GoTriangle RFQ 24-048

Exhibit D

BOMF Space and Efficiency Assessment 2019

(74 pages - including this page)

GoTriangle Bus Operations and Maintenance Facility Space and Efficiency Assessment

Draft Report

August 27, 2019

GoTriangle
Richard Major, M.P.M., PMP®, TSSP
Director of Capital Development
4600 Emperor Blvd
Durham, NC 27703

August 27, 2019

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Durham, NC 27703

Attention: Richard Major, M.P.M., PMP®, TSSP
Director of Capital Development

Reference: Bus Operations and Maintenance Facility
Space and Efficiency Assessment – *DRAFT REPORT*
MBP Task No. 04

Dear Mr. Major,

MBP is pleased to submit the Draft Space and Efficiency Assessment Report for the GoTriangle Bus Operations and Maintenance Facility (BOMF). We appreciate the assistance and participation of the GoTriangle personnel.

The workshops conducted resulted in the development of a report to help GoTriangle determine the scope associated with optimizing the use of the current facility and understand cost and schedule related to the options discussed.

MBP will revise the draft report based on GoTriangle's comments and submit a final report. MBP will present a summary of the report results to the GoTriangle Board of Trustees.

Please feel free to contact me at 404-414-9951 or torr@mbpce.com to discuss any information within this report. We look forward to the next opportunity to support GoTriangle.

Sincerely,

Tom Orr, PE, CVS
Director of Optimization

Enclosure
cc: File; J19029.004

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1.0 EXECUTIVE SUMMARY

The primary focus of this study is to assess operational and space efficiencies that can be achieved through renovations and expansions of the existing Bus Operations and Maintenance Facility (BOMF) building and site. This information is intended to assist GoTriangle in determining the scope associated with optimizing use of the facility, and the estimated funding needed to implement any alternatives.

OPPORTUNITIES FOR OPERATIONAL IMPROVEMENTS

1.1 MAINTENANCE AREAS

The following is a summary of the upgrades recommended to the maintenance areas and support spaces within the building to improve the operational efficiency of the current BOMF (See Section 3.0 for specifics on these upgrades such as location and recommended approach to each):

- Add 6 modular offices for maintenance supervisors
- Add a maintenance staff training area
- Add a vehicle/facility maintenance library
- Add 2 workspaces for parts technicians
- Add storage space for facility maintenance
- Create full-length vehicle steam cleaning room
- Develop a dedicated tire bay
- Develop Receiving Area and Additional Warehouse Space
- New Electronics Repair Shop
- New Maintenance Breakroom
- Upgrades to address deficiencies with storage of parts and other items:
  - Obtain a portable scissor dock lift
  - Obtain proper glass storage rack
  - Obtain proper battery storage cabinet
  - Store chemicals and bus cleaning supplies in newly converted warehouse space (current Bay #9); or move these items to exterior storage sheds

Costs for the building's maintenance area upgrades as listed above are estimated at approximately $867,350. See the appendix of this report for additional backup information.

- Operational Changes to improve the operational efficiency of the BOMF:
  - Implement the "level buying program" and reduce the overage mileage of the fleet, thus reducing the maintenance workload
  - Ensure vehicles are moved out of bays when repairs are of extended nature

1.2 ADMINISTRATION/OPERATIONS AREAS

The assessment of current spaces available, and functional space needs for Administration, Bus Operations and Paratransit Operations showed that all needs could not be met within the current space available. Thus, 2 options are outlined for constructing a dedicated space for Paratransit and renovating the existing Admin and Bus Operations spaces.

1.2.1 Renovate Bus Operations Wing and Construct 2-Story Paratransit and Admin (Option 1)

The following is a summary of the upgrades to the Operations area recommended to improve the operational efficiency of the current BOMF (see Section 5.0 for additional specifics on functional areas required and space sizes):

- **Operations Wing:** Heavy renovation/rehab of approximately 3,500 square feet and an approximately 1,000 square foot addition to the 1-story operations area. Replace and upgrade all finishes in existing area.
- **Admin/Paratransit Wing:** Demo the approximately 4,600 square foot Admin wing and construct a new approximately 11,000 square foot 2-story Paratransit/Admin wing.

Costs for renovating and expanding the Operations wing and replacing the existing Admin wing with a two-story wing for Admin and Paratransit as listed above are estimated at approximately $3,953,900. See the appendix of this report for additional backup cost information.

1.2.2 Renovate Bus Operations and Admin Wings; Construct New Paratransit Building on Upper Lot (Option 2)

The following is a summary of the upgrades recommended to the admin area (Option 2) to improve the operational efficiency of the current BOMF (see Section 5.0 for additional specifics on functional areas required and space sizes):

- **Operations Wing:** Heavy renovation/rehab of approximately 3,500 square feet and an approximately 1,000 square foot addition to the 1-story operations area. Replace and upgrade all finishes in existing area.
- **Admin Wing:** Heavy renovation/rehab of the approximately 4,600 square foot admin area.
- **Paratransit:** Construct new approximately 4,000 square-foot building for Paratransit in upper lot.

Costs for renovating and expanding the Operations wing, renovating the existing Admin wing and constructing a building for Paratransit in the upper lot as listed above are estimated at approximately $4,169,100. See the appendix of this report for additional backup information.

1.3 SITE UPGRADES

The following is a summary of the upgrades recommended to the site areas to meet current needs and also improve the operational efficiency of the BOMF (See Section 6.0 for additional specifics on these upgrades):

- Upgrades to address the bus servicing/fueling/detailing deficiencies include:
  - Install a fare drop vault and a fluids dispenser (3 fluids) at the diesel fueling island located between the building and the bus parking area.
  - Construct a canopy to cover both fueling positions (gasoline and diesel islands) as well as the newly proposed fluids/vault area.
- Expand paved areas behind Bays #6 thru #8 for easier bus movements to/from Bays
- Upgrades to address the bottleneck in the exit path in front of the facility: Reconfigure the exit pathway from the back lot by connecting the driveway from the Paratransit parking area straight through to Nelson Road (see Site sketch).
- Upgrades to address the lack of test deployment space include:

  - Space for test deployment can only be achieved through relocation of Paratransit to the upper lot.
  - Incorporation of a striped area near the exit of the upper lot to stop briefly and test the lifts.
  - Utilization of the current Paratransit parking location for temporarily stopping and testing lifts and bike racks.
- To address the inadequacy of employee and service vehicle parking: Develop the existing wooded "upper lot" for expanded parking (see Section 8.0).
- To address inadequate site lighting for the bus parking area: Add fixtures around the perimeter and replace the interior fixtures with taller LED fixtures.
- Upgrades recommended for the security systems include:
  - Installation of an enhanced CCTV site security system with additional views, high resolution, and additional digital storage
  - Install screens or computer feeds for camera views at monitored locations such as security office, bus and paratransit dispatch, and Admin reception
  - Install higher quality camera and speaker system at security gate; if security fencing added along front of building will need to add these at vehicle gate and personnel/visitor gate
- Upgrades to address fencing deficiencies include:
  - Add 3-strand barbed wire to the top of the existing perimeter fence.
  - Add a security fence between the front parking area and the circulation drive to prevent individuals from having direct access to the building or site.

Costs for the recommended site upgrades as listed above are estimated at approximately $862,750. See the appendix of this report for additional backup cost information.

Additional recommended upgrades not included in the cost estimate include:

- To locate busses in parking area: procure a mapping/tracking system that integrates into the scheduling software
- To ensure electricity rate reductions for new electric bus charging stations: either connect these charging stations to the same meter as the facility or ensuring that Duke Power combines the two meter readings into the same account
- To address all stormwater management needs: make any other upgrades that result in additional impervious areas at the same time as parking area expansion (allows for a single permit).

1.4 BUILDING SYSTEM UPGRADES

The following is a summary of the upgrades recommended to the MEP systems to meet current needs and also improve the operational efficiency of the BOMF (See Section 7.0 for specifics):

- Upgrades to address HVAC and exhaust system deficiencies include:
  - Replace the exhaust fans for the admin and operations wing building areas that will remain.
  - Replace the exhaust fans for the maintenance bay space; also, install units to condition the make-up air. Install a carbon monoxide system for the space which is tied to the operation of the exhaust system.
  - Replace the vehicle exhaust system with drops placed in the correct locations for usage and with nozzles appropriate for GoTriangle's vehicles.
- With renovations of bathrooms (or construction of new bathrooms) mentioned elsewhere, include water-conserving fixtures.

- Upgrades to address power system deficiencies include:
  - With any renovations of spaces (or construction of new space), that result from this exercise it is recommended to assess where any new circuits may be needed to handle additional loads.
  - Replace the backup generator.
- Upgrades to address lighting system deficiencies include:
  - Replace entire lighting system for spaces being renovated, and spaces to remain such as the entire maintenance and parts storage areas
  - Replace task lighting in maintenance bays
  - As mentioned in the Site Section 6.0, replace the site lighting at the bus parking area

Costs for the recommended building system upgrades as listed above are estimated at approximately $494,850. See the appendix of this report for additional backup information.

1.5 COST ESTIMATE SUMMARY

The following is a summary of the upgrade costs broken down by the area of upgrade and showing Option 1 and Option 2.

SUMMARY OF ESTIMATE
PROPOSED UPGRADE FOR GOTRIANGLE BOMF
MORRISVILLE, NC

Item	Description		Total Cost , Option -1	Total Cost , Option -2	Remarks
1.1	Maintenance bay area upgrades		$ 867,350.00	$ 867,350.00	
1.2	Admin and paratransit operation wing office		$ 3,953,900.00	$ 4,169,100.00	
1.3	Site development and upgrade		$ 862,750.00	$ 862,750.00	Site Development for office on upper lot incl. under 1.2
1.4	Building System Upgrades		$ 494,850.00	$ 494,850.00	
1.5	General Requirement	5%	$ 309,000.00	$ 320,000.00	
	TOTAL COST DIRECT COST		**$ 6,487,850.00**	**$ 6,714,050.00**	
	Location Factor/ City	0%	$ -	$ -	See Basis of estimate
	Sales Tax	7%	$ 470,369.13	$ 486,768.63	See Basis of estimate
	Job Difficulty factor	10%	$ 648,785.00	$ 671,405.00	See Basis of estimate
	Labor Burden	0%	$ -	$ -	See Basis of estimate
	Bond and Insurance	2%	$ 130,405.79	$ 134,952.41	See Basis of estimate
	Design Contingency	25%	$ 1,621,962.50	$ 1,678,512.50	See Basis of estimate
	Subcontractor Overhead & Profit	0%	$ -	$ -	See Basis of estimate
	GC Overhead and Profit	15%	$ 1,403,905.86	$ 1,452,853.28	See Basis of estimate
	TOTAL ESTIMATED CONSTRUCTION COST		**$ 10,763,278.27**	**$ 11,138,541.81**	
	Annual escalation rates	6%	$ 1,291,593.39	$ 1,336,625.02	See Basis of estimate
	Gap between Time of Estimate and approval of funding		7	7	See Basis of estimate
	Estimated Time of Completion		17	17	See Basis of estimate
	TOTAL ESTIMATED CONSTRUCTION COST with escalation		**$ 12,054,871.66**	**$ 12,475,166.83**	

1.6 CAPACITY ANALYSIS

1.6.1 Parking

The following is a summary of the parking analyses outlined in Section 8.0. At a minimum the upper lot needs to be developed to provide additional car/service vehicle parking and potentially could be used to provide sufficient parking for the Paratransit vehicles.

Vehicle Type	Current Need	Maximum Capacity	Growth Available
Fixed Route Bus	73	81 with Paratransit on-site 91 with Paratransit off-site	8 (11%) 18 (25%)
Paratransit Bus	25	19 (Current) 28 or more (New Upper Lot)	Deficient currently 3 (12%)
Car/Service Vehicle	175	139 (Current)	Deficient currently
		216 (with upper lot expansion)	41 (23%)
		200 (w/ Paratransit bldg. on upper lot)	25 (14%)

1.6.2 Workspaces

The capacity analyses of workspaces for Administration, Bus Operations and Paratransit Operations indicated that the current Admin and Operations wings have insufficient space to provide adequate workspaces for all three groups as well as providing all the other required functional spaces for efficient BOMF operations. Thus, it is recommended to construct new dedicated space for Paratransit Operations utilizing one of the options presented in Section 5.0. Further information on the workspace capacity analyses can be found in Section 8.0.

1.7 SCHEDULES

High-level schedules were developed to approximate the total time required to complete the upgrades for the BOMF building and site. Separate schedules are developed based on which option is undertaken for the Operations and Admin wings upgrades – see Section 9.0 for these schedules and potential construction phasing.

1.7.1 Schedule for BOMF Upgrades with Admin/Operations Option 1

The time for delivery of all BOMF upgrades should Option 1 (renovating the Operations wing and replacing the existing Admin wing with a two-story wing for Admin and Paratransit) be selected for the Admin/Operations is a total of approximately 51 months. This includes the maintenance area, site and building system upgrades.

1.7.2 Schedule for BOMF Upgrades with Admin/Operations Option 2

The time for delivery of all BOMF upgrades should Option 2 (renovating the existing Admin and Operation wings and constructing a building for Paratransit in the upper lot) be selected for the Admin/Operations is a total of approximately 48 months. This includes the maintenance area, site and building system upgrades.

2.0 INTRODUCTION and BACKGROUND

2.1 SCOPE OF STUDY

The intent of this study is to conduct a high-level operational assessment of the GoTriangle owned Bus Operations and Maintenance Facility (BOMF) site, located at 5201 Nelson Road, Morrisville NC. The resulting information will enable GoTriangle to establish a path forward for capital and operating programs and services associated with the use of the site and develop a long-range plan for the BOMF, including a decision regarding whether the facility adequately addresses GoTriangle's needs through the late 2020's. This assessment identifies the capacity of the existing site to accommodate additional busses in its current configuration and with any recommended modifications or expansions. Further, this assessment identifies ways to ensure there is adequate space allotted for the various teams of employees working at the BOMF, as well as determine whether there is room to accommodate additional employees.

Accordingly, the primary focus of this study is to assess operational and space efficiencies that can be achieved through renovations and expansions of the existing facility and site. This will help GoTriangle determine the scope associated with optimizing use of the facility, and the estimated funding needed to implement any alternatives.

This study represents an assessment for identifying potential operational improvements to a bus operations and maintenance facility and does not include:

- Architectural and/or engineering design analyses; or
- Other technical-related analyses such as structural assessment or code compliance.

2.2 ASSUMPTIONS

The following are assumptions used when considering alternatives for space and site operational efficiency upgrades:

- GoTriangle's Paratransit Team will remain at the Nelson Road BOMF site (discussions were held for possible relocation to the Plaza Building and other locations; however, the decision has been made that Paratransit will remain at this site).
- GoTriangle owns the wooded property across from the BOMF at the west side of House Road; also referred to in this report as the "upper lot". This report suggests alternatives for development and use of this currently wooded site.
- Two 125kw electric bus charging stations will be delivered and installed prior to the end of 2019 to support two new electric buses.
- Compressed Natural Gas (CNG) is not currently being considered a future option.

2.3 WORKSHOPS AND FACILITY TOUR

Two interactive workshops were held at the BOMF facility. Additional site visits were also conducted to review existing conditions and better understand current operations and processes.

2.3.1 Operational and Space/Site Efficiency Workshop #1 and Facility Tour

Workshop #1 consisted of an interactive discussion with the different GoTriangle departments and roles at the BOMF to identify facility deficiencies as well as any potential process improvements.

Workshop Participants

A total of twenty-two participants attended this 1-1/2-day event, including representatives from the following Departments and roles at the facility:

- BOMF Operations
- Administration
- Vehicle Maintenance
- Facility Maintenance
- Bus Operators
- Attendants/Hostlers
- Paratransit Drivers
- Safety & Training
- Security
- Parts Storage
- Dispatch
- Paratransit Reservations

Site Functions:

Functions identified for the BOMF site include:

Verb	Noun		Verb	Noun
Park	Busses		Park	Paratransit Vehicles
Park	Electric Busses		Park	Vendors/Contractors
Train	Operators		Park	Dead Line Busses
Test	Brakes		Park	Contingency Busses
Park	Employees		Park	Service Vehicles
Secure	Site		Fuel	Vehicles
Control	Access		Charge	Vehicles
Receive	Deliveries		Receive	Fuel
Detail	Vehicles		Store	Uniforms

Facility Functions:

As part of the workshop the group identified the required functions provided by the facility and the site. Identification of required functions, rather than a specific space or solution, allows for consideration of additional alternatives that could provide the same function. Functions identified for the facility/building include:

Verb	Noun		Verb	Noun
Maintain	Vehicles		Supervise	Operations
Wash	Vehicles		Maintain	Facility
Fuel	Vehicles		Dispense	Liquids
Detail (Clean)	Vehicles		Store	Liquids
Steam (Clean)	Engines		Train	Employees
Repair	Electronics		Assemble	Employees
Repair	ITS		Store	Maintenance Manuals
Store	Parts		Store	Tools
Store	Personal Items		Check-in	Bus Operators
Store/Dispense	Batteries		Check-in	Paratransit Drivers
Dispatch	Bus Operators		Manage	Operations
Dispatch	Paratransit Operators		Support	Mechanics
Reserve	Paratransit Trips		Shower	Employees
Support	Bus Operators (Quiet/Break Rm)		Receive	Parts
Store	Fare Boxes		Train	Mechanics
Store	Tires		Repair	Tires
Collect	Fares		Store	Uniforms

2.4 FORMAT OF REPORT

Section 3.0 Maintenance Area Assessment: This section outlines the deficiencies identified and suggested upgrades for the Maintenance Bays and other Vehicle Maintenance Support Areas.

Section 4.0 Administration Area Assessment: This section outlines the deficiencies identified and suggested upgrades for the BOMF Administration Support Areas.

