GO Triangle

GoTriangle
Operations & Finance Committee
December 03, 2020 8:30 am-10:00 am
Eastern Time

Based on NC safer at home executive orders in response to COVID-19, the GoTriangle Operations & Finance Committee will meet remotely on Thursday, December 3, 2020, at 8:30 am.

Click here to: Join Webex Meeting
Meeting Number / Access code: #171 387 2144
Password: 1234
Or dial: +1 415-655-0003

I. **Call to Order and Adoption of Agenda**
   (1 minute Vivian Jones)
   > ACTION REQUESTED: Adopt agenda with any changes requested.

II. **Draft Minutes - November 5, 2020**
   (1 minute Michelle Dawson)
   > ACTION REQUESTED: Approve minutes.

III. **Proposed Service Changes for Spring 2021**
   (10 minutes Andrea Neri)
   > ACTION REQUESTED: Recommend that the Board authorize the proposed service expansion to Route 305 in FY21, contingent on approval of the Q2 FY21 Wake Transit Work Plan Amendments which would provide funding for this service change.

IV. **Public Transportation Agency Safety Plan**
   (15 minutes Patrick Stephens)
   > Safety Plan
   > Resolution

V. **Wake Transit FY21 Q1 Amendment**
   (10 minutes Steven Schlossberg)
   > ACTION REQUESTED: Recommend that the Board reallocate $1,100,000 from the Wake Transit Adopted Plan reserves to reimburse the federal interest in five (5) parcels located along the planned Greater Triangle Commuter Rail (GTCR) corridor in Wake County.

VI. **GoForward Regional Technology Strategy**
   (20 minutes Steven Schlossberg & Brian Fahey)

VII. **FY 2020 Comprehensive Annual Financial Report**
   (15 minutes Ren Wiles)

VIII. **Adjournment**
(Vivian Jones)

GoTriangle Board of Trustees
Operations & Finance Committee Meeting Minutes
November 5, 2020
Held Remotely via Webex

Committee Members Present:

Vivian Jones, Committee Chair (arr. 8:40 am)   Steve Schewel

Michael Parker   Stelfanie Williams

Jennifer Robinson

Committee Members Absent:

Corey Branch   Valerie Jordan (excused)

Other Board Members Present:

Will Allen III

Jennifer Robinson called the meeting to order at 8:35 a.m. on behalf of the committee chair.

I.   **Adoption of Agenda**
     Action: On motion by Parker and second by Schewel the agenda was adopted. The motion was carried unanimously.

II. **Approval of Minutes**
     Action: On motion by Parker and second by Schewel the Committee approved the minutes of the October 1, 2020, meeting. The motion was carried unanimously.

III. **ILA with City of Durham – Reimbursement Contract for Technical Services Related to Commuter Rail**
     Katharine Eggleston reminded the committee about the ongoing work on the Greater Triangle Commuter Rail study. She stated one key task involves a detailed engineering feasibility study for downtown Durham, which will require technical reviews by the City. The cost of these reviews will be reimbursed by GoTriangle, which is capped at $75,000.

Jones arrived.

     Schewel noted that the volume of material needing review during the D-O LRT project became an issue and asked about improvements to that process. Eggleston stated that the reviews for the D-O LRT project were at a later, more detailed phase of engineering. She said the volume of materials in this phase of study for commuter rail will be much less; however, should the project move forward, the issue of large volumes of drawings will occur and GoTriangle will need

to work with its partner jurisdictions to negotiate a review schedule so they can forecast their involvement over the coming months. She added that GoTriangle and the City have been working well together.

Action: On motion by Parker and second by Robinson the Committee voted to recommend that the board authorize the president and CEO to execute an Interlocal agreement with City of Durham for reimbursement of actual costs incurred to perform time-critical tasks in support of the Greater Triangle Commuter Rail Study, up to an amount not to exceed $75,000. The motion was carried unanimously.

IV. **Regional Fleet and Facilities Study Contract**
Katharine Eggleston stated that GoTriangle's current work plan includes a regional fleet and facilities study to assess fleet and maintenance capacity at the current Nelson Road facility. The study also will evaluate the need for an expanded facility or additional satellite facilities to support the growth associated with the county transit plans, in particular Durham County. As part of the management contract with the City of Durham for GoDurham, GoTriangle will be administering a similar study for GoDurham. In addition to studying the fleets and facilities of GoTriangle and GoDurham, a third component of the study is an evaluation of the potential for shared operations and maintenance facilities or other functions, not just among GoTriangle and GoDurham but potentially among the other transit providers in the region. The primary item identified as a potential for sharing is electric bus charging infrastructure throughout the region. Other shared maintenance functions will be evaluated for possible economies of scale as well. Eggleston requested that the committee recommend board authorization for a contract. She said a final recommendation for the selected consultant will be made next week and will be included in the board agenda.

Parker asked if the study would look beyond maintenance functions to other technologies which would have the added benefit of making the experience more seamless for riders. Eggleston replied that the study focuses on maintenance functions; although, GoTriangle and the regional agency partners did undertake a regional technology study previously.

