Wake Transit Plan

10 YEAR BUS CAPITAL AND FACILITIES PLAN

CONTENTS

Task 4 – 10 YEAR BUS CAPITAL AND FACILITIES PLAN

PURPOSE

The purpose of this study is to establish an overall condition of each of the Transit Partners' operations and maintenance facilities based on the facility capacity and condition. From this study, the Planning Team has recommended a solution that each Transit Partner should consider in their future planning efforts. Based on projected fleet growth information provided by Nelson/Nygaard (NN), HDR | Maintenance Design Group (HDR | MDG) developed space needs programs and budgetary cost information to assist each Transit Partner in their planning efforts.

INTRODUCTION

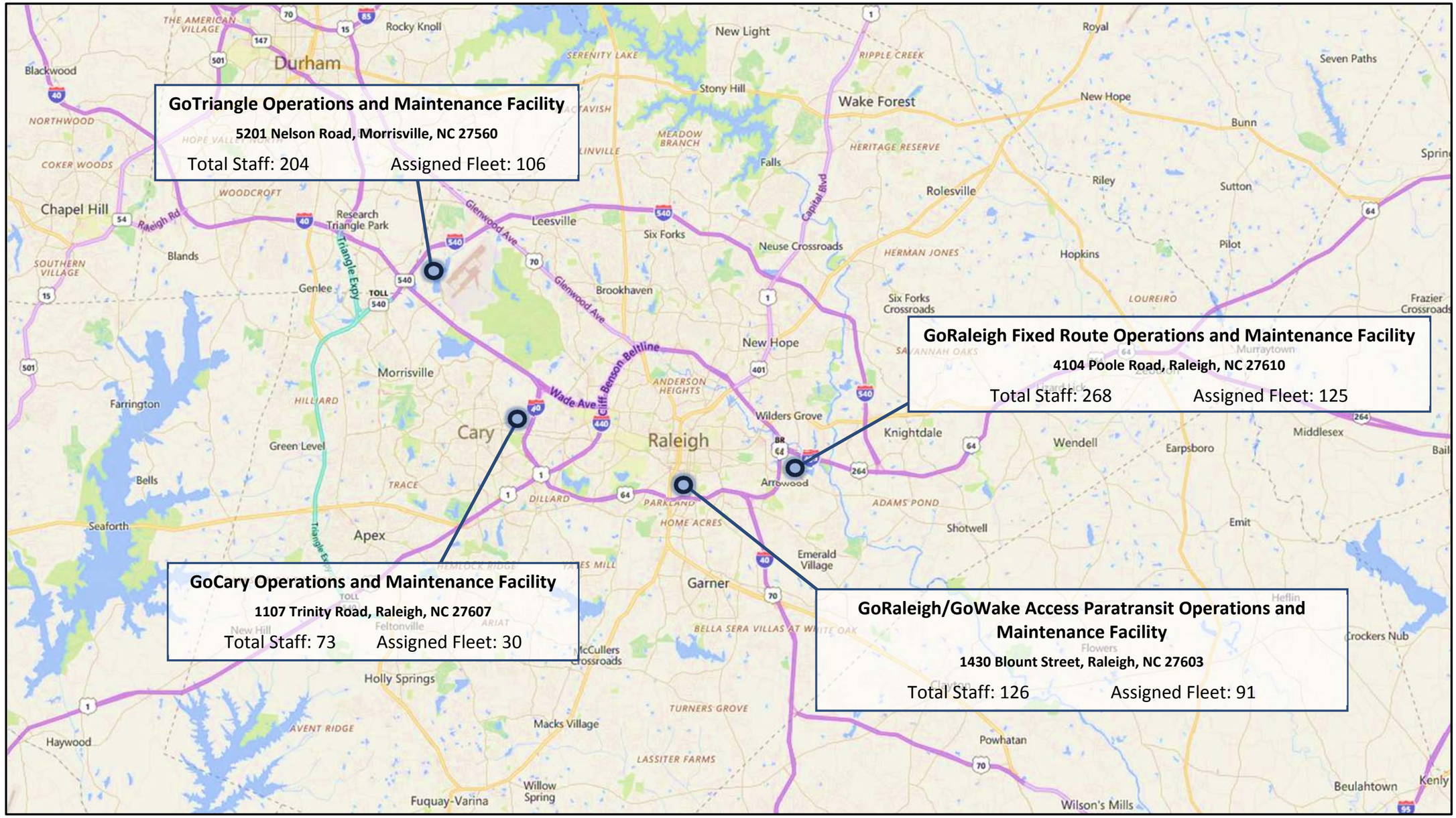
A total of 352 paratransit vehicles and transit buses provide service throughout Wake, Orange, and Durham Counties and the Raleigh metropolitan area. Exhibit A shows the general location of the four facilities within Wake County:

- GoRaleigh Bus Operations and Maintenance Facility
- GoRaleigh/GoWake Access Paratransit Operations and Maintenance Facility
- GoTriangle Bus Operations and Maintenance Facility
- GoCary Paratransit Operations and Maintenance Facility

Staff from each Transit Partner, along with NN and HDR | MDG staff, toured the facilities and sites to collect data used to determine the functional capacity and condition of each facility. Discussions with facility staff provided insight to the deficiencies unique to each facility. This document provides a general summary of the Planning Team's study and findings. Initially, this process was divided into four tasks. The detailed reports for each task can be found in the Appendices.

- Appendix A: Condition and Capacity of Current Bus Facilities
- Appendix B: Equipment Assessment
- Appendix C: Facility Program Data
- Appendix D: Site Selection Criteria
- Appendix E: Impacts of Alternative Fueled Vehicles

Exhibit A – Facility Location Overview



GORALEIGH OPERATIONS & MAINTENANCE FACILITY

Existing Facility Overview

General Description

The GoRaleigh Operations and Maintenance Facility located on Poole Road was constructed in 2013. One of the unique characteristics of this location is how the topography was incorporated into the design and construction of the facility. The administrative and operations building consists of two levels that transition smoothly due to the increase in grade on-site. The grade change allows for the employee entrance to be at the street elevation and for drivers to exit the driver support areas onto the bus parking area that is elevated. All fleet maintenance, service (fuel and wash) and parking functions occur on the same level. This provides a safe separation for visitors and employees entering the site without impacting the bus circulation paths and providing separation between the operations and maintenance staff.

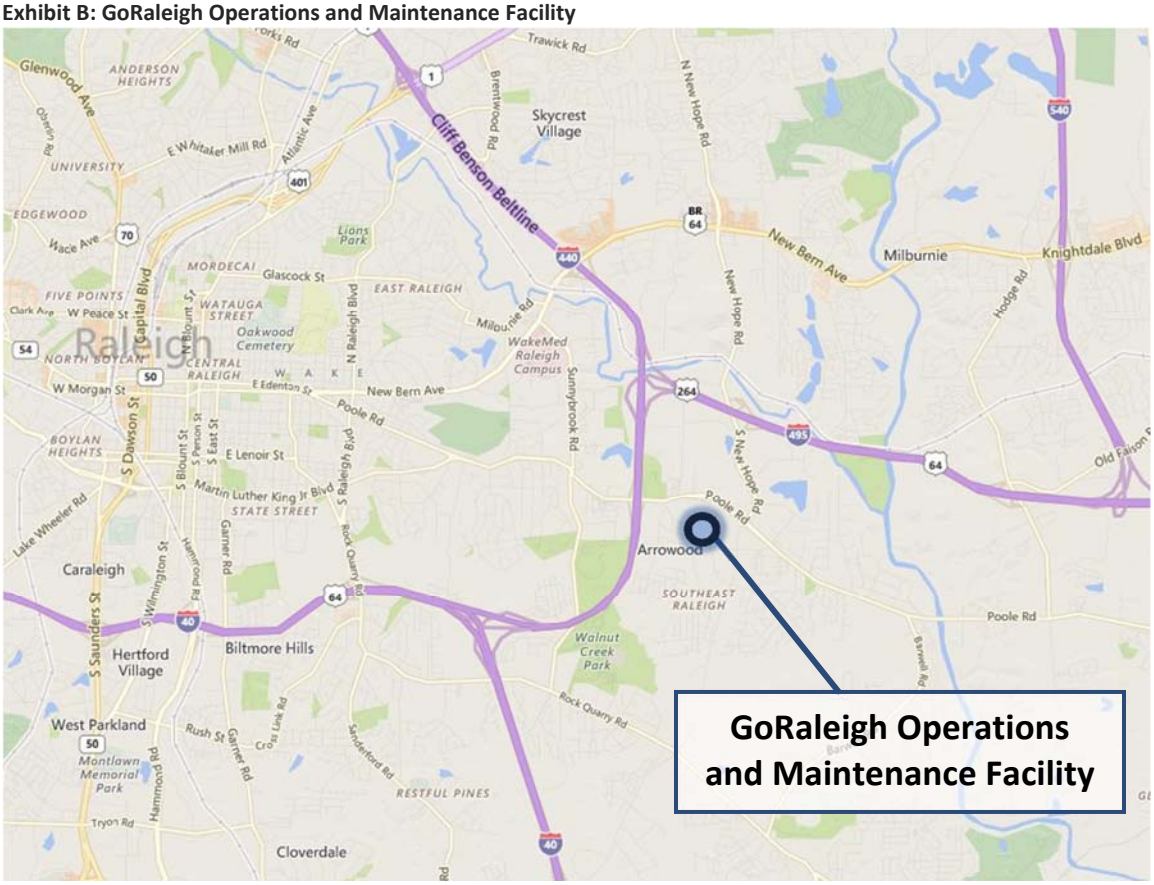
The current maintenance facility has eight running repair bays for standard buses and one for articulated buses. There are four Preventative Maintenance/Inspection bays for standard buses and one for articulated buses that utilize a lower level work area. The future expansion of the building allows for six more repair bays to be added to maintain a fleet of just over 200 buses. Also included in the maintenance areas of the facility is a body repair bay and a down draft paint booth. Parts storage was strategically located to be centralized to the building once expanded to the full build-out. Above the small parts storage area and technician support areas is a mezzanine for long-term storage and mechanical units that support the facility. The maintenance office area includes a training room adjacent to the running repair bays that allows for more hands-on training of technicians.

The Fuel Island has two covered fuel lanes with the opportunity to expand to be a four-lane fuel island. The island was designed to also have one uncovered lane that could eventually be included under cover. A dedicated lubrication room is provided at the island along with support areas for the service staff. The Wash Building consists of two drive-through wash bays with hybrid type washers and a chassis wash with a parallelogram lift. A hybrid type washer includes both rotating brush and high pressure wash arches to effectively clean a transit bus. Adjacent to the Wash Building is the fuel storage area with three above ground diesel storage tanks (AST's) for the bus fleet and one unleaded gasoline tank for the nonrevenue vehicles.

General Location Map

Exhibit B presents a general location of the GoRaleigh Operations and Maintenance facility in relation to Wake County. The site is located a just east of Interstate 440 and south of Interstate 495 at 4104 Poole Road.

Exhibit B: GoRaleigh Operations and Maintenance Facility



Site Plan

Exhibit C graphically represents the site elements and layout of the facilities on the site. A large retaining wall surrounds nearly half of the site due to the significant grade change of the surrounding topography. Employee parking is divided into two separate lots, one with 83 spaces for administrative staff and the other with 128 for operations and maintenance staff as well as visitor parking. Buses that enter the site park and are then taken through the service cycle by service workers. Buses that require maintenance are then brought into the maintenance facility.

Exhibit C: GoRaleigh Operations and Maintenance Facility Site Plan

Existing Facility Statistics

Different vehicles require different parking and maintenance design elements. Exhibit D organizes the types and quantities of vehicles maintained and parked on-site.

Exhibit D: GoRaleigh Fleet Inventory

Vehicle Type	Number of Vehicles
Fixed Route/Standard Bus	103
Articulated Bus	0
Paratransit Bus/Vehicle	0
Non-Revenue	22
Total	125

The staff at the GoRaleigh facility is divided among three departments: Administration, Operations, and Maintenance. Administrative staff are responsible for a variety of tasks including finance, drug testing and assessment, training, human resources, safety, city personnel, and site management. Operations staff includes all drivers, dispatchers, road supervisors, and directors employed to operate the transit agency. Maintenance staff includes supervisors, foremen, technicians, training, and parts handling personnel. Exhibit E presents the total number of staff at the facility between these three departments. The exhibit separates operators from operations staff and technicians and service workers from maintenance staff, as these are the largest groups within the departments.