Section 5.0 Operations Area Assessment: This section outlines the deficiencies identified and suggested upgrades for the Bus and Paratransit Operations Areas, including options for new Paratransit spaces.

Section 6.0 Site Assessment: This section outlines the deficiencies and upgrade recommendations for exterior areas, including parking, bus servicing/fueling/detailing, circulation paths and other site amenities such as security features.

Section 7.0 Building Systems: This section outlines deficiencies identified and recommended upgrades for building systems such as HVAC, Plumbing, Electrical Power and Lighting systems.

Section 8.0 Capacity Analysis: The scope for these efforts included identifying the maximum capacity and constraints for GoTriangle at this existing site. This section outlines the maximum capacity at this site for Bus Parking, Paratransit Parking, Car Parking, and workspaces for Administration and Operations.

Section 9.0 Cost Estimates and Schedules: Based on the recommended upgrades and options listed in the prior report sections, this section identifies the capital costs and project schedules for the BOMF renovations and expansions.

Appendix - Cost Estimates: This Appendix provides high-level back-up cost estimates for the recommended upgrades identified in the report sections.

3.0 MAINTENANCE AREA ASSESSMENT

Based on discussions with maintenance personnel during the two workshops and tours of the facility areas, the following were identified as deficiencies to the maintenance spaces within the building with recommended upgrades for addressing these deficiencies. Addressing these deficiencies will improve the operational efficiency of the current BOMF.

3.1 MAINTENANCE SPACE DEFICIENCIES

3.1.1 Maintenance Offices

Deficiency Identified:
The maintenance department does not have sufficient offices for the supervisor-level staff. Six (6) additional offices are required for maintenance supervisors.

Proposed Upgrade:
The need for 6 additional maintenance supervisor offices can be addressed through incorporation of modular-type offices. It is proposed to place two modular offices on the mezzanine area overlooking the maintenance bays. Additionally, it is proposed to incorporate a "tower-type" modular office mezzanine along the back wall of the maintenance shop in the location of the current tire storage and brake shop area (across the circulation aisle from lift bays #5 & 6). It is proposed to use the ground level underneath the tower-type offices for a training space for maintenance staff. The graphics below show examples of modular offices for these 2 locations - see the end of this section for a floor plan location of these areas.
|

Example of modular offices for mezzanine (www.unitedpartition.com):

Example of tower-type modular offices for back wall of maintenance shop (www.nationalpartitions.com):

It is assumed in the cost estimate and schedule development that the modular will sit on top of the existing slab and structural modifications, cutting into the slab or relocation of underground utilities are not needed.

3.1.2 Training Room for Maintenance Staff

Deficiency Identified:
The maintenance department does not have a sufficient area for staff training sessions.

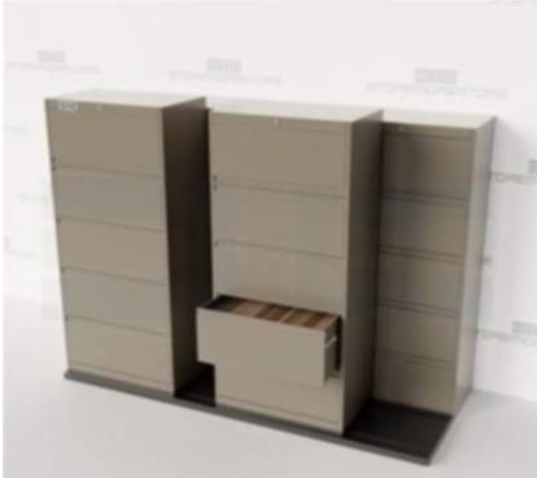
Proposed Upgrade:
The need for a staff training area can be addressed through enclosing the ground floor area underneath the "tower-type" modular offices mentioned in the prior section.

3.1.3 Maintenance/Building System Library

Deficiency Identified:
The maintenance department does not have a sufficient area for storage of reference materials for maintenance manuals and other resources. Additionally, the BOMF facility maintenance group does not have an appropriate area for storage of Operations and Maintenance (O&M) manuals and similar resources for upkeep of the building systems.

Proposed Upgrade:
The need for a library can be addressed through re-purposing the existing closet/storage room currently located along the rear wall of the parts storage mezzanine. This will require lighting improvements of this space and the addition of sliding mobile shelving or cabinets to take advantage of the full room height and area, assuming no structural modifications are needed. Once reorganized and cleared the plan west mezzanine area could also be used for additional library shelving and storage. The graphics below show examples of lateral file or shelving types of storage systems which allow for the best use of room area and height - see the end of this section for a floor plan location of this area.

Example of a sliding lateral file application (www.southwestsolutions.com):



Example of a sliding shelving application (www.southwestsolutions.com):

3.1.4 Maintenance Support Spaces

Deficiency Identified:

The parts storage technicians currently are seated at desks placed underneath stairs and wherever space is available. In addition, the BOMF facility maintenance group does not have adequate storage place for spare parts and other items needed for properly maintaining the building.

Proposed Upgrade:

It is proposed to incorporate a small modular office on the mezzanine overlooking the parts storage area; this would be large enough for two parts technician workspaces. The files currently stored in this area would need to be purged or moved to the new maintenance library. Additionally incorporated into this mezzanine area would be a storage area for the facility group; this area would be enclosed with a lockable chain link fence. See the end of this section for a floor plan location of this area.

3.1.5 Engine Cleaning Area/Steam

Deficiency Identified:
The engine cleaning area is not large enough to clean an entire bus; thus, engines are not cleaned sufficiently prior to maintenance.

Proposed Upgrade:
It is proposed to expand the steam cleaning room to be a full-length steam room; this would require pushing out the exterior wall.

3.1.6 Parts/Storage

Deficiencies Identified:
The parts storage area is inadequately sized to allow for storage of parts for the new electric busses as well as the upcoming 2019 busses. The storage receiving area also does not have a loading dock. Additional storage deficiencies include the following:

- Need proper glass storage rack to prevent damage
- Batteries need upgraded storage rack
- Chemicals have limited storage area
- Currently storing bus cleaning supplies within facility
- In mezzanine, storing files beyond time requirements; also, some items stored are obsolete

Proposed Upgrades:
To address the lack of parts storage space, it is proposed to convert existing Bay #9 to a receiving area as well as additional warehouse space; in order to not reduce the number of repair bays the existing warehouse room next to the steam room would then be converted to a dedicated tire bay. Bay #9 is on the front of the building and adjacent to the existing parts storage area; thus, it would be ideal for a receiving area and additional parts storage.

Additional upgrades to address storage of parts and other items include:

- To address the lack of a loading dock for receipt of parts, it is recommended to obtain a portable scissor dock lift. These come in electric or hydraulic versions; Beacon and Vestil are two manufacturers.
- Obtain proper glass storage rack
- Obtain proper battery storage cabinet
- Obtain in-ground scissor lift in tire bay
- Install awning outside of warehouse receiving bay
- Store chemicals and bus cleaning supplies in newly converted warehouse space (current Bay #9); or move these items to exterior storage sheds
- Purge outdated or obsolete items in mezzanine

3.1.7 Maintenance Repair Bays

GoTriangle currently has a fleet of 73 fixed route busses, 25 Paratransit vehicles and 27 service vehicles that are maintained at this facility. Using a rule of thumb of 1 bay per 15 fixed route busses and 1 bay per 20 Paratransit/gasoline vehicles would yield the need for 8 repair bays. The BOMF has 10 repair bays which would appear to be sufficient using this high-level rule of thumb. However, there are 3

factors which are contributing to the 10 bays feeling insufficient: first, the GoTriangle fleet is very high mileage (existing busses averaging approximately 450,000 miles); second, GoTriangle performs major repairs such as rebuild of engines, transmissions, etc.; and third, vehicles often remain in a bay when repairs are of an extended nature due to waiting for parts, etc. These factors will require the need for additional maintenance bays, over and above that of a typical facility.

GoTriangle's plan is to implement a "level buying program", which involves buying $1/12^{th}$ of a new fleet each year to replace the oldest and highest mileage busses. This will lower the average mileage of the fleet and over time should reduce the demand on the service bays. Another factor to consider to fully evaluate the appropriate quantity of repair bays is the projected growth of the fleet; the projected fleet size determination needs to include the impact of the recent discontinuation of the light rail project. Lastly, due to the need for appropriate site infrastructure and repair bay upgrades, the projection should identify the size of the fleet powered by alternative fuels.

The repair bays were designed for 35-foot busses; however, based on observations the current 40-foot busses fit within the building and do not overhang the circulation aisle. Thus, the bay size appears adequate for the current fleet.

Deficiencies Identified:

Deficiencies noted for the repair bays are as follows:

- Limited shop space for tool boxes and portable equipment, causing storage to take place between bays
- Work benches and workstations located between bays, restrict circulation around busses during service
- Electronics repair shop has limited space and needs a dedicated bay
- Only 2 bays (9/10) are long enough to pull engine and transmission

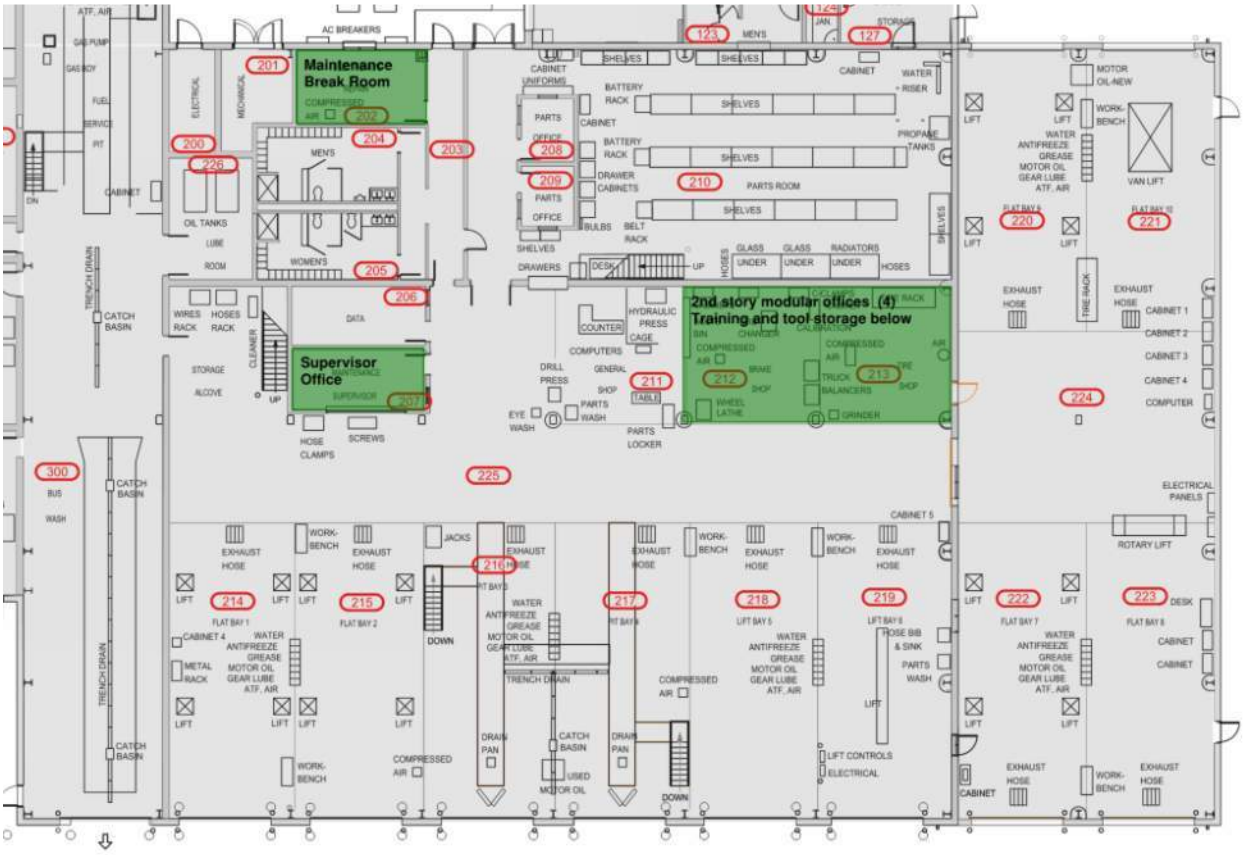
Upgrades and Operational Changes:

The deficiencies identified above can only be resolved by construction of a new facility. However, two operational changes can be made which will improve the operational efficiency of the BOMF:

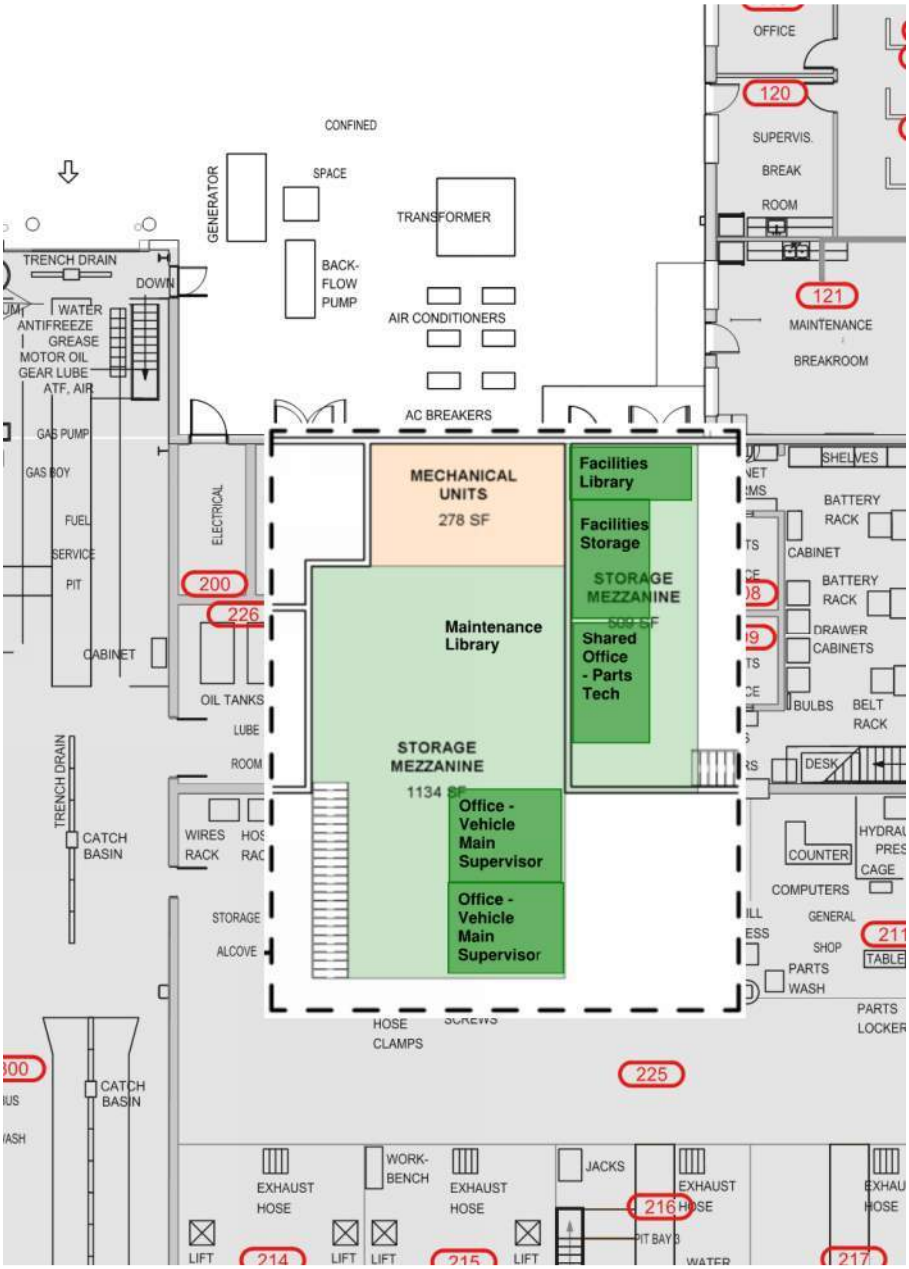
- Implement the "level buying program" and reduce the overage mileage of the fleet, thus reducing the maintenance workload
- Ensure vehicles are moved out of bays when repairs are of extended nature

3.1.8 Floor Plan Sketches

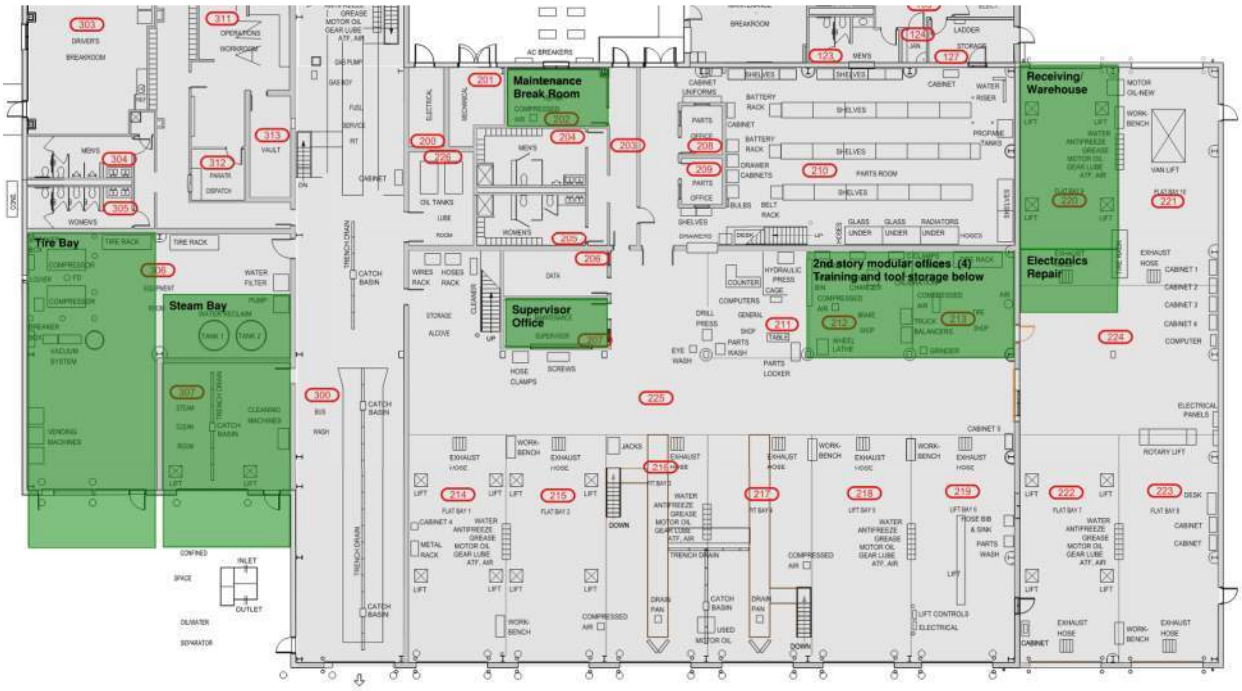
Reconfigured Spaces at Rear of Maintenance Bays – 4 Supervisor Offices and Break Room:



Reconfigured Mezzanines – 2 Supervisor Offices, Training Space, 2 Parts Tech Offices, Library, and Facilities Storage:



Reconfigured Maintenance Bays – Enlarged Steam Bay, Dedicated Tire Bay and Enlarged Receiving/Warehouse Space:



3.2 MAINTENANCE SITE DEFICIENCIES

See Section 6.1 for the deficiencies identified related to the maintenance areas on the site with recommended upgrades for addressing these deficiencies.

