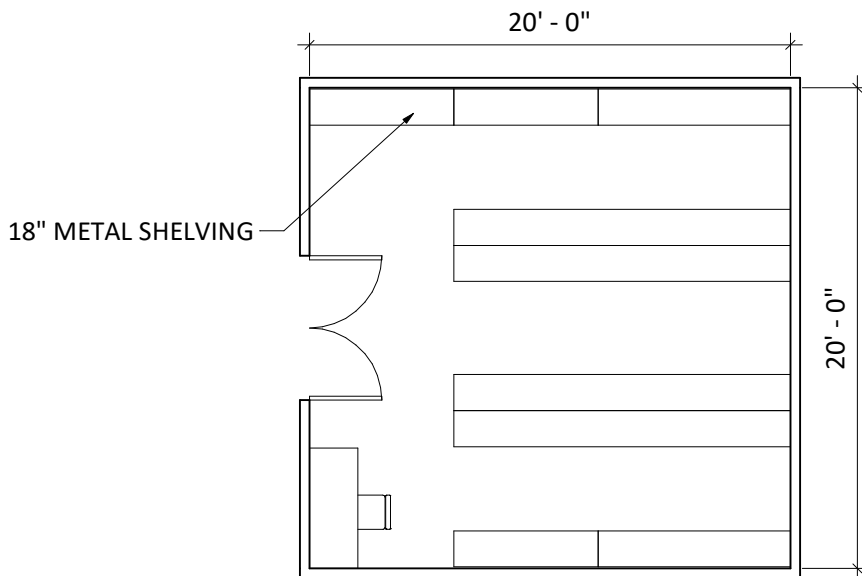
JANITOR'S CLOSET

1/4" = 1'-0"

SHARED SPACE

3.5 BULK STORAGE & CUSTODIAN OFFICE

Adjacency Requirement	None
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Rubber
Walls	CMU or GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, Utility
HVAC / Plumbing	Exhaust only
Special Needs	Somerville Space Standard: ST4
Owner supplied Furn. / Equip.	18" deep metal shelving, desk and desk chair

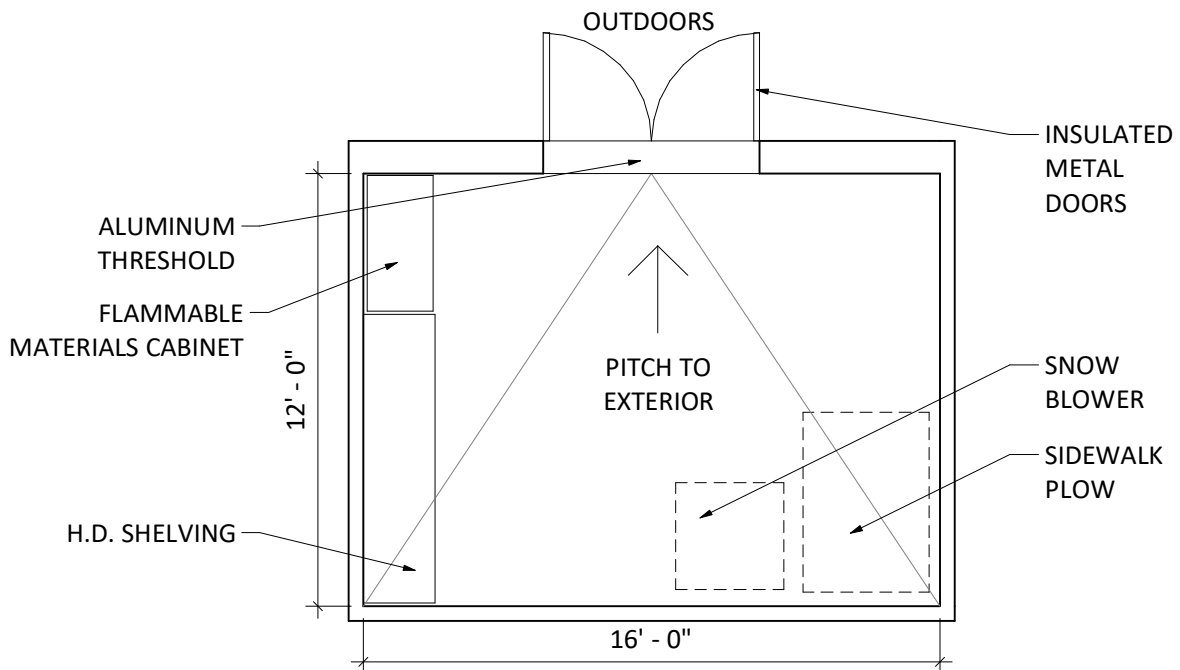


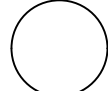
 **BULK STORAGE & CUSTODIAN OFFICE**
1/8" = 1'-0"

SHARED SPACE

3.6 BUILDING / GROUNDS EQUIPMENT STORAGE

Adjacency Requirement	Exterior access only
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener slope to exterior
Walls	CMU / FRP on GWB
Ceiling	None; painted exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Exhaust (unit heater)
Special Needs	Storage for snow blower, shovels, leaf blower, de-icer, B&G equipment, etc.
Owner supplied Furn. / Equip.	Flammable materials cabinet (fluid storage)

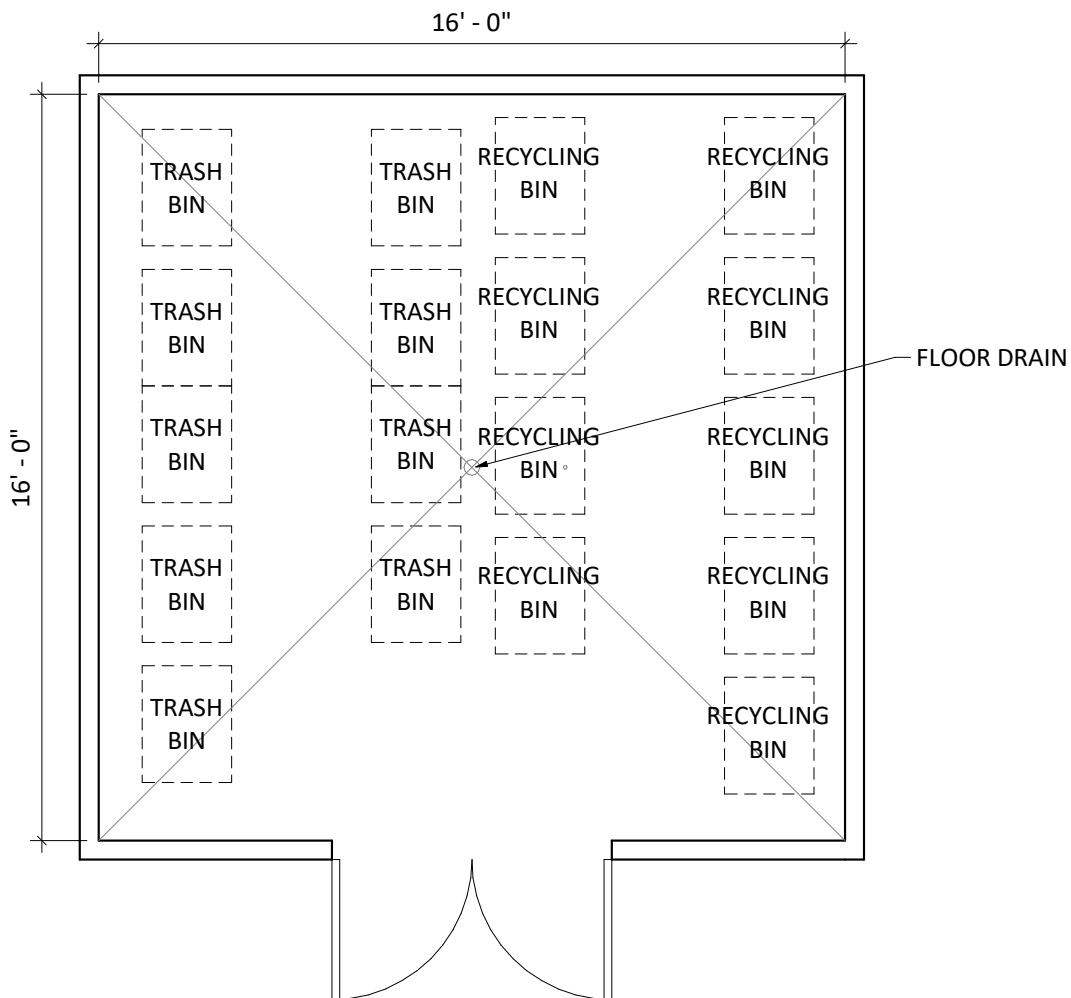


 **BUILDING / GROUNDS**
3/16" = 1'-0"

SHARED SPACE

3.7 TRASH & RECYCLING ROOM

Adjacency Requirement	Near exterior door
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Concrete w/hardener
Walls	CMU w/ epoxy paint or GWB w/FRP panels
Ceiling	GWB, painted
Lighting / Electrical	Utility LED
HVAC / Plumbing	Exhaust only, floor drain
Special Needs	None
Owner supplied Furn. / Equip.	(9) 50 gallon rolling waste bins, (9) recycling bins

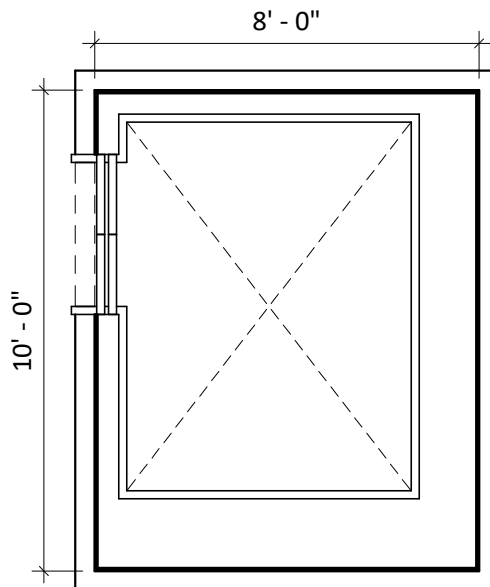


○ TRASH & RECYCLING
1/4" = 1'-0"

SHARED SPACE

3.8 PASSENGER ELEVATOR

Adjacency Requirement	Adjacent to Public Lobby
Public Access	High
Security Requirements	Moderate
Contract Millwork / Equipment	Cab to have rubber floor, Plam wall panels w/ SS grab bars, SS ceiling
Floor	Rubber
Walls	CMU shaft
Ceiling	Rated GWB, in shaft
Lighting / Electrical	LED
HVAC / Plumbing	No A/C
Special Needs	Elevator shall be sized for stretcher. Roof vent required
Owner supplied Furn. / Equip.	None

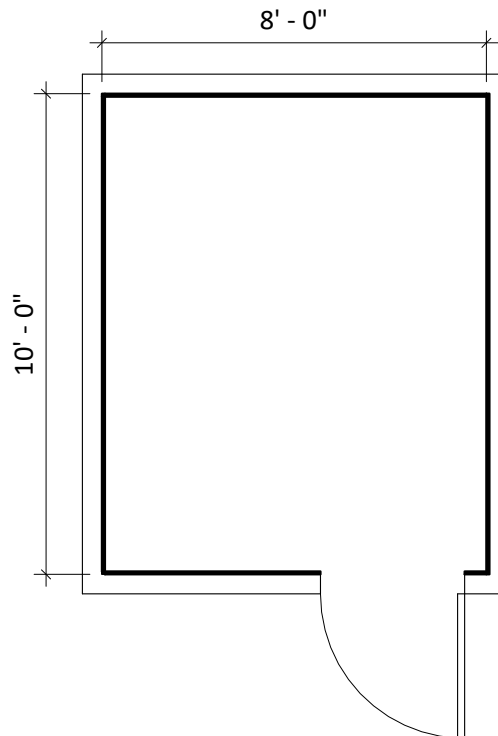


 **PASSENGER ELEVATOR**
1/4" = 1'-0"

SHARED SPACE

3.9 ELEVATOR MACHINE ROOM

Adjacency Requirement	Adjacent to Elevator
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood at all walls over GWB
Floor	Rubber
Walls	Rated GWB, painted
Ceiling	Rated GWB, painted
Lighting / Electrical	LED, utility
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

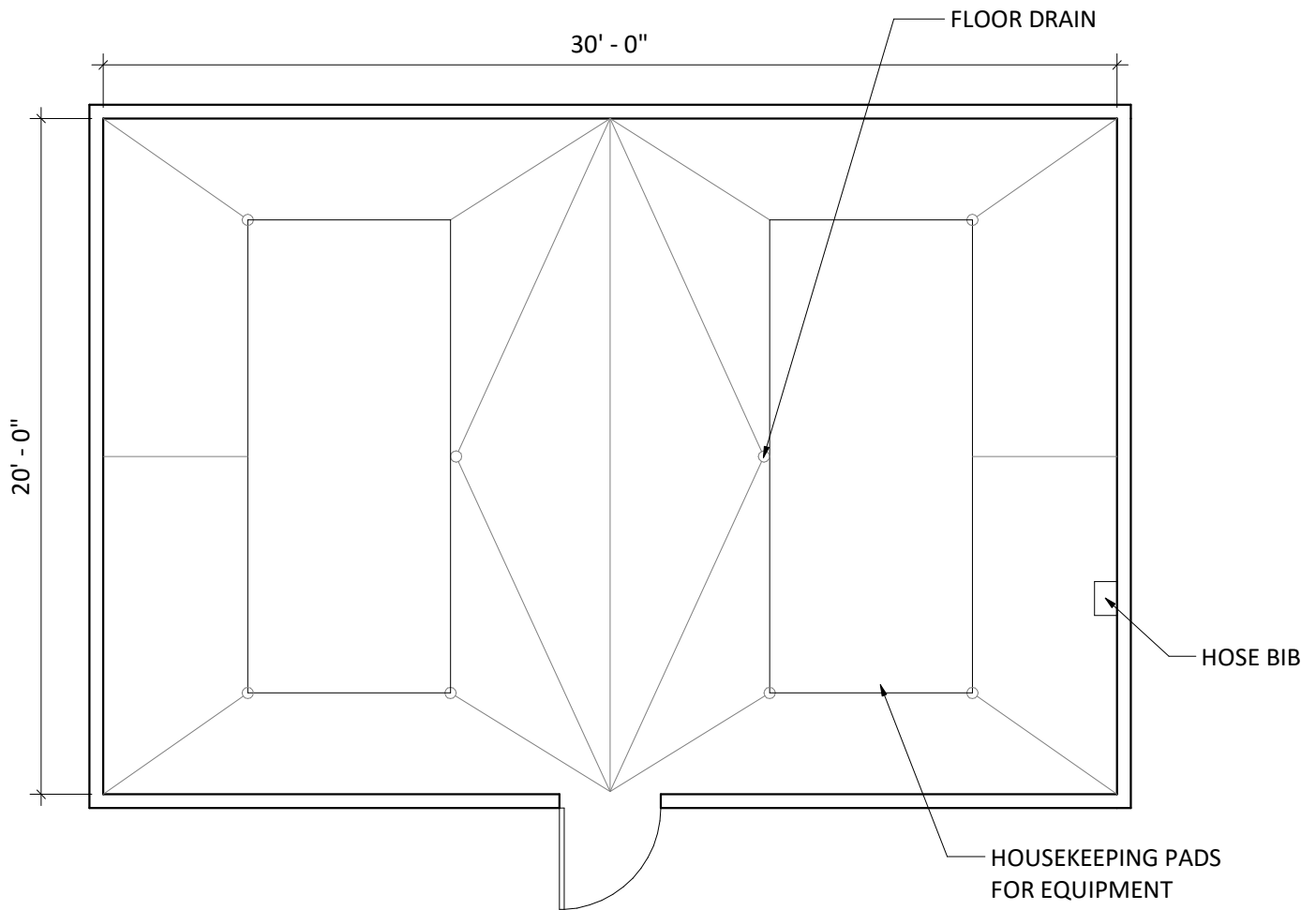



 **ELEVATOR MACHINE ROOM**
1/4" = 1'-0"

SHARED SPACE

3.10 MECHANICAL ROOM

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood at all walls
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	None, painted structure
Lighting / Electrical	LED, utility
HVAC / Plumbing	Floor drains at equipment, exhaust, hose bib
Special Needs	Housekeeping pads at equipment
Owner supplied Furn. / Equip.	None

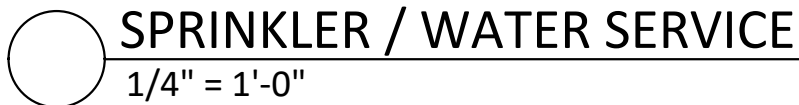
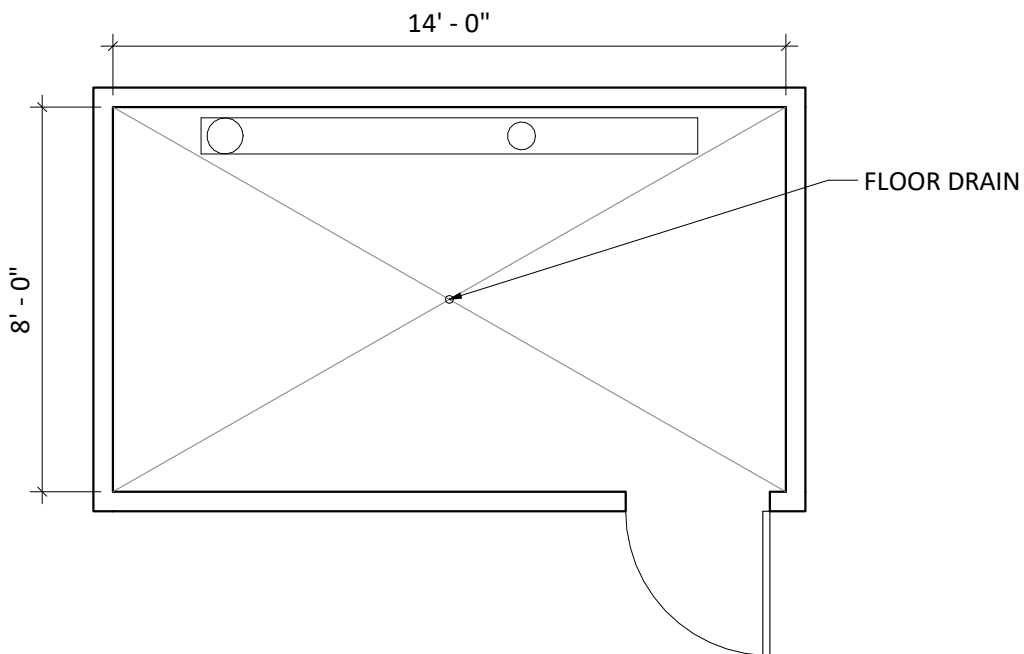


 **MECHANICAL ROOM**
3/16" = 1'-0"

SHARED SPACE

3.11 SPRINKLER / WATER SERVICE

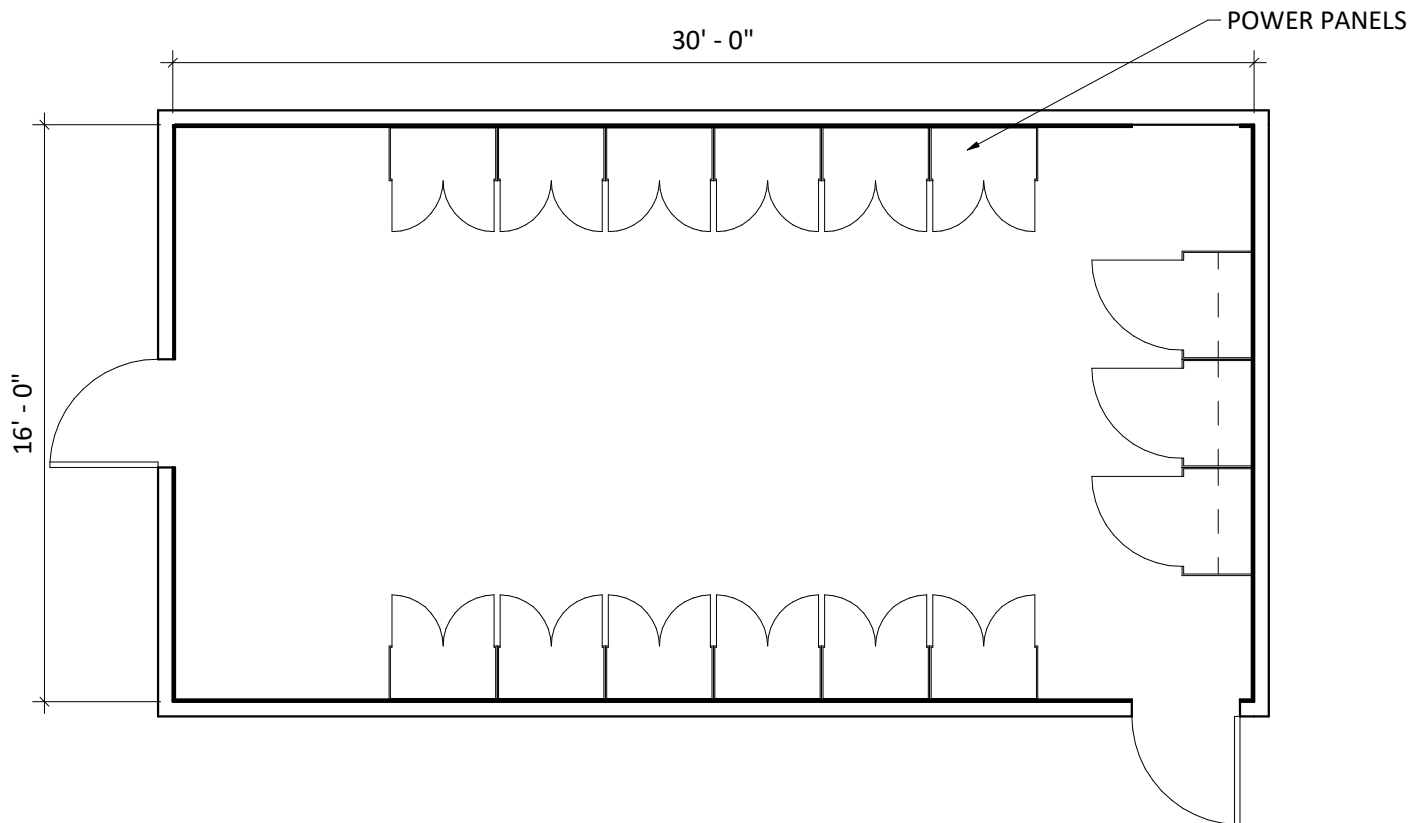
Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	None, painted structure
Lighting / Electrical	LED, utility. Power required for equipment
HVAC / Plumbing	Floor drain at inspector test station, heat only
Special Needs	None
Owner supplied Furn. / Equip.	None



SHARED SPACE

3.12 MAIN ELECTRICAL ROOM

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood on all walls
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	None, painted structure
Lighting / Electrical	LED, utility
HVAC / Plumbing	Heat only
Special Needs	Closers required at doors
Owner supplied Furn. / Equip.	None

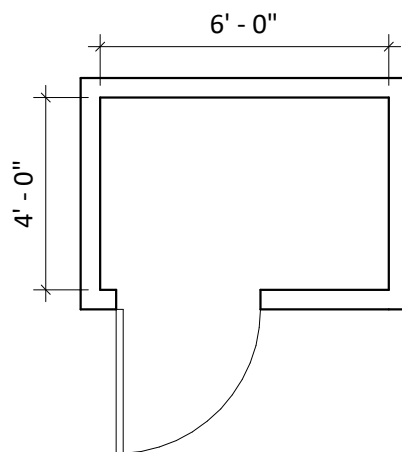


 **MAIN ELECTRICAL ROOM**
3/16" = 1'-0"

SHARED SPACE

3.13 ELECTRICAL CLOSET

Adjacency Requirement	Centrally located on each floor
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood on all walls
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	None, painted structure
Lighting / Electrical	LED, utility
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None

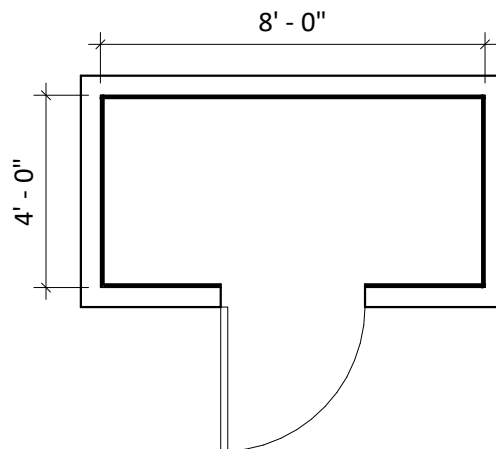


 **ELECTRICAL CLOSET**
1/4" = 1'-0"

SHARED SPACE

3.14 IDF CLOSET

Adjacency Requirement	Centrally located per floor
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood backer along all walls
Floor	Rubber
Walls	GWB
Ceiling	None, painted structure
Lighting / Electrical	LED
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None

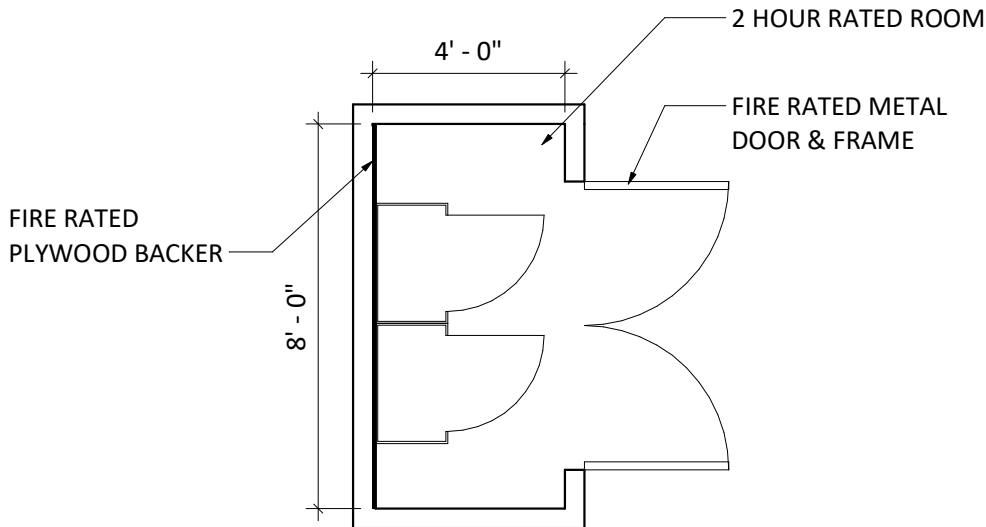


○ IDF CLOSET
1/4" = 1'-0"

SHARED SPACE

3.15 AUTOMATIC TRANSFER SWITCH

Adjacency Requirement	Locate next to Electrical Room
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' high fire rated plywood backer on 1 wall
Floor	Concrete w/ hardener
Walls	2 hour rated GWB, painted
Ceiling	2 hour rated GWB, painted
Lighting / Electrical	LED, utility
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None



 **AUTOMATIC TRANSFER SWITCH**
1/4" = 1'-0"

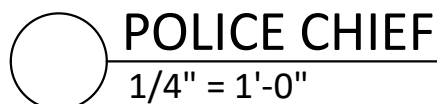
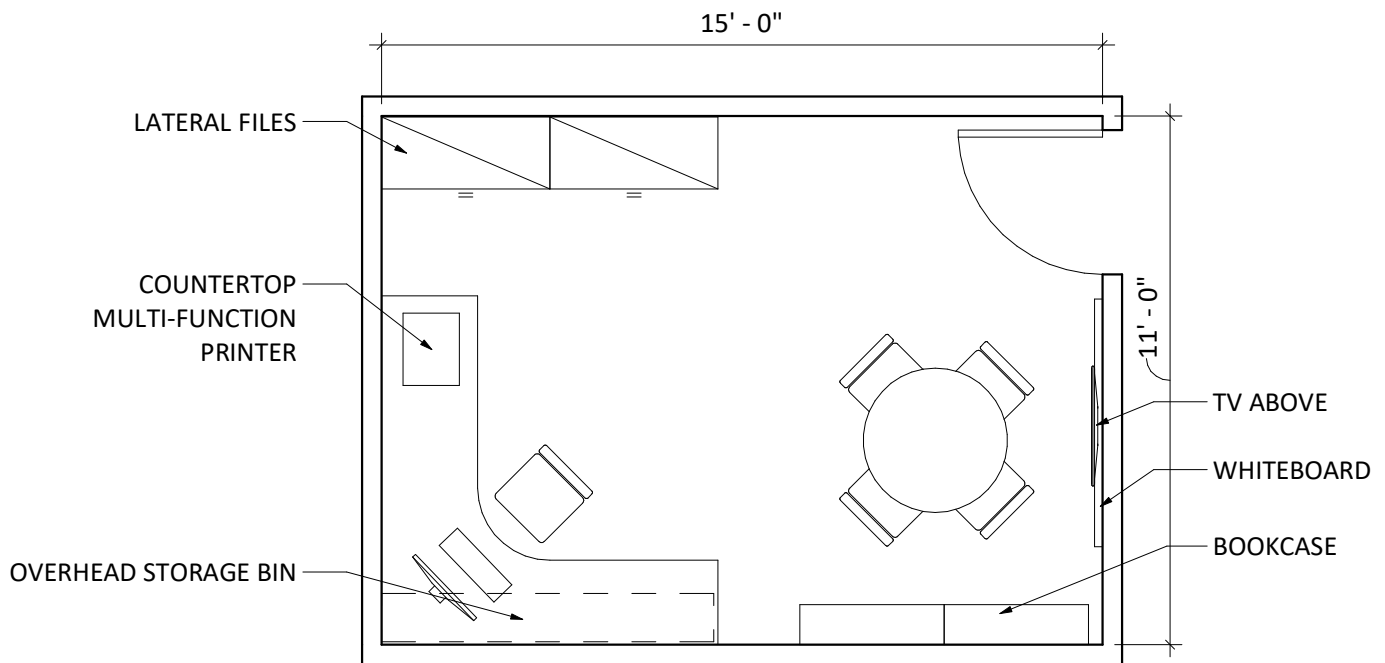
Police Department Space Needs

CHARLES FEMINO, INTERIM POLICE CHIEF

POLICE DEPARTMENT

4.1 POLICE CHIEF

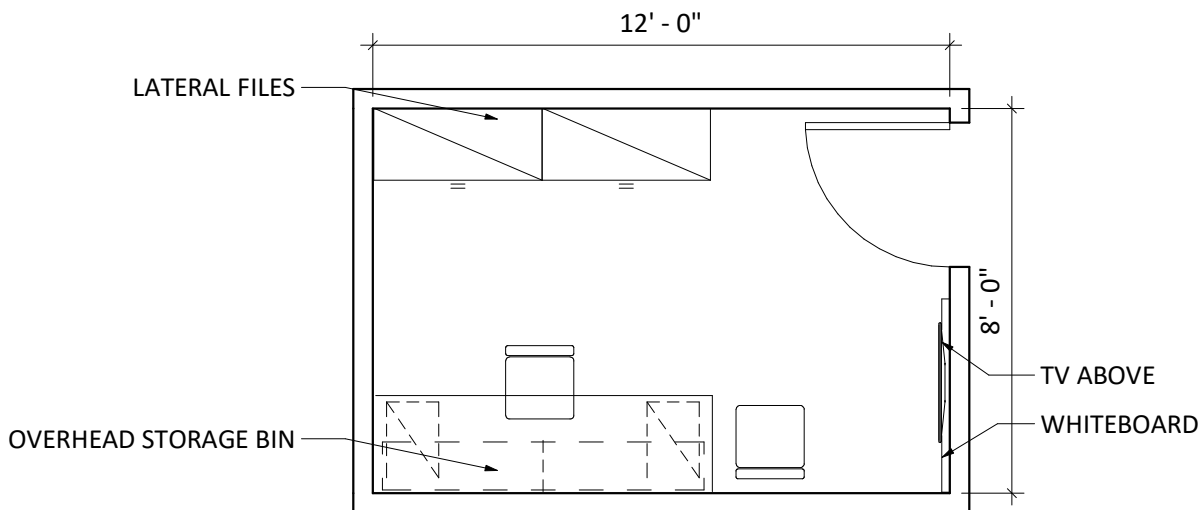
Adjacency Requirement	Adjacent to Administration Assistant and Conference Room
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO1
Owner supplied Furn. / Equip.	Desk w/ return, (2) 42" overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, (2) bookcase, countertop multi-function printer, table and (4) chairs, TV



POLICE DEPARTMENT

4.2 DEPUTY CHIEF

Adjacency Requirement	Adjacent to Administration Assistant and Conference Room
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair, TV

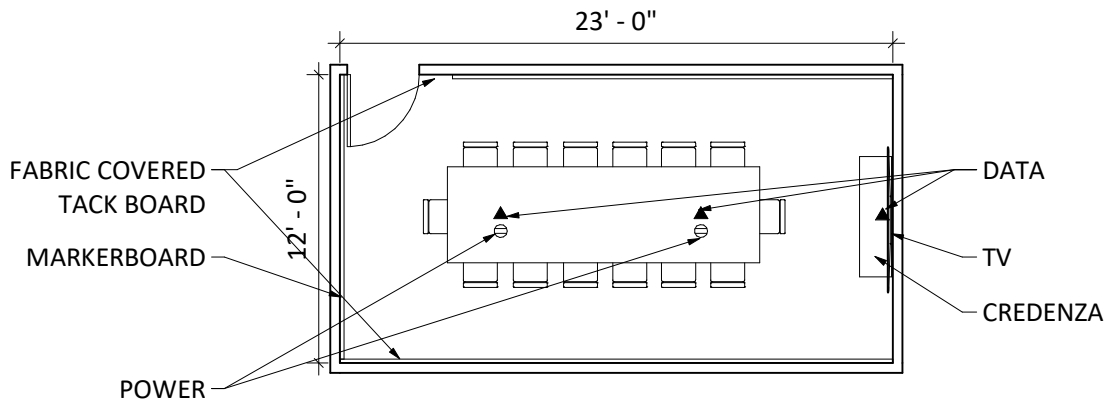


○ **DEPUTY CHIEF**
1/4" = 1'-0"

POLICE DEPARTMENT

4.3 ADMINISTRATIVE CONFERENCE ROOM

Adjacency Requirement	Near Chief and Deputy Chief
Public Access	Limited
Security Requirements	None
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail, solid surface counter with base cabinets below.
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: C2
Owner supplied Furn. / Equip.	(1) conference table w/ (14) chairs, TV, 16"X60" credenza

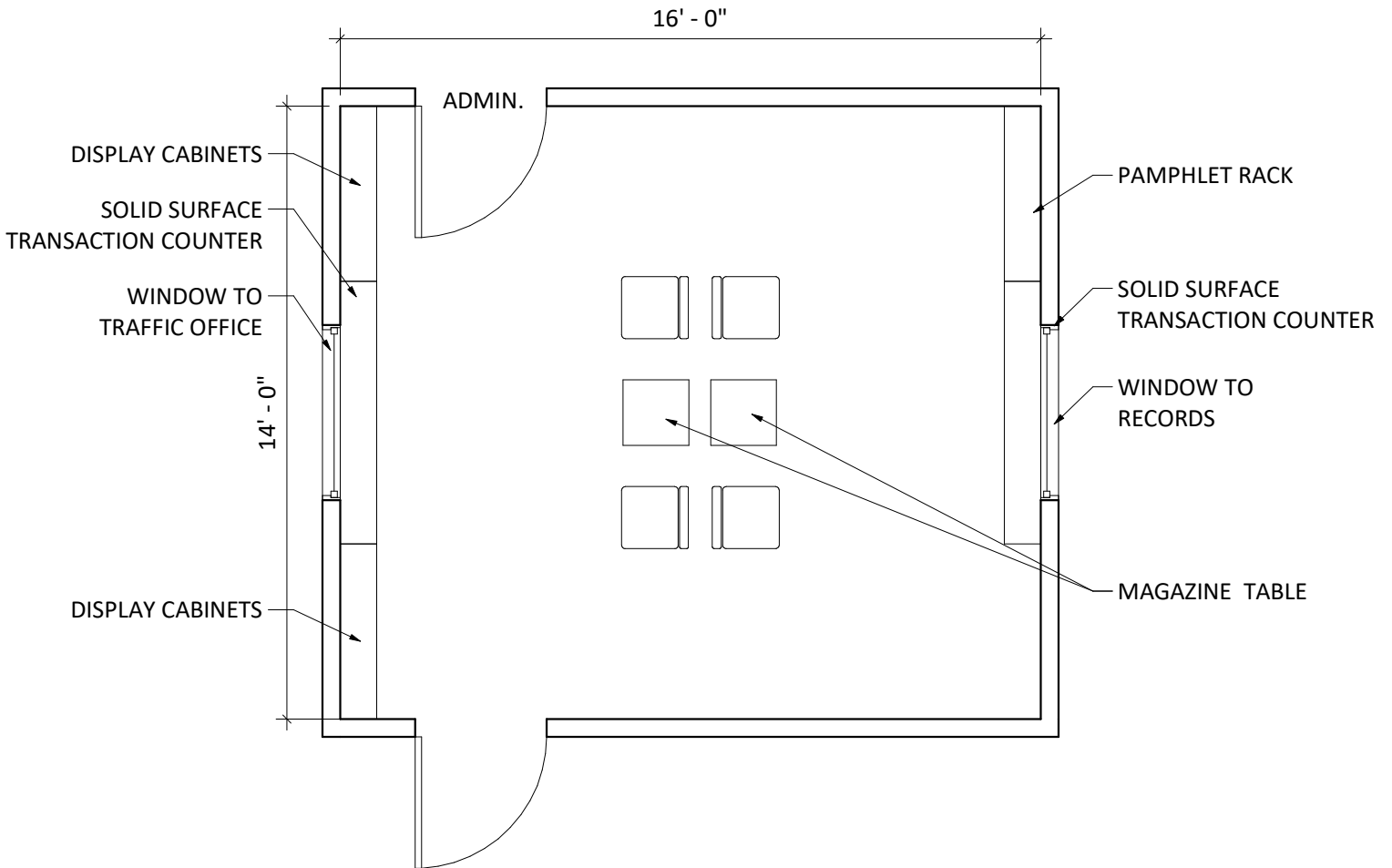


CONFERENCE ROOM
1/8" = 1'-0"

POLICE DEPARTMENT

4.4 POLICE VISITOR LOBBY & WAITING AREA

Adjacency Requirement	Adjacent to Traffic Office, Records Room; Next to elevator; Near public bathrooms
Public Access	High
Security Requirements	Electronic access from lobby to Police Offices
Contract Millwork / Equipment	Chair rail, (2) solid surface transaction counter, display cabinets, pamphlet rack
Floor	Linoleum or VCT
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(4) guest chairs; (2) Magazine tables

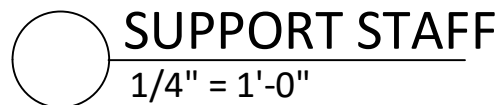
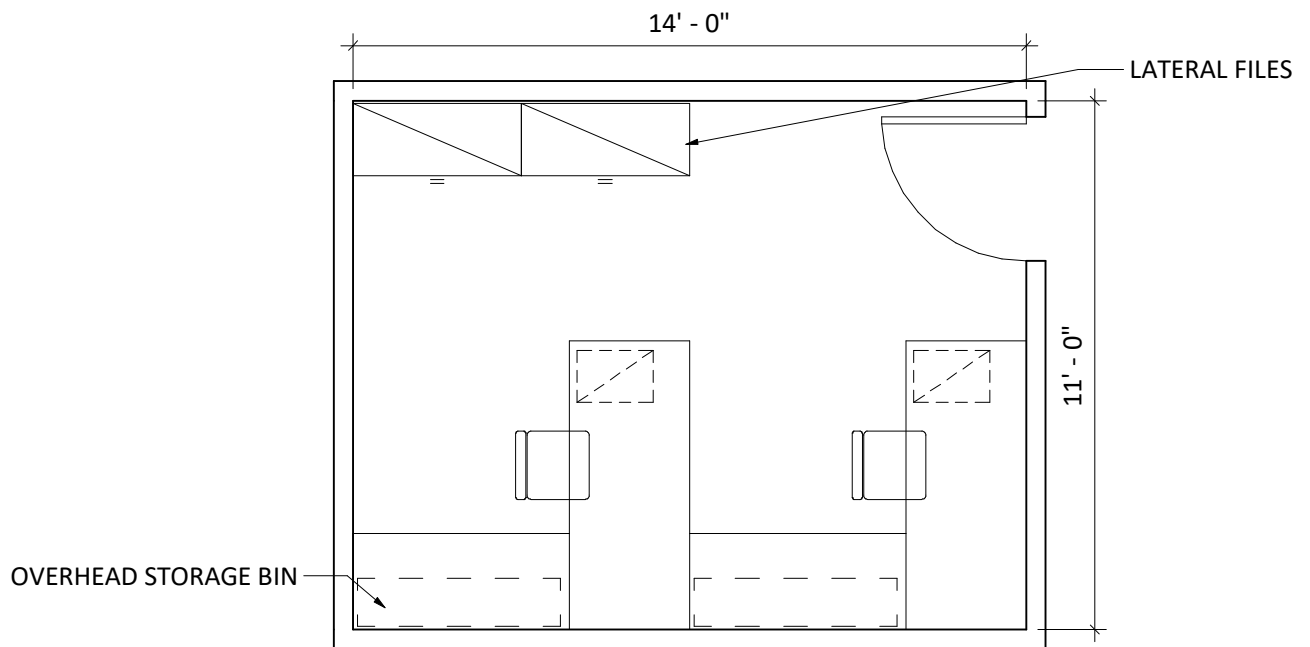


POLICE VISITOR LOBBY & WAITING AREA
1/4" = 1'-0"

POLICE DEPARTMENT

4.5 SUPPORT STAFF

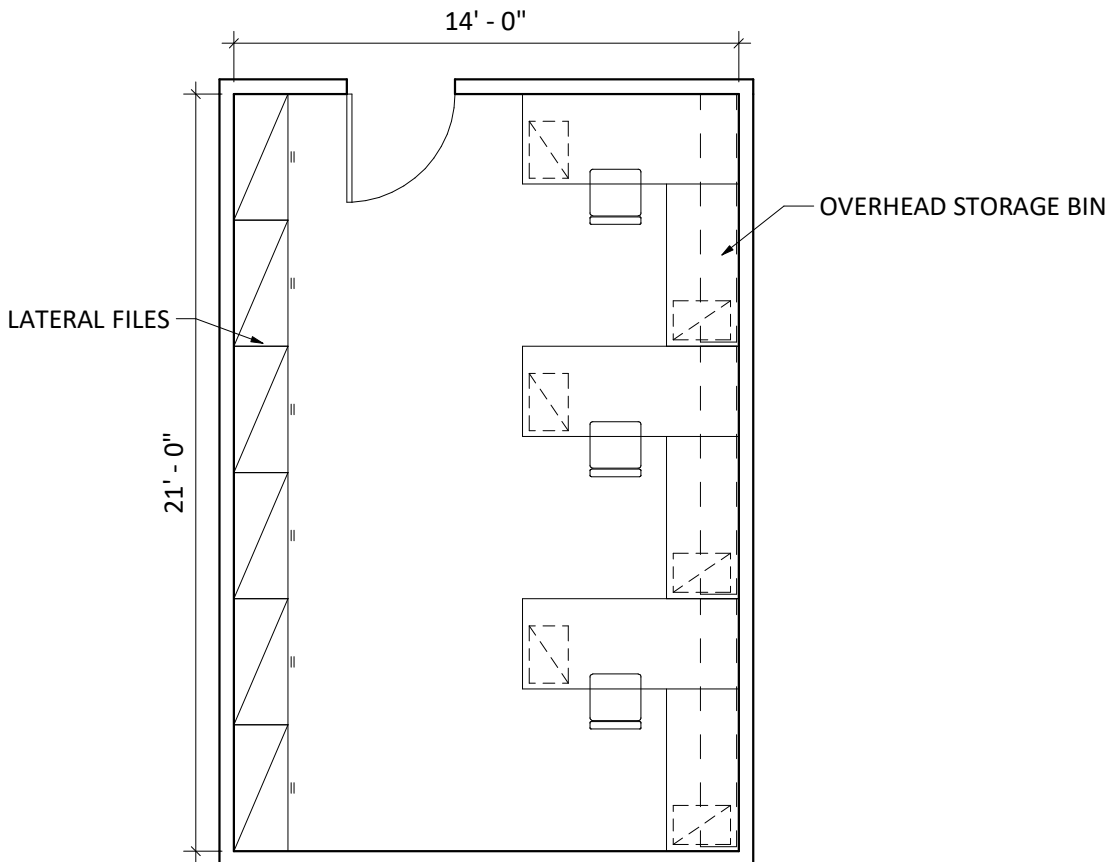
Adjacency Requirement	Near Administration; Senior Clerk & Admin Assist.
Public Access	Low
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair



POLICE DEPARTMENT

4.6 FINANCIAL SERVICES / PAYROLL

Adjacency Requirement	Contains, Financial Analyst, Senior Clerk, Payroll Assistant
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(3) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair; (6) 42" 4-drawer lateral cabinets

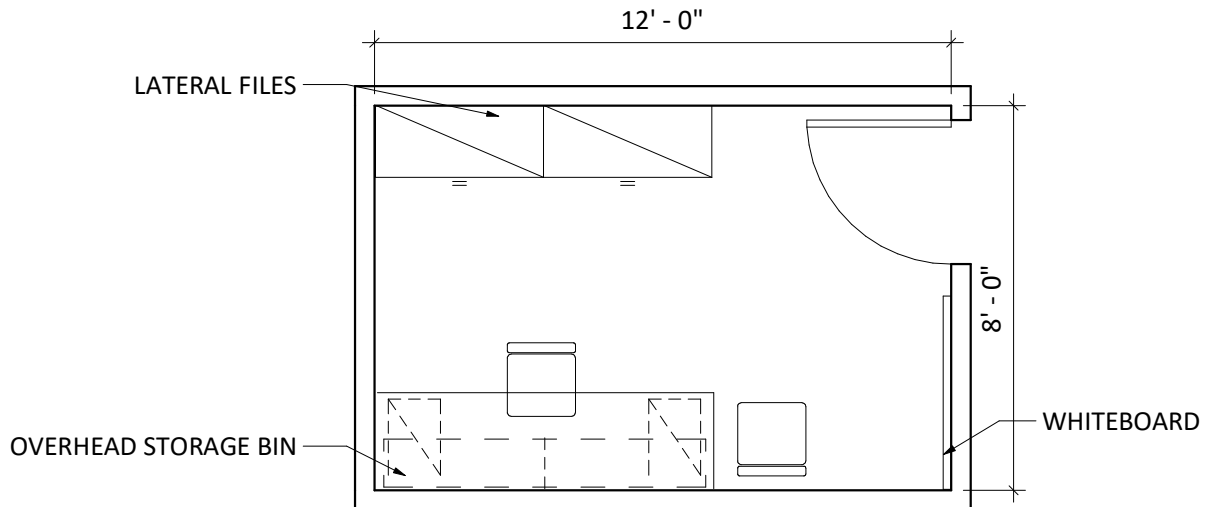


FINANCIAL SERVICES / PAYROLL
3/16" = 1'-0"

POLICE DEPARTMENT

4.7 CAPTAIN, ADMINISTRATION

Adjacency Requirement	Near Conference Room
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair

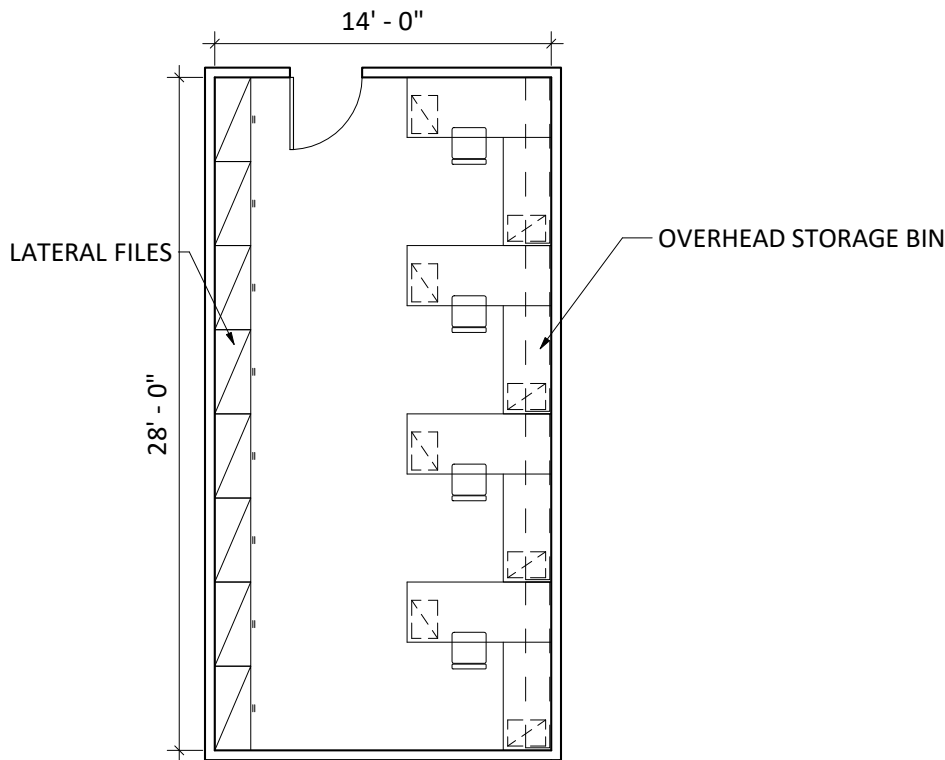


CAPTAIN, ADMINISTRATION
1/4" = 1'-0"

POLICE DEPARTMENT

4.8 SPECIAL OPERATIONS & TRAINING

Adjacency Requirement	Near Administration; Training Lieutenant, Sp Ops Lt, Sgt & Homeland Sgt.
Public Access	Limited
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(4) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair; (8) 42" 4-drawer lateral cabinets

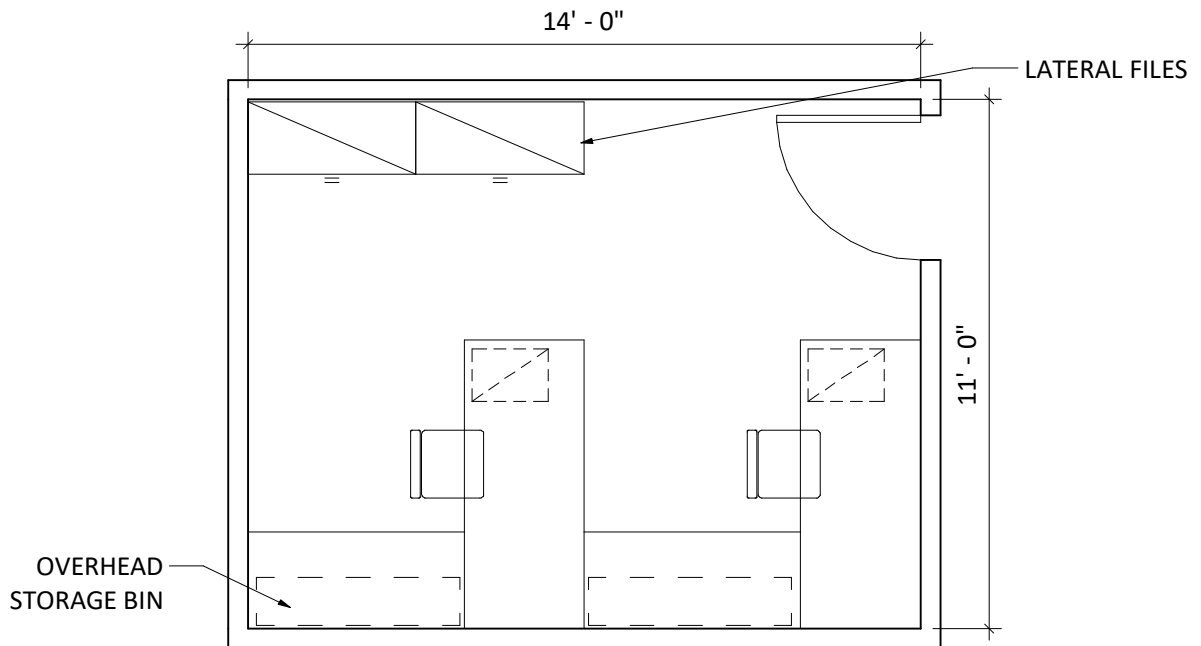



SPECIAL OPERATIONS & TRAINING
1/8" = 1'-0"

POLICE DEPARTMENT

4.9 DETAIL OFFICE

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'7" desk w/ overhead storage bin, pedestal file & desk chair; (2) 42" 4-drawer lateral cabinets

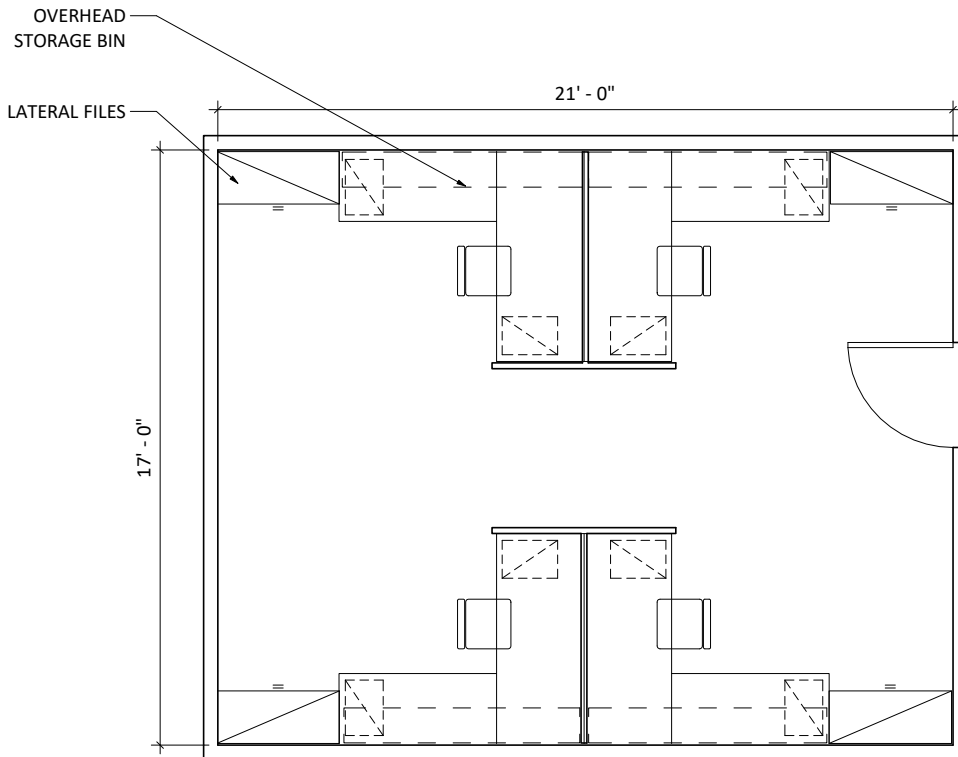


 **DETAIL OFFICE**
1/4" = 1'-0"

POLICE DEPARTMENT

4.10 PROFESSIONAL STANDARDS, ACCREDITATION & CHIEF'S LIAISON

Adjacency Requirement	Near Chief's office
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(4) Workstations each w/ 6'7" desk w/ overhead storage bin, pedestal file & desk chair; (4) 42" 4-drawer lateral cabinets

