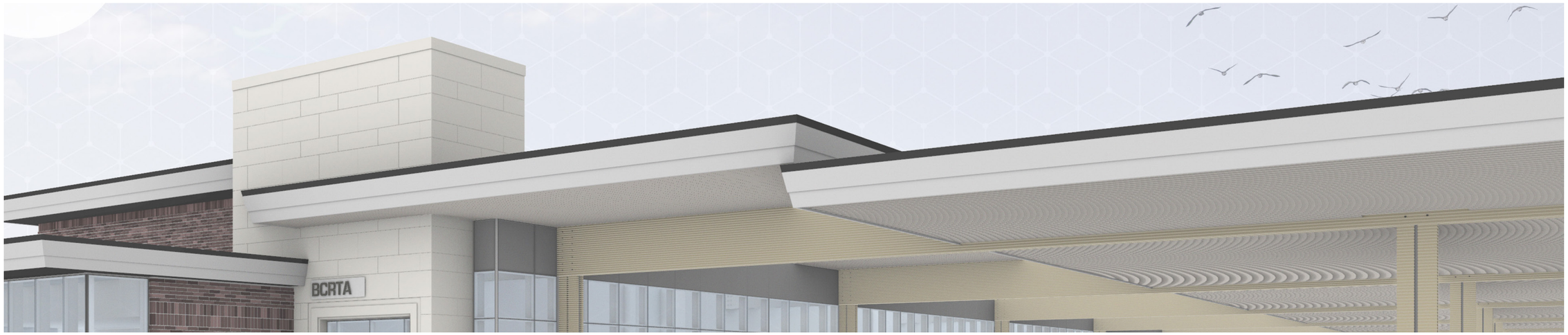
BUTLER COUNTY REGIONAL
TRANSIT AUTHORITY

# CHESTNUT ST MULTIMODAL STATION CONCEPTUAL DESIGN REPORT




SUBMITTED TO:

BUTLER COUNTY REGIONAL TRANSIT AUTHORITY
3045 Moser Court
Hamilton, Ohio 45011

AUGUST 25, 2021

Bowen+

Bcrta
Butler County Regional Transit Authority

City of Oxford OHIO
HOME OF MIAMI UNIVERSITY

MIAMI UNIVERSITY

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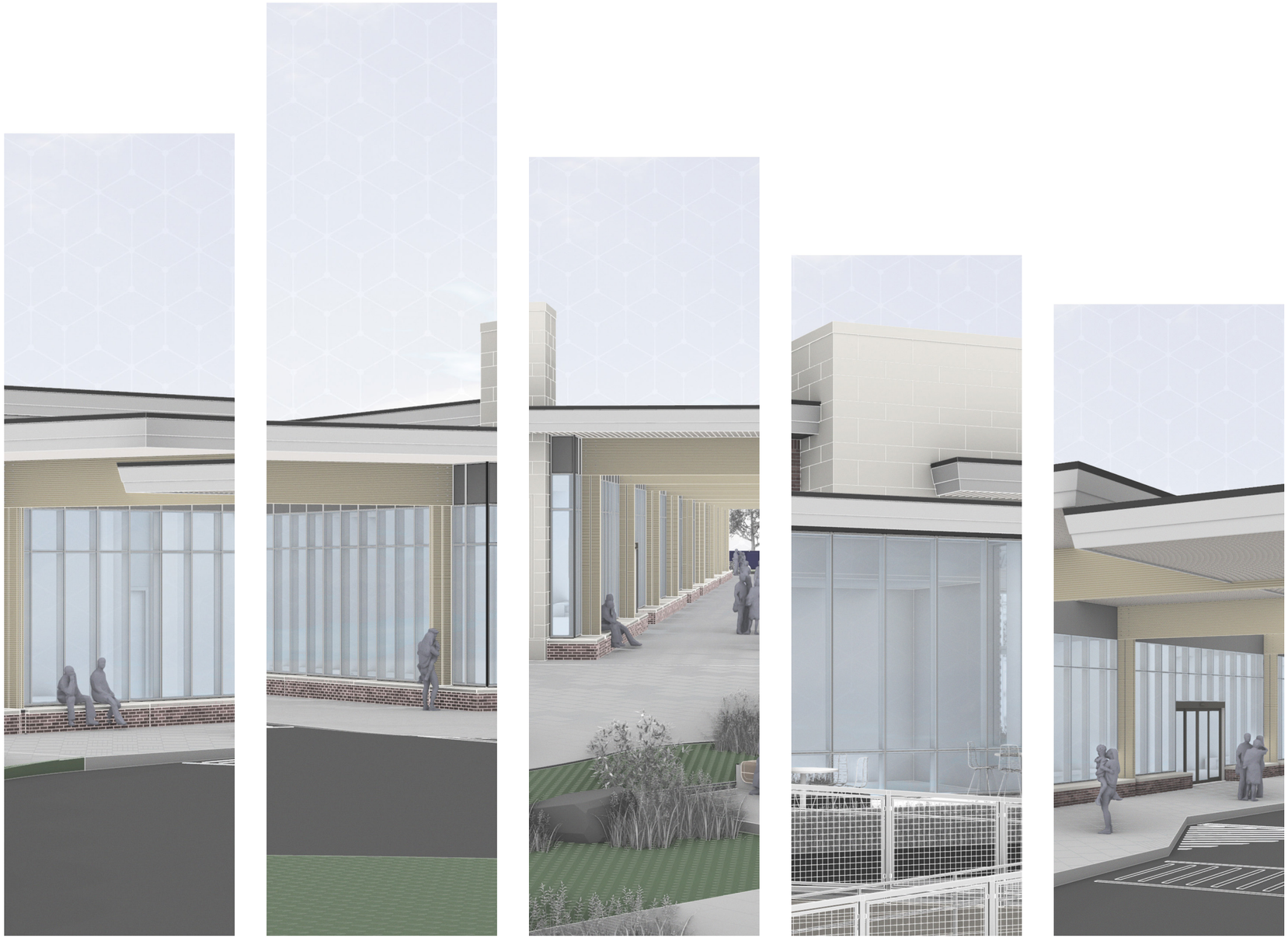

# CONCEPTUAL DESIGN NARRATIVES + ANALYSIS

# EXECUTIVE SUMMARY

**This report is created to support BCRTA and its partners, City of Oxford and Miami University, in their effort of building a shared services facility and multimodal station. The following document evaluates the existing conditions of this site in concert with the needs as defined by BCRTA and its user groups.**

## PROGRAM HIGHLIGHTS

The BCRTA facility is currently planned for construction in (2) phases to allow for the Talawanda School District operations to transition to their new operational space. The building is positioned on the site with the public spaces to the North of the site and then the programming becoming more private / operational towards the South of the site. Public Bus access to the north minimizes off-street bus circulation and creates a visual connection to W. Chestnut.

### Public Features

- Concourse - with seating spanning entire width of the facility, East to West, providing visual connection to bus pickup/drop-off. Ticket window and access to after-hours services.
- Community room - 120 seat flex-space with adjoining kitchenette.
- Restrooms - Ample fixtures for passengers and also to support community events.
- Bike access - Dedicated rider lane and secure parking
- Pedestrian Plaza East - to connect with the future Amtrak Platform.
- Pedestrian Plaza West - to connect with the existing park and ride lot.

### Operations and Administration Features

- Employee Break room - Operators' lounge containing food services, down-time furnishings.
- Employee Outdoor Seating - private and secure.
- Conference and Meeting Spaces - dedicated hoteling office and employee training room.

### Vehicle Maintenance (VM) Features

- (4) Bays of Interior Vehicle Storage - designed for efficient bus storage with pedestrian safety and circulation in mind. The layout will accommodate a Battery Electric Bus Charging lane or lanes as determined by BCRTA.
- (4) Vehicle Maintenance Bays - drive through bays, fall arrest, portable vehicle lifts available at select bays. Adjacent to the vehicle bays are facility services and a VM multipurpose space with ample natural light.
- (2) Lanes for Vehicle Fueling - Independent fueling island designed to accommodate diesel fueling.
- (2) Vehicle Wash Bays - (1) automatic washing system and (1) manual wash down bay.

## PUBLIC CONNECTION

The project will create opportunities for varied and frequent connections with the public.

- W Chestnut St. Parking (Park and Ride) - connections to BCRTA services in Oxford, Middletown, and Hamilton.
- Future Category 4 Amtrak Platform - connection to Cardinal long distance passenger service, which runs between Chicago and New York
- Future Connection to (OAT) City of Oxford Area Multi-Use Trail System - non motorized local trail system.
- Future S Main St. - expansion of north to south collector roadway.

## ARCHITECTURAL / VISUAL CONNECTION

The renderings proposed in this report were created to inspire, and to be respectful of the surrounding context, and to provide a sense of place for BCRTA. Continued coordination with Miami University and City stakeholders will ensure this project is a desirable addition to the City of Oxford. With respect to material selection and scale, Bowen will approach these with sustainability, durability, and riders in mind.

## DESIGN TEAM

This report signifies the completion of Part 1 - Concept Design. Throughout this phase of design, Bowen has engaged the consulting team members to assure the concept provided in this report is feasible. The outlines by Urban, Lawhon, Bayer Becker, expand on the program requirements to position the design team to begin engineering and documentation efforts.

- Bowen - Architectural and Structural services, along with Project Management and Enhanced Construction Administration Services.
- Urban Engineers - Mechanical, Electrical, Plumbing, Technology/Security.
- Bayer Becker - Survey, Civil, and Landscaping
- Terracon - Geotechnical Engineering and Construction Testing
- ORColan - Right of Way + Acquisitions
- Lawhon & Associates, Inc. - Environmental / NEPA Planning
- NV5 - Estimating + Scheduling

As we move forward,  the design team will work in a 3D modeling environment (Revit) to develop the concept plans into a fully realized building. Bowen will continue conversation with BCRTA and its partners as well. To maintain Owner's oversight, there are multiple pencils-down review periods planned.


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Terracon ORC REAL ESTATE SOLUTIONS FOR INFRASTRUCTURE LA Lawhon & Associates, Inc. NV5

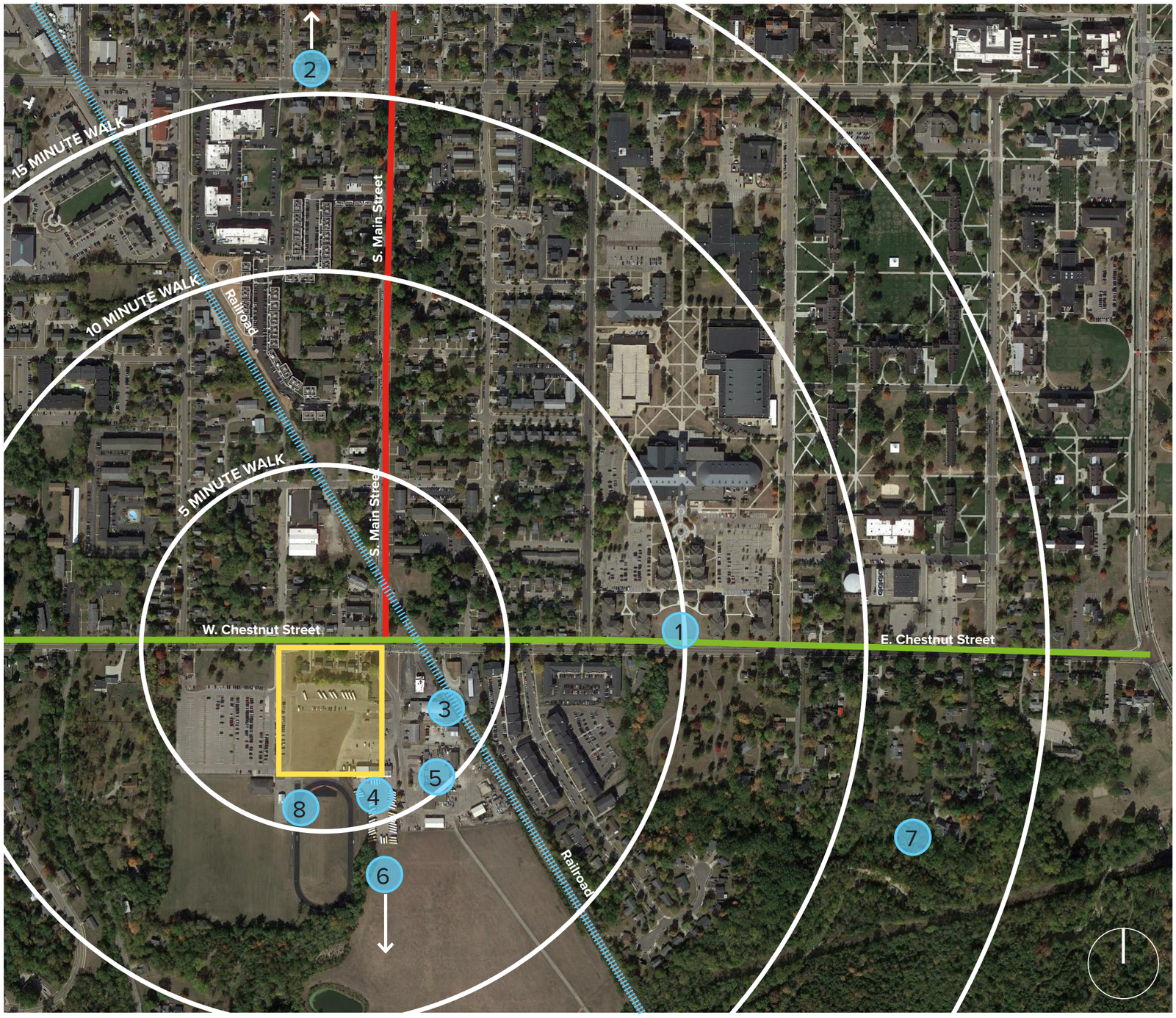
# SURROUNDING CONTEXT

Several surrounding landmarks and connections impact the BCRTA site.

- 1/2 mile: Miami University Housing complex located at the Southern end of the Campus. (1)
- 1 mile: Historic Downtown Oxford (2)
- Direct: Amtrak Cardinal Line (New York City to Chicago) via proposed category IV passenger platform (3)
- Encroaches: Talawanda City School District Bus Maintenance and Storage (4)
- Adjacent: City of Oxford Township Trustees and the Oxford City Garage. (5)
- Connect: future Oxford Area Trails (OAT) System expansion along the proposed S. Main extension (6)
- Near: 1,000 Acres of Preserve and Natural Area. (7)
- Adjacent: Miami University field house and track. (8)

## ARCHITECTURAL VOCABULARY

From the brick laid streets of Uptown Historic District to the Georgian style brick and stone of the University Historic District and Western Historic District, the City of Oxford offers many examples of great architecture that withstand the test of time. The following pages capture historic as well as more modern examples.




Oxford, Ohio Map Detail

## LANDMARKS + SENSE OF PLACE

*LANDMARK + SENSE OF PLACE | PULLEY BELL TOWER*

*THE TRI-DELT SUNDIAL OVERLOOKING MACCRACKEN HALL*

*MAIN STREET OXFORD, OHIO*

## HISTORIC ARCHITECTURE

*UPHAM HALL ARCH: BRICK DETAIL*

*HISTORICAL, HORIZONTAL, PEDESTRIAN SCALE: ALUMNI HALL*

*HISTORICAL + VERTICALITY: KUMLER CHAPEL*

## MODERN SPACES

*WESTERN DINING COMMONS | CBT ARCHITECTS*

*MODERN + NATURAL LIGHT: WESTERN DINING COMMONS | CBT ARCHITECTS*

*MIAMI UNIVERSITY ART MUSEUM | SKIDMORE, OWINGS AND MERRILL*

## GREEN SPACES + PEDESTRIAN SCALE

*VIBRANT GREEN SPACE*

*UPHAM HALL*

*PLAZA BETWEEN BEECHWOODS AND HILLCREST HALLS*

# EXISTING SITE CONDITIONS

The project site is the former home of Talawanda High School. The school was built in 1956 and demolished in 2014 to make way for the W Chestnut Public Parking area, exterior BCRTA bus storage, and other Miami University needs. Two (2) fueling dispensers have remained on the site and are currently utilized by BCRTA and the Talawanda School District.

## SITE CONSTRAINTS AND EVALUATION

The following components impact access to, and usage of, the Chestnut Street site.