3.3 SUMMARY OF RECOMMENDED UPGRADES TO MAINTENANCE SPACES

The following is a summary of the upgrades recommended to the maintenance areas and support spaces within the building to improve the operational efficiency of the current BOMF:

- Add 6 modular offices for maintenance supervisors: place 2 modular offices at the front (bay-side) of the mezzanine, overlooking the maintenance bays. Also, incorporate a "tower-type" modular office mezzanine with 4 workstations along the back wall of the maintenance shop in the location of the current tire storage and brake shop area (across the circulation aisle from lift bays #5 & 6).
- Add a maintenance staff training area: this space is proposed to be located underneath the new tower-type modular office identified in the prior item.
- Add a vehicle/facility maintenance library: re-purpose the existing closet/storage room currently located along the rear wall of the parts storage mezzanine, including lighting improvements and the addition of sliding mobile shelving or cabinets.
- Add 2 workspaces for parts technicians: incorporate a small modular office on the mezzanine overlooking the parts storage area large enough for 2 parts technician workspaces.
- Add storage space for facility maintenance: additionally located on the mezzanine overlooking the parts storage area would be a storage area for the facility group; this area would be enclosed with a lockable chain link fence.

- Create full-length vehicle steam cleaning room: expand the current steam cleaning room to be a full-length steam room; this would require pushing out the exterior wall.
- Develop a dedicated tire bay: expand the current warehouse space at the corner of the building by pushing out the exterior wall and outfit for a dedicated tire bay. Major equipment needs for the tire bay include an in-ground scissors lift.
- Develop Receiving Area and Additional Warehouse Space: construct an interior wall to enclose the existing Bay #9 (at the front of the facility) and utilize as a receiving bay and additional warehouse space. Install an awning over the outside wall at this receiving bay.
- New Electronics Repair Shop: construct a new shop behind the wall of the new receiving/warehouse space.
- New Maintenance Breakroom: renovate the existing Electronics Repair space to create a Maintenance Breakroom. Include cabinetry with sink, refrigerator and microwave.
- Upgrades to address deficiencies with storage of parts and other items:
  - Obtain a portable scissor dock lift.
  - Obtain proper glass storage rack
  - Obtain proper battery storage cabinet
  - Store chemicals and bus cleaning supplies in newly converted warehouse space (current Bay #9); or move these items to exterior storage sheds
  - Purge outdated or obsolete items in mezzanine
- Operational Changes to improve the operational efficiency of the BOMF:
  - Implement the "level buying program" and reduce the overage mileage of the fleet, thus reducing the maintenance workload
  - Ensure vehicles are moved out of bays when repairs are of extended nature

3.4 COSTS OF RECOMMENDED UPGRADES

Costs for the building's maintenance area upgrades as listed above are estimated at approximately $867,350. See the appendix of this report for additional backup information.

4.0 ADMINISTRATION AREA ASSESSMENT

Based on discussions with administration personnel during the two workshops and tours of the facility, the following were identified as deficiencies to the admin spaces within the building with recommended upgrades for addressing these deficiencies. Addressing these deficiencies will improve the operational efficiency of the current BOMF.

4.1 ADMINISTRATION SPACE DEFICIENCIES

4.1.1 Admin Workspaces

Deficiency Identified:
Currently, the administration workspaces are over capacity, partially due to Paratransit and building maintenance staff located in the admin area. Current needs for Admin spaces include:

- 6 Offices: Director of Transit Operations, Assistant Director of Transit Ops, Bus Operations Manager, HR/Payroll, Safety/Training Manager, Bus Operations Supervisor
- 9 cubicles: Admin Assistant, Paratransit Supervisor, Data Specialist, Paratransit Manager, Building Facilities (2), Safety and Security Specialist, Training Coordinator Behind the Wheel Trainer
- Other spaces: Training Room/Conference Room, Break Room, Storage, Copy, Drug Testing, Video Room

Proposed Upgrade:
It is understood that 4 people or positions have been identified for relocation to the Plaza building; however, the existing building is inadequately sized for all required Administration and Operations spaces. See Section 5.0 for possible expansions and additions.

4.1.2 Admin Functional Spaces/Configuration

Deficiencies Identified:
The following deficiencies were identified relating to functional space needs and configuration of spaces:

- The main entry to the Admin area is not able to be visually monitored by the Administrative Assistant
- The Safety/Security Specialist currently sits in a cubicle and should be in an office
- The existing storage space is not adequate, so many files are stored on the mezzanine in the maintenance space
- There is only one training/conference room and there are often two groups that need meeting space at the same time
- The acoustics in the space cause distractions. As an example, the break room does not have a ceiling and the sound carries throughout the work spaces
- The admin area does not provide appropriate office or small meeting space for supervisors to have private conversations with staff
- The maintenance break room is in the admin space and maintenance staff have to exit the maintenance area and walk outside to access the break room
- There is no dedicated secure room to view video footage of bus cameras
- The copy machine is in a central open area, which is a concern when printing confidential or sensitive materials

Proposed Upgrades:
The following upgrades will improve operational efficiencies of the administration suite:

- Add reception desk/area with visual sightline for visitors approaching building and unlocking capability at desk
- Include an office for both Safety/Security employees
- Expand storage space and purge existing administration-related files in mezzanine
- Include two large rooms that can be used for training and/or meetings
- Fully enclose break room with ceiling to improve acoustics and sound travel
- Consider including small huddle or focus rooms for private conversations with staff if all supervisors do not have offices
- Relocate maintenance break room to maintenance area
- Include secure room for monitoring of bus video footage
- Include a copy room and possibly implement an IT solution to print from queue when code is entered

4.1.3 Admin Area Design Deficiencies

Deficiency Identified:
The administration suite, as currently configured, has poor acoustics with conversations projecting across all spaces and noise from break room serving as a distraction to employees.

Proposed Upgrade:
In redevelopment of Admin spaces, upgrade finishes to dampen noise projection and fully enclose break area.

4.1.4 Other Administration Area Deficiencies - Options

Deficiencies Identified:
Deficiencies that would provide some level of improvement for personnel include the following:

- Facility does not have a synchronized clock system

Proposed Upgrades - Options:
The following are recommended to be identified as options in a new project:

- Install a synchronized clock system throughout all building spaces

4.2 OPTIONS FOR ADMINISTRATION SPACE

There are 2 primary options for reconfiguring the Administration suite at the BOMF; the options are dependent on the location of the Paratransit Operations Suite. These options are outlined in Section 5 of this report.

5.0 OPERATIONS AREA ASSESSMENT

Based on discussions with Bus and Paratransit Operations personnel during the two workshops and tours of the facility, the following were identified as deficiencies to the operations spaces within the building with recommended upgrades. Addressing these deficiencies will improve the operational efficiency of the current BOMF.

5.1 OPERATIONS SPACE DEFICIENCIES

5.1.1 Operations Workspaces

Deficiencies Identified:

Currently, the spaces for Bus and Paratransit Operations are inadequate and do not serve the required functional needs for these groups. Current needs for Operations spaces include:

- Bus Operations
  - 1 Office: Bus Operations Manager
  - 11 cubicles (or shared cubicles for 11): Supervisors
  - 4 cubicles: Dispatch
  - Other spaces: Check-in, Dispatch, Breakroom, Quiet Room, Huddle Room, Vault, Uniform Storage, Copy, Lockers and Mailboxes
  - Expanded restrooms with showers
- Paratransit Operations
  - 1 Office: Paratransit Manager
  - 3 cubicles: 2 Supervisors, Safety Specialist
  - Other spaces: Check-in, Dispatch, Breakroom, Quiet Room, Huddle Room, Video, Copy
  - Expanded restrooms with showers, Lockers and Mailboxes

Proposed Upgrades:

To provide all necessary functional spaces required for efficient operations, the BOMF will require renovations and expansions/additions to the administration and operations wings. Later in this section options will be outlined for these upgrades.

5.1.2 Specific Operations Area Deficiencies

Deficiencies Identified:

Specific deficiencies were noted for the existing bus and paratransit operations areas, including the following:

- Paratransit reservations and dispatch staff sit close together, and clients have difficulty hearing with the background noise
- The bus check in window does not have full height visibility of staff or guests entering space. The area for bus check in and dispatch is not adequate for the number of staff members needing to use the space
- Supervisors do not have offices or available huddle room space for private conversations with staff
- Number of fixtures in restroom are inadequate and there are no showers
- Number of lockers are inadequate for number of drivers
- The layout of the space leads to inappropriate space adjacencies, such as the Paratransit check in window being directly across from the restrooms

- There is not dedicated space for the necessary robust radio system or storage for equipment and devices
- No central secure storage is available for confidential personnel files
- It is preferable for the check in staff to have a visual sightline into the quiet room, which currently is not available
- The quiet room needs to be expanded. The room currently has seven chairs for the approximately 120 drivers.
- There is no dedicated small storage space for the demo uniforms.
- The ice machine is located directly outside of the restrooms instead of in the break room.
- All finishes need to be refreshed Bus operations and Paratransit currently have to share a printer/fax and the only color printer is located in the admin area.
- The current layout requires Paratransit drivers to cross the bus wash entrance to get from check in to their vehicles
- The site entrance gate has poor audio and does not provide visual of drivers in taller vehicles

Proposed Upgrades:

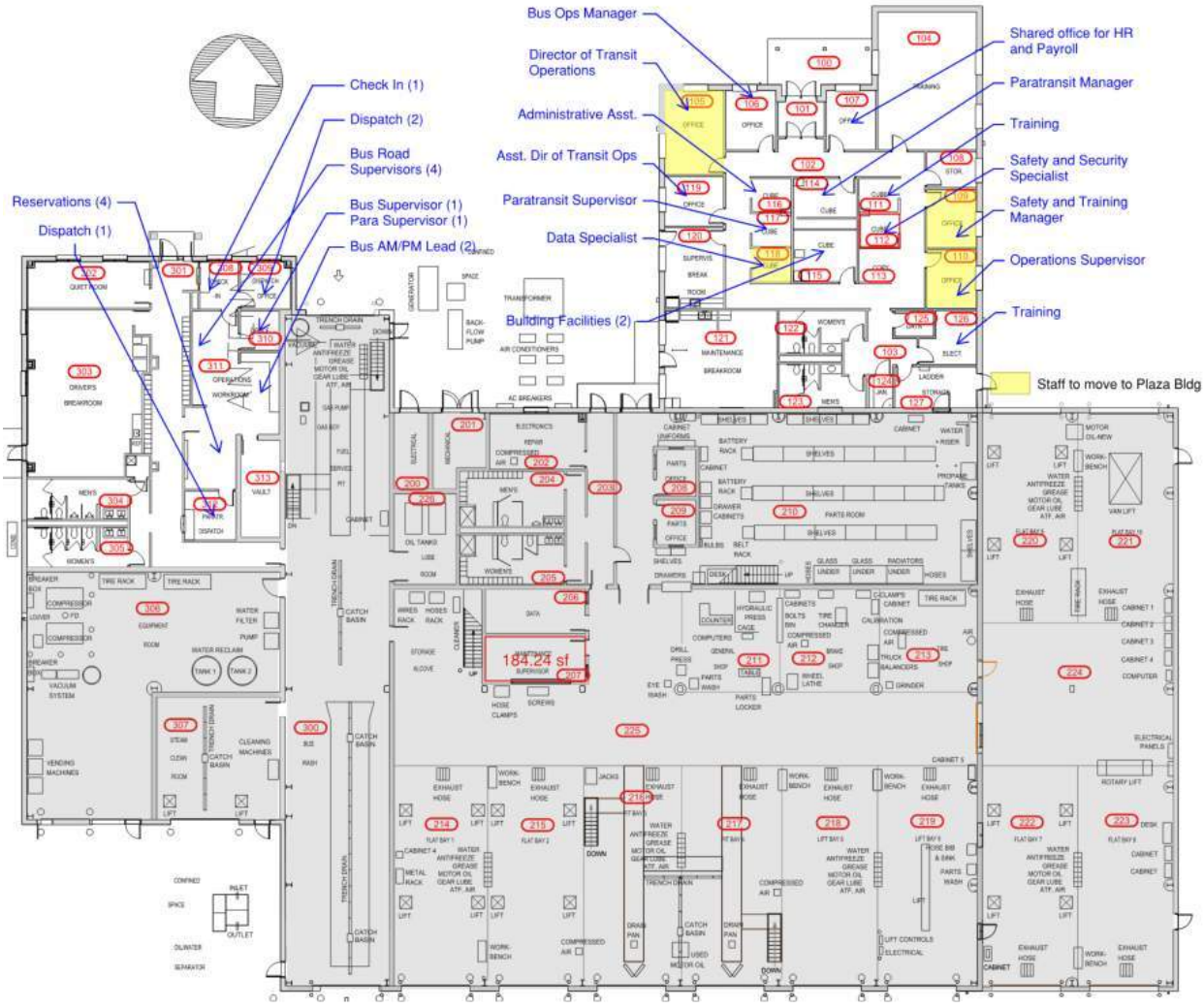
The renovations and expansions/additions to the administration and operations wings should include the following features:

- Include cubicles for Paratransit reservations and dispatch staff to address background noise issue
- Re-arrange entrance and check in area to create a full height visual sightline of staff and guests approaching building
- Expand dispatch and check in area
- Include cubicles for all Bus Operations supervisors and a huddle room for private conversations
- Expand area for lockers and restrooms (approx. 100 lockers and add showers to restrooms)
- Ensure space adjacencies are appropriate based on functions
- Include appropriate space for size requirements of radio system
- Include adequate charging and storage area for operators' tablets, supervisors' radios and supervisors' laptops
- Include file storage room with trilogy lock for personnel files
- Ensure a sightline or means of monitoring quiet rooms
- Expand quiet room and consider including "pods" in addition to or in lieu of chairs
- Include small storage room for demo uniforms
- Include space for ice machine in break room
- Upgrade all finishes in renovated spaces
- Provide a dedicated printer/fax machine for Paratransit (due to receipt of confidential information) and add color copier in Operations area
- Include audio and video upgrade of gate security system

5.2 EXISTING ADMINISTRATION/OPERATIONS WINGS

The following sketch shows the current utilization of spaces in the GoTriangle BOMF. The current spaces are not adequate for the current quantity of personnel and working in insufficient spaces is causing inefficient workflows. Currently, 15 personnel are situated in approximately 2,100 SF of the Admin wing and 16 Bus Operations and Paratransit personnel have workspaces in approximately 875 SF of the undersized Operations wing.