Jones stated that the cost seems high for a study. Eggleston stated that GoDurham would contribute $500,000 for their portion of the study. Additionally, she said the "study" goes beyond planning, to include design work and cost estimating for potential sites.

Action: On motion by Parker and second by Robinson the Committee voted to recommend that the board authorize the president and CEO to execute an agreement with the selected consultant for the Regional Fleet and Facilities Study at a cost not to exceed $967,500. The motion was carried unanimously.

V. **Durham Station Improvements Preliminary Design Contract**

Katharine Eggleston explained this is a preliminary design project for improvements to Durham station, primarily to the platform. She said rain often causes the landscaping to become muddy and the canopies do not provide adequate rain cover. GoTriangle will administrator this preliminary design effort under the management contract for oversight of GoDurham. Upon completion, the City of Durham's general services department will take the project through final design and construction. City staff is involved in the process and represented on the consultant selection committee. Responses to our request for qualifications have been received and a consultant selection should be made next week and included in the board agenda.

Action: On motion by Schewel and second by Parker the Committee voted to recommend that the board authorize the president and CEO to execute an agreement with the selected consultant for the Durham Station Improvements Preliminary Design at a cost not to exceed $300,000. The motion was carried unanimously.

VI. **Task Order for Design of GoDurham FY21 Bus Stops**

Willie Noble requested approval for a task order with Ramey Kemp and Associates for design of the next group of GoDurham bus stops. He said work is wrapping up on the first group of 50 stops, which are expected to go under construction shortly. Staff continues to coordinate with the City on the refinement of the prioritization methodology used to identify stops for improvements. He added that the MWBE goal for this task order is 12%. The cost shall not exceed $500,000.

Schewel commented on the increased cost to $50,000 per stop. Eggleston explained that some stops require new sidewalk connections, filling in sidewalk gaps or pavement rehabilitation so the higher budget ensures sufficient capacity to do those ancillary improvements. She said that cost experience on construction this past year has been excellent with a lot of contractor interest and bids coming in under budget.

Jones responded that a design cost of $10,000 per stop also seems high. Eggleston said that current cost experience has seen that number reduced to about $8,000 per stop. She said staff continues to pursue opportunities for further streamlining and cost savings.

Action: On motion by Parker and second by Robinson the Committee voted to recommend that the board authorize the president and CEO to execute a task order for bus stop design services under GoTriangle Contract #18-041F, Master Agreement between Ramey Kemp and Associates and GoTriangle for On-Call

Architectural and Engineering Consultant Services for an amount not to exceed $500,000. The motion was carried unanimously.

VII. **FY20 Annual Bus Service Performance Report**
Andrea Neri's presentation is attached and hereby made a part of these minutes.

VIII. **RTP Connect Boxyard Update**
Jennifer Green shared that GoTriangle is working with the Research Triangle Foundation to enhance mobility options within the Park. She reminded the committee that RTP Connect is a pilot program in which GoTriangle provides up to $10 per trip for customers travelling to or from the Regional Transit Center and destinations within the Park and surrounding areas. The pilot has shown to increase ridership and reduce costs for GoTriangle. The Foundation has committed funds to the RTP Connect program and requested the addition of a connection to the Boxyard RTP to enable Park employees to travel from their workplace to the Boxyard RTP. Staff feels the added connection point would increase the attractiveness of the RTP Connect program by providing more mobility options. Green added that due to the COVID-19 pandemic, ridership has been much lower than anticipated and the current budget will cover any additional ridership. The start date for this adjustment will be coordinated with the opening of the Boxyard RTP.

Green then introduced Scott Levitan, president and CEO of Research Triangle Foundation, to give an overview of the Boxyard project. Levitan's update is attached and hereby made a part of these minutes. He stated his appreciation for the Foundation's increased partnership with GoTriangle.

IX. **Presentation of Dashboard**
Eric Bergstraesser presented the first iteration of the agency dashboard, which is attached and hereby made a part of these minutes.

Parker commented that for the board and the public, the charts should provide context for the data with targets to easily identify if performance is good, poor or improving. Additionally he suggested that financial data be presented in comparison to budget.

X. **Adjournment**
Action: The meeting was adjourned at 9:44 a.m.

_____
Vivian Jones, Committee Chair

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MEMORANDUM

TO: GoTriangle Board of Trustees Operations & Finance Committee

FROM: Planning and Capital Development

DATE: November 23, 2020

SUBJECT: **Proposed Service Changes for Spring 2021**

Strategic Objective Supported

1.2 Pursue service improvements and expansion opportunities

Action Requested

Staff requests that the Operations and Finance Committee recommend that the Board of Trustees authorize the proposed service expansion to Route 305 in FY21, contingent on approval of the Q2 FY21 Wake Transit Work Plan Amendments by the CAMPO Executive Board and GoTriangle Board of Trustees which would provide funding for this service change.