Exhibit E: GoRaleigh Staff

Position	Employee Count
Administration Staff	17
Fixed Route Operations Staff	19
Fixed Route Drivers	175
Paratransit Operations Staff	0
Paratransit Drivers	0
Maintenance Administrative Staff	19
Maintenance Technicians	25
Sevice Workers	13
Total	268

Functional Capacity

Currently the GoRaleigh facility operates and maintains 103 buses, well under the maximum design capacity of the site. The design capacity for bus parking is 214 buses with an alternate parking layout that can park up to 300 buses. The maintenance building can be expanded to allow for an additional four repair bays to accommodate the increase in fleet. Operations and Administration is already sized to accommodate a fleet of up to 200 buses.

Observed Space/Functional Deficiencies

Although the GoRaleigh Operations & Maintenance facility was constructed recently, there are certain deficiencies that were mentioned by facility staff that should be considered. These deficiencies are as follows:

Operations Areas

- Bulletin space is needed for event and news posting.

Maintenance Areas

- Lack of use of the Lower Level Work Area (LLWA) by the technicians.
  - The facility was designed and constructed with the intention of the LLWA to be used more frequently for service and preventative maintenance inspections, however the technicians have chosen not to embrace this area although the LLWA had a great cost impact to the construction of facility.
- Caution striping in the maintenance shop is peeling from the floor.

Storage Areas

- An alternate forklift had to be purchased due to the circulation restrictions within the parts room.
- The relationship of the parts issue counter with the clerks' workstations creates an issue because the clerks are not facing the counter.
- The workstations for the parts clerks do not have enough layout space for them to perform daily tasks.

Service Areas

- Walls in the Chassis Wash bay need a polyuria coating to protect walls and assist with cleanliness

Facility Recommendations

The recommendation of the Planning Team would be to continue with the current operations and expand the maintenance facility as the fleet grows in the future. It would be beneficial for GoRaleigh to train the technicians on how to utilize the Lower Level Work Area (LLWA) to its optimal capability instead of working on the ground. When used properly, the LLWA can increase the efficiency and accuracy of preventative maintenance inspections and service. To assist with the issues in the Parts Room, the parts clerk area could be reconfigured to have a more engaging approach.

Equipment Assessment

Overview

Staff from HDR | MDG toured the GoRaleigh facility on March 19th, 2018 to collect data and photo document the condition of all equipment used for maintenance and service functions. The Planning Team performed an in-depth assessment of equipment condition, identifying any apparent functional issues or deficiencies. Photos from the tour are located in Appendix B: Equipment Assessment. Based on the observations and assessments, a condition score is determined for each area based on a scale of 1 to 5:

- 1: Equipment is out of operation; Life Expectancy: 0 years

- 2: Equipment is old/out dated with several apparent functional issues; Life Expectancy: 1-3 years
- 3: Equipment works properly with minor issues; Life Expectancy 3-7 years
- 4: Equipment was recently purchased and has been well maintained. Slight cleaning may be required; Life Expectancy 7-15 years
- 5: Equipment was recently installed or purchased; Life Expectancy 15+ years

Total Facility Equipment Assessment Score

The overall score applied to the shop, storage, and service equipment at the GoRaleigh facility is a 4.9. The high score can be expected because the equipment is only a few years old and has been well maintained. There is an adequate amount of equipment provided for each function to operate efficiently and effectively. Exhibit F presents the score for each area and the total facility equipment assessment score. Appendix B documents the condition of the individual equipment assessed to develop the total score.

Exhibit F: GoRaleigh Equipment Assessment Summary

Area	Score
Maintenance Bays	5
Lower Level Work Area (LLWA)	5
Tire Shop	4.8
Brake Shop	4.7
Common Work Area/Portable Equipment Storage (CWA/PES)	4.7
Paint & Body Repair Shop	5
Parts Storage	5
Fuel Island	5
Wash Building	4.5
TOTAL FACILITY EQUIPMENT ASSESSMENT SCORE	**4.9**

Observed Deficiencies

There were no major deficiencies documented in relation to the condition of the equipment used at the GoRaleigh facility. Other than minor cosmetic damage on certain equipment that can be expected overtime, the equipment is in near excellent condition.

Equipment Recommendations

Since there are no major deficiencies, the recommendation of the Planning Team would be to perform the manufacturer recommended service and continue to care for the equipment.

Facility Program Data

Overview

When the GoRaleigh facility was constructed in 2013, a building expansion was planned and accommodated for in the design. This enabled the facility to be constructed with future planning kept in mind. The Operations and Administration areas of the facility were constructed with future growth accounted for and therefore require no modifications or expansion. Building these areas initially limits the cost of expansion. The Maintenance building was easier to plan for expansion since the construction will consist of repair bays, shops, and storage areas.

Fleet Data

Based on the fleet growth projections provided by NN and the expertise of the Planning Team, the GoRaleigh fleet will increase by 47 buses throughout the next 20 years. As the fleet increases, the need for employee and non-revenue vehicles will increase as well. This includes parking areas for operators, technicians, and supervisor vehicles. Exhibit G represents the overall parking requirements based on the projected fleet growth.

Exhibit G: GoRaleigh Fleet Data

Fleet Data

HDR | Maintenance Design Group

GoRaleigh - Bus Administration, Operations, and Maintenance Facility Expansion

BUSES AND VEHICLES ANTICIPATED TO BE ADDED TO THE EXISTING FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type	
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" lona	12' X 65'	1560	0	
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0	
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	47	Note: The Fleet expansion is projected to be 71 vehicles for a total of 167 at the Poole Road Site. The existing maintenance facility was designed for 120 buses.
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0	
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	0	
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	4	
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	50	

Program Summary

With the fleet growth, certain building site areas will require expansion to effectively maintain operations. A larger fleet requires more vehicle maintenance areas including shops and repair bays. To support the repair bays, and increase of parts storage areas is needed. Service areas, such as fuel and wash lanes, will require additional positions to prevent a backflow of buses. The impact to site areas include additional fleet, non-revenue, and employee vehicle parking. Exhibit H documents the programmed space required to efficiently expand the GoRaleigh facility. The detailed Facility Program Data is in Appendix C: Fleet Program Data.

Exhibit H: GoRaleigh Program Summary

Facility Program Summary — HDR | Maintenance Design Group

GoRaleigh - Bus Administration, Operations, and Maintenance Facility Expansion

Fleet Projections/Assumptions	Quantity
Articulated Buses: Includes both fixed route and BRT configurations	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	0
Standard Transit Bus: Includes all fixed route config w/Wheel Chair Lifts and Bicycle Racks	47
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	0
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	4

Building Areas	Area (SQ. FT.) rounded
Total Administrative Area for the Facility (SF)	0
Total Operations Areas for the Facility (SF)	0
Total Vehicle Maintenance Areas for the Facility (SF)	6,300
Total Parts Storage Areas for the Facility (SF)	2,400
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	1,500
Total All Building Areas	10,200

Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	0

Exterior Areas	
Total Exterior Bus Parking	50,760
Total Vehicle Parking Areas for the Facility (SF)	18,400
Total Exterior Storage Areas for the Facility (SF)	0
Total Exterior Storm Water Management Areas for the Facility (SF)	0
Total All Exterior Areas	**69,160**
Subtotal All Areas	**79,360**
Other Site Circulation, Setbacks and Landscaping -100%	0
Grand Total - Site Requirements	**79,360**
Acres	**1.82**

Rough Order of Magnitude Cost

Overview

The estimated project budget cost projection for the design and construction of the expansion to the GoRaleigh maintenance facility and site elements is presented in the table below. The total cost shown is based on 2018 dollars and based only on theoretical program data. It is important to note that an escalation factor of about 5% can be factored to the total each year that the project is postponed. The detailed breakdown of budget and cost escalation is in Appendix C: Fleet Program Data.

Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$164,989
Site Landscaping/Security Fencing	$28,900
Other Paving – Drives and Circulation (Asphalt & Concrete)	$56,300
Total Exterior Bus Parking	$580,400
Site Work Subtotal	**$830,589**
Building Areas	
Total Administrative Areas	$0
Total Operations Areas	$0
Total Vehicle Maintenance Areas	$1,528,100
Total Parts Storage Areas	$582,100
Total Interior Bus Parking	$0
Total Service Areas	$259,900
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$0
Maintenance & Storage Equipment	$367,700
Fuel& Wash Equipment	$181,100
Building Areas Subtotal	**$2,918,900**
SUBTOTAL	**$3,749,489**
Land Acquisition	$0
Architectural/Engineering Fees	$374,949
Surveys/Tests/Reports	$37,495
Environmental Reports	$10,000
Commissioning	$37,495
Additional Contingency	$187,474
Construction Management	$74,990
SUBTOTAL	**$722,403**
TOTAL	**$4,471,892**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$4,471,900**

Alternative Fuel Implications

Lighter Than Air Fuels (HYD, LNG, CNG)

The introduction of lighter than air fuels at new facilities require programming provisions such as additional area for fuel compression or cryogenic plants, and additional fuel island length to accommodate the various new dispensers. Maintenance areas and repair bays are essentially

the same as conventionally fueled buses and planning ratios will remain the same. Some small additional shops will be required otherwise the program areas are only minimally impacted. Parts storage programmatic area needs will need to be increased minimally to accommodate additional fuel system spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

All new facilities and existing facility modifications or expansions must include accommodations and systems to support maintenance of vehicles using lighter than air fuels. These accommodations and systems are based on codes and standards. A technical memorandum has been included with the appendices (Appendix E) that explains in detail the code and system requirements for maintaining and servicing (fuel and washing) of alternative fueled vehicles.

Battery Electric Buses

The GoRaleigh Transit Partner, like most transit providers, is carefully considering adding Battery Electric Buses (BEB) to their respective fleets in the near future. The impacts of BEB on maintenance cycles and components is uncertain at this time, but it is a widely held belief that BEB will require less drivetrain related repairs.

Introduction of BEB technologies at new facilities require programming provisions such as additional area for charging systems, and fuel/service islands program and configuration will change with the reduction of conventional fuels if a 100% conversion to BEB is incorporated. Maintenance areas and work bays planning ratios will be increased to accommodate the anticipated reduction in engine work associated conventional fuel engine technologies. Additional shops will be required for electrical components and battery systems, otherwise the program areas are only minimally impacted. Parts storage area programmatic needs will need to be increased minimally to accommodate additional spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

Charging infrastructure is a major concern as most current technology systems take significant site area that can generally impact the bus storage capacity of the facility. Additionally, charging infrastructure requires significant electric supply and/or a tie in to on-site renewables, such as photovoltaic systems.

BEB charging systems and their physical requirements are changing rapidly. If BEB technology is considered for new or existing facilities, it would be prudent to explore current and emerging system designs, especially related to capacitor systems that take advantage of lower off-peak power costs. Additionally, the Transit Partner should research for an on-route charger that lowers the power impact at the maintenance and operations facilities.

GORALEIGH/GOWAKE ACCESS PARATRANSIT OPERATIONS & MAINTENANCE FACILITY

Existing Facility Overview

General Description

The GoRaleigh/GoWake Access Paratransit Operations and Maintenance Facility was constructed more than 20 years ago. The facility was originally constructed and used by GoRaleigh for their operations. The building and was closed for two years once the Poole Road facility was constructed and reopened in 2015 for use by GoRaleigh/GoWake Access.