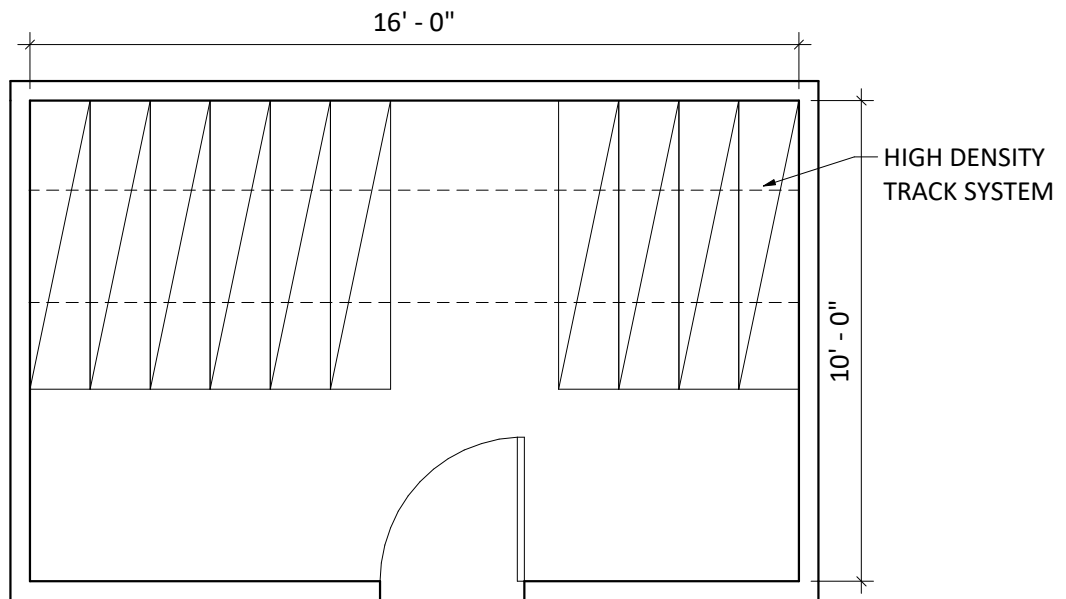


PRO. STANDARDS, ACCREDITATION & CHIEF'S LIAISON
1/4" = 1'-0"

POLICE DEPARTMENT

4.11 ACTIVE FILES

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	High density file storage system, recessed tracks
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, continuous rows perpendicular to shelving
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

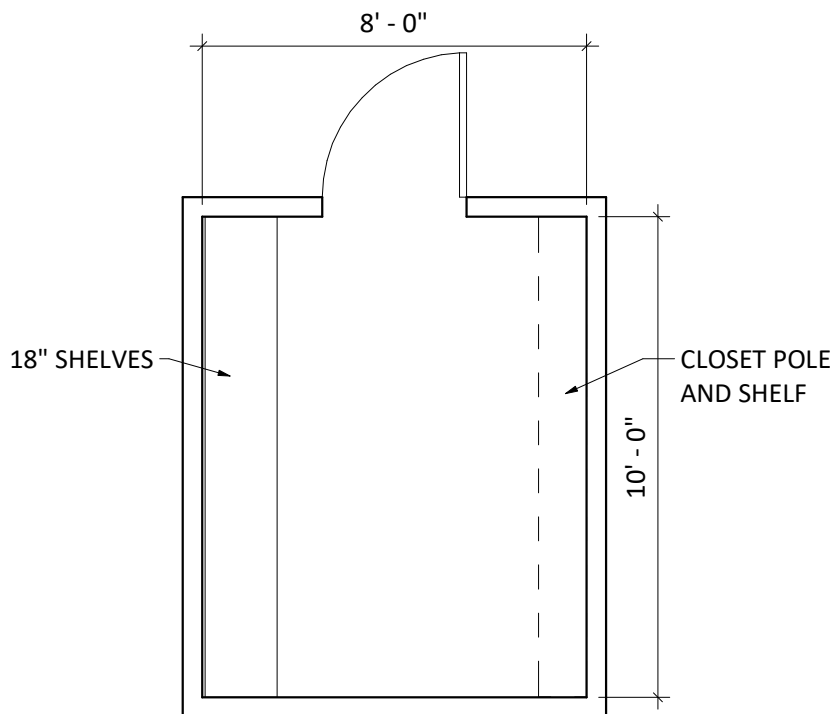


○ **ACTIVE FILES**
1/4" = 1'-0"

POLICE DEPARTMENT

4.12 ADMIN COAT / STORAGE

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	5 tier, 18" deep shelving on two walls, closet pole and shelf
Floor	Rubber or Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Utility
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

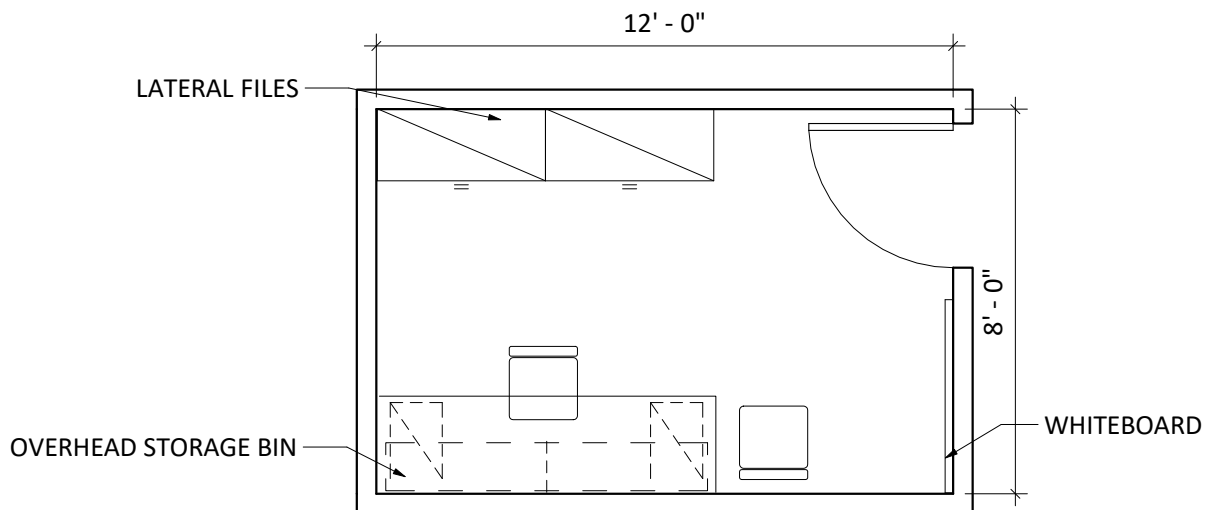


○ ADMIN COAT / STORAGE
1/4" = 1'-0"

POLICE DEPARTMENT

5.1 FIREARMS LICENSING CLERK

Adjacency Requirement	Adjacent to Police Lobby and Records division
Public Access	Limited
Security Requirements	Card access.
Contract Millwork / Equipment	Tackboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair

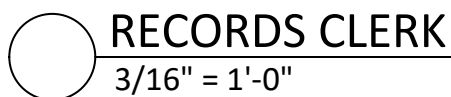
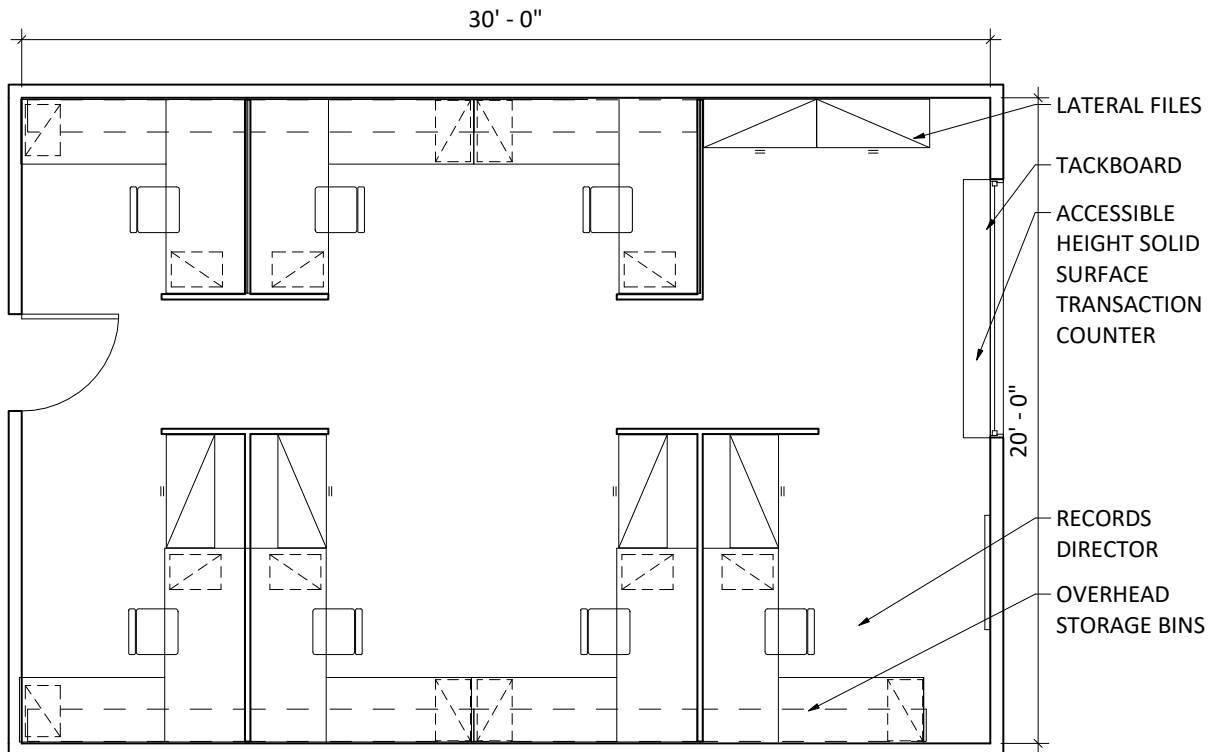


FIREARMS LICENSING CLERK
1/4" = 1'-0"

POLICE DEPARTMENT

5.2 RECORDS OFFICE

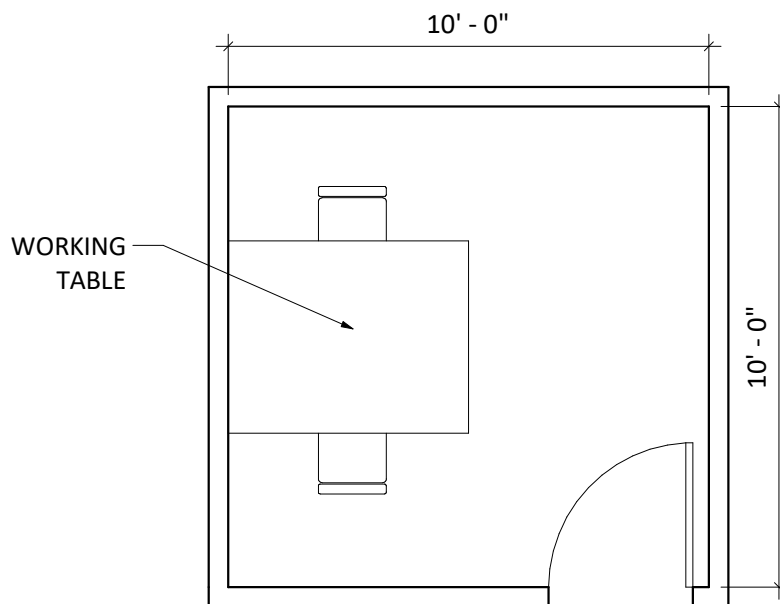
Adjacency Requirement	Adjacent to Police Lobby and Records division
Public Access	Limited
Security Requirements	Card access.
Contract Millwork / Equipment	Accessible height solid surface transaction counter w/ bullet resistant window and deal tray, tackboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(7) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair; (6) 42" 4-drawer lateral cabinets



POLICE DEPARTMENT

5.3 COHR CLINICAL SUPERVISION

Adjacency Requirement	Near CHOR office, used for staff training
Public Access	Low
Security Requirements	Electronic access
Contract Millwork / Equipment	Chair rail
Floor	Carpet Tile or VCT
Walls	GWB
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) Chairs; (1) working table

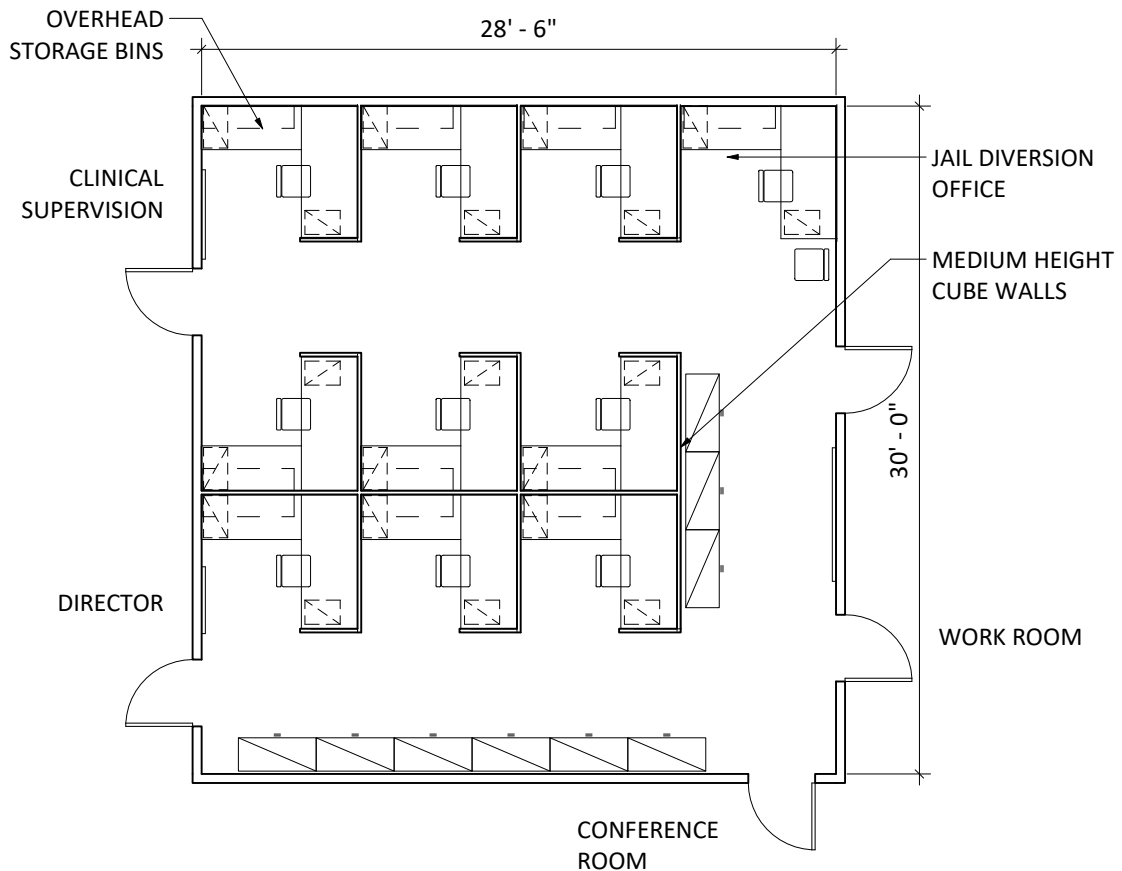


 **COHR CLINICAL SUPERVISION**
1/4" = 1'-0"

POLICE DEPARTMENT

5.4 COHR OFFICES

Adjacency Requirement	Adjacent to COHR Reception
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, power and data to cubicles
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(10) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair; Medium height cubicle walls

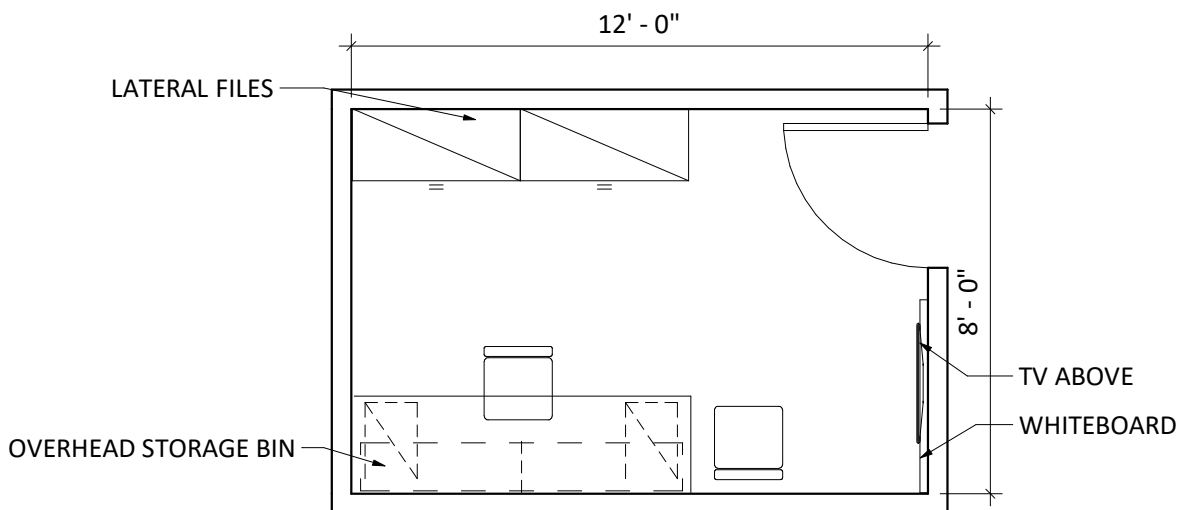


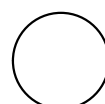
○ COHR OFFICES
1/8" = 1'-0"

POLICE DEPARTMENT

5.5 COHR DIRECTOR

Adjacency Requirement	Adjacent to COHR Offices
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk w/ return, (2) 42" overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, TV

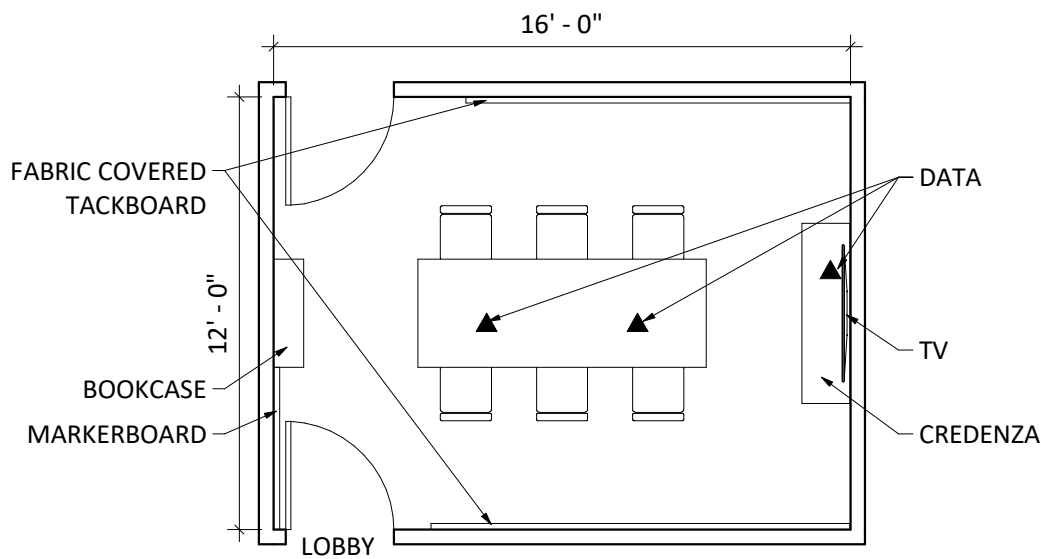


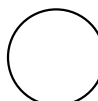
 **COHR DIRECTOR**
1/4" = 1'-0"

POLICE DEPARTMENT

5.6 COHR CONFERENCE

Adjacency Requirement	Near COHR Director, adjacent to Lobby
Public Access	Limited
Security Requirements	None
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	Glass door (no sidelights), Somerville Space Standards: C3
Owner supplied Furn. / Equip.	(1) conference table w/ (6) chairs, TV, bookcase, 16"X60" credenza

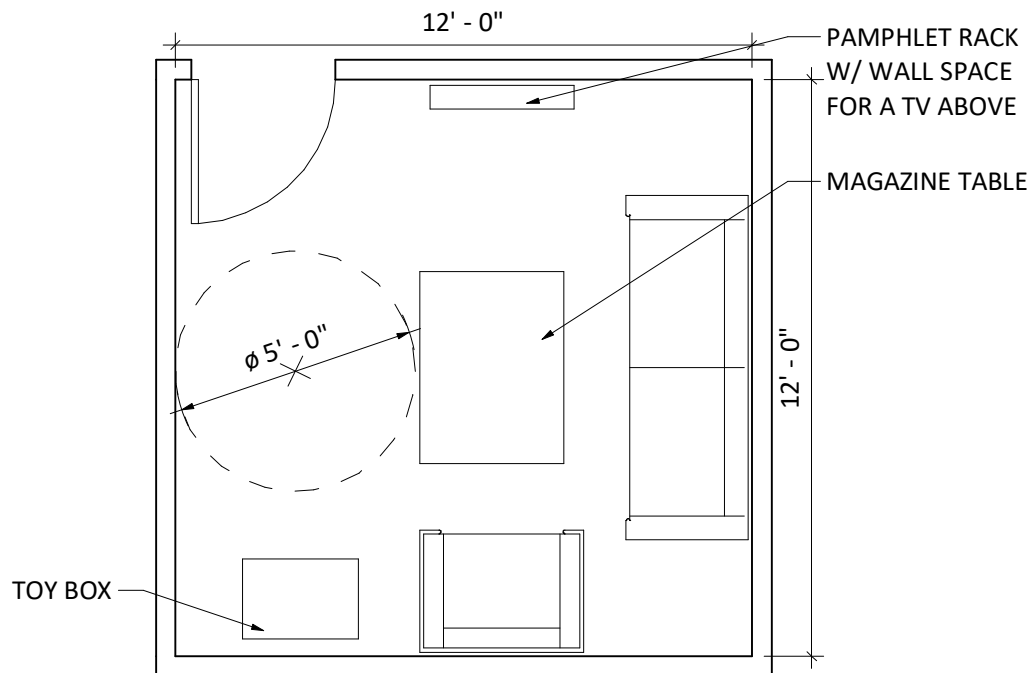


 **COHR CONFERENCE**
3/16" = 1'-0"

POLICE DEPARTMENT

5.7 FAMILY SERVICES WAITING

Adjacency Requirement	Discrete entry, adjacent to Family Services Conference / Interview, close to Detectives
Public Access	High
Security Requirements	Card Access
Contract Millwork / Equipment	Chair rail
Floor	Linoleum or VCT
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) large soft chair, (1) sofa; (1) Magazine table, pamphlet rack, TV

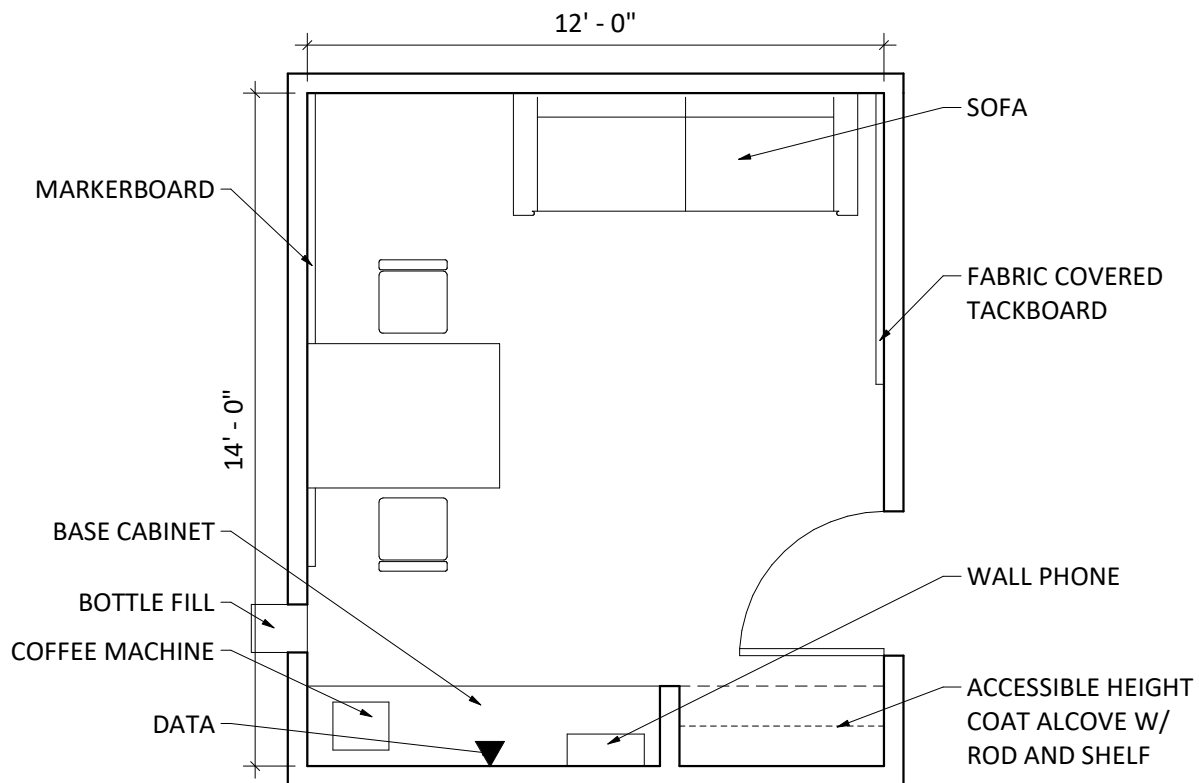


FAMILY SERVICES WAITING
1/4" = 1'-0"

POLICE DEPARTMENT

5.8 FAMILY SERVICES CONFERENCE / INTERVIEW

Adjacency Requirement	Adjacent to Family Services Waiting, near private Bathrooms
Public Access	High
Security Requirements	Privacy w/ occupied function
Contract Millwork / Equipment	Fabric covered tackboard, full length markerboard, chair rail, accessible height base cabinet, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C, water bottle fill
Special Needs	Soft Furnishings, windows acceptable on upper floor
Owner supplied Furn. / Equip.	(1) Sofa, (2) chairs, (1) table, coffee machine

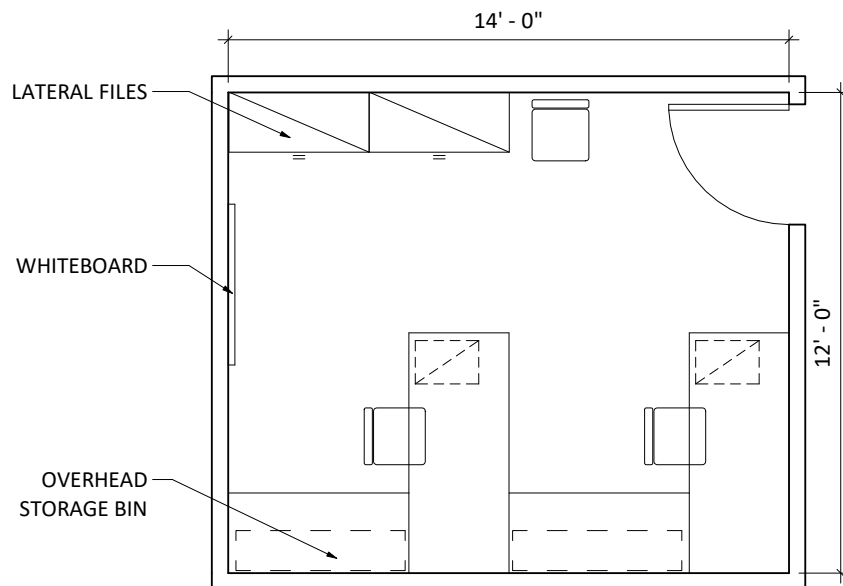


FAMILY SERVICES CONFERENCE / INTERVIEW
1/4" = 1'-0"

POLICE DEPARTMENT

5.9 FAMILY SERVICES OFFICE

Adjacency Requirement	Near Family Services Conference / Interview; Family Services Sergeant & Advocate
Public Access	Moderate
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal files, desk chair, (2) 42" 4-drawer lateral files, guest chair

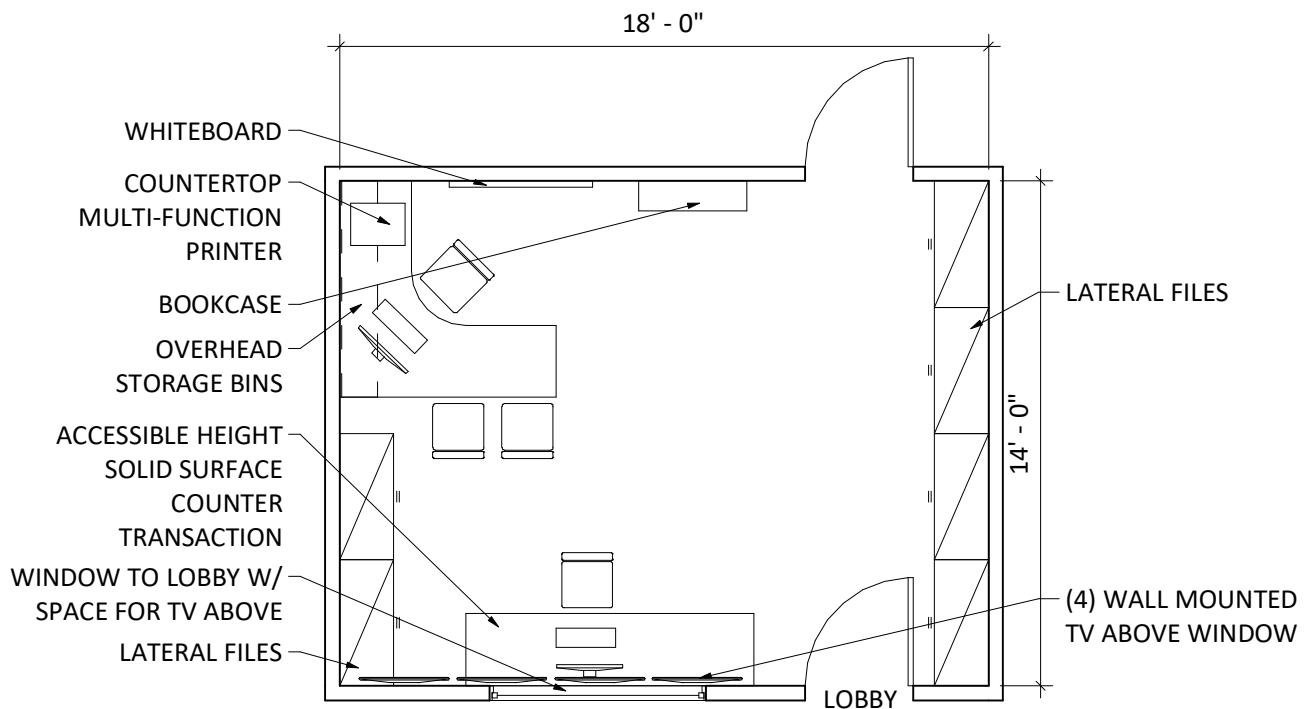


 FAMILY SERVICES OFFICE
1/4" = 1'-0"

POLICE DEPARTMENT

6.1 STATION OFFICER

Adjacency Requirement	Adjacent to Lobby
Public Access	Controlled
Security Requirements	Card access.
Contract Millwork / Equipment	Accessible height solid surface counter transaction, whiteboard, non-sliding bullet resistant window
Floor	Carpet tile
Walls	GWB, painted, bullet resistant at lobby
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C, positive pressure relative to lobby
Special Needs	Bullet resistant door, control of Lobby doors
Owner supplied Furn. / Equip.	(1) 6'x6' L shaped desks, (2) 42" 4-drawer lateral files, (1) 42" 2-drawer lateral files, (3) 42" 3-drawer lateral files (2) desk chair, bookcase, countertop multi-function printer, (2) guest chairs, overhead storage bins, (4) wall mounted TV

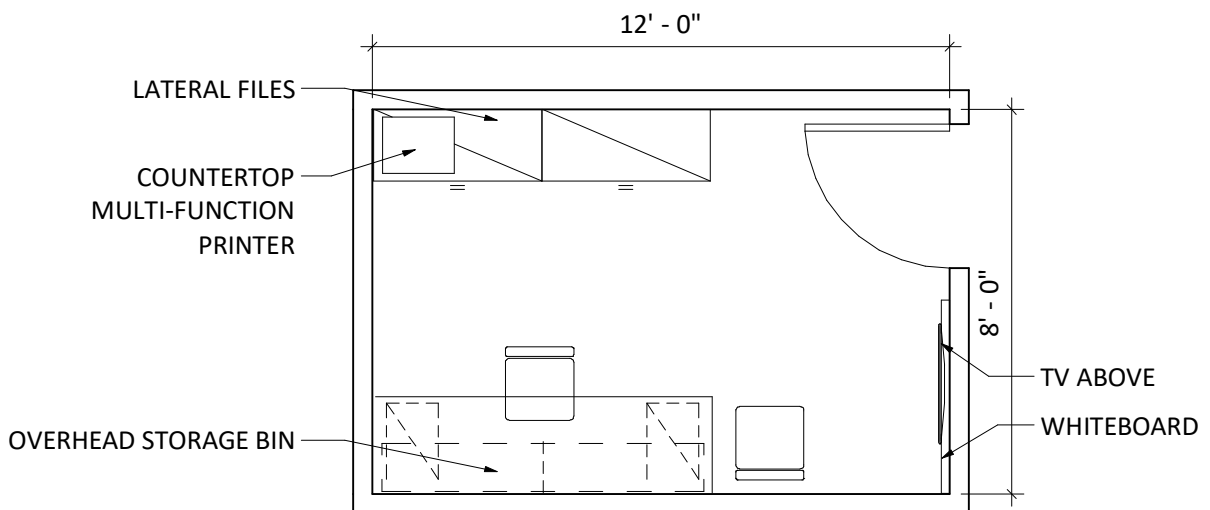



○ STATION OFFICER
3/16" = 1'-0"

POLICE DEPARTMENT

6.2 SHIFT COMMANDER

Adjacency Requirement	Near 911, Detention, Station Officer
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, fabric covered tackboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair

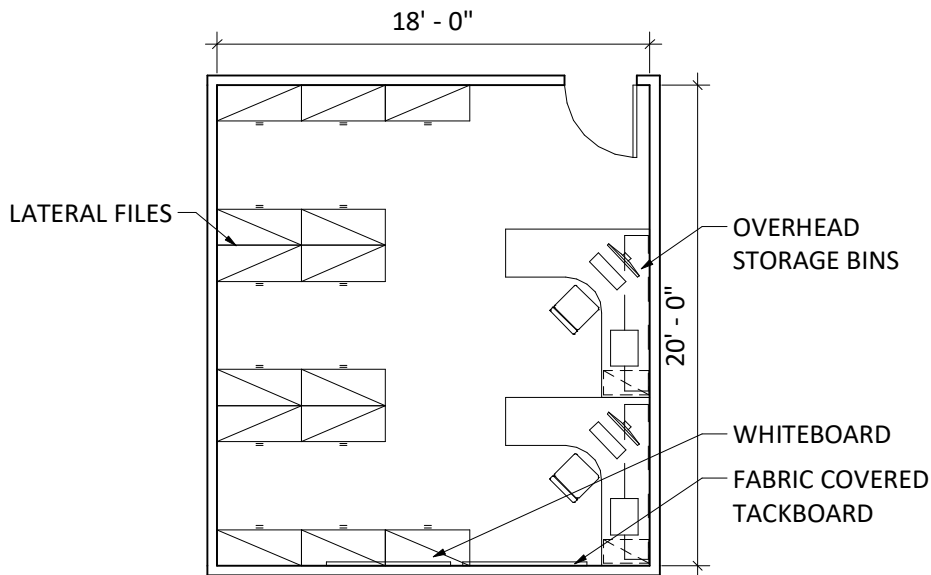


 **SHIFT COMMANDER**
1/4" = 1'-0"

POLICE DEPARTMENT

6.3 STREET COMMANDER

Adjacency Requirement	Near Patrol
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, fabric covered tackboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair

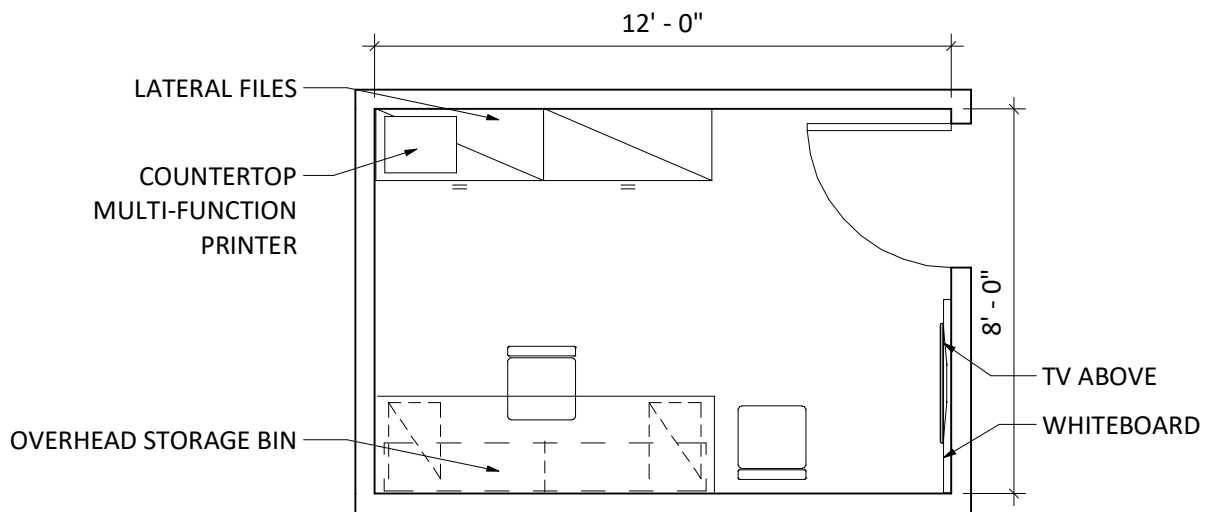


STREET COMMANDER
1/8" = 1'-0"

POLICE DEPARTMENT

6.4 NEIGHBORHOOD POLICING SUPERVISOR

Adjacency Requirement	Near Patrol
Public Access	Moderate
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair



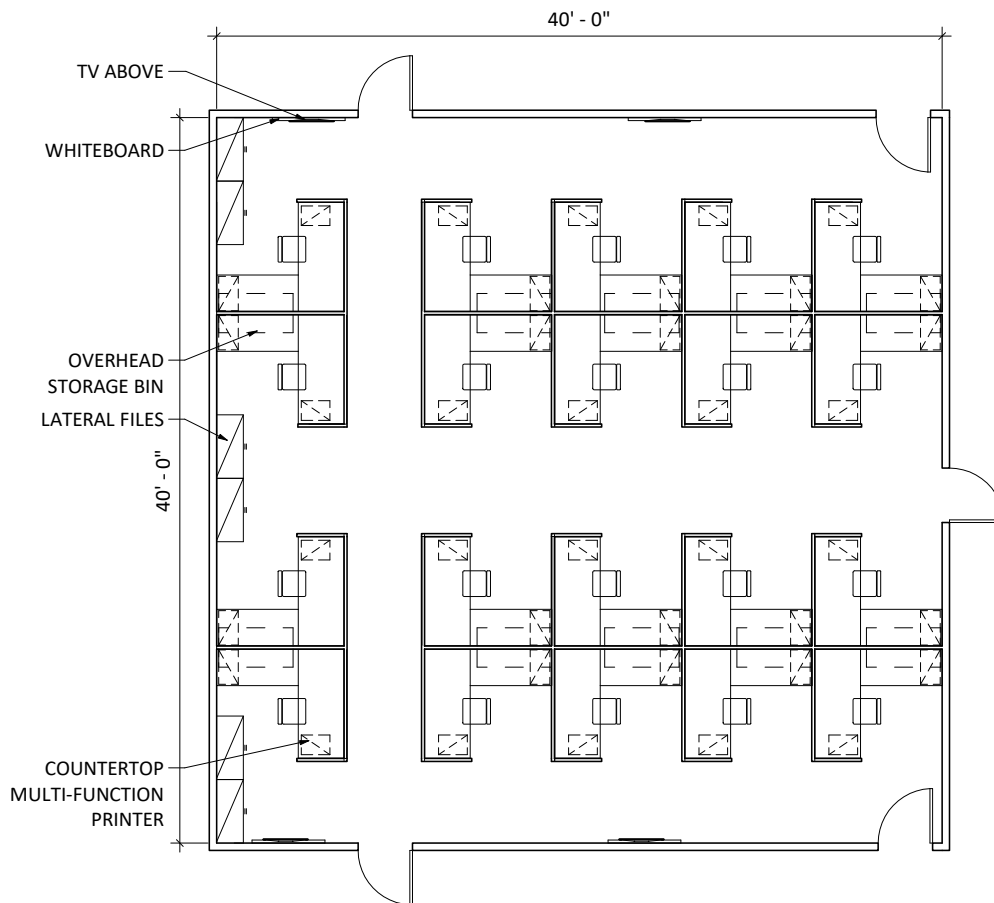
NEIGHBORHOOD POLICING SUPERVISOR

1/4" = 1'-0"

POLICE DEPARTMENT

6.5 PATROL OPEN OFFICE

Adjacency Requirement	Near Patrol; Ward, Count, Vision Zero & Traffic
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, power and data to cubicles
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(20) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair

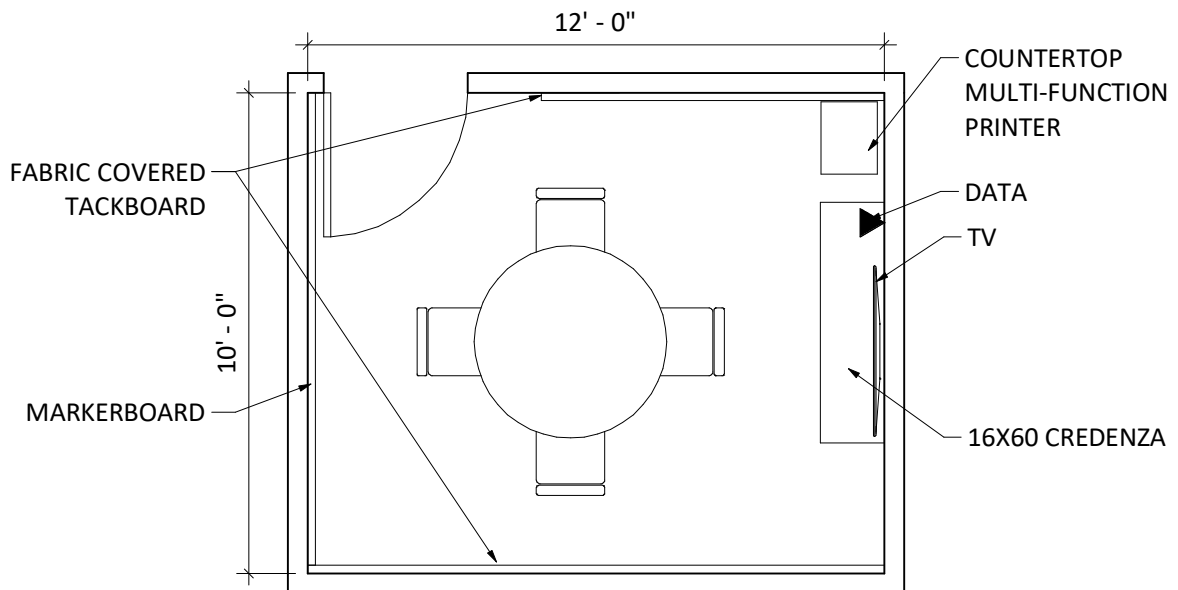


PATROL OPEN OFFICE
1/8" = 1'-0"

POLICE DEPARTMENT

6.6 TRAFFIC CONFERENCE & INTERVIEW

Adjacency Requirement	Near Traffic Clerk
Public Access	Limited
Security Requirements	None
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail, solid surface counter with base cabinets below.
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) conference 4' round table w/ (4) chairs, TV, countertop multi-function printer, 16"x60" Credenza

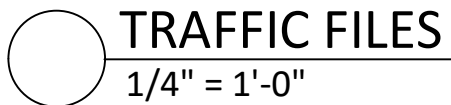
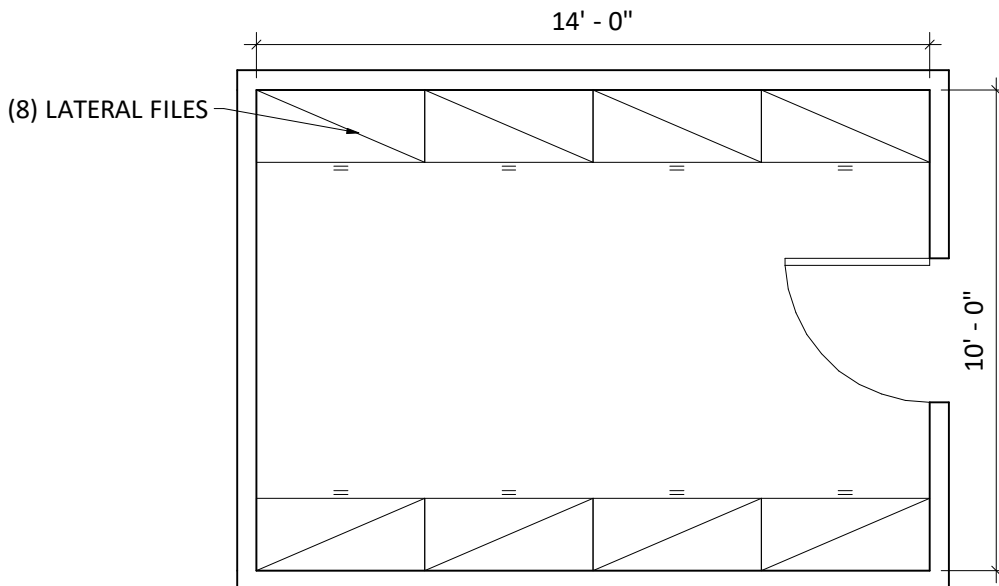


 **TRAFFIC CONFERENCE / INTERVIEW**
1/4" = 1'-0"

POLICE DEPARTMENT

6.7 TRAFFIC FILES

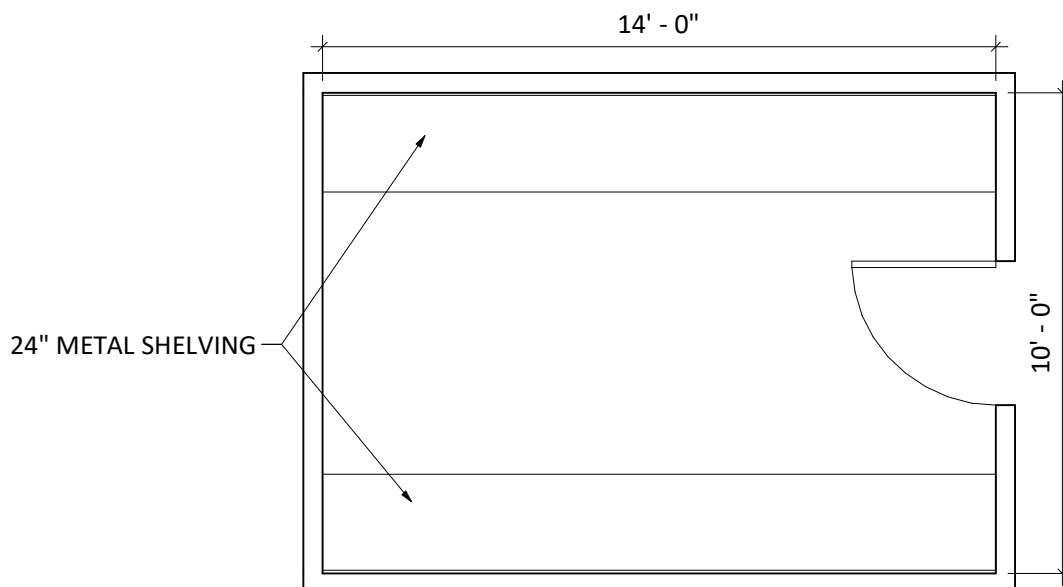
Adjacency Requirement	Near Traffic
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Rubber or Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect light
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(8) 42" 4-drawer lateral files



POLICE DEPARTMENT

6.8 TRAFFIC EQUIPMENT STORAGE ROOM

Adjacency Requirement	Near Traffic
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	24" deep metal shelving on two walls
Floor	Rubber or Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Utility
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

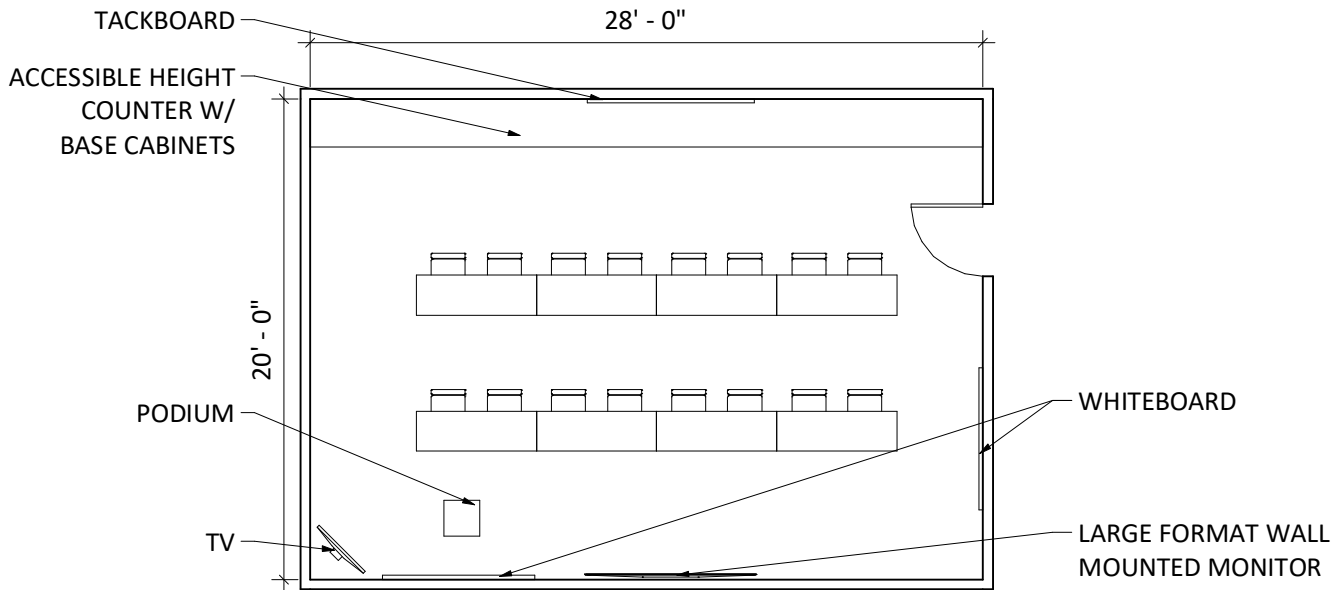


TRAFFIC EQUIPMENT STORAGE ROOM

POLICE DEPARTMENT

6.9 ROLL CALL

Adjacency Requirement	Next to Patrol and Sergeants Office, near Locker Rooms
Public Access	None
Security Requirements	High
Contract Millwork / Equipment	Accessible height solid surface countertop with base cabinets, (2) whiteboards, tackboard
Floor	Resilient flooring or linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED and under counter lighting, CATV
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Space for (16) battery chargers, (8) 20" x 60" training tables w/ (16) chairs. Podium, TV, storage for (20) spare radios & chargers, (30) flashlights, large format wall mounted monitor

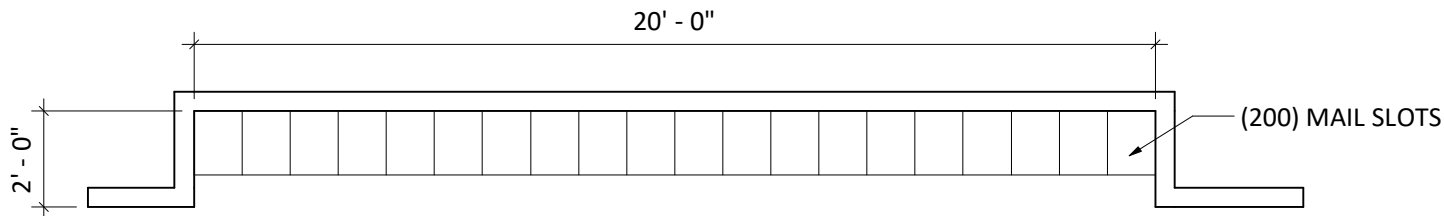


ROLL CALL
1/8" = 1'-0"

POLICE DEPARTMENT

6.10 MAIL ALCOVE

Adjacency Requirement	On corridor within patrol space, near Report Writing
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(200) 12" x 16" x 5" mail slots
Floor	Resilient flooring or linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None

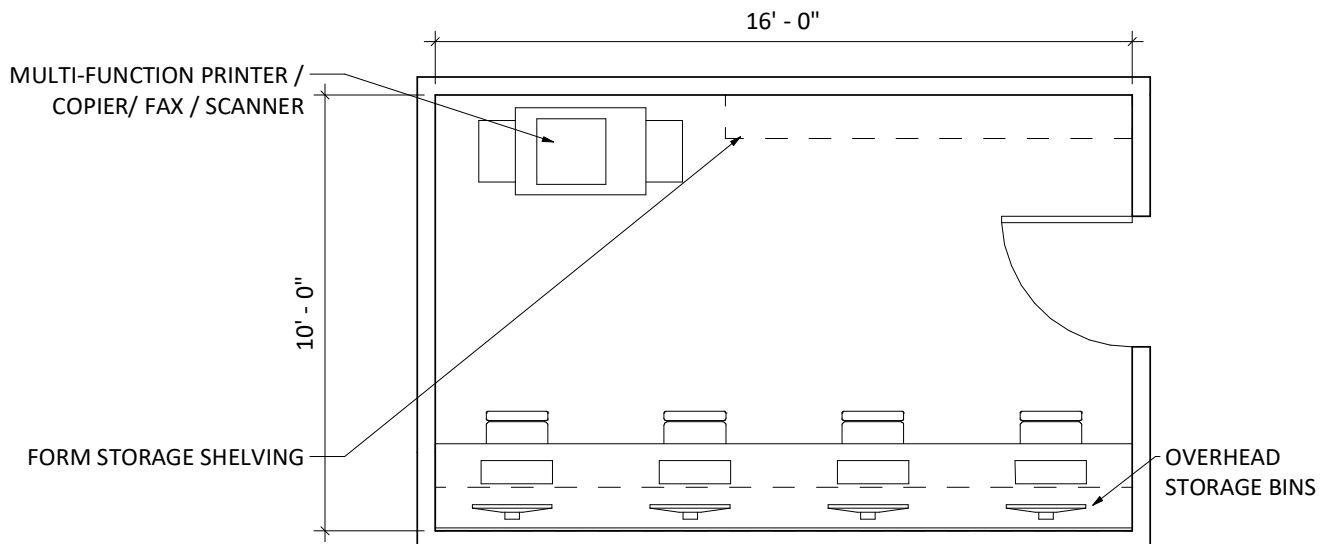


○ MAIL ALCOVE
1/4" = 1'-0"