Background and Purpose

GoTriangle Route 305 currently provides weekday peak commuter service between Holly Springs, Apex, and Raleigh. The FY21 Wake Transit Work Plan includes a service expansion project to add peak trips to Holly Springs and provide 60 minute service at mid-day, night and weekend in the Apex-Raleigh section. Public outreach on the proposed service expansion was conducted as part of the FY 2021 Draft Wake Transit Work Plan effort in January-February 2020.

Funding for this Route 305 service expansion project is currently in unbudgeted reserve status in the FY21 Wake Transit Work Plan, but is under consideration for funding restoration in the FY21 Wake Transit Q2 Amendments. At the beginning of the fiscal year, a large group of projects scheduled for implementation in FY21 were placed into unbudgeted reserve status due to uncertainty surrounding the impacts of the COVID-19 pandemic on the collection of revenues that fund the Wake Transit Plan. It has since been determined that revenue collection is sufficient to restore funding to a group of 35 projects, including this one, via the Wake Transit Work Plan amendment process.

To prepare for the potential restoration of funding for this service change, GoTriangle staff has initiated the service change planning process so the expansion may be implemented in April 2021 if funding becomes available.

The proposed changes to Route 305 are a component of the GoTriangle Short Range Transit Plan that was adopted by the GoTriangle Board of Trustees on November 28, 2018.

PO Box 13787
Research Triangle Park, NC 27709
P: 919.485.7510 | F: 919.485.7547

www.gotriangle.org

The GoTriangle Short Range Transit Plan identified three goals:
- Make service faster and more time-competitive
- Provide more frequent service
- Provide more all-day service

The proposed service changes support these goals while maintaining service to current customers and improving reliability to meet performance expectations for service delivery.

GoTriangle staff is also continuing to evaluate ridership, productivity, and other metrics on routes throughout the pandemic, and will consider implementing additional temporary COVID-related service changes in April. GoTriangle staff is also evaluating the potential to restore service on routes that are currently suspended due to COVID-19.

Financial Impact
This service expansion for Route 305 would be funded 100% by Wake Transit.

The pending Q2 Amendments to the FY21 Wake Transit Work Plan include $681,593 allocated to the Route 305 expansion project, which would be sufficient to fund the service expansion beginning in April.

If the additional Wake Transit funds are not released in the Q2 Amendments, this service change will not be implemented this fiscal year.

Attachments
- None

Staff Contact
- Andrea Neri, 919-485-7592, aneri@gotriangle.org

MEMORANDUM

TO: GoTriangle Board of Trustees Operations & Finance Committee

FROM: Transit Operations

DATE: November 23, 2020

SUBJECT: **Public Transportation Agency Safety Plan (PTASP)**

Strategic Objective or Initiative Supported
2.1 Promote a culture of safety

Approach: Providing the skills, staffing, systems and technology needed to meet our objectives:
Initiatives:

- Transition to a Safety Management System approach to safety, per Moving Ahead for Progress in the 21st Century ACT (MAP-21) Federal Highway Administration

Action Requested
Staff requests that the Operations & Finance Committee recommend that the Board of Trustees adopt a resolution approving GoTriangle's Public Transit Agency Safety Plan.

Background and Purpose
This item provides information on the Federal Transit Administration (FTA) required Public Transportation Agency Safety Plan (PTASP). This new rule requires PTASP plans be completed and certified to the FTA by December 31, 2020. Under this rule, state DOT's are required to prepare plans on behalf of bus operators with fewer than 100 peak-hour buses, unless a bus operator volunteers to prepare their own plan. GoTriangle qualifies for the State DOT plan. However, after careful consideration GoTriangle has elected to prepare its own plan especially in light of our planned expansion with a rail component and additional bus service in the future.

The FTA published the PTASP Final Rule on July 19, 2018. This rule requires certain operators of public transportation systems who receive federal funds under FTA's Urbanized Area Formula Grants to develop safety plans that include the processes and procedures to implement Safety Management Systems (SMS).

The final rule outlining PTASP requirements states that the PTASP must follow a "Safety Management Systems" (SMS) approach. Each safety plan must be signed by the highest executive in the agency, an operator's Accountable Executive, like the accountability to the OSHA's Injury and Illness Prevention Plan and be approved by the Board of Trustees. The rule requires each

operator to certify compliance with these requirements through its annual review. FTA will use its existing Certifications and Assurances process for this effort. FTA intends to use its triennial oversight review programs to assess compliance with the requirements of the rule. Failure to comply with a requirement of the rule subjects a grantee to a range of FTA enforcement options depending upon the circumstances, including a transit operator being ineligible to receive FTA grant funds until the operator satisfies the requirements of the rule.