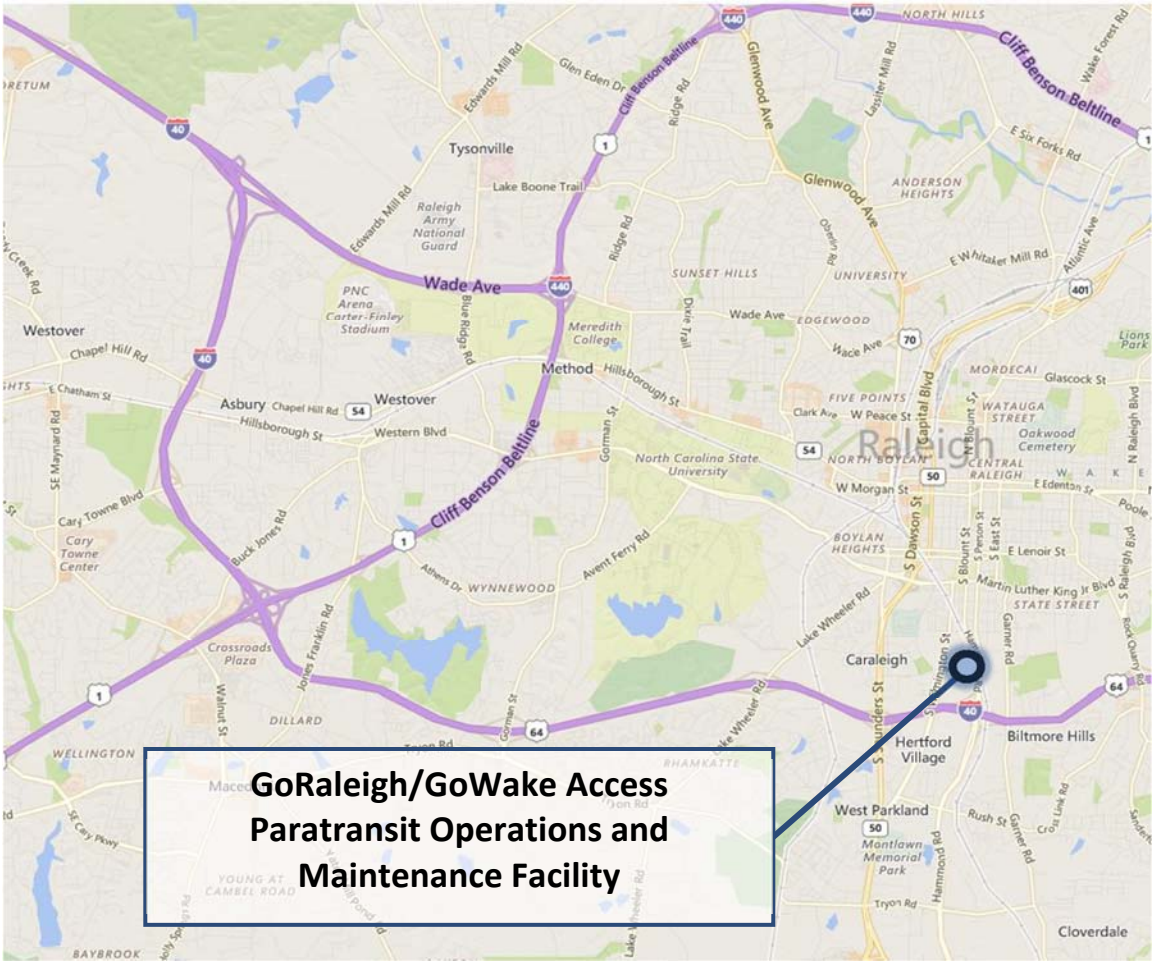
The maintenance portion of the facility has been repurposed to maintain the paratransit buses instead of 35-foot transit buses the building was originally designed and constructed for. Instead of servicing the existing in-ground hydraulic lifts that are in the repair bays, the existing lifts were decommissioned and four post surface mounted lifts were installed in three of the four bays; the remaining bay is used as a flat repair bay. The drive through washer was removed from the wash bay, which is now used for hand washing the paratransit vehicles. An existing paint booth is in the facility that will soon be renovated to create more office and technician support space.

The operation functions of the agency occur in the east side of the facility, separate from the maintenance areas. The operators have a clear flow through the facility from the entrance to the operators' areas and out to the bus parking yard.

General Location Map

Exhibit I presents a general location of the GoRaleigh/GoWake Access Paratransit Operations and Maintenance facility in relation to Wake County. The site is located just north of Interstate 40 and east of Highway 401 at 1430 S. Blount Street in Raleigh.

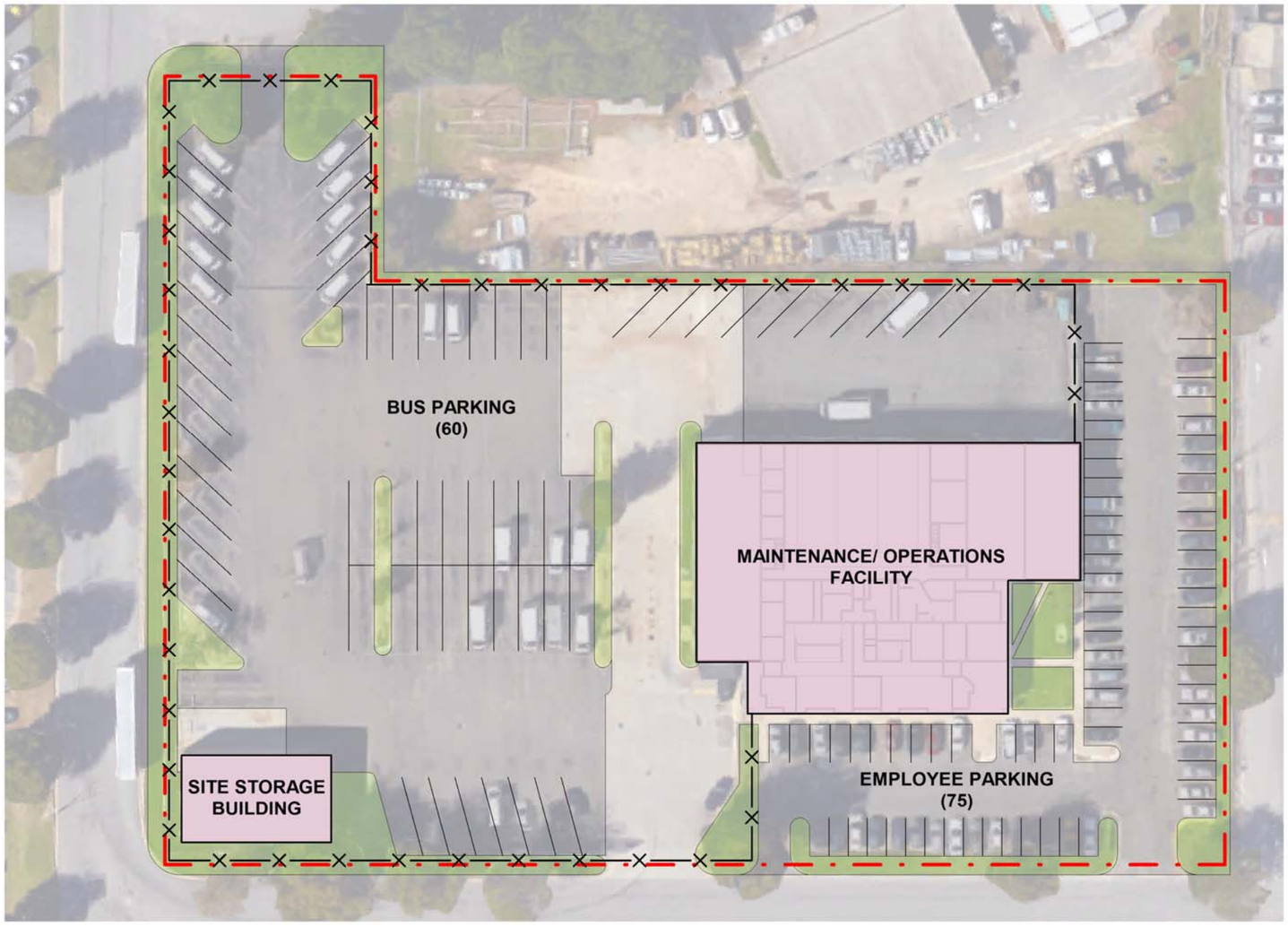
Exhibit I: GoRaleigh/GoWake Access Paratransit Operations and Maintenance Facility



Site Plan

Exhibit J graphically represents the site elements and layout of the facilities on the site. Employee and visitor parking is located on the north side of the site near the facility entrance. The paratransit bus yard occupies the southern side of the site, with the yard entrance leading straight into the fueling lane.

Exhibit J: GoRaleigh/GoWake Access Paratransit Operations and Maintenance Facility Site Plan



Facility Statistics

Different vehicles require different parking and maintenance design elements. Exhibit K organizes the types and quantities of vehicles maintained and parked on-site.

Exhibit K: GoRaleigh/GoWake Access Fleet Inventory

Vehicle Type	Number of Vehicles
Fixed Route/Standard Bus	0
Articulated Bus	0
GoWake Access Paratransit Bus	71
GoRaleigh Paratransit Bus	20
Non-Revenue Vehicle	0
Total	91

The GoRaleigh/GoWake Access staff is divided among operations and maintenance. Operations staff includes all drivers, dispatchers, road supervisors, and directors employed to operate the transit agency. Maintenance staff includes supervisors, foremen, technicians, training, and parts handling personnel. Exhibit L presents the total number of staff at the facility between these three departments. The exhibit separates operators from operations staff and technicians and service workers from maintenance staff since these are the largest group within the departments.

Exhibit L: GoRaleigh/GoWake Access Staff

Position	Employee Count
Fixed Route Operations Staff	14
Fixed Route Drivers	100
Paratransit Operations Staff	shared
Paratransit Drivers	shared
Maintenance Administrative Staff	2
Maintenance Technicians	6
Sevice Workers	4
Total	126

Functional Capacity

The current fleet consists of 91 total paratransit vehicles which exceeds the capacity of the site and facility. The site and facility s designed to handle roughly 60 buses based on standard bus to repair bay ratios and the current parking configuration.

Observed Space/Functional Deficiencies

Several deficiencies occur at the GoRaleigh/GoWake Access Facility since the building does not meet the area requirements to maintain the fleet and staff. The operations area does not have enough space nor up to date amenities typically seen for driver support and operations functions. In maintenance, upgrading the repair bays to standards that have been embraced by the transit industry in the past decade would require significant renovation of the facility and the equipment. The employee parking area is also at maximum capacity with no area to expand

without reducing the parking area for the paratransit buses. Examples of the space deficiencies and building quality are as follows.

Administrative Areas

- The call center is not separated from the lobby causing an overflow of noise.
- Lack of conference and training space.

Operations Areas

- Insufficient space provided in the Drivers' Room and no modern driver support features (kitchenette, quiet room, TV room, etc.)
- Drivers' lockers are in an egress path.
- Dispatch/Sign-out area and vestibule does not have enough space and is not secluded from the Drivers' Room which creates a noise issue.

Maintenance Areas

- Insufficient quantity, size, and condition of repair bays.
- Maintenance shop lacks circulation space around repair bays.
- Paint booth is unused and not code compliant.

Storage Areas

- Minimal area for parts storage.
- Bulk fluid storage is in the Wash Bay.
- Severe lack of ground level equipment storage space.

Service Areas

- No drive through automated wash system.

Exterior Areas

- Parking arrangement is unorganized for paratransit vehicles using former parking areas designed for larger buses.
- Site is constructed on an old landfill, which is unstable and causes random erosion and can crack the slab, structure, and parking.
- Northwest corner of the facility is actively separating from the main structure.

Facility Recommendations

Any money spent to increase the efficiency of the GoRaleigh/GoWake Access facility would be a short-term solution. If a new facility was to be constructed in a phased approach there are still issues with the foundation of the site. The optimal suggestion would be to purchase a new property with good site elements and construct a new operations and maintenance facility.

Equipment Assessment

Overview

Staff from HDR | MDG toured the GoRaleigh/GoWake Access facility on March 19th, 2018 to collect data and photo document the condition of all equipment used for maintenance and service functions. The Planning Team performed an in-depth assessment of equipment condition, identifying any apparent functional issues or deficiencies. The photos from the tour are located in Appendix B: Equipment Assessment. Based on the observations and assessments, a condition score is determined for each area based on a scale of 1 to 5:

- 1: Equipment is out of operation; Life Expectancy: 0 years
- 2: Equipment is old/out dated with several apparent functional issues; Life Expectancy: 1-3 years
- 3: Equipment works properly with minor issues; Life Expectancy 3-7 years
- 4: Equipment was recently purchased and has been well maintained. Slight cleaning may be required; Life Expectancy 7-15 years
- 5: Equipment was recently installed or purchased; Life Expectancy 15+ years

Total Facility Equipment Assessment Score

The overall equipment condition score for the GoRaleigh/GoWake Access Facility is a 2.8. Although the majority of equipment that is used is in good condition, the decommissioned equipment that has not been operational since GoRaleigh moved lowers the overall equipment condition score. Exhibit M presents the score for each area and the total facility equipment assessment score. Appendix B documents the condition of the individual equipment assessed to develop the total score.