POLICE DEPARTMENT

6.11 REPORT WRITING

Adjacency Requirement	Near Patrol Work Room
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Accessible height countertop, form storage shelving
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(4) desk chairs, multi-function printer / copier / fax / scanner

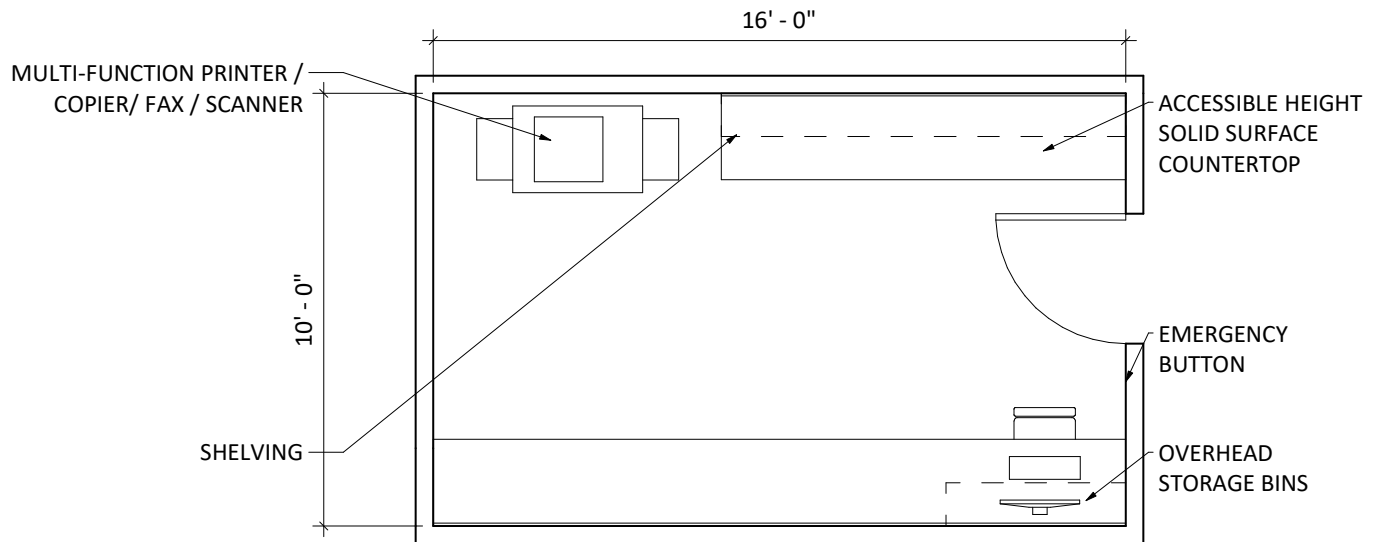


REPORT WRITING
1/4" = 1'-0"

POLICE DEPARTMENT

6.12 PATROL EVIDENCE PREP.

Adjacency Requirement	Near Patrol Work Room
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Accessible height countertop, form storage shelving
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, Emergency button
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Multi-function printer / copier / fax / scanner, evidence packaging supplies

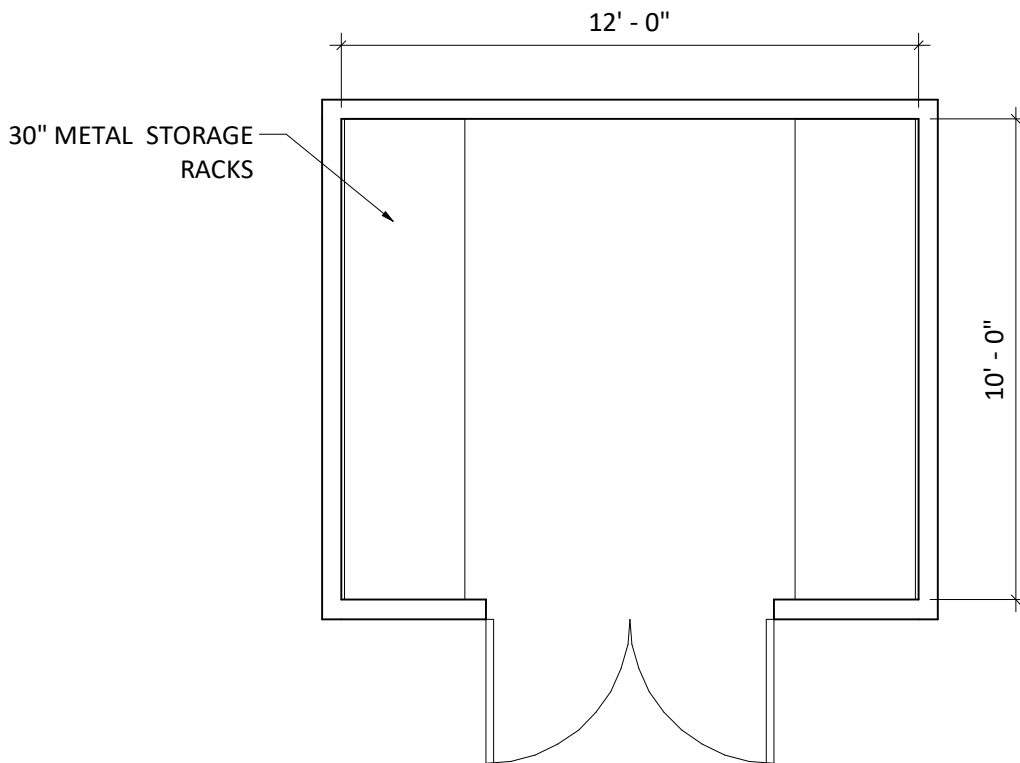


 **PATROL EVIDENCE PREP**
1/4" = 1'-0"

POLICE DEPARTMENT

6.13 PATROL GEAR STORAGE

Adjacency Requirement	Adjacent to Patrol Vehicles
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	30" Metal storage racks

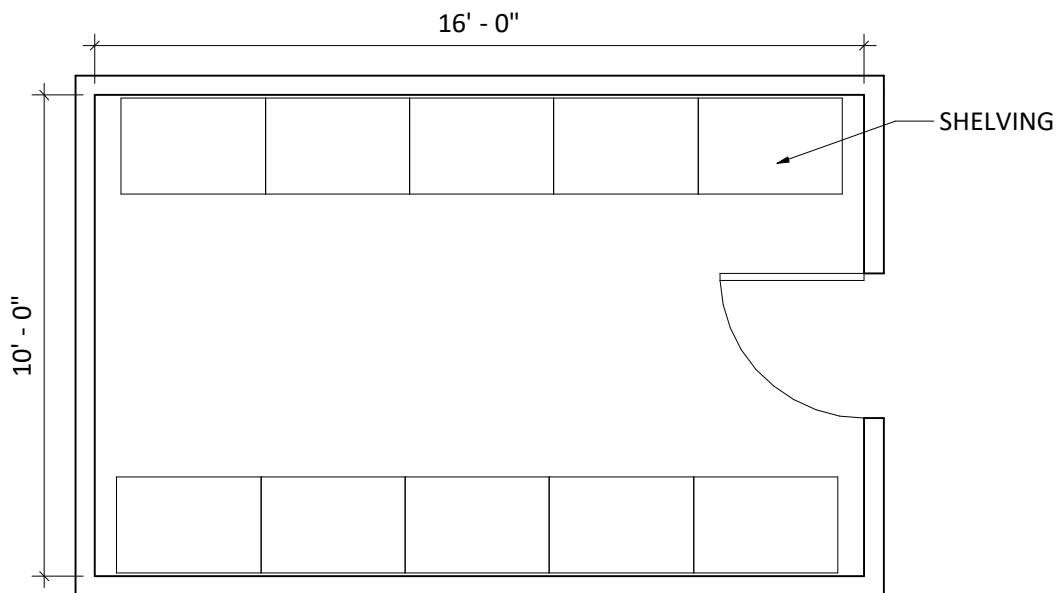


 **PATROL GEAR STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

6.14 SRT GEAR STORAGE

Adjacency Requirement	Adjacent to Patrol Vehicles
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	5 Tier 24" metal storage racks

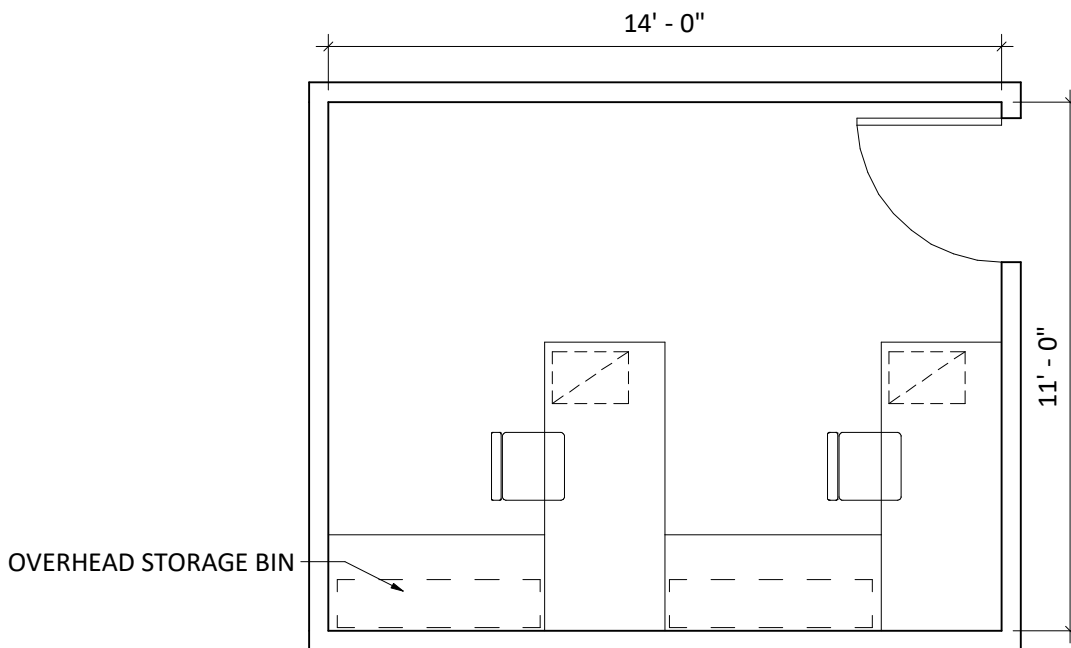


 **SRT GEAR STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

6.17 ANIMAL CONTROL

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'7" desk w/ overhead storage bin, pedestal file & desk chair

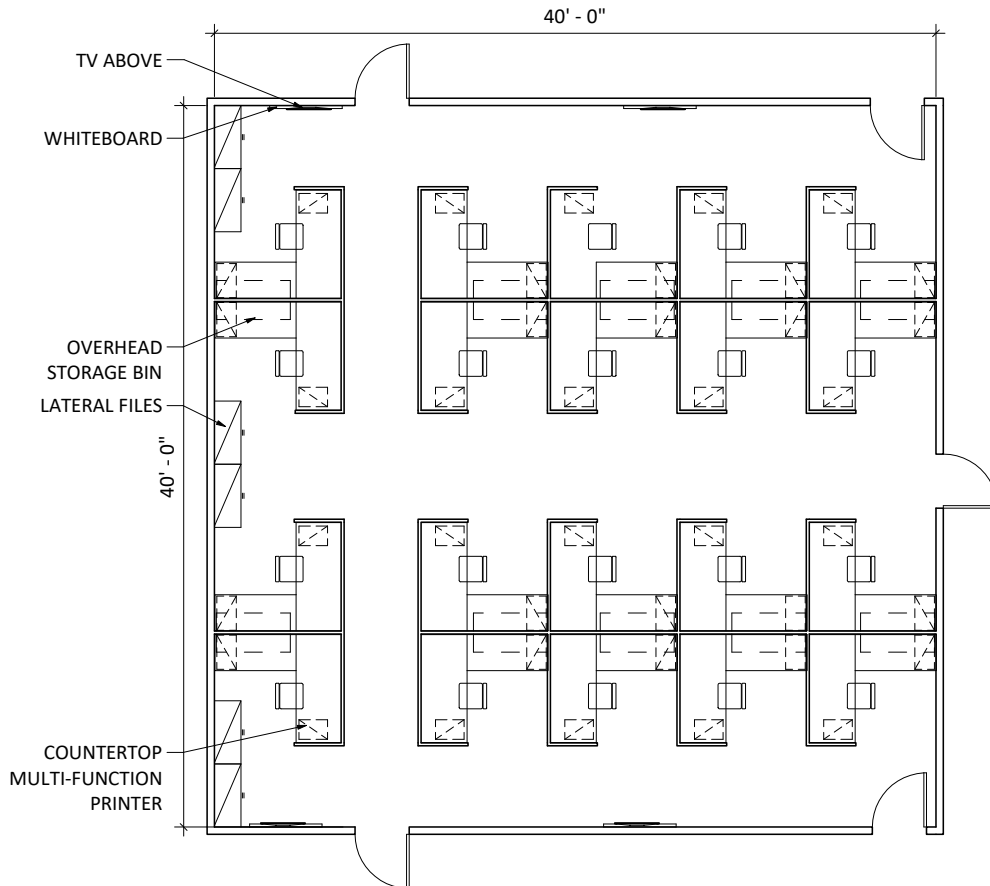


ANIMAL CONTROL
1/4" = 1'-0"

POLICE DEPARTMENT

7.1 DETECTIVES OPEN OFFICE

Adjacency Requirement	Near Detective Clerk
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted, partial glass wall, demountable wall systems
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(20) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file & desk chair; (6) 42" 4-drawer lateral cabinets

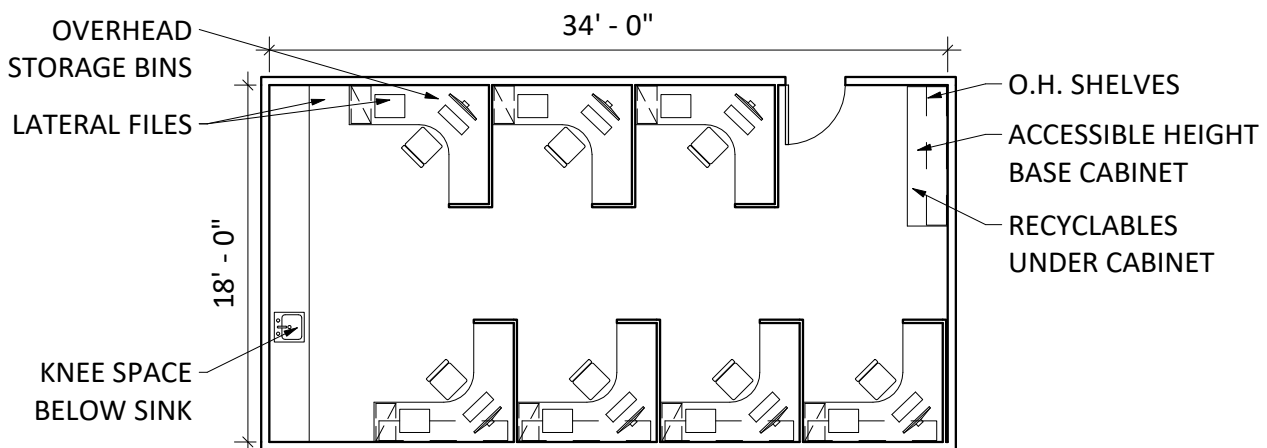


○ DETECTIVES OPEN OFFICE
1/8" = 1'-0"

POLICE DEPARTMENT

7.2 NARCOTICS OFFICES

Adjacency Requirement	Near Detectives
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	(2) Accessible height countertop with base and upper cabinets
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, power and data to cubicles, wire mold at work counter
HVAC / Plumbing	A/C, sink
Special Needs	None
Owner supplied Furn. / Equip.	(7) Workstations, each with 6'X7' desk w/ return w/ (1) 24" 2-drawer files, overhead storage bins, desk chairs,



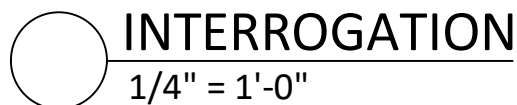
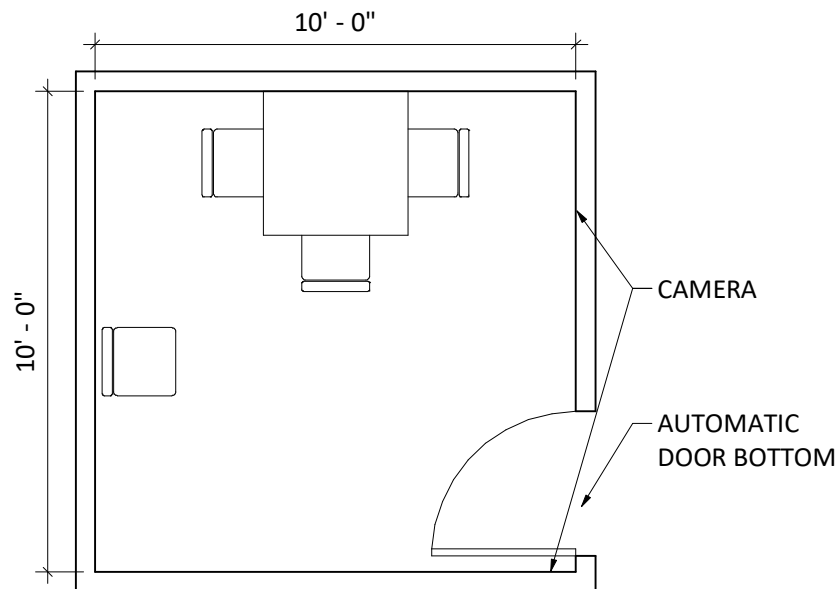
NARCOTICS OFFICES

3/32" = 1'-0"

POLICE DEPARTMENT

7.3 INTERROGATION

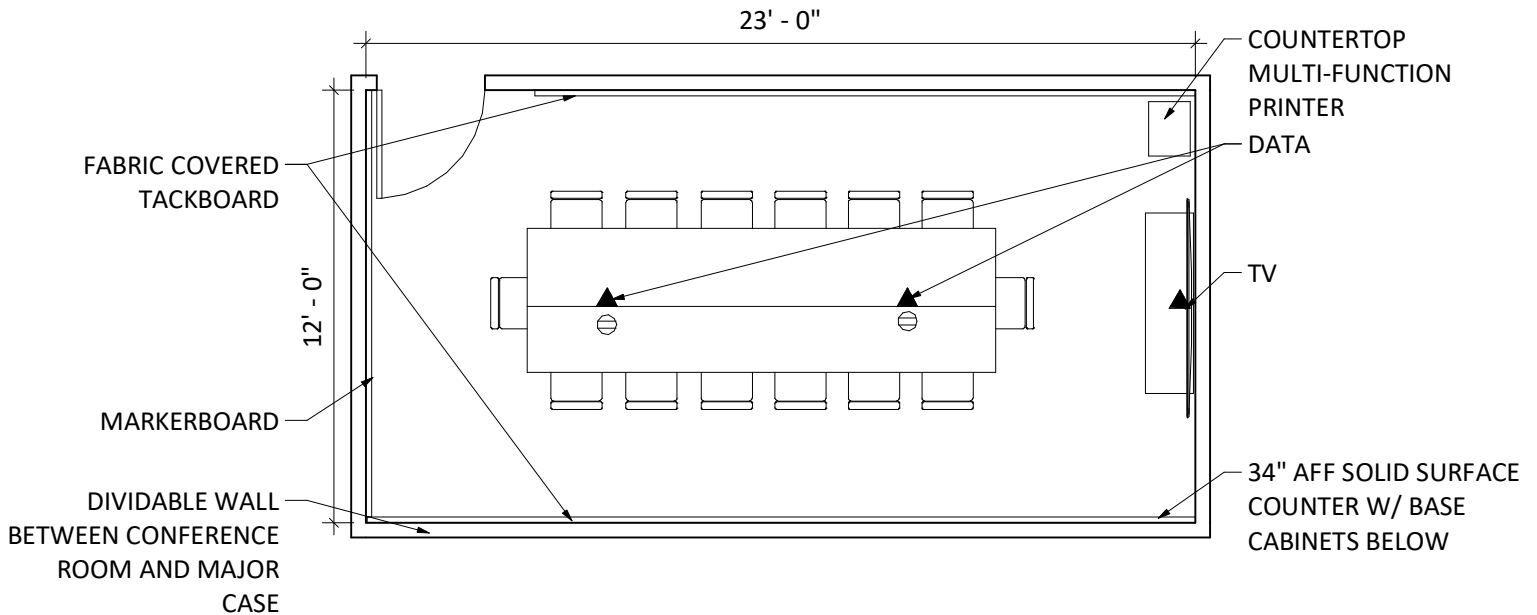
Adjacency Requirement	Near confidential entry
Public Access	High
Security Requirements	Card access in and out
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Pendant fixtures, CCTV camera, microphone, in use light outside room, automatic door bottom
HVAC / Plumbing	A/C
Special Needs	Acoustic privacy
Owner supplied Furn. / Equip.	Table w/ (4) chairs



POLICE DEPARTMENT

7.4 MAJOR CASE

Adjacency Requirement	Near Detectives
Public Access	Limited
Security Requirements	Card access
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville space standards: C2
Owner supplied Furn. / Equip.	(1) conference table w/ (10) chairs, TV, countertop multi-function printer, 16x60 credenza

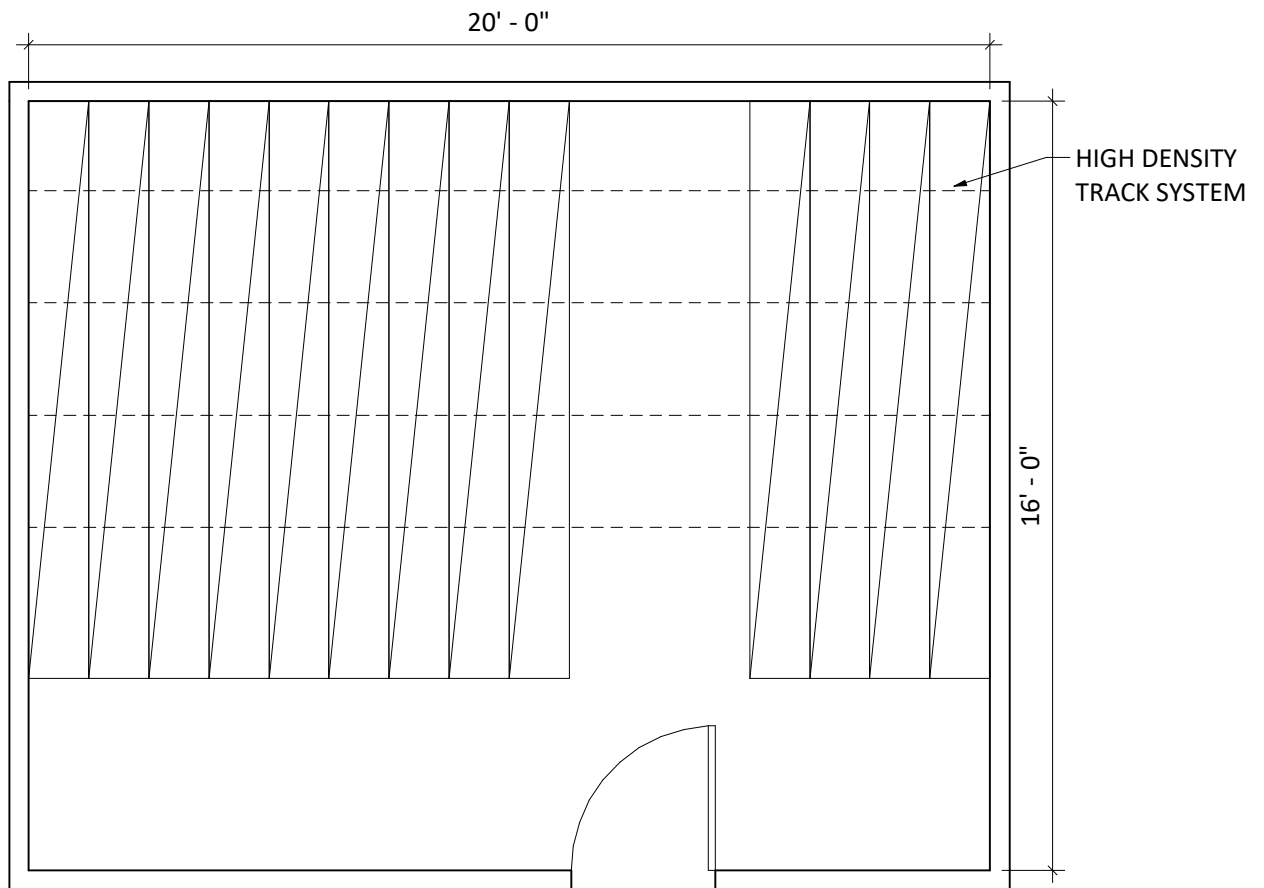


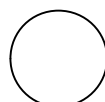
○ MAJOR CASE
3/16" = 1'-0"

POLICE DEPARTMENT

7.5 CID SECURE FILES

Adjacency Requirement	Near Detectives
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	High density track system
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, continuous rows perpendicular to shelving
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

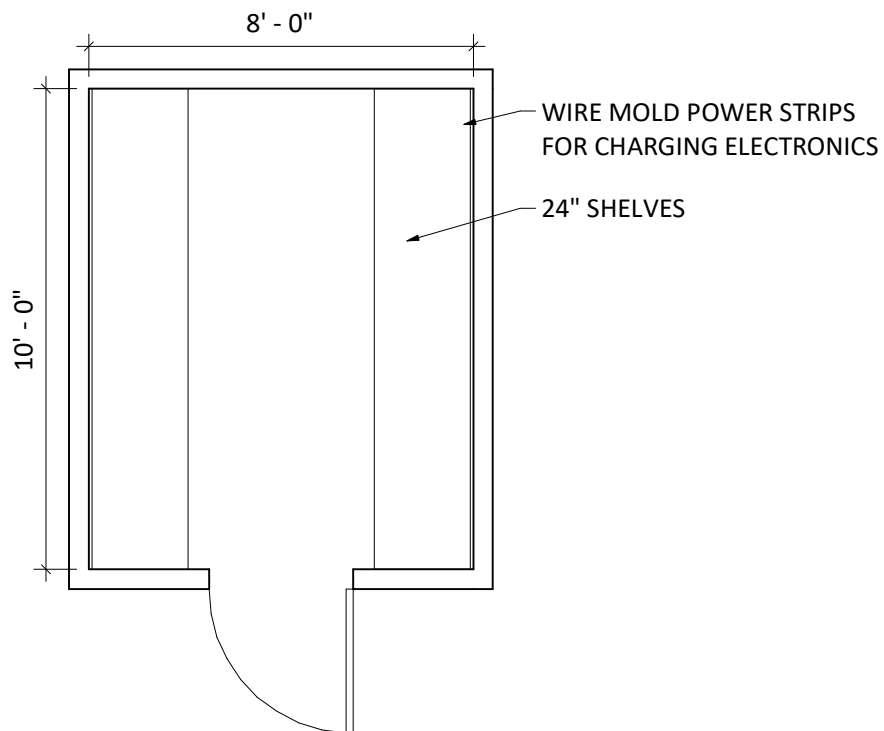


 **CID SECURE FILES**
1/4" = 1'-0"

POLICE DEPARTMENT

7.6 CID EQUIPMENT STORAGE

Adjacency Requirement	Off of CID Offices
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	24" shelving on 2 walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, power strips for charging electronics, wire mold
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

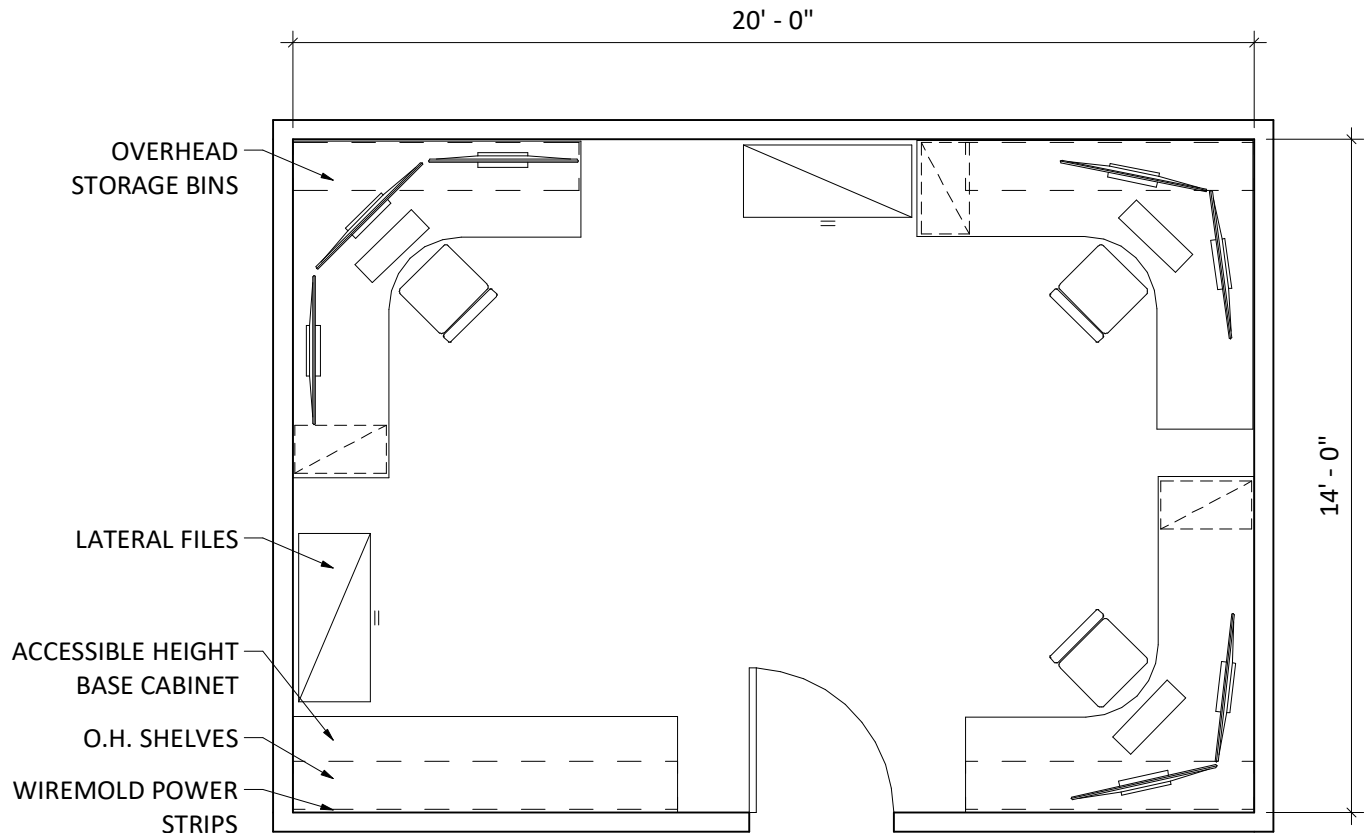


 CID EQUIPMENT STORAGE
1/4" = 1'-0"

POLICE DEPARTMENT

7.7 DIGITAL FORENSICS

Adjacency Requirement	Near Evidence
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	8' Accessible height countertop w/ base and upper cabinets
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, multiple data / power drops, wiremold power
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: WS2
Owner supplied Furn. / Equip.	(3) Workstations, each with 6'X7' desk w/ return, overhead storage bins, desk chairs, (2) 42" 4-drawer lateral files, evidence locker outside w/ power

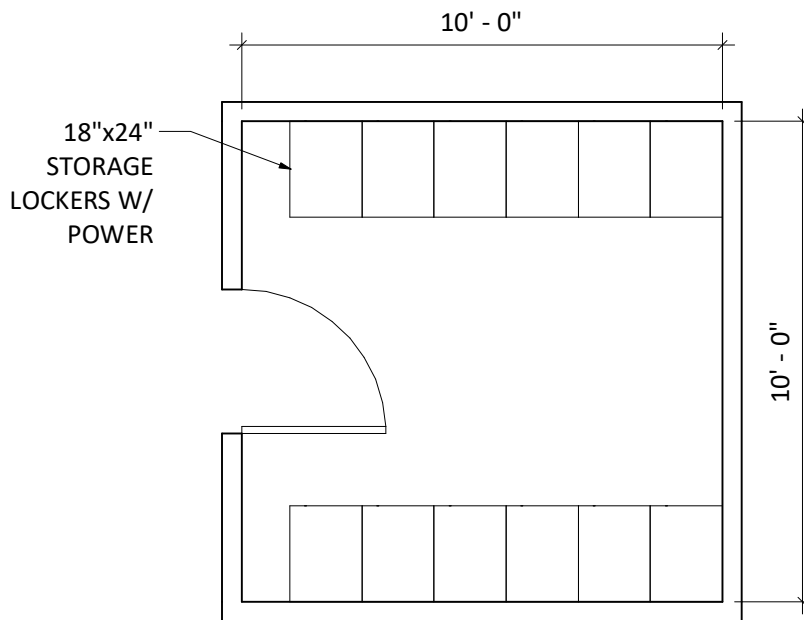


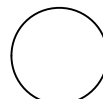
 **DIGITAL FORENSICS**
1/4" = 1'-0"

POLICE DEPARTMENT

7.8 EVIDENCE LOCKER

Adjacency Requirement	Near Evidence
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(12) 18"x24" Lockable storage units with duplex power in each and USB charging device
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; power for locker plugs
HVAC / Plumbing	Good ventilation
Special Needs	None
Owner supplied Furn. / Equip.	None

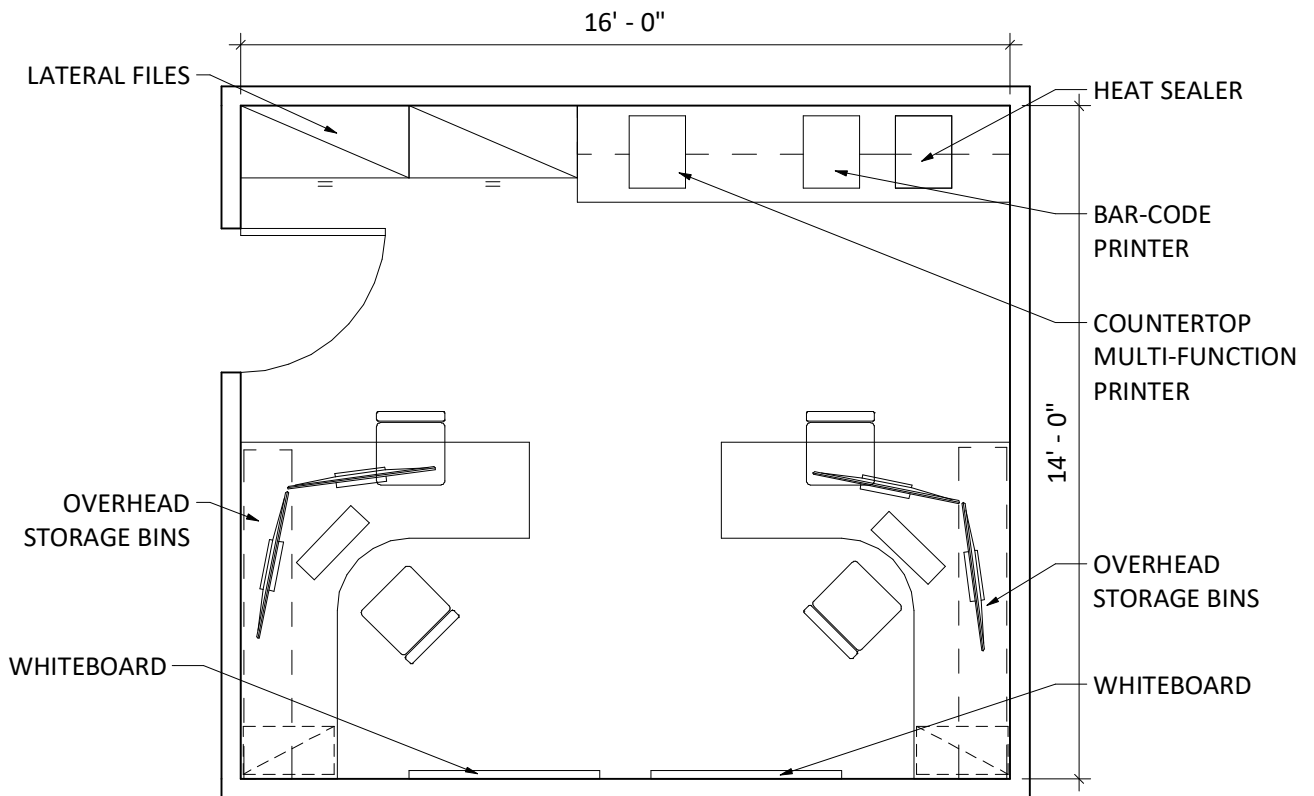


 **EVIDENCE LOCKER**
1/4" = 1'-0"

POLICE DEPARTMENT

7.9 EVIDENCE TECHNICIAN OFFICE

Adjacency Requirement	Adjacent to Evidence Processing
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	(2) Whiteboard
Floor	Carpet tile
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB painted
Lighting / Electrical	Indirect LED, power at counter
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: WS2
Owner supplied Furn. / Equip.	(2) 6'x7' L shaped desks, (2) 42" 4-drawer lateral files, (2) desk chair, bookcase, countertop multi-function printer, (2) guest chairs, overhead storage bins

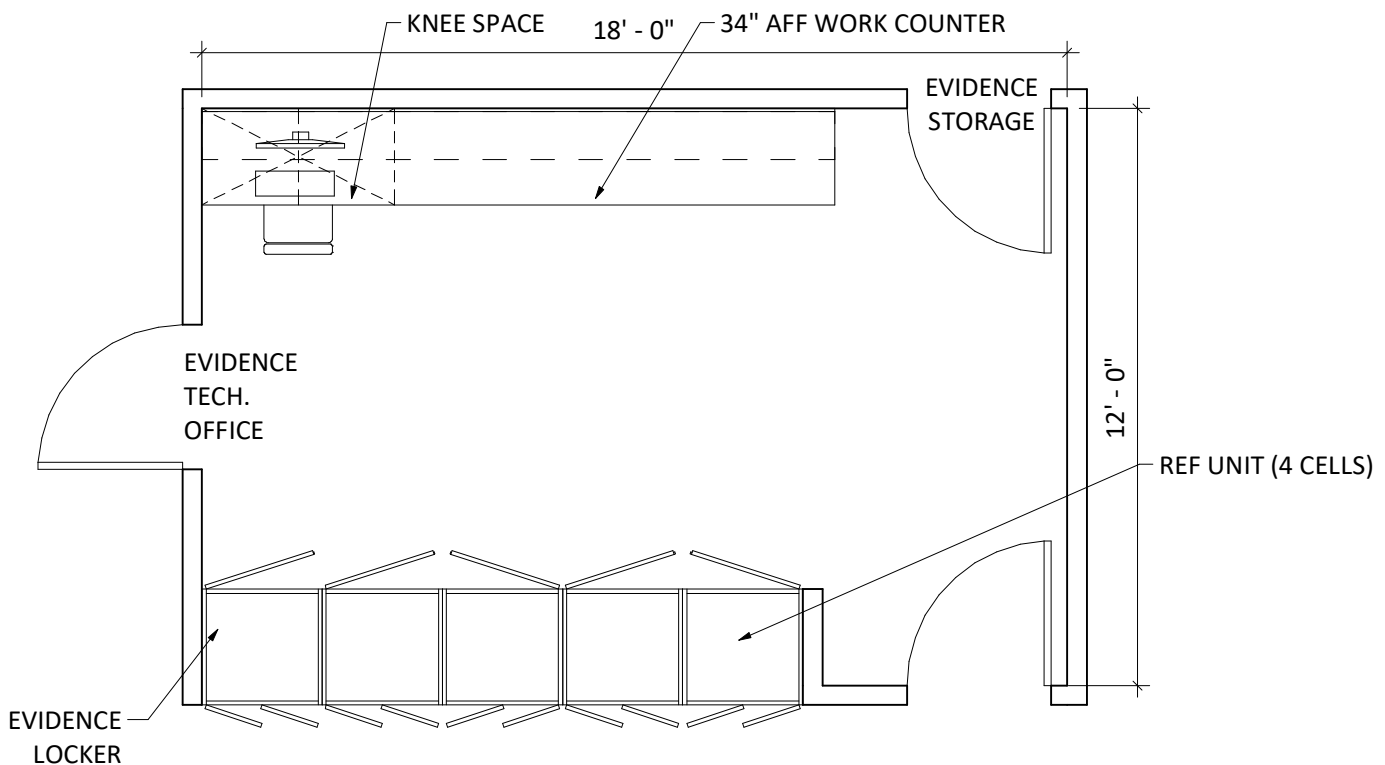


 **EVIDENCE TECHNICIAN OFFICE**
1/4" = 1'-0"

POLICE DEPARTMENT

7.10 EVIDENCE PROCESSING

Adjacency Requirement	Near Booking, Report Writing, direct access to Evidence
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	Base and wall cabinets; stainless steel counter w/ slots above for forms; evidence pass through (36) lockers of varying sizes, (1) REF unit (4 cells)
Floor	Epoxy
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB painted
Lighting / Electrical	Indirect LED, CCTV cameras, data
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Chair

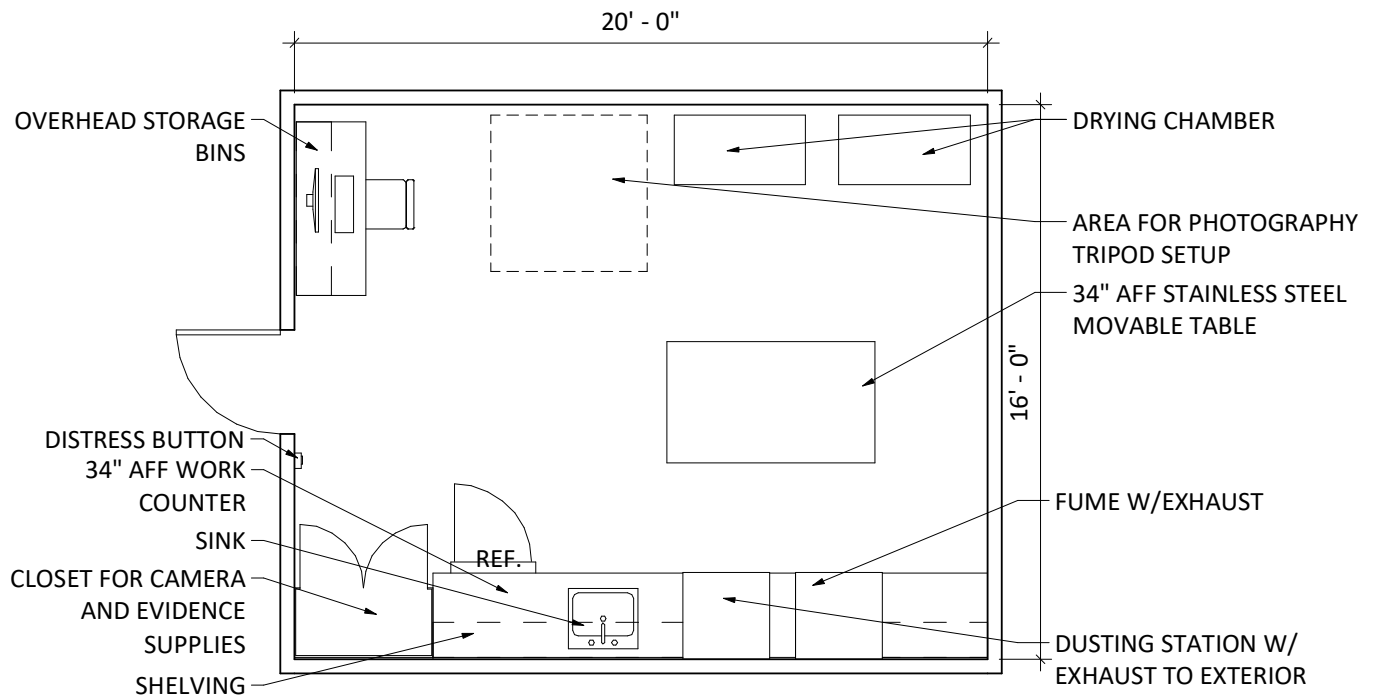


EVIDENCE PROCESSING
1/4" = 1'-0"

POLICE DEPARTMENT

7.11 EVIDENCE LAB

Adjacency Requirement	Near Evidence (no access from Evidence)
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	Base and wall cabinets; stainless steel counter w/ slots above for forms; evidence pass through, under counter refrigerator; fuming hood, dusting station w/ exhaust to exterior
Floor	Epoxy
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB painted
Lighting / Electrical	Indirect LED, data, Distress Button
HVAC / Plumbing	A/C, exhaust for fume hood, sink
Special Needs	None
Owner supplied Furn. / Equip.	(2) Drying chambers, (1) 3.5' x 6' stainless steel table, closet for camera and evidence supplies, 6' workstation, overhead storage bins

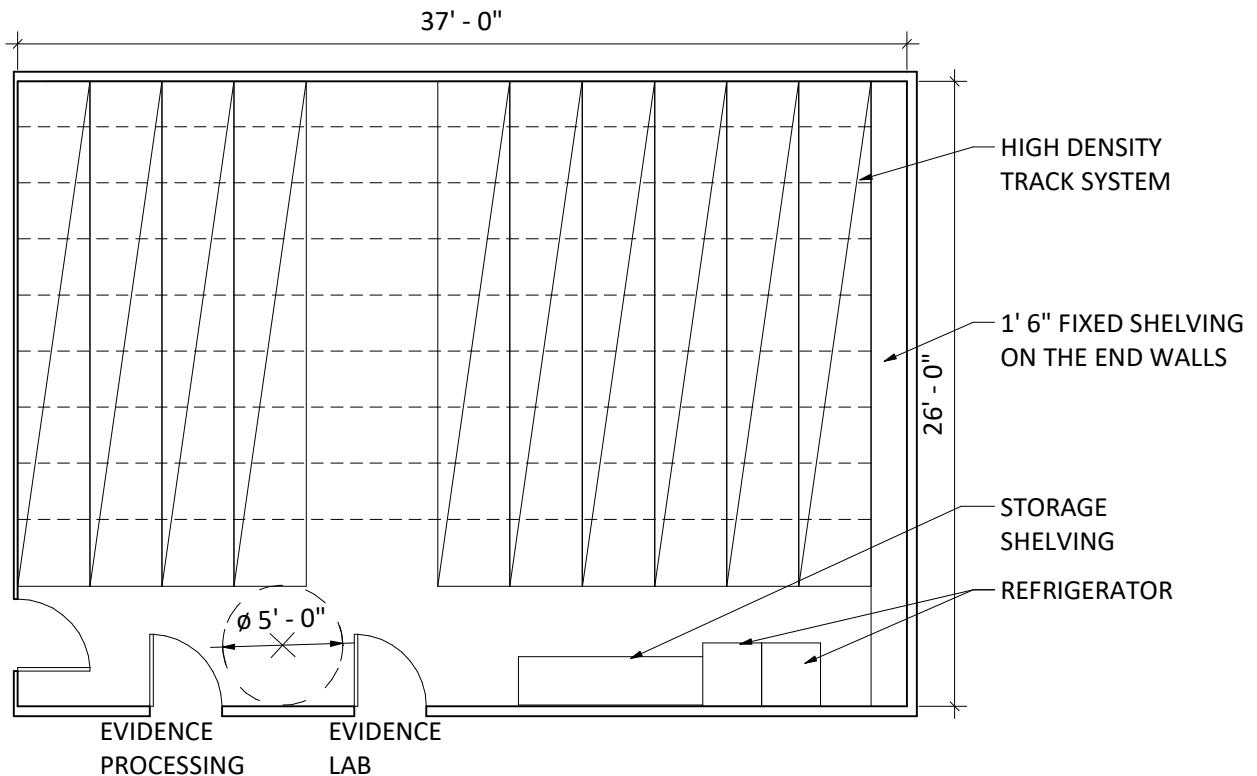


EVIDENCE LAB
3/16" = 1'-0"

POLICE DEPARTMENT

7.12 EVIDENCE, GENERAL STORAGE

Adjacency Requirement	Direct access from Evidence Processing
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	High density track system, storage shelving
Floor	Linoleum or Resilient
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB, painted
Lighting / Electrical	LED, continuous rows perpendicular to shelving, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) Refrigerators

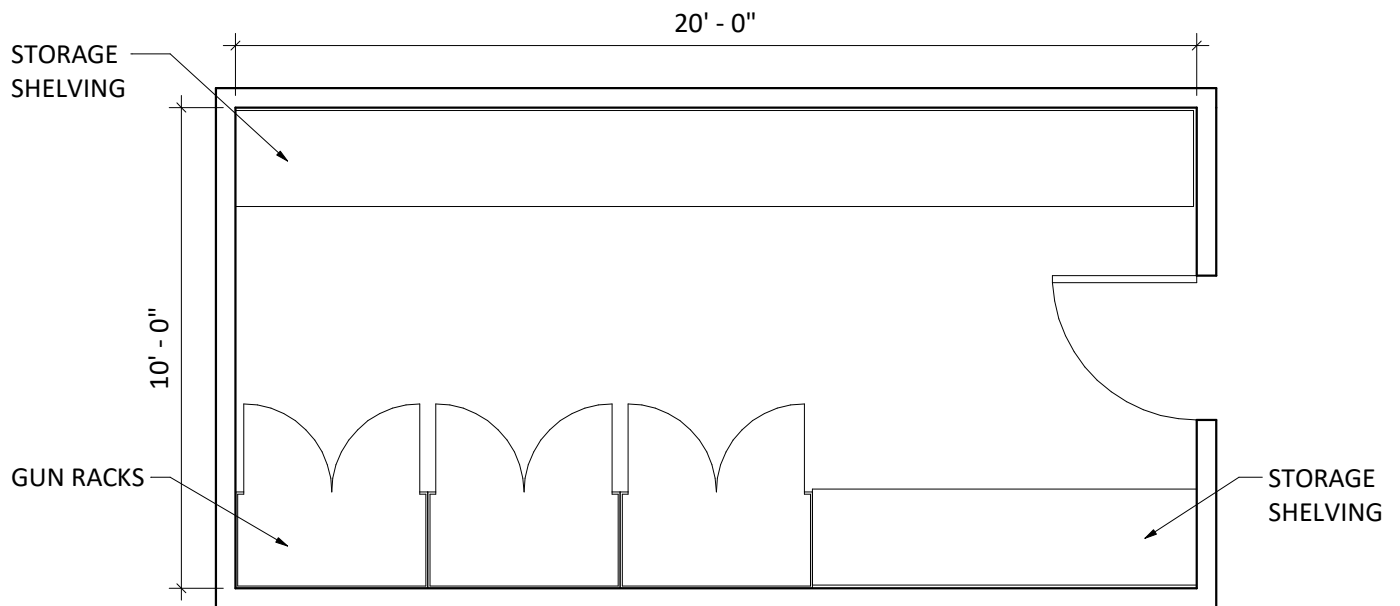


EVIDENCE, GENERAL STORAGE
1/8" = 1'-0"

POLICE DEPARTMENT

7.13 EVIDENCE, WEAPONS STORAGE

Adjacency Requirement	Direct access from Evidence
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	5 tier 18" deep metal shelving along (2) walls
Floor	Linoleum or Resilient
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB, painted
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Gun racks

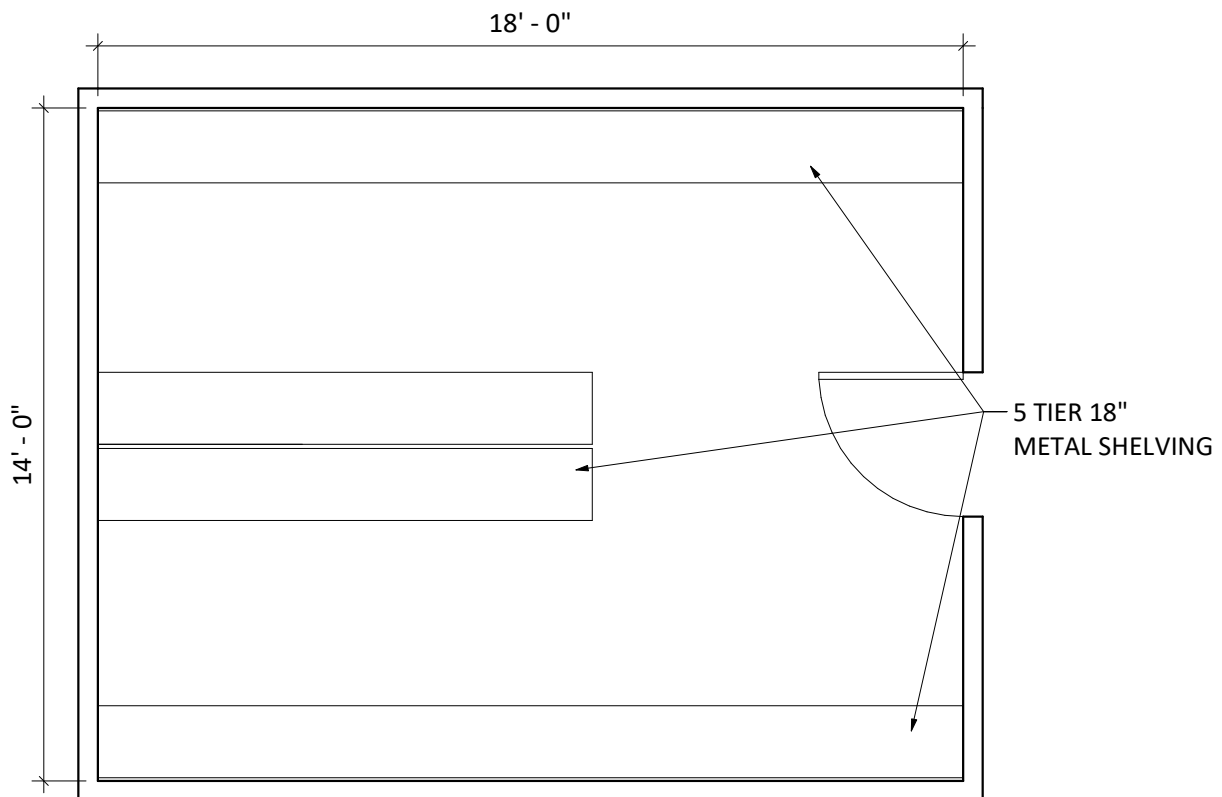


 **EVIDENCE, WEAPONS STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

7.14 EVIDENCE, NARCOTICS STORAGE

Adjacency Requirement	Direct access from Evidence
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	5 tier 18" deep metal shelving along (2) walls and center of room
Floor	Linoleum or Resilient
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB, painted
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C, good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	None