- Elevation change 10ft from West to East (Low)
- Coordination with City garage secure site
- Access to Miami University Field House
- Buffer between site and residential properties North
- Traffic control at S. Main and Chestnut
- Shared drive with W Chestnut Park and Ride ( approx. 400 spaces)
- Talawanda School Bus exterior storage
- Frontage to W Chestnut and S Main
- Bike/ trail connection along future S Main Street
- Connection East - Future Amtrak Platform
- Connection West - Existing Park and Ride Lot

*FUELING SHELTERS*


*FRONT GATE W. SIGNAGE + BUILDING*


*ENTRANCE FROM S. MAIN AND CHESTNUT*

*ENTRANCE FROM CHESTNUT + S. BEECH | PARK AND RIDE LOT*

# CIVIL, LANDSCAPE, AND SITE UTILITIES

**Civil**

- 73 secure side parking spaces including ADA stalls near entrances and 8 Electric Vehicle charger locations.
- Several short retaining walls will be necessary throughout the site to assist with grade transitions.
- Emergency Generator
- Dumpster
- The site is substantially enclosed by security fencing, the color style, and detail of which will be determined in later phases of design. In coordination with the building architecture, the perimeter fence will be broken up with landscape walls, screening walls, and softened with plantings.
- Water quality best management practice

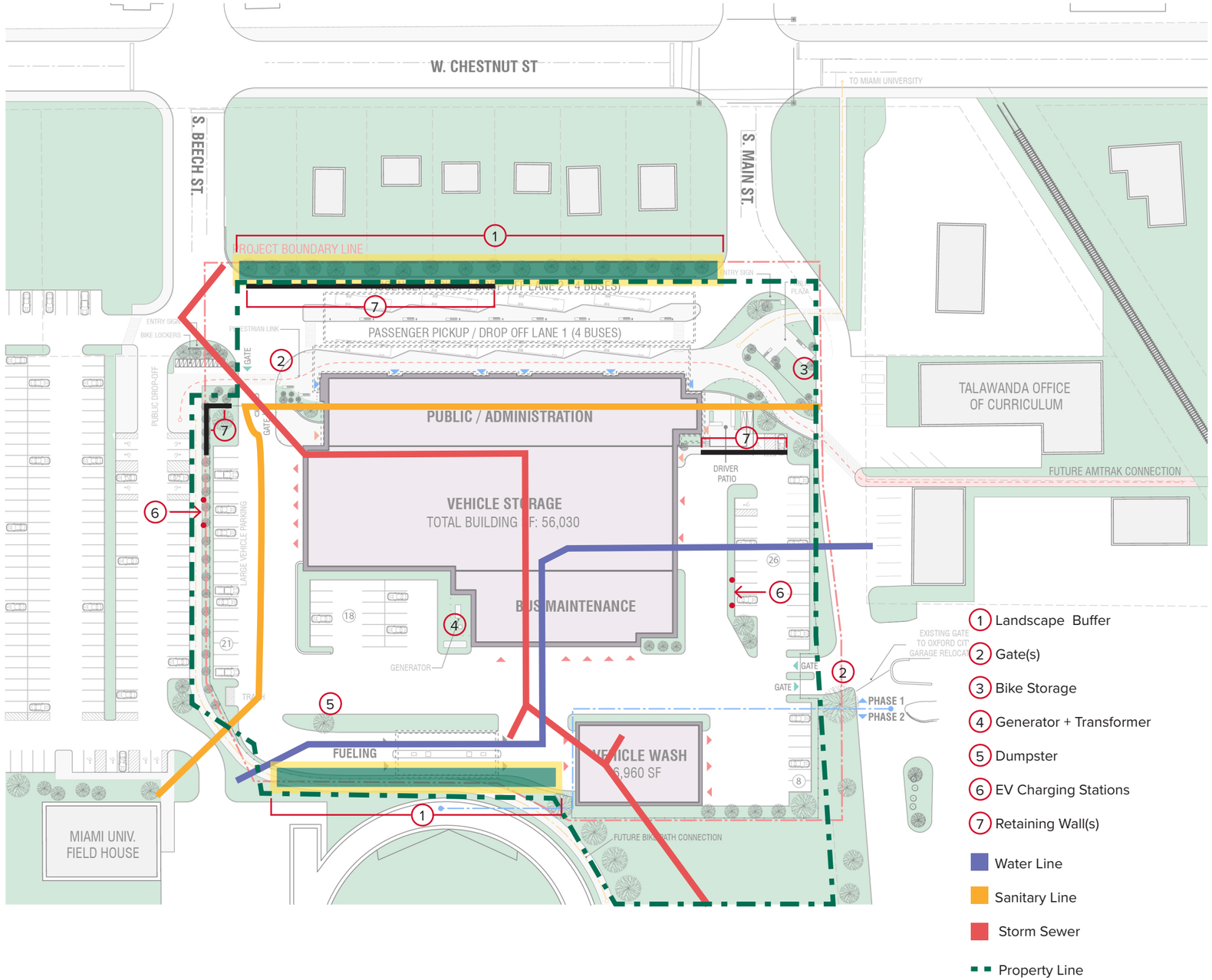
**Landscaping**

- Use of cobble surfacing to minimize maintenance.
- Tree buffer along north between residential neighbor, and tree buffer to the south between the field house track.
- Shade trees through the property to meet code and reduce surface temperature of the extensively paved lot.
- The public plazas will be laid in one (1) or multiple paver types to support the sense of place while providing subtle way finding to riders new to the station.

**Site Utilities**

The site contains several existing utilities which will need to be relocated to accommodate the proposed buildings.

- An existing 8” sanitary sewer bisects the northern portion of the site.
- A series of storm pipes starting to the west and entering the property to the center before heading south.
- A water line originates at the main to the east and enters the site midway before heading south to serve the existing block building to the southwest.



**Photovoltaic Solar Panels**
Solar Panel installations provide an excellent opportunity to offset operational expenses, while taking advantage of renewable solar energy. The large roof areas of the bus storage and maintenance facility are ideal for photovoltaic (PV) solar panels. Covered walkways and potential covered parking area could increase potential size of the solar panel installation. Based on current solar panel power density and proposed roof area we estimate that the BCRTA facility could provide 600 KW of electric generation. Should BCRTA decide to advance the concept, the solar panel design will provide recommendations for coverage, as well as panel alignment to maximize the solar capture, including the load-weight of panels for coordination with structural elements of the project. The next phase of design will also evaluate the installation of solar panels on canopies. Additionally, solar panel system interconnection to grid will be coordinated with the utility company.

**Battery-Electric Bus Charging**
Development of Battery-Electric Bus (BEB) charging systems including type, location and quantities require close coordination with the BEB vehicle manufacturer and agency bus operation plans. Our design currently would provide for the incoming electrical service size, main electrical distribution equipment and conduits to bus parking areas to provide for future electric bus operations. Should BCRTA wish to advance BEB Operations to coincide with the design of the facility, we will develop recommendations, evaluating US-based vehicle and charging equipment manufacturers (OEMs), current (and future) technologies, and existing site and infrastructure conditions. We will evaluate and provide recommendations for cord-reel plugs (wall and gantry mounted) and overhead pantographs. Given the constraints of the site and facility, physical space is a commodity; we will evaluate space-saving power dense vertical configurations for equipment and infrastructure. As part of our evaluation, we will identify the pros and cons of potential equipment, providing conceptual strategies for procurement, including evaluating equipment that is readily available from state procurement schedules.

**Key Risks + challenges BEB Implementations**
Key risks and challenges associated with BEB Implementation,

| KEY RISKS | MITIGATION STRATEGIES |
|---|---|
| Evaluation of complex variables, maintaining continuity and compatibility of existing and new systems and infrastructure. | Comprehensive and holistic approach to planning, design, and construction by technical experts. |
| Funding sources to implement improvements by deadlines. | Understanding and evaluation of funding resources, credits, and tariffs. |
| **KEY CHALLENGES** | **POTENTIAL SOLUTIONS** |
| Physical space constraints for new equipment and infrastructure, while limiting use and impact of existing facility and bus storage capacity. | Modular and scalable alternatives, evaluation of emerging charging technologies |
| Utility coordination: capacity upgrades, resiliency, renewable energy resources, management of peak demands | Proactive coordination and collaboration early in design progress with utility provider |
| Balancing capital costs, while maintaining flexibility for future phase implementation and technology updates | Strategic phasing and implementation plan; stakeholder engagement throughout design process; deep understanding of charging technology and advancements |

**Outdoor Amenities**
The planting design will consist of vegetated buffers between residential uses and the campus to the north and between the field house track and the campus to the south. Shade trees will be strategically located throughout the property to meet code requirements and help to reduce heat island effect. Plants may also be used to screen mechanical equipment, and/or trash enclosures. The plant palette will consist of native / adaptive plants where practicable. The balance of plants will be selected from a list that have proven to perform well in the region, while avoiding those that are invasive or detrimental to the environment.

Public plazas and key hardscape areas will utilize durable materials such as cobble stone surfacing and pavers. These products can offer lower long-term maintenance and greater longevity as well as provide an aesthetic quality that supports a sense of place for the campus. Changes in materials can be used to subtly convey wayfinding information to riders new to the station. The paver system will respond to geotechnical information and the intended use (vehicular versus pedestrian) to extend the lifecycle of the system.

Site amenities will include covered canopies at passenger drop-off / pick-up areas and site furnishings such as benches, bicycle racks, storage lockers, litter receptacles, electric vehicle charging stations and potential phone charging stations. The site will be substantially enclosed by security fencing, the color and style of which will be determined in later design phases and in coordination with the building architecture. This perimeter fencing may be enhanced to provide visual relief through landscape screening, decorative walls and/or softened with plantings.

Pedestrian connections will be provided that strengthen the relationship between public sidewalks, administration building, public plaza, passenger pick up waiting area, adjacent rail platform, parking lot, outdoor employee break room and other important outdoor connections. These connections will be articulated to improve safety, promote a sense of well-being, and provide a welcoming environment for community users.

Lighting will be provided across the site to enhance pedestrian safety. Fixtures will be selected that provide three levels of illumination: (1) Parking Lot Lighting with fixtures that range between 18’-25’ ht., (2) Pedestrian Scale Lighting with fixtures that range 12’-14’ ht., and (3) Bollard Lights / Pathway Lights along primary pedestrian walks and drop off locations.

Irrigation may be installed in strategic, high visibility areas on the campus to ensure long-term plant viability. The location for irrigation will be coordinated with the Owner.

# ENVIRONMENTAL ASSESSMENT

Lawhon & Associates, Inc. (L&A) has worked with the design team to complete or is in the process of completing the following tasks. Also included is some information regarding future work which will be addressed as design or construction occurs. L&A continues to coordinate with the design team and BCRTA to assist with the NEPA process and with specific tasks required for NEPA compliance.

## PHASE I ESA

The Phase I ESA was performed in accordance with the scope and limitations of American Society for Testing and Materials (ASTM) Designation: E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. The Phase I ESA revealed no evidence of recognized environmental conditions (RECs), controlled recognized environmental conditions (CRECs) or historical recognized environmental conditions (HRECs) in connection with the subject property.

**Findings:**
The following items were noted but are not considered RECs as defined by ASTM E 1527-13. However, these items may need to be addressed prior to any future renovations or redevelopment of the subject property.

- Based on available information, there are no reported deficiencies associated with a 5,000-gallon diesel underground storage tank (UST) and a 10,000-gallon diesel UST. As such, the presence of these tanks is not considered a current REC, and do not require further investigation at this time. However, if the USTs are no longer in use or will be impacted during future redevelopment of the subject property, it is recommended that all necessary permits be obtained, and a proper closure assessment be performed in accordance with Bureau of Underground Storage Tank Regulations (BUSTR) regulations.

## HAZARDOUS BUILDING MATERIALS SURVEY

L&A conducted a Hazardous Materials Assessment for BCRTA at the Talawanda Bus Garage located at 131 W Chestnut Street, Oxford, Ohio 45056. The purpose of the assessment was to determine if potential hazardous materials will be impacted by proposed demolition/renovation activities. L&A inspected all building materials, including roofing materials. All electrical components were energized at the time of the assessment. Electrical components have been assumed for reporting purposes.

**Asbestos Containing Materials Summary**
The following assumed asbestos containing materials are present within the Talawanda Bus Garage. These materials will require abatement by a State of Ohio Licensed Asbestos Abatement Contractor prior to renovation/demolition work which will impact the materials.

- Electrical Components (Category II Non-Friable) (Assumed)- 10 square feet found in the shop area and the east office utility room.

**Lead Based Paint Summary**
No building components were identified as coated with paint containing lead at concentrations greater than 1.0 mg/cm2 within the Talawanda Bus Garage.

## NEPA NOISE AND VIBRATION ASSESSMENT:

L&A completed a noise and vibration analysis included in the BCRTA NEPA document as required by the Federal Transit Administration (FTA).

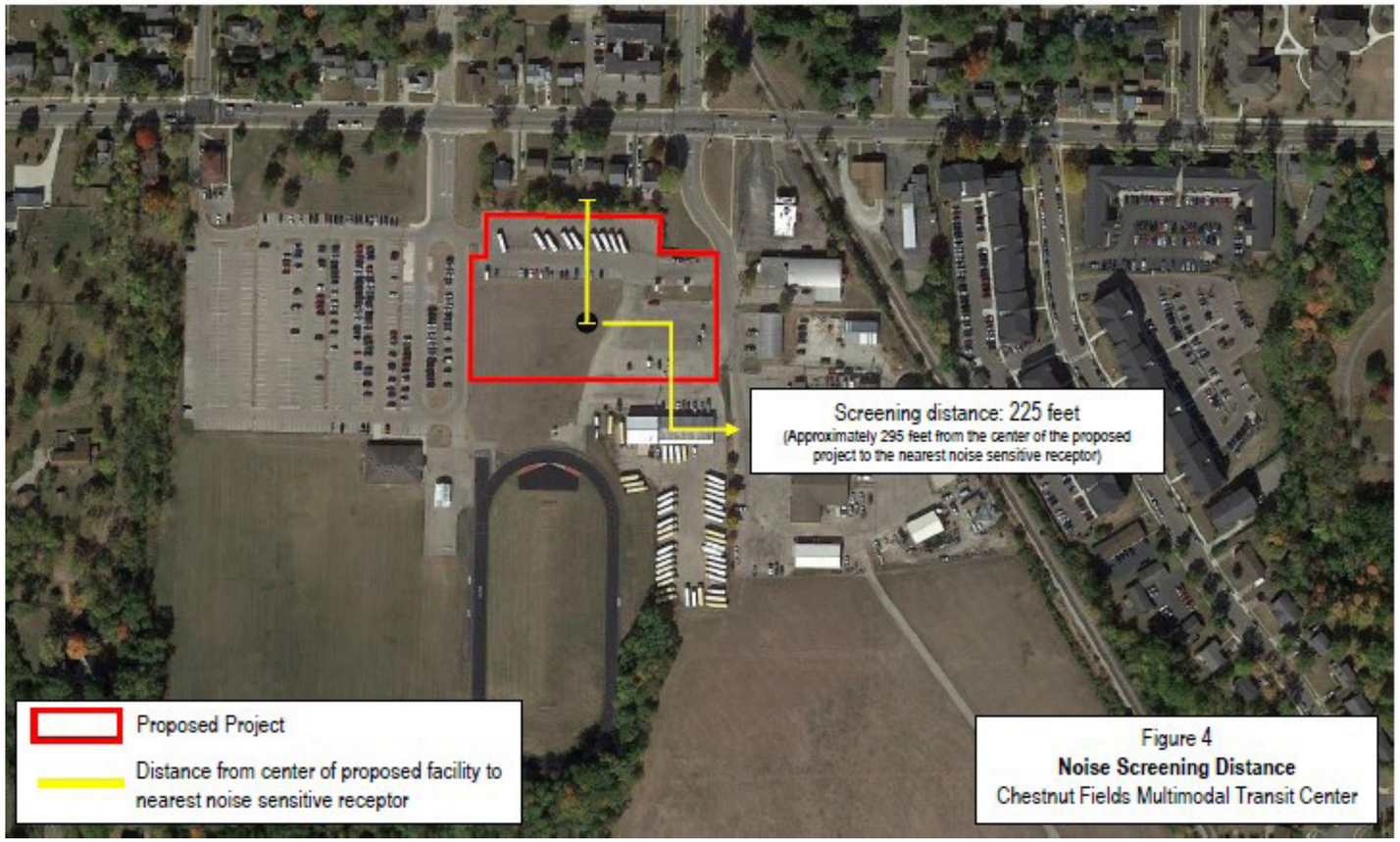
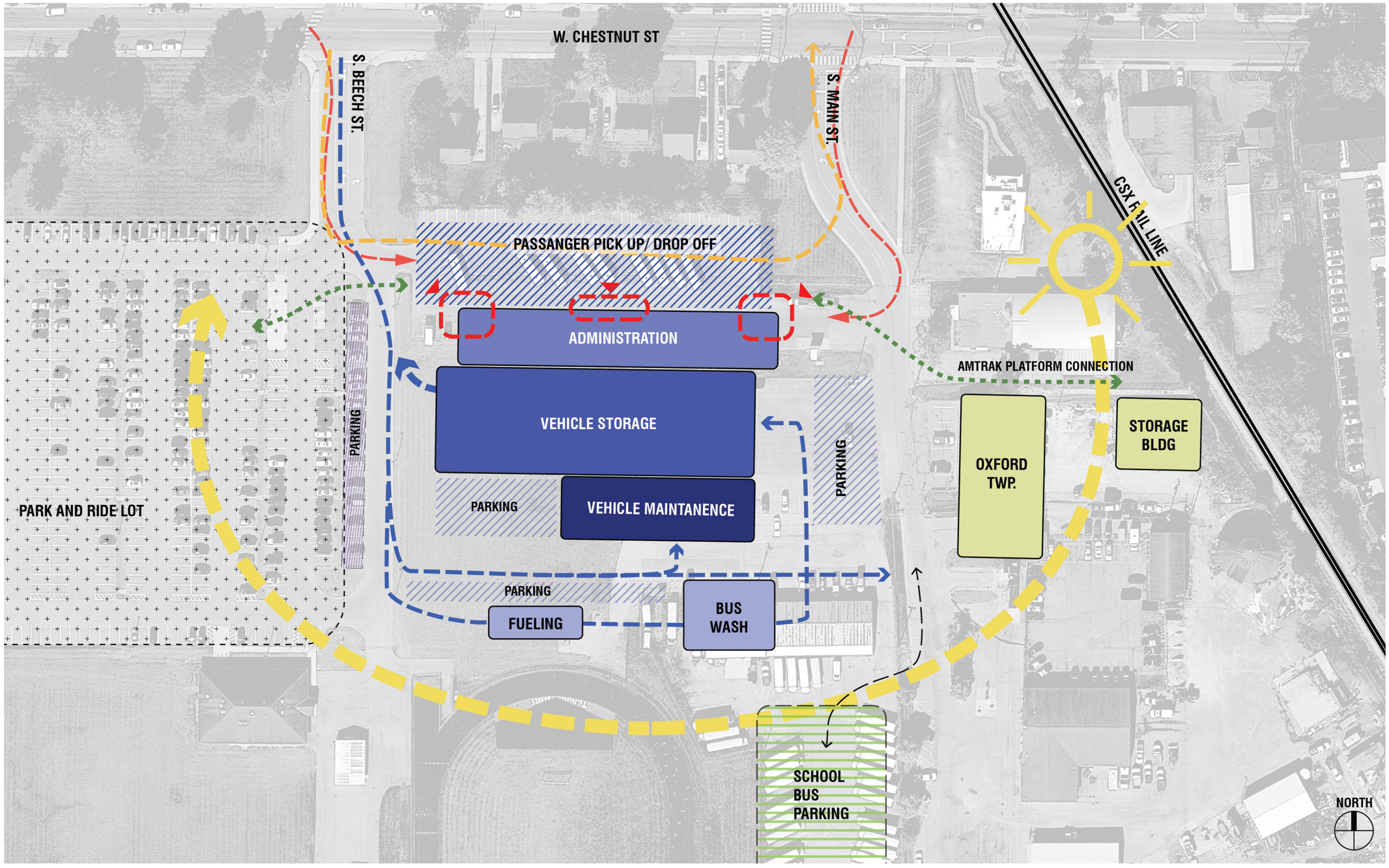