Exhibit M: GoRaleigh/GoWake Equipment Assessment Summary

Area	Score
Maintenance Bays	3
Tire Repair Area	5
Paint Booth	1
Facilities Maintenance/Common Workshop	2.3
Parts Storage	2.5
Tire Storage	2
Compressor Room	3
Fluid Storage	4
Battery Storage/Charging	3
Wash Bay	4
Fuel Lane	1
TOTAL FACILITY EQUIPMENT ASSESSMENT SCORE	**2.8**

Observed Deficiencies

The following lists the major deficiencies noted specifically related to the condition and quantity of equipment. The detailed assessment is located in Appendix B: Equipment Assessment.

- Hydraulic in-ground lifts from GoRaleigh's past operation have ben decommissioned but are still in place.
- Fluid distribution reel banks are no longer used.
- Exhaust reels in place are located based on the original building purpose of servicing transit buses.
- The paint room is no longer used and has been decommissioned.
- Brake lathe is no longer used as drums and rotors are replaced instead of machined.
- Shelving units and bulk storage racks are damaged, missing shelves and in poor condition.
- Battery benches are not safe or effective.
- Battery charger is not installed properly.
- None of the fuel equipment is used. All tanks have been emptied and decommissioned.
- No automated bus wash system. Buses are briefly washed by hand which is not very effective.

Equipment Recommendations

With a new facility, it would be beneficial to replace the majority of equipment used for service and maintenance. Certain equipment, however, is in good condition and could be relocated. The tire repair equipment, four post lifts and majority of the portable equipment were purchased recently. As long as regular scheduled maintenance/service is performed as recommended by the manufacturer, the equipment will meet or exceed the life expectancy.

Facility Program Data

Overview

Based on the condition and capacity of the current site and facility, GoRaleigh/GoWake Access should abandon the current facility and relocate to a new facility due to the building and site conditions and constraints. There are no expansion opportunities of the current facility and it would not be cost effective to construct a new facility on the current site. Based on the information provided by NN, there are three possible growth/reduction predictions.

Scenario A.1 assumes that the GoWake Access partner will function as the Medicaid broker and dispatch contracted and owner vehicles. This also assumes that the ADA program for GoRaleigh will grow faster than originally anticipated. Scenario A.2 assumes a consistent growth pattern through 2027 as Medicaid trips are divided between GoWake Access and GoRaleigh. Scenario A.3 covers a reduction of the total fleet assuming GoRaleigh eliminates their ADA program and

uses taxi type services. GoWake would also no longer use their Medicaid program and would utilize their fleet to support the rural areas of Raleigh.

Fleet Data

Based on the possible scenarios for the GoRaleigh/GoWake Access fleet projections, separate fleet data summaries were developed. As the fleet increases, the need for employee and non-revenue vehicles will increase as well. This includes parking areas for operators, technicians, and supervisor vehicles. Exhibits N, O and P represent the overall parking requirements based on the projected fleet growth for each of the scenarios.

Exhibit N: GoRaleigh/GoWake Fleet Data

Fleet Data — HDR Maintenance Design Group

Scenario A.1: GoRaleigh/GoWake Access - New 100 Bus Paratransit Administration, Operations, and Maintenance Facility

BUSES AND VEHICLES ANTICIPATED TO BE DOMICILED AT THE FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	0
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	100
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	15
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	130

Exhibit O: GoRaleigh/GoWake Fleet Data

Fleet Data

HDR | Maintenance Design Group

Scenario A.2: GoRaleigh/GoWake Access - New 76 Paratransit Administration, Operations, and Maintenance Facility

BUSES AND VEHICLES ANTICIPATED TO BE DOMICILED AT THE FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	0
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	76
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	10
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	115

Exhibit P: GoRaleigh/GoWake Fleet Data

Fleet Data

HDR | Maintenance Design Group

Scenario A.3: GoRaleigh/GoWake Access - New 34 Paratransit Administration, Operations, and Maintenance Facility

BUSES AND VEHICLES ANTICIPATED TO BE DOMICILED AT THE FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	0
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	34
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	4
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	50

Program Summary

The construction of a new facility would include modern design and construction features and processes to increase the efficiency and longevity of a new facility. Exhibits Q, R and S summarizes the estimated programmed space required to support each of the projected fleet numbers for a newly constructed Administration, Operations, and Maintenance facility for GoRaleigh/GoWake Access. The detailed Facility Program Data for Scenarios A.1, A.2, and A.3 are located in Appendix A: Fleet Program Data.

Exhibit Q: GoRaleigh/GoWake Program Summary

Facility Program Summary

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Scenario A.1: GoRaleigh/GoWake Access - New 100 Bus Paratransit Administration, Operations, and Maintenance Facility

Fleet Projections/Assumptions	Quantity
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	100
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	15
Building Areas	**Area (SQ. FT.) rounded**
Total Administrative Area for the Facility (SF)	6,800
Total Operations Areas for the Facility (SF)	8,400
Total Vehicle Maintenance Areas for the Facility (SF)	18,400
Total Parts Storage Areas for the Facility (SF)	2,700
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	5,300
Total All Building Areas	**41,600**
Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	**0**
Exterior Areas	
Total Exterior Bus Parking	84,000
Total Vehicle Parking Areas for the Facility (SF)	49,600
Total Exterior Storage Areas for the Facility (SF)	3,500
Total Exterior Storm Water Management Areas for the Facility (SF)	45,000
Total All Exterior Areas	**182,100**
Subtotal All Areas	**223,700**
Other Site Circulation, Setbacks and Landscaping -100%	223,700
Grand Total - Site Requirements	**447,400**
Acres	**10.27**

Exhibit R: GoRaleigh/GoWake Program Summary

Facility Program Summary

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Scenario A.2: GoRaleigh/GoWake Access - New 76 Paratransit Administration, Operations, and Maintenance Facility

Fleet Projections/Assumptions	Quantity
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	76
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	10
Building Areas	**Area (SQ. FT.) rounded**
Total Administrative Area for the Facility (SF)	6,500
Total Operations Areas for the Facility (SF)	7,900
Total Vehicle Maintenance Areas for the Facility (SF)	18,400
Total Parts Storage Areas for the Facility (SF)	2,200
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	5,300
Total All Building Areas	40,300
Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	0
Exterior Areas	
Total Exterior Bus Parking	63,840
Total Vehicle Parking Areas for the Facility (SF)	42,600
Total Exterior Storage Areas for the Facility (SF)	3,500
Total Exterior Storm Water Management Areas for the Facility (SF)	45,000
Total All Exterior Areas	154,940
Subtotal All Areas	195,240
Other Site Circulation, Setbacks and Landscaping -100%	195,240
Grand Total - Site Requirements	390,480
Acres	8.96

Exhibit S: GoRaleigh/GoWake Program Summary

Facility Program Summary

HDR | Maintenance Design Group

Scenario A.3: GoRaleigh/GoWake Access - New 34 Paratransit Administration, Operations, and Maintenance Facility

Fleet Projections/Assumptions	Quantity
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	34
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	4

Building Areas	Area (SQ. FT.) rounded
Total Administrative Area for the Facility (SF)	3,700
Total Operations Areas for the Facility (SF)	5,200
Total Vehicle Maintenance Areas for the Facility (SF)	16,600
Total Parts Storage Areas for the Facility (SF)	1,400
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	3,200
Total All Building Areas	**30,100**

Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	**0**

Exterior Areas	
Total Exterior Bus Parking	28,560
Total Vehicle Parking Areas for the Facility (SF)	18,400
Total Exterior Storage Areas for the Facility (SF)	2,900
Total Exterior Storm Water Management Areas for the Facility (SF)	45,000
Total All Exterior Areas	**94,860**
Subtotal All Areas	**124,960**
Other Site Circulation, Setbacks and Landscaping -100%	124,960
Grand Total - Site Requirements	**249,920**
Acres	**5.74**

Rough Order of Magnitude Cost

Overview

The estimated project budget cost projection for design and construction of a new Administration, Operation, and Maintenance facility to support each of the projected fleet scenarios for GoRaleigh/GoWake Access is presented in the following tables. The total cost shown is based on 2018 dollars and based only on theoretical program data. The detailed breakdown of budget and cost escalation is in Appendix C: Fleet Program Data.

Scenario A.1 Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$930,100
Site Landscaping/Security Fencing	$162,800
Other Paving – Drives and Circulation (Asphalt & Concrete)	$2,206,300
Total Exterior Bus Parking	$960,500
Site Work Subtotal	**$4,259,700**
Building Areas	
Total Administrative Areas	$2,356,200
Total Operations Areas	$2,910,600
Total Vehicle Maintenance Areas	$4,462,900
Total Parts Storage Areas	$654,900
Total Service Areas	$918,200
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$458,900
Maintenance & Storage Equipment	$891,700
Fuel& Wash Equipment	$640,000
Building Areas Subtotal	**$13,293,400**
SUBTOTAL	**$17,553,100**
Land Acquisition	$2,684,400
Architectural/Engineering Fees	$1,755,300
Surveys/Tests/Reports	$175,500
Environmental Reports	$50,000
Commissioning	$175,500
Additional Contingency	$2,633,000
Construction Management	$526,600
SUBTOTAL	**$8,000,300**
TOTAL	**$25,553,400**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$25,553,400**

Scenario A.2 Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$811,800
Site Landscaping/Security Fencing	$142,100
Other Paving – Drives and Circulation (Asphalt & Concrete)	$1,973,000
Total Exterior Bus Parking	$730,000
Site Work Subtotal	**$3,656,900**
Building Areas	
Total Administrative Areas	$2,252,300
Total Operations Areas	$2,737,400
Total Vehicle Maintenance Areas	$4,462,900
Total Parts Storage Areas	$533,600
Total Service Areas	$918,200
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$434,700
Maintenance & Storage Equipment	$870,600
Fuel& Wash Equipment	$640,000
Building Areas Subtotal	**$12,849,700**
SUBTOTAL	**$16,506,600**
Land Acquisition	$2,342,900
Architectural/Engineering Fees	$1,650,700
Surveys/Tests/Reports	$165,100
Environmental Reports	$50,000
Commissioning	$165,100
Additional Contingency	$2,476,000
Construction Management	$495,200
SUBTOTAL	**$7,345,000**
TOTAL	**$23,851,600**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$23,851,600**

Scenario A.3 Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$519,600
Site Landscaping/Security Fencing	$90,900
Other Paving – Drives and Circulation (Asphalt & Concrete)	$1,332,000
Total Exterior Bus Parking	$326,600
Site Work Subtotal	**$2,269,100**
Building Areas	
Total Administrative Areas	$1,282,100
Total Operations Areas	$1,801,800
Total Vehicle Maintenance Areas	$4,026,300
Total Parts Storage Areas	$339,600
Total Service Areas	$554,400
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$268,700
Maintenance & Storage Equipment	$760,700
Fuel& Wash Equipment	$386,400
Building Areas Subtotal	**$9,420,000**
SUBTOTAL	**$11,689,100**
Land Acquisition	$1,499,500
Architectural/Engineering Fees	$1,168,900
Surveys/Tests/Reports	$116,900
Environmental Reports	$50,000
Commissioning	$116,900
Additional Contingency	$1,753,400
Construction Management	$350,700
SUBTOTAL	**$5,056,300**
TOTAL	**$16,745,400**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$4,471,900**

Alternative Fuel Implications

Lighter Than Air Fuels (HYD, LNG, CNG)

The introduction of lighter than air fuels at new facilities require programming provisions such as additional area for fuel compression or cryogenic plants, and additional fuel island length to accommodate the various new dispensers. Maintenance areas and repair bays are essentially the same as conventionally fueled buses and planning ratios will remain the same. Some small

additional shops will be required otherwise the program areas are only minimally impacted. Parts storage programmatic area needs will need to be increased minimally to accommodate additional fuel system spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

All new facilities and existing facility modifications or expansions must include accommodations and systems to support maintenance of vehicles using lighter than air fuels. These accommodations and systems are based on codes and standards. A technical memorandum has been included with the appendices (Appendix E) that explains in detail the code and system requirements for maintaining and servicing (fuel and washing) of alternative fueled vehicles.

Battery Electric Buses

The GoRaleigh Transit Partner, like most transit providers, is carefully considering adding Battery Electric Buses (BEB) to their respective fleets in the near future. The impacts of BEB on maintenance cycles and components is uncertain at this time, but it is a widely held belief that BEB will require less drivetrain related repairs.