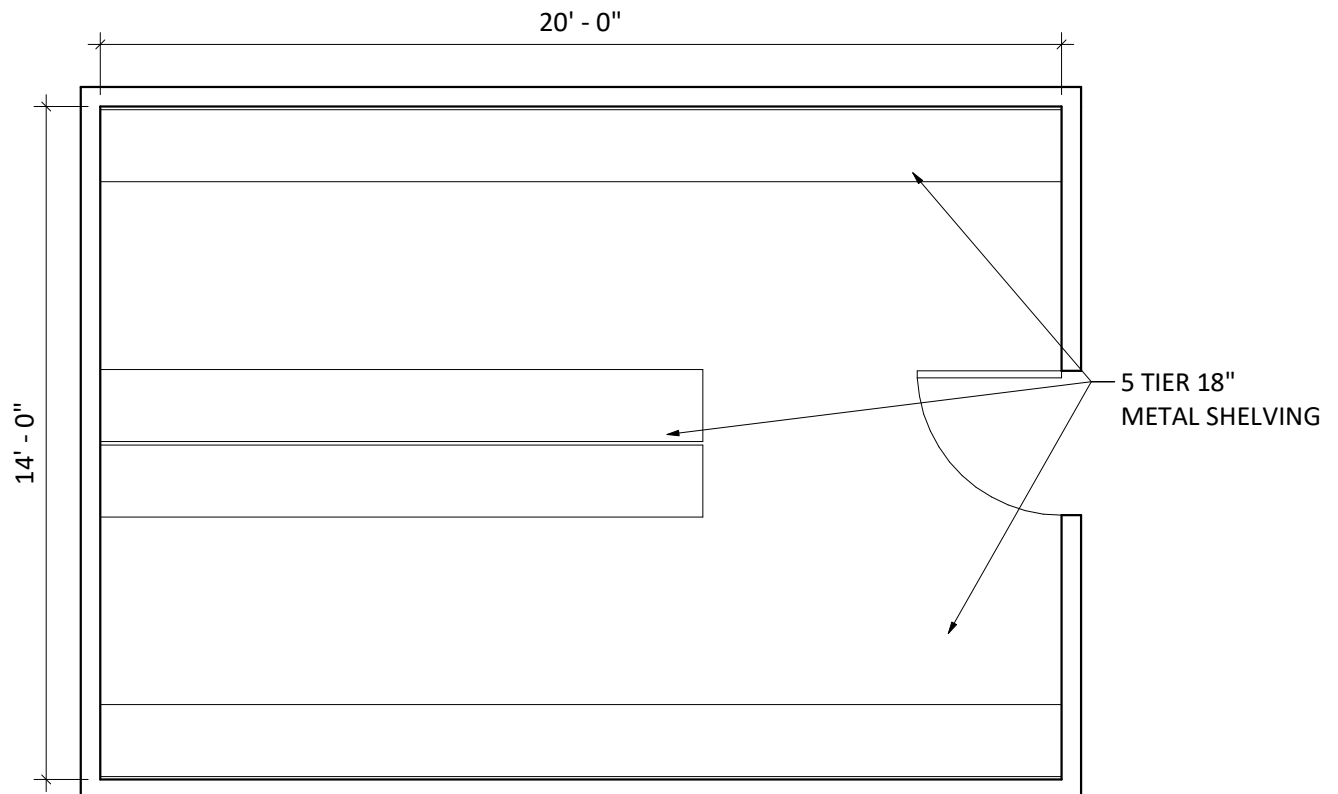


 **EVIDENCE, NARCOTICS STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

7.15 EVIDENCE, ASSAULT STORAGE

Adjacency Requirement	Direct access from Evidence
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	5 tier 18" deep metal shelving along (2) walls and center of room
Floor	Linoleum or Resilient
Walls	GWB, painted w/ plywood security liner
Ceiling	GWB, painted
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

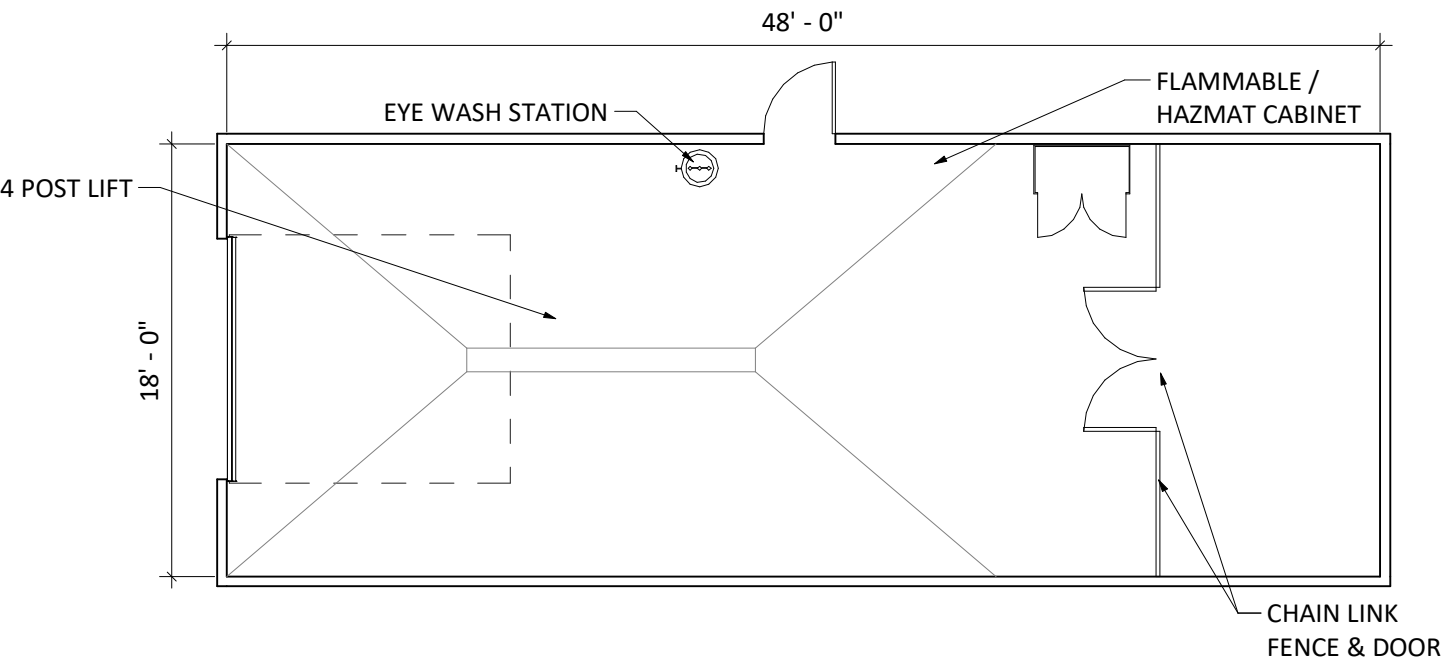


○ EVIDENCE, ASSAULT
1/4" = 1'-0"

POLICE DEPARTMENT

7.16 EVIDENCE GARAGE

Adjacency Requirement	Remote
Public Access	None
Security Requirements	Card access in and out
Contract Millwork / Equipment	Chain link fence and gates
Floor	Concrete w/ hardener
Walls	Epoxy painted CMU
Ceiling	Exposed
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C, exhaust, floor drain, compressed air, multiple power, eye wash station and sink
Special Needs	(1) 12' x 12' O.H. doors
Owner supplied Furn. / Equip.	Flammable / hazmat cabinet

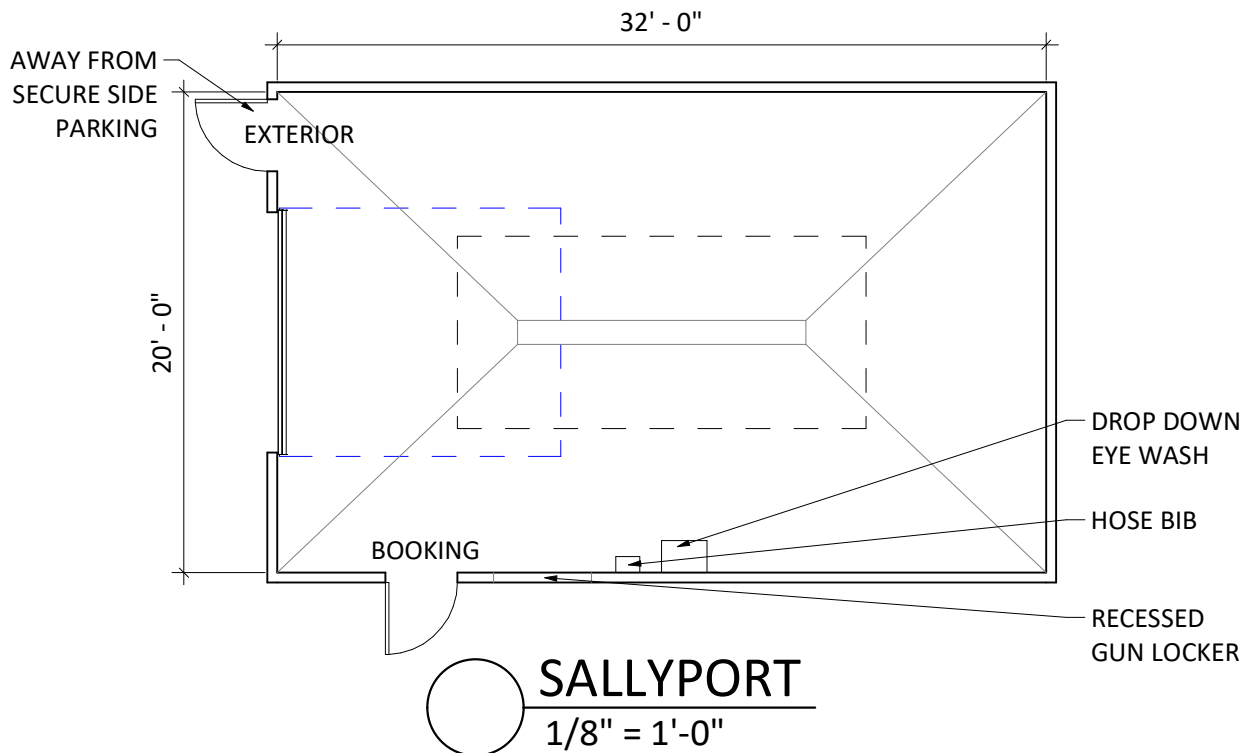


EVIDENCE GARAGE
1/8" = 1'-0"

POLICE DEPARTMENT

8.1 SALLYPORT

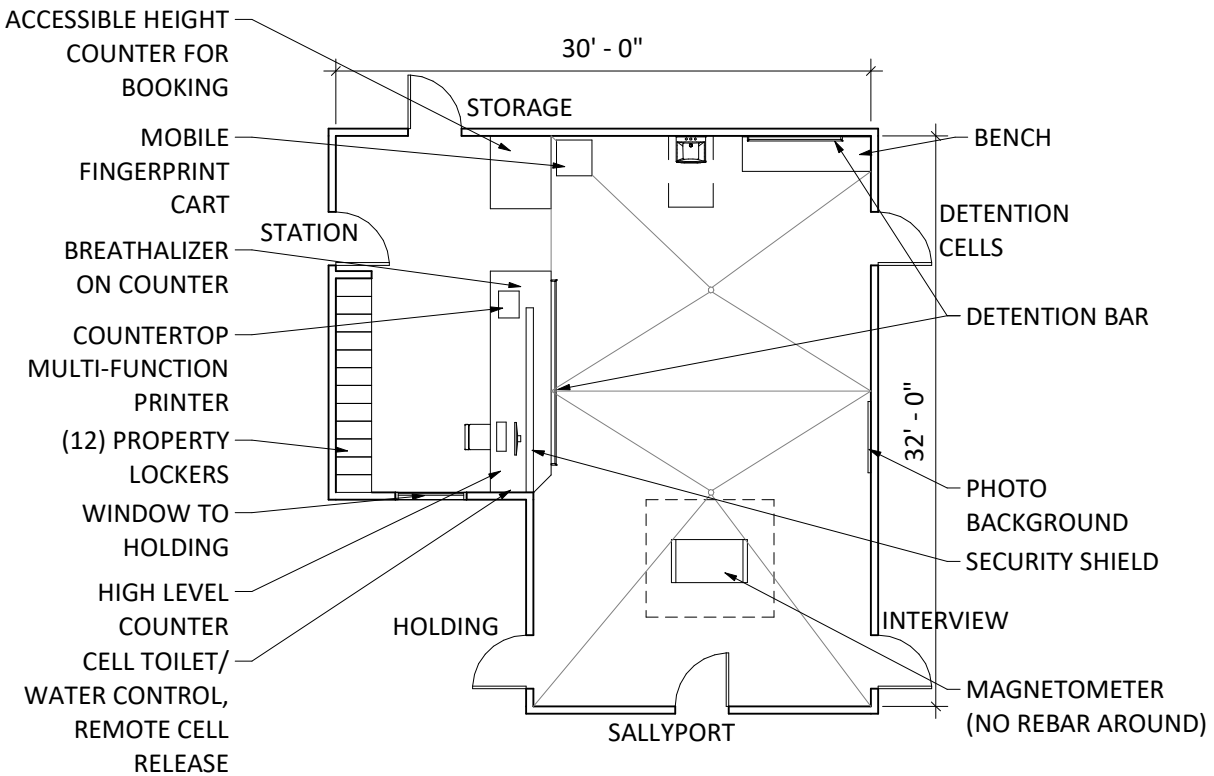
Adjacency Requirement	Adjacent to Booking, secure access to exterior, card access from exterior, overhead door controller
Public Access	None
Security Requirements	None, doors controlled by Dispatch & Officer in Charge
Contract Millwork / Equipment	(8) Gun lockers (for tazer and weapon)
Floor	Concrete w/ hardener
Walls	Epoxy painted CMU
Ceiling	Exposed
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	Exhaust, floor drain, hose bib, recessed drop down eye wash
Special Needs	12' x 12' O.H. door, man door to exterior
Owner supplied Furn. / Equip.	None



POLICE DEPARTMENT

8.2 BOOKING

Adjacency Requirement	Adjacent to Sallyport, Detention Cells, Reports and Interview
Public Access	None
Security Requirements	Card access in and out of Booking; free access to Cell corridor
Contract Millwork / Equipment	Stainless steel booking counter w/ base cabinets and CMU wall on opposite side w/ security shield, (12) 12' x 24' recessed property lockers, 4' x 6' painted panel for photo backdrop, accessible height countertop for booking
Floor	Concrete w/ epoxy (non-slip)
Walls	Epoxy painted CMU
Ceiling	(2) Layers GWB
Lighting / Electrical	Security type recessed LED, bright, CCTV cameras, duress button & beacon, camera and microphone control, remote cell door release
HVAC / Plumbing	A/C, good ventilation, wall hung detention sink, remote toilet flush controls, water shut off
Special Needs	Smoke compartment; supervised egress exit through Sallyport (man door), magnetometer (no rebar at magnetometer)
Owner supplied Furn. / Equip.	Fingerprint & breathalyzer machines, booking pc, blankets, cups, countertop multi-function printer

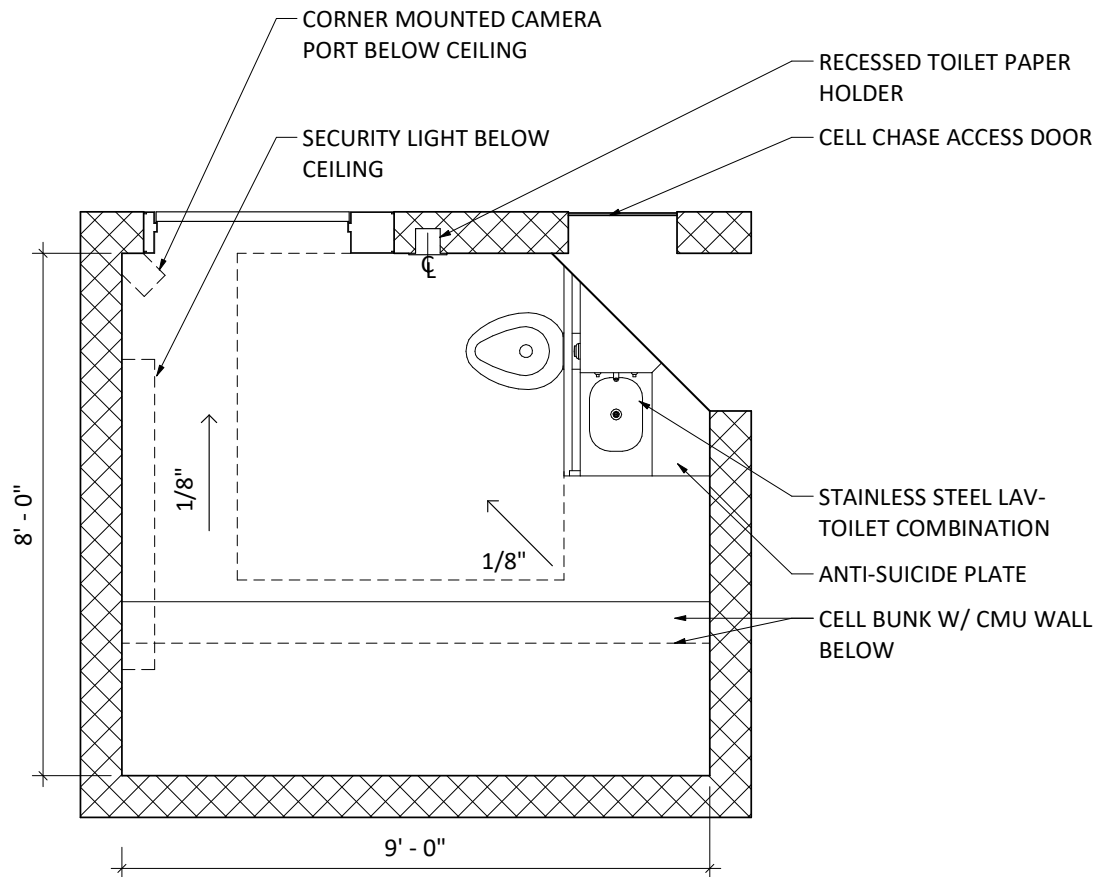


BOOKING
3/32" = 1'-0"

POLICE DEPARTMENT

8.3 DETENTION CELLS

Adjacency Requirement	Adjacent to Booking
Public Access	None
Security Requirements	Remote release from Booking and Officer in Charge
Contract Millwork / Equipment	S.S. Bench, recessed toilet paper holding
Floor	Concrete w/ sloped epoxy (non-slip), drain into corridor
Walls	Epoxy painted CMU
Ceiling	Welded steel plate
Lighting / Electrical	Security LED, mic and speaker, CCTV camera
HVAC / Plumbing	A/C, combination toilet / sink detention fixture
Special Needs	1 pod of 4, 4 individually sight and sound separated male and female detention room areas, provide flexibility in use of detention rooms. Meet Mass Police Accrediting Standards, Mass Department of Public Health Regulations and Mass Access Code. All to be handicap accessible
Owner supplied Furn. / Equip.	None

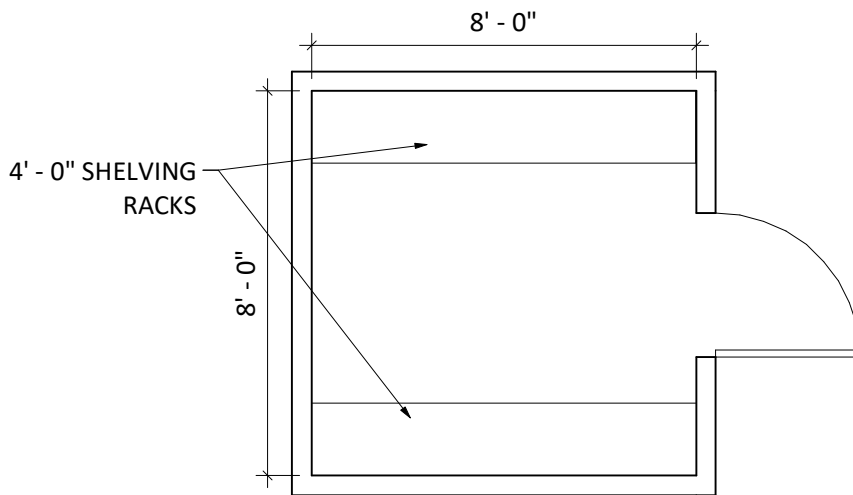


DETENTION CELLS
3/8" = 1'-0"

POLICE DEPARTMENT

8.4 DETENTION STORAGE ROOM

Adjacency Requirement	Access from Booking
Public Access	None
Security Requirements	Remote release, card access in and out
Contract Millwork / Equipment	(2) 4' - 0" Shelving racks
Floor	Concrete w/ sloped epoxy (non-slip), drain into corridor
Walls	Epoxy painted CMU
Ceiling	(2) Layers GWB, painted
Lighting / Electrical	Security LED, mic and speaker
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

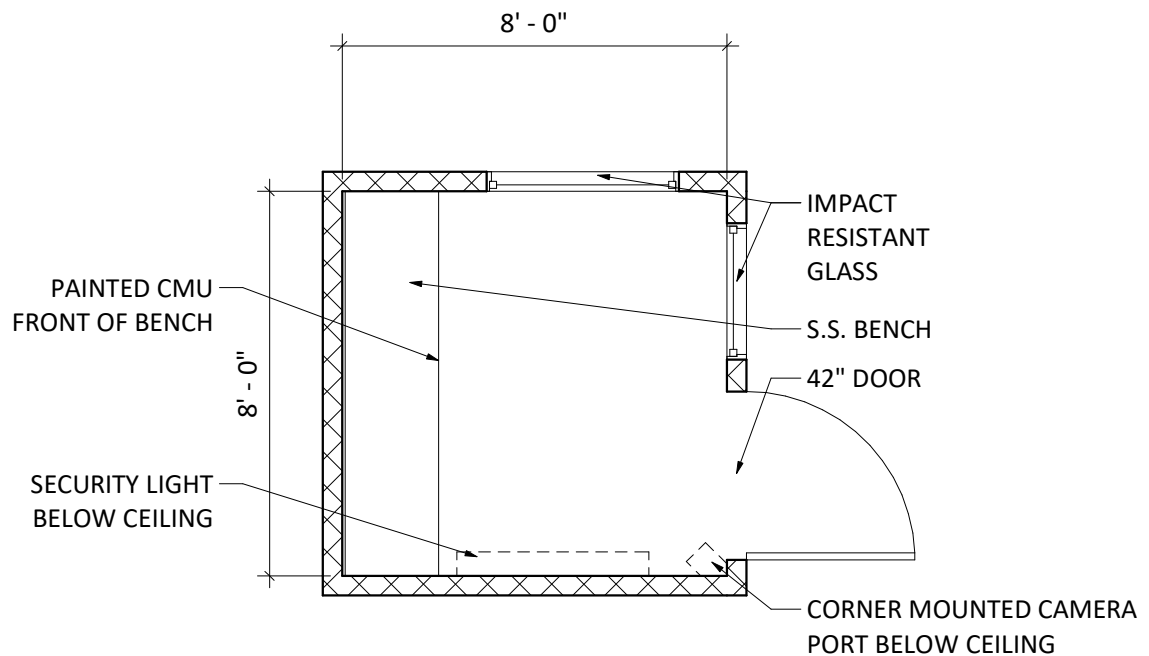


○ DETENTION STORAGE
1/4" = 1'-0"

POLICE DEPARTMENT

8.5 TEMPORARY HOLDING

Adjacency Requirement	Access from Booking
Public Access	None
Security Requirements	Remote release, card access in and out
Contract Millwork / Equipment	S.S. CMU Bench, painted CMU front
Floor	Concrete w/ sloped epoxy (non-slip), drain into corridor
Walls	Epoxy painted CMU
Ceiling	(2) Layers GWB, painted
Lighting / Electrical	Security LED, mic and speaker, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	Observation windows, 42" door
Owner supplied Furn. / Equip.	None

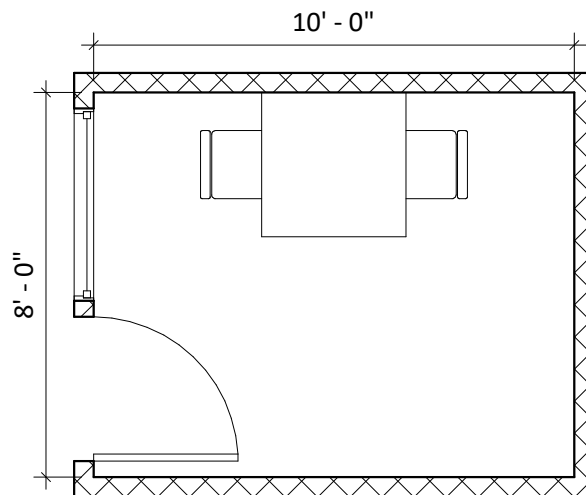


 **TEMPORARY HOLDING**
1/4" = 1'-0"

POLICE DEPARTMENT

8.6 INTERVIEW

Adjacency Requirement	Access from Booking
Public Access	Limited
Security Requirements	Remote release, card access in and out
Contract Millwork / Equipment	None
Floor	Concrete w/ sloped epoxy (non-slip), drain into corridor
Walls	Epoxy painted CMU
Ceiling	(2) Layers GWB, painted
Lighting / Electrical	Security LED, mic and speaker, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	Observation windows, sight and sound separate from booking area
Owner supplied Furn. / Equip.	Table w/ (2) chairs

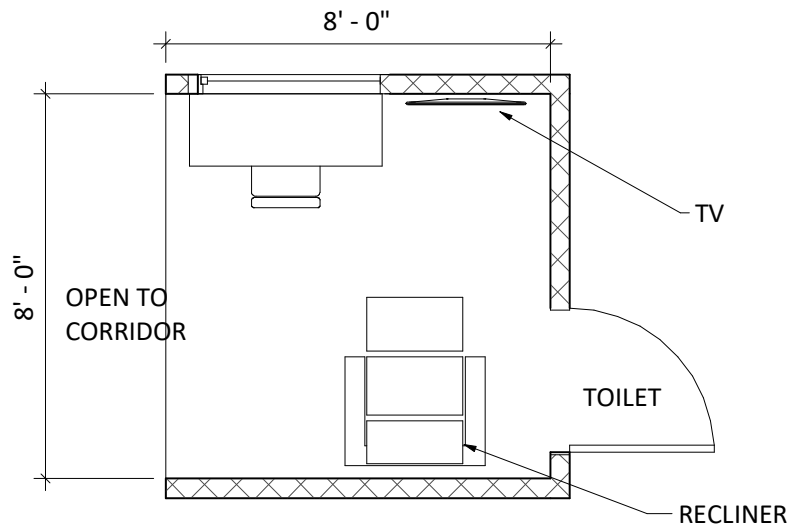


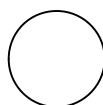
○ INTERVIEW
1/4" = 1'-0"

POLICE DEPARTMENT

8.7 MATRON

Adjacency Requirement	Off main cell block for monitoring juveniles
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Concrete w/ epoxy
Walls	Epoxy painted CMU
Ceiling	(2) Layers GWB, painted
Lighting / Electrical	Indirect LED, CCTV camera
HVAC / Plumbing	A/C
Special Needs	Window to exterior
Owner supplied Furn. / Equip.	Table w/ chair, recliner, TV

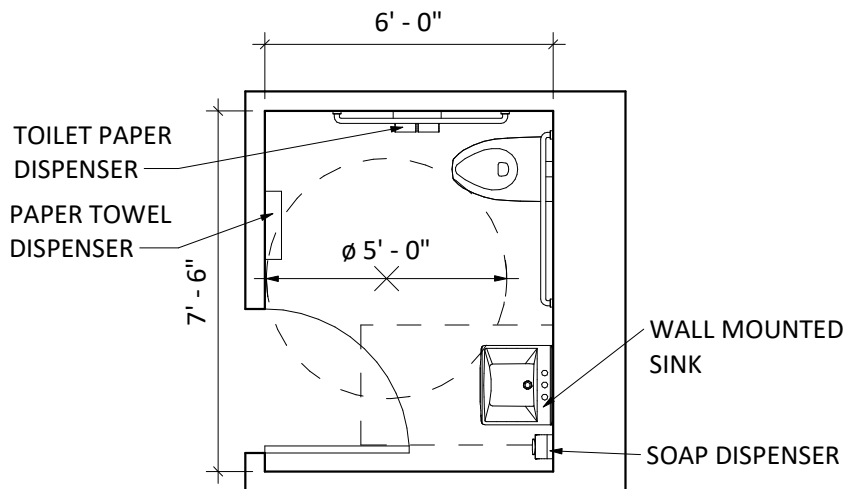


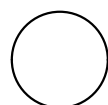
 **MATRON**
1/4" = 1'-0"

POLICE DEPARTMENT

8.8 MATRON TOILET

Adjacency Requirement	Adjacent to Matron
Public Access	Limited
Security Requirements	Privacy, High
Contract Millwork / Equipment	Toilet accessories
Floor	Ceramic tile
Walls	Ceramic tile wainscot, all walls, painted GWB walls above ceramic tile
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust; (1) toilet and (1) sink
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	None

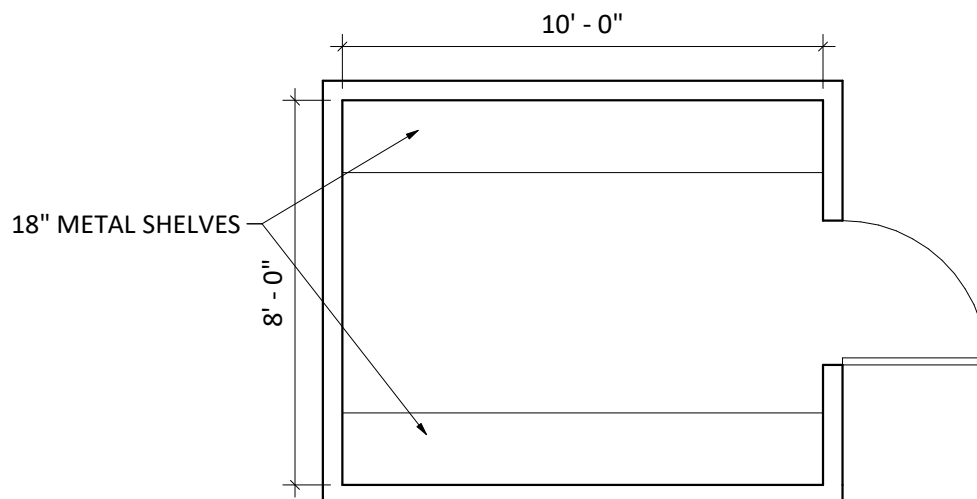


 **MATRON, TOILET**
1/4" = 1'-0"

POLICE DEPARTMENT

9.1 TRAINING AIDS STORAGE

Adjacency Requirement	Adjacent to Training Room
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	18" Metal shelving on 2 walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

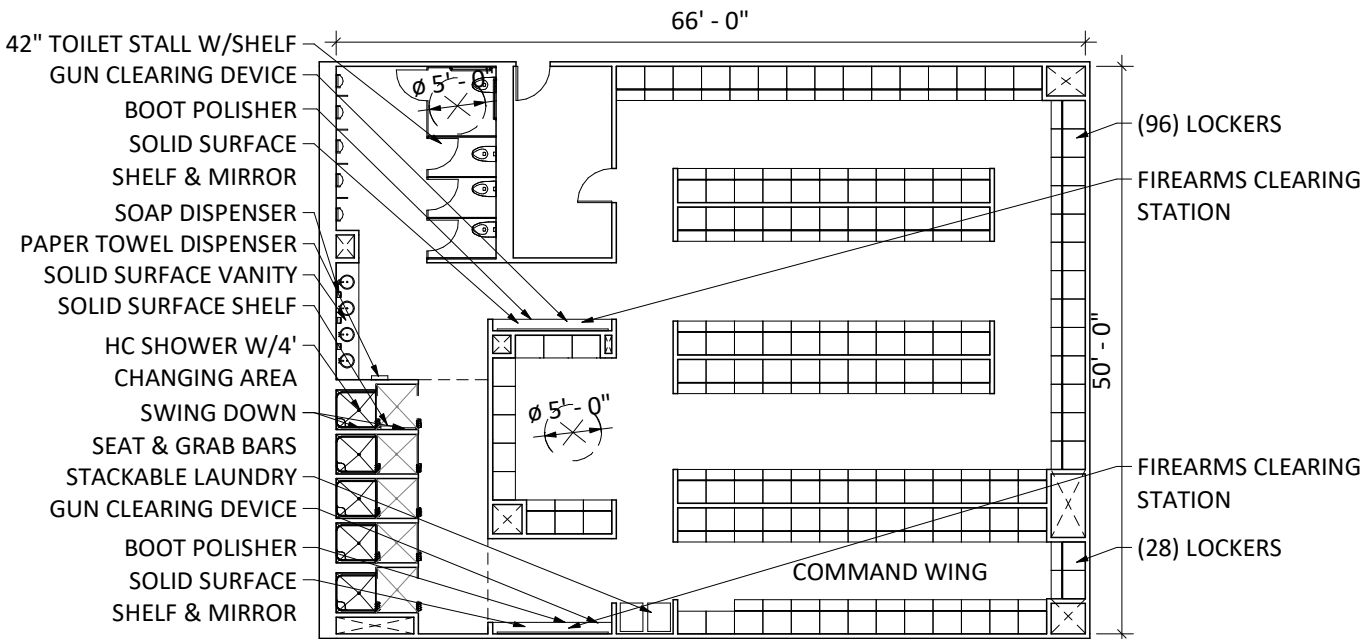


TRAINING AIDS STORAGE
1/4" = 1'-0"

POLICE DEPARTMENT

9.2 MEN'S LOCKERS & SHOWERS

Adjacency Requirement	Near Patrol & Fitness Room
Public Access	None
Security Requirements	Card access
Contract Millwork/ Equipment	(115) 30" Wide lockers w/ pullout drawers under including (10) HC lockers w/o bench), solid surface vanity, toilet accessories, swing down seat for changing, solid surface shelf, wall to wall mirrors, gun clearing device
Floor	Epoxy finish
Walls	GWB, ceramic tile wainscot, all walls, full height tile around shower unit, painted GWB above tile wainscot
Ceiling	GWB, painted in showers, ACT in locker room
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust; toilet, sink, 42" accessible shower unit, shower, urinals, floor drains
Special Needs	None
Owner supplied Furn./ Equip.	(2) Boot polisher

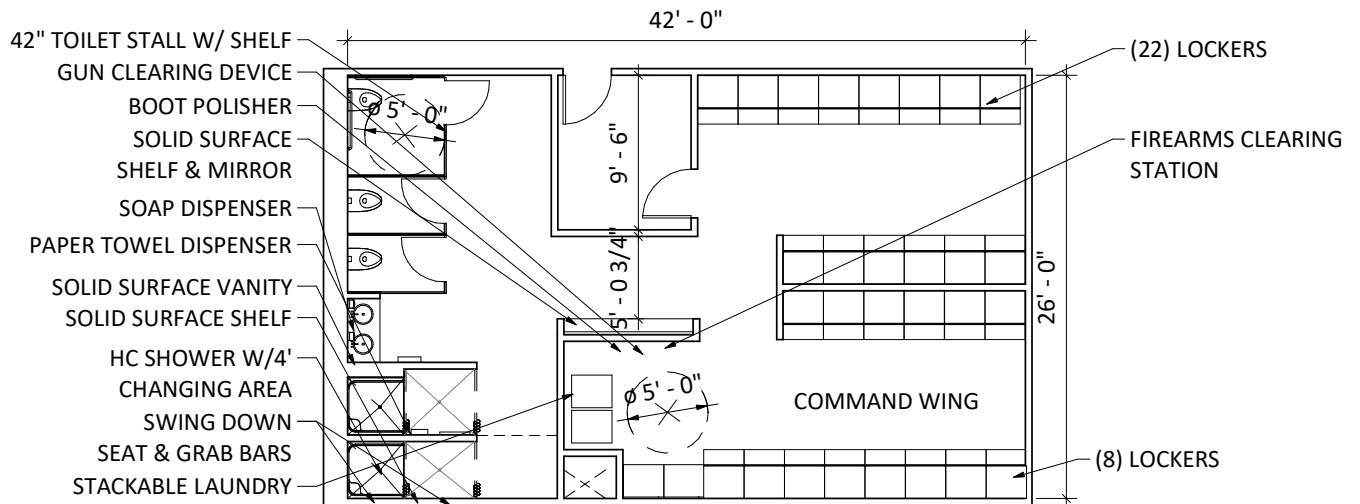


MEN'S LOCKERS AND SHOWERS
1/16" = 1'-0"

POLICE DEPARTMENT

9.3 WOMEN'S LOCKERS & SHOWERS

Adjacency Requirement	Near Patrol & Fitness Room
Public Access	None
Security Requirements	Card access
Contract Millwork/ Equipment	(28) 30" Wide lockers w/ pullout drawers under including (2) HC lockers w/o bench), solid surface vanity, toilet accessories, swing down seat for changing, solid surface shelf, wall to wall mirrors, gun clearing device
Floor	Epoxy
Walls	GWB, ceramic tile wainscot, all walls, full height tile around shower unit, painted GWB above tile wainscot
Ceiling	GWB, painted in showers, ACT in locker room
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust; toilet, sink, 42" accessible shower unit, shower, urinals, floor drains
Special Needs	None
Owner supplied Furn./ Equip.	(2) Boot polisher

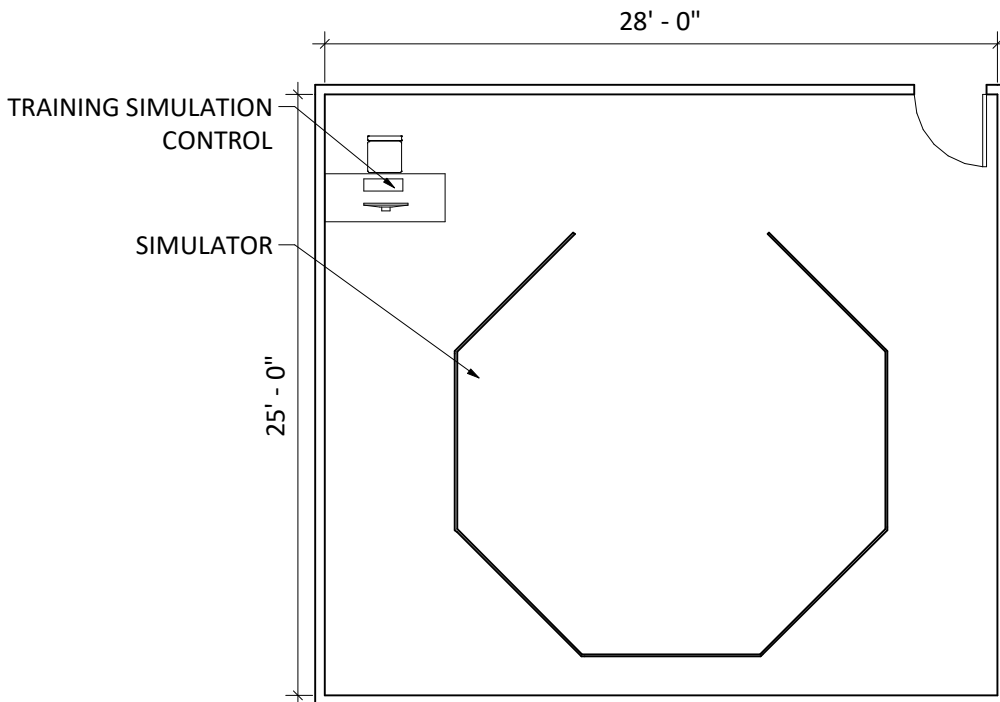


WOMEN'S LOCKERS AND SHOWERS
3/32" = 1'-0"

POLICE DEPARTMENT

9.4 FIREARMS TRAINING SIMULATION (F.A.T.S.)

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Rubber sports flooring
Walls	GWB, painted
Ceiling	High noise reduction ACT 10' ceiling minimum
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Control desk inside space

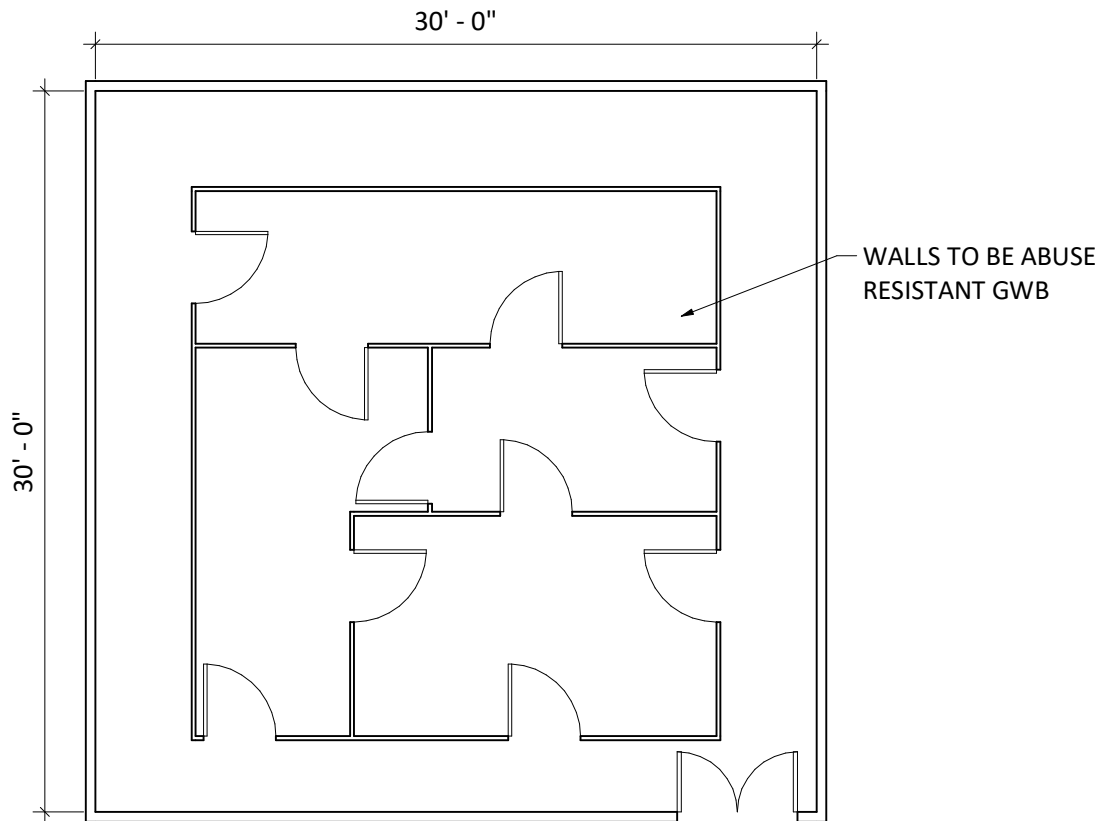


 FIREARMS TRAINING SIMULATION
1/8" = 1'-0"

POLICE DEPARTMENT

9.5 TACTICAL TRAINING

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	Walls to be Abuse Resistant GWB
Ceiling	Exposed, painted
Lighting / Electrical	LED
HVAC / Plumbing	A/C
Special Needs	Acoustic separation
Owner supplied Furn. / Equip.	Shoot-house prop training structure 20' X 20' (currently owned); paint bullets (fired from service weapon)

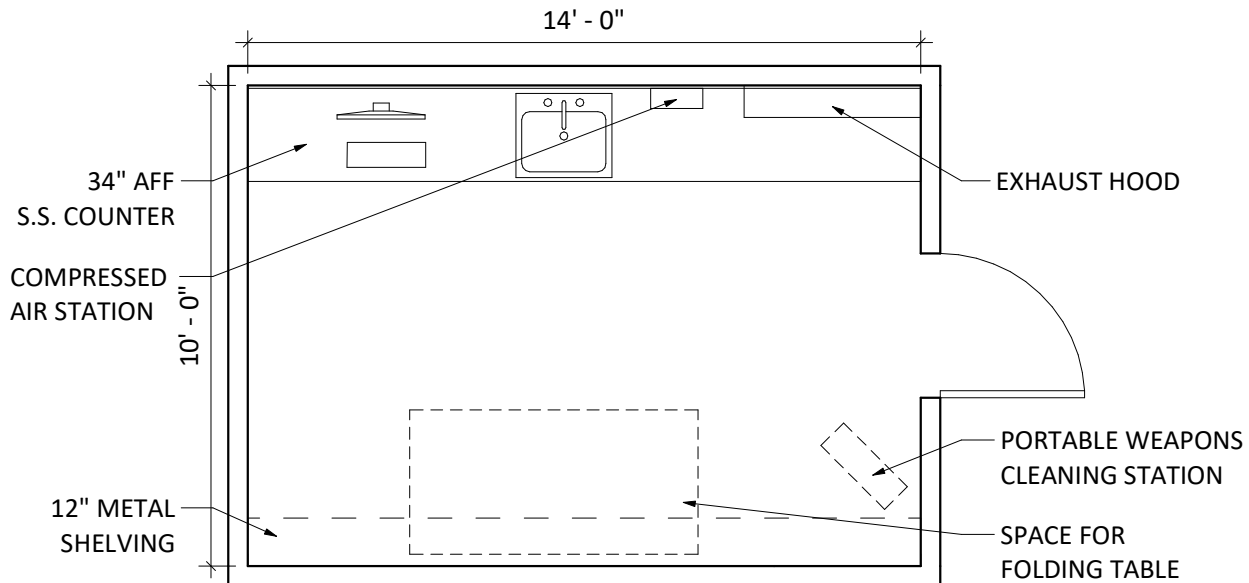


TACTICAL TRAINING
1/8" = 1'-0"

POLICE DEPARTMENT

9.6 FIREARMS CLEANING

Adjacency Requirement	Near Patrol
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	34" AFF SS counter w/ base cabinets, SS exhaust chamber, 12" shelving
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, task lighting, data
HVAC / Plumbing	A/C, Connect to exhaust hood at work bench, compressed air, stainless steel sink
Special Needs	None
Owner supplied Furn. / Equip.	Portable weapon cleaning station

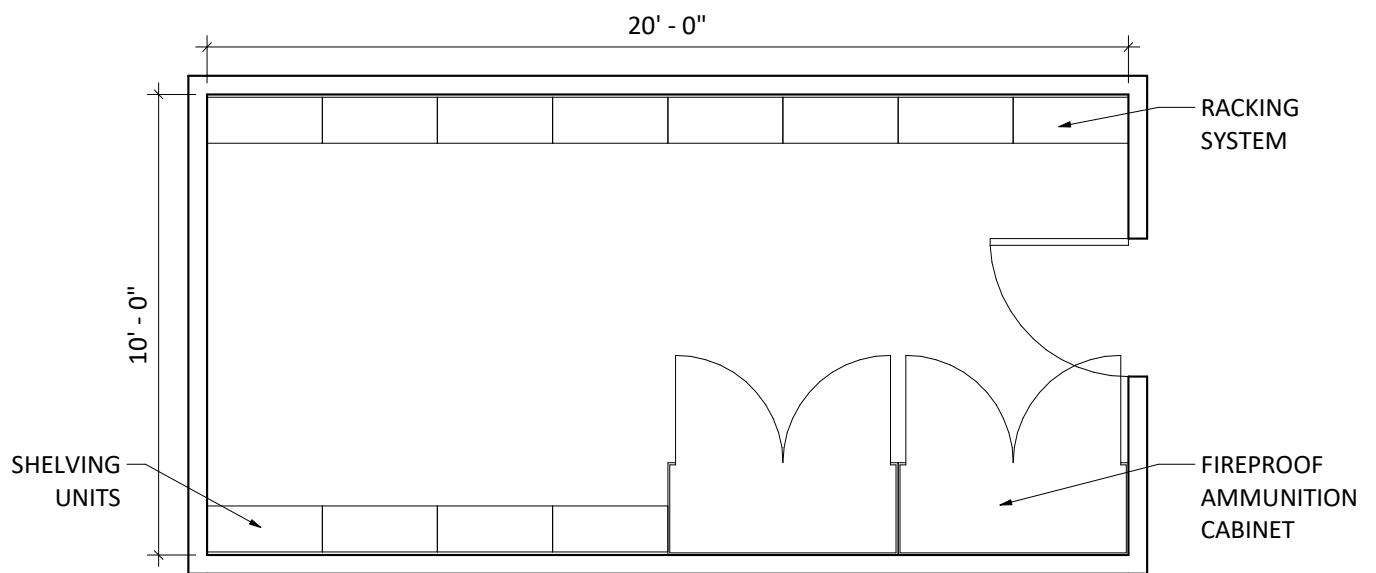


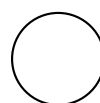
FIREARMS CLEANING
1/4" = 1'-0"

POLICE DEPARTMENT

9.7 FIREARMS STORAGE

Adjacency Requirement	Near Firearms Cleaning
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, CCTV cameras
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Racking system, fireproof ammunition cabinets, 5 tier shelving units

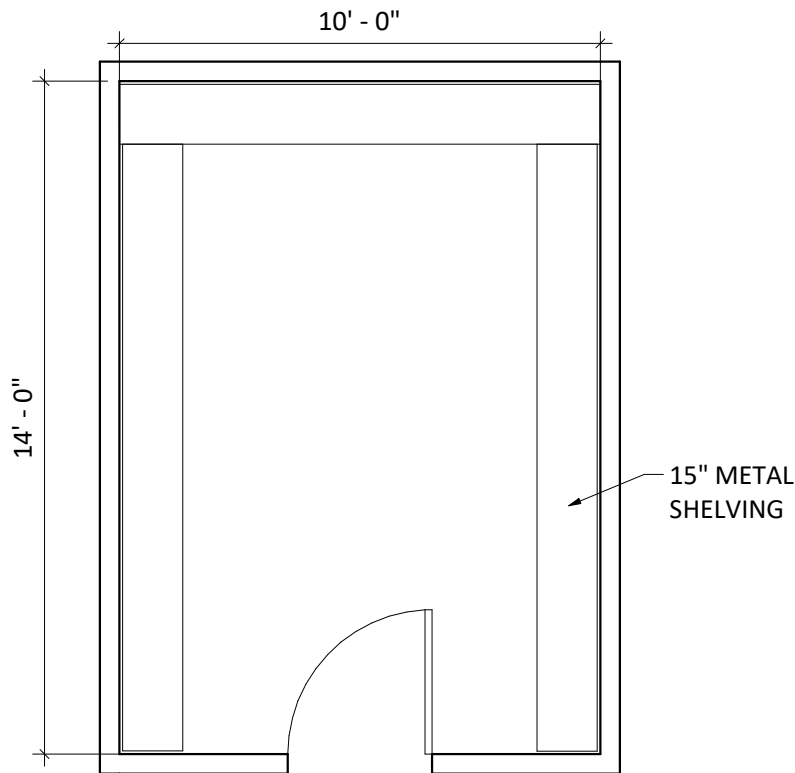


 **FIREARMS STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

9.8 QUARTERMASTER STORAGE

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	15" deep metal shelves on (3) walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	None

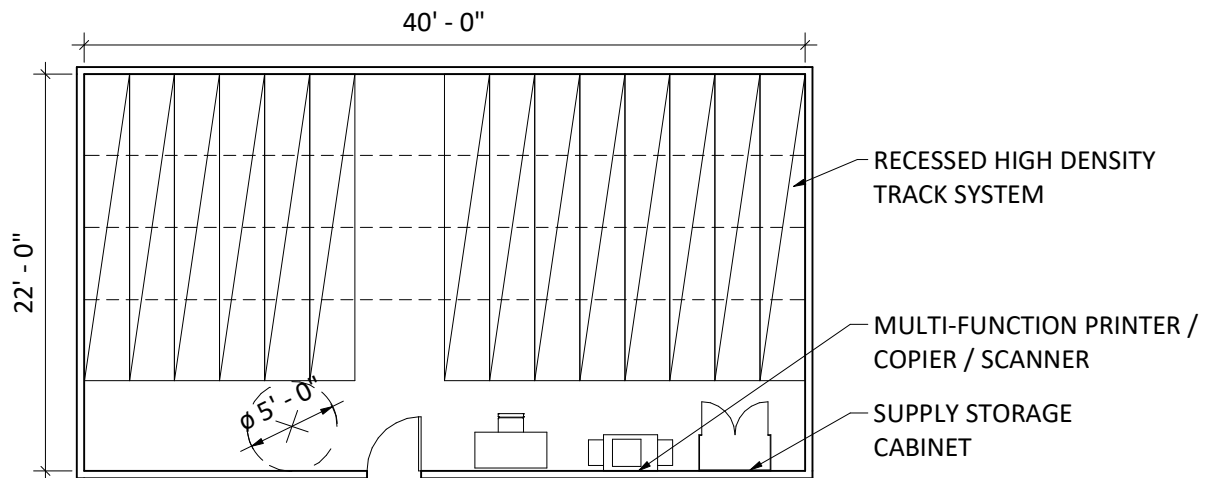


○ QUARTERMASTER STORAGE
1/4" = 1'-0"

POLICE DEPARTMENT

9.9 INACTIVE RECORD STORAGE

Adjacency Requirement	Remote
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Recessed high density file storage system
Floor	Linoleum
Walls	GWB
Ceiling	ACT
Lighting / Electrical	LED, continuous rows perpendicular to shelving
HVAC / Plumbing	No overhead piping of any kind (above or below ceiling)
Special Needs	Does not need to Follow MA Sec State Record Keeping Standards
Owner supplied Furn. / Equip.	2' x 4' Work table and chair, multi-function printer / copier / scanner, supply storage cabinet

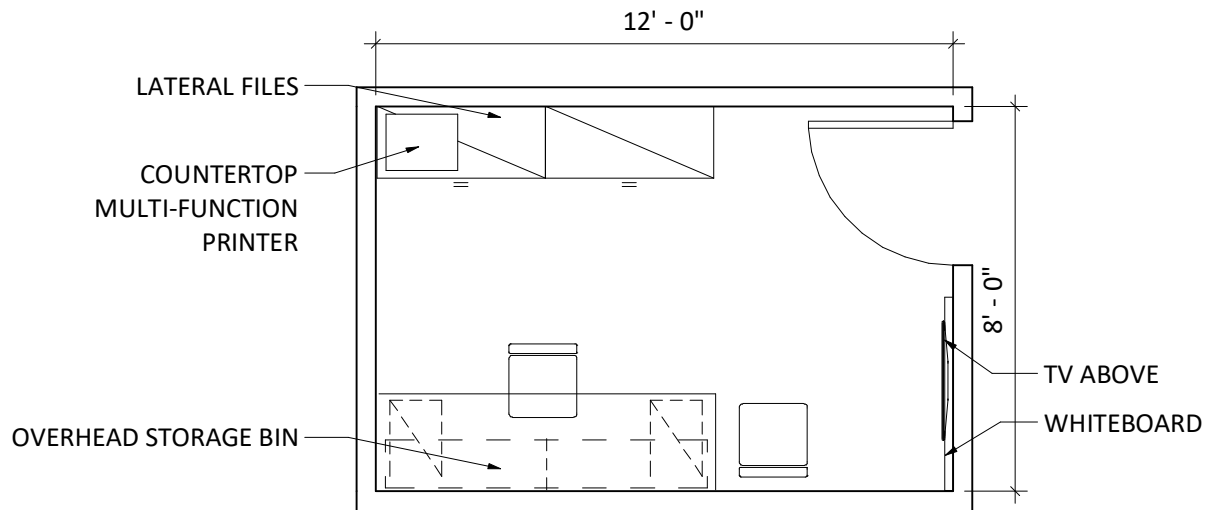


INACTIVE RECORD STORAGE
3/32" = 1'-0"