5.2.1 Existing Admin/Operations Wing Sketch



5.3 OPERATIONS/ADMINISTRATION AREA OPTIONS

An exercise was performed on attempting to fit all required functional spaces based on the number of current BOMF personnel. The results of this exercise showed that expansions to the existing wings or additional spaces need to be constructed to serve all needs. The options for resolving the inadequate space for Administration, Bus Operations and Paratransit Operations are as follows:

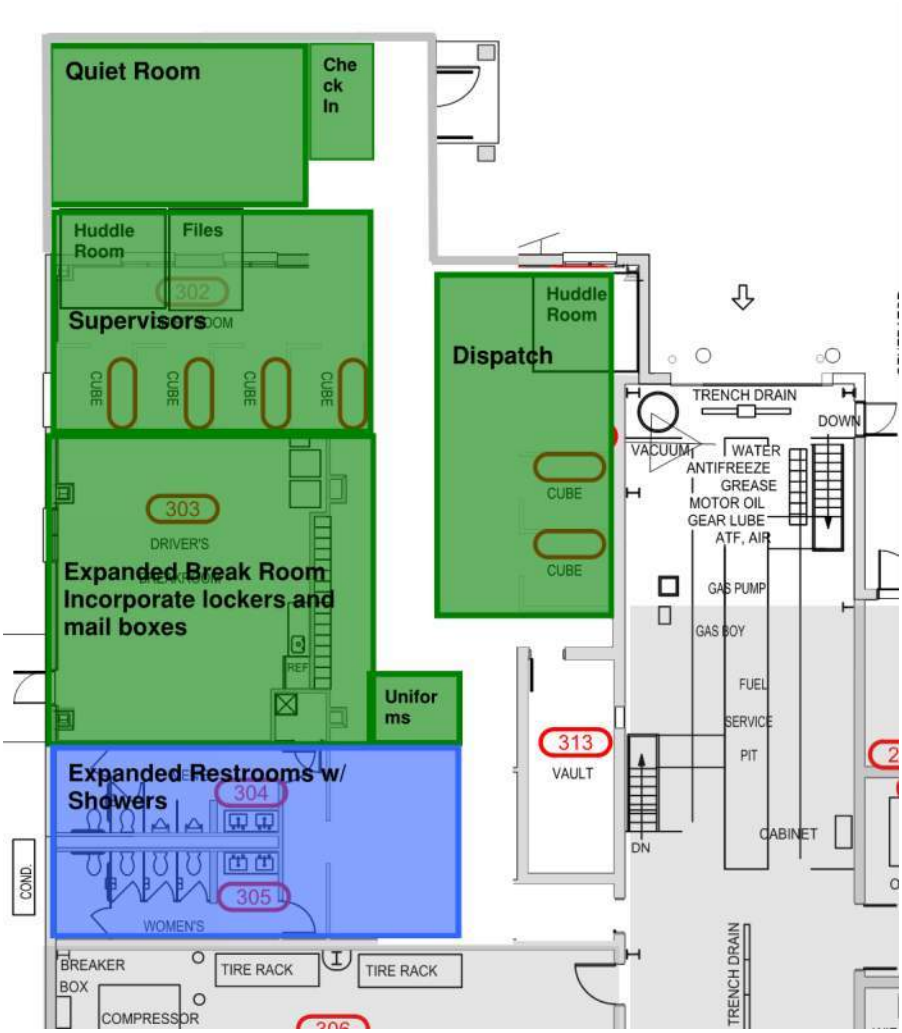
1. 2-Story Paratransit and Admin (Option 1): Build a 2-story wing in current Admin location with Paratransit operations on the 1st Floor and Admin on the 2nd Floor; leave Paratransit parking at current location or move to front lot. Build out upper lot for additional employee parking.
2. Renovated Admin with Paratransit building and parking on upper lot (Option 2): Renovate Admin wing in current location, renovate and expand Operations wing to serve Bus Operations; and build out wooded area on upper lot with additional parking and dedicated Paratransit building. Move Paratransit parking to upper lot (and current Paratransit parking becomes available for bus parking expansion).

5.3.1 2-Story Paratransit and Admin (Option 1)

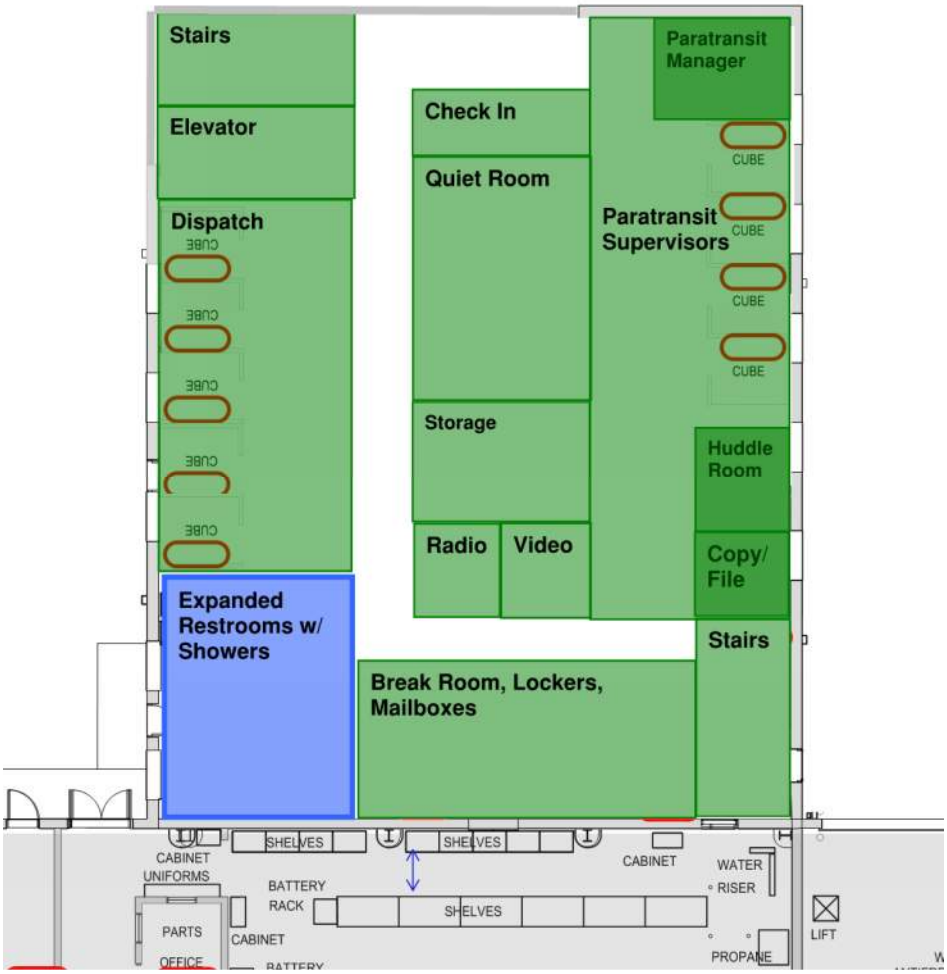
In this option, the existing Admin wing would be demolished and a 2-story wing constructed with Paratransit Operations on the 1st Floor and Admin on the 2nd Floor. The Bus Operations area would also be renovated and expanded:

Expanded Bus Operations Area and 1st Floor Paratransit Wing

Operations Wing



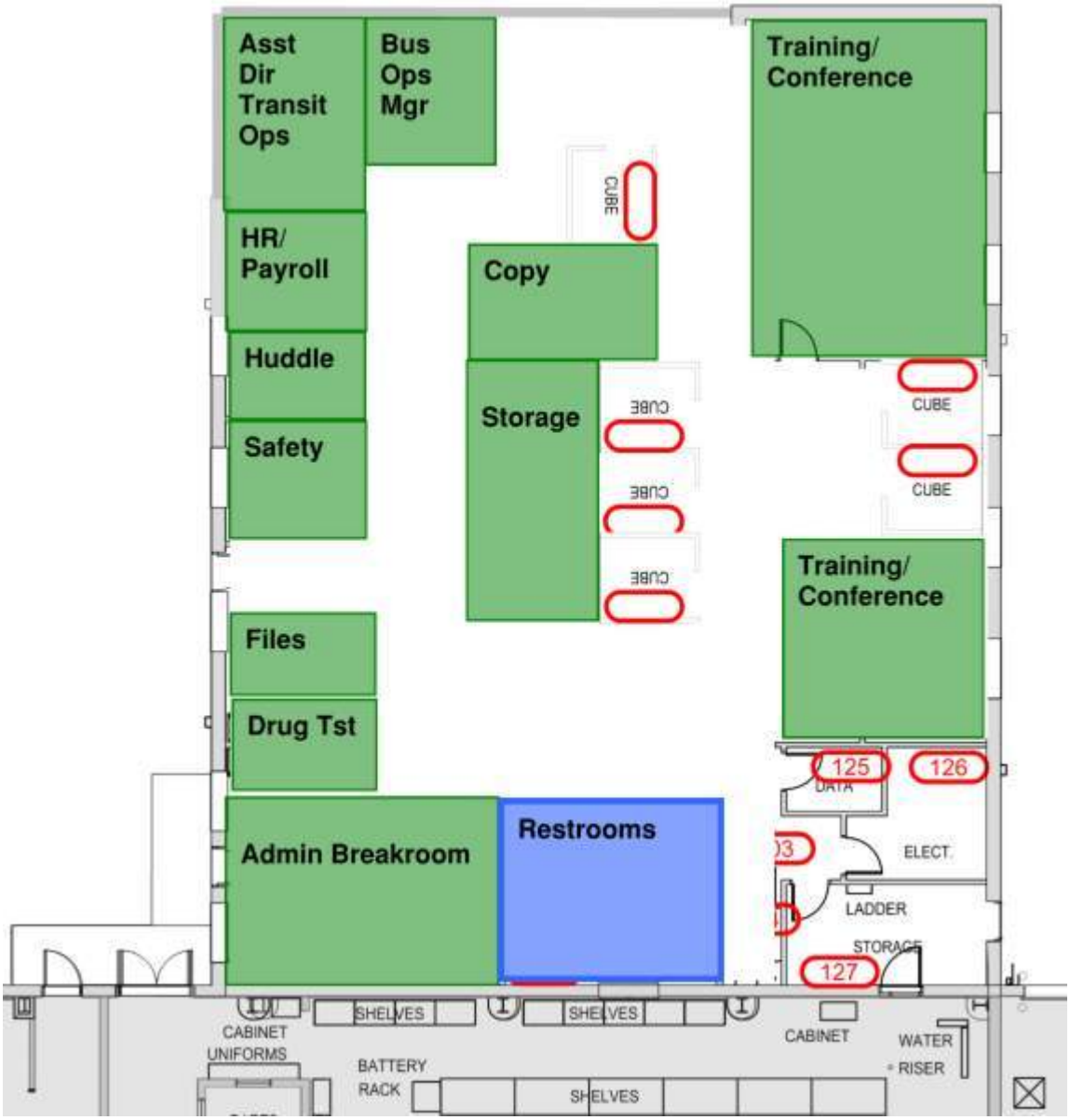
Paratransit 1st Floor



2nd Floor Admin

5.3.2 Renovated Admin Wing with Paratransit in Upper Parking Lot (Option 2)

In this option, the existing Admin wing would be renovated and a separate Paratransit Operations building would be constructed in the upper lot. The Bus Operations area would also be renovated and expanded similar to the first option.



Spaces in Paratransit Operations Building:

A space planning exercise was conducted that showed a 4,000 SF building would provide the necessary functional spaces for a separate Operations Building for Paratransit. These spaces are as follows:

- **3 Offices**
  - Paratransit Manager
  - Supervisor
  - Check in
- **7 Cubicles**
  - Paratransit Supervisor (2)
  - Paratransit Safety Specialist
  - Paratransit Dispatchers (4)
- **Other spaces**
  - Copy/Storage
  - Video room
  - Break room
  - Quiet Room
  - Restrooms
  - Electrical/data

5.4 SUMMARY OF RECOMMENDED UPGRADES TO ADMIN AND OPERATIONS SPACES

5.4.1 2-Story Paratransit and Admin (Option 1)

The following is a summary of the upgrades to the Operations area recommended to improve the operational efficiency of the current BOMF:

Operations Wing: Heavy renovation/rehab of approximately 3,500 square feet and an approximately 1,000 square foot addition to the 1-story operations area. Replace and upgrade all finishes in existing area.

- Expand footprint of operations area: move front façade of building toward the road to increase the square footage of the operations area and accommodate necessary programmed space.
- Create full height visual sightline at entrance: Situate check-in area to have full height view of all employees entering building. Also provide visual from check in area into quiet room.
- Add cubicles for all supervisors: Create space with shared cubicles for four dispatch supervisors and a huddle room for private conversations. Create space with shared cubicles for seven bus supervisors, a huddle room for private conversations, a copy room with a color printer/copier, and secure file storage.
- Expand restrooms: Add fixtures to restrooms to accommodate usage and add showers.
- Add lockers: Replace lockers to have individual locker for each of the ~100 bus drivers.
- Modify layout of spaces: Ensure space adjacencies are appropriate based on functions.
- Expand break room: Increase size of break room to appropriate size for all bus drivers and include the ice machine.
- Expand quiet room: Increase size of quiet room and consider including "pods" in addition to or in lieu of chairs.
- Add small storage room: Incorporate a small storage room to store demo uniforms for more convenient access.
- Install synchronized clock system: Install a synchronized clock system throughout all building spaces
- Upgrade security gate: Include audio and video upgrade to security gate system.

The following is a summary of the upgrades recommended to the Admin area (Option 1) to improve the operational efficiency of the current BOMF:

Admin/Paratransit Wing: Demo the approximately 4,600 square foot Admin wing and construct a new approximately 11,000 square foot 2-story Paratransit/Admin wing.

- 2-story Paratransit/Admin wing: move admin functions to 2nd floor and create 1st floor for Paratransit. Add required elevator and stair access.
  - 1st floor Paratransit
    - Create full height visual sightline at entrance: Situate check in area to have full height view of all employees entering building. Also provide visual from check in area into quiet room.
    - Add cubicles: Five cubicles to be added in an office for Dispatch to address background noise issue. Four cubicles for Paratransit supervisors to be included in the Paratransit manager "suite". Each area includes one extra cubicle for future growth.
    - Add Paratransit copy room: Include a dedicated printer/fax machine for Paratransit.
    - Expand check-in area: Include appropriate space for size requirements of radio system.

        - Add storage space for bus equipment: Include adequate charging and storage area for operators' tablets, supervisors' radios, and supervisors' laptops.
        - Add huddle room: Include huddle room in Paratransit Manager's "suite" for private conversations between supervisors and staff.
        - Add video room: Include small, secure room for supervisors to watch bus video footage.
    - 2nd floor Admin
        - Reduce number of offices: Based on certain employees relocating to the Plaza Building, reduce the number of offices to include Assistant Director of Transit Operations, Bus Operations Manager, HR/Payroll, and Safety.
        - Expand storage space: Include larger storage space for all admin files. This includes purging the existing admin files currently located on mezzanine and moving the remaining files to the admin area.
        - Include two training/conference rooms: A second conference room is needed so larger meetings can take place concurrently with training sessions.
        - Improve acoustics: Fully enclose break room, offices, conference rooms, etc. With a ceiling.
        - Add copy room: Include a copy room and possibly implement an IT solution to print from queue when code is entered

5.4.2 Renovate Bus Operations and Admin Wings; Construct New Paratransit Building on Upper Lot (Option 2)

The following is a summary of the upgrades recommended to the admin area (Option 2) to improve the operational efficiency of the current BOMF:

Operations Wing: Heavy renovation/rehab of approximately 3,500 square feet and an approximately 1,000 square foot addition to the 1-story operations area (see itemized list in Option 1). Replace and upgrade all finishes in existing area.

Admin Wing: Heavy renovation/rehab of the approximately 4,600 square foot admin area.

- Upgrades to existing admin area
    - Add reception desk/area with visual sightline for visitors approaching building and unlocking capability at desk
    - Expand storage space: Include larger storage space for all admin files. This includes purging the existing admin files currently located on mezzanine and moving the remaining files to the admin area
    - Include two training/conference rooms: A second conference room is needed so larger meetings can take place while training is happening.
    - Improve acoustics: Fully enclose break room, offices, conference rooms, etc. With a ceiling.
    - Add copy room: Include a copy room and possibly implement an IT solution to print from queue when code is entered

Paratransit: Construct new approximately 4,000 square-foot building for Paratransit in upper lot.

5.5 PROS/CONS OF OPERATIONS/ADMIN OPTIONS

The advantages and disadvantages of the 2 project approaches are listed below. These factors should be taken into account when making a decision on the best option for GoTriangle.

5.5.1 2-Story Paratransit and Admin Wing (Option 1)

The pros and cons of the project approach involving replacing the current Admin wing with a 2-story Paratransit and Admin wing are as follows:

Pros:

- All Operations and Admin are centrally located
- Allows for improved post-construction conditions of Admin space (improved acoustics, etc)
- Slightly lower cost as compared to Option 2

Cons:

- Increased impact to operations
- Slightly longer construction schedule as compared to Option 2
- Requires swing space during construction of 2-story wing and renovation of Operations wing

5.5.2 Renovate Bus Operations and Admin Wings; Construct New Paratransit Building on Upper Lot (Option 2)

The pros and cons of the project approach involving renovating the existing Operations and Admin wings, and constructing a new Paratransit building on the upper lot are as follows:

Pros:

- Reduced impact to operations during construction
- Shorter construction schedule
- Allows for easier phasing during construction and use of new Parantransit building as swing space
- Allows for improved post-construction conditions of Admin space (improved acoustics, etc)

Cons:

- Paratransit operations separate
- Does not allow for shared spaces (Break room, Quiet rooms, Restrooms)
- Increases distance traveled by attendants for post-route servicing
- Requires running utilities to upper lot for new building
- Slightly increased cost as compared to Option 1

5.6 COSTS OF RECOMMENDED UPGRADES

5.6.1 Renovate Bus Operations and Construct 2-Story Paratransit and Admin Wing (Option 1)

Costs for renovating and expanding the Operations wing and replacing the existing Admin wing with a two-story wing for Admin and Paratransit as listed above are estimated at approximately $3,953,900. See the appendix of this report for additional backup information.

5.6.2 Renovate Bus Operations and Admin Wings; Construct New Paratransit Building on Upper Lot (Option 2)

Costs for renovating and expanding the Operations wing, renovating the existing Admin wing and constructing a building for Paratransit in the upper lot as listed above are estimated at approximately $4,169,900. See the appendix of this report for additional backup information.

6.0 SITE ASSESSMENT

6.1 MAINTENANCE-RELATED SITE DEFICIENCIES

Based on discussions with maintenance personnel during the two workshops and tours of the site, the following were identified as deficiencies to the maintenance areas on the site with recommended upgrades for addressing these deficiencies.