Introduction of BEB technologies at new facilities require programming provisions such as additional area for charging systems, and fuel/service islands program and configuration will change with the reduction of conventional fuels if a 100% conversion to BEB is incorporated. Maintenance areas and work bays planning ratios will be increased to accommodate the anticipated reduction in engine work associated conventional fuel engine technologies. Additional shops will be required for electrical components and battery systems, otherwise the program areas are only minimally impacted. Parts storage area programmatic needs will need to be increased minimally to accommodate additional spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

Charging infrastructure is a major concern as most current technology systems take significant site area that can generally impact the bus storage capacity of the facility. Additionally, charging infrastructure requires significant electric supply and/or a tie in to on-site renewables, such as photovoltaic systems.

BEB charging systems and their physical requirements are changing rapidly. If BEB technology is considered for new or existing facilities, it would be prudent to explore current and emerging system designs, especially related to capacitor systems that take advantage of lower off-peak power costs. Additionally, the Transit Partner should research for an on-route charger that lowers the power impact at the maintenance and operations facilities.

GOTRIANGLE OPERATIONS & MAINTENANCE FACILITY

Existing Facility Overview

General Description

The GoTriangle Operations and Maintenance Facility was originally constructed in 1998 for the operations and maintenance functions of 35-foot transit buses. In 2006, an addition was built for administrative functions to serve the agency.

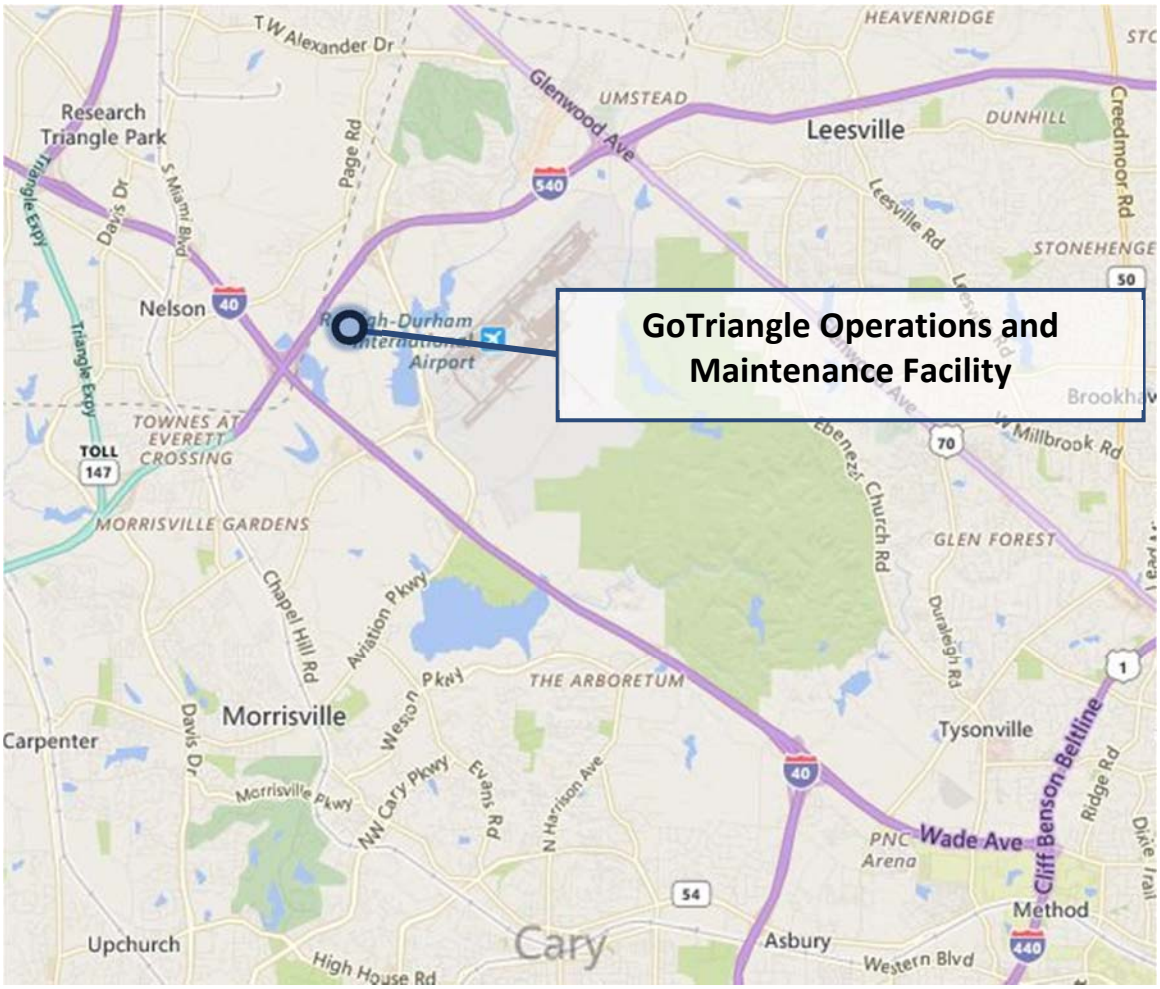
The maintenance portion of the facility consists of 10 repair bays, two of which utilize an in-ground axle engaging scissor lift. The remaining repair bays use portable lifts when needed. Two of the bays provided are for paratransit and non-revenue vehicle service and repair. One of these repair bays is equipped with a four post surface mounted lift; the other with a two post surface mounted lift. The parts storage room mainly consists of small parts storage with a mezzanine for larger items and building mechanical and electrical units. Also included with the maintenance areas of the facility is a Wash Bay with a drive through wash system. This bay separates the operations and maintenance functions of the building. The facility also includes a steam cleaning area for cleaning the engine bay of the buses before preventative maintenance inspections or maintenance is performed.

Operations areas are located in the west side of the facility, separate from the maintenance areas. All administrative functions occur in the building addition along the north face of the facility.

General Location Map

Exhibit T presents a general location of the GoTriangle Operations and Maintenance facility in relation to Wake County. The site is located in the northeast corner of Interstate 40 and Interstate 540 near the Raleigh-Durham International Airport at 5201 Nelson Road.

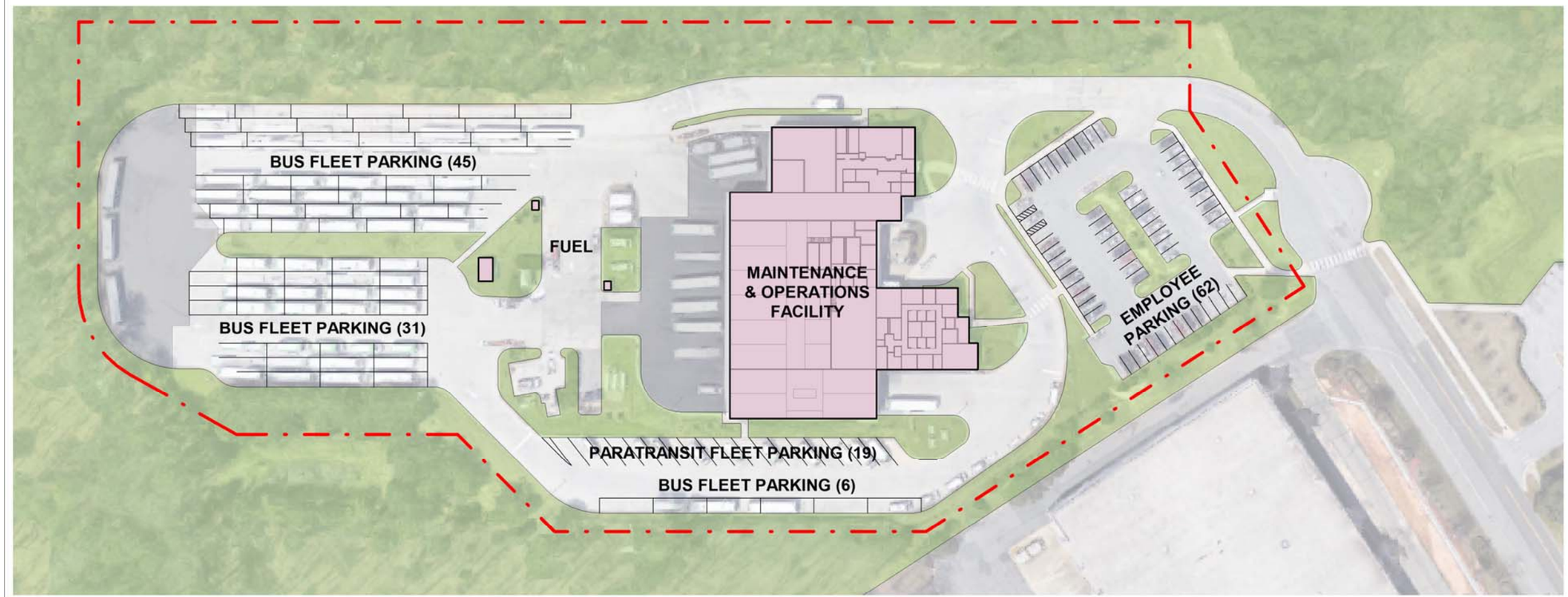
Exhibit T: GoTriangle Operations and Maintenance Facility



Site Plan

Exhibit U graphically represents the site elements and layout of the facilities on the site. Employee and visitor parking is located on the North side of the property at the entrance to the site. The bus parking yard occupies the south half of the site with the operations and maintenance facility dividing the site.

Exhibit U: GoTriangle Operations and Maintenance Facility Site Plan



Facility Statistics

Different vehicles require different parking and maintenance design elements. Exhibit V organizes the types and quantities of vehicles maintained and parked on-site.

Exhibit V: GoTriangle Fleet Inventory

Vehicle Type	Number of Vehicles
Fixed Route/Standard Bus	77
Articulated Bus	0
Paratransit Bus/Vehicle	20
Non-Revenue Vehicle	9
Total	106

The staff at the GoTriangle Facility is divided among three departments: administration, operations, and maintenance. Administrative staff are responsible for a variety of tasks including finance, training, human resources, safety, and site management. Operations staff includes all drivers, dispatchers, road supervisors, and directors employed to operate the transit agency. Maintenance staff includes supervisors, foremen, technicians, training, and parts handling personnel. Exhibit W presents the total number of staff at the facility between these three departments. The exhibit separates operators from operations staff and technicians and service workers from maintenance staff since these are the largest group within the departments.

Exhibit W: GoTriangle Staff

Position	Employee Count
Administration Staff	3
Fixed Route Operations Staff	14
Fixed Route Drivers	113
Paratransit Operations Staff	10
Paratransit Drivers	29
Maintenance Administrative Staff	9
Maintenance Technicians	16
Sevice Workers	10
Total	204

Functional Capacity

GoTriangle operates and maintains a fleet of 97 transit vehicles, exceeding the capacity of the site and facility. GoTriangle must park 66 service vans at a remote site due to the lack of space. This causes a deadhead of approximately five minutes. The total fleet size also exceeds the capacity of the operations and maintenance area. The service vans are not maintained on-site.

Observed Space/Functional Deficiencies

The current GoTriangle Operations and Maintenance buildings are in good physical shape. However, all could use some general modernization, system updates and increase of area for some driver functions. The following items are deficiencies noted from facility tours and conversations with GoTriangle staff:

Administrative Areas

- Lack of conference space in the administrative area. Meetings are often help in the break room only because the space is available.
- The maintenance break room is used as a conference room due to limited conference space.

Operations Areas

- Operations areas do not have adequate space to support the number of drivers needed to support the fleet.
- No distinct circulation/egress path for operators to enter and exit the building.
- Dispatch for fixed route and paratransit fleet is in the main egress path, causing a congestion of drivers during sign-out.
- Drivers' lockers are in the main egress path of the Operations building.
- Paratransit Operations have no offices or separate/secluded areas for the supervisors or reservationists.
- Drivers' Room does not have separation between the kitchenette, vending area, and computer workstations making the area congested and loud.

Maintenance Areas

- Insufficient and inadequate amount of repair bays. Repair bays were originally designed for 35-foot buses and GoTriangle has moved to 40' transit buses. Maintenance often occurs outside of the facility due to the insufficient amount of repair bays
- Shop space is limited for tool box storage, portable equipment and miscellaneous storage.
- Technician support areas are not easily accessible from the maintenance areas.
- Bus repair overflows into the repair bays intended for paratransit repair and inspection due to the lack of repair bays.
- Toolboxes and shop equipment are stored between repair bays because of the lack of equipment storage space.
- Work benches/workstations are between bays restricting the circulation around buses when serviced
- Electronics repair shop is limited in workspace and require a designated repair bay
- The Engine Cleaning area is not large enough to lift an entire bus which cause buses to not be sufficiently cleaned before maintenance.