POLICE DEPARTMENT

9.10 ASSOCIATION

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: PO3
Owner supplied Furn. / Equip.	(1) Workstations, with chairs, overhead storage bins; (2) 42" 4-drawer lateral files, countertop multi-function printer

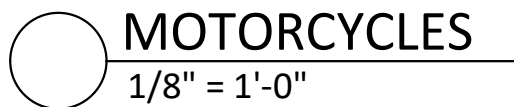
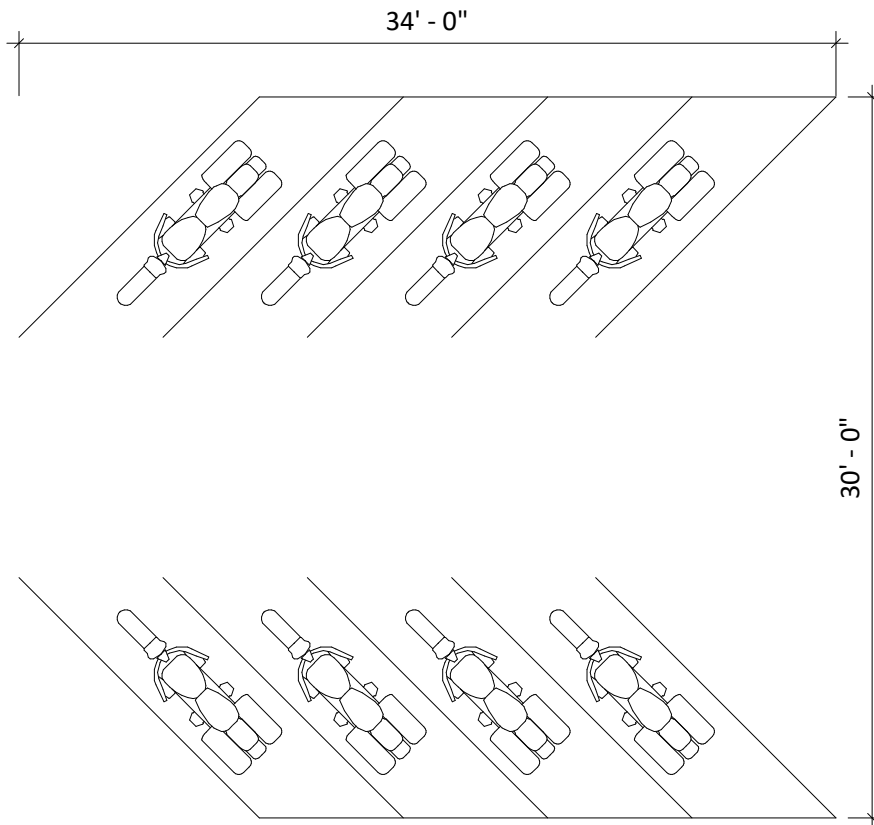


ASSOCIATION
1/4" = 1'-0"

POLICE DEPARTMENT

9.11 MOTORCYCLES

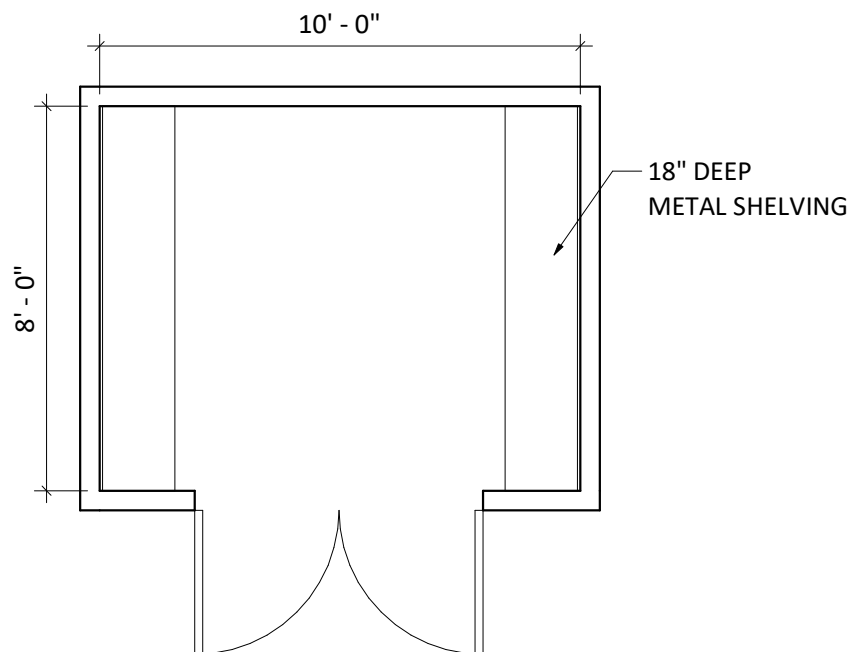
Adjacency Requirement	In Garage
Public Access	None
Security Requirements	Card access to Garage
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	Exposed, painted. Striped parking lines
Ceiling	Exposed, painted
Lighting / Electrical	Power for motorcycle battery chargers
HVAC / Plumbing	Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	(8) Motorcycles



POLICE DEPARTMENT

9.12 MOTORCYCLE & BICYCLE SUPPLIES

Adjacency Requirement	Adjacent to Garage
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	18" Metal shelving on 2 walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None



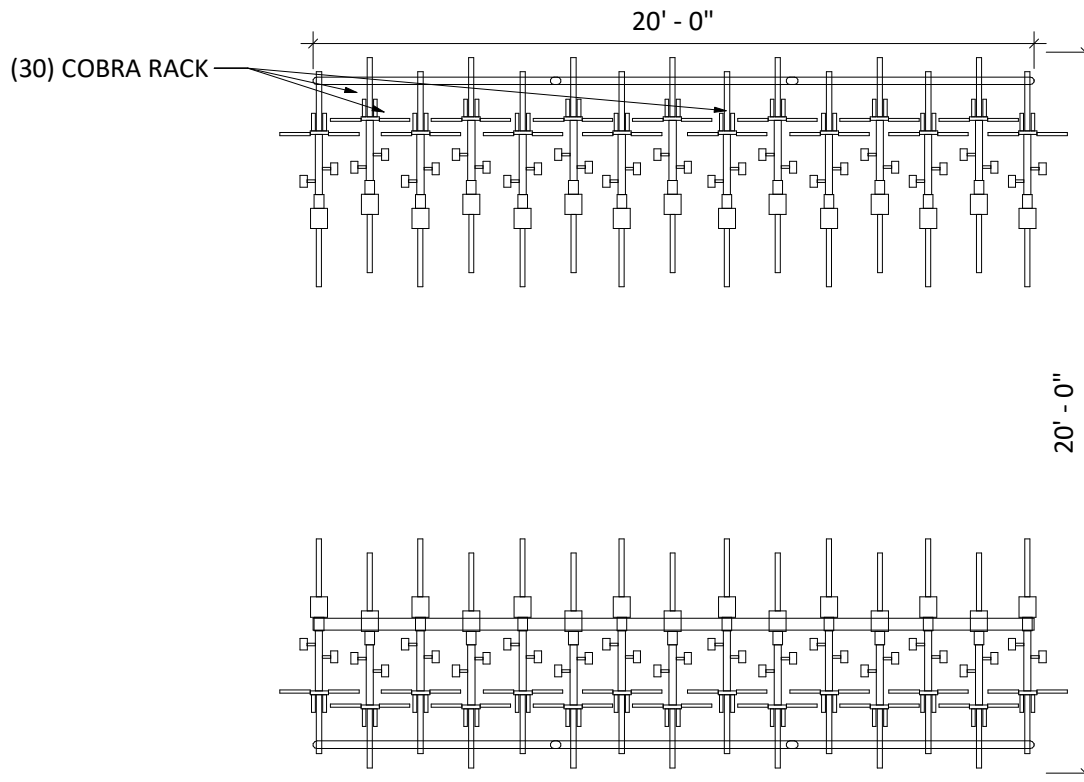
MOTORCYCLES & BICYCLE SUPPLIES

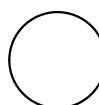
1/4" = 1'-0"

POLICE DEPARTMENT

9.13 SPD BICYCLES

Adjacency Requirement	In Garage
Public Access	None
Security Requirements	Card access to Garage
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	Exposed, painted. Striped parking lines
Ceiling	Exposed, painted
Lighting / Electrical	None
HVAC / Plumbing	Exhaust
Special Needs	Electrical for Segway
Owner supplied Furn. / Equip.	(30) Cobra racks

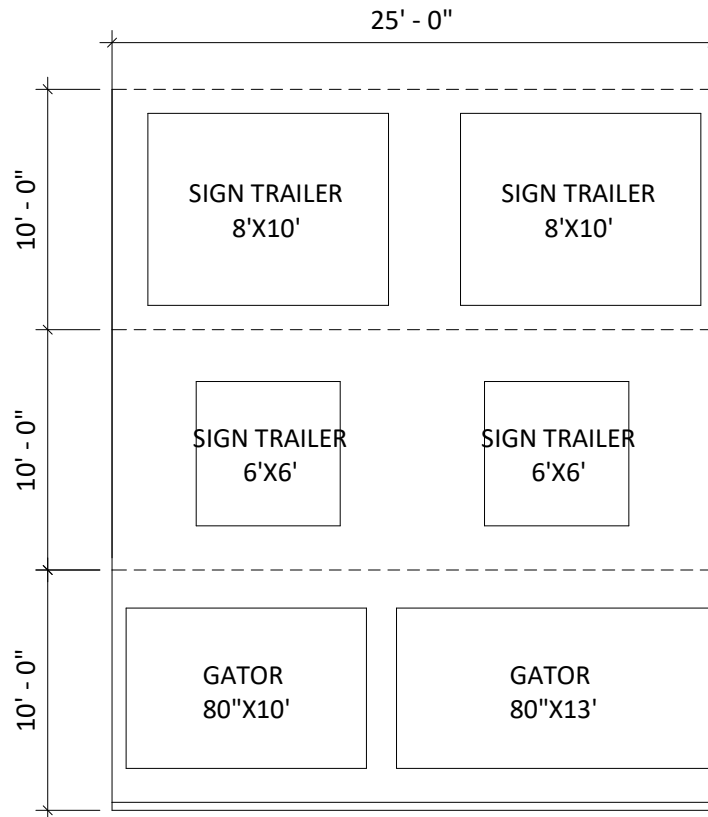


 **SPD BICYCLES**
3/16" = 1'-0"

POLICE DEPARTMENT

9.14 ATV & TRAILERS

Adjacency Requirement	In Garage
Public Access	None
Security Requirements	Card access to Garage
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	Exposed, painted
Ceiling	Exposed, painted
Lighting / Electrical	None
HVAC / Plumbing	Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	(1) 80"X10' Gator, (1) 80"X13' gator, (2) 6'X6' sign trailers, (2) 8'X10' sign trailers

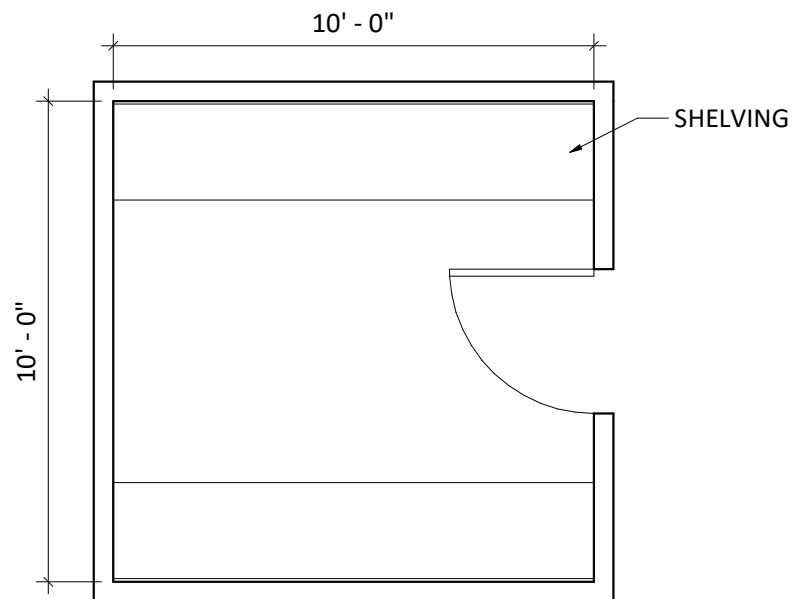


○ **ATV & TRAILERS**
1/8" = 1'-0"

POLICE DEPARTMENT

9.15 FOUND PROPERTY STORAGE

Adjacency Requirement	Access from Firing Range Control
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	18" deep metal shelves on (2) walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	None

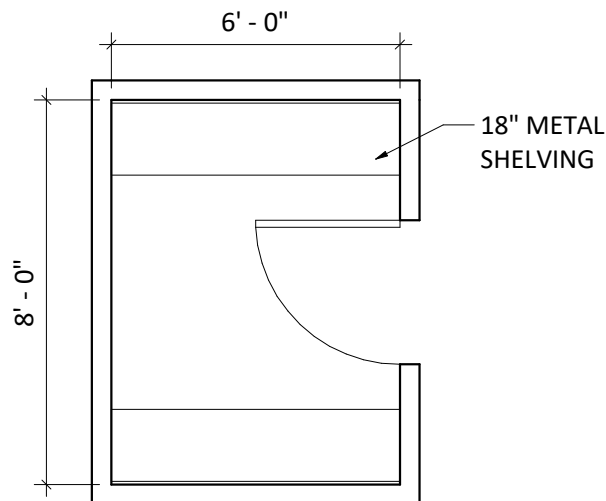


 **FOUND PROPERTY STORAGE**
1/4" = 1'-0"

POLICE DEPARTMENT

9.16 MARINE STORAGE ROOM

Adjacency Requirement	Adjacent to Garage
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	18" deep metal shelves on (2) walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	None



 **MARINE STORAGE ROOM**
1/4" = 1'-0"

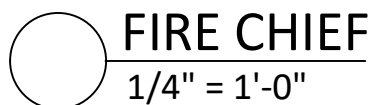
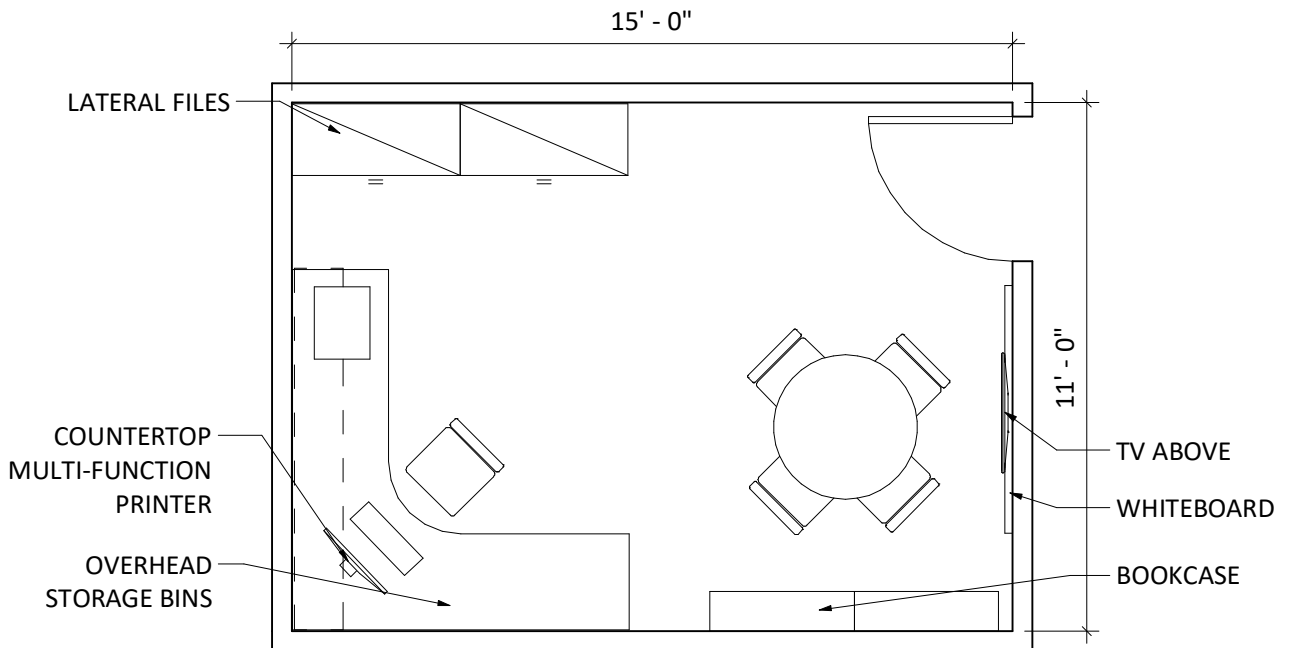
Fire Department Space Needs

CHARLES BREEN, FIRE CHIEF

FIRE DEPARTMENT

10.1 FIRE CHIEF

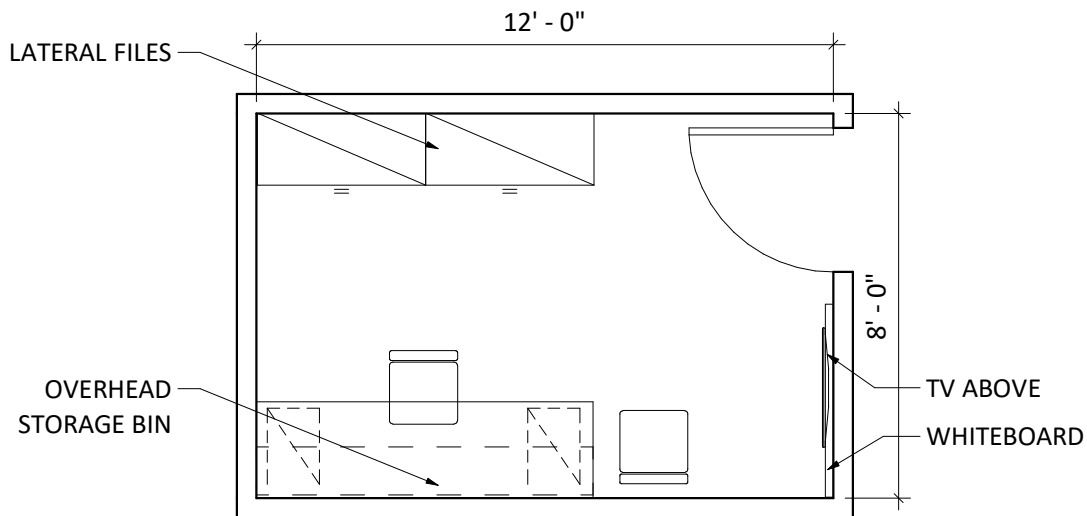
Adjacency Requirement	Adjacent to Administrative Assistant and Conference Room
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV, USB outlets
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: PO1
Owner supplied Furn. / Equip.	Desk w/ return, (2) 42" overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, countertop multi-function printer, table and (4) chairs, TV



FIRE DEPARTMENT

10.2 ASSISTANT FIRE CHIEF

Adjacency Requirement	Adjacent to Administrative Assistant and Conference Room
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV, USB outlets, TV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: PO3
Owner supplied Furn. / Equip.	Desk, 42" overhead storage bin, desk chair, (2) 42" 4-drawer lateral files, guest chair, TV

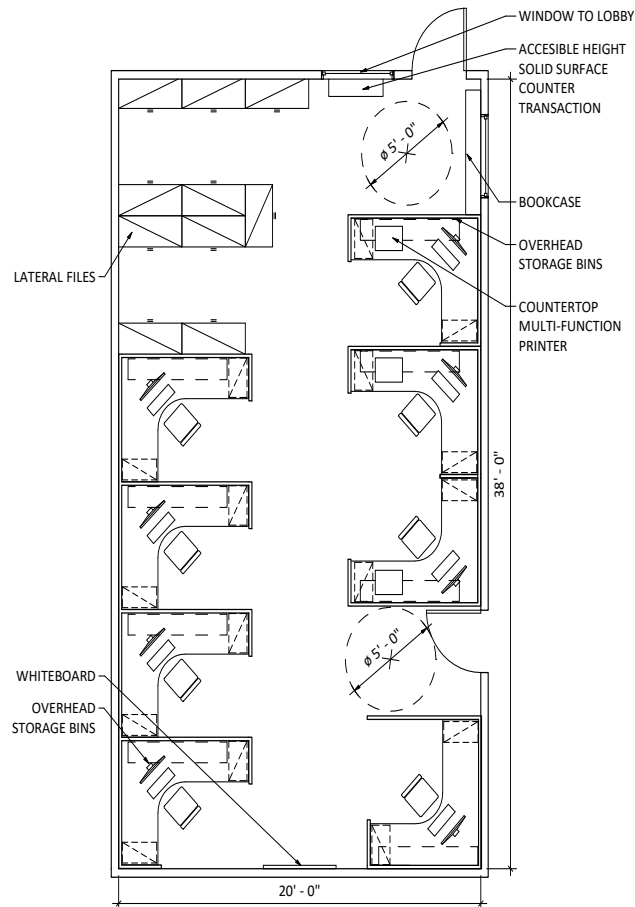



○ ASSISTANT FIRE CHIEF
1/4" = 1'-0"

FIRE DEPARTMENT

10.3 FIRE OPEN OFFICE

Adjacency Requirement	Adjacent to Assistant Chief; Admin, Admin Lieutenant, Homeland, Training, & Investigator
Public Access	Moderate
Security Requirements	Card access.
Contract Millwork / Equipment	White board
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, USB outlets, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: WS2
Owner supplied Furn. / Equip.	(8) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file, & desk chair; (9) 42" lateral file cabinets.

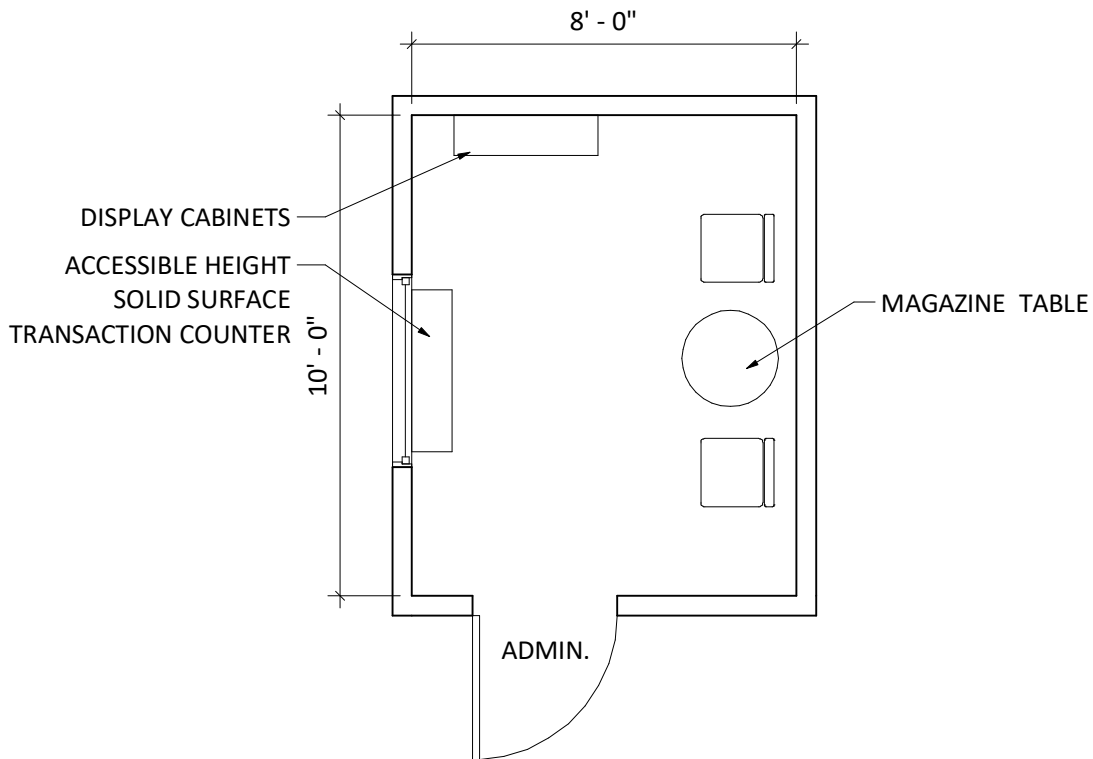


 FIRE OPEN OFFICE
3/16" = 1'-0"

FIRE DEPARTMENT

10.4 FIRE VISITOR LOBBY & WAITING AREA

Adjacency Requirement	Adjacent to Admin; Next to elevator; Near public bathrooms
Public Access	High
Security Requirements	Electronic access from lobby to Fire Offices controlled by Admin
Contract Millwork / Equipment	Chair rail, solid surface counter transaction, display cabinets
Floor	Linoleum or VCT
Walls	GWB
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) guest chairs; (1) Magazine table

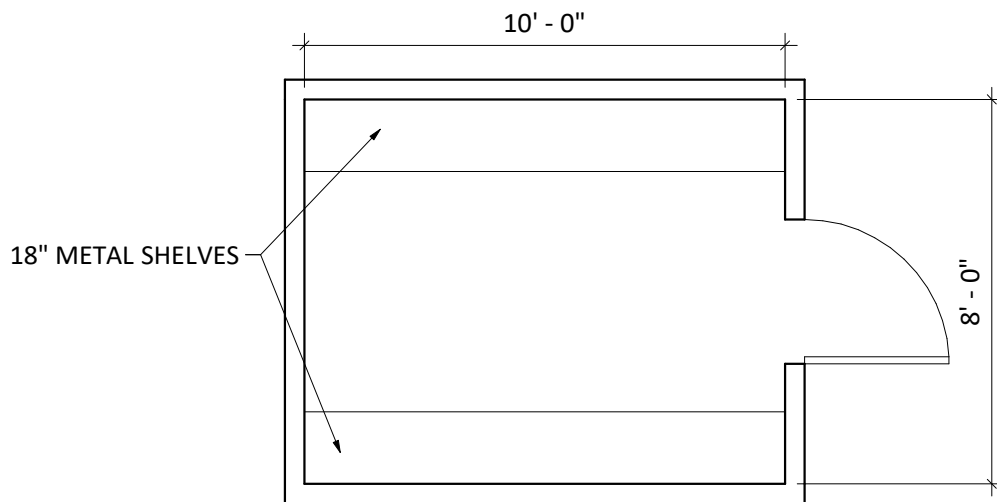


 FIRE VISITOR LOBBY & WAITING AREA
1/4" = 1'-0"

FIRE DEPARTMENT

10.5 FIRE TRAINING AIDS STORAGE

Adjacency Requirement	Off of Community Room
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	5 Tier 18" metal shelving on 2 walls
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

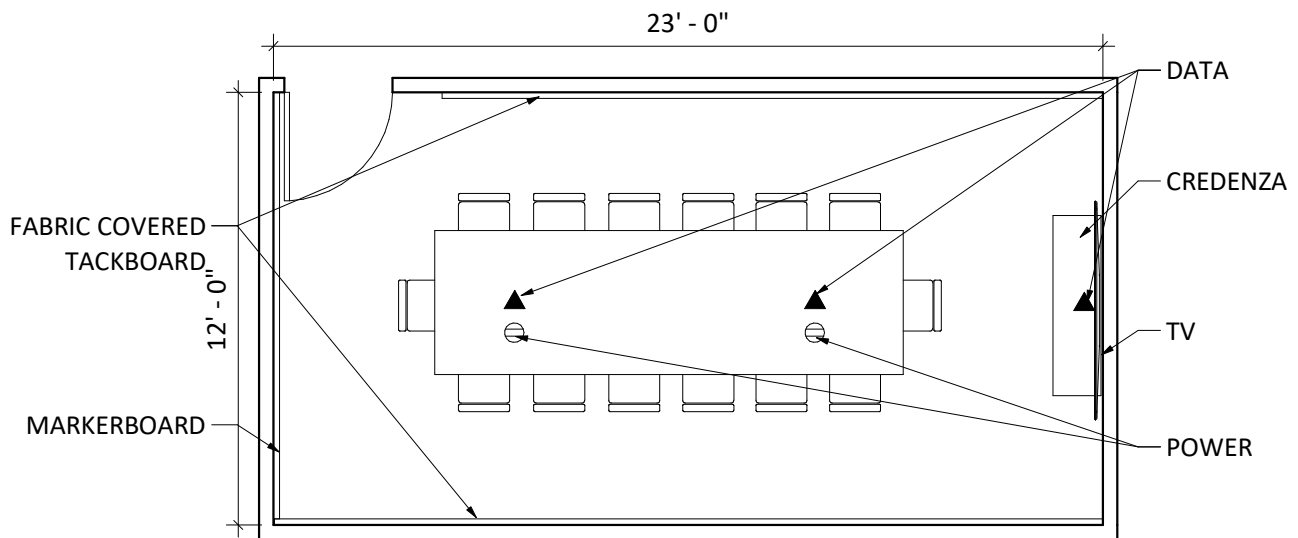


 FIRE TRAINING AIDS STORAGE
1/4" = 1'-0"

FIRE DEPARTMENT

10.6 CONFERENCE ROOM

Adjacency Requirement	Near Chief and Assist. Chief
Public Access	Limited
Security Requirements	None
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: C3
Owner supplied Furn. / Equip.	(1) conference table w/ (12) chairs, (1) TV, 16"X60" credenza

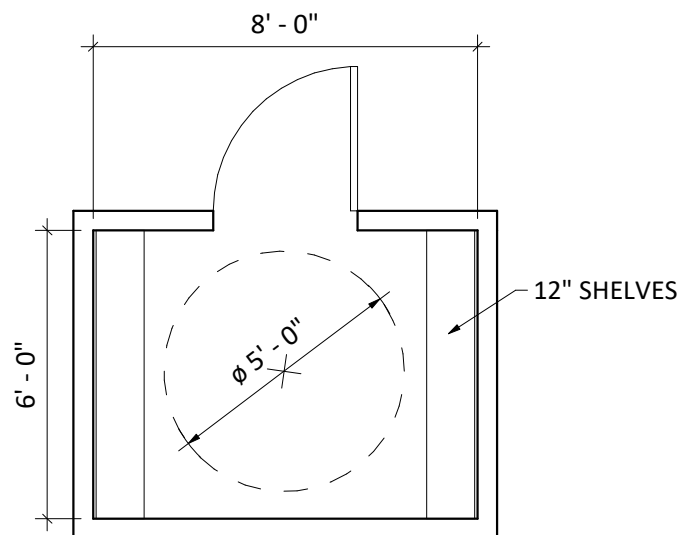


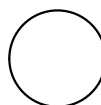
 **CONFERENCE ROOM**
3/16" = 1'-0"

FIRE DEPARTMENT

10.7 ADMIN. STORAGE

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	5 tier, 12" deep shelving on two walls
Floor	Rubber or Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Utility
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

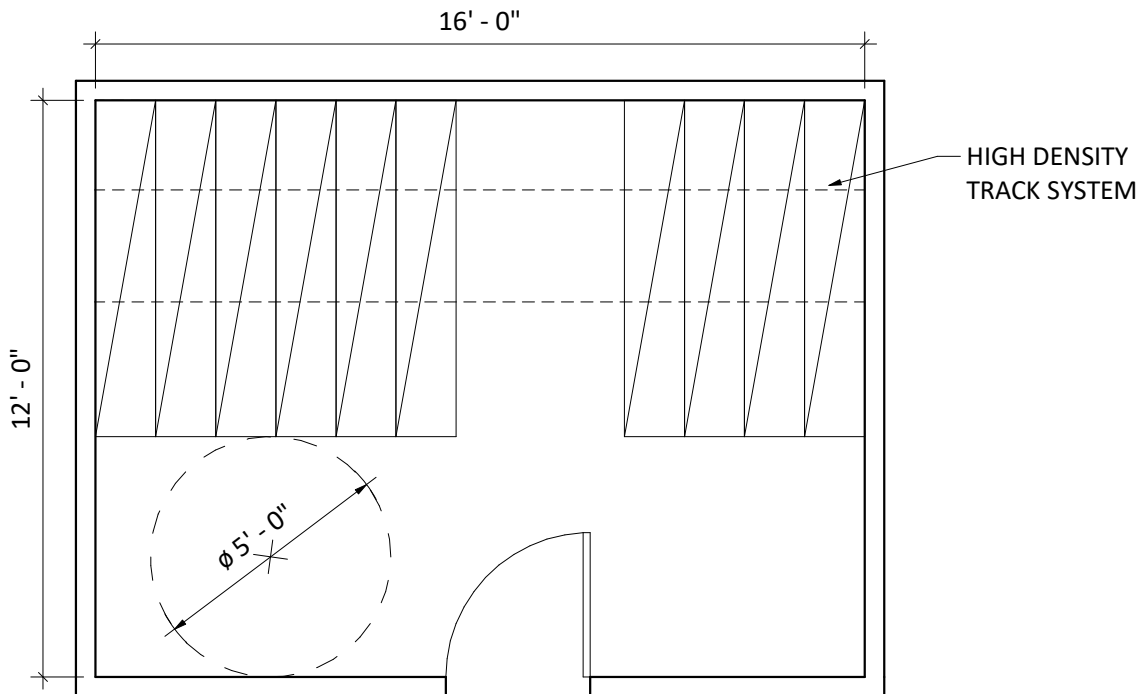


 **ADMIN. STORAGE**
1/4" = 1'-0"

FIRE DEPARTMENT

10.8 ACTIVE RECORDS STORAGE

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	High density file storage system
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, continuous rows perpendicular to shelving
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

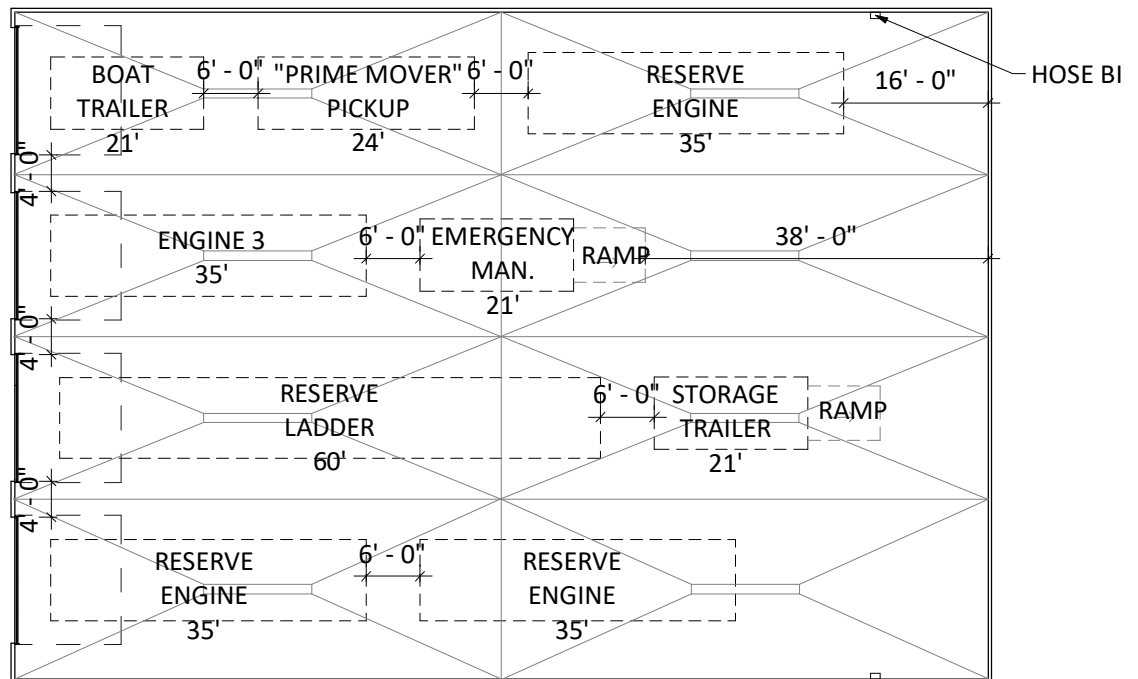


ACTIVE RECORDS STORAGE
1/4" = 1'-0"

FIRE DEPARTMENT

11.1 APPARATUS ROOM

Adjacency Requirement	Near Firefighter's Quarters and Support Spaces.
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Concrete w/ H.D. Floor Hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	Low Level Night Lighting, Rapid Response; Overhead door power; Overhead Light Curtain, Red/green lights w/ door controls at doors/ dispatch/reports & trucks, recess all devices & boxes in CMU
HVAC / Plumbing	No AC; Vehicle exhaust system; water fill @ columns (1 1/2" lines); Overhead compressed air lines (1 drop per truck), trench drains, reels @ exterior wall, hose bibs @ walls, recess all in slab & CMU walls
Special Needs	Overhead doors to be 14' x 14'. (3) 18' bays.
Owner supplied Furn. / Equip.	Front line: Engine 3 (35'), Boat on Trailer (21'), Emergency Management Trailer (21'); Reserve: (2) Engine (35'), Storage Trailer (21')

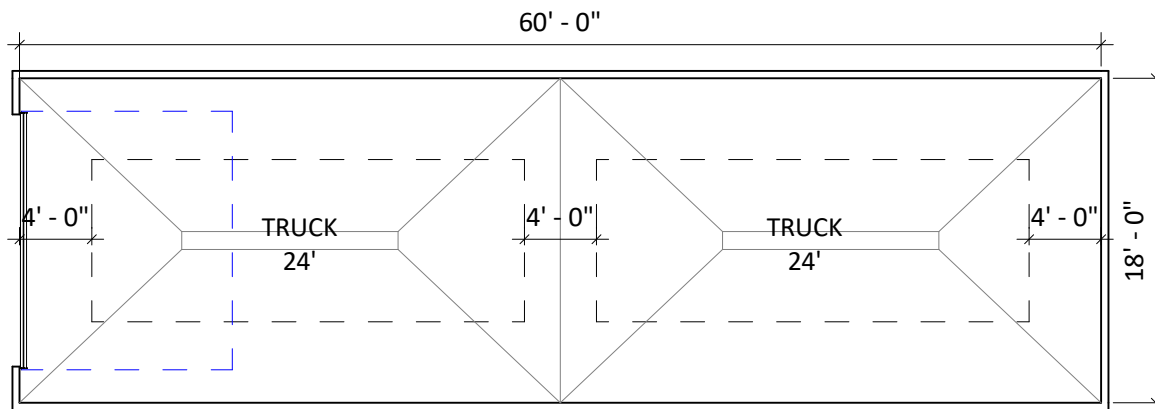


APPARATUS ROOM
3/64" = 1'-0"

FIRE DEPARTMENT

11.2 FIRE INVESTIGATION BAY

Adjacency Requirement	Within apparatus room
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ H.D. Floor Hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	Overhead power; Overhead door, Light Curtain, Red/green lights w/ door controls at doors/dispatch & trucks, recess all devices & boxes in CMU
HVAC / Plumbing	No AC; Vehicle exhaust system; trench drains, hose bibs @ walls, recess all in slab & CMU walls
Special Needs	Overhead doors to be 14' x 14'
Owner supplied Furn. / Equip.	(2) 24' Truck

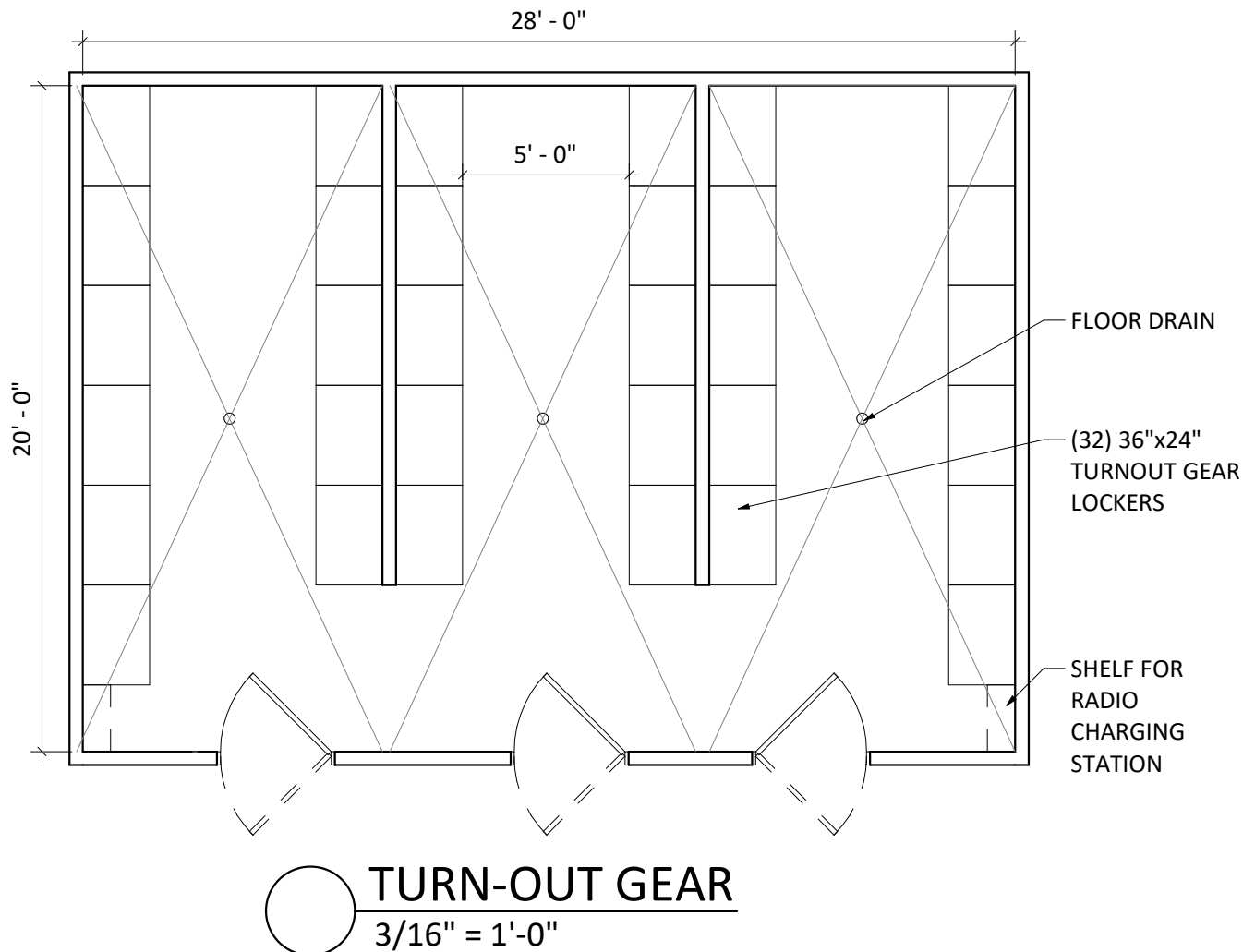


 **FIRE INVESTIGATION BAY**
3/32" = 1'-0"

FIRE DEPARTMENT

11.3 TURN-OUT GEAR

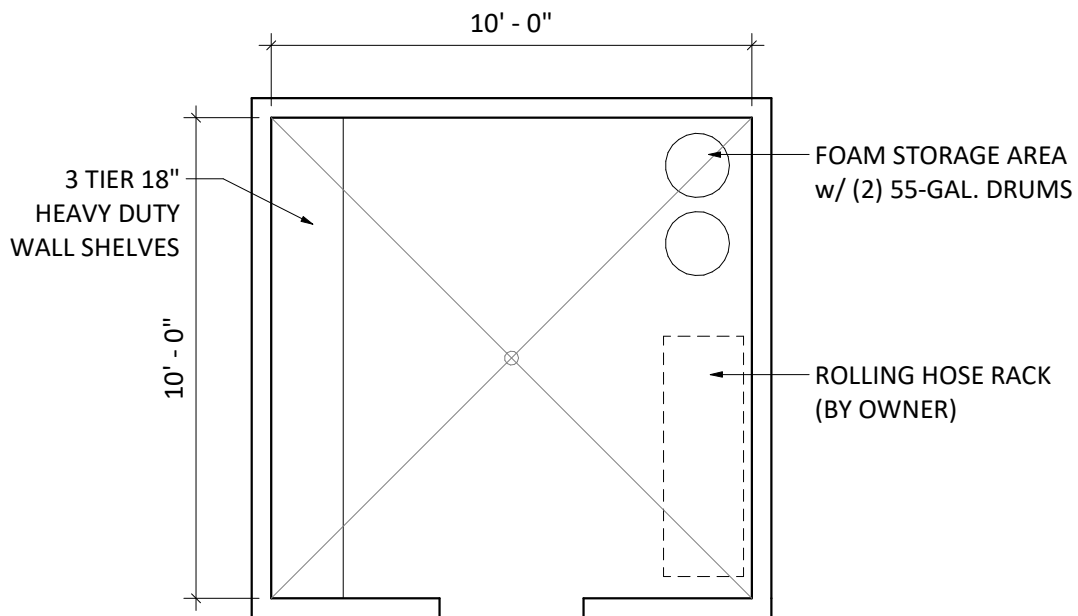
Adjacency Requirement	Next to Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(32) steel mesh cubicles at 36" x 24" w/ top & bottom shelves, small compartment, hat hook, nameplate, door
Floor	Concrete w/ H.D. Hardener
Walls	CMU w/ epoxy paint
Ceiling	GWB, painted
Lighting / Electrical	LED, USB outlets @ each locker
HVAC / Plumbing	No A/C, very good ventilation; Floor Drains, positive pressure
Special Needs	HDPE double swing access doors; no ultraviolet sunlight.
Owner supplied Furn. / Equip.	None



FIRE DEPARTMENT

11.4 HOSE & FOAM STORAGE

Adjacency Requirement	Next to Apparatus Room, possibly share Police Bike Storage if accessible to Fire
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	18" deep heavy duty galv. shelving 3 tiers high to hold foam buckets
Floor	Concrete w/ H.D. hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	No A/C; very good ventilation; floor drain
Special Needs	No ultraviolet light; foam storage in 5 gal. buckets & (2) 55 gallon drums
Owner supplied Furn. / Equip.	Rolling hose storage rack (50"x 20")

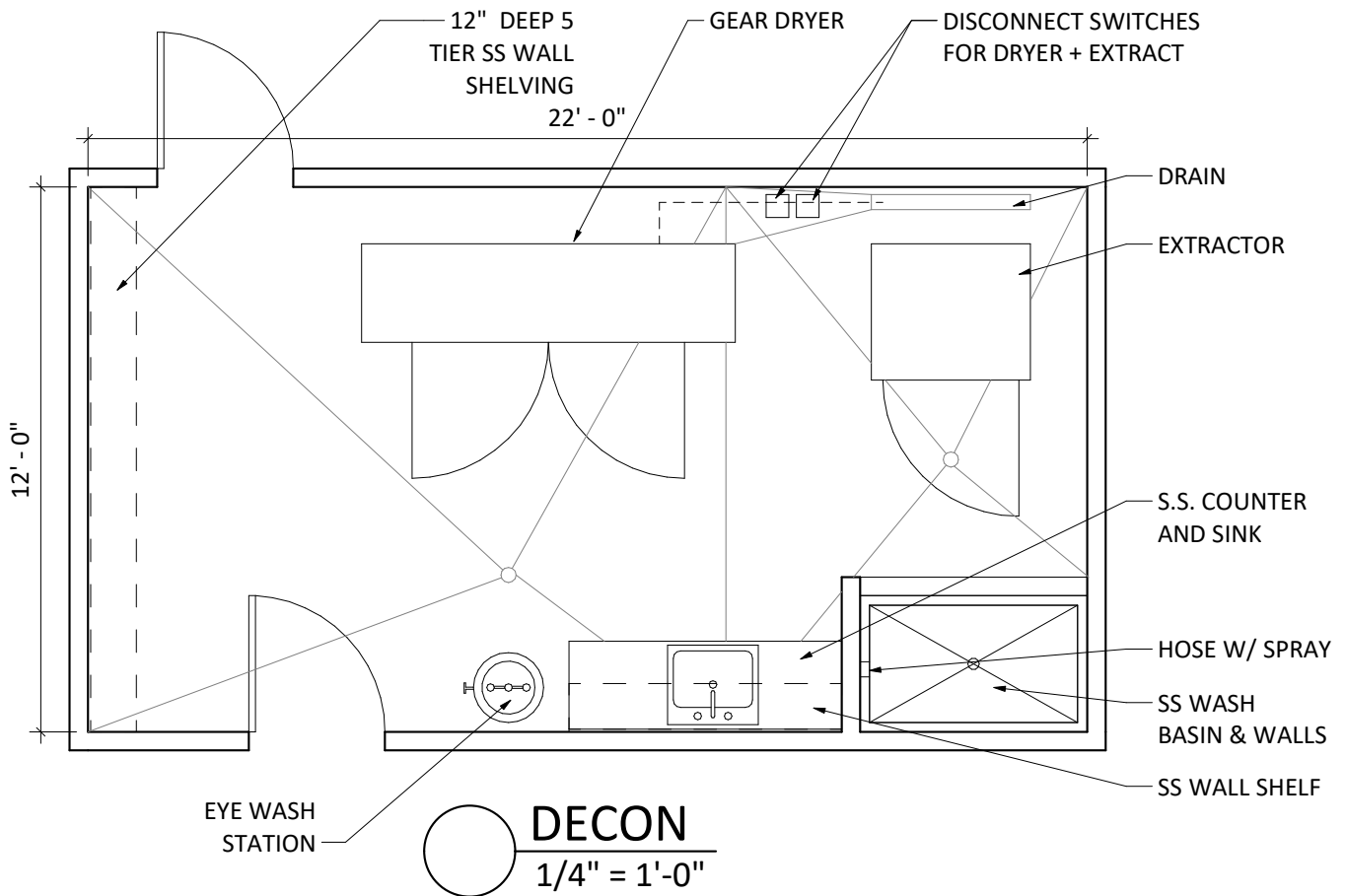


 **HOSE & FOAM STORAGE**
1/4" = 1'-0"

FIRE DEPARTMENT

11.5 DECON

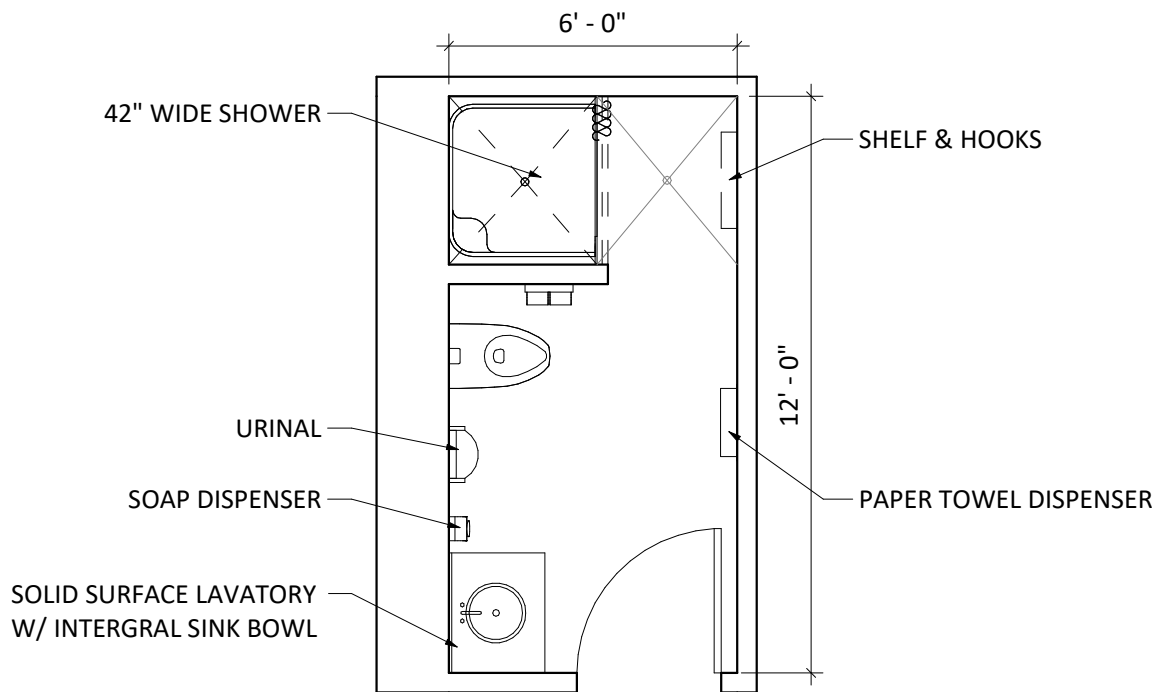
Adjacency Requirement	Off Apparatus Room, next to Turn- out Gear Room. Provides access to decon showers.
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	SS wall shelving
Floor	Concrete w/ H.D. hardener
Walls	CMU w/ epoxy paint
Ceiling	GWB, painted
Lighting / Electrical	LED power for appliances
HVAC / Plumbing	No A/C, Exhaust, eye wash, floor drain, SS wash tub with hand spray, SS utility sink w/ integral wash board, negative pressure
Special Needs	None
Owner supplied Furn. / Equip.	Extractor & gear dryer

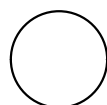


FIRE DEPARTMENT

11.6 DECON SHOWERS

Adjacency Requirement	Next to lockers and clean side entrance, access from Decon Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Ceramic tile
Walls	GWB, painted; Ceramic tile wainscot at walls and full height at shower
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	No A/C, Exhaust, floor drain, urinal, toilet, shower
Special Needs	None
Owner supplied Furn. / Equip.	None

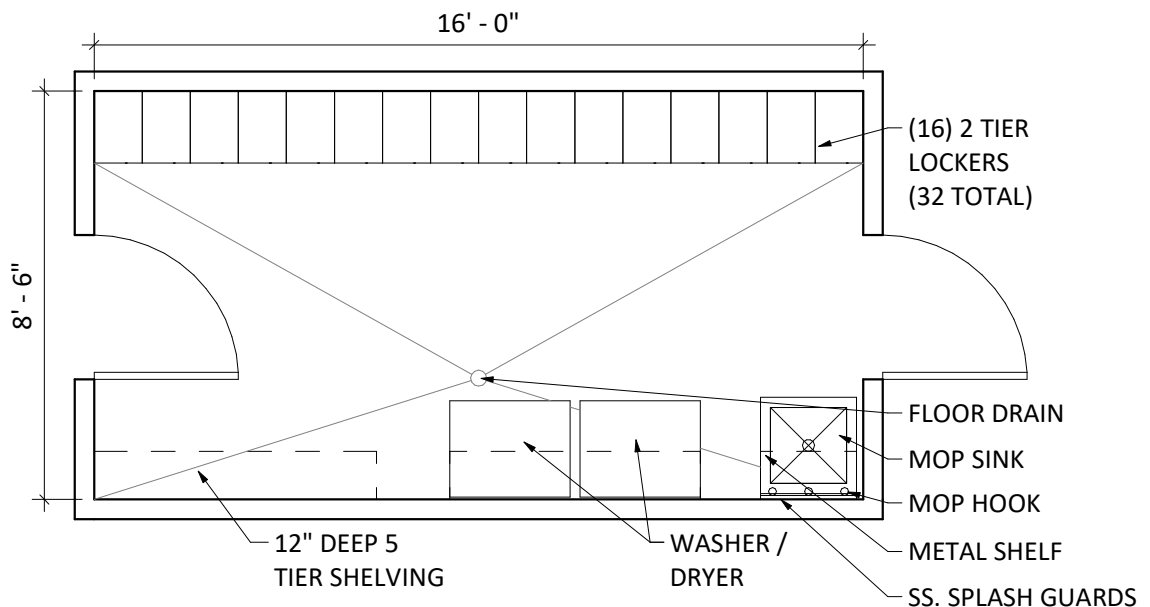


 **DECON SHOWERS**
1/4" = 1'-0"

FIRE DEPARTMENT

11.7 DECON LOCKERS & STATIONWARE WASHING

Adjacency Requirement	Adjacent to clean side, access from Decon and Decon Showers
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(32) 12" wide x 24" deep (2 tier) lockers, 12" deep 5 tier wall shelving, washer / dryer
Floor	Rubber
Walls	GWB w/ FRP
Ceiling	ACT
Lighting / Electrical	LED; power for appliances, gas for dryer
HVAC / Plumbing	No A/C, Exhaust for dryer, floor drains, mop sink, cold and hot water for washer
Special Needs	None
Owner supplied Furn. / Equip.	None