The required components of the SMS approach incorporated into GoTriangle's Agency Safety Plan are listed below:

1) Safety Management Policy (Plan)
   Establishes agency's objectives while identifying the roles and responsibilities of agency personnel.
   a) A written policy statement establishing:
      1. Organizational accountabilities
      2. Safety responsibilities
      3. Confidential employee reporting program
      4. Designation of the Accountable Executive and SMS Executive
   b) Agency's Safety Objectives

2) Safety Risk Management (Process)
   Delineates the protocols used to adhere to the PTASP.
   a) Safety Risk Management
   b) Safety Hazard Identification
   c) Safety Risk Assessment
   d) Safety Risk Mitigation
   e) Minimize Exposure to Hazards/Unsafe Conditions
   f) Annual Review/Update of PTASP

3) Safety Assurance (Culture)
   Based on the safety performance criteria standards set out in the National Public Transportation Safety Plan.
   a) Safety Performance Monitoring/Measurement
   b) Performance Targets

4) Safety Promotion (Foundation)
   a) Assignment of Chief Safety Officer or SMS Executive
   b) Safety communications
   c) Safety Training Program Implementation
   d) Supporting Documentation

Safety Training & Communication

The PTAS Plan rule requires Safety Promotion, specifically a staff training program. A comprehensive safety program for all agency employees and contractors who are directly responsible for safety must be implemented by the transit agency. The agency must also communicate safety information throughout the agency's organization that:

1. Conveys information on hazards and safety risks, and
2. Informs employees of safety actions taken in response to reports submitted through an employee safety program.

Attachments
- GoTriangle Agency Safety Plan
- Resolution adopting safety plan

Staff Contact
- Patrick Stephens, Chief of Operations, (919) 485-7456, pstephens@gotriangle.org

GoTriangle Agency Safety Plan

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FIGURES

TABLES

1) **TRANSIT AGENCY INFORMATION**

Transit Agency Name	GoTriangle Transit Authority
Transit Agency Address	4600 Emperor Boulevard, Suite 100, Durham, NC, 27709
Name and Title of Accountable Executive	Charles E. Lattuca, President and Chief Executive Officer
Name of Chief Safety Officer or Safety Management System Executive	Jimmy L. Price, Chief Safety Officer and Manager of Safety, Security and Training

Mode(s) of Service Covered by This Plan	Fixed Route Bus; Paratransit; and Vanpool	List All FTA Funding Types	5307, 5339

Mode(s) of Service Provided by the Transit Agency (Directly operated or contracted service)	Bus, directly operated (DO), and contractor operated, under GoTriangle, Contract Number GoTriangle 08-050 and GoTriangle18-054; Paratransit Service, Directly Operated (DO); and Vanpool contractor operated, under GoTriangle, Contract Number GoTriangle 17-066.
Does the agency provide transit services on behalf of another transit agency or entity?	Not applicable
Name and Address of Transit Agency(ies) or Entity(ies) for Which Service Is Provided	Not applicable

GoTriangle addresses all applicable requirement and standards as set forth in FTA's Public Transportation Safety Program and the National Public Transportation Plan

2) **PLAN DEVELOPMENT, APPROVAL AND UPDATES**

Name of Person Who Drafted This Plan	Jimmy Price, Chief Safety Officer and Manager of Safety, Security, and Training	
Signature by the Accountable Executive	Signature of Accountable Executive	Date of Signature
	Chief Executive Officer	
	GoTriangle Transit Board of Trustees	Date of Approval
Approval by the Board of Directors or an Equivalent Authority	Resolution # _____	
	Relevant Documentation (title and location)	
	A copy of Resolution # _____, approving the Agency Safety Plan, is maintained on file by the Chief Safety Officer.	

Version Number and Updates			
Version Number	Section/Pages Affected	Reason for Change	Date Issued
1		New Document	

Annual Review and Update of the ASP

The Accountable Executive holds GoTriangle's management and committees accountable for compliance with the processes and procedures detailed in the Agency Safety Plan (ASP) to ensure adequate safety performance and fulfill requirements of the Public Transportation Agency Safety Plan (PTASP), Regulation (49 CFR Part 673). The Chief Safety Officer will coordinate the annual review of the ASP that reflects changes in the bus system, equipment, facilities or the organization. GoTriangle departments will be notified by June 1 each calendar year (CY) that they must review ASP sections applicable to their department function to ensure that the ASP aligns with their processes. GoTriangle departments must evaluate proposed changes, and if warranted, submit comments to the Chief Safety Officer by July 1 of each year.

The Chief Safety Officer will incorporate departmental comments in the ASP and then conduct a final review and update with the Director of Transit Operations by September 1 each year. The Accountable Executive will sign any changes, then forward the ASP to the Board of Trustees for approval by December 1 of each year. By February 1 the following year, GoTriangle's safety performance targets (SPT) are made available

to local Metropolitan Planning Organizations (MPOs). This information is intended to aid in the planning process and, to the maximum extent practicable, coordinate with the State and Metropolitan Planning Organization to select relative safety performance targets. GoTriangle will make the agency's SPTs available to North Carolina Department of Transportation (NCDOT) and the MPOs via this safety plan by February 1 of each year.