Storage Areas

- Tires are stored in two separate areas within the facility instead of in one large tire storage room/area

- Batteries are currently stored in a locked cabinet instead of in a dedicated storage/charging room
- Parts room has no room for large parts to be stored and has reached capacity on the ability to store small parts

Service Areas

- The service cycle loops buses around the site to go through fuel and wash without being parked between services.
- A single automated wash bay is used for washing the fleet. The entire fleet cannot be washed on the same day.
- Service workers perform tasks in the elements because the fuel lanes are not covered

Exterior Areas

- Insufficient employee/vehicle parking causes employees to park along Nelson Road.
- Bus parking configuration has reached the maximum capacity
- Buses bottleneck when returning to the site at the end of the day.

Facility Recommendations

Small renovations can be made to improve the overall operations of the site and facility. However, neither the site nor facility is designed to maintain and operate a fleet of this size. The ideal recommendation would be to find a new site within the area handled by GoTriangle to construct a new facility that would be designed to accommodate future growth.

Equipment Assessment

Overview

Staff from HDR | MDG toured the GoTriangle facility on March 20th, 2018 to collect data and photo document the condition of all equipment used for maintenance and service functions. The Planning Team performed an in-depth assessment of equipment condition, identifying any apparent functional issues or deficiencies. The photos from the tour are located in Appendix B: Equipment Assessment. Based on the observations and assessments, a condition score is determined for each area based on a scale of 1 to 5:

- 1: Equipment is out of operation; Life Expectancy: 0 years
- 2: Equipment is old/out dated with several apparent functional issues; Life Expectancy: 1-3 years
- 3: Equipment works properly with minor issues; Life Expectancy 3-7 years
- 4: Equipment was recently purchased and has been well maintained. Slight cleaning may be required; Life Expectancy 7-15 years
- 5: Equipment was recently installed or purchased; Life Expectancy 15+ years

Total Facility Equipment Assessment Score

The overall equipment condition score for the GoTriangle Facility is a 4.2. The high score is driven by the amount of new and well maintained equipment. Overall, there is an adequate amount of equipment that satisfies the needs of the facility, other than a few mentioned deficiencies. Exhibit X presents the score for each area and the total facility equipment assessment score. Appendix B documents the condition of the individual equipment assessed to develop the total score.

Exhibit X: GoTriangle Equipment Assessment Summary

Area	Score
Maintenance Bays	3.4
Paratransit Repair	5
Common Work Area	4.5
Tire Repair Area	5
Portable Equipment Storage	4.5
Battery Storage/Charging	3
Tire Storage	3
Lube/Compressor Room	4.5
Parts Storage	4
Storage Room	5
Vault Room	5
Wash Bay	5
Engine Steam Area	3
Fuel Lane	4.5
TOTAL FACILITY EQUIPMENT ASSESSMENT SCORE	**4.2**

Observed Deficiencies

The following lists the major deficiencies noted specifically related to the condition and quantity of equipment. The deficiencies vary in score. The detailed assessment is located in Appendix B: Equipment Assessment.

- Some of the portable lifts are of older design and are not wireless leading to cords running down the side and across the repair bays.
- Exhaust reels are ducted to a single vent location and the nozzles do not fit the exhaust ports of the newer designed buses.
- No used oil evacuation system installed. Used oil is dumped into a bulk tank in the center of the repair bays.
- The fall protection system in place does not allow for full roof top access of the buses. In order to access the roof of the bus, a bus must be positioned where it blocks the clear egress path.

- The tire stacking system is out of date as there are more modern and efficient tire storage solutions.
- Glass storage rack does not fully protect windshields and windows from damage.
- The hot water pressure wash unit is not in a protected area and is covered in grease and debris from the undercarriage of buses.

Equipment Recommendations

With a new facility, it would be beneficial to replace the majority of equipment used for service and maintenance. Certain equipment, however, is in good condition and could be relocated. Some of the portable lifts and above ground lifts have been purchased recently and are in good condition. Some of the portable, general shop, and tire equipment is also in good condition and could be relocated. As long as regular scheduled maintenance/service is performed as recommended by the manufacturer, the equipment will meet or exceed the life expectancy. It would not be beneficial to relocate the in-ground lifts as there are new lift options with newer technology available. Other items such as the fuel tanks and the recently purchased gantry washer could also potentially be relocated in a phased approach to limit impacts to the operations.

Facility Program Data

Overview

Based on the capacity analysis for GoTriangle, the facility and site is at it limits in terms of Administration, Operations, Maintenance, Service, and Parking areas. There have been minimal expansion and construction opportunities discussed to correct the service flow, however these would only be a short term solution and would not address the compactness of the size.
Two scenarios have been developed for GoTriangle. Scenario A would be to expand the maintenance and operations building as much as possible with minimal renovation and construction. Scenario B would be to construct a new facility that would be designed for the future growth of the GoTriangle operations. If a new facility is constructed, the current site could be sold to a private party or possibly the GoRaleigh/GoWake Access.

Fleet Data

Two fleet data analyses were developed based on the programming scenario for GoTriangle. Exhibit Y documents Scenario A which is based on a projected growth of 14 standard buses. This is the max number of buses that can fit on-site based on the information presented in Task 4.1. Exhibit Z presents the Fleet Data for Scenario B which is a new facility and site capable of supporting up to 150 fleet vehicles. This includes 15 articulated buses, 105 standard buses, and 30 paratransit buses. As the fleet increases, the need for employee and non-revenue vehicles will increase as well. This includes parking areas for operators, technicians, and supervisor vehicles.

Exhibit Y: GoTriangle Fleet Data (Scenario A)

Fleet Data

HDR | Maintenance Design Group

GoTriangle - Bus Administration, Operations, and Maintenance Facility Expansion

BUSES AND VEHICLES ANTICIPATED TO BE ADDED TO THE EXISTING FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type	
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	0	
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0	
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	14	Note: The Fleet expansion is projected to be 14 in Wake County only by FY26 and then dropping to only 3 in FY 27. The existing maintenance facility has limited expansion capcity for parking.
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0	
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	0	
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	0	
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	10	

Exhibit Z: GoTriangle Fleet Data (Scenario B)

Fleet Data

HDR | Maintenance Design Group

GoTriangle - New 150 Bus Administration, Operations, and Maintenance Facility

BUSES AND VEHICLES ANTICIPATED TO BE DOMICILED AT THE FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	15
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	105
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	30
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	10
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	150

Program Summary

Scenario A: Existing Site & Facility Renovation/Expansion

The program for accommodating an additional 14 buses is presented in Exhibit AA. The site and building areas impacted would include maintenance, operations and service. The detailed Facility Program Data is located in Appendix A: Facility Program Data.

Scenario B: New Facility Construction

Exhibit AB summarizes the space needs for a new Administration, Operations, and Maintenance facility to accommodate 150 buses. The spaces and area depicted are based on space standards developed by the Planning Team derived by past project experience. The detailed Facility Program Data is located in Appendix A: Facility Program Data.

Exhibit AA: GoTriangle Program Summary (Scenario A)

Facility Program Summary

HDR | Maintenance Design Group

GoTriangle - Bus Administration, Operations, and Maintenance Facility Expansion

Fleet Projections/Assumptions	Quantity
Articulated Buses: Includes both fixed route and BRT configurations	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	0
Standard Transit Bus: Includes all fixed route config w/Wheel Chair Lifts and Bicycle Racks	14
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	0
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	0

Building Areas	Area (SQ. FT.) rounded
Total Administrative Area for the Facility (SF)	0
Total Operations Areas for the Facility (SF)	6,300
Total Vehicle Maintenance Areas for the Facility (SF)	2,000
Total Parts Storage Areas for the Facility (SF)	0
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	9,100
Total All Building Areas	17,400
Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	0
Exterior Areas	
Total Exterior Bus Parking	11,340
Total Vehicle Parking Areas for the Facility (SF)	3,200
Total Exterior Storage Areas for the Facility (SF)	0
Total Exterior Storm Water Management Areas for the Facility (SF)	0
Total All Exterior Areas	14,540
Subtotal All Areas	31,940
Other Site Circulation, Setbacks and Landscaping -100%	0
Grand Total - Site Requirements*	23,640
Acres	0.54

* Site Area does not include are within existing building being remodeled.

Exhibit AB: GoTriangle Program Summary (Scenario B)

Facility Program Summary

HDR | Maintenance Design Group

GoTriangle - New 150 Bus Administration, Operations, and Maintenance Facility

Fleet Projections/Assumptions	Quantity
Articulated Buses: Includes both fixed route and BRT configurations	15
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	0
Standard Transit Bus: Includes all fixed route config w/Wheel Chair Lifts and Bicycle Racks	105
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	30
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	10

Building Areas	Area (SQ. FT.) rounded
Total Administrative Area for the Facility (SF)	6,600
Total Operations Areas for the Facility (SF)	12,500
Total Vehicle Maintenance Areas for the Facility (SF)	45,000
Total Parts Storage Areas for the Facility (SF)	7,300
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	9,100
Total All Building Areas	**80,500**

Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	**0**

Exterior Areas	
Total Exterior Bus Parking	162,000
Total Vehicle Parking Areas for the Facility (SF)	54,400
Total Exterior Storage Areas for the Facility (SF)	4,600
Total Exterior Storm Water Management Areas for the Facility (SF)	45,000
Total All Exterior Areas	**266,000**
Subtotal All Areas	**346,500**
Other Site Circulation, Setbacks and Landscaping -100%	346,500
Grand Total - Site Requirements	**693,000**
Acres	**15.91**

Rough Order of Magnitude Cost

Scenario A: Existing Site & Facility Renovation/Expansion

The estimated project budget cost projection for design and construction for renovating the existing GoTriangle site and facility is presented in table below. The total cost shown is based on 2018 dollars and based only on theoretical program data. For comparison, included in Appendix C: Facility Program Data is the adjusted total estimated budget cost projection based on an escalation factor of 5% each year the building addition is postponed.

Scenario B: New Facility Construction

The estimated project budget cost projection for a new Administration, Operations, and Maintenance facility for a 150 bus operation is presented in table below. The total cost shown is based on 2018 dollars and based only on theoretical program data. For comparison, included in Appendix C: Facility Program Data is the adjusted total estimated budget cost projection based on an escalation factor of 5% each year the building addition is postponed.

Scenario A Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$49,148
Site Landscaping/Security Fencing	$0
Other Paving – Drives and Circulation (Asphalt & Concrete)	$27,700
Total Exterior Bus Parking	$82,500
Site Work Subtotal	**$159,348**
Building Areas	
Total Administrative Areas	$0
Total Operations Areas	$1,746,400
Total Vehicle Maintenance Areas	$346,500
Total Parts Storage Areas	$0
Total Service Areas	$1,576,600
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$190,200
Maintenance & Storage Equipment	$169,100
Fuel& Wash Equipment	$1,098,000
Building Areas Subtotal	**$5,127,600**
SUBTOTAL	**$5,286,948**
Land Acquisition	$0
Architectural/Engineering Fees	$528,695
Surveys/Tests/Reports	$52,869
Environmental Reports	$10,000

Commissioning	$52,869
Additional Contingency	$264,347
Construction Management	$105,739
SUBTOTAL	**$1,014,520**
TOTAL	**$6,301,468**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$6,301,500**

Scenario B Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$1,440,700
Site Landscaping/Security Fencing	$252,100
Other Paving – Drives and Circulation (Asphalt & Concrete)	$3,002,000
Total Exterior Bus Parking	$1,852,400
Site Work Subtotal	**$6,547,200**
Building Areas	
Total Administrative Areas	$2,286,900
Total Operations Areas	$4,331,300
Total Vehicle Maintenance Areas	$10,914,800
Total Parts Storage Areas	$1,770,600
Total Service Areas	$1,576,600
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$576,600
Maintenance & Storage Equipment	$2,210,300
Fuel& Wash Equipment	$1,098,800
Building Areas Subtotal	**$24,765,900**
SUBTOTAL	**$31,313,100**
Land Acquisition	$4,158,000
Architectural/Engineering Fees	$3,131,300
Surveys/Tests/Reports	$313,100
Environmental Reports	$50,000
Commissioning	$313,100
Additional Contingency	$4,697,000
Construction Management	$939,400
SUBTOTAL	**$13,601,900**
TOTAL	**$44,915,000**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$44,915,000**

Alternative Fuel Implications

Lighter Than Air Fuels (HYD, LNG, CNG)

The introduction of lighter than air fuels at new facilities require programming provisions such as additional area for fuel compression or cryogenic plants, and additional fuel island length to accommodate the various new dispensers. Maintenance areas and repair bays are essentially the same as conventionally fueled buses and planning ratios will remain the same. Some small additional shops will be required otherwise the program areas are only minimally impacted. Parts storage programmatic area needs will need to be increased minimally to accommodate additional fuel system spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

All new facilities and existing facility modifications or expansions must include accommodations and systems to support maintenance of vehicles using lighter than air fuels. These accommodations and systems are based on codes and standards. A technical memorandum has been included with the appendices (Appendix E) that explains in detail the code and system requirements for maintaining and servicing (fuel and washing) of alternative fueled vehicles.