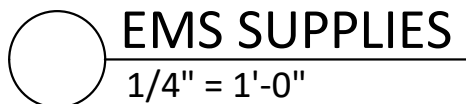
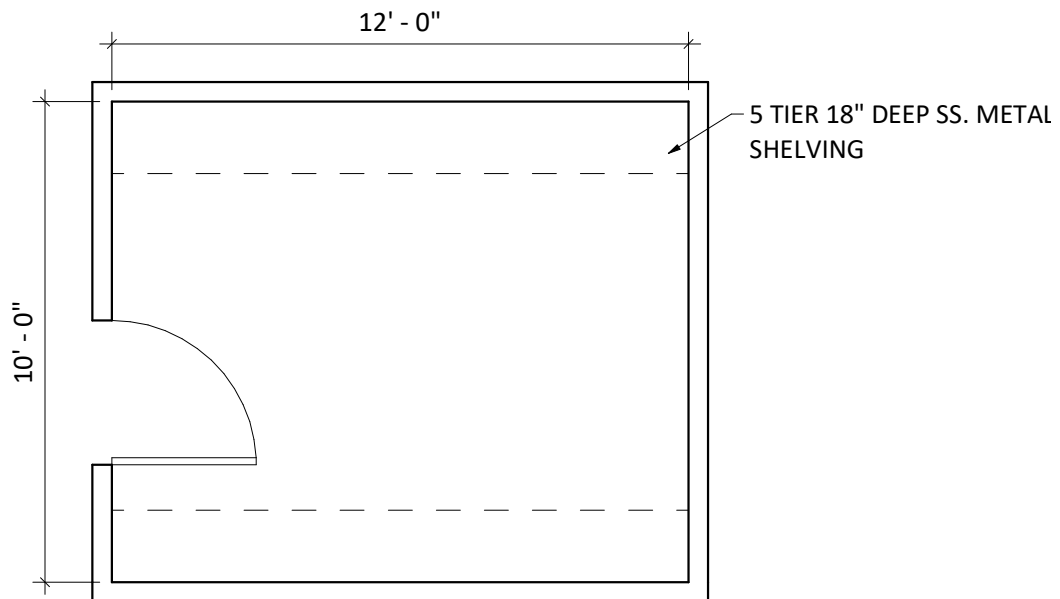
DECON LOCKERS & STATIONWARE WASHING

1/4" = 1'-0"

FIRE DEPARTMENT

11.8 EMS SUPPLIES

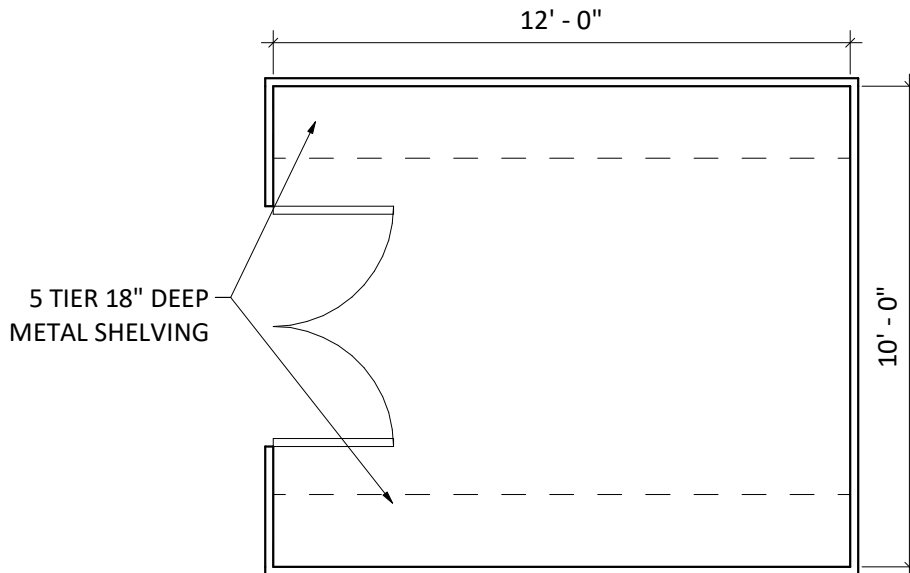
Adjacency Requirement	Next to Apparatus Room
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	5 tier 18" deep metal shelving on two walls
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	None

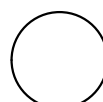


FIRE DEPARTMENT

11.9 GEAR SUPPLY

Adjacency Requirement	Off Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	5 tier 18" deep metal shelving on two walls
Floor	Concrete w/ hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	None

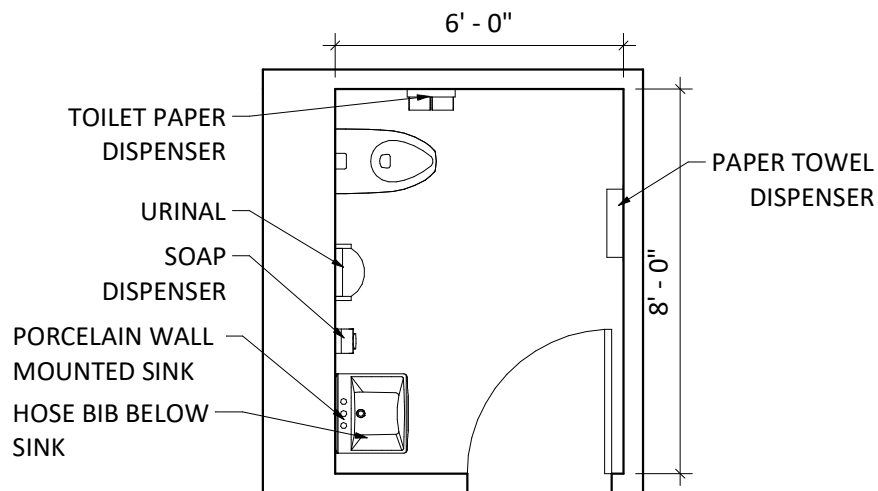


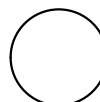
 **GEAR SUPPLY**
1/4" = 1'-0"

FIRE DEPARTMENT

11.10 FIREFIGHTER TOILET

Adjacency Requirement	Off Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Toilet accessories
Floor	Ceramic tile
Walls	CMU w/ epoxy paint, ceramic tile
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	Exhaust, floor drain, sink, toilet, urinal, hose bib
Special Needs	None
Owner supplied Furn. / Equip.	None

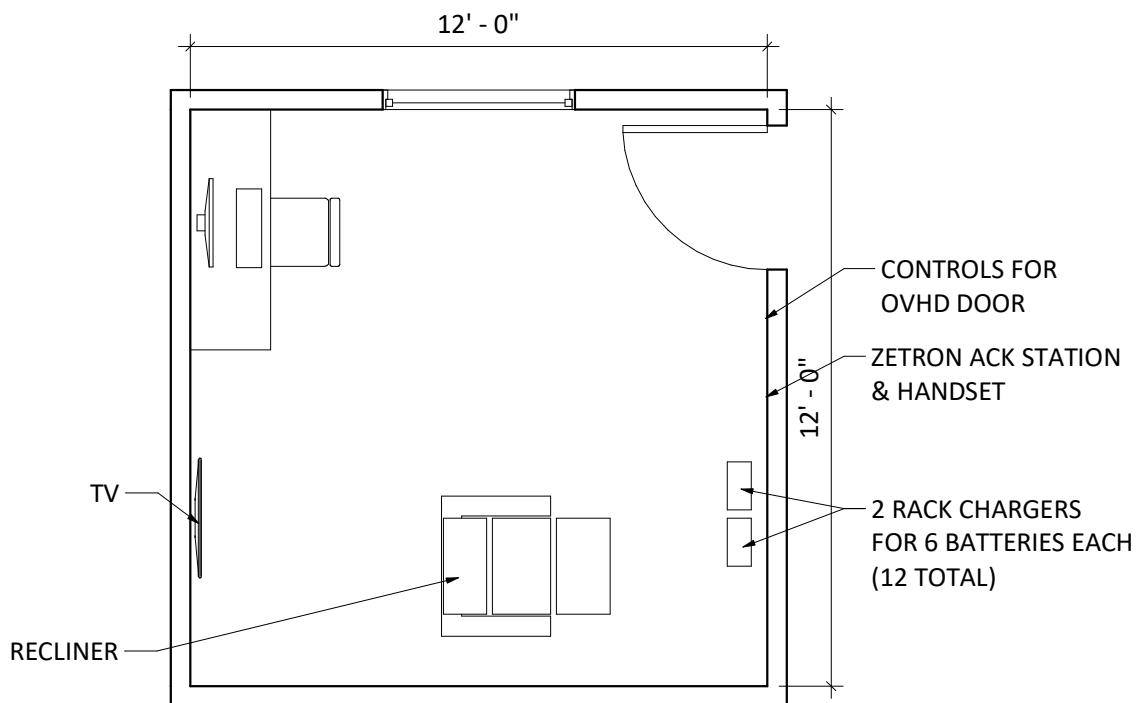



 **FIREFIGHTER TOILET**
1/4" = 1'-0"

FIRE DEPARTMENT

11.11 PATROL DESK

Adjacency Requirement	Adjacent to apparatus
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Window to apron/street & bays
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, under cabinet lighting, controls for OVHD
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk, desk chair, recliner, TV

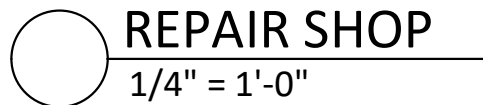
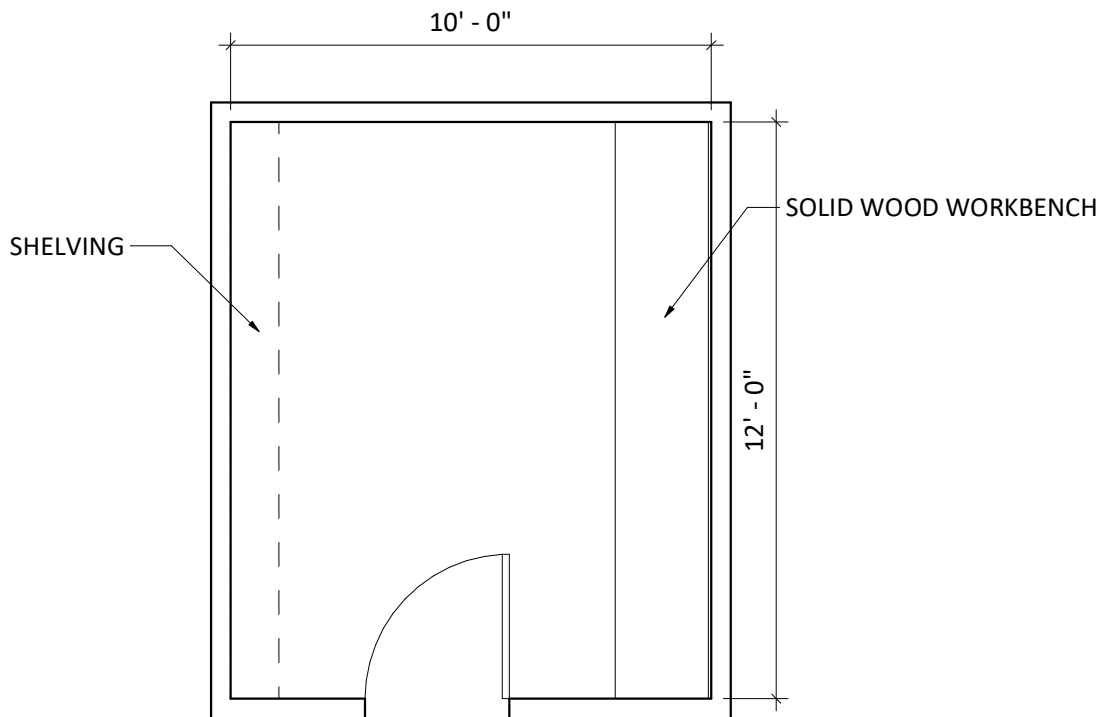


 **PATROL DESK**
1/4" = 1'-0"

FIRE DEPARTMENT

11.12 REPAIR SHOP

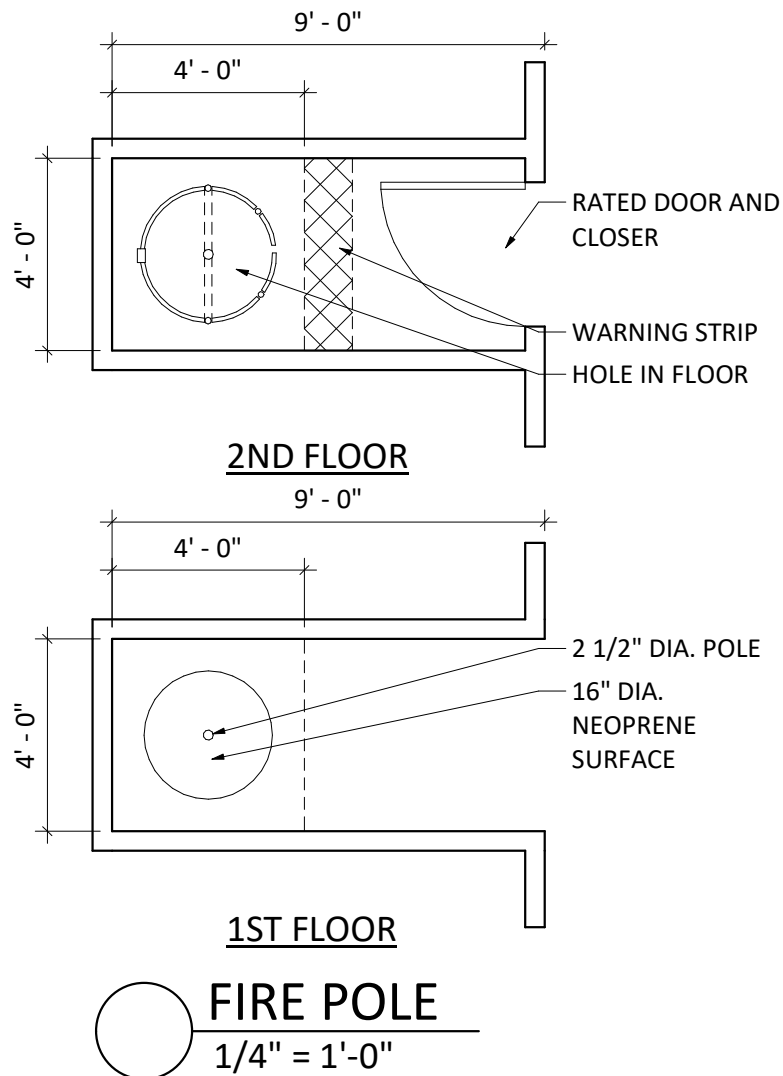
Adjacency Requirement	Off Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid wood workbench
Floor	Concrete w/ hardener
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED - Power for appliances
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None



FIRE DEPARTMENT

11.13 FIRE POLE

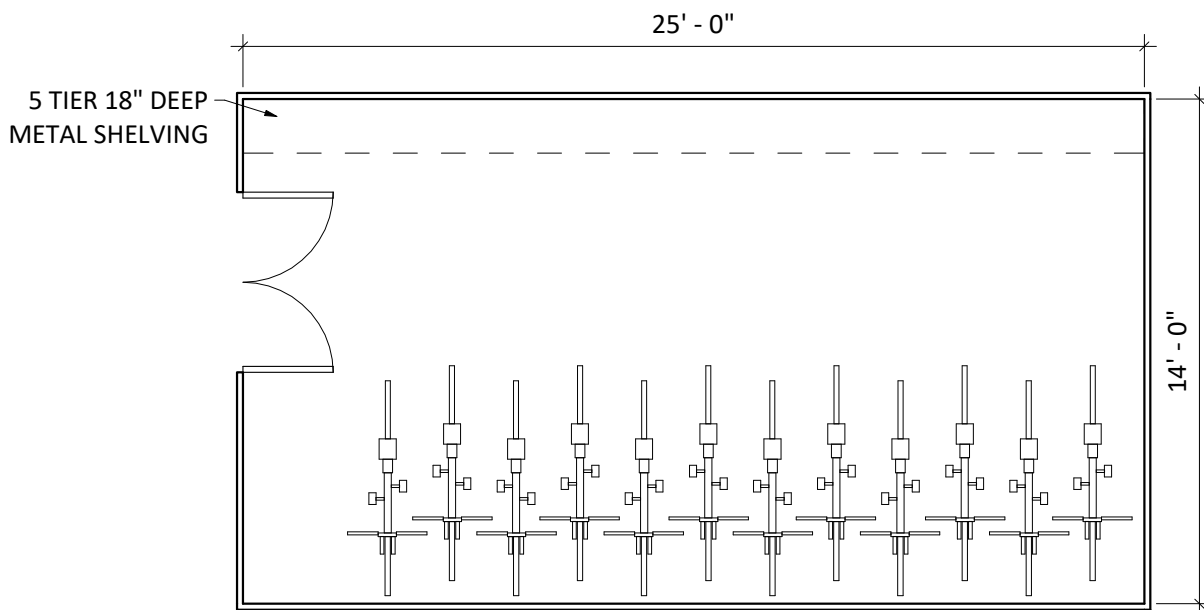
Adjacency Requirement	Direct access to living quarters
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Rubber, warning strip at 2nd floor, sealed concrete at first floor
Walls	GWB, painted, fire rated
Ceiling	GWB, painted, fire rated
Lighting / Electrical	LED lighting
HVAC / Plumbing	Heat only, negative pressure
Special Needs	Tactile grip on 2nd floor door hardware, pole w/ floor ring and cage, mat at 1st floor
Owner supplied Furn. / Equip.	None



FIRE DEPARTMENT

11.14 FIRE BIKE PATROL STORAGE

Adjacency Requirement	Off Apparatus Room, Possibly share police bike storage if accessible to fire.
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	5 tier 18" deep metal shelving on one wall
Floor	Concrete w/ hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	12 Bikes, bike racking system

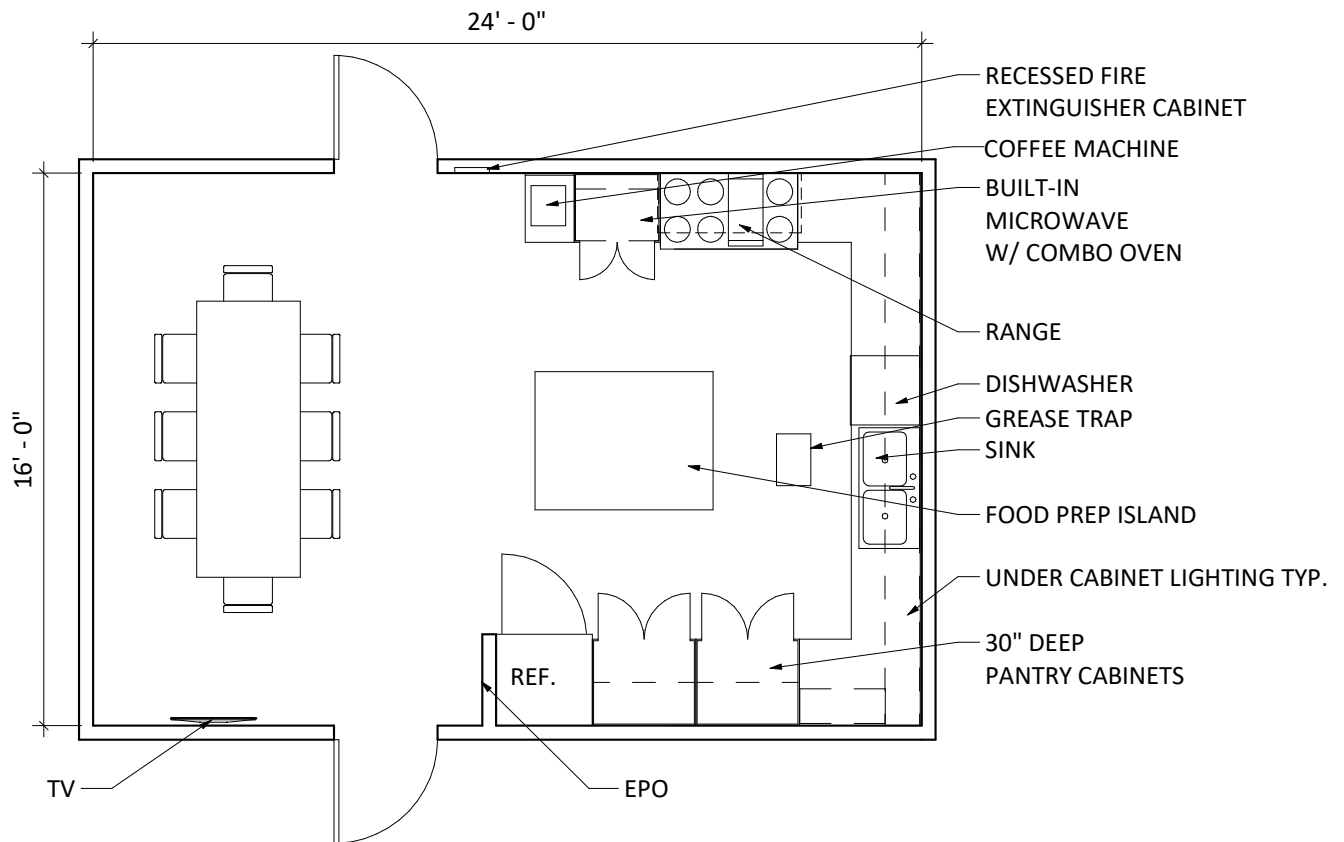


 FIRE BIKE PATROL STORAGE
3/16" = 1'-0"

FIRE DEPARTMENT

12.1 KITCHEN & DINING

Adjacency Requirement	Adjacent to Dorm & Day Room, quick access to Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	S.S. countertops w/ base & upper cabinets, (2) shared food pantry, work areas for food prep and heavy duty residential appliances, commercial appliances; 6-burner range w/ oven, exhaust hood, Commercial UC dishwasher, 36" wide refrigerator/freezer, built-in microwave
Floor	Quarry tile, or epoxy
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; CATV, EPO, USB outlets, under cabinet lighting
HVAC / Plumbing	A/C; Deep sink, grease trap, exhaust from range hood, no ansul, instant hot water dispenser, water filtration for sink
Special Needs	Not a Commercial Kitchen
Owner supplied Furn. / Equip.	Coffee maker, TV

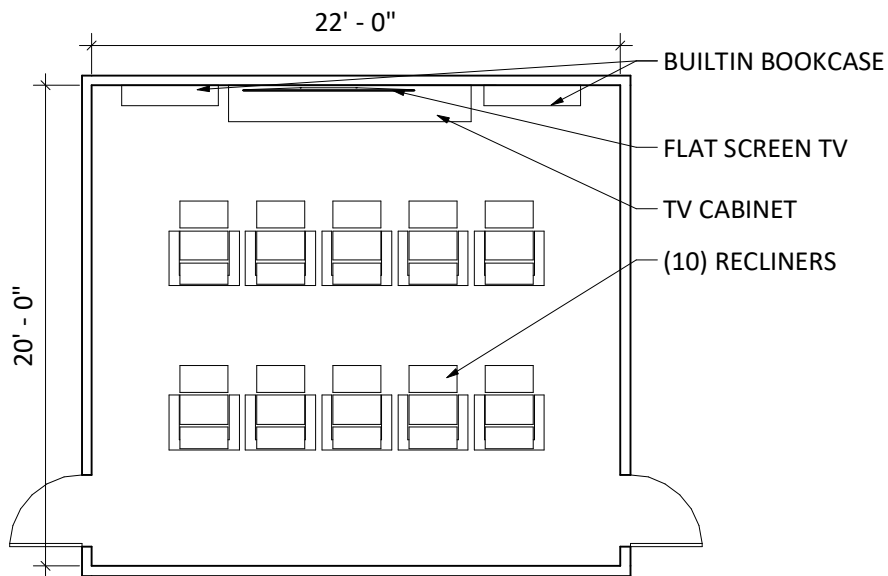


KITCHEN & DINING
3/16" = 1'-0"

FIRE DEPARTMENT

12.2 DAY ROOM

Adjacency Requirement	Adjacent to Dorm & Kitchen, Quick access to Apparatus Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Chair rail, (2) built-in bookcases
Floor	Rubber
Walls	GWB, painted w/ chair rail
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmable; CATV, USB outlets
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(10) recliners, flat screen TV, task lighting, cabinet for cable box below TV

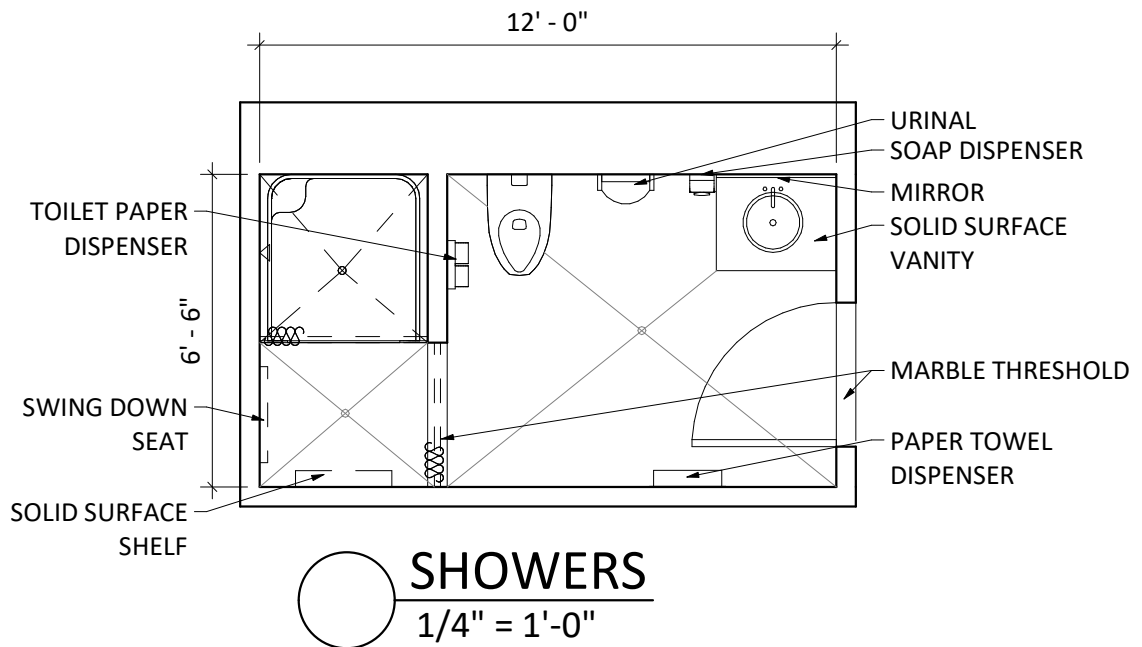


○ DAY ROOM
1/8" = 1'-0"

FIRE DEPARTMENT

12.3 SHOWERS

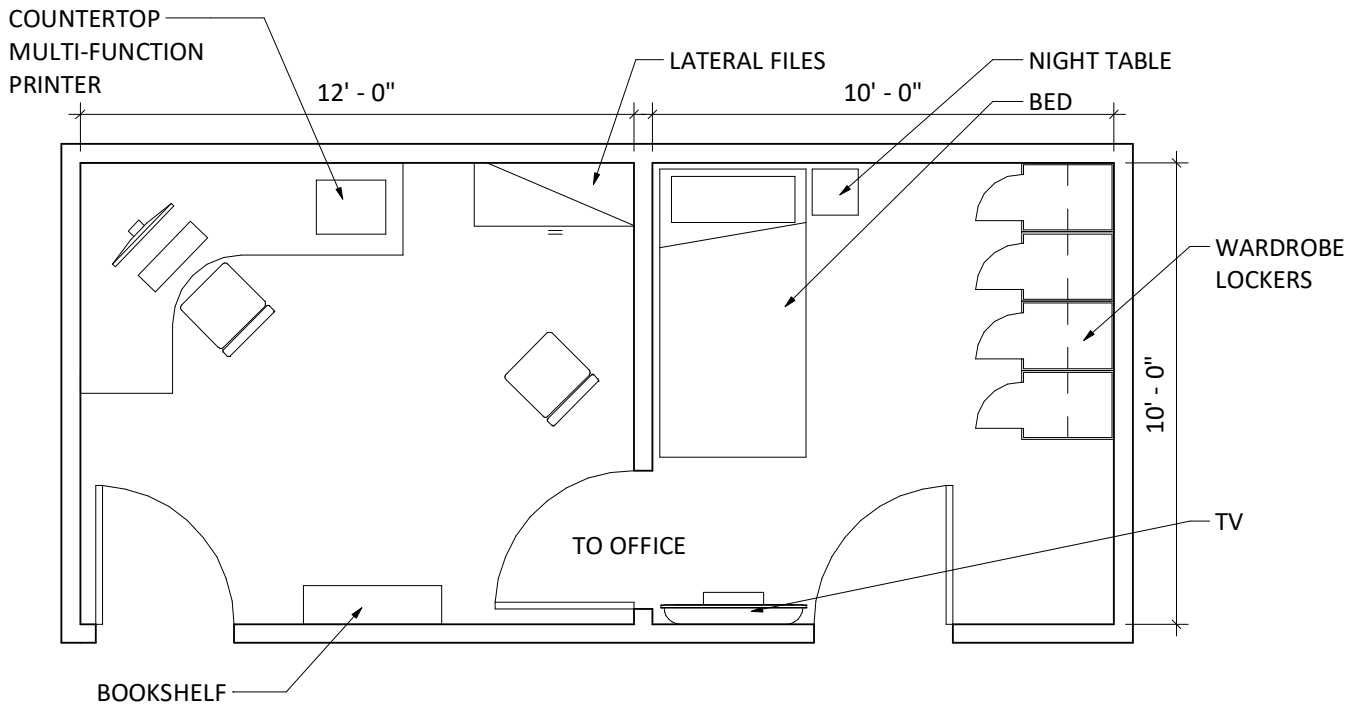
Adjacency Requirement	Near Firefighter Dorm Rooms
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	Solid Surface, lavatory w/ integral bowl, toilet accessories continuous mirrors above counter; full length mirror, swing down seat
Floor	Ceramic tile
Walls	GWB, ceramic tile wainscot typ., full height at showers, painted GWB above tile wainscot
Ceiling	GWB, painted
Lighting / Electrical	LED w/ sensor
HVAC / Plumbing	A/C; exhaust; (1) shower w/ drying area, (1) toilet, (1) sink, floor drains
Special Needs	None
Owner supplied Furn. / Equip.	None



FIRE DEPARTMENT

12.4 OFFICER'S DORM

Adjacency Requirement	Near showers, Kitchen and Day Room, quick access to Apparatus room
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	Painted GWB w/ sound insulation
Ceiling	ACT
Lighting / Electrical	LED - 2 levels; data/ telephone jacks, USB outlets
HVAC / Plumbing	A/C
Special Needs	Space for fold out cot
Owner supplied Furn. / Equip.	Extra-long bed, night table, desk, desk chair, chair, TV, (4) wardrobes, countertop multi-function printer, 2-drawer lateral files, bookcase

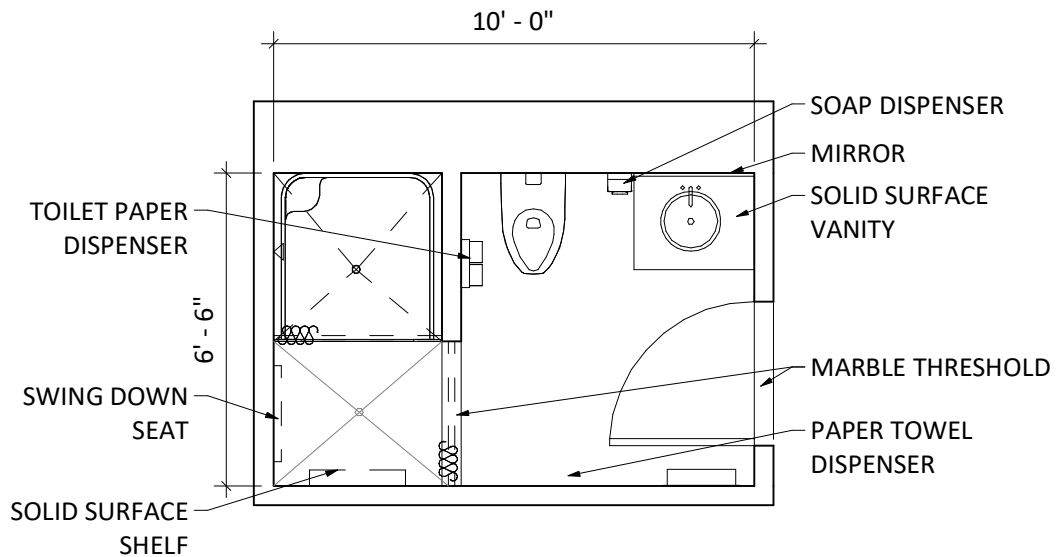


OFFICER'S DORM
1/4" = 1'-0"

FIRE DEPARTMENT

12.5 OFFICER SHOWER ROOM

Adjacency Requirement	Enter from Officer's Dorm
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	Solid Surface, lavatory w/ integral bowl, toilet accessories continuous mirrors above counter; full length mirror, swing down seat
Floor	Ceramic tile
Walls	GWB, ceramic tile wainscot typ., full height at showers, painted GWB above tile wainscot
Ceiling	GWB, painted
Lighting / Electrical	LED w/ sensor
HVAC / Plumbing	A/C; exhaust; (1) shower w/ drying area, (1) toilet, (1) sink
Special Needs	None
Owner supplied Furn. / Equip.	None

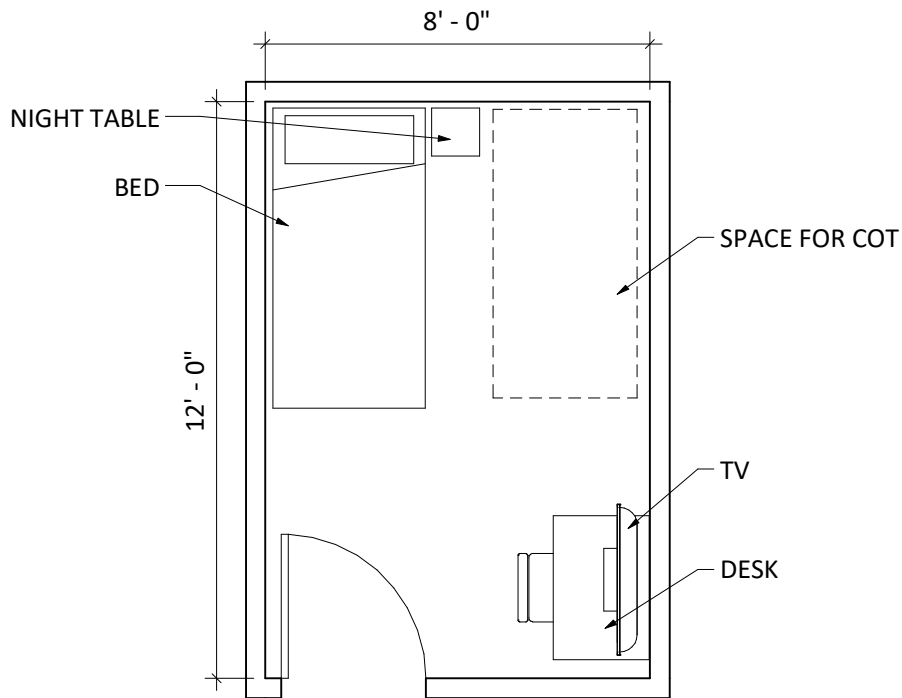


OFFICER SHOWER ROOM
1/4" = 1'-0"

FIRE DEPARTMENT

12.6 FIREFIGHTER DORM ROOMS

Adjacency Requirement	Near showers, Kitchen and Day Room, quick access to Apparatus room
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	Painted GWB w/ sound insulation
Ceiling	ACT
Lighting / Electrical	LED - 2 levels; data/ telephone jacks, USB outlets
HVAC / Plumbing	A/C
Special Needs	Space for fold out cot
Owner supplied Furn. / Equip.	Extra-long bed, night table, desk & chair, TV

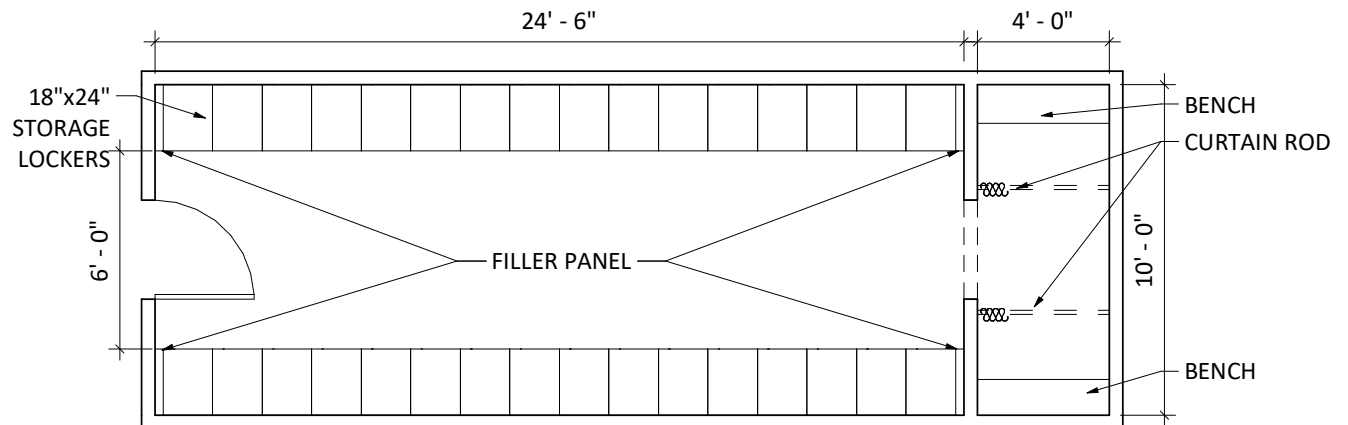



 **FIREFIGHTER DORM ROOM**
1/4" = 1'-0"

FIRE DEPARTMENT

12.7 LOCKER ROOM

Adjacency Requirement	Adjacent to Dorms
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(32) 18"x24" Lockable storage units with duplex power in each and USB charging device, (2) benches, fillers
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; power for locker plugs
HVAC / Plumbing	Good ventilation
Special Needs	None
Owner supplied Furn. / Equip.	None

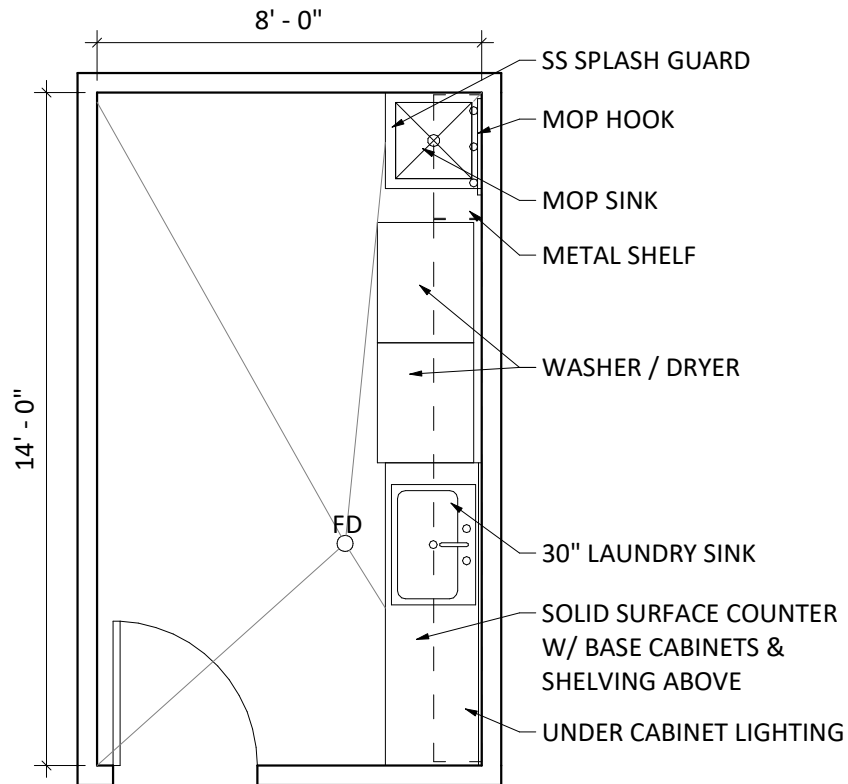


 **LOCKER ROOM**
3/16" = 1'-0"

FIRE DEPARTMENT

12.8 WASHER / DRYER

Adjacency Requirement	Adjacent to Dorm Rooms
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface counter w/ base cabinets and shelving above, washer / dryer, mop hook and shelf, SS splash guards
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED - Power for appliances
HVAC / Plumbing	Exhaust vent & gas for dryer, floor drain, laundry sink and floor sink
Special Needs	None
Owner supplied Furn. / Equip.	Washer / dryer

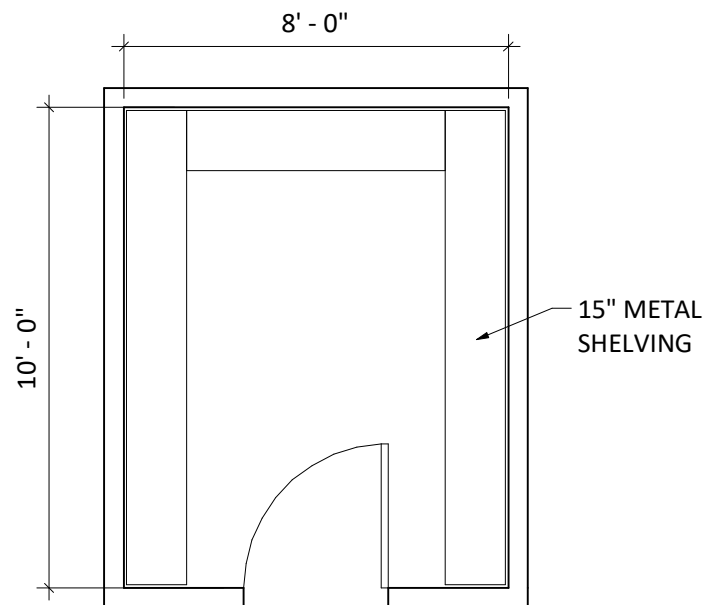


WASHER / DRYER
1/4" = 1'-0"

FIRE DEPARTMENT

12.9 QUARTERMASTER STORAGE

Adjacency Requirement	Near Firefighters Quarters & Kitchen
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	15" deep metal shelves on (3) walls
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Ventilation
Special Needs	None
Owner supplied Furn. / Equip.	None

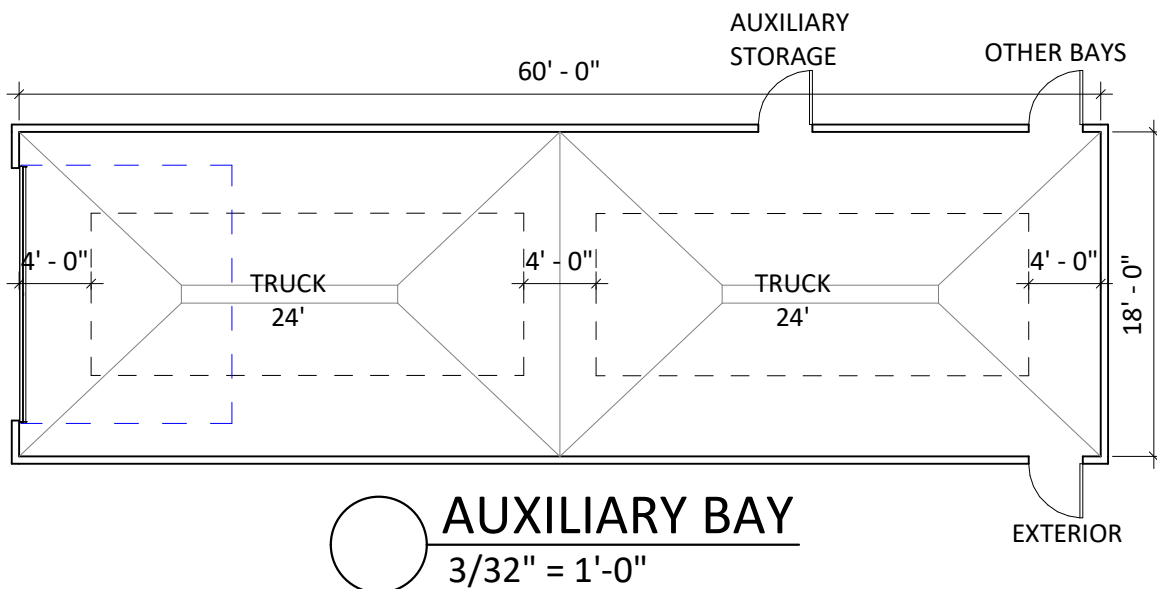


QUARTERMASTER STORAGE

FIRE DEPARTMENT

13.1 AUXILIARY BAY

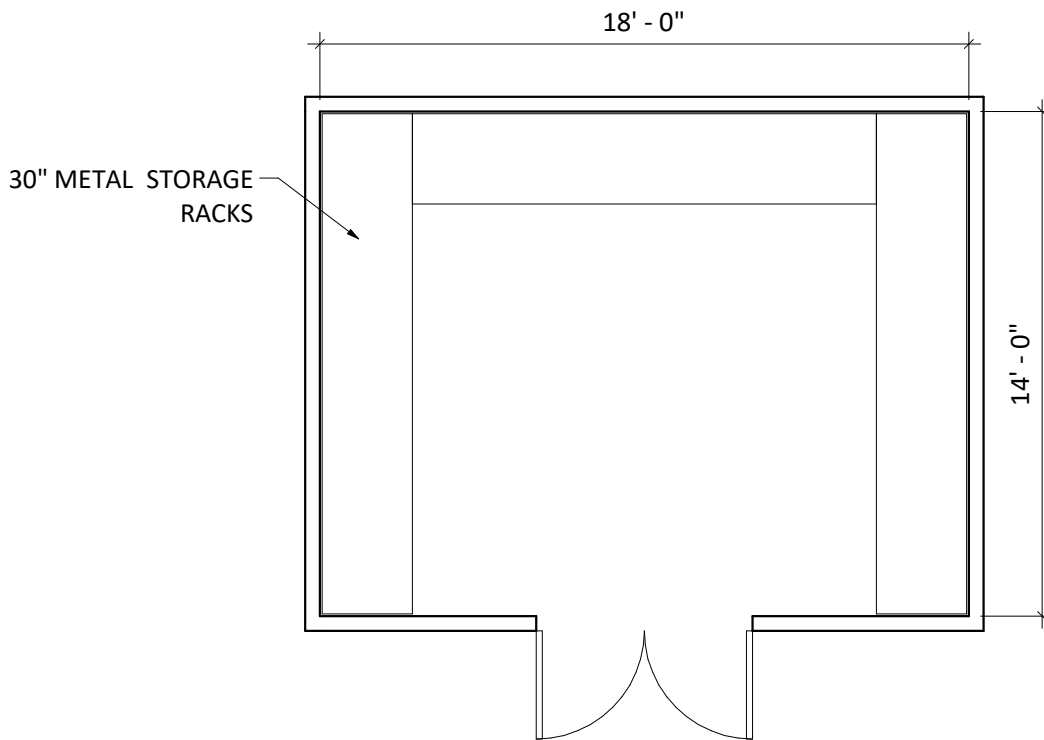
Adjacency Requirement	Within apparatus room
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ H.D. Floor Hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	Low Level Night Lighting, Overhead power; Overhead door Light Curtain, Red/geen lights w/ door controls at doors/dispatch & trucks
HVAC / Plumbing	No AC; Vehicle exhaust system, hose bibs @ walls, trench drains
Special Needs	Overhead door to be 14' x 14'.
Owner supplied Furn. / Equip.	(2) Truck (24')

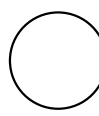


FIRE DEPARTMENT

13.2 AUXILIARY STORAGE

Adjacency Requirement	Adjacent to Auxiliary Bay
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	30" Metal storage racks

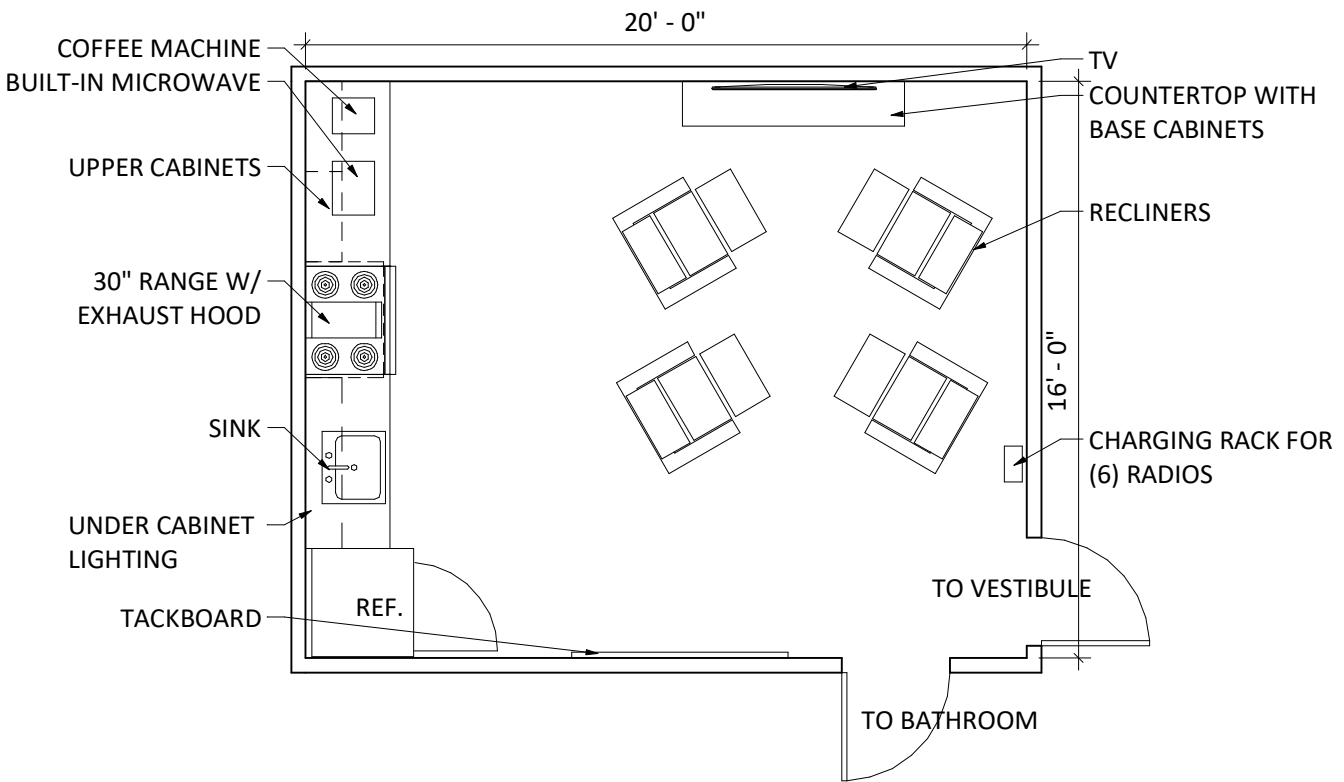


 **AUXILIARY STORAGE**
3/16" = 1'-0"

FIRE DEPARTMENT

13.3 AUXILIARY DAY/ KITCHENETTE

Adjacency Requirement	Adjacent to Auxiliary Bay
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	Accessible height solid surface countertops w/ base & upper cabinets, 4 burner range w/ oven, exhaust hood, 36" refrigerator, tackboard, built-in microwave
Floor	Linoleum, or epoxy
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; CATV, under cabinet lighting, USB outlets
HVAC / Plumbing	A/C, sink, grease trap
Special Needs	None
Owner supplied Furn. / Equip.	Coffee maker, (4) recliners, flat screen TV, cabinet for cable box below TV.