6.1.1 Bus Servicing/Fueling/Detailing

Deficiencies:

The current process for bus servicing includes each operator parking their bus in the main lot at the rear of the site. The service attendants then pull each bus around to enter the service line which runs through the building from front to rear; the service line is where each bus can be fueled, fluids dispensed, and the fare drop occurs at the vault alongside the service line. Deficiencies in this process include:

- The single service line is a bottleneck due to this also being the only location for bus washing, dispensing fluids and dropping fares
- When busses are queued for the service line they often block the front drive which is the single exit from the rear lot and doesn't allow other vehicles to exit the property
- The bus wash is a gantry-style and takes approximately 7 minutes to wash each bus; the time for complete servicing of each bus, including fueling, washing, and dropping fares, is approximately 17 minutes. With limited downtime between routes, the current time for bus washing only allows for washing each bus twice per week.
- The fueling islands at the rear are not covered and in the hottest and coldest months are open to the elements

Proposed Upgrades:

Upgrades to address the bus servicing/fueling/detailing deficiencies include:

- Install a fare drop vault and a fluids dispenser (3 fluids) at the diesel fueling island located between the building and the bus parking area. This will provide a second location for fare drops and fluids and would not require busses to circulate to the front of the building for servicing unless they require washing; this shorter route from for servicing and relief of the bottleneck should greatly improve operational efficiencies for these functions. Another alternative would be to add the second fare drop even if the fluids dispenser is not added.
- Construct a canopy to cover both fueling positions (gasoline and diesel islands) as well as the newly proposed fluids/vault area. This will protect the attendants from the elements while fueling/servicing the vehicles and will provide a location for detailing of vehicles during inclement weather. An additional upgrade to be considered, with added cost, includes fans under the canopy.
- Option: due to the gantry-style wash requiring 7 minutes to wash a single bus, busses are only being washed twice per week. Should GoTriangle desire to wash vehicles on a daily basis, the gantry-style can be replaced with a drive-through style. A drive-through style would allow the wash cycle to be reduced from 7 minutes to as little as 3.5 minutes (according to the manufacturer). While replacement of the wash system might provide some operational improvements, since this wash system is only 18 months old and recent steps have been taken to improve the operations and reliability of the system, it is not recommended to replace the wash system at this time.

See the end of this section for a site plan indicating the site upgrades.

6.1.2 Bus Access to Maintenance Bays

Deficiency:
Due to a limited pavement area outside of Bays #6 thru 8, there is some difficulty in moving fixed route busses to/from these bays for maintenance. Also, the pavement throat used for circulation from the fueling or parking area to these Bays is narrow.

Proposed Upgrades:
It is recommended to extend/expand the paved areas behind Bays#6 thru 8 and to widen the pavement throat from the fueling areas to allow for easier movement of fixed route busses to/from these bays. See the Site Plan at the end of this section for identification of the expanded paved areas.

6.2 BUS PARKING AND CIRCULATION SITE DEFICIENCIES

Based on discussions with attendants and bus operators during the workshops and tours of the site, the following were identified as deficiencies to the bus parking and circulation routes on the site with recommended upgrades for addressing these deficiencies.

6.2.1 Circulation Route for Busses

Deficiencies:
The exit path for busses in front of the facility can become a bottleneck when busses are queueing to enter the single service line/wash bay. Additionally, the bus parking area can become a bottleneck at peak evening return times.

Proposed Upgrades:
Upgrades to address the bottleneck in the exit path in front of the facility include:

- Installing a fare drop vault and a fluids dispenser (3 fluids) at the diesel fueling island as mentioned previously will reduce the servicing time for the attendants and should greatly help these situations.
- Reconfigure the exit pathway from the back lot by connecting the driveway from the Paratransit parking area straight through to Nelson Road (if stormwater retention is an issue could re-develop front parking lot as pervious pavement).

See the end of this section for a site plan indicating these upgrades.

6.2.2 Pre-Route Testing for Bus and Paratransit

Deficiency:
Currently, neither the fixed route busses nor Paratransit have adequate parking/space on-site to test deploy lifts and bike racks before leaving facility. Thus, Paratransit is typically test deploying alongside of Nelson Road. For busses, this requires bus assignments to take into account the testing the lifts on the right side prior to starting the route.

Proposed Upgrades:
Upgrades to address the test deployments include:

- Paratransit: should the option be selected to locate Paratransit in the upper lot the new lot could incorporate a striped area near the exit to stop briefly and test the lifts.

- Bus: if Paratransit parking stays in the current location there is no room for incorporating a bus lift and bike rack test area; however, if Paratransit moves to the upper lot the current Paratransit parking location could be utilized for temporarily stopping and testing lifts and bike racks.

6.2.3 Configuration of Bus Parking

Based on our own discussions and analysis of the size and shape of the existing bus parking area, the current configuration maximizes the bus parking on the site. We know of no other alternative parking configurations that would gain any additional bus parking on the site. Thus, no upgrades are recommended for the arrangement of the bus parking. Section 8.0 of this report analyzes the maximum capacity of the bus parking on the current site.

6.3 OTHER PARKING DEFICIENCIES

6.3.1 Parking for Employees and Service Vehicles

Deficiencies:
Parking deficiencies for employee and service vehicles include:

- Parking currently inadequate for the number of employees at the BOMF. This results in vehicles being parked along Nelson Road.
- Existing parking is currently inadequate for the 27 service vehicles; thus, they are currently being parked along the front curve of the exit circulation path

Proposed Upgrades:
Upgrades to address the inadequacy of employee and service vehicle parking include:

- The inadequate parking can only be addressed by developing the existing wooded “upper lot” for expanded parking. This will provide adequate parking based on the current vehicle counts – see Section 8.0 for additional information on the maximum parking capacity.

See Section 8.0 for a site plan indicating developing the upper lot for additional parking.

6.4 SECURITY DEFICIENCIES

6.4.1 Site Lighting at Bus Parking Area

Deficiencies:
The bus parking area is not properly illuminated at night. Most fixtures are on the interior and the light is blocked by the busses parked on the site.

Proposed Upgrades:
It is recommended to upgrade the site lighting for the bus parking area. Fixtures should be added around the perimeter and the interior fixtures replaced with taller LED fixtures such that the light is not blocked by the busses.

6.4.2 Security Systems

Deficiencies:

Security system deficiencies include:

- The current CCTV site security system is limited, with limited views, low resolution/quality, and limited digital storage
- The camera at the security gate is low resolution and speaker cannot be heard clearly
- The ability to monitor the existing CCTV camera views is limited

Proposed Upgrades:

Upgrades recommended for the security systems include:

- Install an enhanced CCTV site security system with additional views, high resolution, and additional digital storage
- Install screens or computer feeds for camera views at monitored locations such as security office, and bus and paratransit dispatch; potentially some supervisor offices and Admin reception also
- Install higher quality camera and speaker system at security gate; if security fencing added along front of building will need to add these at vehicle gate and personnel/visitor gate

6.4.3 Security Fencing

Deficiencies:

Security deficiencies related to fencing include:

- Existing fencing around bus parking area is limited to a chain link fence. The current fence is easily scalable by individuals.
- There is no fencing across the front of the building and some maintenance bays are along the front and not within the existing fence line. Thus, an individual can easily enter the building or site if these bay doors are open.

Proposed Upgrades:

Upgrades to address fencing deficiencies include:

- The current chain link fencing around the bus parking perimeter appears to be in good shape; thus, it is recommended to add 3-strand barbed wire to the top of the existing fence.
- It is recommended to add a security fence between the front parking area and the circulation drive to prevent individuals from entering the building or site when the front bay doors are open or when parts are being received at the unloading area.

The Site Plan at the end of this section recommends a routing for new fencing across the front of the facility.

6.5 OTHER SITE DEFICIENCIES

6.5.1 Bus Mapping System

Deficiency:
The BOMF fixed route bus operations currently do not utilize a mapping/tracking system for the bus parking.

Proposed Upgrade:
It is recommended to procure a mapping/tracking system that integrates into the scheduling software and would indicate the exact location of each specific bus in the parking area, which would increase the efficiency of the bus assignments for the Dispatch operations.

6.5.2 Brake Testing/Bus Training

There is not room on the existing site for performing brake testing or for conducting training of bus operators. Currently, the busses will be taken off site for brake testing and training of operators. For example, the PNC Arena parking lot is often utilized for bus operator training; however, when events are scheduled (such as the NHL Playoffs this past year), scheduled training must be canceled.

No upgrades can be made to the current site to allow adequate space for these functions; however, a consideration may be made to contact the local school district for the possibility of sharing their bus operator training course.

6.5.3 Electric Bus Charging Stations

Potential Issue Identified:
At the time of the facility assessment it was not known if the 2 new electric bus charging stations were to be metered separately from the remainder of the facility.

Proposed Upgrade:
It is proposed to ensure that the electricity consumed at the bus charging stations be considered on the same account as the facility to ensure that the total usage for the site is recognized which will allow any rate reductions for usage thresholds to be realized. This can either be done by connecting these charging stations to the same meter as the facility or ensuring that Duke Power combines the two meter readings into the same account.

6.5.4 Impervious Areas

It is currently assumed that any additional impervious areas resulting from these upgrades will require additional stormwater quantity and quality management features. Since there are existing needs that will require additional impervious areas, such as the current lack of parking requiring a parking area in the wooded upper lot, it is recommended to make any other upgrades that result in additional impervious areas at the same time (such as revising the pavement area behind Bays #6-8). This will allow for a single permitting to cover all stormwater management issues at the site.

6.5.5 Alternative Fuels – Compressed Natural Gas

The current bus parking area is landlocked with and the current parking capacity has limited expansion options (see Section 8.0 of this report for the Maximum Capacity assessments). It is our understanding

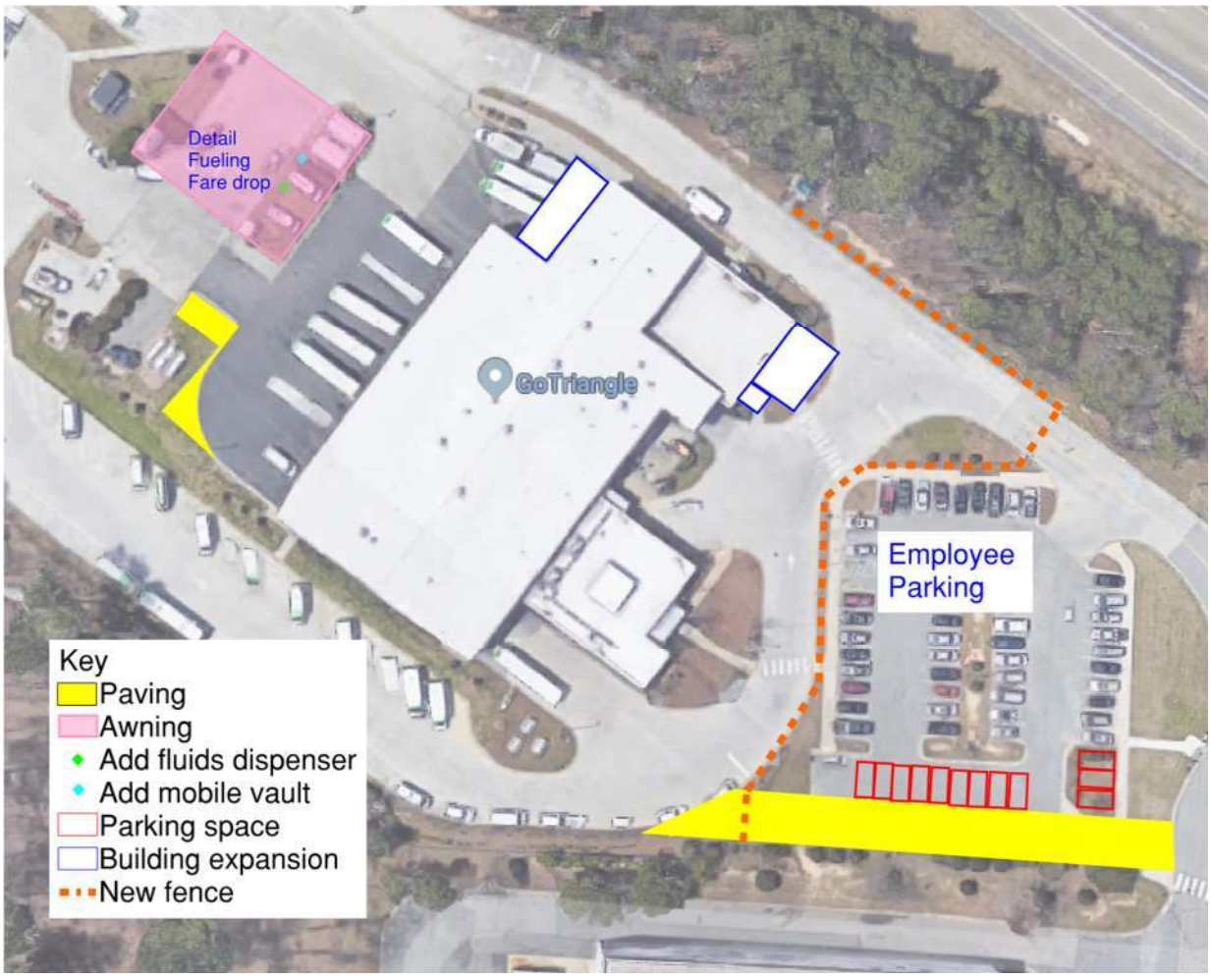
that Compressed Natural Gas (CNG) busses may be considered for future fleet vehicles. The infrastructure to support CNG fueling of vehicles requires site space and it doesn't appear that this site has available space for CNG fueling stations. Should the fleet grow or the decision be made to start procuring CNG vehicles, it will either require a new site for the BOMF or obtaining a nearby site to park a portion of the fleet and allow sufficient space on the site for CNG fueling stations.

6.5.6 Covered Bus Parking

While not a "deficiency", the current bus parking area is not covered which creates some issues in snowy/icy weather and requires additional deicing of the entire area during winter events. Some facilities have covered bus parking and even have solar panels on the roof to reduce power consumption. While there are obvious benefits to covering the parking area, such as eliminating the icy conditions and reducing the summer temperatures, a covering is not an option on the current site due to the covering requiring additional perimeter circulation, also requiring additional space between rows for supports. The covering would thus reduce the available parking area such that the required bus parking could not be achieved.

6.6 SITE SKETCHES

BOMF Site Sketch indicating recommended upgrades:



See Section 8.0 for a site sketch of developing the upper lot for additional parking.

6.7 SUMMARY OF RECOMMENDED UPGRADES TO SITE

The following is a summary of the upgrades recommended to the site areas to meet current needs and also to improve the operational efficiency of the BOMF:

- Upgrades to address the bus servicing/fueling/detailing deficiencies include:
  - Install a fare drop vault and a fluids dispenser (3 fluids) at the diesel fueling island located between the building and the bus parking area.
  - Construct a canopy to cover both fueling positions (gasoline and diesel islands) as well as the newly proposed fluids/vault area.
  - *Option:* Replace the gantry-style bus wash with a drive-through style – this upgrade could improve operations; however due to the current wash system being only 18 months old and having done recent work to improve its operation and reliability, it is not recommended to be replaced at this time.
- Expand paved areas for easier bus movements to/from Bays: extend/expand the paved areas behind Bays#6 thru 8 and to widen the pavement throat from the fueling areas (see Site sketch).
- Upgrades to address the bottleneck in the exit path in front of the facility: Reconfigure the exit pathway from the back lot by connecting the driveway from the Paratransit parking area straight through to Nelson Road (see Site sketch).
- Upgrades to address the test deployments include:
  - Should the option be selected to locate Paratransit in the upper lot the new lot could incorporate a striped area near the exit to stop briefly and test the lifts.
  - If Paratransit parking stays in the current location there is no room for incorporating a bus lift and bike rack test area (would continue to assign bus locations taking into account need for testing prior to exiting site); however, if Paratransit moves to the upper lot the current Paratransit parking location could be utilized for temporarily stopping and testing lifts and bike racks.
- To address the inadequacy of employee and service vehicle parking: Develop the existing wooded "upper lot" for expanded parking (see Section 8.0).
- To address inadequate site lighting for the bus parking area: Add fixtures around the perimeter and replace the interior fixtures with taller LED fixtures.
- Upgrades recommended for the security systems include:
  - Installation of an enhanced CCTV site security system with additional views, high resolution, and additional digital storage
  - Install screens or computer feeds for camera views at monitored locations such as security office, bus and paratransit dispatch, and Admin reception
  - Install higher quality camera and speaker system at security gate; if security fencing added along front of building will need to add these at vehicle gate and personnel/visitor gate
- Upgrades to address fencing deficiencies include:
  - Add 3-strand barbed wire to the top of the existing perimeter fence.
  - Add a security fence between the front parking area and the circulation drive to prevent individuals from having direct access to the building or site.
- To locate busses in parking area: procure a mapping/tracking system that integrates into the scheduling software
- To ensure electricity rate reductions for new electric bus charging stations: either connect these charging stations to the same meter as the facility or ensuring that Duke Power combines the two meter readings into the same account

- To address all stormwater management needs: make any other upgrades that result in additional impervious areas at the same time as parking area expansion (allows for a single permit).

6.8 COSTS OF RECOMMENDED SITE UPGRADES

Costs for the recommended site upgrades as listed above are estimated at approximately $862,750. See the appendix of this report for additional backup information.

7.0 BUILDING SYSTEMS

Based on discussions with facilities personnel during the workshops and tours of the site, the following were identified as deficiencies of the building systems with recommended upgrades for addressing these deficiencies.

7.1 MECHANICAL SYSTEMS

7.1.1 HVAC and Exhaust Systems

Deficiencies Identified:

Noted deficiencies of the HVAC and exhaust systems include:

- The HVAC equipment is generally in good condition and most all units have been replaced in the recent past; likewise, the building control system is less than two years old and in good condition – it also allows remote access and the controls vendor provides good service. However, some personnel have complained of fumes in the admin areas when vehicles are running outside the admin wing. Thus, a measurement of building pressurization and outside air ventilation is recommended. This requires all exhaust fans to be in operation; it appears the 18 exhaust fans are original equipment with many being inoperable or in need of repair. It is recommended these be replaced in all areas to be renovated or existing building areas to remain (the building pressurization cannot be tested until the exhaust system is fully operational).
- The vehicle exhaust system in the maintenance bays is not being utilized:
  - In half of the bays, the busses are pulled in forward. However, the vehicle exhaust nozzles are located in a position for backing the busses in.
  - The nozzle on the end of the exhaust system hoses does not match up with the exhaust pipe on the busses.
  - The exhaust fans serving the main exhaust system for the maintenance bay spaces are very loud; also, the makeup air serving this system is pulled directly from the outdoors and is not conditioned.
  - There is no carbon monoxide system or alarms in maintenance bays beyond local plug in alarms.