Battery Electric Buses

The GoRaleigh Transit Partner, like most transit providers, is carefully considering adding Battery Electric Buses (BEB) to their respective fleets in the near future. The impacts of BEB on maintenance cycles and components is uncertain at this time, but it is a widely held belief that BEB will require less drivetrain related repairs.

Introduction of BEB technologies at new facilities require programming provisions such as additional area for charging systems, and fuel/service islands program and configuration will change with the reduction of conventional fuels if a 100% conversion to BEB is incorporated. Maintenance areas and work bays planning ratios will be increased to accommodate the anticipated reduction in engine work associated conventional fuel engine technologies. Additional shops will be required for electrical components and battery systems, otherwise the program areas are only minimally impacted. Parts storage area programmatic needs will need to be increased minimally to accommodate additional spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

Charging infrastructure is a major concern as most current technology systems take significant site area that can generally impact the bus storage capacity of the facility. Additionally, charging infrastructure requires significant electric supply and/or a tie in to on-site renewables, such as photovoltaic systems.

BEB charging systems and their physical requirements are changing rapidly. If BEB technology is considered for new or existing facilities, it would be prudent to explore current and emerging system designs, especially related to capacitor systems that take advantage of lower off-peak power costs. Additionally, the Transit Partner should research for an on-route charger that lowers the power impact at the maintenance and operations facilities.

Site Selection Criteria

The methodology and processes utilized by the Study Team in a Site Selection effort for a paratransit or fixed route bus operations and maintenance facility is documented in Appendix D: Site Selection Criteria. When the GoTriangle Transit Partner is prepared to begin the planning and design process for a new operations and maintenance facility, the steps listed in the Site Selection Criteria document should be followed. By doing so this will enhance the quality of the design process.

GOCARY OPERATIONS AND MAINTENANCE FACILITY

Existing Facility Overview

General Description

The GoCary Operations and Maintenance operates from a building previously used by a heavy truck repair shop. The facility is leased by Cary's operations contractor who repurposed the building for GoCary's operation and maintenance facility. The Wake Transit Plan and corresponding annual work has already decided that GoCary will be constructing a new facility and the lease will be terminated on the current site. It is assumed that the new facility will be constructed and operational in two years.

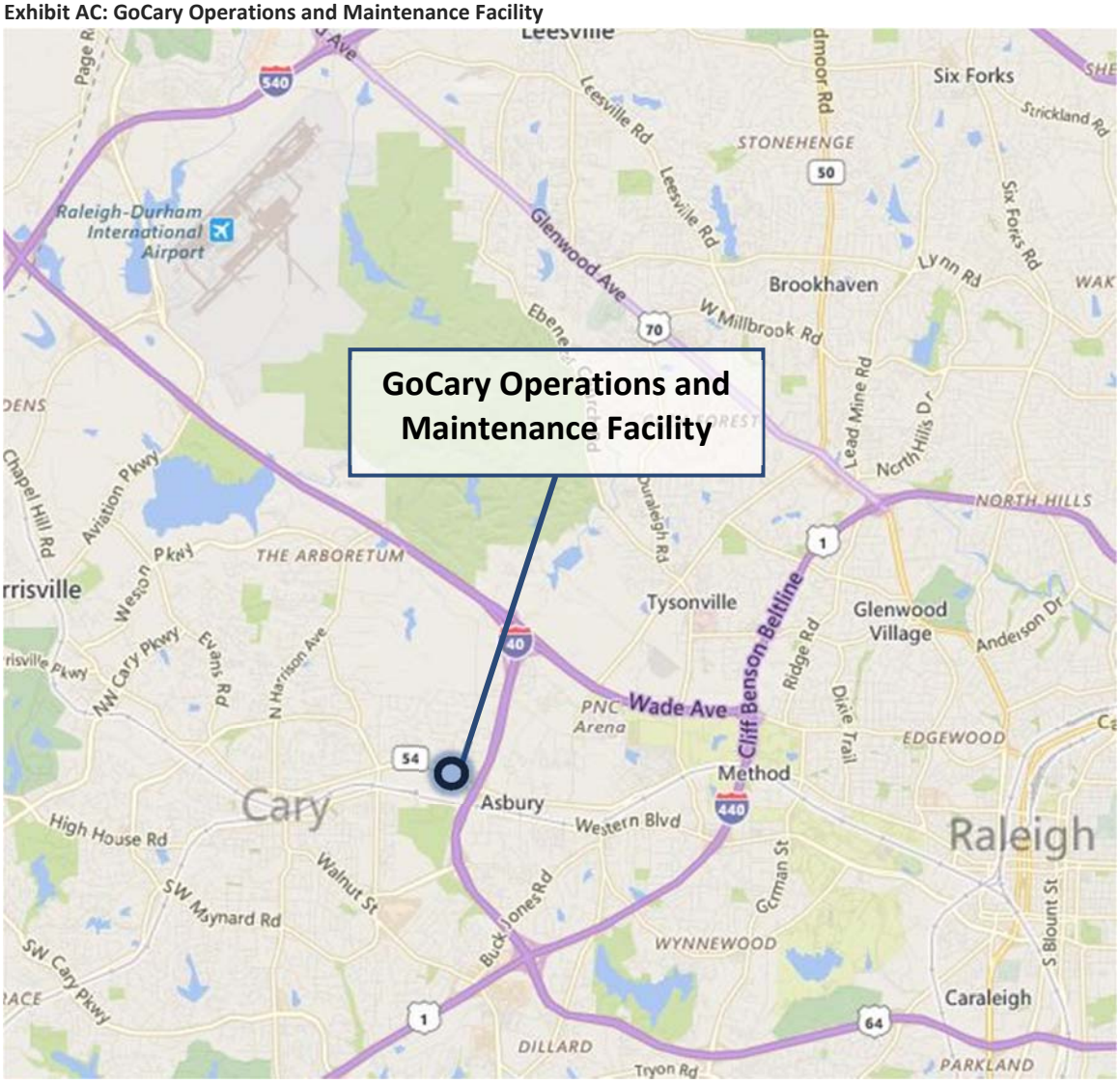
The maintenance area is made up of 10 repair bays, exceeding the quantity needed for an efficient repair bay to bus ratio. In the maintenance areas are two cranes, a three ton jib and a 7.5 ton bridge, neither of which are used. Two four post surface mounted lifts are used for lifting the vehicles as well as two sets of portable lifts. Fluid storage consists of 55 gallon drums stored along the exterior wall with hand pumps. Support areas for the maintenance staff are in the office portion of the building.

The administrative and operations functions share the office portion of the building. These functions include training, supervisors, management, dispatch, and scheduling.

General Location Map

Exhibit AC presents a general location of the GoCary Operations and Maintenance Facility in relation to Wake County. The site is located west of Interstate 40 near NC 54 at 1107 Trinity Road.

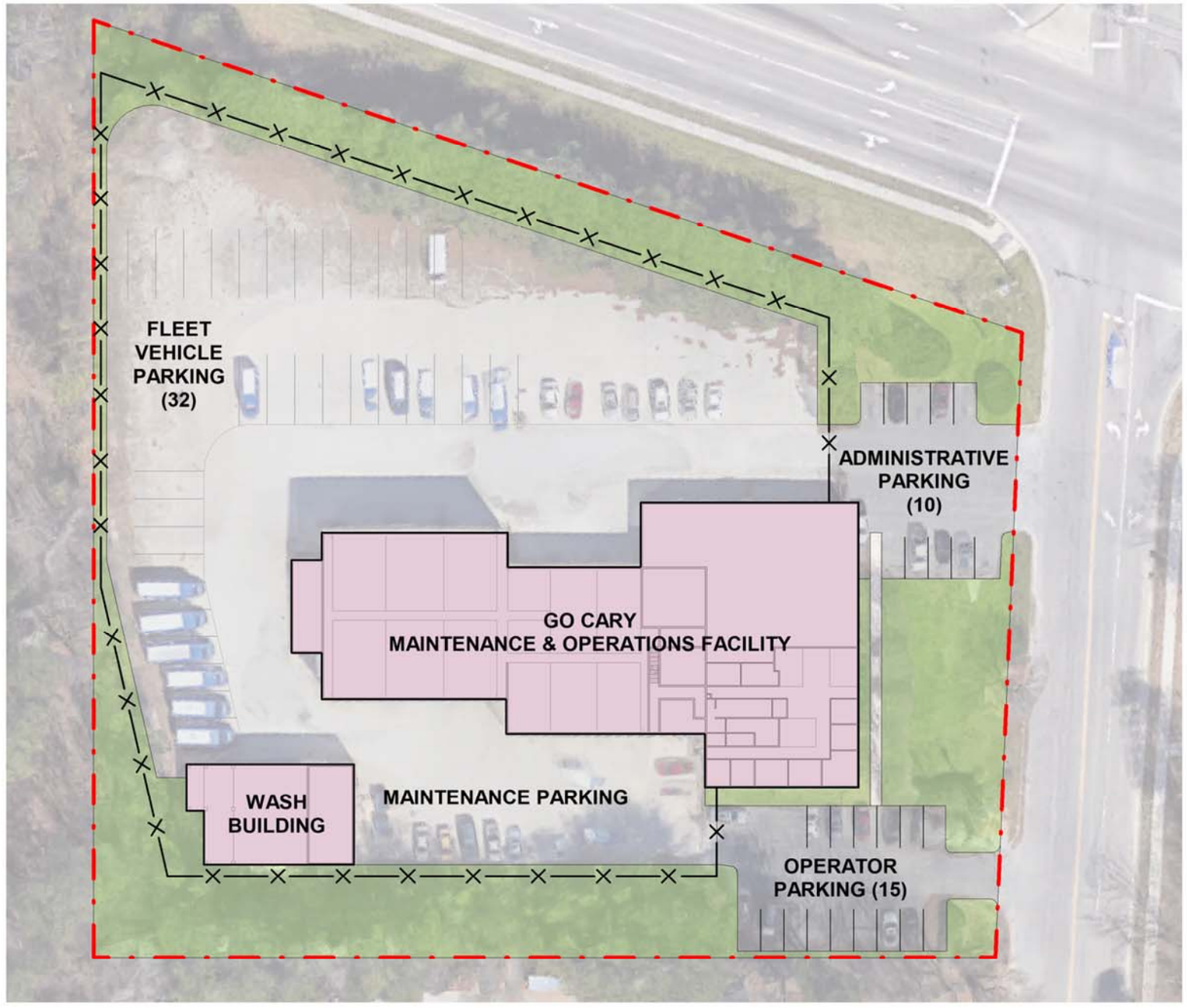
Exhibit AC: GoCary Operations and Maintenance Facility



Site Plan

Exhibit AD graphically represents the site elements and layout of the facilities on the site. Employee and visitor parking is divided between two parking lots. Due to the lack of space, employees also park in the yard. The bus parking occurs on the back half of the property, however there are no designated parking spaces.

Exhibit AD: GoCary Operations and Maintenance Facility Site Plan



Facility Statistics

Different vehicles require different parking and maintenance design elements. Exhibit AE organizes the types and quantities of vehicles maintained and parked on-site.

Exhibit AE: GoCary Fleet Inventory

Vehicle Type	Number of Vehicles
Fixed Route/Standard Bus	12
Articulated Bus	0
Paratransit Bus/Vehicle	18
Non-Revenue Vehicle	0
Total	30

The staff at the GoCary Facility is divided among two departments: operations and maintenance. Operations staff includes all drivers, dispatchers, road supervisors, and directors. Maintenance staff includes supervisors, foremen, technicians, training, and parts handling personnel. Exhibit AF presents the total number of staff at the facility between these three departments. The exhibit separates operators from operations staff and technicians and service workers from maintenance staff since these are the largest category within the departments.