Figure 4
**Noise Screening Distance**
Chestnut Fields Multimodal Transit Center

**Noise Analysis**
The noise screening procedure, as described in Section 4 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment guidance document, has been utilized to determine screening distances for noise sensitive receptors in the project area. There are currently no noise sensitive receptors located within the screening distance and no additional noise analysis work would be anticipated.

**Vibration Analysis**
Based on a review of the project area, the nearest vibration sensitive land use would be approximately 300 feet from the proposed transit facility. According to the FTA guidance document, a project that includes any type of rubber tire, such as cars and buses, generally do not have vibration impact. A Vibration Screening Analysis, as described in Chapter 9 of the FTA Transit Noise and Vibration Impact Assessment guidance document has been prepared to identify whether the proposed project could result in adverse vibration impact on receptors located within the project corridor. Screening distances will be determined based on project type and land use categories. Currently there is not an indication that more detailed Vibration Analysis would be required.

# SITE ANALYSIS- CONCEPT DESIGN SITE FLOW



# PROGRAM OF REQUIREMENTS

## BCRTA Multi-Modal Transit Facility

Chestnut Street - Oxford, OH

Bowen

2019 Center Street, Suite 500, Cleveland, Ohio 44113

August 25, 2021

Job No: 13405.00

## SUMMARY OF SPACE REQUIREMENTS

***(Including Additional Program Areas)***

### DEPARTMENT SUMMARY

| SPACE REQUIREMENTS | SPACE PROJECTION | | |
|---|---|---|---|
| Department | Net Space | Gross Area | Remarks |
| Shared Fueling | **175** | **184** | All exterior space excluded from Building Area |
| Wash Facility | **6,100** | **6,527** | |
| Vehicle Storage | **23,460** | **29,677** | |
| Vehicle Maintenance | **7,790** | **9,854** | |
| BCRTA Offices | **3,080** | **4,066** | All exterior space excluded from Building Area |
| Shared Spaces | **5,685** | **7,504** | |
| Public Spaces | **3,580** | **4,654** | All exterior space excluded from Building Area |
| **Total Assignable Area in SF** | **49,870** | | Utitlity Support space currently calculated as % Program elements. |
| **TOTAL PROJECTED BUILDING AREA** | | **62,466** | **GROSS SQ. FT. BUILDING AREA** |
| **PROJECTED SITE DEVELOPMENT AREA** | | **24,730** | square footage for programmed site development areas only |
| | | **0.57** | **Acres** (*Subject to change per layout)* |

General Comments/ Notes:

MEP: 480v Electrical Service and Outdoor Generator

Layout/ Design: Analyize possibility of solar field; roof strucutre, space planning, electrical considerations.

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## SHARED FUELING FACILITY

SPACE REQUIREMENTS — Space Projection

| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
|---|---|---|---|---|---|---|
| | | **FUELING FACILITY** | | | ***3,385*** | |
| | S | Fuel Island | 1 | 510 | **510** | Island will be 6' wide X 85' long - dual sided with 2 dual-hosed diesel dispensers |
| | S | Fuel Island Lanes | 2 | 1,350 | **2,700** | Lanes will be 12' wide and 85' long. Each lane will be able to accommodate a 35' bus and a 45' bus at the same time. Both lanes will be covered by canopy |
| | | Storage Room | 1 | 175 | **175** | Space to be exhausted and heated with unit heaters. If combustible fuels are stored must be explosion |
| | | NET ASSIGNABLE SPACE | | | **175** | All exterior space - not included in Program |
| | | AREA FACTOR | | 0% | **-** | Exterior space - ped circulation and vehicle path not included |
| | | CONSTRUCTION FACTOR | | 5% | **9** | |
| | | MECH/ ELEC FACTOR | | 5% | **9** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **184** | All exterior space - not included in Program |
| | | **PROJECTED SITE AREA (SF)** | | | **3,210** | |

General Comments/ Notes:
- MEP: Power and water required, vaccum equipment is desired by the BCRTA for interior @ Fueling
- MEP: Lighting to be provided under canopy (shield adjacent field house light spill )
- Equipment: Fueling pumps with communication network connections and alarming.
- Equipment: DEF tank/tote @ island + (2) double walled 10,000gal Undergound Storage Tanks
- Equipment: Squeegees shall be provided for windshields w/ appropriate accessories
- Design: High visibility bollards protecting dispensers. Prefered straight on approach (avoid quick turns)
- Shared: Miami Univ access to Fueling
- Site: All pavement area under canopy - storm water drainage to be tied to oil/water separator
- Layout: If CNG or Hydrogen, must be separate fueling dispenser. Hydrogen would likely be trucked in and require above grade storage tanks.

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## VEHICLE WASH FACILITY

SPACE REQUIREMENTS — Space Projection

| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
|---|---|---|---|---|---|---|
| | | **WASH FACILITY** | | | ***6,100*** | |
| | | Bus Wash Bay | 1 | 2,500 | **2,500** | BCRTA Buses. 26' x 100' long single wash bay. Ample draninage with sloped concrete. |
| | | Other Vehicle / Truck Wash Bay | 1 | 2,500 | **2,500** | 26' x 100' long single wash bay |
| | | Wash Equipment Room | 1 | 1,100 | **1,100** | Interior space for chemical and water tanks, pumps, settling pit, and all equipment related to the 2 wash bays. Room to be heated above freezing. Include recycle water tanks and draindown. |
| | | NET ASSIGNABLE SPACE | | | **6,100** | Circulation built into the space projection sqft for storage space/bay. |
| | | AREA FACTOR | | 0% | **-** | |
| | | CONSTRUCTION FACTOR | | 7% | **427** | |
| | | MECH/ ELEC FACTOR | | 10% | **610** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **6,527** | |

General Comments/ Notes:
- Equipment: Next Phase review drive-through vs. gantry type washers with the user groups for both wash bays
- Shared: Miami University to have access to the non-bus wash bay
- MEP: Exhaust/make-up air ventilation system, local unit heaters
- MEP: Consider water collection from roof for process water.

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## VEHICLE STORAGE

SPACE REQUIREMENTS — Space Projection

| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
|---|---|---|---|---|---|---|
| | | **VEHICLE STORAGE** | | | ***23,460*** | |
| | | 35-foot bus parking stall | 16 | 560 | **8,960** | 14' x 40' overall area per bus |
| | | 27-foot bus parking stall | 2 | 448 | **896** | 14' x 32' overall area per bus |
| | | Cut-Away bus parking stall | 12 | 392 | **4,704** | 14' x 28' overall area per bus |
| | | Minivan | 1 | 350 | **350** | 10' x 20' parking space |
| | | Administrative non-revenue car | 8 | 350 | **2,800** | 10' x 20' parking space (4 admin/ 4 other) |
| | | Fork Lift Parking | 1 | 50 | **50** | 5' x 10' parking space |
| | | By-Pass Lane | 1 | 3,000 | **3,000** | 15' x 200' lane (TBD depending on layout) |
| | | Pedestrian Circulation (E/W) | 1 | 500 | **500** | 5' x 100' |
| | | Pedestrian Circulation (E/W) | 2 | 1,100 | **2,200** | 5' x 200' |
| | | NET ASSIGNABLE SPACE | | | **23,460** | |
| | | AREA FACTOR | | 15% | **3,519** | Circulation built into the space projection sqft for storage stalls /bays. |
| | | CONSTRUCTION FACTOR | | 10% | **2,698** | |
| | | MECH/ ELEC FACTOR | | 10% | **2,346** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **29,677** | |

General Comments/ Notes:

Design: Skylights and clerestory windows are desired and will be built into the design

Layout: Stacked Bus Parking is preferred - "first in, first out", Avoid cross-traffic and blocking of non-revenue parking and VM areas.

MEP: In bus garage, storage and repair areas provide not less than 1.0 cfm/sf of continuous exhaust within 18" from the highest point in the ceiling to declassify the ceiling space and eliminate the need for the 18" hazard zone at the ceiling. Exhaust system will need to be designed 4ACH to allow electrical design within the 18" ceiling pocket. Also noted; fresh air intake during summer for comfort, and adequate bus storage exhaust during vehicle start-up.

Layout: To plan for future BEB charging hold aside floor/ wall area in close proximity to transformer for control panel and required power cabinets (1 per 2 charging pedestals) can be either non- enclosed or open. Aisle widths need adjusted for adequate clearance of charging pedestals. Provide (4) EV charging dispensions for non-revenue storage spaces.

MEP: Gas Detection for all fuel types (CNG/ Hydrogen).

MEP: Exhaust/make-up air ventilation w/ controls

Design: Visual impact of Overhead Coiling doors should considered, sheilded, or minimized.

Design: Consider pedestrian driver access through bus storage and maintenance areas.

Layout:Tie-in bypass lane with VM bays to allow for both interior and exterior access for mainenetance.

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## VEHICLE MAINTENANCE

SPACE REQUIREMENTS — Space Projection

| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
|---|---|---|---|---|---|---|
| | | **VEHICLE MAINTENANCE** | | | ***7,790*** | |
| | | Maintenance Bay | 4 | 1,200 | **4,800** | 20' x 60' bay (fall arrest in one bay), floor drains and sloped concrete under lift areas |
| | | Lube Room | 1 | 330 | **330** | Above-ground storage tanks pumped to lube reels at the bays, include shop air compressor. |
| | | Tire Storage Room | 1 | 200 | **200** | Tire storage may inpact fire supression. Consider total required tires and vertical rack. |
| | | Parts Storage Room | 1 | 300 | **300** | OH door for ext access, provide forklift drive aisle (6ft x Lenth) |
| | | Small Parts Repair Shop | 1 | 180 | **180** | Shared space, include workbench(s). |
| | | Hot (Welding) Room | 1 | 150 | **150** | Consider including welding in Repair Shop |
| | | VM Admin / Breakroom | 1 | 550 | **550** | Work area, meeting space, and small break area. Include "priviate space/ office". |
| | | Unisex Restroom | 2 | 80 | **160** | Each w/ ADA shower |
| | | Janitor Closet | 1 | 70 | **70** | |
| | | Locker Area | 1 | 250 | **250** | Adjacent to restrooms,10-14 lockers (standard size with incorporated bench), does not need to be enlosed. Also provide Uniform lockers (Big 8 or sim) with master door. |
| | | Facility Maintenance Shop | 1 | 300 | **300** | Storage/shop area to maintain the building |
| | | Facility Maintenance Storage | 1 | 300 | **300** | Cleaning Supplies, filters, etc., floor area required for rider floor scrubbing vehicle parking (6x3ft)cc and |
| | | Portable Lift Charging Station | 2 | 100 | **200** | Each set (4) portable lifts - need parking/charging area. Single phase, 3-phase, or battery powered |
| | | NET ASSIGNABLE SPACE | | | **7,790** | |
| | | AREA FACTOR | | 15% | **1,169** | |
| | | CONSTRUCTION FACTOR | | 10% | **896** | |
| | | MECH/ ELEC FACTOR | | 15% | **1,169** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **9,854** | |

General Comments/ Notes:

Equipment: (3) Portable Lifts, all maintenance bays will receive have lubrication reels including compressed air, power and a shop light. Recommend considering (2) fall arrest at BCRTA for future flexibility.

Equipment: Fueling and fluid despensing management system (Fleetwatch or sim), control panel in maintenance room

Layout: To plan for future BEB charging hold aside floor/ wall area in close proximity to transformer for control panel and required power cabinets (1 per 2 charging pedestals) can be either non- enclosed or open. Aisle widths need adjusted for adequate clearance of charging pedestals

MEP: Shared Compressed Air System (room area 10x12ft)

MEP: In bus garage, storage and repair areas provide not less than 1.0 cfm/sf of continuous exhaust within 18" from the highest point in the ceiling to declassify the ceiling space and eliminate the need for the 18" hazard zone at the ceiling. Exhaust system will need to be designed 4ACH to allow electrical design within the 18" ceiling pocket. Also noted; fresh air intake during summer for comfort, and adequate bus storage exhaust during vehicle start-up.