Figure 1: Annual ASP Review

June 1 — CSO notifies departments that they must review ASP sections applicable to their function

July 1 — Departments submit comments to the CSO

September 1 — CSO incorporates departmental comments then conducts a final review and update with Director of Transit Operations

December 1 — Accountable Executive signs and approves changes, then forwards the ASP to the Board of Trustees for approval

February 1 — GoTriangle's safety performance targets are made available to local Metropolitan Planning Organizations (MPOs) and North Carolina Department of Transportation (NCDOT)

GoTriangle may need to modify this ASP outside of this annual review cycle. Within (30) calendar days of a modification request, the Chief Safety Officer and Employee Safety Committee will review the modifications; then the Chief Safety Officer will present the modification request to the Safety Management System Committee (SMSC), then to the Accountable Executive will receive the modified plan for review and signature. The Accountable Executive will then forward the modified plan to the Board of Trustees for approval.

3) SAFETY PERFORMANCE TARGETS (SPT)

The objectives of the ASP are the means to achieving GoTriangle's safety performance target goals. They also provide a method of evaluating the effectiveness of GoTriangle's safety efforts. GoTriangle has established safety performance targets that are realistic, measurable, and data-driven to meet our safety objectives. GoTriangle will proactively manage safety hazards and their associated safety risks, with the intent to eliminate unacceptable safety risks or try to mitigate hazards as low as reasonably practical. Safety performance targets are based on the safety National Public Transportation Safety Plan's safety performance measures, January 2017. The safety performance measures selected by FTA are intended to provide "state of the industry" high-level measures and help GoTriangle focus on the development of specific performance indicators and measurable targets relevant to the operations. See Appendix B for annual performance targets and results.

Performance Target Goals

Fixed Route

3.1 Fatalities: Total number of reportable **fatalities** and rate per total vehicle revenue miles (VRM) by mode.
- GoTriangle strives to maintain 0 total fatalities.
- GoTriangle target is to maintain a 0.0 rate of fatalities per 100,000 total vehicle revenue miles.

3.2 Injuries: Total number of reportable **injuries** and rate per total vehicle revenue miles (VRM) by mode.
- GoTriangle strives not to exceed 3 total reportable injuries.
- GoTriangle target is to maintain its reportable injuries rate per 100,000 total vehicle revenue miles.

3.3 Safety Events: Total number of reportable **events** and rate per total VRM by mode.
- GoTriangle strives not to exceed 3 total reportable events.
- GoTriangle target is to maintain its reportable events rate per 100,000 total vehicle revenue miles.

3.4 System Reliability: **Mean distance** between mechanical failures by mode.
- GoTriangle strives to maintain 25,577 mean distance miles between major mechanical failures.
- GoTriangle target is to increase its mean distance miles between major mechanical failures by five percent.

Non-Fixed Route

3.5 Fatalities: Total number of reportable **fatalities** and rate per total vehicle revenue miles (VRM) by mode.
- GoTriangle strives to maintain 0 total fatalities
- GoTriangle target is to maintain a 0.0 rate of fatalities per 100,000 total vehicle revenue miles.

3.6 Injuries: Total number of reportable **injuries** and rate per total vehicle revenue miles (VRM) by mode.
- GoTriangle strives not to exceed 3 total reportable injuries.
- GoTriangle target is to maintain its reportable injuries rate per 100,000 total vehicle revenue miles.

3.7 Safety Events: Total number of reportable **events** and rate per total VRM by mode.

- GoTriangle strives not to exceed 3 total reportable events.
- GoTriangle target is to <u>maintain</u> its reportable events rate per 100,000 total vehicle revenue miles.

3.8 System Reliability: **Mean distance** between mechanical failures by mode.
- GoTriangle strives to maintain 99,902 mean distance miles between major mechanical failures.
- GoTriangle target is to increase its mean distance miles between major mechanical failures by five percent.

GoTriangle's goal is to improve its safety performance targets listed above throughout CY2021 ending on December 31, 2021.

Safety Performance Target Coordination		
GoTriangle's Accountable Executive shares its ASP, including safety performance targets with MPO's annually, after its formal adoption by the GoTriangle Board of Trustees to coordinate of efforts to aid in the planning process for both local and state levels. GoTriangle's Accountable Executive also provides a copy of our formally adopted plan to the North Carolina Department of Transportation.		
Targets Transmitted to the State	State Entity Name	Date Targets Transmitted
	NC Department of Transportation	
Targets Transmitted to the MPO	MPO Name	Date Targets Transmitted
	Capital Area Metropolitan Planning Organization (CAMPO)	
	Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC)	

4) SAFETY MANAGEMENT POLICY

4.1 GoTriangle Safety Management Policy Statement

Commitment: Ultimate responsibility for the safety at GoTriangle rests with the President and Chief Executive Officer (CEO). The responsibility for making operations safer lies with everyone – from executive management to frontline employees. As documented in our ASP, we commit to developing, implementing, maintaining, and continuously improving processes to ensure the safety of our system, employees, and the public we serve. Each manager is responsible for implementing the Safety Management System (SMS) in their area of responsibility. They are held accountable for taking an active role in communicating the Safety Management Policy, following the Safety Risk Management Process, ensuring that Safety Assurance (monitoring and measuring) activities are adequately supported, and achieving Safety Promotion through communication and training employees and contractors. We maintain an active Safety Management System (SMS) that encourages the open sharing of information on all safety issues throughout our organization.