Proposed Upgrades:

Upgrades to address HVAC and exhaust system deficiencies include:

- Replace half of the exhaust fans for the admin and operations wing building areas that will remain.
- Replace the exhaust fans for the maintenance bay space; also, install units to condition the make-up air. Install a carbon monoxide system for the space which is tied to the operation of the exhaust system.
- Replace the vehicle exhaust system with drops placed in the correct locations for usage and with nozzles appropriate for GoTriangle's vehicles.

7.1.2 Plumbing Systems

Deficiencies Identified:
The domestic hot water is distributed throughout the facility close to points of use and is in good condition. Not all plumbing fixtures are of water-conserving type; however, there are plans to remodel the bathrooms.

Proposed Upgrades:
With renovations of bathrooms (or construction of new bathrooms) mentioned elsewhere, include water-conserving fixtures.

7.2 ELECTRICAL SYSTEMS

7.2.1 Power Systems

Deficiencies Identified:
Power system deficiencies were noted as follows:

- There were a few locations where plug loads exceeded the original design intention.
- The backup generator for the facility is original equipment and is approaching the end of its useful life.

Proposed Upgrades:
Upgrades to address power system deficiencies include:

- With any renovations of spaces (or construction of new space), that result from this exercise it is recommended to assess where any new circuits may be needed to handle additional loads.
- Replace the backup generator.

7.2.2 Lighting Systems

Deficiencies Identified:
Lighting deficiencies were noted as follows:

- Lighting systems in the admin and operations wings are inefficient and outdated.
- Lighting in the maintenance areas is also inefficient and outdated; task lighting also provides less visibility than desired.
- Lighting in the bus parking area is inadequate.

Proposed Upgrades:
Upgrades to address lighting system deficiencies include:

- Replace entire lighting system for spaces being renovated, and spaces to remain such as the entire maintenance and parts storage areas
- Replace task lighting in maintenance bays
- As mentioned in the Site Section 6.0, replace the site lighting at the bus parking area

7.3 SUMMARY OF BUILDING SYSTEM UPGRADES

Proposed Upgrades:

The following is a summary of the upgrades recommended to the MEP systems to meet current needs and also improve the operational efficiency of the BOMF:

- Upgrades to address HVAC and exhaust system deficiencies include:
  - Replace the exhaust fans for the admin and operations wing building areas that will remain.
  - Replace the exhaust fans for the maintenance bay space; also, install units to condition the make-up air. Install a carbon monoxide system for the space which is tied to the operation of the exhaust system.
  - Replace the vehicle exhaust system with drops placed in the correct locations for usage and with nozzles appropriate for GoTriangle's vehicles.
- With renovations of bathrooms (or construction of new bathrooms) mentioned elsewhere, include water-conserving fixtures.
- Upgrades to address power system deficiencies include:
  - With any renovations of spaces (or construction of new space), that result from this exercise it is recommended to assess where any new circuits may be needed to handle additional loads.
  - Replace the backup generator.
- Upgrades to address lighting system deficiencies include:
  - Replace entire lighting system for spaces being renovated, and spaces to remain such as the entire maintenance and parts storage areas
  - Replace task lighting in maintenance bays
  - As mentioned in the Site Section 6.0, replace the site lighting at the bus parking area

7.4 COSTS OF RECOMMENDED UPGRADES

Costs for the recommended MEP system upgrades as listed above are estimated at approximately $494,850. See the appendix of this report for additional backup information.

8.0 CAPACITY ANALYSIS

This Section identifies the capacity of the existing site to accommodate additional busses in its current configuration and with any recommended modifications or expansions. Further, this assessment identifies ways to ensure there is adequate space allotted for the various teams of employees working at the BOMF, as well as determine whether there is room to accommodate additional employees.

8.1 PARKING

8.1.1 Bus Parking

GoTriangle currently has 69 busses, with 3 being retired and 7 new busses arriving in September 2019 (2 electric and 5 diesel); this results in a total current need to park 73 busses. Utilizing the FTA approach, GoTriangle has a peak daily pull-out of 60 busses (as projected in August 2019) and with 20% spare capacity results in a total fleet of 72 busses (not counting busses that could be designated as "contingency" fleet). This report will assume the current need is for 73 busses.
Analyzing the maximum capacity of the site, the current limit for parking fixed route busses is 81 in designated spaces. There are areas for 45 and 31 busses in the back lot and 5 on the side (2 electric busses at the charging stations and adequate space to park 3 behind the electric busses). The limit of 81 assumes the Paratransit busses remain parked in their current spaces along the side drive. Should the Paratransit busses be moved to the upper lot, which would be viable if a separate Paratransit building is constructed using Option 2 in Section 5.0, an additional 10 busses could be parked in the current Paratransit parking location along the side driveway bringing the maximum capacity for parking fixed route busses to 91.

The maximum capacity of 81 represents a growth of 8 busses, or 11% above the current need of 73; should Paratransit be moved from their current spaces a maximum capacity of 91 could be achieved, which would represent potential growth of 18 busses, or 25%.

Bus Parking, Current Needs and Maximum Capacity

Current Need	73
Maximum Capacity of Current Site	81, with Paratransit parking in current location 91, with use of Paratransit parking area
Potential for Growth	8, or 11% with Paratransit in current location 18, or 25% with use of Paratransit parking area

8.1.2 Paratransit Parking

GoTriangle currently has a fleet of 25 Paratransit busses. There are, however, only 19 dedicated parking spaces for Paratransit; the remaining busses are either parked within the fixed route bus parking areas or at other locations along the edges of the driveways. Thus, the capacity of the current site is maximized at 19 spaces, which requires either reconfiguring the front lot for the additional Paratransit vehicles or incorporating parking spaces for Paratransit into the development of the upper lot (parking spaces for Paratransit are approximately 11' wide by 26' deep).

Paratransit Parking, Current Needs and Maximum Capacity

Current Need	25
Maximum Capacity of Current Site	19 (based on dedicated Paratransit spaces)
Potential for Growth	None (without building out upper lot or reconfiguring front lot for Paratransit spaces)

8.1.3 Car Parking

During the workshop, information was gathered for car parking requirements which indicated a current requirement of 175 car spaces for peak periods during the workday. This number includes parking for bus operators/drivers, BOMF staff, visitors, service vehicles and a few spaces for GoTriangle personnel being at the BOMF for training purposes. The car parking count was derived as follows:

Current Car Parking Peak Requirement:

Bus Operators	57
Paratransit Drivers	20
Paratransit Staff	12
Bus Operations Staff	7
Admin Staff	15
Mechanics	28
Corporate/Visitors	5
Service Vehicles	27
Training	approx. 4
Total	**175**

The current maximum capacity of car spaces available, including the lot in front of the BOMF with 62 spaces and the lot across Nelson Road with 77 spaces, for a total of 139 spaces. Thus, the BOMF is currently deficient by 36 spaces. This indicates the reason for cars currently being parked alongside all driveways and along the sides of Nelson Road. Developing the upper lot with additional parking can provide an additional 77 spaces, and would also allow the Paratransit vehicles to be moved to a corner of the expanded lot. Should a new 4,000 SF Paratransit building be placed in the upper lot the number of spaces would be reduced by 16.

Paratransit Parking, Current Needs and Maximum Capacity

Current Need	175
Maximum Capacity of Current Site	139 (62 in BOMF front lot and 77 in lot across road)
Potential for Growth (with Paratransit building on BOMF site)	Developing upper lot would provide 77 additional spaces for a total of 216 spaces, 41 over the 175 required for a growth potential of 23%
Potential for Growth (with Paratransit building on upper lot)	New upper lot would provide 77 additional spaces, existing lot reduced by 16 spaces yielding a total of 200 spaces, 25 over the 175 required for a growth potential of 14%

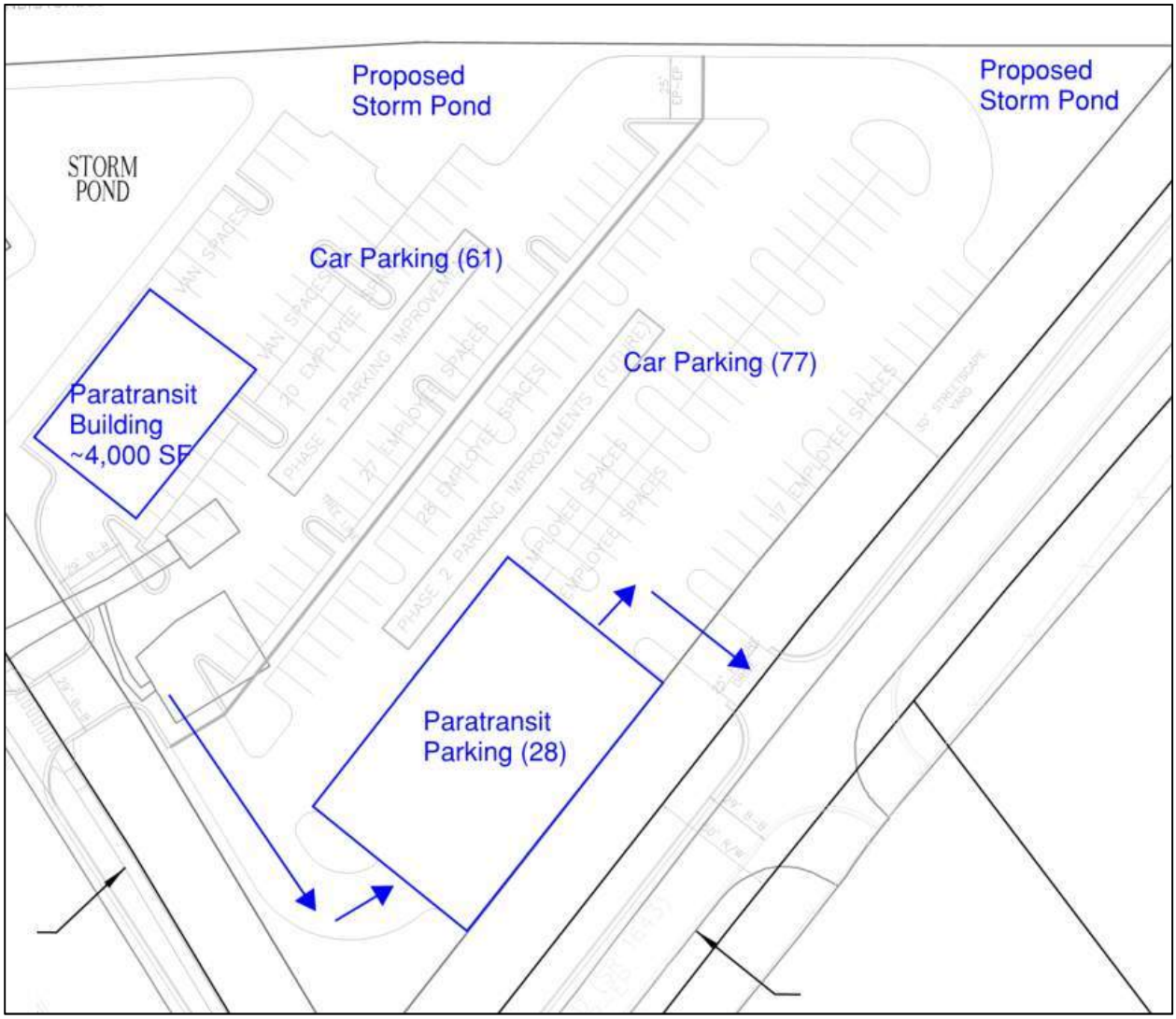
8.1.4 Parking Analysis - Summary

The following is a summary of the parking analyses described above:

Vehicle Type	Current Need	Maximum Capacity	Growth Available
Fixed Route Bus	73	81 with Paratransit on-site 91 with Paratransit off-site	8 (11%) 18 (25%)
Paratransit Bus	25	19 (Current) 28 or more (New Upper Lot)	Deficient currently 3 (12%)
Car/Service Vehicle	175	139 (Current)	Deficient currently
		216 (with upper lot expansion)	41 (23%)
		200 (w/ Paratransit bldg. on upper lot)	25 (14%)

GoTriangle BOMF Site with Capacities Listed

Upper lot expanded with Paratransit Building and Vehicle Parking area



8.2 WORKSPACES

8.2.1 Admin Offices

The GoTriangle BOMF Admin Department requires 4 offices for Assistant Director of Transit Operations, Operations Manager, HR/Payroll, and Safety (this number was reduced due to 3 offices/positions being moved to the Plaza Building). Cubicles are required for the 4 positions of Administrative Assistant, Safety and Security Specialist, Training Coordinator and Behind the Wheel Trainer; in the existing building 4 cubicles in the Admin wing are being utilized by Paratransit (2) and Building Facilities (2) – 1 position currently utilizing a cubicle is being relocated to the Plaza Building. Other spaces required include Training/Meeting (2), Storage, Copy, Drug Testing, and Video Room. The current capacity of the Admin wing is fully utilized with no space for growth; and renovation of the Admin wing is required to provide all functional spaces required for efficient operations.

See Section 5.0 for floor plans with functional spaces indicated in a renovated Admin wing.

Administration Area Workspaces, Current Needs and Maximum Capacity

Current Need	4 offices and 3 cubicles (after moving 4 positions to Plaza)
Maximum Capacity of Current Building	4 offices and 3 cubicles (after renovation)
Potential for Growth	None (requires renovation to provide all functional spaces required for efficient operation)

8.2.2 Bus Operations Offices

The GoTriangle Bus Operations Department requires 1 office for the Bus Operations Manager, and 11 cubicles for Bus Operations Supervisors. Currently, the Bus Operations Manager is located in the Admin wing and there are only 7 workstations for the Bus Operations staff located in very under-sized workspaces. Other spaces required include Check-in, Dispatch, Breakroom, Quiet Room, Huddle Room and Vault. Currently, the Operations wing is shared between Bus Ops and Paratransit and requires all personnel to work in very under-sized workstations, also the break room, quiet room and restrooms are undersized; thus, the wing is over capacity with no space for growth. Renovation of the Operations wing is required to provide all functional spaces required for efficient Bus operations, and the Paratransit Operations will need to be relocated.

See Section 5.0 for Operations wing renovation/expansion spatial arrangements, as well as the options for relocation of Paratransit Operations.

Bus Operations Workspaces, Current Needs and Maximum Capacity

Current Need	1 office and 11 cubicles
Maximum Capacity of Current Building	1 office (in Admin wing) and 7 undersized workstations
Potential for Growth	None (requires renovation to provide all functional spaces required for efficient operation, and relocation of Paratransit Operations)

8.2.3 Paratransit Offices

The GoTriangle Paratransit Operations Department requires 1 office for the Paratransit Manager, and 11 cubicles for other positions including dispatchers (4), reservations (3), supervisors (2), training specialist, and data technician. Currently, the Paratransit Manager, one supervisor and the data technician are located in the Admin wing and the remaining positions are located in very under-sized workspaces in the Operations wing. Other spaces required include Check-in, Breakroom, Quiet Room, Huddle Room, Copy and Video. Currently, the Operations wing is shared between Bus Ops and Paratransit and requires all personnel to work in very under-sized workstations, also the break room, quiet room and restrooms are undersized; thus, the space allotted for Paratransit is over capacity with no space for growth. A separate space is required to allow properly sized spaces and all required functional spaces for efficient Paratransit operations.

See Section 5.0 for the options for relocation of Paratransit Operations.

Paratransit Operations Workspaces, Current Needs and Maximum Capacity

Current Need	1 office and 11 cubicles
Maximum Capacity of Current Building	3 cubicles (in Admin wing) and 6 undersized workstations in Ops wing
Potential for Growth	None (requires construction of dedicated space for efficient Paratransit Operations)

9.0 COST ESTIMATES AND SCHEDULES

9.1 COST ESTIMATES

Cost estimates were developed for the capital cost upgrades recommended in this report. The cost derivations in this report are based on Means recognized cost databases, and engineering experience. The costs are in 2019 dollars, escalated to the mid-point of construction as determined from the schedules shown later in this section. See the appendix of this report for the cost derivations.

9.1.1 Maintenance Area Upgrades

Costs for the building's maintenance area upgrades as listed in Section 3.0 are estimated at approximately $867,350.

9.1.2 Options for Admin and Operations Area Upgrades

Renovate Bus Operations and Construct 2-Story Paratransit and Admin Wing (Option 1)
Costs for renovating the Operations wing and replacing the existing Admin wing with a two-story wing for Admin and Paratransit as listed in Section 5.0 are estimated at approximately $3,953,900.

Renovate Bus Operations and Admin Wings; Construct New Paratransit Building on Upper Lot (Option 2)
Costs for renovating the existing Admin and Operation wings and constructing a building for Paratransit in the upper lot as listed in Section 5.0 are estimated at approximately $4,169,100.

9.1.3 Site Upgrades

Costs for the recommended site upgrades as listed in Section 6.0 are estimated at approximately $862,750.

9.1.4 Building System Upgrades

Costs for the recommended MEP building system upgrades as listed in Section 7.0 are estimated at approximately $494,850.