Code: Emergency eye wash station & shower

Layout: Consider eliminating wall separating VM Shop from VM Welding

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## BCRTA OFFICE SPACES

| SPACE REQUIREMENTS | | | Space Projection | | | |
|---|---|---|---|---|---|---|
| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
| | | **BCRTA OFFICE SPACES** | | | ***17,480*** | |
| | | Employee Entry Area | 1 | 300 | **300** | Include vestibule. *A work counter for customer service should be included in the customer side of bldg; might include infastructure for pamphlets, maps, or other interaction with public.* |
| | | Transportation Coordination (Dispatch) | 1 | 200 | **200** | Directly adjacency to the employee entry area. Include window to Garage for visual coordination |
| | | Copy/ Work Room | 1 | 100 | **100** | Direct adjacency to the Drivers Lounge. Proivde 2 sided mailboxes (35-40, letter size). |
| | | Dispatch | 1 | 180 | **180** | |
| | | Driver Lounge Area | 1 | 1,100 | **1,100** | Secured room (contains timeclocks, radios, keys to buses). 20-25 bus operations, includes kitchenette. |
| | | Office | 2 | 150 | **300** | |
| | | Hoteling Office | 1 | 450 | **450** | Includes (2) workstations and (4) chair table. For used by Executive Direction, Director of Operations, Mobility Manager, other management level employees. |
| | | Info/ Tranaction Office | 1 | 150 | **150** | (1) people with Tranaction Window |
| | | Conference Room | 1 | 300 | **300** | Large Conference Room |
| S | | Outdoor break area | 1 | 400 | **400** | Gated and out of public sight. Screen or canopy dependant on site layout and design. |
| S | | Employee Parking Space | 40 | 350 | **14,000** | Gated employee lot. Consideration for public parking customer service interactions. |
| | | NET ASSIGNABLE SPACE | | | **3,080** | |
| | | AREA FACTOR | | 20% | **616** | |
| | | CONSTRUCTION FACTOR | | 10% | **370** | |
| | | MECH/ ELEC FACTOR | | 5% | **154** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **4,066** | All exterior space - not included in Program |
| | | **PROJECTED SITE AREA (SF)** | | | **14,400** | |

General Comments/ Notes:
MEP: Print area shall have local exhaust. HVAC shall be PTAC or split-system.
Civil: Electric vehicle (EV) charging

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## SHARED SPACES

| SPACE REQUIREMENTS | | | Space Projection | | | |
|---|---|---|---|---|---|---|
| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
| | | **SHARED OFFICE SPACES** | | | **5,685** | |
| | | Employee Breakroom | 1 | 1,200 | **1,200** | 20-25 people. Will need to define requirements of snack shop & Kitchenette. Wall for cubby lockers. Soft and hard seating, Timeclock w/ bulletin area. Floor area for additional entertainment (i.e. pool table) |
| | | Quiet Room | 1 | 340 | **340** | |
| | | Mother's Room | 1 | 70 | **70** | Chair, side table, fridge, sink. |
| | | Restrooom Mens | 1 | 250 | **250** | Ample fixtures for constant avaibility. Adjacent to Breakroom |
| | | Restroom Womens | 1 | 250 | **250** | Ample fixtures for constant avaibility. Adjacent to Breakroom |
| | | Custodial Closet (large) | 1 | 150 | **150** | Ample space for storage of paper items |
| | | Community Room | 1 | 1,750 | **1,750** | 120 seat - theater setting. Dividable w/ operable parition |
| | | Community Room: Table/Chair Storage | 1 | 200 | **200** | Connected to Community Room |
| | | Community Room: Kitchenette | 1 | 250 | **250** | Direct adjancency to Community Room, include, sink, fridge (w/ freezer), prep counter, and must |
| | | Meeting / Conference Room | 1 | 175 | **175** | 12 people |
| | | Training Room | 1 | 450 | **450** | 10-12 people plus Instructor. Classroom style computer lab. |
| | | Training Room: Storage | 1 | 200 | **200** | Direct adjacency to Training Room |
| | | IT / Communications Room | 1 | 175 | **175** | |
| | | Mechanical/Electrical Room(s) | 1 | 225 | **225** | |
| S | | Emergency Generator | 1 | 120 | **120** | Site area to account for Transformer as well. |
| S | | Dumpster Location | 1 | 150 | **150** | Confirm requirements |
| | | NET ASSIGNABLE SPACE | | | **5,685** | |
| | | AREA FACTOR | | 20% | **1,137** | |
| | | CONSTRUCTION FACTOR | | 10% | **682** | |
| | | MECH/ ELEC FACTOR | | 5% | **284** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **7,504** | |
| | | **PROJECTED SITE AREA (SF)** | | | **270** | |

General Comments/ Notes:
MEP: Community room shall have dedicated HVAC system with ventilation control- Rooftop packaged unit(s) with energy recovery
MEP: Training and conference room HVAC systems shall be SSAC with ventilation control.
MEP: Restrooms shall have exhaust
MEP: Power & Lighting w/control systems
Equipment: If food will be prepared for commercial transactions kitchen must meet commercial cooking requirements with hood/makeup air system.

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

## PUBLIC SPACES

| SPACE REQUIREMENTS | | | Space Projection | | | |
|---|---|---|---|---|---|---|
| Dept. | No. | Area Name | No. of Spaces | Unit S.F. | **Net S.F.** | Remarks |
| | | **PUBLIC SPACES** | | | **10,430** | |
| | | Public Concourse / Waiting area | 1 | 3,000 | **3,000** | 40 fixed seats (min. 15sf/occ). Ample receptacles for phone charging w/ USB ports. |
| | | Men's Restroom | 1 | 250 | **250** | Public and to service Community Room |
| | | Women's Restroom | 1 | 250 | **250** | Public and to service Community Room |
| | | Family Restroom | 1 | 80 | **80** | Provide baby changing station |
| | S | Bus Berths | 8 | 650 | **5,200** | Sawtooth is prefered layout, (2) lanes are accetable. |
| | S | Bike Parking | 1 | 250 | **250** | 6 unit concrete pad = 12 bike capacity. Will allow site space for expansion. Provisions for public bike repair. |
| | S | EV Charging | 4 | 350 | **1,400** | Dual port charging (sim to chargepoint CT4021) |
| | | NET ASSIGNABLE SPACE | | | **3,580** | |
| | | AREA FACTOR | | 20% | **716** | |
| | | CONSTRUCTION FACTOR | | 10% | **358** | |
| | | MECH/ ELEC FACTOR | | 5% | **179** | |
| | | **TOTAL PROJECTED AREA (SF)** | | | **4,654** | All exterior space - not included in Program |
| | | **PROJECTED SITE AREA (SF)** | | | 6,850 | |

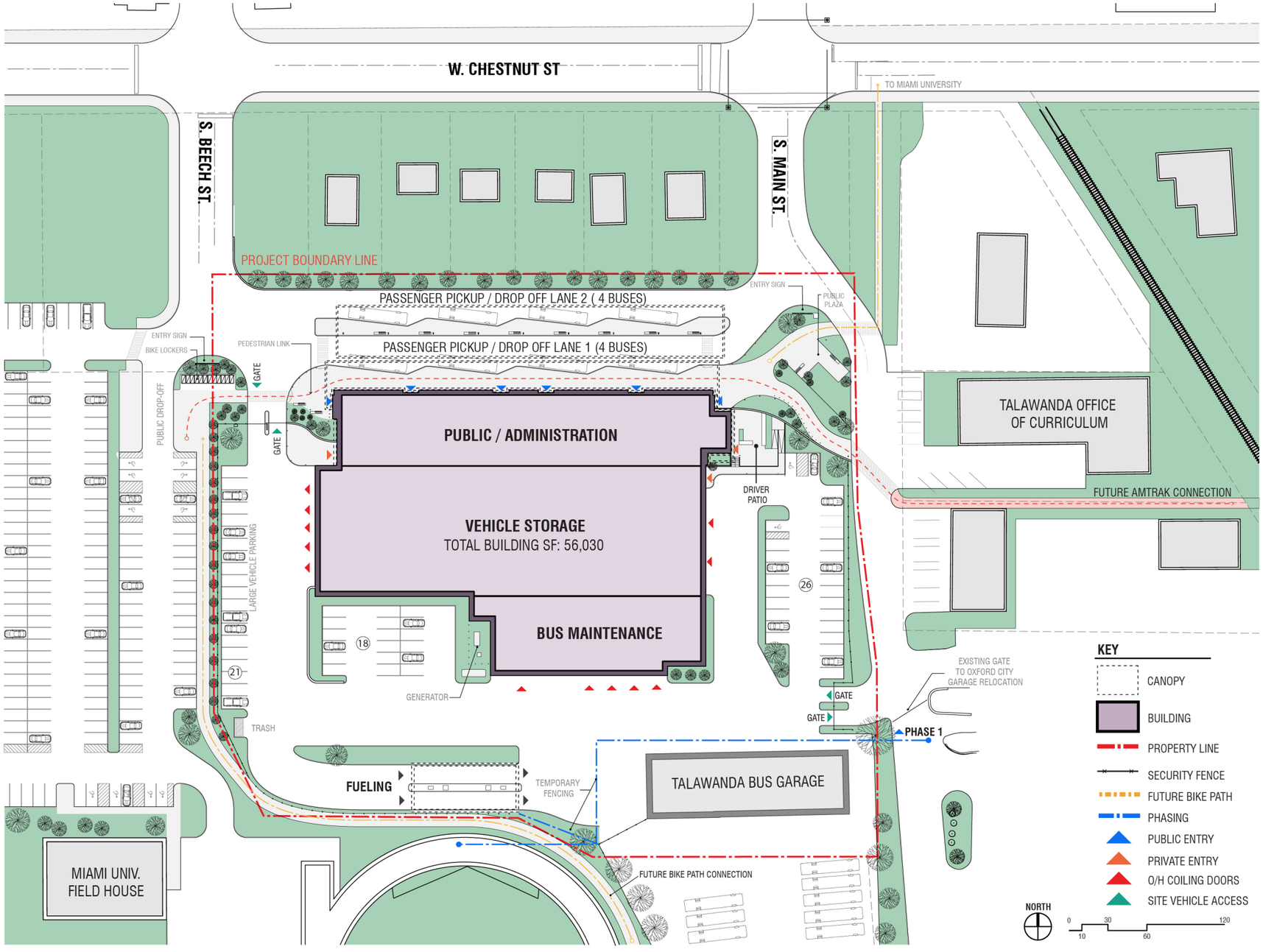
General Comments/ Notes:
MEP: Waiting Room have dedicated HVAC system with ventilation control- Rooftop packaged unit(s) with energy recovery
MEP: Restrooms shall have exhaust
MEP: Power & Lighting w/control systems
Site Layout: Exterior Seating

NOTE: PROGRAM BASED ON REVIEWS WITH USER GROUPS; This information will be the basis for testing concept layouts and may be revised or refined.