Core Value: Safety is more than a priority, it is an embodied core value of GoTriangle, and we are committed to developing, implementing, and maintaining the Safety Management System (SMS) as one of our critical business functions, and will use the safety risk management process as a management tool for the continuous improvement of safety for our system, employees, and the public we serve. In balance with achieving the highest safety performance level, no employee will be asked to compromise safety for "on-time performance or getting the job done". GoTriangle will clearly define authorities, accountabilities, and responsibilities to deliver its safety performance and an effective Safety Management System.

Safety Culture: GoTriangle commits to developing its culture built upon safety, starting with one employee at a time. The Accountable Executive expects the senior management team to take the lead in developing a strong culture of safety as a way of thinking in all our safety activities and acknowledge that safety is paramount.

4.2 Responsibilities and Accountabilities for Safety

To remain consistent with the top-down, organization-wide nature of SMS, our Executive Management and Board of Trustees will ensure that organizational resources are prioritized and allocated to further this commitment and achieve the highest transit safety performance level. Management must have access to the information necessary to strategically deploy resources based on identified safety concerns, establish and support accountability for safety decision-making, and address unacceptable safety risk to a level as low as reasonably practical.

Our overall safety objective is to proactively manage safety hazards and their associated safety risks, with the intent to eliminate unacceptable safety risks in our transit operations. To that end, we will continuously examine our operations for hazards. As required by the Federal Transit Administration, we have set annual safety performance targets to measure our transit service's safety. To address our overall safety objective, we have established mandatory and voluntary employee safety reporting programs. We will conduct training sessions with all frontline, supervisory, and management personnel during this calendar year.

4.3 Safety Objectives

GoTriangle has established a set of safety objectives to assess our safety performance and the effectiveness of our SMS. Our objectives include the following:

- Promoting a robust culture in safety;
- Ensuring that employees charged with implementing the agency's SMS processes, methods, and activities are adequately trained and only assigned tasks commensurate with their skills and experience;
- Continuously examining our operations for hazards through active employee reporting and review analysis of data;
- Investigating all accidents, incidents, near misses, and identifying hazards and documenting the root causes to implement corrective action to prevent a recurrence; and
- Providing GoTriangle employees and contractors with formal and ongoing SMS communications.

Quarterly Progress Report

Each quarter, the Chief Safety Officer will report to our entire agency how well we are meeting our safety objectives. We will review and update these objectives as needed each year.

Signatures

As required by 49 CFR Part 673 and Section 4 of this document, GoTriangle's ASP, which describes our agency's commitment to continuously monitoring, measuring, and improving safety performance, has been approved by the Board of Trustees and endorsed by the Chief Executive Officer.

Charles E. Luttuca, President and Chief Executive Officer, and Accountable Executive	
Chair, Board of Trustees	

4.4 Safety Management

GoTriangle has established accountabilities and responsibilities for its SMS, and our Accountable Executive has issued a written Safety Management Policy (SMP) statement that includes GoTriangle's safety objectives.

The Chief Safety Officer, who leads GoTriangle's SMS activities, ensures the SMP statement is distributed via electronic or hard copy to all employees and contractors. GoTriangle conducts an annual Agency Safety Plan review meeting to discuss safety issues and timeline to submit considerations for modification to the plan. We begin this annual activity by reviewing the SMP statement and management's commitment to our system's safety.

The Chief Safety Officer also ensures the SMP statement is readily available to all executives, directors, managers, supervisors, administrative, and frontline employees for additional posting and mail-outs. The Chief Safety Officer prepares and disseminates quarterly reports documenting how GoTriangle meets

the safety objectives outlined in the SMP statement. The results of these reports are written in GoTriangle's newsletter. GoTriangle also posts copies of the SMP statement and quarterly reports on electronic communication boards, information bulletin boards at GoTriangle's headquarters building, and all operations and maintenance break areas at each of the operating divisions. The SMP statement and quarterly reports are also distributed during new hire training and orientation.

Should the SMP statement be updated during the year, the Chief Safety Officer will redistribute it throughout the agency following the same protocols to ensure it is provided to all employees and contractors. GoTriangle also communicates organizational accountabilities and responsibilities described in the section below. The Safety Promotion section of this ASP outlines additional mechanisms and processes available to support GoTriangle's SMP statement of communicating information to employees.

4.5 Authorities, Accountabilities and Responsibilities

Accountable Executive (AE)

GoTriangle's President & Chief Executive Officer (CEO) is designated as the Accountable Executive (AE). The AE will work with the Chief Safety Officer (CSO) and the executive management team to adjust the ASP as needed based on, but not limited to, the strategic plan initiatives, safety performance targets, employee feedback, accident-incident trends, and data analysis. The AE is vested with the primary responsibility for the GoTriangle's safety activities and overall safety performance.