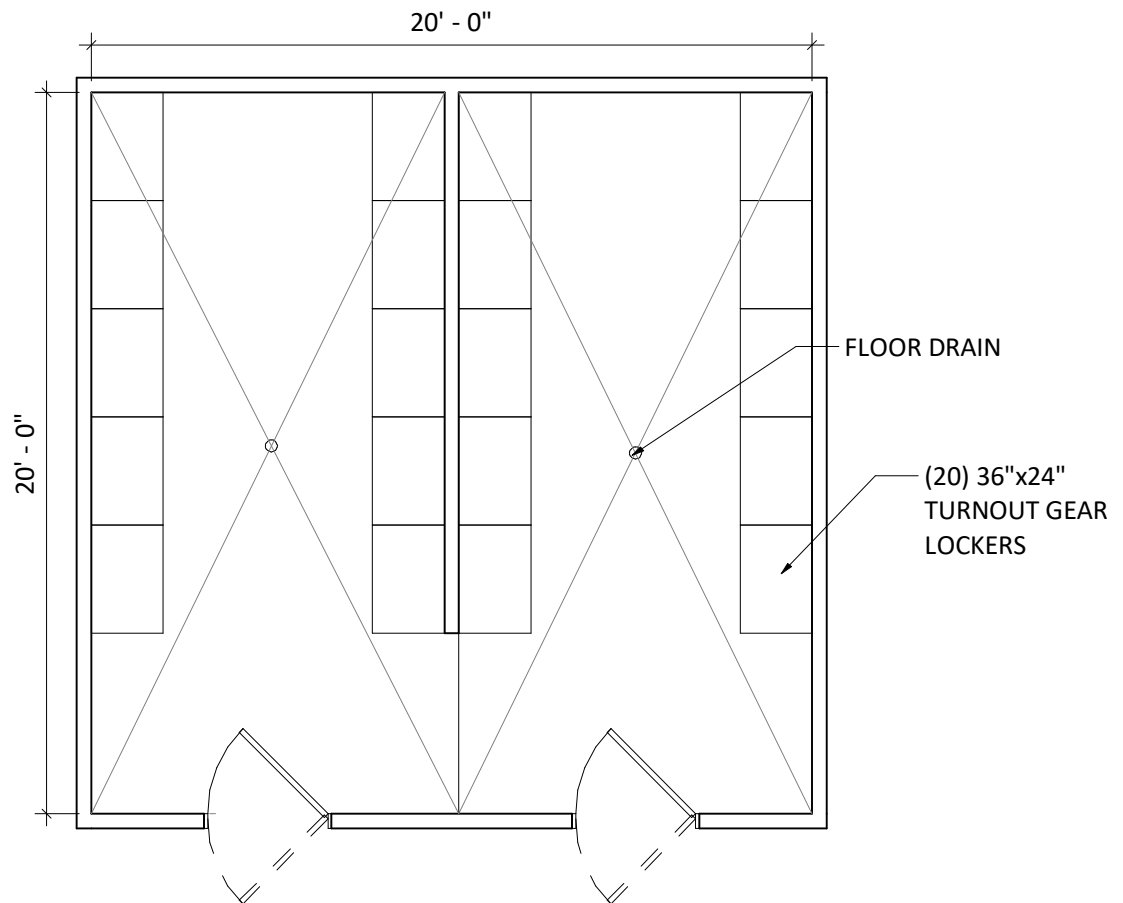


AUXILIARY DAY / KITCHENETTE
3/16" = 1'-0"

FIRE DEPARTMENT

13.4 AUXILIARY TURN-OUT GEAR

Adjacency Requirement	Next to Auxiliary Bay
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(20) steel mesh cubicles at 36" x 24" w/ top & bottom shelves, small compartment, hat hook, nameplate, door
Floor	Concrete w/ H.D. Hardener
Walls	CMU w/ epoxy paint
Ceiling	Painted, exposed structure
Lighting / Electrical	LED, USB outlets
HVAC / Plumbing	No A/C, very good ventilation; Floor Drains, positive pressure
Special Needs	HDPE double swing access doors; no ultraviolet sunlight.
Owner supplied Furn. / Equip.	None

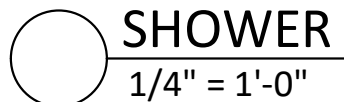
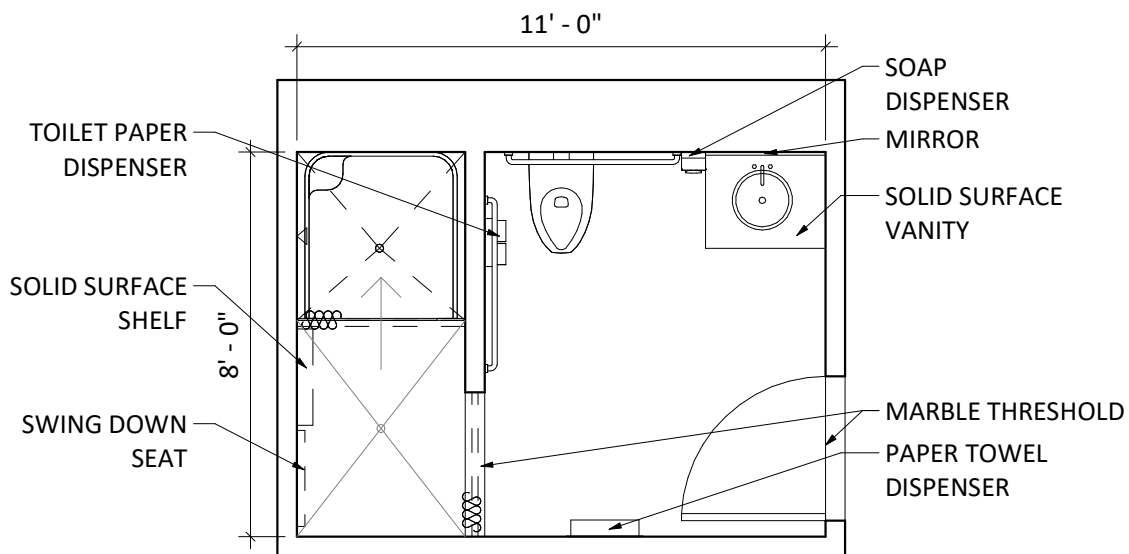


 **AUXILIARY TURN-OUT GEAR**
3/16" = 1'-0"

FIRE DEPARTMENT

13.5 SHOWER

Adjacency Requirement	Off Auxiliary Day Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid Surface lavatory w/ integral bowl, toilet accessories continuous mirrors above counter; full length mirror, solid surface shelf, swing down seat
Floor	Ceramic tile
Walls	Ceramic tile wainscot on all walls, full height tile around shower unit, painted GWB above tile wainscot
Ceiling	GWB, painted
Lighting / Electrical	LED
HVAC / Plumbing	No A/C, good ventilation, floor drain, sink, toilet
Special Needs	None
Owner supplied Furn. / Equip.	None

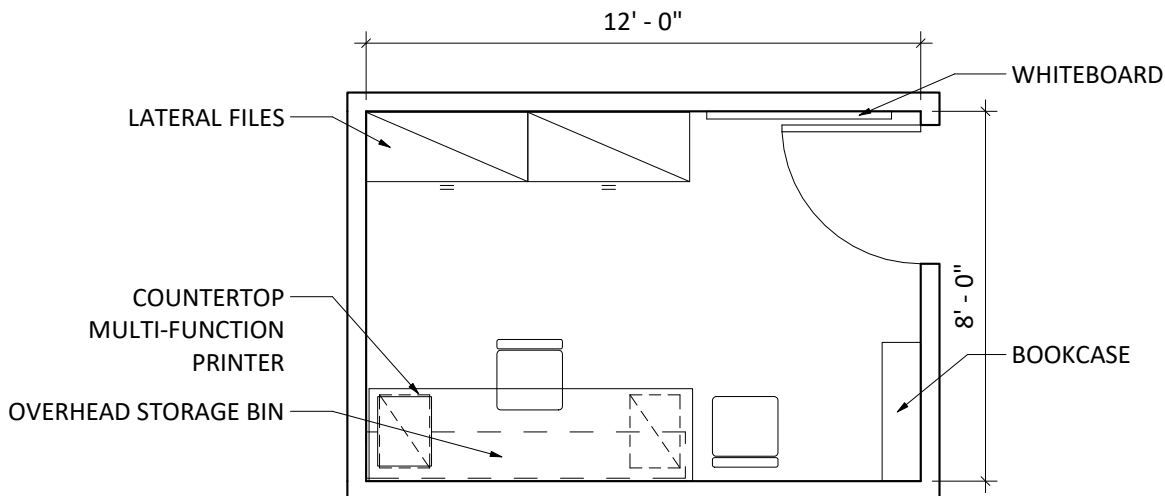


Emergency Management Space Needs

EMERGENCY MANAGEMENT

14.1 DIRECTOR OF EMERGENCY MANAGEMENT

Adjacency Requirement	Adjacent to Emergency Management Office
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod, shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standards: PO3
Owner supplied Furn. / Equip.	Desk w/ return, (2) 42" overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, (2) bookcase, countertop multi-function printer, table and (4) chairs, TV

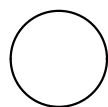
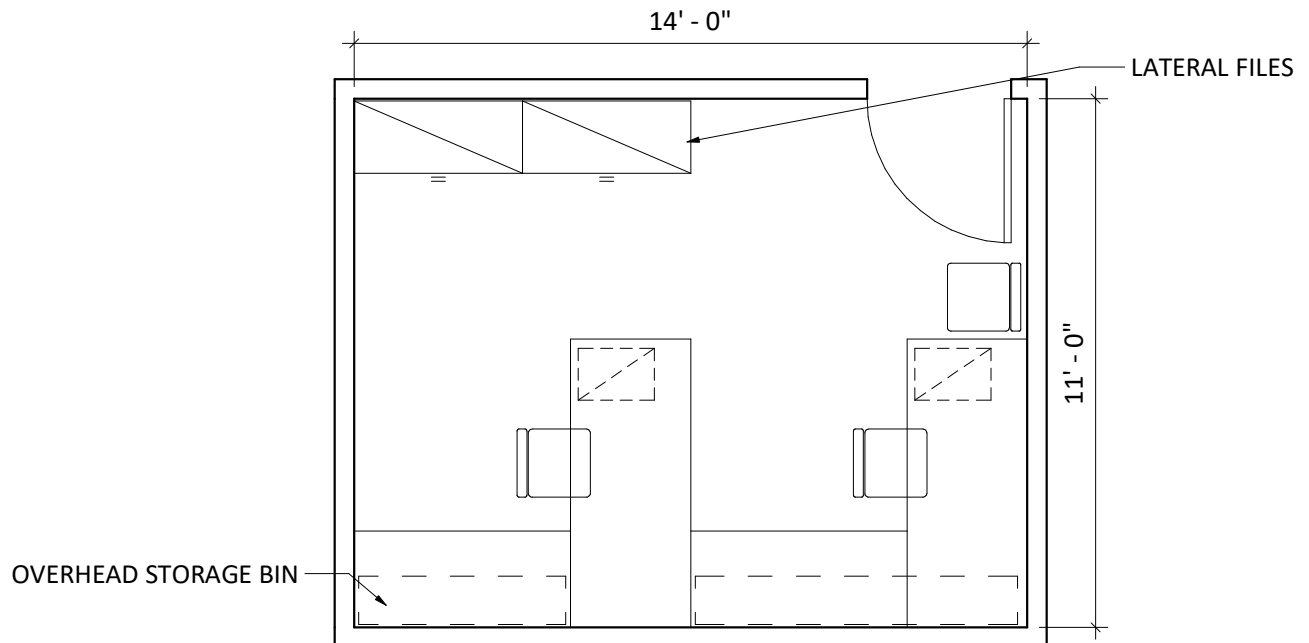


 **DIRECTOR OF EMERGENCY MANAGEMENT**
1/4" = 1'-0"

EMERGENCY MANAGEMENT

14.2 EMERGENCY MANAGEMENT OFFICE

Adjacency Requirement	Adjacent to Director of Emergency Management
Public Access	Moderate
Security Requirements	Card access.
Contract Millwork / Equipment	White board
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, USB outlets, CATV
HVAC / Plumbing	A/C
Special Needs	Somerville Space Standard: WS2 & WS1
Owner supplied Furn. / Equip.	(2) Workstations each w/ 6'x7' desk w/ overhead storage bin, pedestal file, & desk chair; (2) 42" lateral file cabinets, guest chair



EMERGENCY MANAGEMENT OFFICE

1/4" = 1'-0"

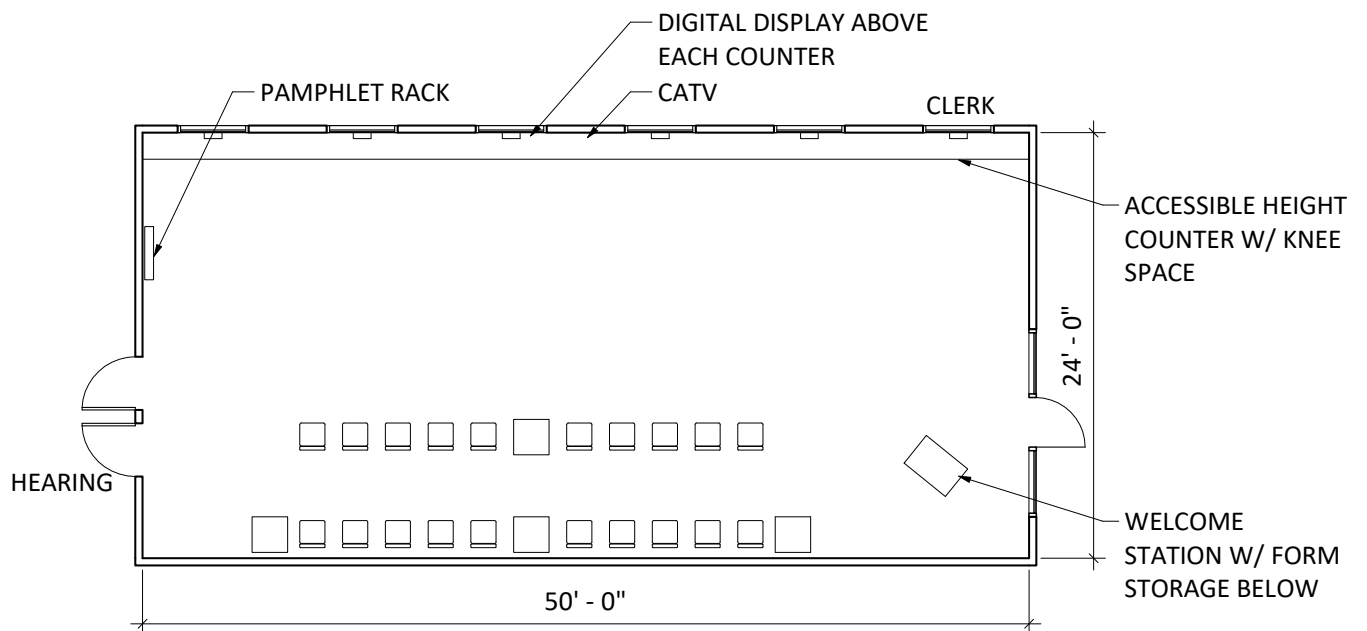
PARKING DEPARTMENT

SUZANNE RINFRET, DIRECTOR OF PARKING

APPENDIX - PARKING DEPARTMENT

15.1 PUBLIC WAITING ROOM

Adjacency Requirement	Close to main public entry, adjacent to Hearing Room and Clerks
Public Access	High
Security Requirements	Access controlled exit from lobby to the rest of the Parking Dept.
Contract Millwork / Equipment	Pamphlet rack, wood wainscotting, transaction counter (ADA height)
Floor	Linoleum
Walls	GWB, painted
Ceiling	ACT upgrade
Lighting / Electrical	Bright indirect; accent lighting; CCTV, digital information display
HVAC / Plumbing	A/C
Special Needs	Durable finishes.
Owner supplied Furn. / Equip.	Seating for 20 & low tables, TVs, desk w/ form storage below

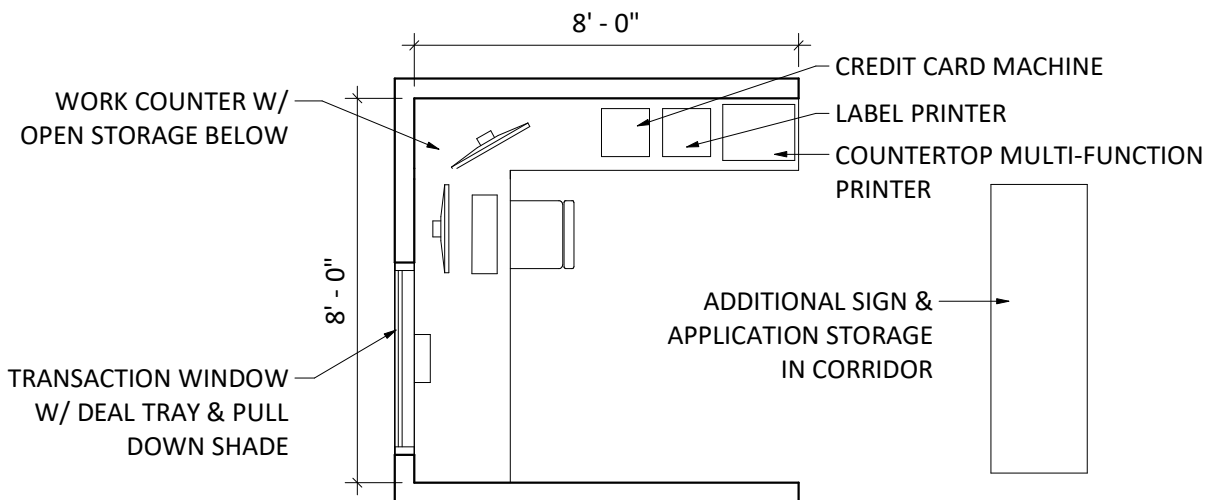


PUBLIC WAITING ROOM
3/32" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.2 CLERKS

Adjacency Requirement	Adjacent to Public Waiting Room
Public Access	None
Security Requirements	Panic button
Contract Millwork / Equipment	Work counter w/ cash drawer & open storage below, pull down shade above transaction window. Additional sign & application storage behind work area in corridor
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) desk chair, slots for paper sign & permit storage, label printer, countertop multi- function printer, credit card machine

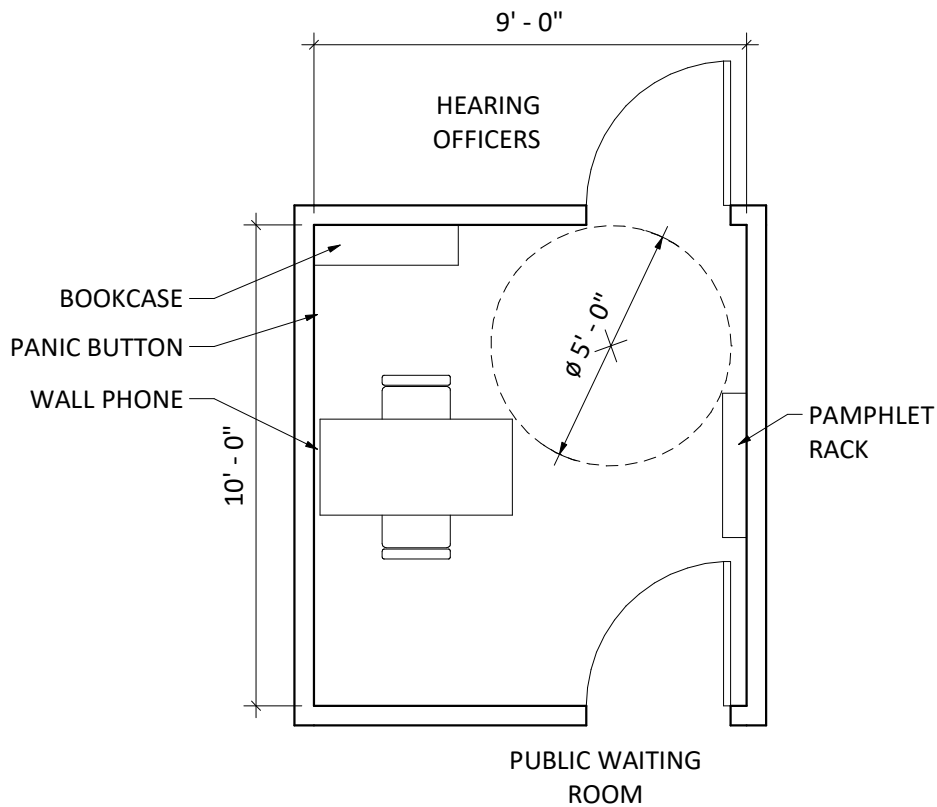


CLERKS
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.3 HEARING ROOM

Adjacency Requirement	Adjacent to Public Waiting Room
Public Access	High
Security Requirements	Panic button
Contract Millwork / Equipment	Pamphlet rack, bookcase
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED / Wall phone, CCTV & audio recording
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) conference table w/ (2) chairs

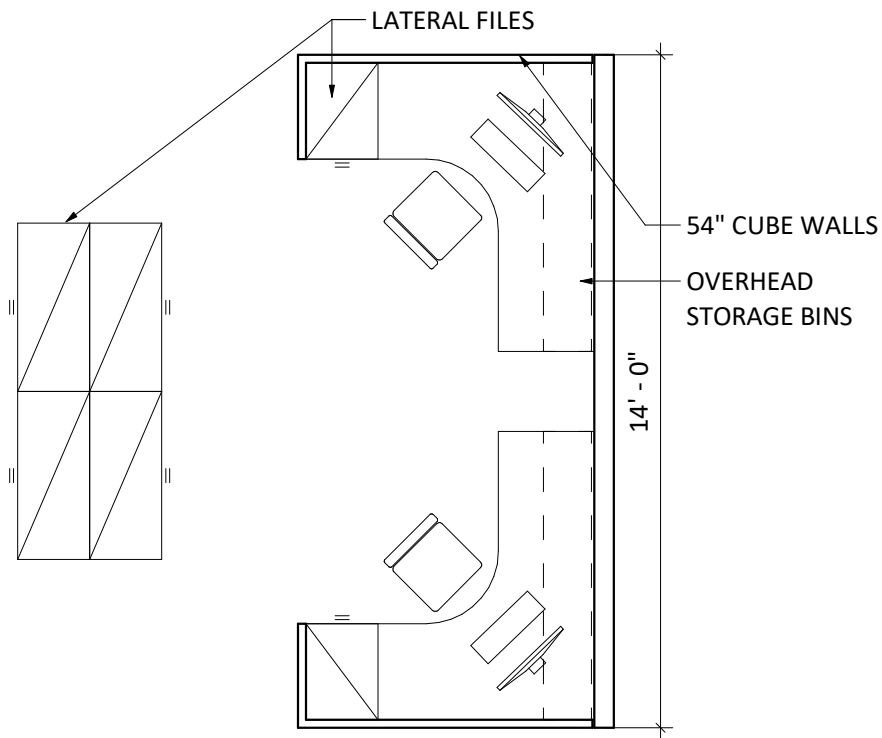


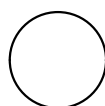
HEARING ROOM
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.4 HEAD CLERKS

Adjacency Requirement	Adjacent to Clerks
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) Workstations, each with 54" tall cube walls, 7'X7' desk w/ return w/ (1) 24" 2-drawer files, overhead storage bins, desk chairs, (4) 42" 4-drawer lateral files

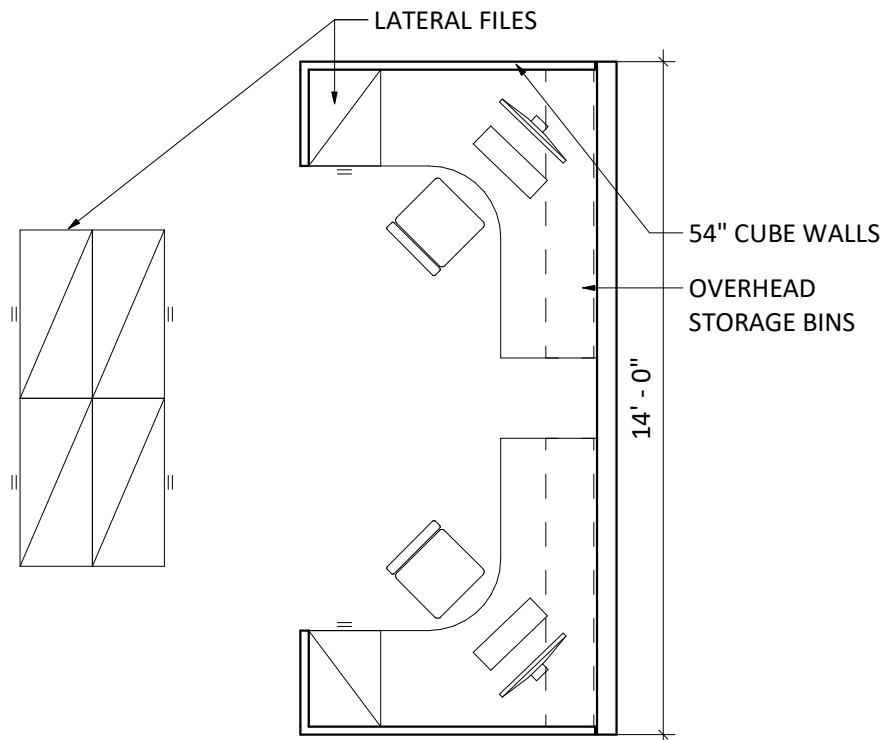


 **HEAD CLERKS**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.5 PRINCIPAL CLERKS

Adjacency Requirement	Adjacent to Clerks
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) Workstations, each with 54" tall cube walls, 7'X7' desk w/ return w/ (1) 24" 2-drawer files, overhead storage bins, desk chairs, (4) 42" 4-drawer lateral files

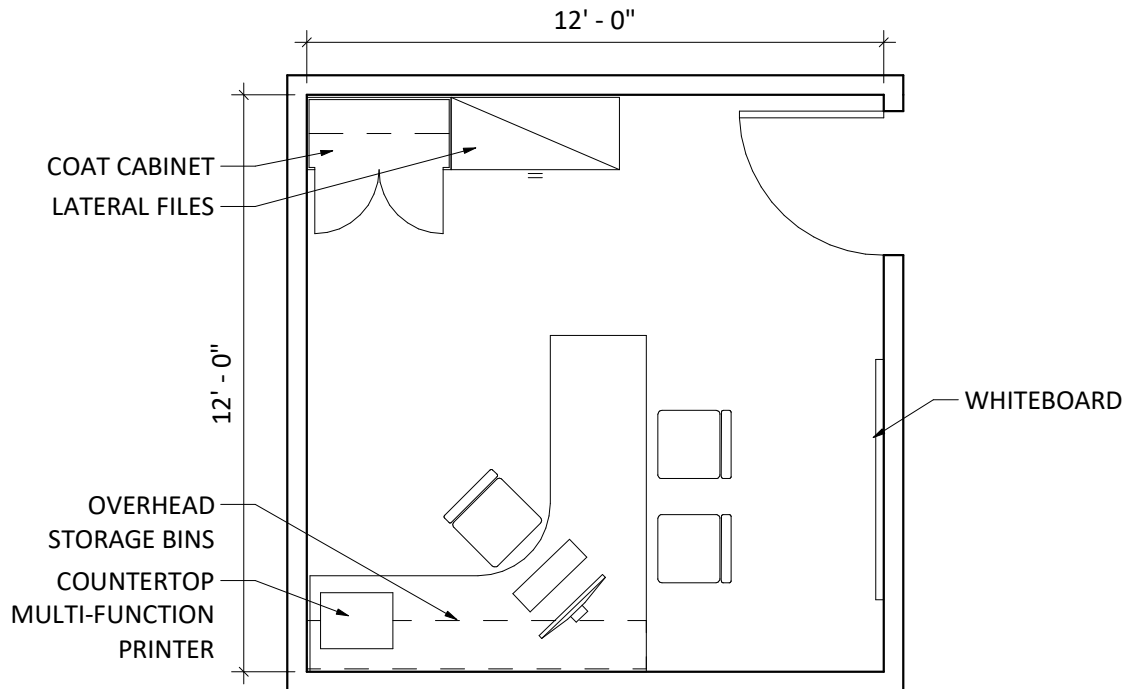


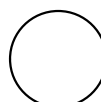
○ **PRINCIPAL CLERKS**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.6 FINANCIAL ANALYST

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, 36" coat cabinet, overhead storage bins, desk chair, (1) 42" 4-drawer lateral files, (2) guest chairs

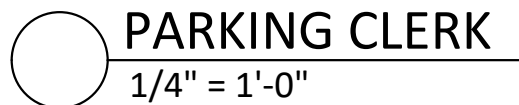
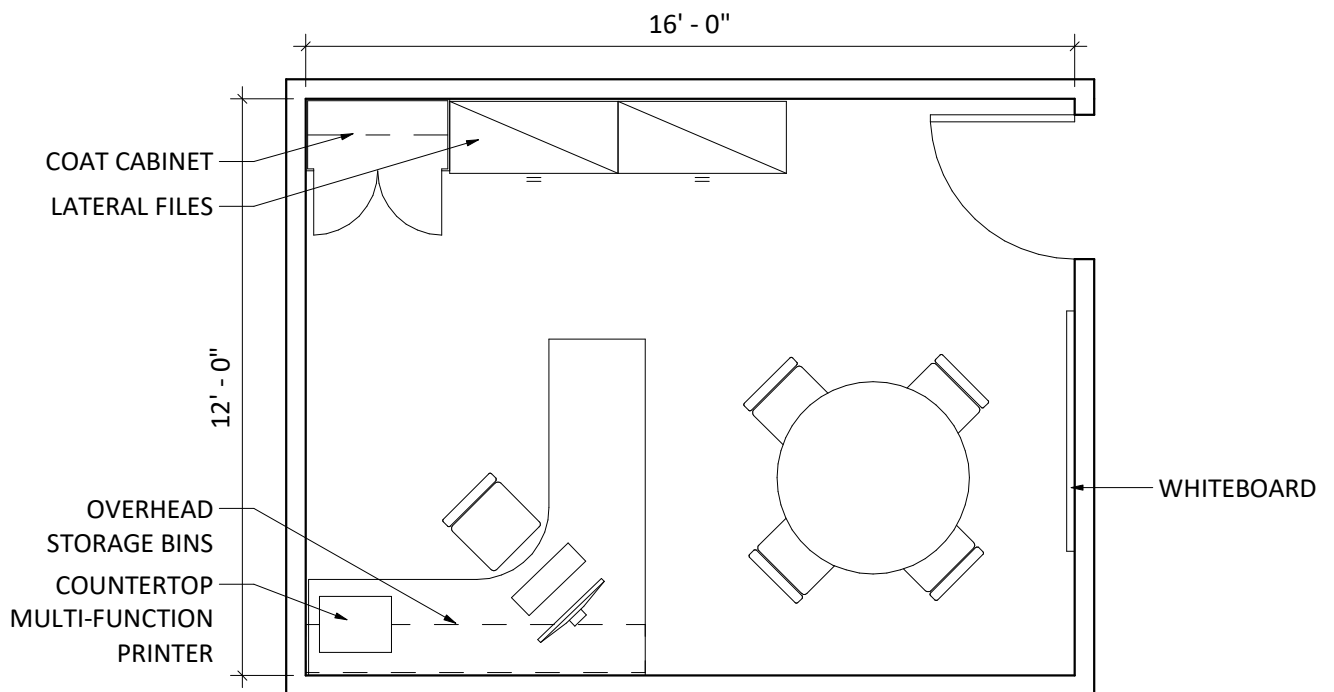


 **FINANCIAL ANALYST**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.7 PARKING CLERK

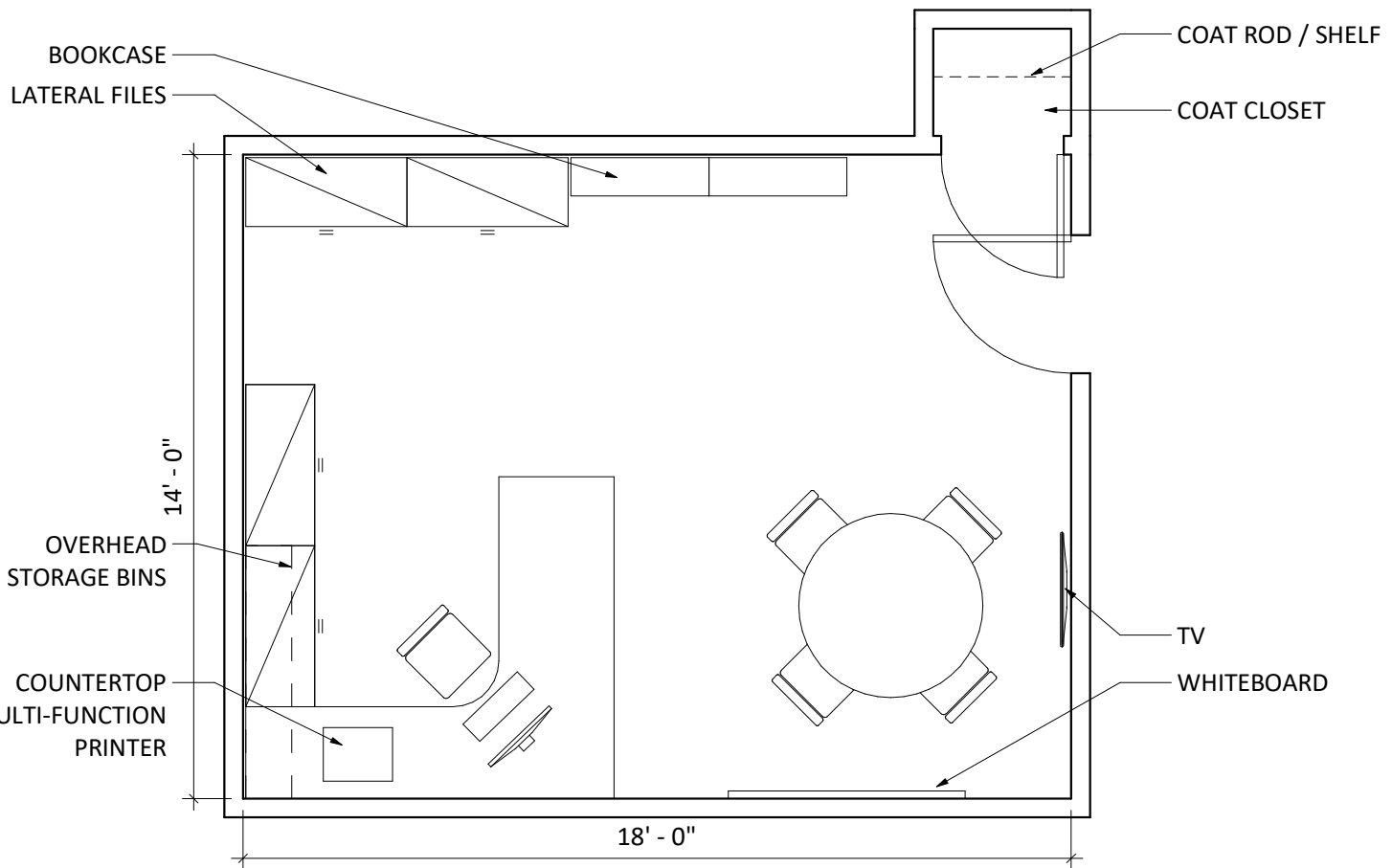
Adjacency Requirement	Near Clerks
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, 36" coat cabinet, overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, table w/ chairs



APPENDIX - PARKING DEPARTMENT

15.8 DIRECTOR OF PARKING

Adjacency Requirement	Adjacent to Administrative Assistant and Conference Room
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard, coat rod w/ shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED; CATV
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, & credenza w/ (2) 42" 2-drawer lateral files, overhead storage bins, desk chair, (2) 42" 4-drawer lateral files, (2) bookcase, countertop multi-function printer, table and (4) chairs, TV

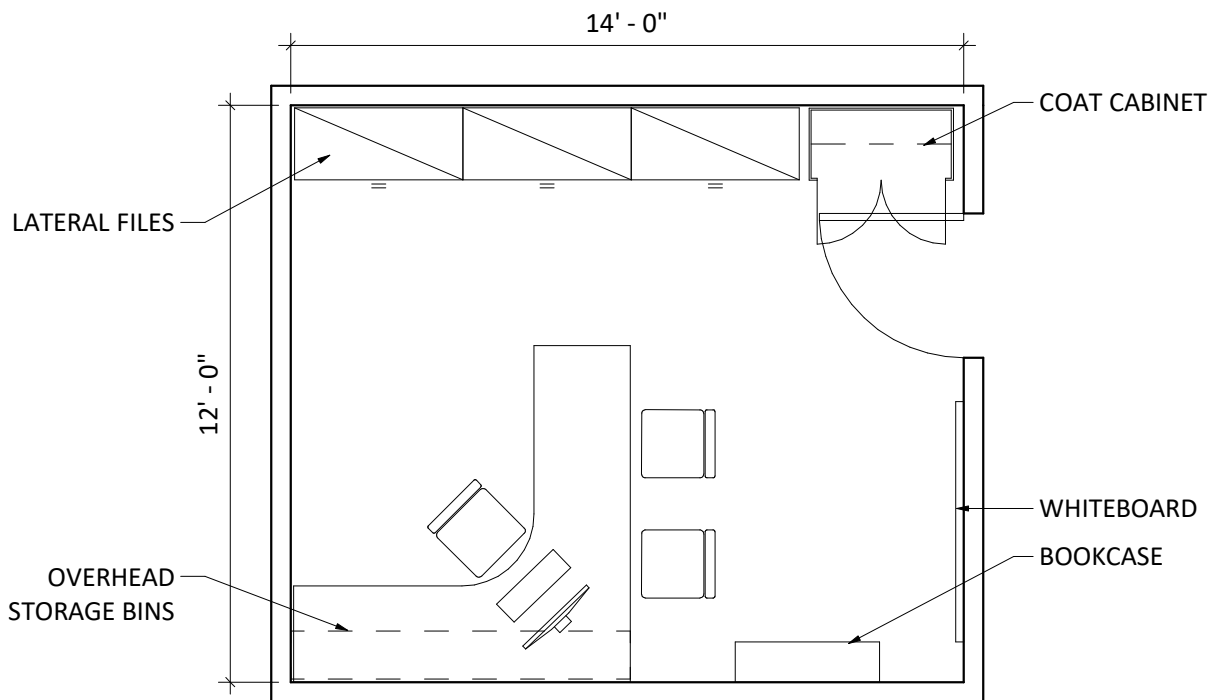


DIRECTOR OF PARKING
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.9 ADMINISTRATIVE ASSISTANT

Adjacency Requirement	Near Director of Parking
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, 36" coat cabinet, overhead storage bins, desk chair, bookcase, (3) 42" 4-drawer lateral files, (2) guest chairs

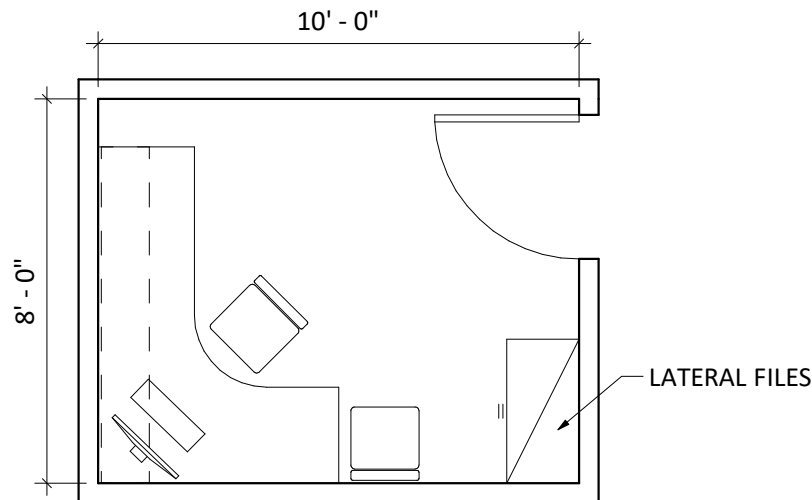


ADMINISTRATIVE ASSISTANT
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.10 PROJECT MANAGER

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) 7'x5' L shaped desks, (1) 42" 4-drawer lateral files, (1) desk chair, (1) guest chair, overhead storage bins

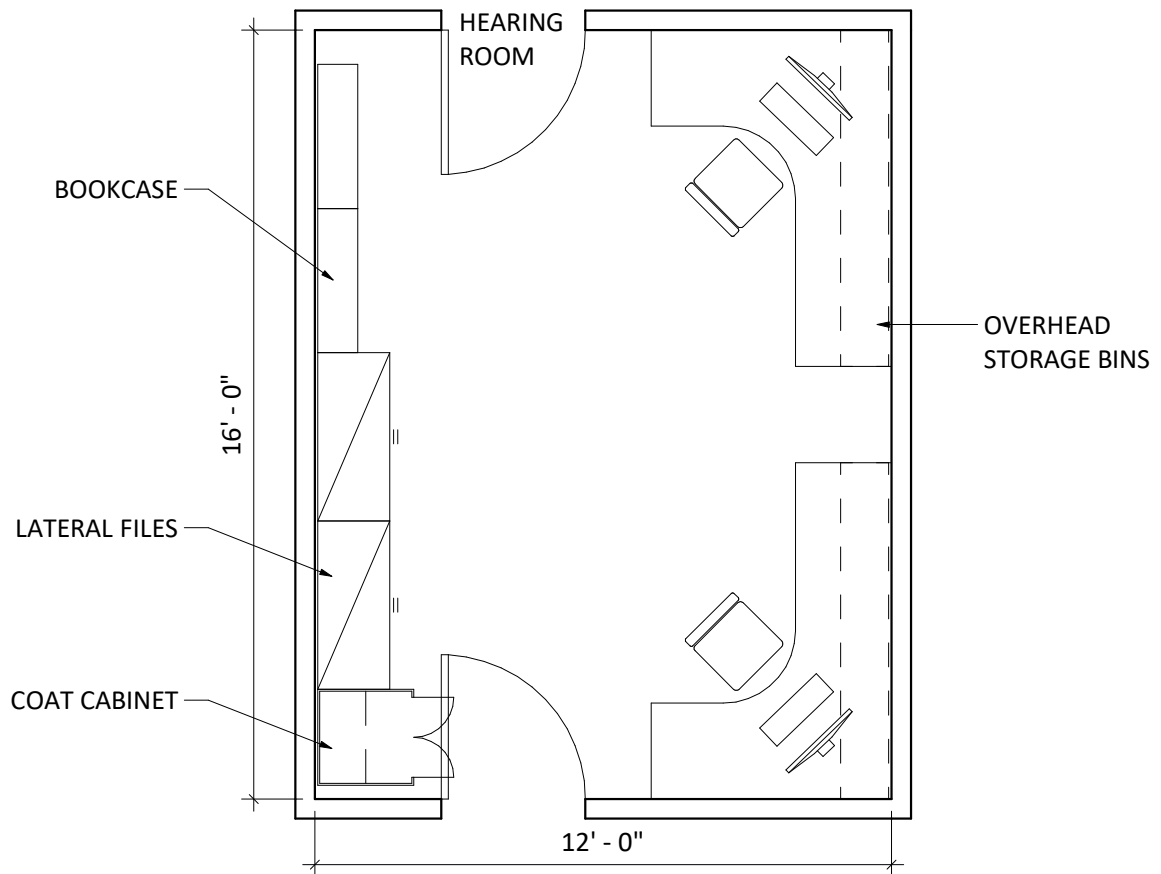


 **PROJECT MANAGER**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.11 HEARING OFFICERS

Adjacency Requirement	Adjacent to Hearing Room
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) 7'x5' L shaped desks, (2) 42" 4-drawer lateral files, (2) desk chair, overhead storage bins, coat cabinet, (2) bookcases

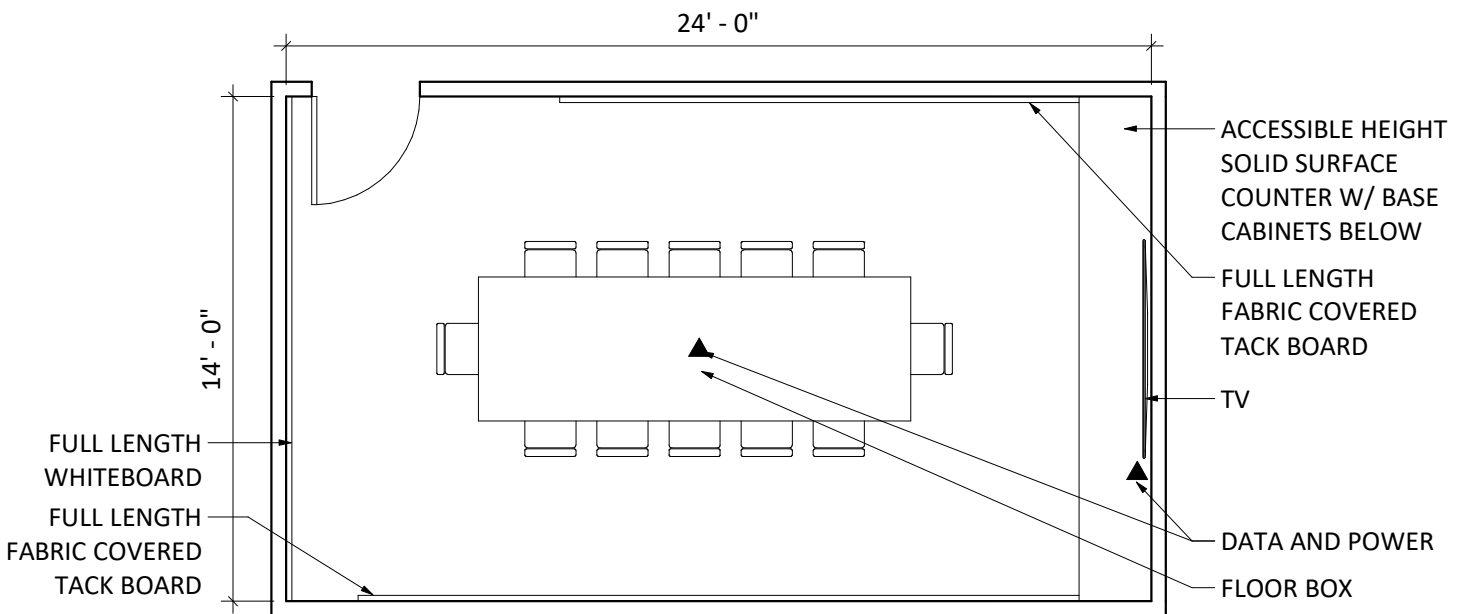


HEARING OFFICERS
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.12 ADMINISTRATION CONFERENCE ROOM

Adjacency Requirement	Adjacent to Director of Parking
Public Access	Limited
Security Requirements	None
Contract Millwork / Equipment	Fabric covered tackboards along two walls. Full length markerboard, chair rail, solid surface counter with base cabinets below
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) conference table w/ (12) chairs, (1) TV

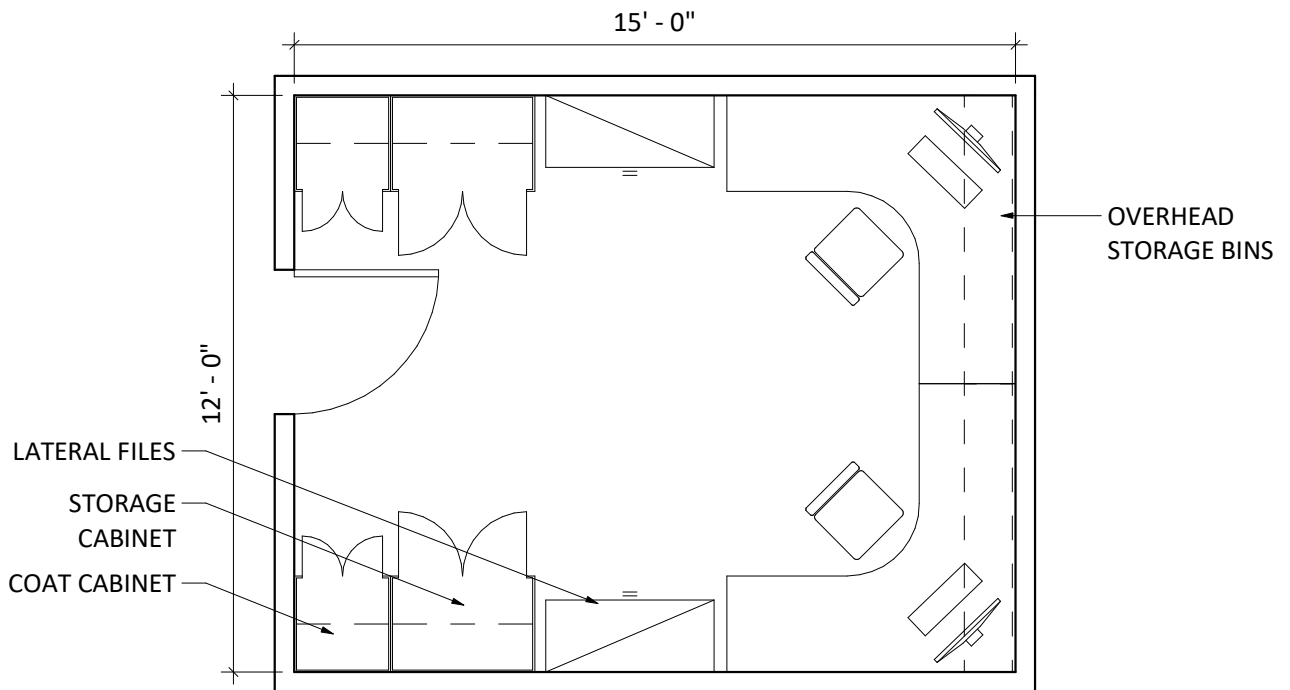


ADMINISTRATION CONFERENCE ROOM
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.13 CONTROL SUPERVISORS

Adjacency Requirement	Near Roll Call
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(2) 6'x6' L shaped desks, (2) 42" 4-drawer lateral files, (2) desk chair, overhead storage bins, (2) coat cabinets, (2) 36" storage cabinets

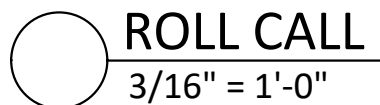
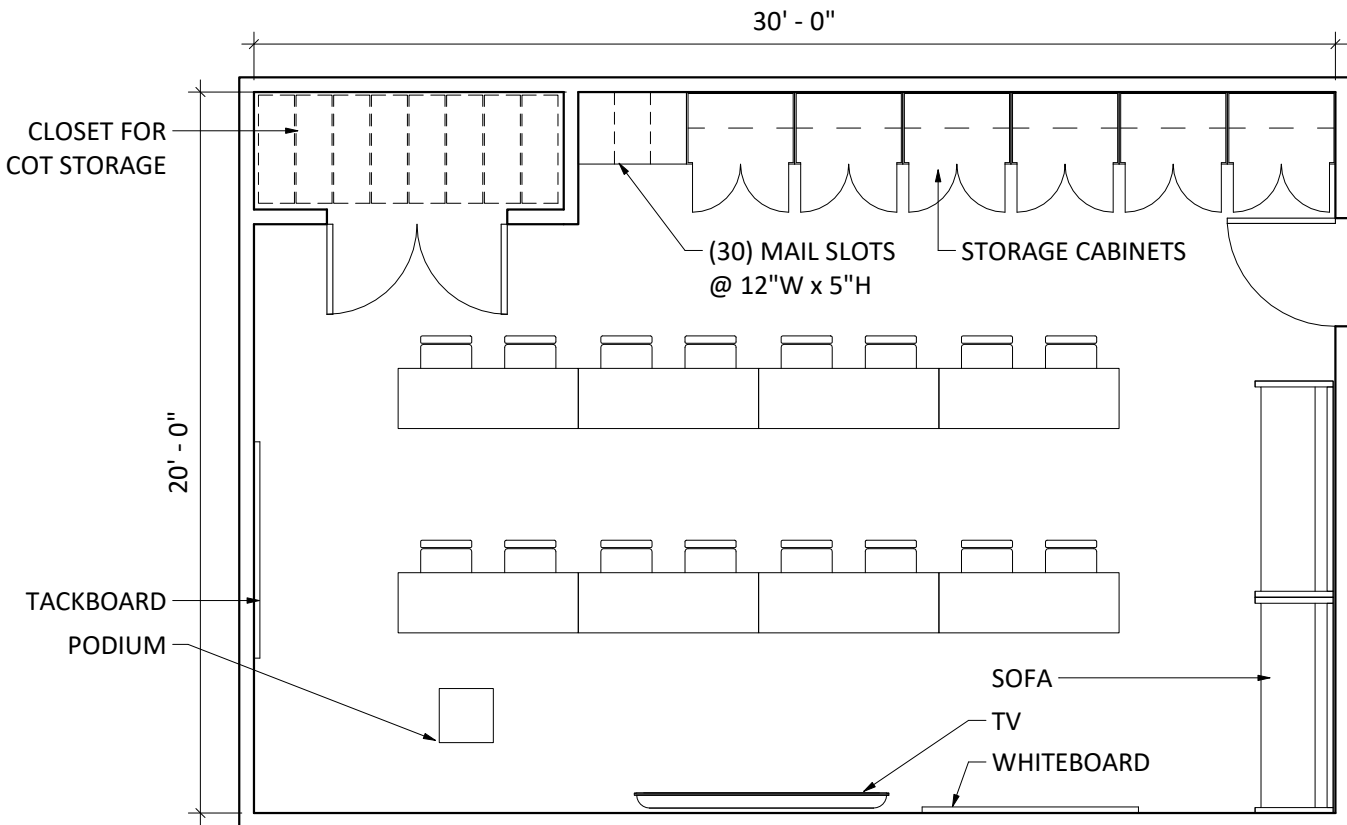


 **CONTROL SUPERVISORS**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.14 ROLL CALL

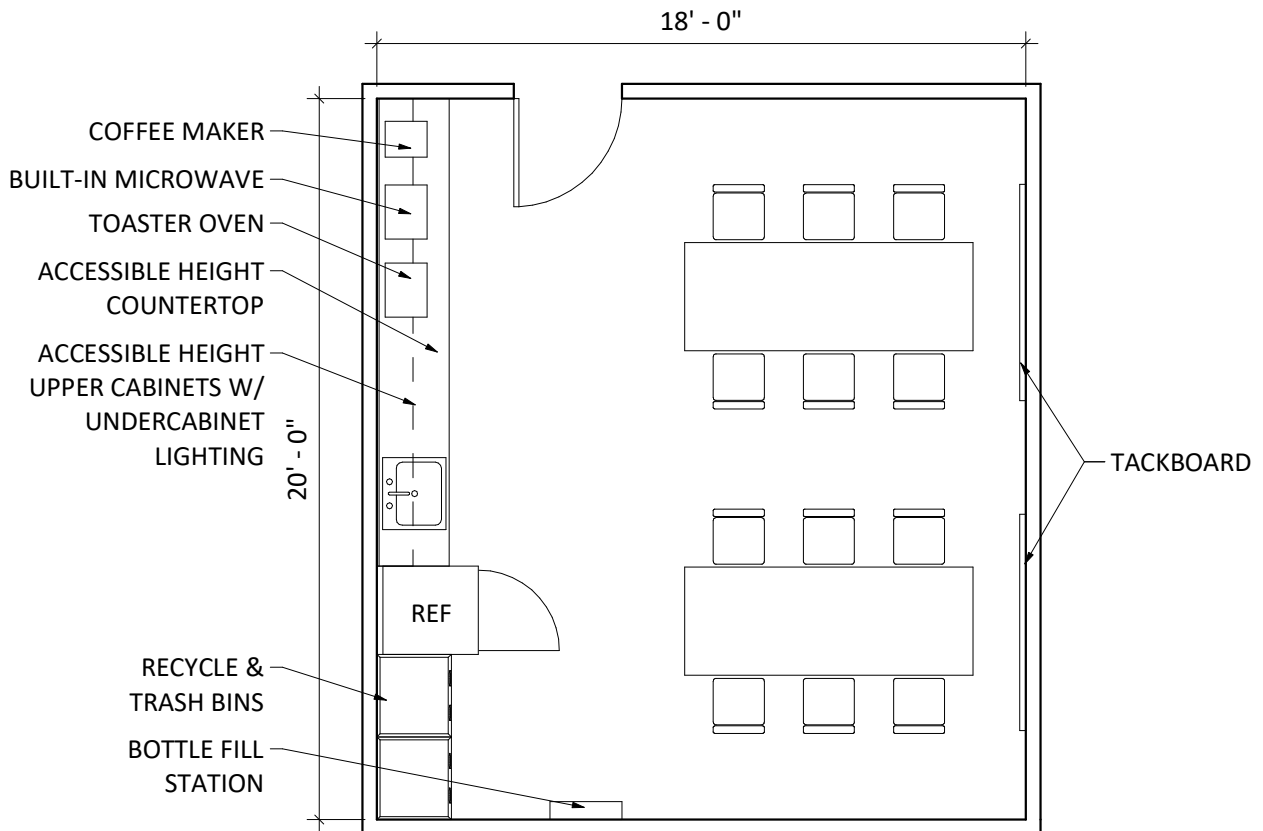
Adjacency Requirement	Adjacent to Supervisors and near exterior
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Whiteboard, tackboard, mail box w/ (30) slots
Floor	Resilient flooring or linoleum
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, CATV, A/V box behind TV
HVAC / Plumbing	A/C
Special Needs	Closet for storage of (8) cots
Owner supplied Furn. / Equip.	(8) 20" x 60" training tables w/ (16) chairs, (6) storage cabinets, podium, TV, (2) sofas for shift hold