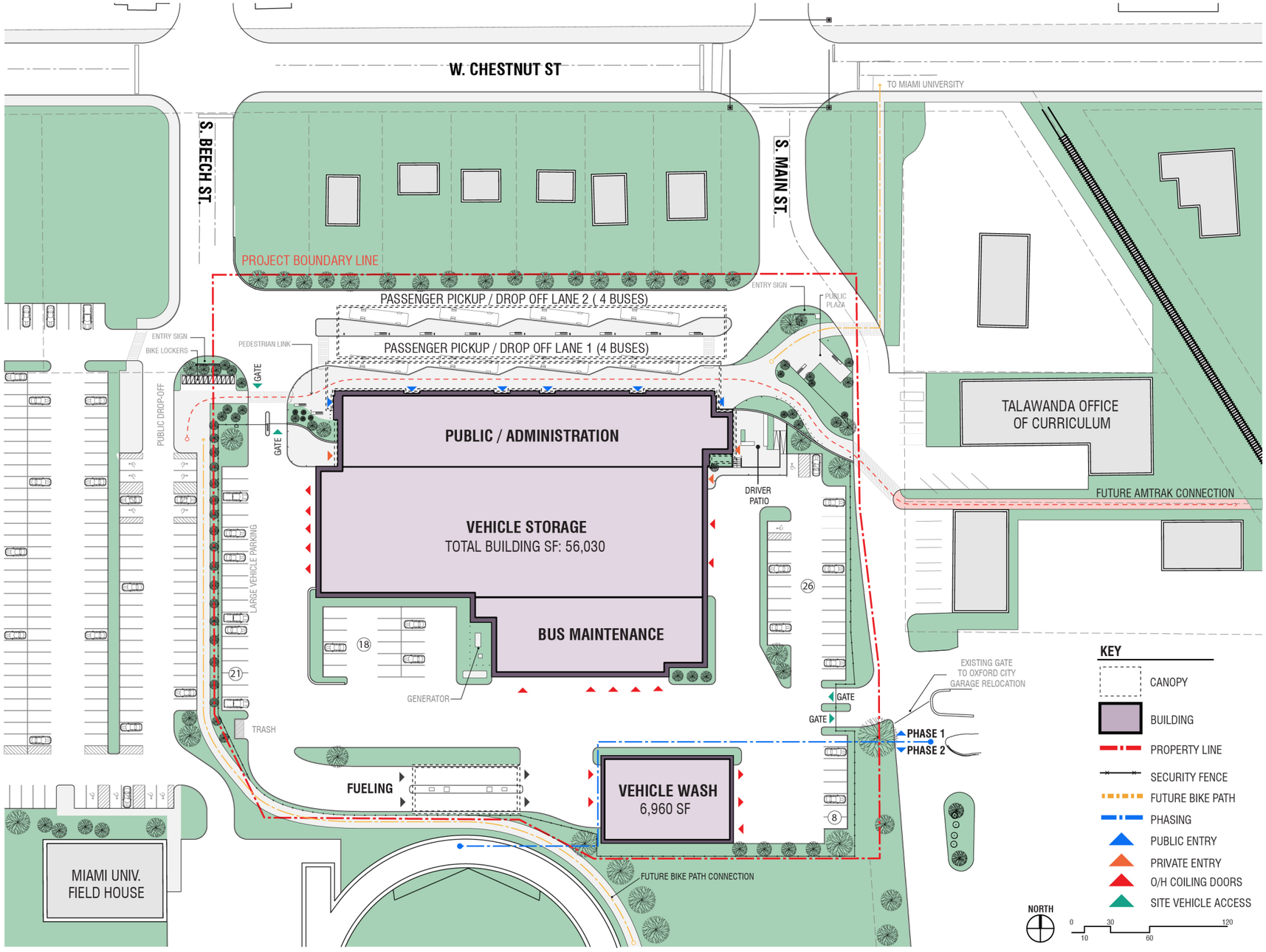
# PLANS + CONCEPTUAL RENDERINGS

# CONCEPTUAL PLANS

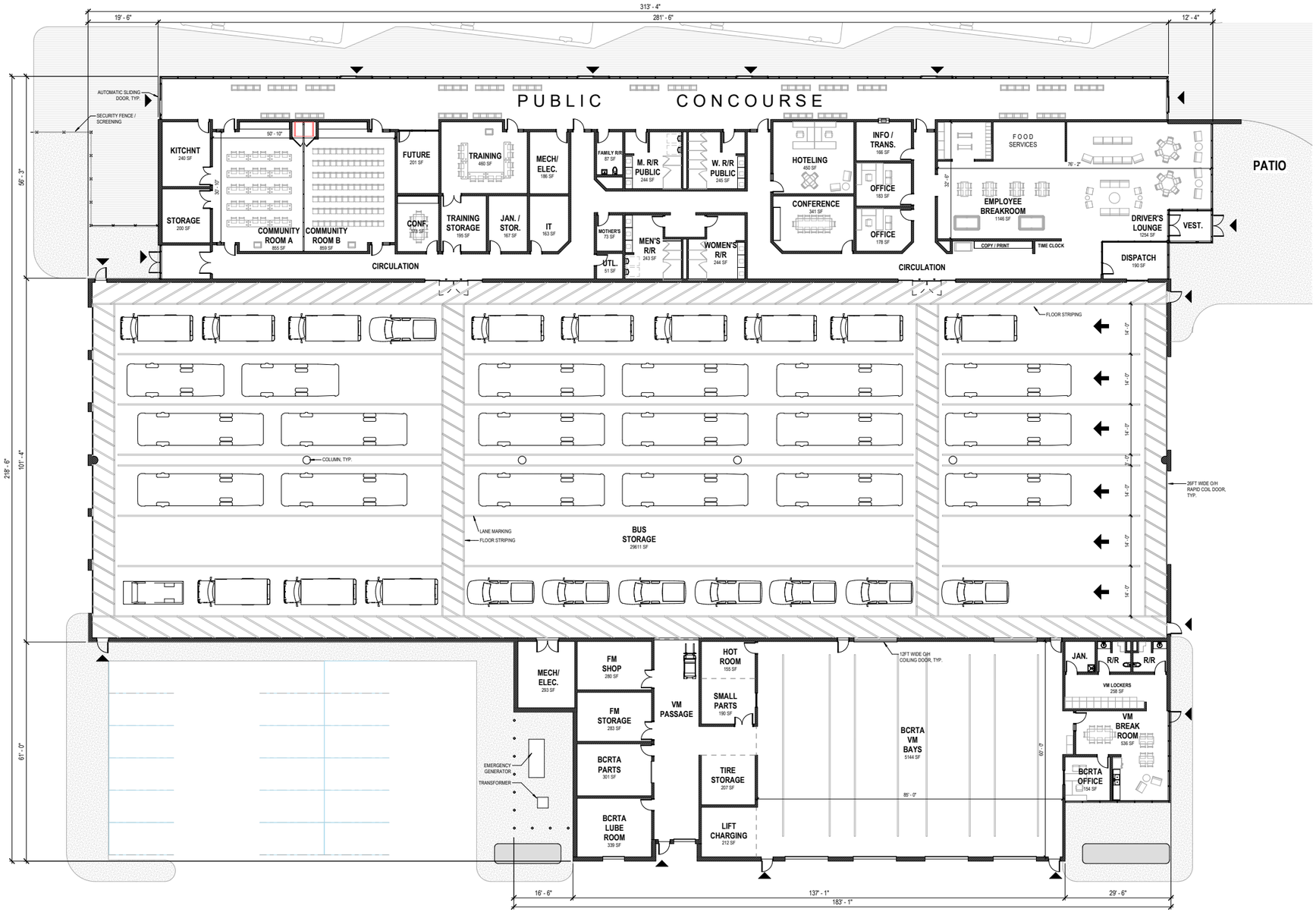
## SITE PLAN | PHASE 1



# SITE PLAN | PHASE 2



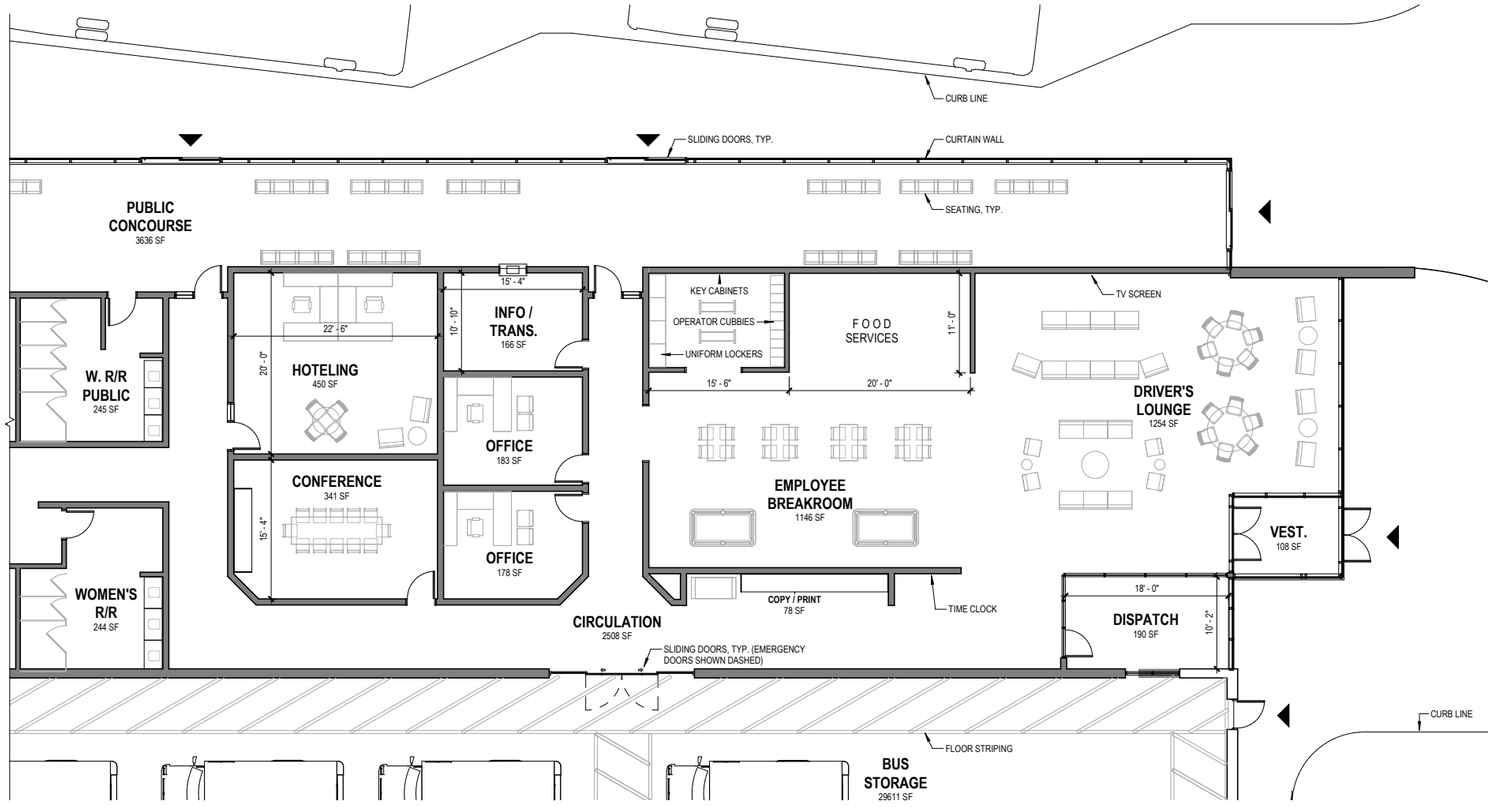
# FLOOR PLAN

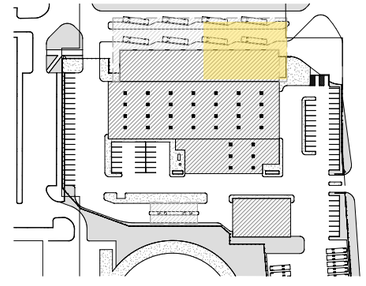



**FIRST FLOOR PLAN**

SCALE: 3/32" = 1'-0"

# FLOOR PLAN | ADMINISTRATION DETAIL - EAST DETAIL



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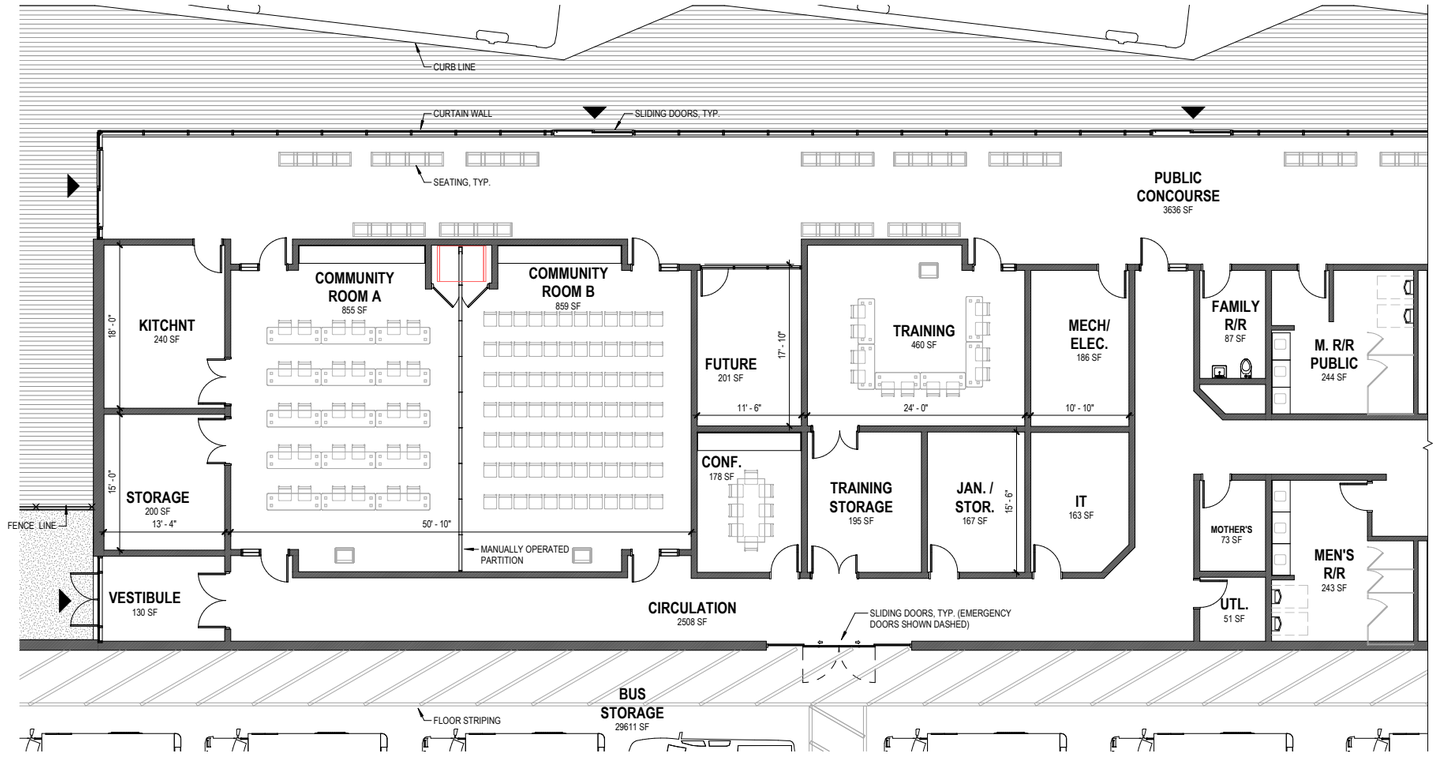
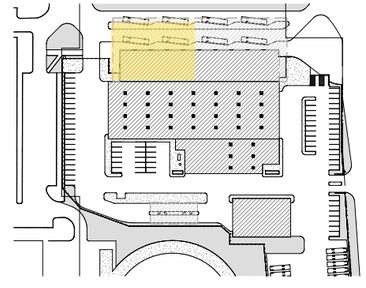
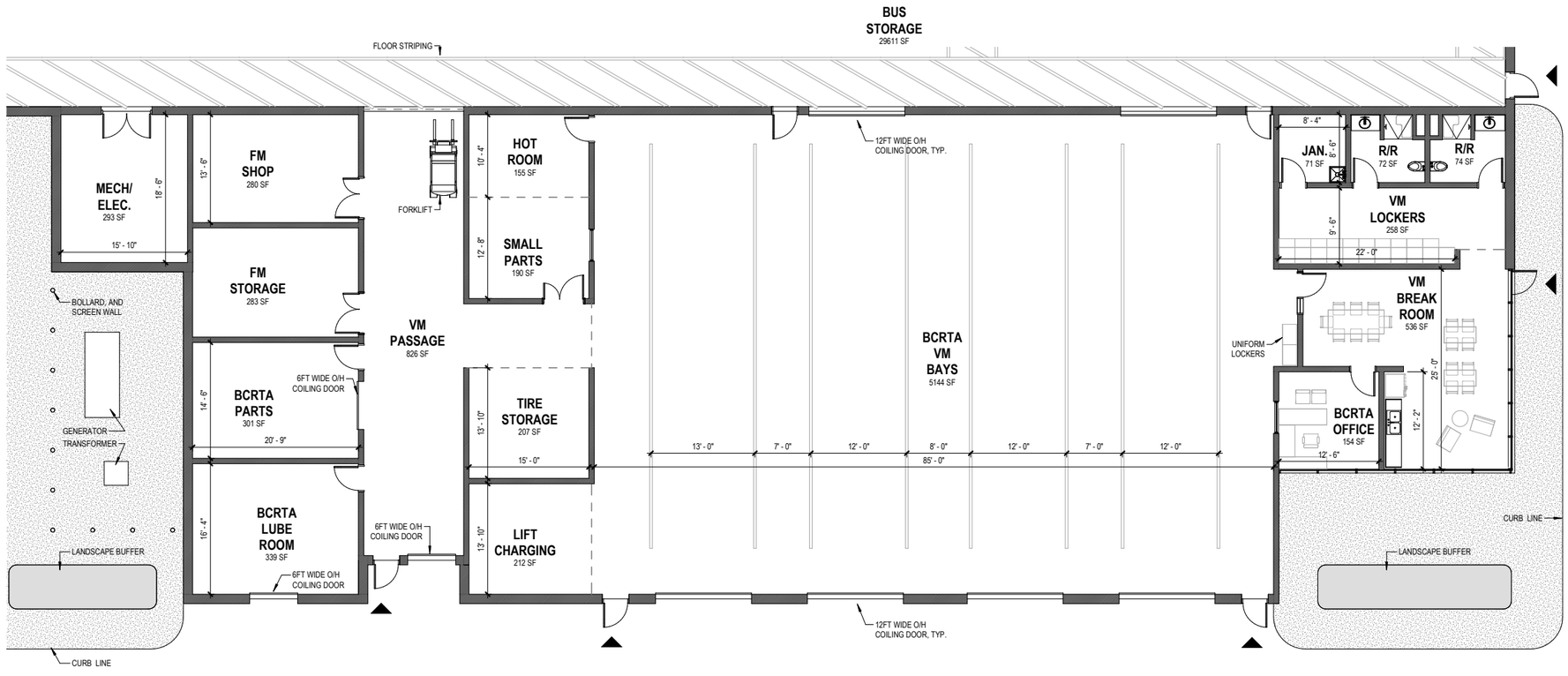
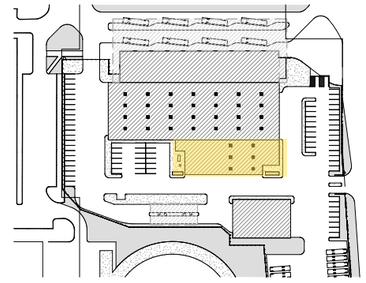


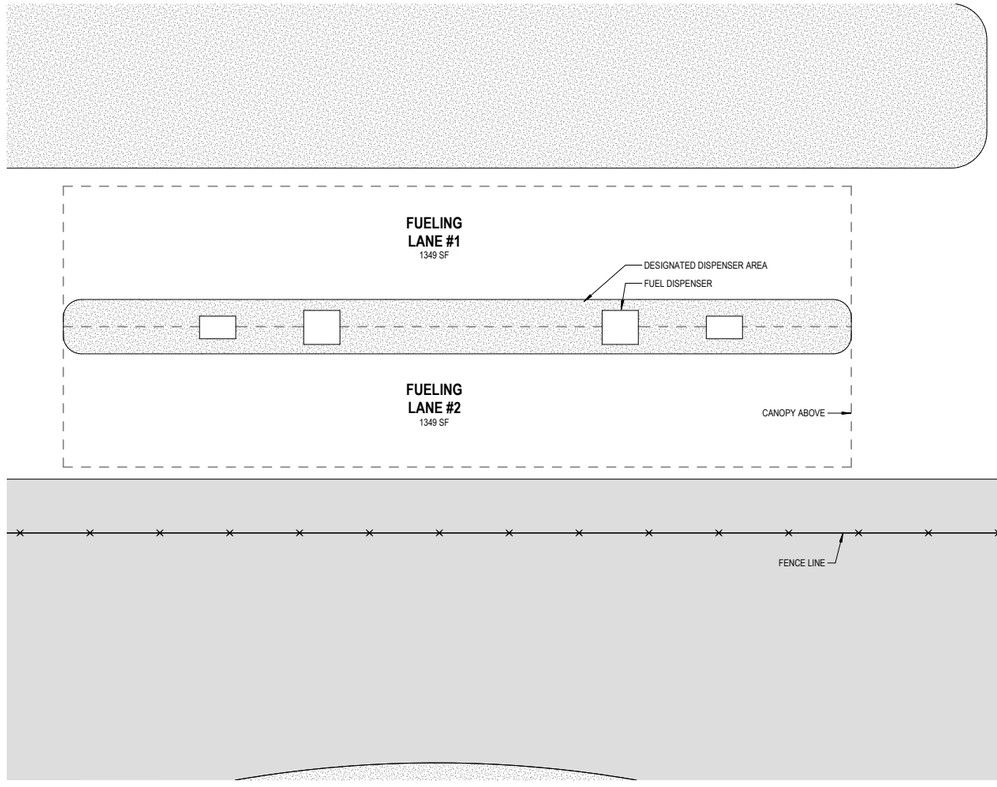



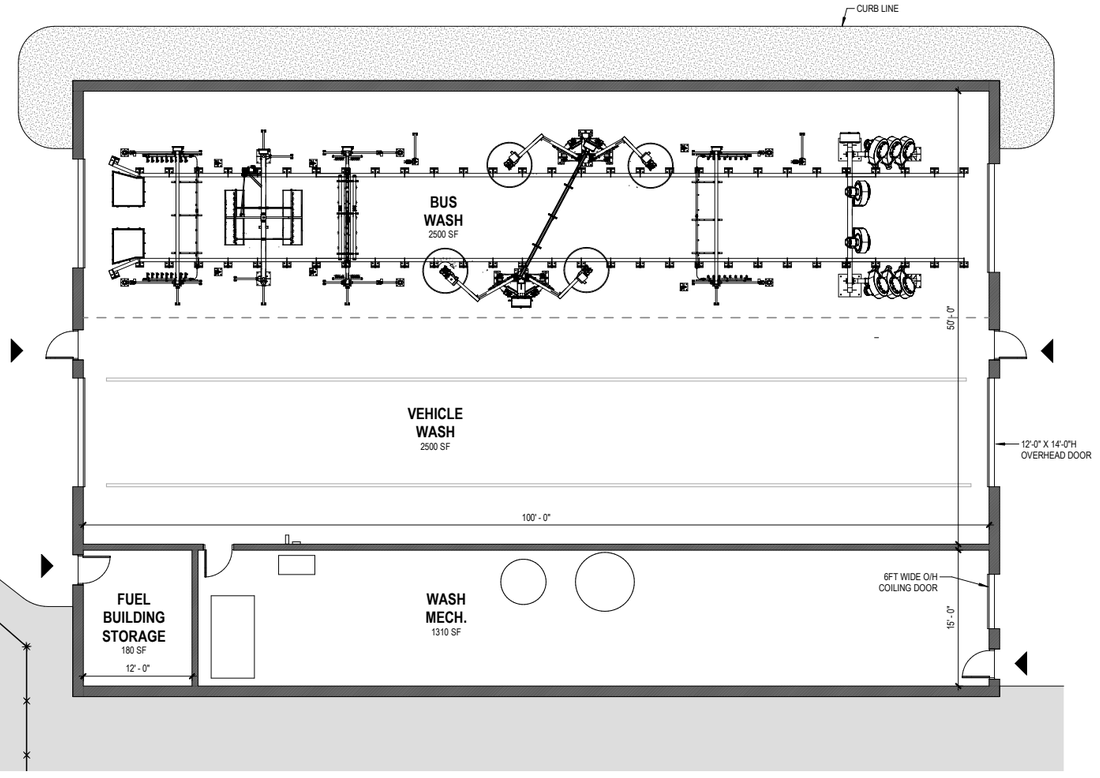
# FLOOR PLAN | VEHICLE MAINTENANCE DETAIL