9.2 SCHEDULES

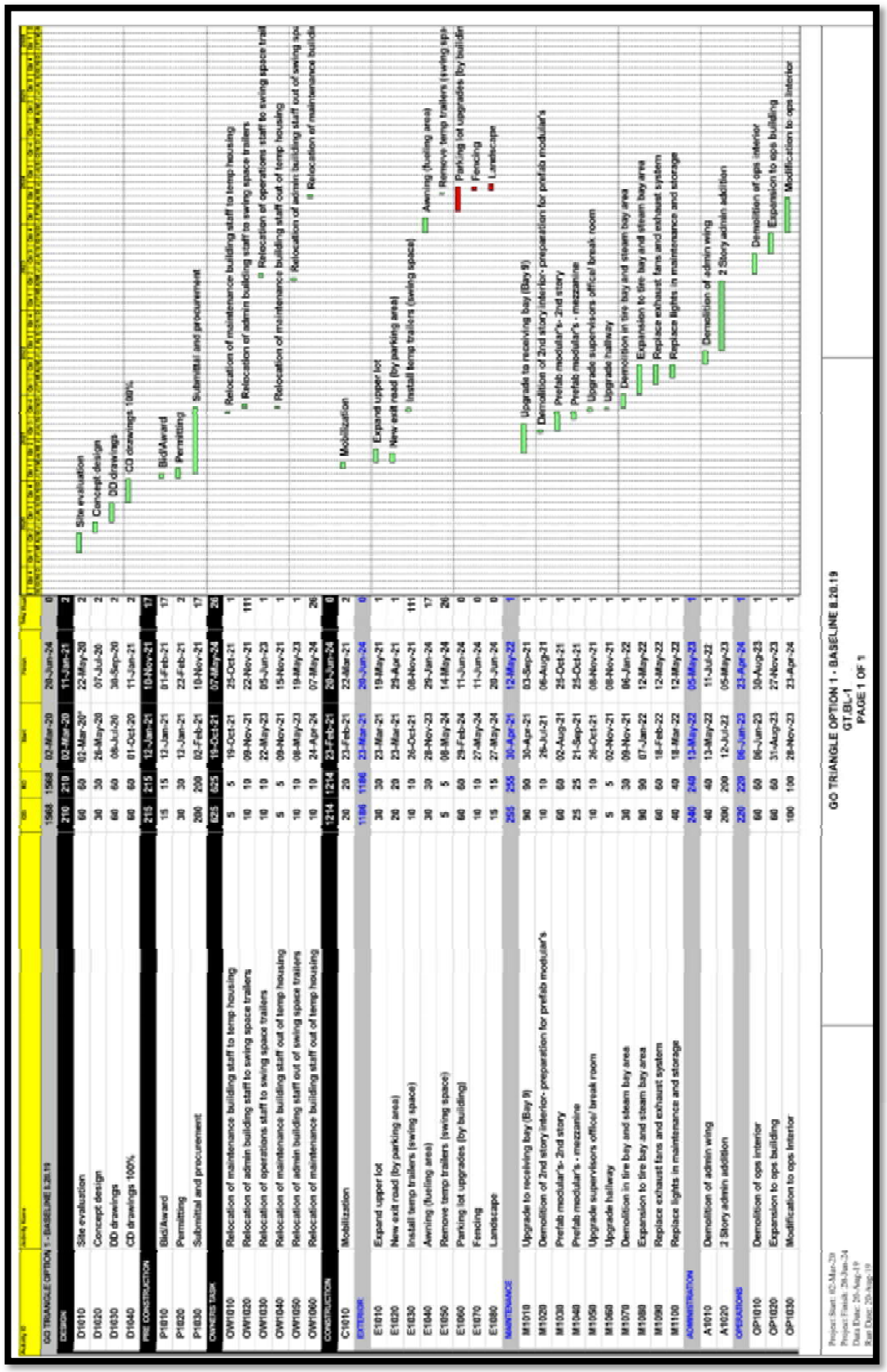
High-level schedules were developed to approximate the total time required to complete the upgrades for the BOMF building and site. Separate schedules are developed based on which option is undertaken for the Operations and Admin wings upgrades.

9.2.1 Schedule for BOMF Upgrades with Admin/Operations Option 1

The following schedule shows a total time for delivery of all BOMF upgrades should Option 1 be selected for the Admin/Operations at a total of approximately 51 months (renovating the Operations wing and replacing the existing Admin wing with a two-story wing for Admin and Paratransit).

Potential construction phasing for the Admin and Operations spaces with Option 1 might consist of the following sequence:

1. Clear and Develop New Parking Area in Upper Lot
2. Upgrades to Receiving Bay in Maintenance Area
3. Insertions of Permanent Prefab Modular in Maintenance Area
4. Upgrades to Tire and Steam Bay
5. Set Modular Office Units in Front or upper Lot and Move in Admin wing personnel
6. Demolish Admin wing and Construct 2-story Paratransit/Admin Wing
7. Move Paratransit and Admin to new wing; move Bus Operations to Modular Offices
8. Renovate and Expand Operations Wing
9. Complete exterior upgrades/renovations



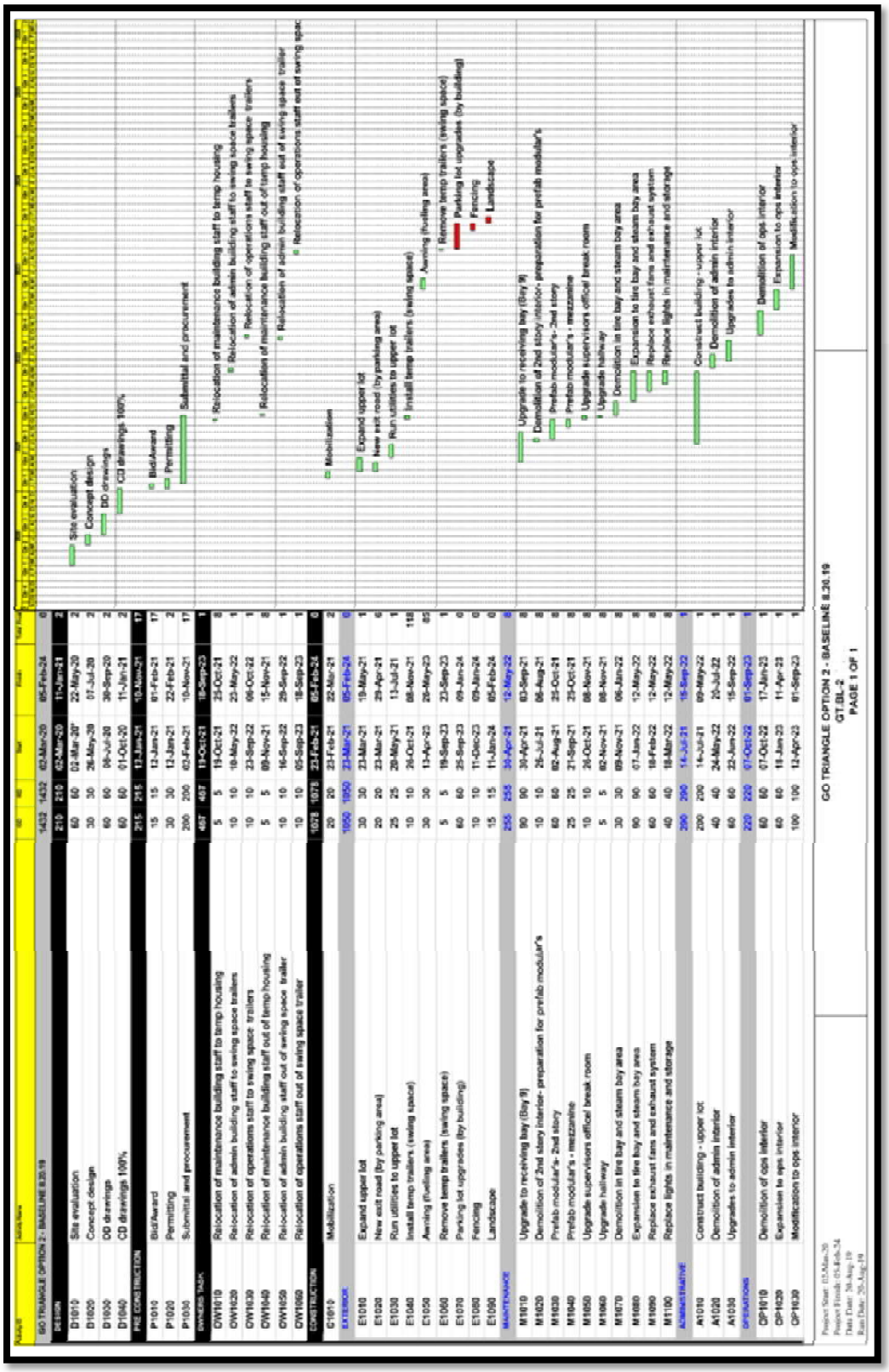
Schedule for BOMF Upgrades with Admin/Operations Option 1

9.2.2 Schedule for BOMF Upgrades with Admin/Operations Option 2

The following schedule shows a total time for delivery of all BOMF upgrades should Option 2 be selected for the Admin/Operations at a total of approximately 48 months (renovating the existing Admin and Operation wings and constructing a building for Paratransit in the upper lot).

Potential construction phasing for the Admin and Operations spaces with Option 2 might consist of the following sequence:

1. Clear and Develop New Parking Area in Upper Lot
2. Begin Construction of Paratransit Building in Upper Lot, and Upgrades to Receiving Bay in Maintenance Area
3. Insertions of Permanent Prefab Modula in Maintenance Area
4. Upgrades to Tire and Steam Bay
5. At completion of the tire and steam bay; set Modular Office Units in Front Lot and Move in Admin wing personnel
6. Renovate/Expand Admin wing
7. Upon completion of Paratransit Building and Admin Wing Renovation, Move Paratransit and Admin to new spaces, and Move Bus Operations to Modular Offices
8. Renovate and Expand Operations Wing
9. Complete exterior upgrades/renovations
   Note: other upgrades can take place concurrently with some impact to operations.



Schedule for BOMF Upgrades with Admin/Operations Option 2

APPENDIX A – COST ESTIMATE

COST ESTIMATE

BASIS OF ESTIMATE

Project Code:	J19029.004	**Date Estimate Prepared:**	8/20/2019
Institution/Agency:	GoTriangle		
Project Title:	Proposed upgrade of GoTriangle Bus Operations Maintenance Facility (BOMF)	**For questions regarding this estimate, contact:**	
Project Location	5201 Nelson Rd, Morrisville, NC	Name:	Flora F Koester
Architect/Engineer:	TBA	Phone:	(919)-8750124
Cost Consultant:	MBP	E-mail:	fkoester@mbpce.com

Stage of Design

- [X] Conceptual/Preplanning
- [ ] Schematic Design
- [ ] Preliminary Design-DD's
- [ ] Working Drawings
- [ ] Other (describe)

Type of Estimate

- [ ] A/E's Estimate
- [X] Owner's Independent Estimate

Prepared By

- [ ] A/E
- [X] Cost Consultant

Procurement Method

Design Bid Build

Assumed Kick off date : 3/20/2020

Escalation incl'd at: 6 % per annum

Project Gross Area (gross square feet):

New Construction Area #1 (SF)	11,000
New Construction Area #2 (SF)	4,000
Renovated Area-Opt#1 (SF)	28,500
Renovated Area-Opt#2 (SF)	33,100
TOTAL GROSS AREA #1	**39,500**
TOTAL GROSS AREA #2	**37,100**

SCOPE OF WORK

Option #1 : Convert Room #306 to Tire Bay and Expand Steam Bay. Convert Bay #9 Receiving. Additional Modular office in Maintenance Bay and minor upgrade for existing condition. Demolish and re-build Admin Wing. Renovate and Expand Operation Wing. Expand upper parking lot and site upgrades. Option #2 : Build new Para-transit office including new utilities on the upper lot in lieu of re-building Admin Wing.

SOURCE COST DATA

RS Means 3rd Quarter 2019, Open Shop labour type, location in Durham

ESTIMATE ASSUMPTIONS

Period of construction as per the tentative proposed schedule. New Building based on RS Means Square footage model for 1 and 2-story office. Heavy interior office renovation based on RS means square footage model for 1-story office's interior and lighting. Cost for any necessary temporary/permanent shelter to store operational parts and equipment during construction and/or excess equipment, temperory shelter for staff, major relocation of undergroud utilities are not included. Office design parameters based on RS means Model for office. Scope of work based on preliminary findings by our team as per per the DRAFT report dated 23 August 2019 and other itemized work based on standard assembly in the RS Means as noted. Cost estimate includes mark ups as stipulated below.

MARK-UP, FACTORS AND CONTINGENCY			**Remark**
Location Factor/ City	:	0	Location factor for Durham included in the estimated unit cost
Sales Tax	:	7.25%	North Carolina, 4.75% + Wake County sale tax 2.5%
Job Difficulty factor	:	10%	Suggested renovation factor for stopage of works due to operation not more than 10% of the time
Labor Burden	:	0%	28% Already included in the unit cost
Bond and insurance	:	2.01%	1.2%, 0.37% and 0.44 % for bond, Insurance and Builder's risk
Design Contingency	:	25%	At conceptual stage MBP suggest 25% design contingency
Subcontractor Overhead & Profit	:	0	10% + 10% Profit and Overhead included in the unit cost
GC Overhead and Profit	:	15%	MBP standard allowance for GC Overhead
Annual escalation rate	:	6%	MBP assume 6% escalation rates on straightline basis
Assumed Kick off date	:	3/20/20	Tentative assumption, design and engineering begin soon after approval of funding
Estimated Time of completio (months)	:	17	17 Option #1 and #2 respectively, See proposed schedule for detail

BREAKDOWN OF BASE COST ESTIMATE
PROPOSED UPGRADES FOR GOTRIANGLE BOMF
MORRISVILLE, NC

Line Item	DESCRIPTIONS	Q'ty	UOM	Unit Cost	TOTAL COST
	TOTAL ESTIMATED COST				**$ 6,178,850.00**
1.1	**MAINTENANCE AREAS UPGRADES**	**3,500**	**SF**	**$ 247.81**	**$ 867,350.00**
	CONVERT ROOM #306 TO TIRE BAY AND EXPAND STEAM BAY				
1.1.1	Demolition of existing walls	1,750	SF	$ 5.00	$ 8,750.00
1.1.2	Building expansion, foundation, Shell and roof	1,000	SF	$ 100.00	$ 100,000.00
1.1.3	New Brick walls 12" thick	1,150	SF	$ 35.00	$ 40,250.00
1.1.4	New Garage doors/Roller shutter	2	Set	$ 8,660.00	$ 17,320.00
1.1.4	New Awning for detailing and operation side walks	1,000	SF	$ 40.00	$ 40,000.00
1.1.5	Dedicated Tire bay area interior & accessories	1	LS	$ 76,000.00	$ 76,000.00
1.1.6	Stertil Koni ECO 60 lift	1	EA	$ 150,000.00	$ 150,000.00
	MAINTENANCE BAY ADDITIONAL OFFICES AND UPGRADES				
1.1.7	Skilled workers for Minor Renovation and re-organising	800	Man Hours	$ 85.50	$ 68,400.00
1.1.8	Miscellaneous Supplies allowance for relocation, small repair and touch up	1	LS	$ 20,000.00	$ 20,000.00
1.1.9	4 walls Elevated/tower type modular office mezzanine, max 8' high at bay 5 & 6	800	SF	$ 55.00	$ 44,000.00
1.1.10	Stairs leading to elevated office	1	unit	$ 10,080.00	$ 10,080.00
1.1.11	4 walls regular modular office and training, max 8' high on mezzanine	600	SF	$ 35.00	$ 21,000.00
1.1.12	Drywall partition on metal stud, fire rated under tower modular office	1,200	SF	$ 5.50	$ 6,600.00
1.1.13	Services for Modular Office	1,400	SF	$ 33.00	$ 46,200.00
1.1.14	Sliding Mobile shelving 7' Wx5' D x6' high for Library	40	EA	$ 2,500.00	$ 100,000.00
1.1.15	Lockable chain link fence, 8' high on mezzanine	20	LF	$ 50.00	$ 1,000.00
	CONVERT BAY #9 TO RECEIVING				$ -
1.1.16	Demolition of walls	880	SF	$ 5.00	$ 4,400.00
1.1.17	Construction of new 12" thick brick walls	1,430	SF	$ 35.00	$ 50,050.00
1.1.18	New Double Interior door from receiving to storage room	1	EA	$ 2,500.00	$ 2,500.00
1.1.19	Scissor Lifter 3000 Lb./dock Lifter	1	EA	$ 10,800.00	$ 10,800.00
1.1.20	New Casework for glass work storage, battery for part storage	1	LS	$ 50,000.00	$ 50,000.00
					$ -

1.2	**ADMIN AND OPERATIONS AREA UPGRADES - OPTION 1**	**11,000**	**SF**	**$**	**359.45**	**$**	**3,953,900.00**
	Re-building of Paratransit Admin office - Option 1						
1.2.1	Demolition of existing office building for re-building	4,600	SF	$	5.00	$	23,000.00
1.2.2	Construction of new office building, 2 story, 12' high, building perimeter not more than 880 LF, See Model for detail	11,000	SF	$	290.00	$	3,190,000.00
1.2.7	Additional furniture allowance	6,400	SF	$	5.00	$	32,000.00
1.2.8	Building Signage etc.	11,000	SF	$	4.00	$	44,000.00
1.2.9	Additional Parking on the upper lot	77	Cars	$	2,200.00	$	169,400.00
	Heavy Renovation of Administration/Operation areas						
1.2.11	Demolition of existing floor and partition	3,500	SF	$	3.00	$	10,500.00
1.2.12	New building structure addition including services	1,000	SF	$	307.00	$	307,000.00
1.2.13	Construction of new office interior including restroom renovation	4,500	SF	$	23.00	$	103,500.00
1.2.14	Additional Cubicle and furniture	5	set	$	5,000.00	$	25,000.00
1.2.15	Relocate lightings and re-wiring	4,500	SF	$	11.00	$	49,500.00