Exhibit AF: GoCary Staff

Position	Employee Count
Administration Staff	3
Fixed Route Operations Staff	shared
Fixed Route Drivers	shared
Paratransit Operations Staff	9
Paratransit Drivers	54
Maintenance Administrative Staff	1
Maintenance Technicians	3
Sevice Workers	3
Total	73

Functional Capacity

GoCary operates and maintains 30 vehicles, exceeding the maximum capacity of the site. There is inadequate parking for fleet and employee vehicles, which causes an overrun of parking. Maintenance bays exceed the quantity needed to maintain the fleet; however, the space is utilized. Operations and maintenance need almost twice as much space as they currently occupy.

Observed Space/Functional Deficiencies

GoCary realizes that their current facility is not intended to be used for their operation and will be constructing a new facility. The Transit Partner already owns an eight acre parcel of land that will be used for a new operations and maintenance facility and will be designed to accommodate their future growth. The following items are deficiencies of the current facility that were noted from facility tours and conversations with GoTriangle staff and should be considered in the design of a new facility:

Administrative Areas

- No conference space provided for meetings. Meetings are often held in someone's office or in the lobby.
- No office size standard has been applied causing offices to be undersized.
- Administrative areas are open to the support areas and lobby of the facility.

Operations Areas

- Lacks modern support areas for the drivers and staff, such as a dedicated break room, training room, quiet room, and lockers.
- Training/Conference room is on second level and shared between all functions.
- There is no elevator in the building to access the second floor which does not meet ADA requirements.

Maintenance Areas

- The size and quantity of the maintenance bays exceeds the needs to support the GoCary fleet.
- Lacks modern support for technicians such as a dedicated break room, training room, and restrooms with private lockers and showers.

Storage Areas

- Bulk fluid is stored using 55 gallon drums along the back wall of the facility.
- New and used oil is stored outside in repurposed tanks previously used for fuel.
- The compressor is under a small shed roof with only a tarp to protect it from damage.
- No designation of work areas including portable equipment storage and tire repair.

Service Areas

- The covered wash structure is deteriorating from rust.
- All vehicles are washed by hand using a soap brush and a high pressure washer.

Exterior Areas

- Insufficient quantity of employee parking spaces caused operations and maintenance staff to park in the yard, which causes a safety issue when buses enter or exit the site.
- Limited paved parking for buses. Some buses are parked along the edge of the site in the gravel and grass.
- No striping to delineate parking for different bus types.
- Building features and systems are outdated. The facility was repurposed from a prior trucking
- No designation of work areas including portable equipment storage and work areas.

Facility Recommendations

As a new facility is designed for GoCary's operations, the deficiencies at the current facility should be taken into account. The new facility should include modern areas and design features to accommodate the drivers and technicians. Space standards can be applied to accurately size offices, support areas, repair bays, maintenance shops, storage areas, and other building areas. Planning ratios can also be used to calculate the required number of repair bays and service lanes.

Equipment Assessment

Overview

Staff from HDR | MDG toured the GoCary facility on March 19th, 2018 to collect data and photo document the condition of all equipment used for maintenance and service functions. The Planning Team performed an in-depth assessment of equipment condition, identifying any apparent functional issues or deficiencies. The photos from the tour are located in Appendix B: Equipment Assessment. Based on the observations and assessments, a condition score is determined for each area based on a scale of 1 to 5:

- 1: Equipment is out of operation; Life Expectancy: 0 years
- 2: Equipment is old/out dated with several apparent functional issues; Life Expectancy: 1-3 years
- 3: Equipment works properly with minor issues; Life Expectancy 3-7 years
- 4: Equipment was recently purchased and has been well maintained. Slight cleaning may be required; Life Expectancy 7-15 years
- 5: Equipment was recently installed or purchased; Life Expectancy 15+ years

Total Facility Equipment Assessment Score

The overall equipment condition score for the GoCary Facility is a 3. The lower score is due to the poor condition of the equipment and equipment that has been decommissioned. There are select equipment items that could potentially be relocated, however, most of the equipment will need to be replaced. Exhibit AG presents the score for each area and the total facility equipment assessment score. Appendix B documents the condition of the individual equipment assessed to develop the total score.

Exhibit AG: GoCary Equipment Assessment Summary

Area	Score
Maintenance Bays	2.8
Tire Repair Area	3.5
Portable Equipment Storage	3
Lube/Compressor Storage	2.7
Parts Storage	3.7
Wash Area	2
TOTAL FACILITY EQUIPMENT ASSESSMENT SCORE	**3**

Observed Deficiencies

The following lists the major deficiencies noted specifically related to the condition and quantity of equipment. The deficiencies vary in score. The detailed assessment is located in Appendix B: Equipment Assessment.

- Floor drains are used for capturing used fluid from vehicles due to the lack of lifts.
- Fabricated drain table would not be needed if more lifts were provided and oil receiver were used that could be pumped through a fluid evacuation system.
- Four post lift is too tall for paratransit vehicles to use if an airbag is blown out.
- The job crane and bridge crane in place were for the original owner of the facility and have been decommissioned.
- Tire inflation cage is not the proper model for inflating large transit bus tires.
- One tire rack is provided for storage. More racks are needed to store light duty and heavy duty tires.
- Engine hoist is an old model and can be replaced with a newer hoist with the ability to fold which would occupy less space.
- Bulk oil and used oil tanks and distribution pumps are repurposed from the previous fuel distribution system.
- All shelving units and bulk storage racks have particle board shelving which does not last as long as metal shelving.
- Storage cabinets are damaged and the lock mechanisms malfunction.
- The wash system used consists of a high pressure washer, detergent dispensing system, and water softener. All component to support washing the vehicles are old and are deteriorating.

Equipment Recommendations

With a new facility, it would be beneficial to replace the majority of equipment used for service and maintenance. The only equipment that could be relocated would be the portable lifts, heavy duty tire mounter, and minimal shop equipment. In-ground or flush mounted lifts could be used for lifting the paratransit vehicles to avoid clearance issues. The new facility will not require any overhead lifting via jib or bridge cranes.

Facility Program Data

Overview

The GoCary Transit Partner has already decided to construct a new facility. They currently own a property that is estimated to be about eight acres which will house their Administration, Operations, and Maintenance. This section documents the projected fleet growth, program summary, and estimated budget cost to construct a new facility.

Fleet Data

Based on the fleet growth projections from NN and the expertise of the Planning Team, the GoCary operations could increase to as many as 30 fixed route buses and 45 paratransit buses. As the fleet increases, the need for employee and non-revenue vehicles will increase as well. This includes parking areas for operators, technicians, and supervisor vehicles. Exhibit AH represents the overall parking requirements based on the projected fleet growth.

Exhibit AH: GoCary Fleet Data

Fleet Data

HDR | Maintenance Design Group

GoCary - New Bus Administration, Operations, and Maintenance Facility

BUSES AND VEHICLES ANTICIPATED TO BE DOMICILED AT THE FACILITY

Type of Bus or Vehicle	Size	Space Standard	Resulting Area (includes Circulation)	Entry Quantity of this Vehicle Type
Articulated Buses: Includes both fixed route and BRT configurations	vehicles 8'-6" wide x 60-0" long	12' X 65'	1560	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	Vehicles 8'-6" wide x 45'-0" long	12' X 50'	1200	0
Standard Transit Bus: Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 42'-0" long	12' X 45'	1080	30
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	Vehicles 8'-6" wide x 37'-0" long	12' X 40'	960	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	Vehicles 8'-6" wide x 28'-0" long	12' X 30'	720	45
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	10' X 20'	400	5
Staff and Visitors: Personal Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	Vehicles 8'-6" wide x 12'-0" to 16'-0" long	9' X 18'	324	90

Program Summary

The construction of a new facility would include modern design and construction features and processes to increase the efficiency and longevity of a new facility. Exhibit AI summarizes the space needs for a new Administration, Operations, and Maintenance facility to accommodate the future growth of the GoCary Transit Partner. The spaces and area depicted are based on space standards developed by the Planning Team derived by past project experience. From the data it is confirmed that the eight acres GoCary purchased will be sufficient to support a new facility. The detailed Facility Program Data is located in Appendix C: Facility Program Data.

Exhibit AI: GoCary Program Summary

Facility Program Summary

HDR | Maintenance Design Group

GoCary - New Bus Administration, Operations, and Maintenance Facility

Fleet Projections/Assumptions	Quantity
Articulated Buses: Includes both fixed route and BRT configurations	0
Over the Road (OTR) Coach: OTR either in touring or commuter configuration	0
Standard Transit Bus: Includes all fixed route config w/Wheel Chair Lifts and Bicycle Racks	30
Small Transit Bus: Buses 30 and 35 feet in length. Includes all fixed route configuration with Wheel Chair Lifts and Bicycle Racks	0
Paratransit Buses: Cut-away Vans, Large Vans and Small Buses no longer than 28 feet.	45
Non-Revenue Vehicles: Pick-up Trucks, Sedans, Vans, SUV's and Motorcycles	5

Building Areas	Area (SQ. FT.) rounded
Total Administrative Area for the Facility (SF)	5,000
Total Operations Areas for the Facility (SF)	7,300
Total Vehicle Maintenance Areas for the Facility (SF)	15,900
Total Parts Storage Areas for the Facility (SF)	2,900
Total Interior Bus Parking	0
Total Service Areas (Fuel/Fare/Wash)	7,200
Total All Building Areas	38,300

Covered Areas	
Total Covered Bus Parking	0
Total All Covered Areas	0

Exterior Areas	
Total Exterior Bus Parking	70,200
Total Vehicle Parking Areas for the Facility (SF)	32,200
Total Exterior Storage Areas for the Facility (SF)	2,500
Total Exterior Storm Water Management Areas for the Facility (SF)	22,500
Total All Exterior Areas	127,400
Subtotal All Areas	165,700
Other Site Circulation, Setbacks and Landscaping -100%	165,700
Grand Total - Site Requirements	331,400
Acres	7.61

Rough Order of Magnitude Cost

The estimated project budget cost projection for design and construction for renovating the existing GoCary site and facility is presented in table below. The total cost shown is based on 2018 dollars and based only on theoretical program data. For comparison, included in Appendix C: Facility Program Data is the adjusted total estimated budget cost projection based on an escalation factor of 5% each year the building addition is postponed.

Scenario B Preliminary Budget Summary	
Site Work	
Site Clearing/Development & Site utility Extensions	$688,981
Site Landscaping/Security Fencing	$120,600
Other Paving – Drives and Circulation (Asphalt & Concrete)	$1,500,300
Total Exterior Bus Parking	$802,700
Site Work Subtotal	**$3.112.581**
Building Areas	
Total Administrative Areas	$1,732,500
Total Operations Areas	$2,529,500
Total Vehicle Maintenance Areas	$3,856,500
Total Parts Storage Areas	$703,400
Total Service Areas	$1,247,400
Covered Areas	
Total Covered Areas	$0
FF&E (Administration & Operations Areas)	$371,300
Maintenance & Storage Equipment	$794,500
Fuel& Wash Equipment	$869,400
Building Areas Subtotal	**$12,104,500**
SUBTOTAL	**$15,217,081**
Land Acquisition	$0
Architectural/Engineering Fees	1,521,708
Surveys/Tests/Reports	$152,171
Environmental Reports	$50,000
Commissioning	$152,171
Additional Contingency	$2,282,562
Construction Management	$304,342
SUBTOTAL	**$4,462,953**
TOTAL	**$19,680,034**
TOTAL PRELIMINARY BUDGET COST PROJECTION	**$19,680,100**

Alternative Fuel Implications

Lighter Than Air Fuels (HYD, LNG, CNG)

The introduction of lighter than air fuels at new facilities require programming provisions such as additional area for fuel compression or cryogenic plants, and additional fuel island length to accommodate the various new dispensers. Maintenance areas and repair bays are essentially the same as conventionally fueled buses and planning ratios will remain the same. Some small additional shops will be required otherwise the program areas are only minimally impacted. Parts storage programmatic area needs will need to be increased minimally to accommodate additional fuel system spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

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Battery Electric Buses

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Introduction of BEB technologies at new facilities require programming provisions such as additional area for charging systems, and fuel/service islands program and configuration will change with the reduction of conventional fuels if a 100% conversion to BEB is incorporated. Maintenance areas and work bays planning ratios will be increased to accommodate the anticipated reduction in engine work associated conventional fuel engine technologies. Additional shops will be required for electrical components and battery systems, otherwise the program areas are only minimally impacted. Parts storage area programmatic needs will need to be increased minimally to accommodate additional spare parts and components. For existing facilities with expansions, program requirements will also only be minimally impacted.

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