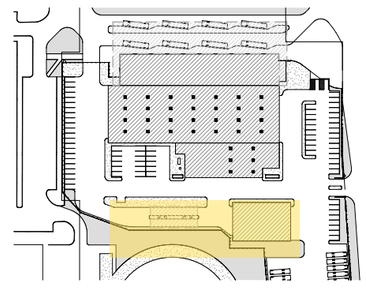


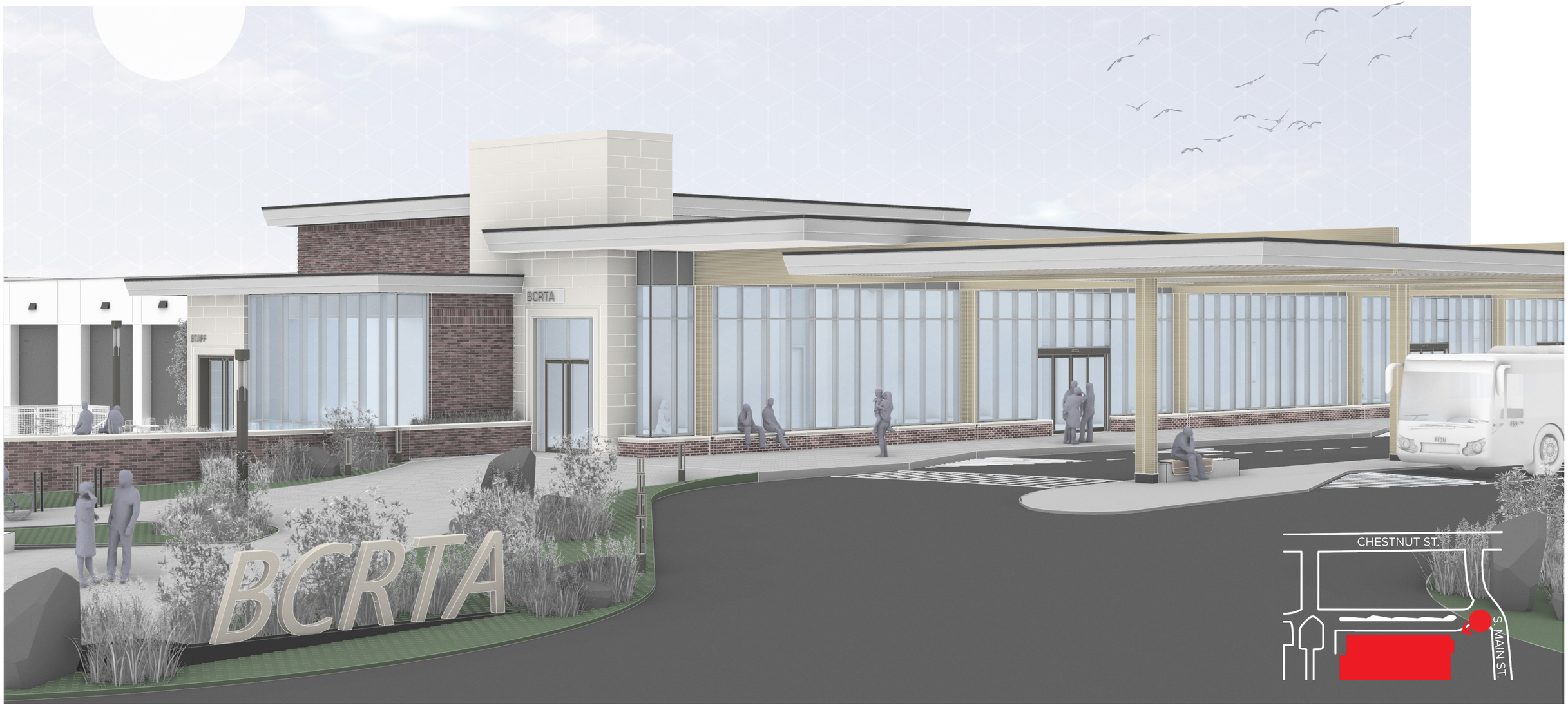
# FLOOR PLAN | FUELING + WASH DETAIL



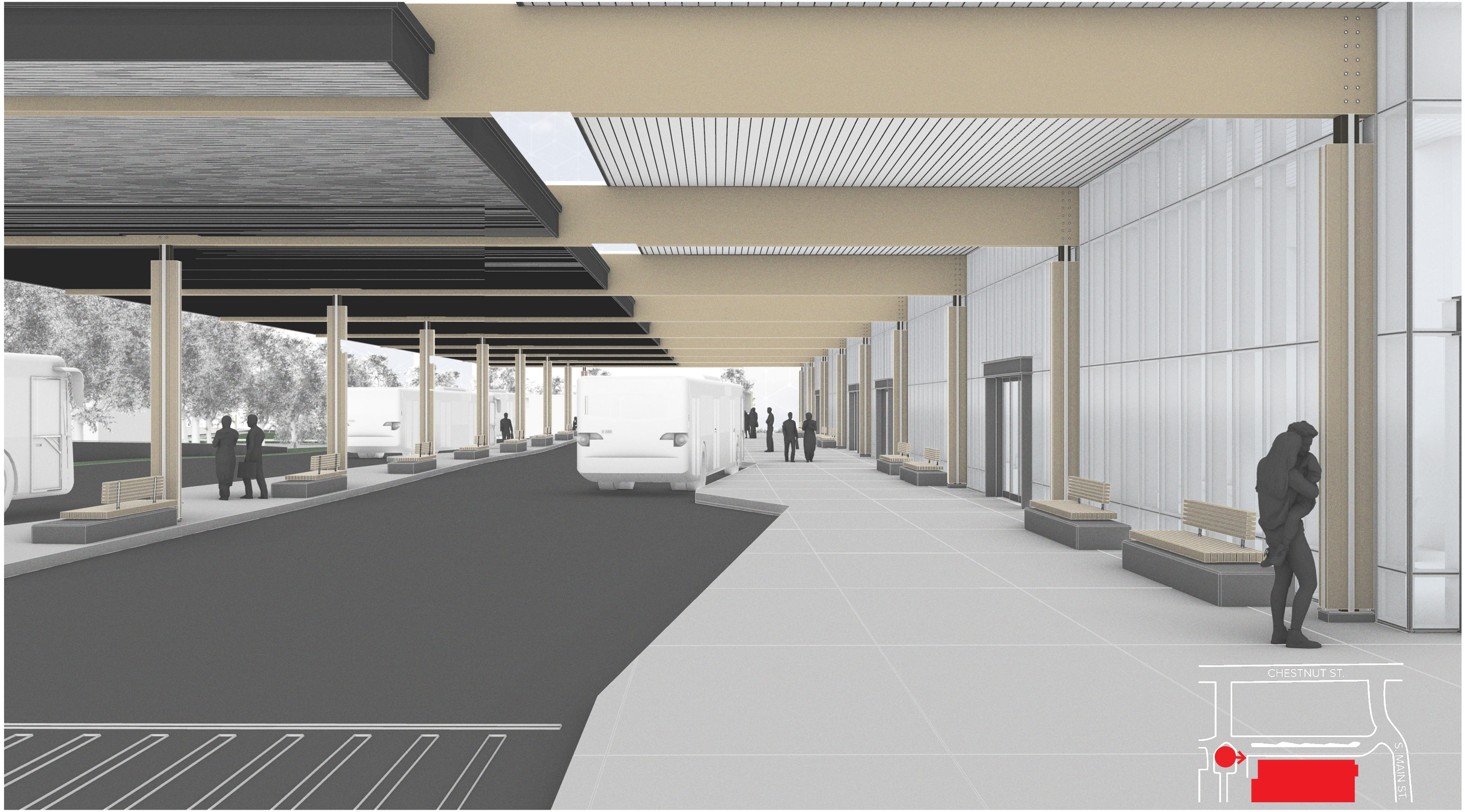
# CONCEPTUAL RENDERINGS




BCRTA
STAFF
CHESTNUT ST.
S. MAIN ST.


CHESTNUT ST.
S. MAIN ST.


BCRTA
< BCRTA PARK >
S. MAIN ST.


CHESTNUT ST.
S. MAIN ST.

# STRUCTURAL NARRATIVE + BUILDING SYSTEMS

# STRUCTURAL NARRATIVE


**Steel Structure**

**Masonry Structure**

The one-story envelope will be supported with a combination of load bearing masonry and steel construction. Low span areas such as the Vehicle Maintenance auxiliary spaces will utilize load bearing masonry. Long span locations, VM bays and Bus Storage will be designed with the combination of load bearing walls, steel columns, and bar joists. In coordination with roof drainage and to minimize required taper insulation, slope will be designed into the structural steel system. Along with efficiency of construction the bar joist will eliminate the joist pockets commonly created when using concrete Ts or other solid members, this will be a benefit if BCRTA chooses CNG or Hydrogen fueling.

To create the long spans and 1:2 cantilever of the concourse, while maintaining the sleek profiles of this design, we will utilize steel columns and beams. The steel will be clad in a wood species that is moisture and mold resistant, potentially Cypress. Columns in the concourse will set into the masonry water table that runs continuous along the concourse curtainwall.

# BUILDING SYSTEMS NARRATIVES

## 1. INTRODUCTION

### 1.1 GENERAL

The purpose of this report is to describe the mechanical, electrical, plumbing, and fire protection (MEP&FP) design concepts for the planned multimodal transit facility. The report states our design objectives, discusses the major equipment that will be required to serve the building, and discusses limitations imposed by the existing site.

The principal areas of study include:

1. Code review for MEP and FP system design
2. Restrictions imposed by property lines and adjacent structures
3. Maintenance building equipment
4. Bus wash facility equipment
5. Utility requirements
6. Mechanical system space requirements
7. Electrical service requirements
8. Security system scope
9. Life safety equipment

### 1.2 SCOPE OF WORK

The scope of design is based on the floor plans developed during the conceptual design and space programming phase. This task involves developing the concept design to accommodate the MEP and FP systems serving the building and preparing a cost estimate of the design.

### 1.3 BUILDING PROGRAM

The project consists of a new 56,500 SF Administration and Maintenance building, a new 6,960 SF Vehicle Wash Facility, and a Fueling Station. The structures will include the following departments and major equipment and activities.

#### 1.3.1 Administrative Building

The following office and administrative areas will be heated, ventilated, and air conditioned by rooftop packaged air-handling units with ducted air distribution:

- BCRTA Offices
- Shared Offices
- Training Room
- Conference Rooms
- Kitchenette
- Employee Break Room Driver's Lounge
- Dispatch
- Public Spaces/Community Rooms

#### 1.3.2 Maintenance Building

The following areas within the maintenance building will be heated and ventilated.

- Vehicle Storage
- Locker Rooms (cooled)
- Rest Rooms (cooled)
- Break Room (cooled)
- Parts Storage
- Tire Storage

The tire storage room will have a compressed air hose reel, hose bib and hose for leak detection and cleaning, and a floor drain.

Lift Charging

240v Power and dedicated ventilation systems will be provided in the lift charging space for the new lift charging equipment.

BCRTA Lube Room

The lube room is anticipated to contain multiple 55 gallon drums of motor oil and hydraulic fluids. The design will include multiple fluid pumping systems to distribute the oil and hydraulic fluid to hose reels located at the individual service bays. We also anticipate an above ground waste oil storage tank of approximately 500 gallons.

Vehicle Maintenance

We anticipate each work bay to be provided with a compressed air hose reel served by a central air compressor. Multiple power receptacles will be provided for tool use. Should welding be anticipated, dedicated receptacles and portable welding exhaust stations will be provided. Portable vehicle lifts rated for vehicles of 18,000 lb GVWR such as the MSC-18K-X-472 or the BendPak PCL-18B-4 will be provided. Heavy truck bays may require lifts for vehicles exceeding a GVWR of 60,600 lbs. Crane provision requirements within the garage will be established during design development.

#### 1.3.3 Vehicle Wash Facility

Wash Bay

The wash bay is anticipated to have an automatic vehicle wash system such as the Ultra Gantry by Interclean or the SmartWash Scout Gantry 3 brush rollover system by Whiting Systems for washing buses. The system will have high-pressure water and brush, rinse, and blow-dry options for cleaning of standard trucks and fleet buses. The system will have water recycling and treatment for disinfecting and pH neutralization of the water.

Wash Equipment Room

The wash equipment room will contain the water and detergent tanks, pumps, compressors, water heaters, water softeners, and controls associated with the bus wash system. The reclaim systems will include centrifugal separation for solids removal and organic matter control. Drainage pits and in ground oil/water separators will collect debris and provide water basin for recirculation pumps.

#### 1.3.4 Fueling Facility

Fueling Island

The island is anticipated to be 6 feet wide and 85 feet long. There will be an access lane to each side of the island capable of accommodating a 35' bus. Both lanes will be covered by a canopy. Overhead lighting will be in the canopy.

Two dual-sided fueling pumps will be capable of dispensing diesel fuel from either side of the island. The pumps will communicate alarm and data to Maintenance building via data communications network.

Compressed natural gas (CNG)/ Hydrogen fueling will be an option in the future at a station aside from the fueling island. The CNG/ Hydrogen equipment will be above ground in a fenced off secured area.

Fuel Storage

Diesel fuel will be stored in two (2) underground double-walled steel fuel storage tanks, 10,000 gallons each. One above ground diesel exhaust fluid (DEF) tank/tote will be on the island.

### 1.4 NEW BUILDING CRITERIA

The highest occupied level of any structure will be less than 75 feet above the fire department access at grade so none of the buildings will be considered a high-rise structure.

The facility will require an emergency generator to provide power to life safety systems when building power is lost and back-up power for some systems. If the generator cannot be located on grade, NFPA 110 requires the generator to be in a dedicated, fire rated room.

The facility will require a fire pump to maintain required water pressure in the standpipes

*CNG EQUIPMENT EXAMPLE*

and for sprinkler heads. The fire pump needs to be in a dedicated, fire rated room.

# 2. APPLICABLE CODES AND STANDARDS

The project site is located in Butler County, Ohio, and falls under the following adopted codes and standards:

- 2017 Ohio Building Code & Amendments
- 2017 Ohio Plumbing Code & Amendments
- 2017 Ohio Mechanical Code & Amendments
- 2017 Ohio Fire Code
- 2017 National Electrical Code
- 2012 International Energy Conservation Code
- 2015 International Fuel Gas Code

# 3. SITE CONDITIONS

## 3.1 GENERAL

The lot proposed for the new building is currently used as a partially paved parking lot. A school building was previously constructed and demolished on the lot. Major utilities (Electric, natural gas, water, sewer) are nearby but do not currently serve the site.

# 4. PLUMBING SYSTEMS

## 4.1 GENERAL

The new building will have a new domestic water service sized as per the 2017 Ohio Plumbing Code. New domestic water meter and backflow preventer will be installed as per Butler County Water & Sewer Department requirements and will be located in the Mech./ Elec. Room.

Urban Engineers will, upon receiving hydrant flow test data, determine if the building can be served completely from street pressure. For the schematic design submission, it is assumed that street pressure is adequate.

The new building will have a new domestic water service sized as per the 2017 Ohio Plumbing Code. The incoming cold-water service is to be 3".

All of the domestic water piping will be type "L" copper piping with lead free solder joints.

## 4.2 PLUMBING FIXTURES

Plumbing fixtures provided in toilet rooms will be "high efficiency" water saving type and handicap accessible (barrier-free) where required in accordance with the Americans with Disabilities Act (ADA). Water closets will consume a maximum of 1.28 gallons per flush (GPF) and urinals will consume 1/8 GPF. Flush valves for water closets and urinal flush valves will be sensor operated type. Sensor operated lavatory faucets will be provided with a maximum of 0.5 gallon per minute flow restrictors. The showers will be manual operated at 2.0 GPM.

Miscellaneous plumbing fixtures will include the mop receptor, hose bibbs, hand wash basins, safety shower/eye wash in the service bays and frost proof wall hydrants located around the perimeter of the building spaced at approximately 100-foot intervals.