The Accountable Executive has the following authorities, accountabilities, and responsibilities under this plan:

- Signs this ASP as the Accountable Executive and is ultimately responsible for carrying out GoTriangle's ASP and SMS;
- Delegates an adequately trained Chief Safety Officer who is a direct report with the responsibility and authority for the day-to-day implementation of the ASP;
- Sets the agenda and facilitates the Safety Management System (SMS) into the cooperative decision-making processes of the senior management team;
- Controls and directs the human and capital resources necessary to achieve ASP goals and objectives by exercising the approval authority for system modifications as warranted;
- Ensures that GoTriangle's SMS is effectively implemented throughout the system;
- Provides employees with the tools and training needed to be successful and safe in their roles;
- Monitors GoTriangle's safety performance;
- Accepts safety risk associated with hazards or mitigates unacceptable safety risk to a level as low as reasonably practical;
- Ensures that SMS is effectively implemented, and action is taken, as necessary, to address any degradation in safety performance at GoTriangle; and
- Issues the annual SMP statement and safety objectives.

Chief Safety Officer (CSO)

While the AE is ultimately accountable for the safety performance of GoTriangle, the authority and responsibility for managing the day-to-day implementation and operation of GoTriangle's SMS is delegated to the CSO. The CSO holds a direct line of reporting to the AE to enforce strategy, policy, and goals for maintaining safety for employees, passengers, contractors, and the general public. All departments have been notified of the CSO's role and the established reporting requirements relating to safety-related matters.

The Chief Safety Officer has the following authorities, accountabilities, and responsibilities under this plan:

- Develops GoTriangle's ASP and SMS policies and procedures;
- Adequately trained to facilitate full implementation of the SMS across the agency and oversees GoTriangle's day-to-day operation to identify hazards and mitigate risk through evaluation, feedback, and analysis;
- Ensures GoTriangle's policies are consistent with its safety goals and objectives;
- Develops and maintains SMS documentation;
- Monitors the safety performance of GoTriangle's operations and activities through formal safety management data collection and analysis;
- Manages GoTriangle's Employee Safety Reporting Program;
- Ensures personnel that submitted voluntary reports are notified and informed about the disposition of the report;
- Chairs the GoTriangle Safety Management System Committee, Employee Safety Committee, Accident and Incident Review Committee, and coordinates the following activities of the committee:
    - Coordinates the activities of the committee with other members;
    - Develops agendas and sets topics for discussion; and
    - Maintains and distributes minutes of committee meetings.
- Develops and distributes a quarterly report on GoTriangle's process in its safety objectives specified in the SMP statement;
- Advises the Accountable Executive and senior management on safety matters and SMS implementation progress;
- Identifies substandard performance in GoTriangle's SMS and develops action plans for review and approval by the Accountable Executive;
- Manages and updates SMS processes based on experiences and lessons learned throughout the year;
- Provides additional guidance material (as required) to strengthen further and clarify the SMS processes;
- Supports GoTriangle departments in managing safety risk by providing Safety Risk Management (SRM) expertise and conducting and overseeing Safety Assurance activities;
- Facilitates coordination of SRM, evaluations, investigations, and controls with particular attention to cross-organizational impacts;
- Tracks all safety-critical issues to a conclusion using the safety risk register; and
- Oversees and assists all departments in establishing and maintaining clear and unambiguous lines of authority and responsibility for ensuring safety measures and procedures are in place for meeting safety performance targets.

Along with CSO responsibilities, the CSO is also the Manager of Safety, Security, and Training.

The Manager of Safety, Security, and Training supports the Chief Safety Officer and serves as the SMS Manager for Transit Operations Department. Overseeing the management of the Transit Operation's safety risks is a core responsibility. The Manager of Safety, Security, and Training has the following authorities, accountabilities, and responsibilities under this plan:

- Development and implementation of the SMS processes for Transit Operations in accordance with GoTriangle's SMS and PTASP requirements;
- Delivery of SMS Training to Transit Operations personnel;
- Development and implementation of SMS Worksheets and tools in accordance with GoTriangle's SMS;
- Ensuring Job Hazard Analyses are performed for "high/medium risk" tasks;
- Reviewing identified safety risks to verify the risks are adequately prioritized using the established Risk Matrices;
- Collection and management of Safety Risk Data;
- Ensuring Transit Operations director is informed of Safety Risks categorized to be outside GoTriangle's Risk Tolerance;
- Ensuring the Director and Chief Safety Officer are notified of all unacceptable risks that require additional resources to sufficiently reduce the risk to as low as reasonably possible (ALARP);
- Fostering a positive safety culture by leading with integrity in the SMS;
- Establishing and Managing methods to collect and analyze safety risk data; and
- Co-Chair Safety Committee meetings.

Agency Leadership and Executive Management
GoTriangle Agency Leadership and Executive Management have authorities and responsibilities for the day-to-day implementation and operation of GoTriangle SMS as it applies to their respective business units. Also, they support system-wide SMS implementation as requested by the Chief Safety Officer and Safety Committee.