1.2b	**ADMIN AND OPERATIONS AREA UPGRADES - OPTION #2**		**SF**			**$**	**4,169,100.00**
	Renovating existing Paratransit wing - Option 2						
1.2b.1	Demolition of existing floor and partition	4,600	SF	$	3.00	$	13,800.00
1.2b.2	Construction of new interior floor, partition and ceiling	4,600	SF	$	23.00	$	105,800.00
1.2b.3	New Lighting for newly renovated office	4,600	SF	$	11.00	$	50,600.00
1.2b.4	Additional Office Furnitures and re- use existing furniture	1,000	SF	$	5.00	$	5,000.00
	New Para transit Office on the upper lot and site works						
1.2b.5	Construction of new office on the upper lot, One story office building with perimeter walls not exceeding 640 LF, 15' high. See Model for details	4,000	SF		312	$	1,248,000.00
1.2b.6	Construction of site works on the upper lot for new pavement, resurfacing, sedimentation control, site utilities and landscaping	116,000	SF		19.4	$	2,250,400.00
	Expand and renovating existing operation office						
1.2b.7	As per breakdown in option #1	See option #1 for breakdown				$	495,500.00

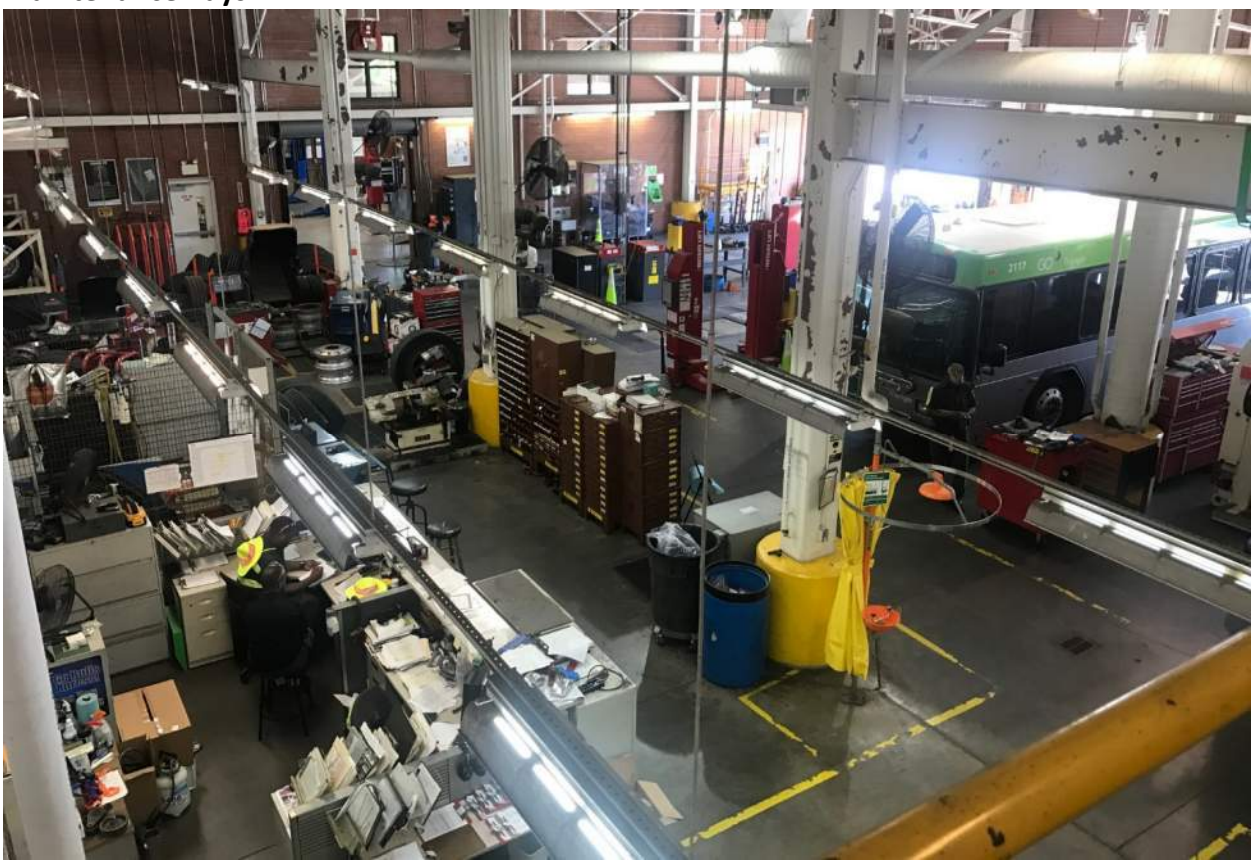
1.3	**SITE UPGRADES**					**$**	**862,750.00**
	Site Improvements - Parking, canopy, fencing, etc.						
1.3.1	Site demolition works (Pavement, curbs)	1	LS	$	5,000.00	$	5,000.00
1.3.2	New vehicle concrete curbs	650	LF	$	15.00	$	9,750.00
1.3.3	New impervious Pavement for vehicle	7,700	SF	$	18.00	$	138,600.00
1.3.4	New Canopy , 20' high for Bus services	7,500	SF	$	44.00	$	330,000.00
1.3.5	New Chain Link fencing 10' high	700	LF	$	20.00	$	14,000.00
1.3.6	Wire Barbs	2,000	LF	$	5.00	$	10,000.00
1.3.7	Additional site lighting along Bus Parking perimeter , 40' high, LED , 1000 Watt	35	EA	$	5,900.00	$	206,500.00
1.3.8	Attendant Booth	1	EA	$	30,000.00	$	30,000.00
1.3.9	Fare drop Vault	1	EA	$	1,500.00	$	1,500.00
1.3.10	Fluid Dispenser , 6 Nozzles	1	EA	$	28,900.00	$	28,900.00
1.3.11	Allowance for storm water management	1	LS	$	25,000.00	$	25,000.00
	Site Security improvement					$	-
1.3.12	Removal of Existing CCTV	1	LS	$	5,000.00	$	5,000.00
1.3.13	Master Monitor station	1	EA	$	1,300.00	$	1,300.00
1.3.14	Internet protocol network	1	EA	$	1,600.00	$	1,600.00
1.3.15	Monitor 19"	5	EA	$	850.00	$	4,250.00
1.3.16	Surveillance station (CCTV)	1	EA	$	2,250.00	$	2,250.00
1.3.17	Additional CCTV Camera	25	EA	$	980.00	$	24,500.00
1.3.18	Public address system - Industrial	10	Speaker	$	460.00	$	4,600.00
1.3.19	Wiring allowance	1	LS	$	20,000.00	$	20,000.00
	Other Sites						
1.3.20	Bus Tracking System - GPS	Excluded					
1.3.21	Connecting Electric Bus Charging Stations to the meter	Not Meaningful cost					
						$	-
1.4	**BUILDING SYSTEM UPGRADES**					**$**	**494,850.00**
	HVAC and Exhaust for maintenance bay and admin wing						
1.4.1	Remove existing exhaust fan at Admin and operation	1	LS	$	5,000.00	$	5,000.00
1.4.2	Fume Exhaust fan in the buses service bay, system equivalent to Diesel Vehicle exhaust system by Plywovent. Indicative cost	1	EA	$	76,000.00	$	76,000.00
1.4.3	Fume Exhaust fan in the renovated operation wings office, 1000-2500 CFM	9	EA	$	14,500.00	$	130,500.00
1.4.4	Carbon Monoxide detection system for maintenance bay	1	EA	$	54,000.00	$	54,000.00
	Plumbing System for admin wing						
1.4.7	Disconnection and reconnection of plumbing for Sanitary fixtures	1	LS	$	5,000.00	$	5,000.00
	Sanitary fixtures for renovated operation wing incl new plumbing					$	-
1.4.8	Water Closet	2	EA	$	5,500.00	$	11,000.00
1.4.9	Urinal	1	EA	$	1,050.00	$	1,050.00
1.4.10	Lavatory	1	EA	$	1,000.00	$	1,000.00
1.4.11	Service Sink	1	EA	$	3,200.00	$	3,200.00
	Electrical System upgrade						
	Power						
1.4.12	New Gas Engine Generator Set - assuming additional load of 20% for building addition	120	KW	$	660.00	$	79,200.00
	Lightings upgrade for mezzanine						
1.4.15	New Receptacles , max 8 EA/400 SF	1,900	SF	$	2.50	$	4,750.00
1.4.16	New Lighting fixtures and wiring , Fluorescent light, max 11 fixtures/ 400 SF	1,900	SF	$	10.50	$	19,950.00
1.4.17	*Lightings upgrade for maintenance bay*						
1.4.18	New Lightings for entire maintenance bay including new expansion with extension wiring, 1000W high bay max 4 fixture /900 SF	25,500	SF	$	4.00	$	102,000.00
1.4.19	New Task Lighting , provisional quantities	20	EA	$	110.00	$	2,200.00
1.4.20	Site Lightings, see Site improvement						

APPENDIX B – AERIAL PHOTOS

APPENDIX C – BUILDING AND SITE PHOTOS

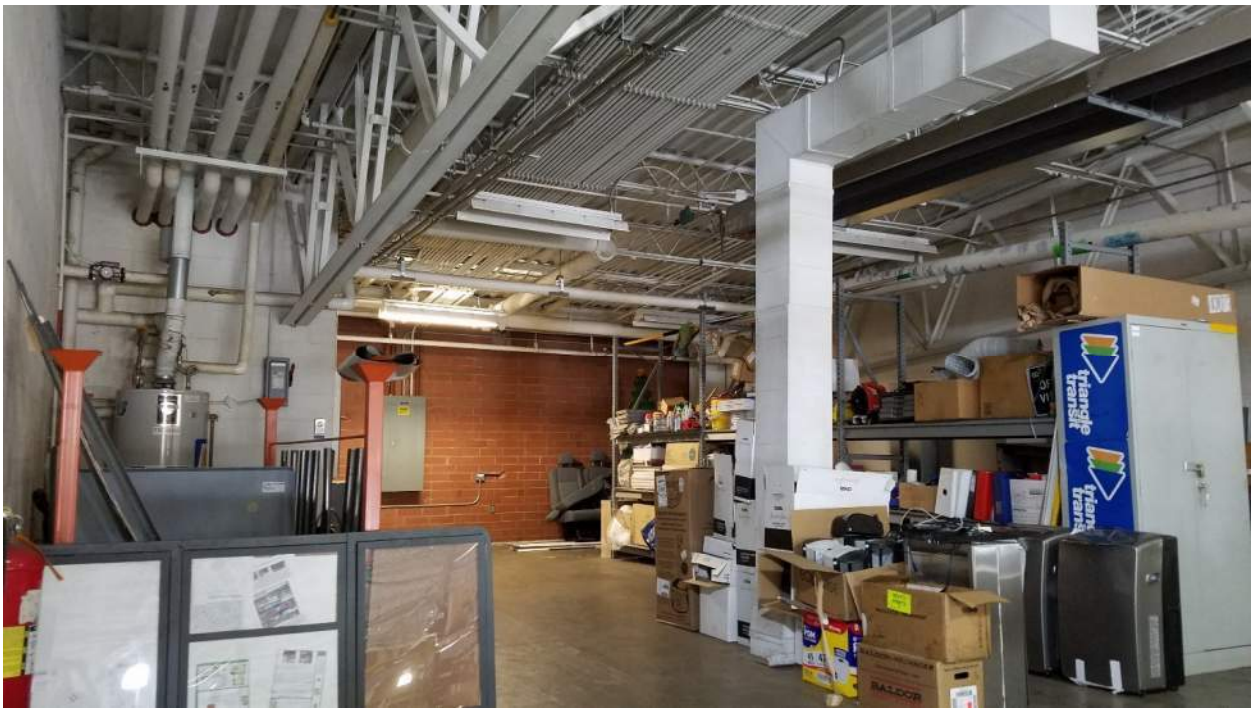
Maintenance Bays and Exhaust System

Maintenance Bays



Tools Storage Between Maintenance Bays

Mezzanine West Side



Mezzanine Side

Mezzanine East Side

Receiving Area and Warehouse

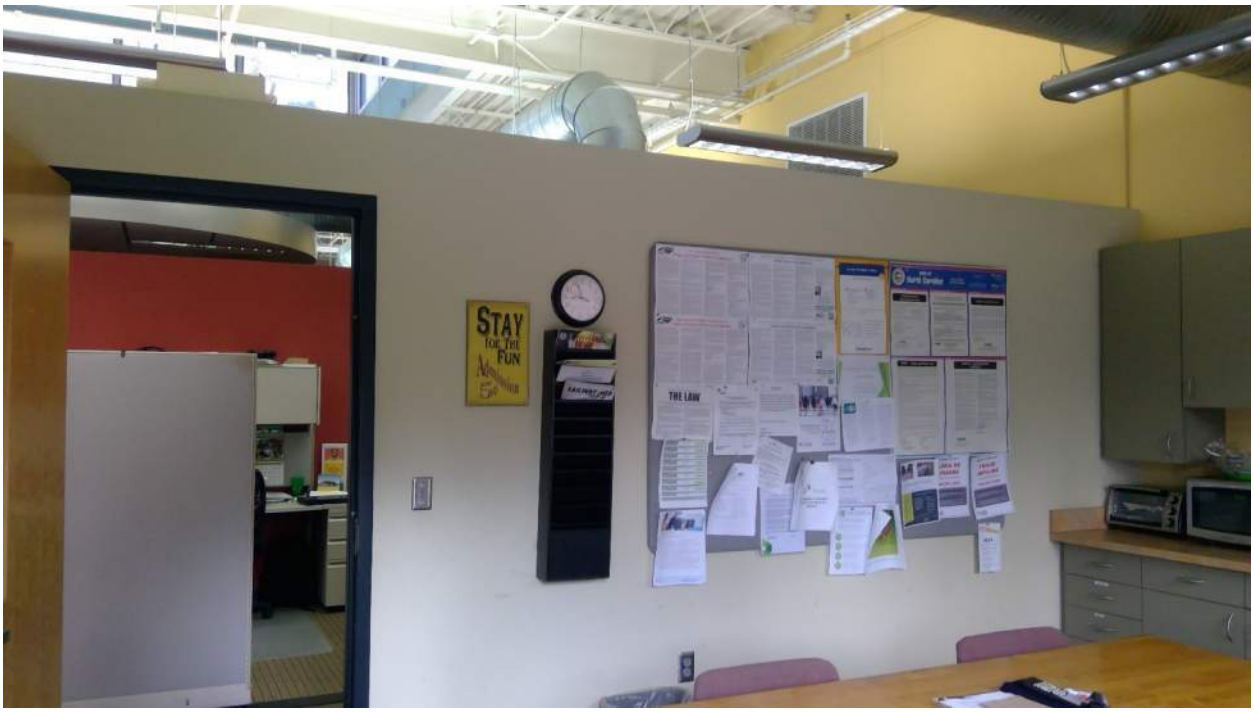
Tire Storage

Exterior of Bays 1-7

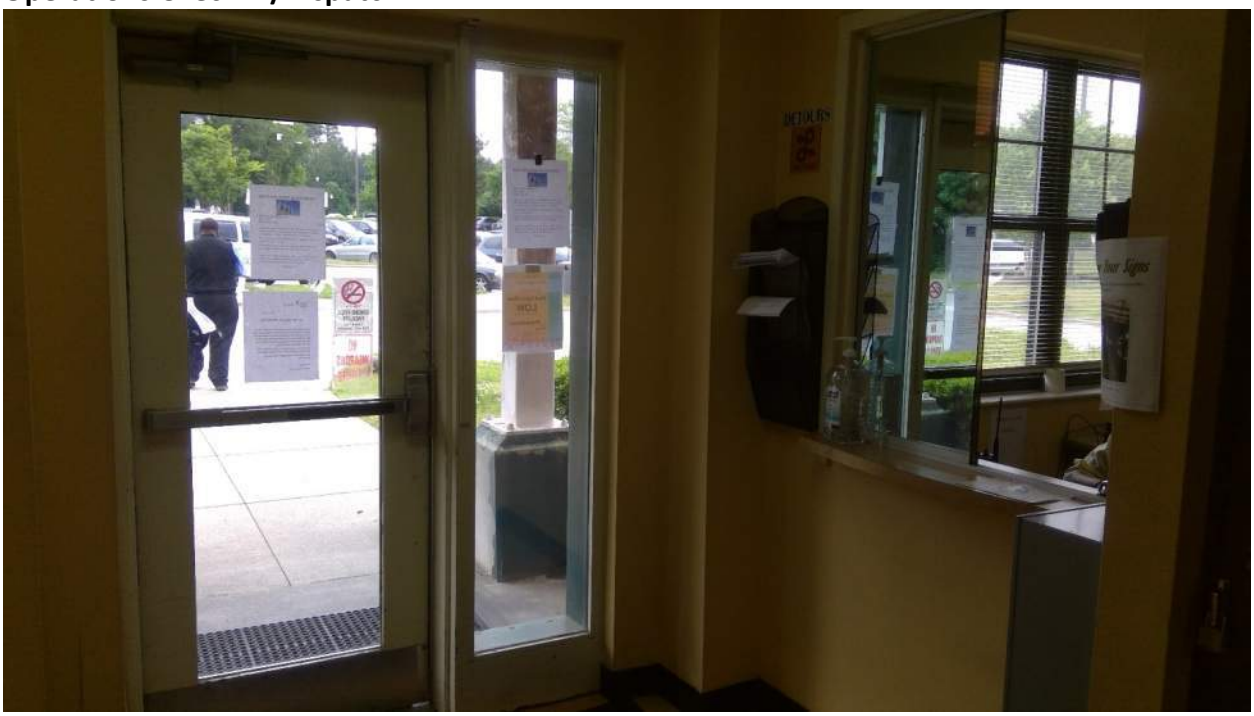
Diesel Tank Island

Paratransit Parking

Admin Break Room



Operations Check In/Dispatch



Operations Quiet Room