Toilet rooms, equipment rooms, and work areas where domestic water hoses are used will contain floor drains. All floor drains will be provided with deep seal p-traps and connections for automatic trap priming. Where traps cannot have trap primers, they will be installed with sure seal trap sealers.

## 4.3 DOMESTIC WATER DISTRIBUTION

Hot water will be generated by a gas-fired heater located in the Janitor Storage. Provide domestic water booster pump for system. Minimal size room for backflow preventer & booster system is 100 square feet.

The underground domestic water piping from 5'-0" outside the building to 2'-0" into the building is to be ductile iron piping with flanges fittings. The aboveground domestic water piping from 2'-0" into the building to the rest of the building is to be Type "L" copper. For piping 2" in size and smaller press copper fittings or brazed copper fittings are acceptable. The copper piping with lead-free solder joints will be used for distribution with pipe insulation.

The domestic water heater will have 223 GPH recovery at 100º F rise and 60 gallons of storage. The domestic water heater, located in the central boiler room, will be supplied with a thermal expansion tank. There will be a hot water circulation system for the water heater. The hot water circulation piping will be supplied with a hot water circulation pump that is an in-line type pump. Domestic hot water will be provided to all plumbing fixtures. Hot water distribution systems will utilize insulated type L copper piping with lead-free solder joints. Thermostatic mixing valves will be provided with the domestic water heater.

## 4.4 SANITARY WASTE AND VENT SYSTEMS

All floor drains will have trap primers. Sanitary waste collected from the plumbing fixtures will be collected and piped together below the floor and piped out of the building via gravity to the sanitary sewer connection 5'-0" outside the building toward South Main Street. The sanitary main pipe from the building is anticipated to be six inches in diameter. No sanitary lift stations are anticipated to be needed.

Domestic sanitary vents will be piped together and extended up to vents thru the roof. Vents to atmosphere will be four inches in size. All domestic sanitary waste and vent piping will be service weight, cast iron piping.

The above ground sanitary waste piping and sanitary vent piping will be service weight cast iron piping with "hubless" fittings and "heavy-duty" couplings. The belowground sanitary waste and sanitary vent piping will be service weight cast iron piping with bell and spigot fittings. Neoprene compression gaskets are acceptable for use with the bell and spigot fittings.

Industrial waste from the repair shops, vehicle service bays and the wash bays will be drained to an exterior waste oil interceptor.

## 4.5 STORM WATER DRAINAGE

Rainwater will be collected from the roof areas by roof drains to internal rainwater conductors and piped underground to an on-site storm water system.

Roof areas with parapet walls will be provided with secondary (overflow) scuppers provided in the parapet walls.

Storm water drainage from the paved surfaces around the fueling island will drain to an oil/ water interceptor.

We do not anticipate a green roof or the need for a foundation drainage system.

## 4.6 NATURAL GAS SYSTEM

Natural gas will be required to serve the new domestic water heater and the HVAC equipment. Natural gas will be provided to the building from the gas main. A gas meter and regulator will be located outside the building.

Gas pressure in the building is anticipated to be less than 5 psi maximum.

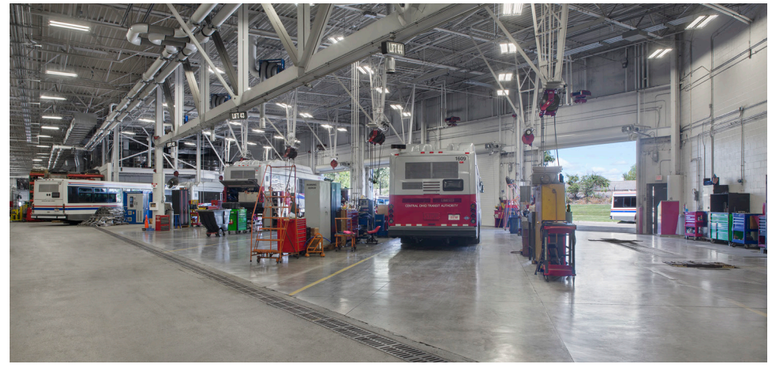
## 4.7 COMPRESSED AIR

One central air compressor plant will be provided for the new facility to serve the pneumatically driven tools throughout the facility. There will be two air compressors that will be combination rotary screw type equipped with a horizontal receiver tank, refrigerated air dryer, filters, and an oil removal system. A compressed air receiver tank will be provided with automatic drain valves. The system will have combination 20 hp. compressor, refrigerated air dryer, filters, a receiver tank and an oil removal system rated for 60.8 acfm at 125 psi. The Compressor Room will require a room dimensions of 26'0"x 20'0".

It is anticipated that the compressor will serve hose reels, one in each vehicle service bay and one in the tire storage room.

## 4.8 REPAIR BAYS

Hose bibbs and trench drains will be provided in the bays. The hose bibbs will be located between two service bays. The trench drains will be located near the perimeter of each bay and will drain to the waste oil interceptor.



# 5. HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

## 5.1 GENERAL HVAC REQUIREMENTS

All areas of the building will be heated and ventilated. Administrative offices, operations offices and shops, material management areas, distribution areas, locker rooms, break rooms, and facilities areas will be air conditioned as well as heated. Areas with similar occupancies will share common Heating Ventilating Air-Conditioning (HVAC) systems where practical.

A goal of the HVAC systems will be to minimize energy consumption while maintaining space design criteria. To this end, ASHRAE Standard 90.1 will be adhered to and the following will incorporated into the design.

It is assumed that some, but not all, parts of the facility will operate 21 hours per day.

HVAC systems will be designed to contribute to overall building energy goals as defined in this document, and show improvement in energy efficiency performance compared to the baseline building established in Appendix G of ASHRAE 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential.

## 5.2 DESIGN CRITERIA

HVAC load computations will be based upon the following exterior and interior conditions:

1. Outside – Ambient
    a. Summer – 91°FDB, 74°FWB.
    b. Winter – 1°FDB.
2. Interior – Offices and Lobby:
    a. Summer – 75°FDB, 55% RH.
    b. Winter – 70°FDB.
3. Interior – Shop & Vehicular Maintenance Areas:
    a. Summer – Ambient outdoor conditions plus 5°FDB.
    b. Winter – 55°FDB.

### 5.2.1 Ventilation Criteria

The mechanical design will utilize a combination of rooftop natural gas-fired heating and ventilation air units (HVU), interior air handling units (AHU) with ducted ventilation, Energy Recovery Ventilation Units (ERVU), and exhaust fans to provide the required amount of ventilation air to satisfy the latest ventilation code requirements.

Mechanically ventilated systems shall be designed to meet the minimum requirements of the 2017 Ohio Mechanical Code, ASHRAE Standard 62.1-2019, and Ventilation for Acceptable Indoor Air Quality or applicable local codes, whichever is more stringent.

### 5.2.2 Air Motion Criteria

HVAC systems shall be designed to ensure air temperature, thermal radiation, relative humidity (for system with cooling provisions), and air speed that conforms to ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy or applicable local codes, whichever is more stringent.

### 5.2.3 Pressurization Criteria

To control the migration of odors and contaminant, all systems shall be designed to attain desirable pressure levels within the rooms relative to all adjacent areas.

The following guidelines will apply:

- Toilet and shower areas shall be under negative pressure relative to adjacent areas
- Offices shall be under positive pressure relative to adjacent areas.
- Exterior zones will generally be under positive pressure relative to the outdoors where conditions permit infiltration of untreated outdoor air.

### 5.2.4 Environmental Control Zone Criteria

During occupied hours, supply airflow shall exceed exhaust/return airflow to assure positive pressure. During unoccupied hours, supply and exhaust/return airflow may be reduced provided that room pressurization criterion are maintained and carbon monoxide and nitrogen dioxide levels set points are maintained.

Office areas shall operate as a single heating and cooling zone with their associated lobbies with a single thermostat.

## 5.3 HEATING AND VENTILATION ROOF TOP UNITS

The shop areas and vehicle maintenance areas of the building will be heated and ventilated using rooftop gas-fired ventilation air units. The units will be full curb mounted with ducted supply and return air through a roof curb. Temperature and air quality will be controlled individually by dedicated space sensors.

The units will be able to modulate the amount of outside air delivered from 25% to 100% to assure the minimum ventilation air is always provided. The units will be able to allow free cooling using outside air when conditions permit. The units will also be able to recirculate air and to relieve air when providing high percentages of outside air.

## 5.4 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) UNITS

HVAC units will be packaged roof-top type with integral air-cooled condensing units. Heating will be by gas–fired heaters in the AHU. Units will consist of a mixing box with modulating dampers, filter box, furnace section, access section, cooling (dx) coil, supply fan, condensing unit, and ducted discharge plenum.

Ventilation air will be modulated to maintain setpoint indoor air conditions. Units will have air-side economizer capability for free cooling when conditions permit.

We anticipate the HVAC units ranging in size from 2.5 tons to 10 tons of cooling. The smaller systems will be constant volume, larger systems will be variable air volume (VAV) with terminal VAV boxes with electric heating coils. The units will operate during unoccupied periods to maintain a night setback temperature with no ventilation air.

## 5.5 ENERGY RECOVERY VENTILATING UNITS (ERVU)

The locker rooms and associated toilet and shower areas will be exhausted, ventilated, heated and cooled using an indoor ERVU system. The ERVU will recover energy from the exhaust air stream by use of a desiccant wheel to pre-heat and pre-cool make-up air.

The ERVU will use a remote air-cooled condenser located on the roof for cooling and hot water for heating. The unit will be self-contained with all operations controlled by a factory installed control package.

## 5.6 SPLIT-SYSTEM AIR CONDITIONING UNITS (SSAC)

Small isolated office spaces will be heated and air-conditioned using split-system air conditioning units. Supply and return air will be ducted to/from the space served. Each system will operate under the control of a dedicated wall thermostat.

## 5.7 AIR DISTRIBUTION SYSTEMS

Supply, return, and outside air ductwork will be galvanized steel construction, low pressure (SMACNA negative 2 inch water gauge). Exhaust ductwork from shower areas and wash bays will be aluminum.

The supply air from units providing air conditioning will be distributed through ductwork wrapped in 1-1/2” thick flexible fiberglass insulation (blanket type). Indoor return air ductwork will be also be insulated in 1-1/2” thick flexible fiberglass insulation (blanket type). The supply air from rooftop heating and ventilation units will not be insulated where inside of the building. Exterior duct work will be insulated with 3” jacket such as K-flex.

Supply and return registers and grille(s) will be galvanized steel construction, painted.

## 5.8 EXHAUST SYSTEMS

Areas will be exhausted by either ceiling exhaust fans, inline exhaust fans, or rooftop exhaust fans.

The small toilet rooms will be exhausted by ceiling fans vented to the roof. It will operate by the room light switch.

1. The Janitor's Closets will have dedicated exhaust fans that operate continuously.
2. Electrical room will have a dedicated exhaust fan that operates on a room thermostat.
3. Welding benches will be independently exhausted.
4. Vehicle Work Bays and Wash Bays will have vehicle exhaust systems.
5. Areas where work is performed on CNG/ Hydrogen vehicles will be continuously ventilated at a minimum 4.0 air changes per hour with no recirculation. If this is provided, the top 18" of the space will not need to be constructed in compliance with hazardous zone requirements.

    a. Alternative - Areas where work is performed on CNG/ Hydrogen vehicles will be continuously ventilated at a minimum 2.5 air changes per hour with no recirculation and have purge capability of 1 cfm/sf plus additional 5 air changes per hour with interlocked make-up through overhead door operators. The top 18" of the space will be constructed in compliance with hazardous zone requirements.


## 5.9 RADIANT HEATERS

Natural Gas-fired radiant heaters will be located over each roll up door. Heaters will be independently controlled with local thermostats.

## 5.10 UNIT HEATERS

Natural Gas-fired unit heaters will be used at exits from the maintenance work bay areas.

## 5.11 HVAC INSTRUMENTS AND CONTROLS

A computer based Direct Digital Control (DCC) energy management and automatic control system will provide supervision and control, energy management, alarms, data information and collection, and operator interface for the building's HVAC systems and equipment.

The following systems will report to and be controlled by the BMS system:

1. Heating Systems
2. Cooling Systems
3. Ventilation and Fan Systems
4. Airflow/Demand Ventilation
5. Vehicle Tailpipe Exhaust Systems
6. Carbon Monoxide Levels and Nitrogen Dioxide (vehicle maintenance areas)
7. Carbon Dioxide Levels (high occupancy areas)

In addition, the following systems will report to the BMS system for monitoring only (no controls):

1. IT Room Ductless Split Systems
2. Overhead Door Status (open/closed)
3. Alarm Monitoring for Miscellaneous Systems
4. Pressurization Controls
5. Oil/Water Separator
6. Standby Generator
7. Emergency Transfer Switch
8. UPS System

Areas where work is performed on CNG/ Hydrogen vehicles will be continuously monitored for gas detection.

In garage maintenance areas Carbon monoxide (CO) and Nitrogen Dioxide (NO2) detection will be provided with the following functionality:

1. Audible and visual alarms
2. Interlock and modulation with demand ventilation system

Specific functions on the new DDC system will include:

1. Status and alarm of all HVAC systems and equipment
2. Start/stop of all HVAC systems and equipment
3. Temperature measurement and indication of all zones
4. Air flow indication of all air systems and each space terminal unit (supply and exhaust)
5. Temperature, pressure, flow and RH measurement of all critical control points in HVAC systems
6. Set point adjustment of control points
7. Equipment lead-lag
8. System occupied and unoccupied and day-night operation

## 5.12 TESTING, ADJUSTING, AND BALANCING AND COMMISSIONING

Testing and balancing will be conducted by Associated Air Balance Council (AABC) certified technicians, and tests will be performed in accordance with AABC standard procedures.

The following systems will require testing, adjusting and balancing:

1. Air handling units and duct distribution systems (supply, return, exhaust, and outdoor air.)
    a. Hot water heating system pumps, piping distribution, and associated coils, radiation, and equipment.
    b. Energy recovery system pumps, piping distribution and associated coils.
    c. Air terminal units and blower/coil units.
    d. Air devices (diffusers and registers), and hoods.
    e. Exhaust fans and associated duct systems.
2. The balancing agency will develop and execute a test plan.
3. The balancing agency will prepare a written report which will include diagrams and descriptions of procedures together with all recorded test data.

# 6. FIRE PROTECTION

## 6.1 GENERAL DESIGN SCOPE

The new building will be equipped with a wet automatic sprinkler system throughout the building. Depending on available pressure and flow from the water utility, a diesel-fired fire pump and electric jockey pump will be required for this building.

The diesel-fired central fire pump and electric jockey pump will comply with NFPA-20, Standard for the Installation of Stationary Fire Pumps for Fire Protection, 2013 edition. The fire pump will be provided with a control panel and two (2) battery racks. The jockey pump will be provided with its own control panel. The fire pump and jockey pump will be in a fire pump room.

## 6.2 SPRINKLERS

The entire building will be fully protected by an automatic sprinkler system.

The offices breakrooms, restrooms, corridors, and non-storage spaces in the building will be designed to comply with NFPA-13, Installation of Sprinkler Systems, 2013. These areas are to be designed to Light Hazard, 0.10 GPM/Sq. Ft. density, 1,500 Sq. Ft. hydraulic area, and 225 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 or K=11 type.

For the mechanical spaces, and the storage areas (other than Bus storage) where the storage will be less than 12' above the finished floor, these areas will be designed to be Ordinary Hazard (Group 2), 0.15 GPM/Sq. Ft. density, 1,500 Sq. Ft. hydraulic area, and 130 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 type.

For the Bus storage area, these areas will be designed with dry system and to be Ordinary Hazard (Group 2), 0.20 GPM/Sq. Ft. density, 1,500 Sq. Ft. hydraulic area, and 130 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 type.

For Bus entry canopy area, these areas will be designed with dry system and to be Ordinary Hazard (Group 2), 0.20 GPM/Sq. Ft. density, 1,500 Sq. Ft. hydraulic area, and 130 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 type.

The shop area VM Bays will be designated to be Extra Hazard (Group 1), 0.30 GPM/Sq. Ft., 2,500 Sq. Ft. hydraulic area, and 100 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 type.

The Vehicle Wash will be designated to be Ordinary Hazard (Group 2), 0.15 GPM/Sq. Ft. density, 1,500 Sq. Ft. hydraulic area, and 130 Sq. Ft. maximum spacing between sprinklers. The sprinklers that will be utilized in these spaces will be K=5.6 type.

The fuel dispensing canopy, although not required by code, Urban is recommending a proprietary foam system that can be installed in the canopy above fuel dispensing pumps. The Pyro-Chem Attendant™ II Gas Station Fire Protection System by Johnson Controls.

All sprinkler systems shall be designed with a 5 PSIG safety factor. An ASSE 1015 double-check backflow preventer (BFP) will be provided in the fire main within the building. Indicating valves will be provided with the double check valve BFP unit.

The buildings will be provided with fire department connections.