APPENDIX - PARKING DEPARTMENT

15.15 BREAK ROOM

Adjacency Requirement	Within Parking Offices
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface countertop with base and upper cabinets, fully accessible 30" wide refrigerator, (2) tackboards, built-in microwave
Floor	Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under cabinet lighting
HVAC / Plumbing	A/C, good exhaust system / sink, bottle fill
Special Needs	None
Owner supplied Furn. / Equip.	Coffee maker, toaster oven, (2) tables each w/ (6) chairs, recycle & trash bins

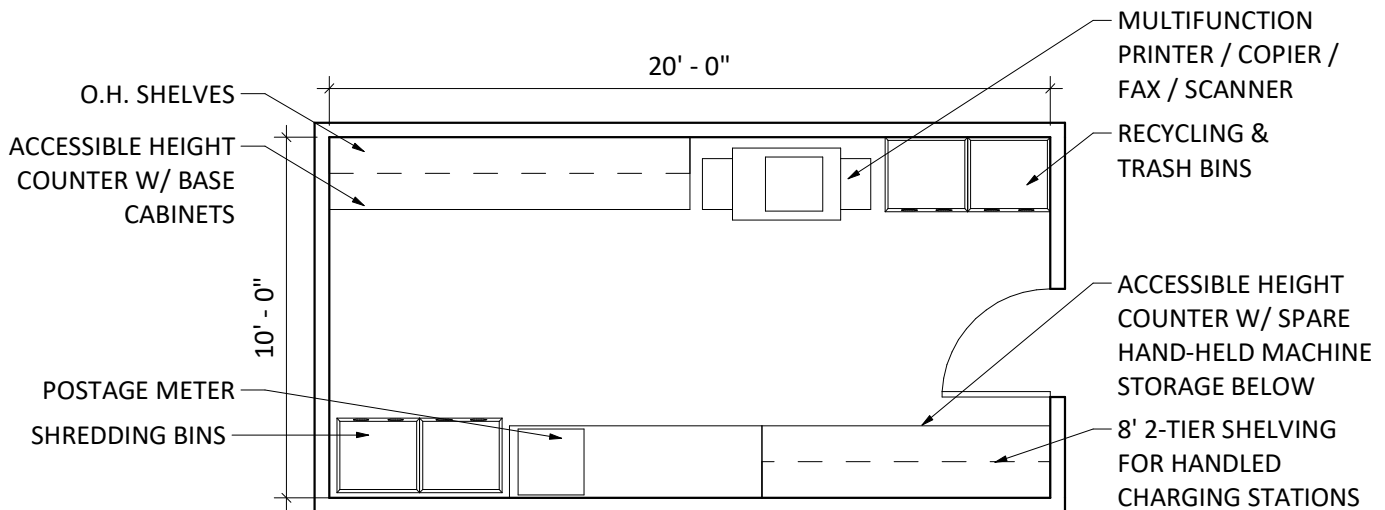


BREAK ROOM
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.16 WORK ROOM

Adjacency Requirement	Near Parking Offices
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	(2) Accessible height solid surface countertop with base and overhead shelving
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under shelving lighting
HVAC / Plumbing	A/C, Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	Multi-function printer / copier / fax / scanner, postage meter, shredding bins, trash and recycle bins

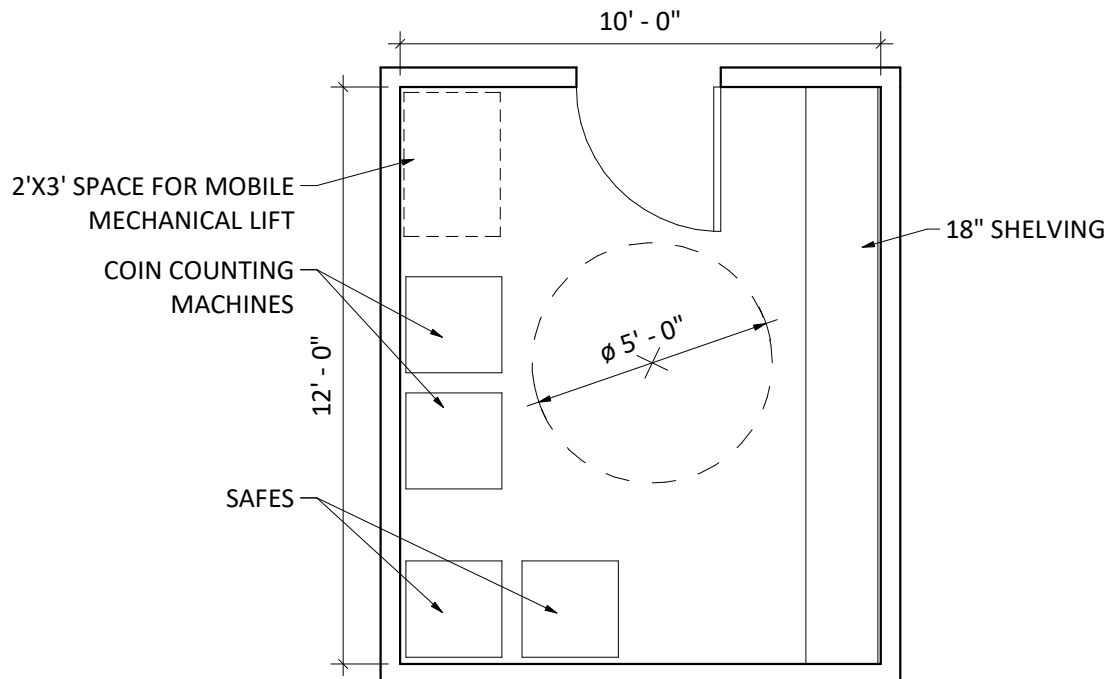


WORK ROOM
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.17 COUNTING & SAFE

Adjacency Requirement	None
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; CCTV
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	18" metal shelving, (2) safes, (2) coin counting machines, mechanical lift

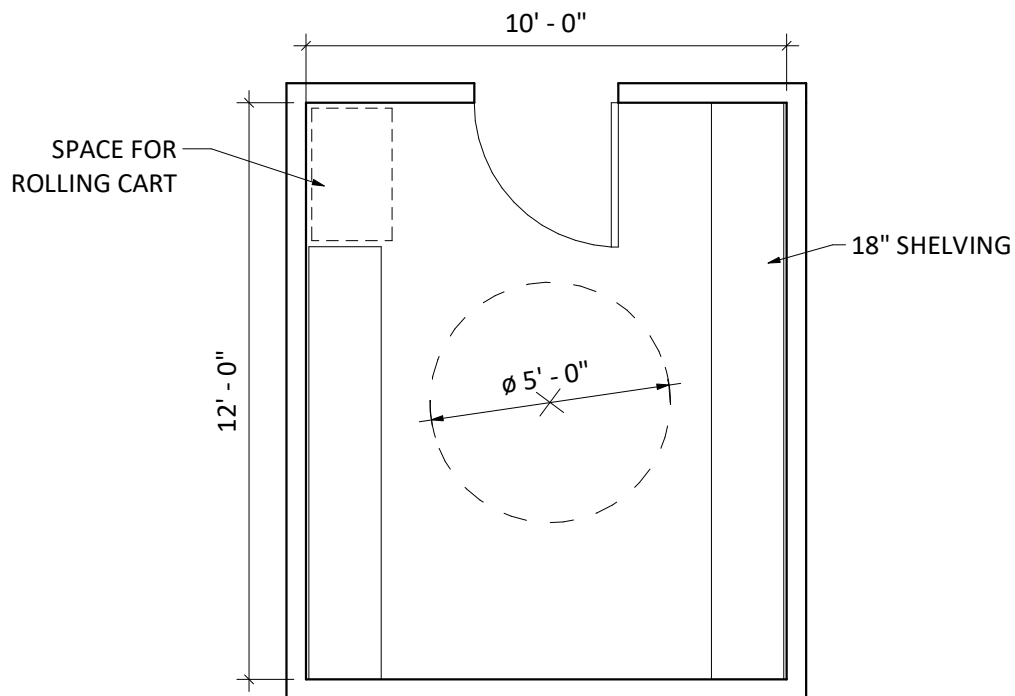


COUNTING & SAFE
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.18 PAPER SIGN STORAGE

Adjacency Requirement	None
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED; CCTV
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	18" metal shelving

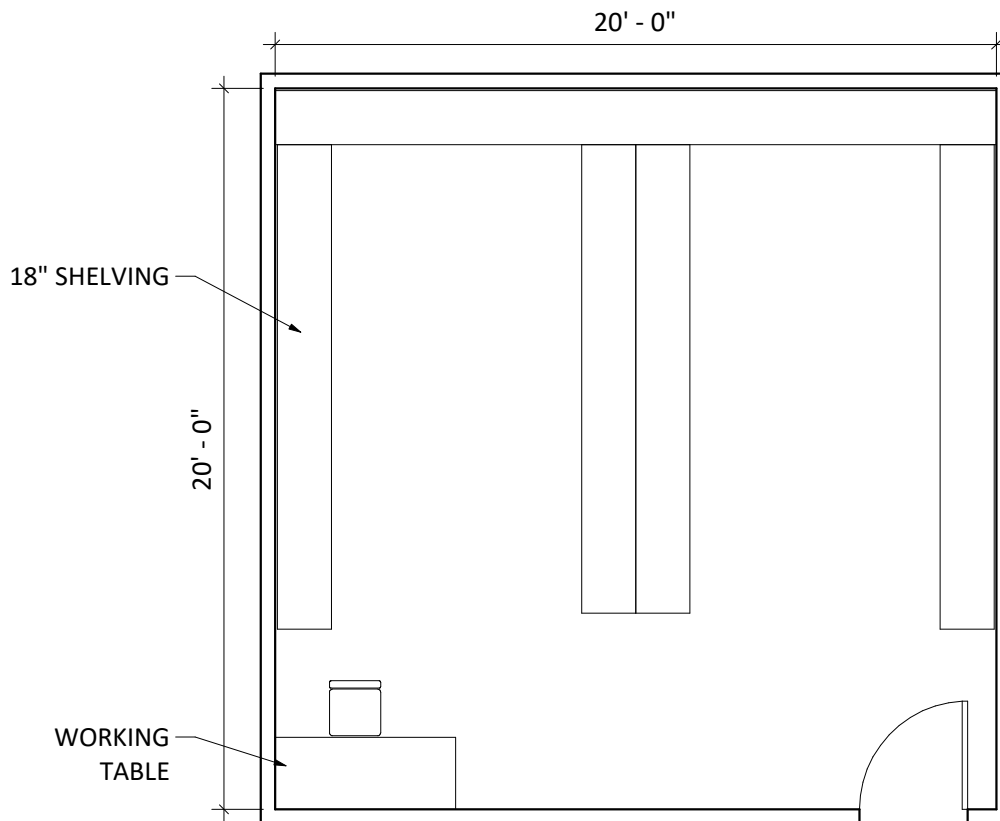



 **PAPER SIGN STORAGE**
1/4" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.19 DEAD RECORDS

Adjacency Requirement	None
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	None
Floor	Linoleum or Resilient
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED, continuous rows perpendicular to shelving
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) desk chair, work table, 18" metal shelving

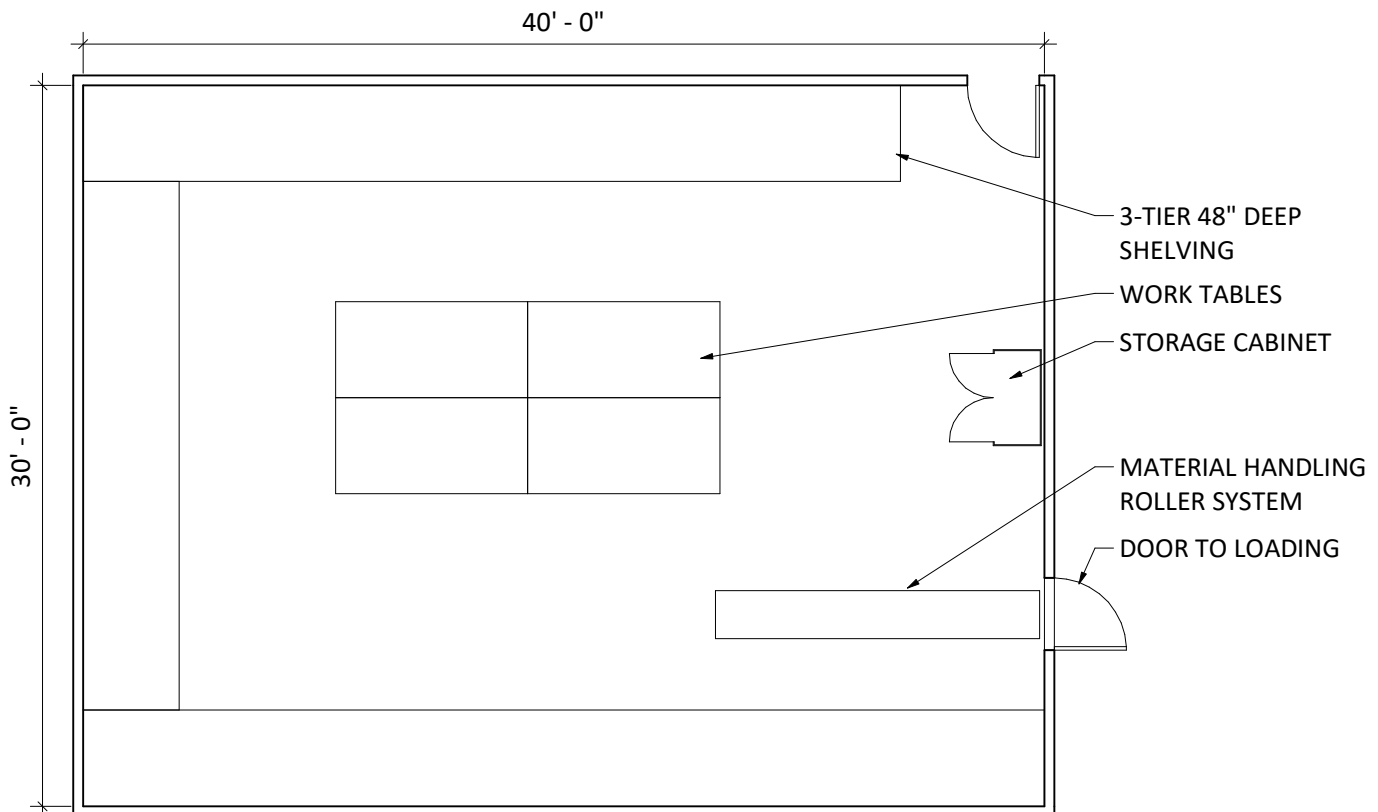


 **DEAD RECORDS**
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.20 SIGN SHOP

Adjacency Requirement	Adjacent to garage or exterior for easy loading
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	3-tier 4' deep shelving
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint or impact resistant GWB
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	Receiving deliveries of heavy signage
Owner supplied Furn. / Equip.	(4) work tables, material handling roller system, storage cabinet

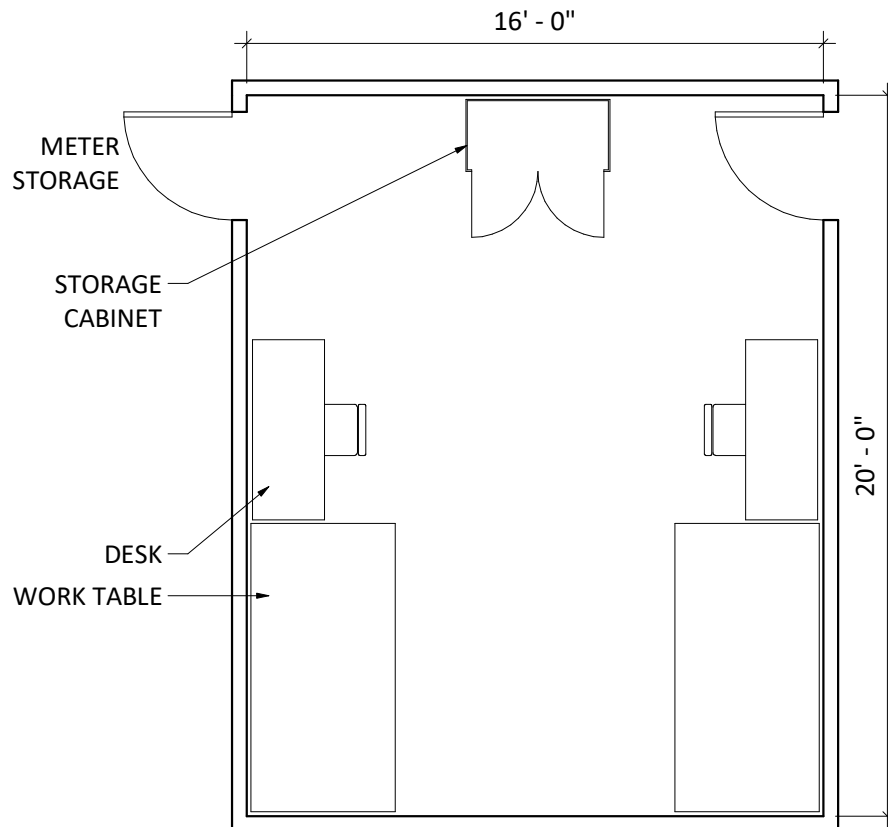



SIGN SHOP
1/8" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.21 METER SHOP

Adjacency Requirement	Near Sign Shop
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint or impact resistant GWB
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust
Special Needs	None
Owner supplied Furn. / Equip.	(2) desks w/ desk chairs, (2) work tables, storage cabinet

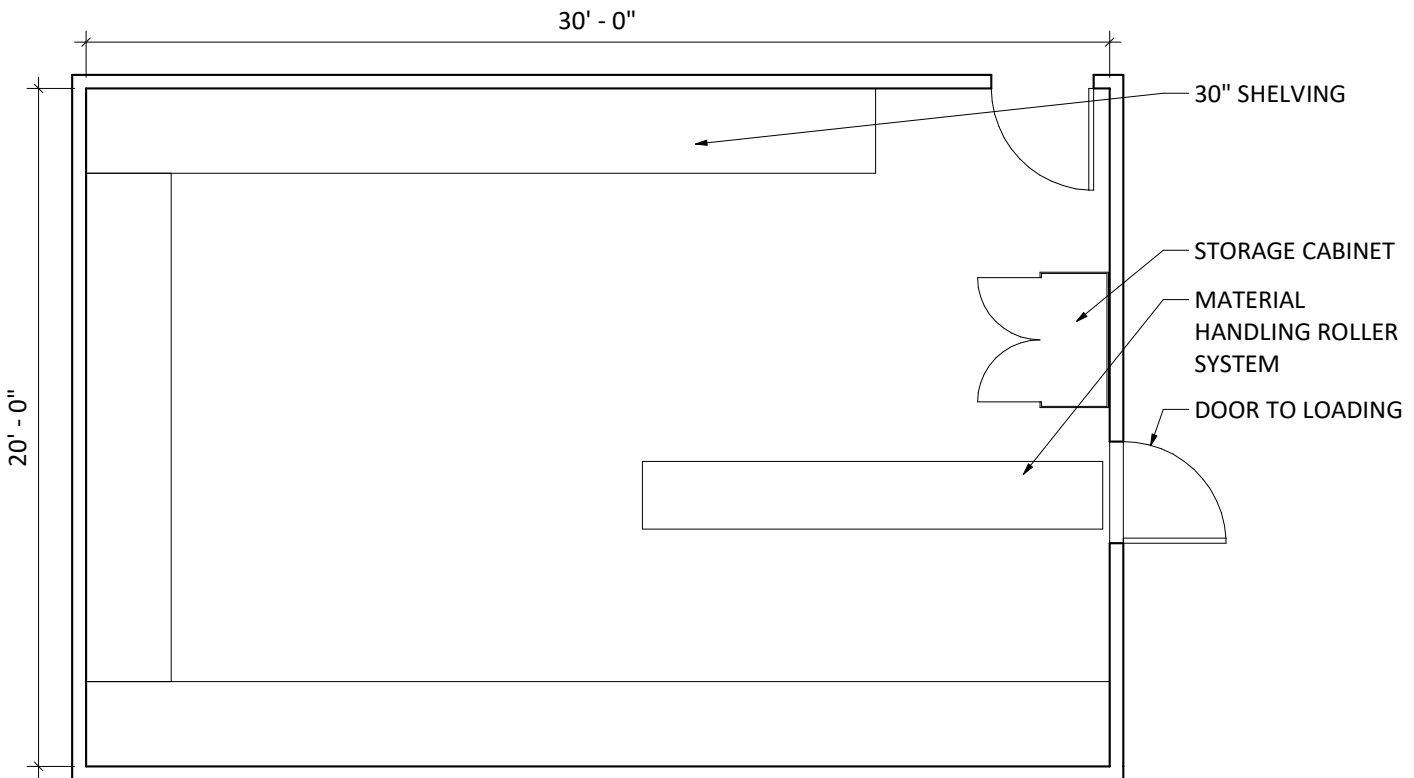


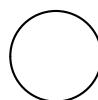
 **METER SHOP**
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.22 METER STORAGE

Adjacency Requirement	Adjacent to garage or exterior for easy loading, near Meter Shop
Public Access	None
Security Requirements	Card Access
Contract Millwork / Equipment	None
Floor	Concrete w/ hardener
Walls	CMU / epoxy paint or impact resistant GWB
Ceiling	Painted, exposed structure
Lighting / Electrical	LED
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	30" metal shelving, material handling roller system, storage cabinet

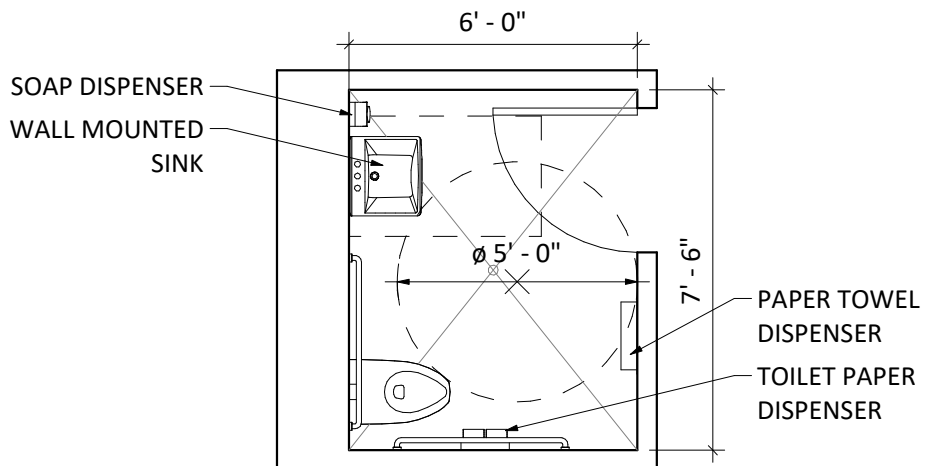


 **METER STORAGE**
3/16" = 1'-0"

APPENDIX - PARKING DEPARTMENT

15.23 STAFF TOILET

Adjacency Requirement	Within Parking department
Public Access	None
Security Requirements	Privacy
Contract Millwork / Equipment	Toilet accessories
Floor	Ceramic tile
Walls	GWB, painted, ceramic tile wainscot on all walls
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	Good exhaust; (1) toilet and (1) sink, floor drain
Special Needs	Handicap accessible
Owner supplied Furn. / Equip.	None

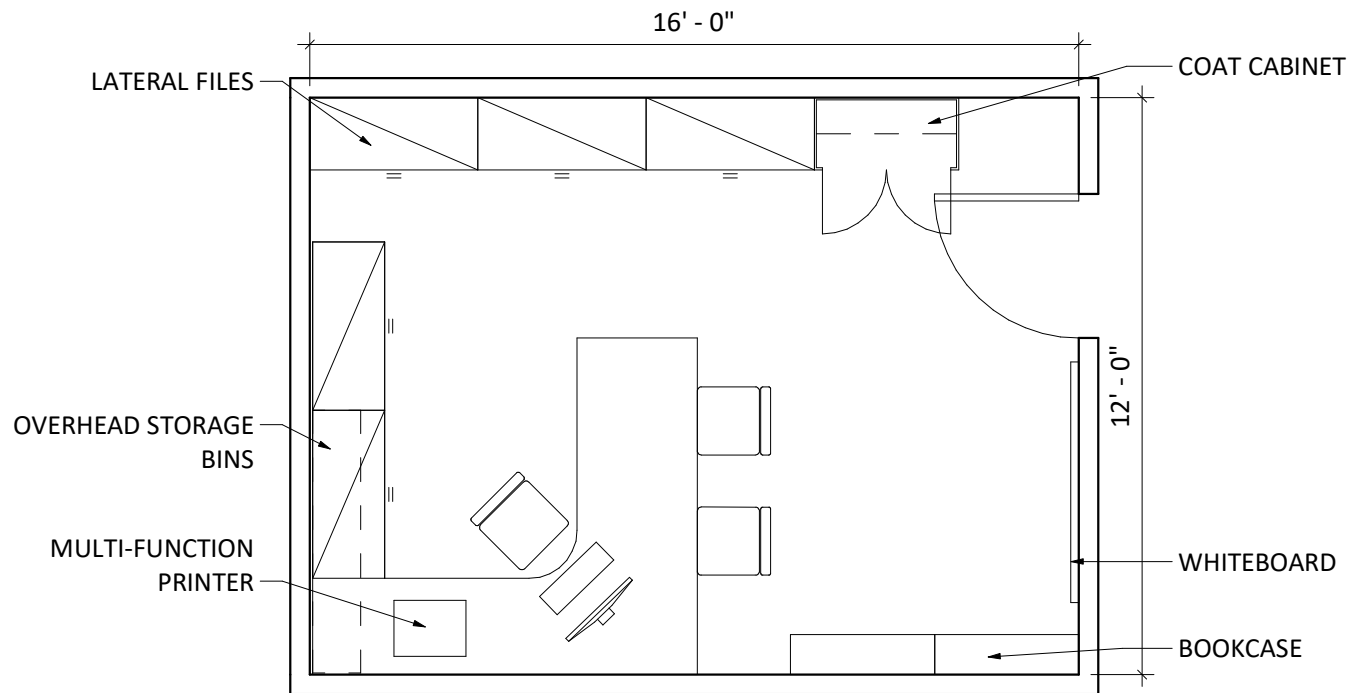


○ **STAFF TOILET**
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.1 DIRECTOR OF CONSTITUENT SERVICES

Adjacency Requirement	Adjacent with Administration
Public Access	Low
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, & credenza w/ (2) 42" 2-drawer lateral files, 36" coat cabinet, overhead storage bins, desk chair, (3) 42" 4-drawer lateral files, (2) bookcases, countertop multi-function printer, (2) guest chairs

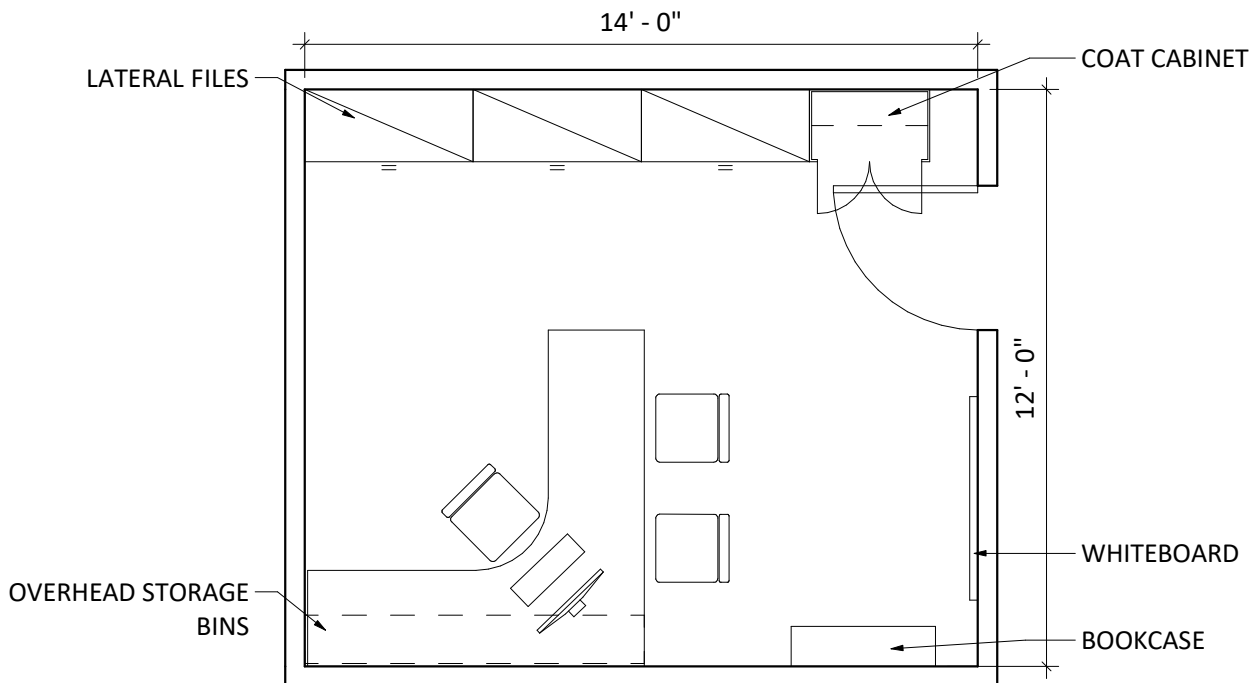


DIRECTOR OF CONSTITUENT SERVICES
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.2 311 CONTACT CENTER MANAGER

Adjacency Requirement	Adjacent with Administration
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, 30" coat cabinet, overhead storage bins, desk chair, (3) 42" 4-drawer lateral files, bookcase, (2) guest chairs

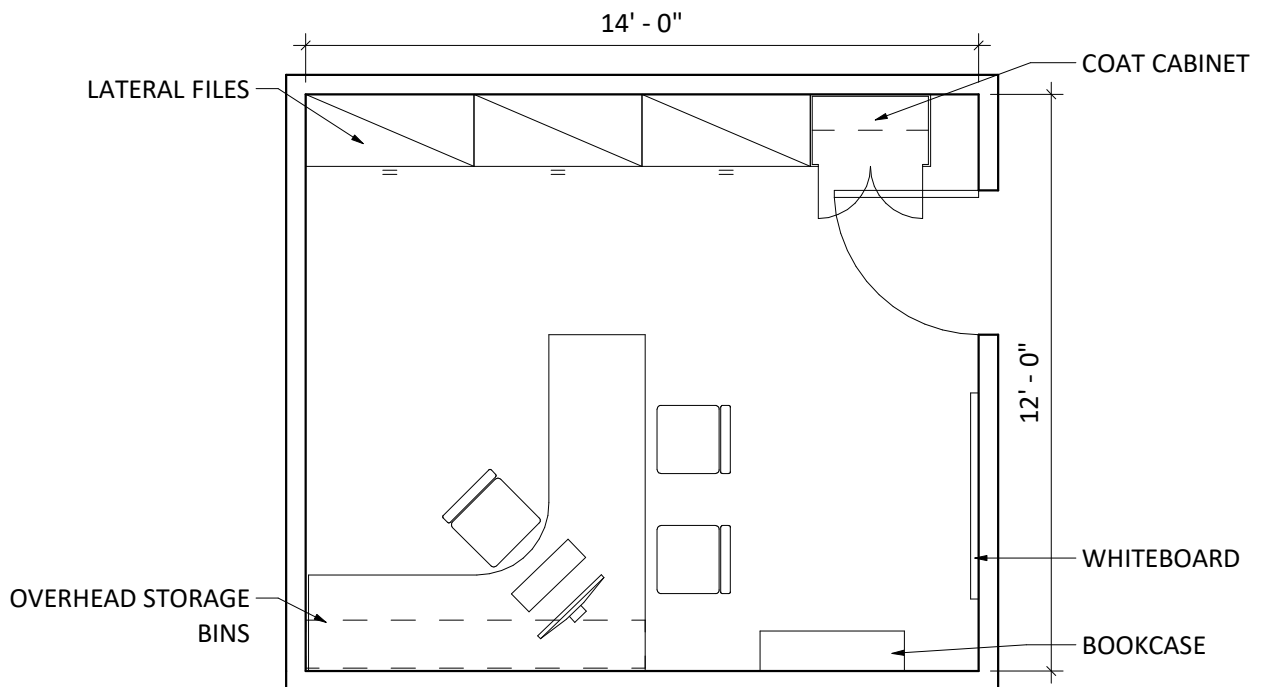


 **311 CONTACT CENTER MANAGER**
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.3 CUSTOMER EXPERIENCE MANAGER

Adjacency Requirement	Adjacent with Administration
Public Access	Moderate
Security Requirements	Card access
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	Desk w/ return, 30" coat cabinet, overhead storage bins, desk chair, (3) 42" 4-drawer lateral files, bookcase, (2) guest chairs

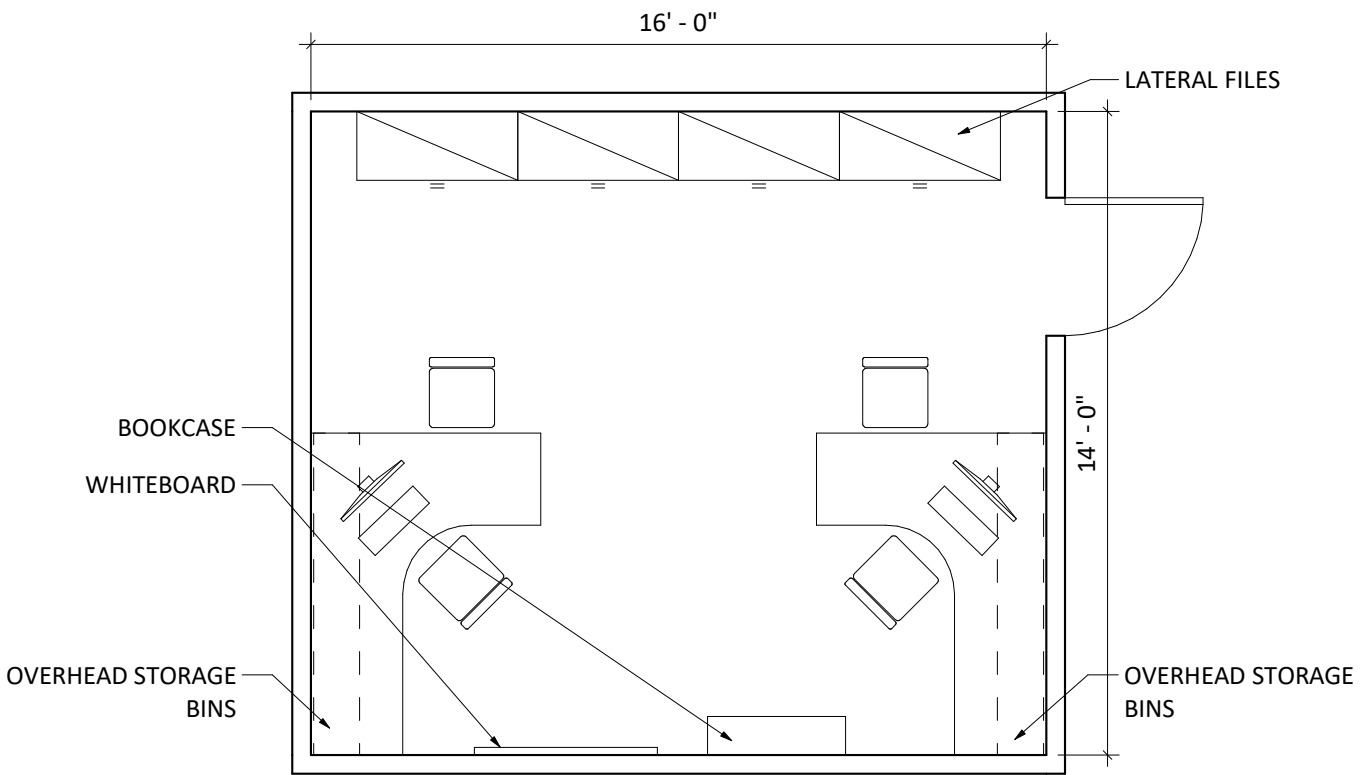


 **CUSTOMER EXPERIENCE MANAGER**
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.4 ADMINISTRATION

Adjacency Requirement	Adjacent with Administration
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Whiteboard
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	2 Workstations, each with "7'x5' L shaped desks, desk chairs, overhead storage bins", (4) 42" 4-drawer lateral files, bookcase, (2) guest chairs

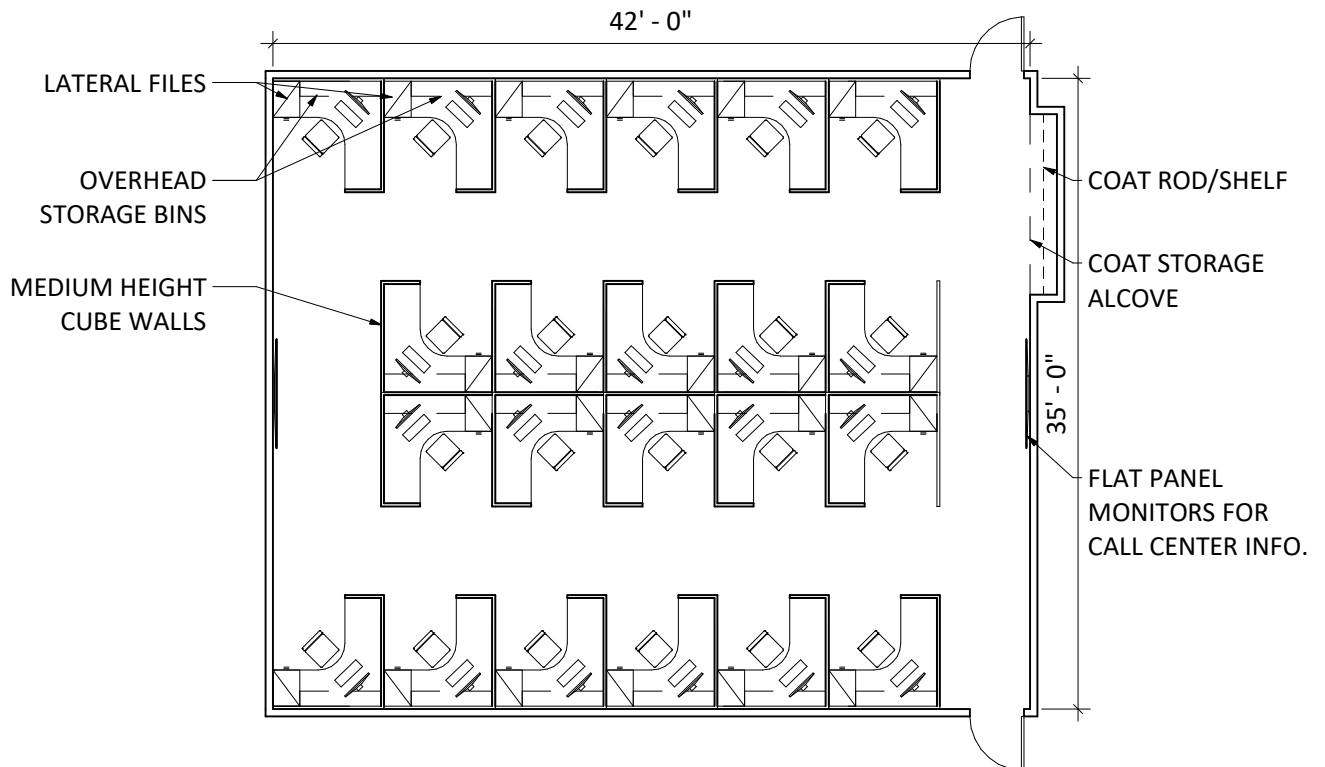


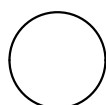
○ ADMINISTRATION
 1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.5 CALL CENTER

Adjacency Requirement	Near Administration
Public Access	None
Security Requirements	Card access.
Contract Millwork / Equipment	Acoustic wall panels on all walls, coat rod / shelf
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, power and data to cubicles, power and data recessed behind flat panel monitors
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(22) Workstations, each with "desk w/ return w/ (1) 24" 2-drawer lateral files, overhead storage bins, desk chairs", medium height cube walls, (2) flat panel monitors

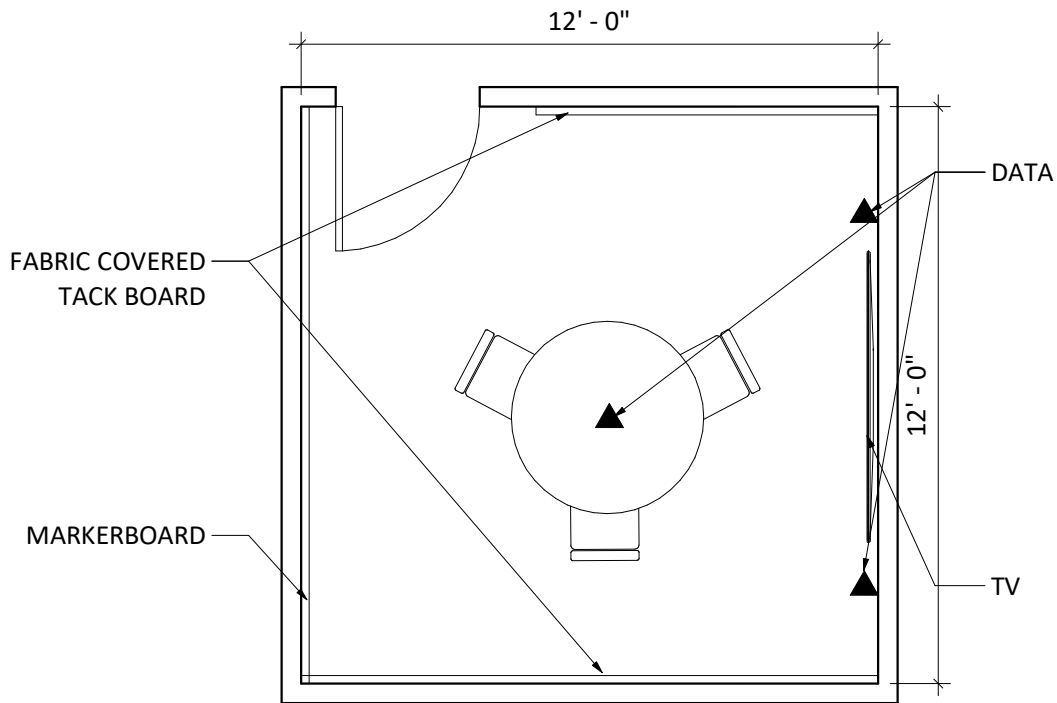


 **CALL CENTER**
3/32" = 1'-0"

311 - CONSTITUENT SERVICES

16.6 CALL CENTER CONFERENCE ROOM

Adjacency Requirement	Near Director of Constituent Services
Public Access	Low
Security Requirements	None
Contract Millwork / Equipment	Framed fabric covered tackboards along two walls. Full length framed markerboard, chair rail
Floor	Carpet tile
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	Indirect LED, dimmers, pendant fixtures, data, CATV
HVAC / Plumbing	A/C
Special Needs	None
Owner supplied Furn. / Equip.	(1) Conference table w/ (3) chairs, TV

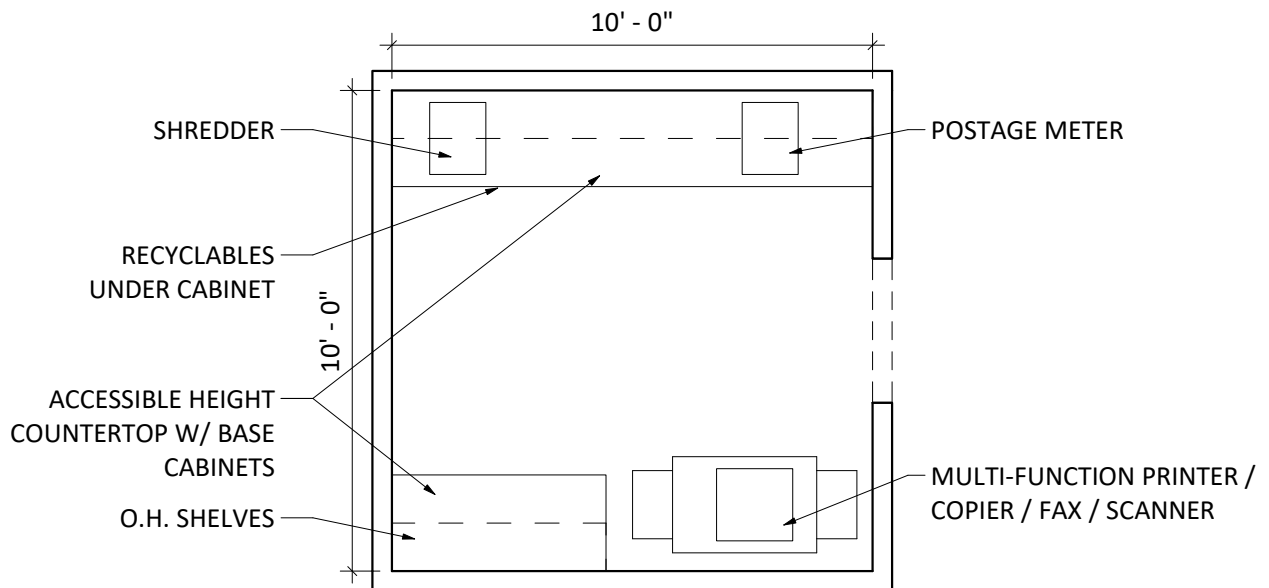


 **CALL CENTER CONFERENCE ROOM**
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.7 WORK ROOM

Adjacency Requirement	Adjacent to Call Center
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Countertop with base and upper cabinets
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under counter lighting
HVAC / Plumbing	A/C, Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	Multi-function printer / copier / fax / scanner, postage meter, shredder

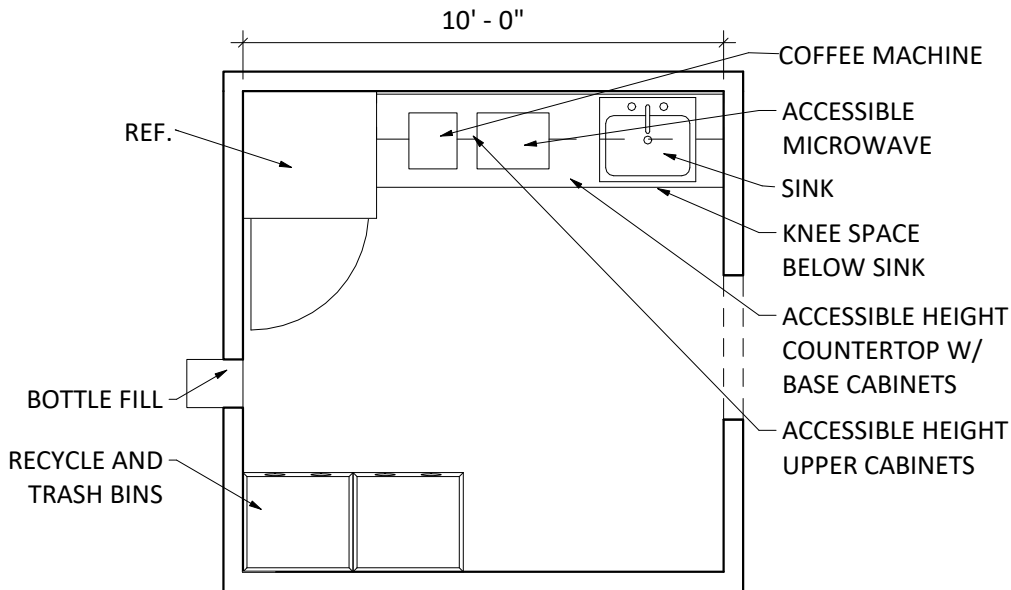


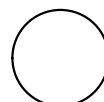
WORK ROOM
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.8 BREAK ROOM

Adjacency Requirement	Adjacent to Call Center
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	Solid surface countertop with base and upper cabinets
Floor	Resilient flooring or Rubber
Walls	GWB, painted
Ceiling	ACT
Lighting / Electrical	LED and under counter lighting
HVAC / Plumbing	A/C, Exhaust
Special Needs	None
Owner supplied Furn. / Equip.	Refrigerator, coffee machine, microwave

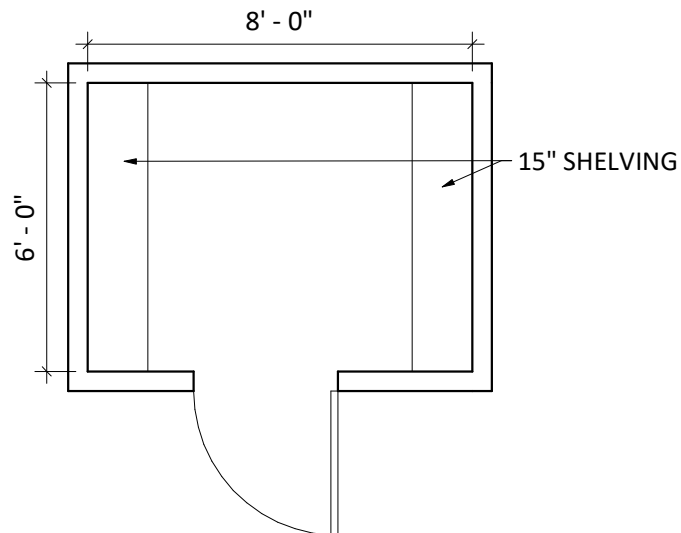


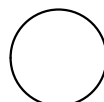
 **BREAK ROOM**
1/4" = 1'-0"

311 - CONSTITUENT SERVICES

16.9 OUTREACH STORAGE

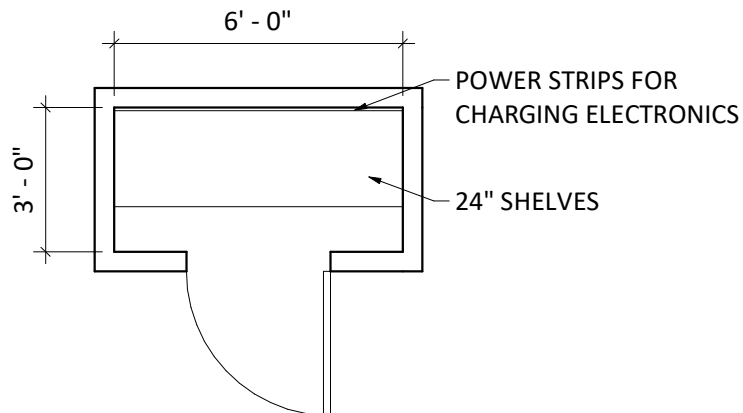
Adjacency Requirement	Near Work Room
Public Access	None
Security Requirements	None
Contract Millwork / Equipment	5 tier shelving w/ 15" deep shelves on (2) walls
Floor	Linoleum
Walls	GWB
Ceiling	ACT
Lighting / Electrical	LED
HVAC / Plumbing	None
Special Needs	None
Owner supplied Furn. / Equip.	None



 **OUTREACH STORAGE**
1/4" = 1'-0"

16.10 COMPUTER EQUIPMENT STORAGE

Adjacency Requirement	Near Work Room
Public Access	None
Security Requirements	Card access
Contract Millwork / Equipment	5 tier shelving w/ 2' deep shelves
Floor	Linoleum
Walls	GWB
Ceiling	ACT
Lighting / Electrical	LED, power strips for charging electronics and laptop batteries
HVAC / Plumbing	AC for equipment
Special Needs	None
Owner supplied Furn. / Equip.	None



COMPUTER EQUIPMENT STORAGE

1/4" = 1'-0"

END OF DOCUMENT

E. HAZMAT REPORT

April 27, 2021

Ms. Angela Campbell
Project Manager
Context Architecture
68 Harrison Avenue
Boston, MA 02111

Reference: **Hazardous Materials Consulting Services**
City of Somerville – 90 Washington Street

Dear Ms. Campbell:

Thank you for the opportunity for Universal Environmental Consultants (UEC) to provide professional services.

UEC was contracted by Context Architecture to retain the services of a demolition contractor (Contractor) to excavate around the foundations walls to expose any suspect Asbestos Containing Materials (ACM) that might be found below grade. The scope also included for the Contractor to perform selective destructive demolition of the building slab to expose any suspect ACM that might be found.

Excavation at couple locations around the foundation walls and destructive testing of the slab were performed and no suspect ACM was found.

Please do not hesitate to call me at (508) 628-5486 if you have questions about our services.

Very truly yours,

Universal Environmental Consultants



Ammar M. Dieb
President

The Somerville Public Safety Building is proposed for the 90 Washington Street parcel at the former location of a retail mall. The site is being divided into three parcels A, B and C with a planned realignment of New Washington Street which will bisect the property into Parcel A, B and Parcel C. Parcels A and C will be developed as separate projects. Parcel B will become the site for the new Public Safety Building.

The new Somerville Public Safety Building will be designed to accommodate Engine 3 Fire Apparatus, Fire Administration Offices, Police Administration Offices and Police Patrol and will include a Community Room among other City offices. The building is a 4-story, Category IV commercial building, approximately 74,000 SF. The proposed building will also include a 3-story, attached open-air parking garage, approximately 57,000 SF which will house police vehicles.

Soil remediation will occur as part of an earlier phase of the project and preliminary preparations for utility trenching and roadway preparation will also occur as part of the Early Site package.

The tail end parcel of Parcel B will be designed to include a below-grade geothermal well field and a public park at grade.

F LIST OF DRAWINGS

CIVIL:

V101 EXISTING CONDITIONS PLAN

V102 EXISTING CONDITIONS PLAN

C101 SITE PLAN

C102 SITE PLAN

C103 UTILITY PLAN

C104 UTILITY PLAN

LANDSCAPE:

L1.0 LANDSCAPE PLAN

ARCHITECTURAL:

A1.1 ABBREVIATIONS LEGENDS SYMBOLS

A1.2 WALL TYP LEGEND

A1.3 BUILDING CODE ANALYSIS

A2.0 SITE PLAN

AS.2 FIRST FLOOR PLAN

A2.2 MEZZANINE FLOOR PLAN

A2.3 SECOND FLOOR PLAN

A2.4 THIRD FLOOR PLAN

A2.5 FOURTH FLOOR PLAN

A2.6 ROOF PLAN

A2.7 FIRST FLOOR PLAN-GARAGE

A2.8 SECOND FLOOR PLAN-GARAGE

A2.9 ROOF PLAN-GARAGE

A2.10 ROOF PLAN-GARAGE PV PANEL

A3.1 BUILDING ELEVATIONS

A3.2 BUILDING ELEVATIONS

A3.3 BUILDING PERSPECTIVES

NARRATIVE
8/13/2021

A4.1 BUILDING SECTIONS

A4.2 BUILDING SECTIONS

A4.3 WALL SECTIONS

A8.1 FIRST FLOOR RCP

A8.2 MEZZANINE RCP

A8.3 SECOND FLOOR RCP

A8.4 THIRD FLOOR RCP

A8.5 FOURTH FLOOR RCP

A9.2 ENLARGED PLAN-DETENTION

A10.1 MILLWORK

A10.2 MILLWORK