Quick response sprinklers will be provided throughout the building.

## 6.3 OTHER FIRE PROTECTION SYSTEMS

The fire pump will be diesel fuel powered and will require engine exhaust, make-up air, and sound attenuation. The fire pump will be in the Fire Pump Room. The fire pump requires a diesel oil storage tank which will be in the Fire Pump Room. The tank will be filled from a fill station located on the exterior wall. An overflow and emergency vent will be located at the exterior wall. The Fire Pump Room will require a room dimensions of 34'0"x 22'6".

A solid state, soft-start controller will be provided with the diesel fire pump. A jockey pump and controller will be provided.

A fire pump test header will be provided at the exterior of the building.

A by-pass and flow meter will be provided with the fire pump arrangement.

All fire protection piping shall be minimum Schedule 40. Schedule 10 (thin wall) piping is not permitted.

## 6.4 FIRE DETECTION AND ALARM SYSTEM

The fire alarm system will be an analog addressable system designed in accordance with NFPA 72 (National Fire Alarm Code), NFPA 101 (Life Safety Code), the ADA Accessibility Guidelines for Buildings and Facilities.

The fire alarm system will be provided with horn type notification for safe evacuation of the facility under alarm conditions.

Initiation of the building alarm will be by manual fire alarm boxes (single-action type), smoke detectors (photoelectric type), heat detectors (combination type), and water flow switches in the automatic sprinkler system.

Occupant notification will be by audible and visual alarms (horns and strobe lights).

Automatic sprinkler system control valves, the fire pump control panel, the emergency generator control panel, and smoke detectors in HVAC ductwork will be supervised by the fire alarm system.

Signaling line circuits will be Class B, Style 4, and will originate from the fire alarm control panel. Notification appliance circuits will be Class B, Style Y. Notification appliance circuits will originate from the fire alarm control panel. Fire alarm system circuits will be installed in electrical metallic tubing (EMT).

If 4.0 ACH is not provided, the top 18" of areas where work is performed on CNG/ Hydrogen vehicles will be constructed in compliance with hazardous zone requirements. Fire alarm system installations will be in accordance with Class 1, Division 2 classified location requirements of the National Electrical Code

The fire alarm control panel will be located in the Mech/Elec Room near the Vehicle Maintenance Area. Control panel will include a digital alarm communicator transmitter (DACT) for transmission of fire alarm, supervisory, and trouble signals to the campus remote alarm receiving station by means of telephone lines.

The fire alarm control panel will be supplied from a dedicated emergency branch circuit and will be provided with batteries and a battery charger.

A remote annunciator panel will be located at the Northeast entrance (Main Fireman's Entrance) to the building.

Building fire alarm and detection system will be by Fire Controls Instruments (FCI), Simplex Grinnell, or Siemens Building Technologies.

Testing of fire alarm system will be via NFPA 72 procedures, and supervised by a NICET Level III technician.

# 7. ELECTRICAL

## 7.1 ELECTRICAL SERVICE AND DISTRIBUTION

Medium voltage electrical power will be supplied from the utility company and routed to a pad-mounted transformer. Preliminary building load calculations indicate the transformer will be rated 750 kilovolt-amperes (kVA). Secondary voltage will be 480Y/277 V. The transformer will feed a 1200 ampere (A) switchboard installed in a dedicated main electrical room.

The main distribution secondary switchboard will include a draw-out main power breaker and group mounted molded case distribution circuit breakers, and integral surge protection. Metering will be included per the utility company's requirements.

Electrical power distribution throughout the building will be 480Y/277 volt. Mechanical equipment and lighting panelboards will be supplied directly from the main switchboard. Receptacle and appliance branch circuit panelboards will be supplied from 480 volt-208Y/120 volt dry type step-down transformers. Transformers and panelboards will be located in dedicated electrical rooms.

Electrical rooms will be provided throughout the building to facilitate an efficient installation and provide flexibility for future modifications.

Dedicated branch circuit panelboards will be provided for the food services space and vehicle wash/fueling facility.

Surge suppression will be provided at the building service entrance equipment, as previously noted. All wall penetrations will be properly sealed.

If 4.0 ACH is not provided, the top 18" of areas where work is performed on CNG/ Hydrogen vehicles will be constructed in compliance with hazardous zone requirements. Electrical installations will be in accordance with Class 1, Division 2 classified location requirements of the National Electrical Code.

Panelboards:

1. Panelboards will have copper buses and fully rated to withstand available short circuit currents.
2. All panelboard circuit breakers will be bolt-on type.
3. Panelboards will have 20 percent spare capacity, and all panelboards will include a minimum of 20 percent spare circuit breakers or bussed space.

Motor controllers and variable frequency controllers will be provided in mechanical rooms for control of HVAC fans, pumps, and other motor-driven equipment.

1. All three phase motors will use combination type magnetic motor starters with motor circuit protectors. All starters will have thermal overload protection, hand-off-automatic switch, indicating lights, control transformers, auxiliary contacts and phase-loss protection.
2. Variable frequency controllers should be considered on all motors larger than 7½ horsepower.
3. All fractional horsepower motors will be provided with horsepower rated manual motor starters. All starters will be provided with thermal overload protection and indicating lights.
4. All starters used for interior purpose will use NEMA 1 enclosure and all starters for exterior wet locations will use NEMA 4 enclosures.

Local disconnect switches will be provided for all motor-driven equipment. Motors rated ½ horsepower or greater will be 460 volt, three phase. Motors rated less than ½ horsepower will be 115 volt, single phase.

1. Disconnect switches will be heavy duty, single throw knife type with quick make - quick break mechanism, capable of full load operations.
2. All disconnect switches used for interior purpose will use NEMA 1 enclosure and all switches for exterior wet locations will use NEMA 4 enclosures.

The basis-for-design for electrical distribution equipment will be Square D.

Raceways:

1. Separate raceway/conduit systems will be provided for normal lighting, normal power, emergency lighting, emergency power, the fire alarm system and other special systems.
2. The wiring method for feeders and branch circuits will be copper conductors enclosed in conduit, typically electrical metallic tubing for interior raceways, rigid metal conduit for exterior raceways, and nonmetallic conduit where installed in concrete.
3. Minimum conduit size will be 3/4".
4. All conduit fittings will be compression type or threaded. Set-screw fittings will not be allowed.
5. In finished spaces all conduit will be installed concealed above ceilings, in walls, or in floor slabs.
6. Flexible metal conduit will be used in short lengths for making final connections to vibrating or rotating equipment such as transformers and motors, and in lengths less than six feet for final connections to lighting fixtures installed in accessible suspended ceilings. Liquid-tight flexible metal conduit will be used for making final connections to equipment in damp or wet locations.
7. All conduit runs will use expansion couplings or flexible conduits when conduits pass over a structural expansion joint.
8. All conduit penetrations of fire-rated construction will be sealed with listed fire-stopping materials.

Conductors:

1. All wires and cables will be copper with Type THHN/THWN insulation rated for 600 volt at 75°C. Sizes will be designed to have current carrying capacities and voltage drop limits to meet NEC requirements. More stringent (lower) voltage drop limits will be incorporated into the branch circuit designs to account for power circuits to sensitive laboratory equipment.
2. The minimum conductor size will be #12 American Wire Gauge (AWG) for power and #14 AWG for control wiring.
3. Wire sizes #10 AWG and smaller will be solid and wires #8 and larger will be stranded in accordance with ASTM standards.
4. All feeder conductors will have 25 percent spare capacity.
5. All branch circuit wiring for computer receptacles will be provided with separate neutrals and grounding conductors. Multiple phase branch circuit homerun wiring with shared neutrals will not be allowed for computer outlets.

Wiring Devices:

1. General power duplex receptacles will be 20 ampere, 125 volt, 3 wire, grounding type, specification grade, and will be NEMA 5-20R configuration.
2. At least one duplex receptacle per wall will be provided in offices and other areas. In addition to the regular receptacles, more receptacles will be provided where required for computer outlets, desks, etc. Receptacle layouts will be coordinated with furniture and workstation layouts throughout design phase.
3. Training and Community Rooms will be equipped with an instructor's station with power, data, and AV outlets. Power will be provided for ceiling mounted projectors and motor operated screens. Wireless control of teaching technology (projectors, smartboards, flat panels) will be provided as the needs for each space dictate.
4. Floor boxes (with power, data, and/or AV provisions) will be provided as the needs for each space dictate.
5. In corridors, receptacles will be provided on 50-feet centers for cleaning equipment.
6. All restrooms will be provided with ground fault circuit interrupter (GFCI) receptacles.
7. All receptacles provided within 6 feet of sinks will be provided with GFCI.
8. All receptacles provided in food services and breakroom areas will be provided with GFCI protection.
9. Exterior receptacles to be provided around perimeter of building at grade. Exterior receptacles to be provided near exterior rooftop mechanical equipment for servicing. All exterior receptacles will be weatherproof, GFCI type receptacles.
10. Toggle switches will be single unit toggle, butt contact, quiet AC type specification grade with an integral mounting strap with provisions for back wiring and side wiring.
11. All wall plates for switches and receptacles will be 0.04-inch thick, type 302 satin-finished stainless steel.

Grounding System

1. A complete grounding electrode system will be provided for the building, including driven ground rods, connection to the incoming metallic water service pipe, and bonding to building structural steel. A wall-mounted ground bus will be provided in the main electrical room, distribution electrical rooms and telecom rooms.
2. All exposed metallic structures such as disconnect switches, panelboards, switchboards, transformers, automatic transfer switches, starters, and other equipment and enclosures will be permanently grounded.
3. All branch circuit and feeder raceways will be provided with equipment grounding conductors.

## 7.1 LIGHTING AND BRANCH WIRING

### 7.1.1 Interior lighting

1. Interior lighting will be designed in accordance with the recommendations of the Illuminating Engineering Society Lighting Handbook, with specific consideration given to visual acuity, aesthetics, and sustainability, according to the needs of each space. Lighting power densities on a space-by-space method will be established in accordance with ASHRAE Standard 90.1.
2. Typically, lighting fixtures will utilize light emitting diode (LED) sources with a correlated color temperature of 3500K and minimum color rendering index of 80.
3. Light fixtures in public spaces, such as corridors and restrooms, will be auto-on and auto-off controlled via occupancy sensors. Wall switches will be provided to manually turn off lighting as desired.
4. Light fixtures in private spaces, such as offices and conference rooms, will be manual-on controlled via wall switches with vacancy sensors provided to automatically turn off lighting.
5. Light fixtures will be fed from addressable control modules that accept control signal inputs, similar to that described above. All system components, including drivers, sensors, and wall switches, will be connected via a common low-voltage communication bus. The control system will be programmed to optimize energy efficiency, and will be capable of being re-programmed and expanded in the future to accommodate changing needs.
6. Daylight harvesting will be provided for perimeter spaces and spaces with skylights with abundant natural light, as an energy saving measure. This will include automatic photocell-based control of the room/space lighting fixtures. During daytime hours, the artificial lighting will be automatically dimmed in response to the available natural light. Sensors will be provided to automatically turn lighting off when room is unoccupied. An override wall control station will be provided in each space.
7. Desk task lights are recommended for individual offices, where occupants may request higher light levels than that provided by the building lighting systems.
8. Lighting for teaching spaces will incorporate several zones to illuminate the presenter, teaching wall, and seating area. Lighting control wall stations will be provided to allow for preset scene selection, as well as raise/lower dimming control. Lighting control systems will be integrated with room AV systems, window shades, and projection screens. Occupancy sensors will be provided to automatically turn the lights off when the room is unoccupied.
9. If 4.0 ACH is not provided, the top 18" of areas where work is performed on CNG/Hydrogen vehicles will be constructed in compliance with hazardous zone requirements. Lighting installations will be in accordance with Class 1, Division 2 classified location requirements of the National Electrical Code.

### 7.1.2 Exterior lighting

1. Exterior lighting will be designed in accordance with the recommendations of the Illuminating Engineering Society Lighting Handbook. As with interior lighting, the exterior lighting systems will meet or exceed the International Energy Conservation Code (IECC) power budget requirements.
2. All exterior lighting systems will be designed to minimize the light pollution generated from the project site. Fixtures will be chosen, and layouts will be carefully coordinated to minimize light trespass and reduce night sky pollution.
3. Exterior lighting will be a combination of building mounted, canopy mounted, and pole mounted, to illuminate building entrances, walkways, steps, fuel stations, and overhead doors areas. Exterior lighting sources will be LED lamp types.
4. All exterior lighting will be controlled through the building lighting control system.

### 7.1.3 Emergency lighting

1. Emergency lighting will be provided to illuminate the paths of egress and other critical areas as required. The emergency lighting will be controlled 'off' with other normal lighting fixtures, and programmed through the building lighting control system to automatically come 'on' during a power outage.
2. LED type exit lights will be provided to mark the paths of egress.
3. Emergency egress lighting fixtures and exit signs will be connected to the emergency power system, with backup power supplied by the building generator-supplied life safety system. No unitary battery equipment will be used.

## 7.2 COMMUNICATION AND SECURITY SYSTEMS

Telecommunications service will be extended to the building and be terminated in the main telecom room in the office spaces area of the building.

A telecommunications infrastructure consisting of equipment spaces and cable path-ways will be provided in accordance with TIA/EIA-569: Commercial Building Standard for Telecommunications Pathways and Spaces and TIA/EIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications.

A 1-1/4 inch conduit will be extended to the accessible ceiling from each recessed wall box provided for typical telecommunications outlets, and will be terminated with an insulated bushing to a collector pullbox in that room's ceiling space.

Telecommunications rooms will be provided with wall mounted fire-resistant plywood backboards, overhead cable tray for wire and cable management, emergency lighting, and a minimum of two quadraplex receptacles on dedicated circuits. A ground bus will be pro-vided in each space and will be connected to the main building electrical service ground.

## 7.3 OTHER ELECTRICAL SYSTEMS

### 7.3.1 Emergency power distribution system

1. An exterior diesel generator will feed the life safety loads. An automatic transfer switch (ATS) will be provided with normal supply from the building service switchboard and feed an emergency distribution panel that feeds the following loads:
    a. Egress lighting.
    b. Exit signs.
    c. Fire alarm system.
    d. Fire pump controller.
2. The fire pump will be equipped with a U.L. Listed fire pump controller and automatic transfer switch. Electrical service to the fire pump controller will come from the emergency distribution panelboard (emergency).
3. The basis-for-design for the automatic transfer switches will be ASCO or Zenith.

# 8. SECURITY REQUIREMENTS

Pathways and backboxes for door access controls, including electric door strikes, card readers, door contacts, etc. will be provided. Pathways and backboxes for security camera systems will also be provided. Both systems will be located in the main telecommunications room, along with the building's main distribution frame.

## 8.1 ELECTRONIC SECURITY SYSTEMS

Security system infrastructure including conduit and category 6 cables will designed by the Owner.

Types and locations of cameras, monitors and other electronic security requirements to be determined by the Owner.

## 8.2 PERIMETER SECURITY

Provide perimeter fencing around entire site in accordance with the Owner's requirements.

Key card access shall be provided and sliding main gates and personnel gates per the Owner's direction.

## 8.4 BUILDING SECURITY

Ensure outside air intakes are inaccessible to the public.

Prevent entry into the building through ductwork or intake/exhaust openings.

Key card access to be provided to exterior man doors, offices, mechanical rooms, janitor's closet, IT rooms, electrical rooms, storage rooms, parts room, tool storage, fueling, and vehicle wash.

# 5. CONCEPTUAL ESTIMATE

# CONCEPTUAL ESTIMATE

Butler County Regional Transit Authority
Multi-Modal Transit Facility
Chestnut Street
Oxford, Ohio

Estimate of Probable Cost

| Program Area | SF | Cost per SF | Total Cost |
|---|---|---|---|
| | | Conceptual Design August 9th, 2021 | |
| **Administration, Vehicle Storage, and Vehicle Maintenance Building** | | | |
| Public Space and Administration | 16,224 | $ 325.00 | $ 5,273,000 |
| Vehicle Maintenance | 9,854 | $ 235.00 | $ 2,316,000 |
| Vehicle Storage | 29,677 | $ 160.00 | $ 4,748,000 |
| **Subtotal** | **55,755** | **$ 221.27** | **$ 12,337,000** |
| Demolition and Abatement | | | $ 250,000 |
| Site Development | | | $ 3,250,000 |
| Fueling Facility | | | $ 650,000 |
| Vehicle Wash Facility | | | $ 1,025,000 |
| Design/Estimating Contingency | | 10.00% | $ 1,751,000 |
| **Total Direct Construction Cost** | | | **$ 19,263,000** |
| GC/CM Overhead and Profit | | 10.00% | $ 1,926,000 |
| **Total Construction Cost** | | | **$ 21,189,000** |

Bowen+

ARCHITECTURE – ENGINEERING – CONSTRUCTION

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