Executive Management include staff who reports directly to the Accountable Executive:

Executive Management

- Chief Financial Officer,
- Chief Operating Officer,
- Chief Talent Officer,
- Chief Development Officer,
- Chief Communications Officer, and
- Director of Equal Employment Opportunity and manager of the Disadvantage Business Enterprise

GoTriangle's Executive Management staff have the following authorities, accountabilities, and responsibilities in this plan:

- Supports the AE in fulfilling the Agency's overall responsibilities for SMS;
- Participates in the decision-making on managing safety risk and allocating safety resources and coordinate with department heads to identify safety resources needed to accomplish safety objectives identified in the SMP statement and address substandard performance in the SMS;
- Monitors SMS safety performance against established safety performance targets;

- Participates in Senior Management meetings to discuss resource allocation and safety risk tolerability;
- Completes training on SMS Executives and GoTriangle's ASP elements;
- Oversee day-to-day SMS operations in their departments;
- Modifies safety policies in departments to make consistent with the implementation of the SMS and other safety regulations; and
- Supports the AE commitment to safety by setting an example for employees.

Agency Leadership

- Director of Transit Operations,
- Director of Regional Partnerships,
- Director of Capital Development, and
- Director of Facilities and Real Estate

GoTriangle Agency Leadership personnel have the following authorities, accountabilities, and responsibilities in this plan:

- Oversee day-to-day SMS operations in their departments;
- Coordinating with the Safety Department on the implementation of SMS in their respective departments and providing subject matter expertise as requested;
- Upholding and promoting safety policies, safety risk management, safety assurance, and safety training and communication protocols;
- Facilitating safety performance measures and targets;
- Fostering a strong safety culture within their department;
- Identifying the necessary funds to meet the safety performance requirements and incorporate them into budgeting plans, prioritizing and allocating expenditures according to safety risk;
- Safety performance within their functional areas;
- Ensuring procedures are consistent with the SMS;
- Determining and implementing countermeasures required to counteract safety risks and manage issues that negatively impact GoTriangle safety performance;
- Ensuring that all employees are trained in SMS;
- Supporting and requiring employees within their department to participate in safety training activities;
- Integrating SRM into existing processes;
- Requiring that all relevant safety information is communicated and used in decision-making;
- Ensuring that all system changes are coordinated, documented, and go through the SRM & SA process; and
- Cooperating with and providing support for evaluations and audits conducted.

Key Staff and Activities

GoTriangle's Key Staff includes those positions that directly oversee GoTriangle's Operating Divisions, Dispatch Office, Maintenance, Facilities, as well as Training and Procurement Departments. Key staff directly operates and ensure actions are taken to reduce risk, and the whole system is continuously monitored to ensure actions are effective and appropriate. GoTriangle's key staff will be involved with updates, modifications, and implementation of the ASP. Each staff member brings a valued perspective to the development of policies and procedures they will be expected to implement. Every opportunity

will be given for employees and riders to provide input to increasing safety at GoTriangle. Those opportunities include monthly safety meetings, employee meetings and training, department meetings, customer and employee surveys, and an open-door policy with access to all management staff.

Key Staff Positions

- Operations Manager,
- Paratransit Manager,
- Manager of Fleet Maintenance,
- Manager of Safety, Security, and Training,
- Facilities Manager,
- Human Resources Manager,
- Procurement Manager,
- Quality Assurance Manager, and
- Construction Manager

Specific authorities, responsibilities, and accountabilities for Key Staff under this plan include, but are not limited to, the following:

- Reports safety concerns of departments to senior management staff that takes strategic directions from the Accountable Executive;
- Complete training on SMS and GoTriangle's ASP elements.
- Oversee day-to-day operations of the SMS in their departments.
- Provide subject matter expertise to support SMS implementation requested by the Accountable Executive and Chief Safety Officer, including SRM activities, investigation of safety events, development of safety risk mitigations, and monitoring mitigation effectiveness.
- Complying with SMS programs and processes;
- Supporting development, implementation, and operation of GoTriangle's SMS;
- Maintaining documents that support SMS implementation;
- Reviewing and investigating employee reports, in coordination with the Chief Safety Officer and SMSC, and documenting results in GoTriangle's safety reporting system; and
- Verifying compliance with safety requirements and reporting deviations to the Safety Department.

Agency Safety Committees

The SMS is represented on various committees to facilitate the identification of hazards, the proper resolution of safety issues, and the distribution of safety information. These include:

- Safety Management System Committee (SMSC) (management level);
- Employee Safety and Committee (ESC) (frontline level); and
- Accident and Incident Review Committee.

Each of these committees are briefly described below.

Committee Members

Each committee has a Chairperson, assigned by the Accountable Executive. The Chairperson is responsible and accountable for conducting meetings, establishing an agenda and selecting the meeting's time and place. The Chairperson sends out meeting notices monthly and is responsible and accountable for producing and retaining all committee documentation. This includes documenting meetings and creating meeting minutes, maintaining files, and posting minutes. All committee documentation is retained electronically for a minimum of three years.

Each committee includes a member of the Safety Department. This person is responsible for bringing injury documentation to the monthly meetings and leading safety inspections. Safety Committees also include management and employees. Committee membership is an option for any staff member. All members of the Safety Committees are trained in hazard identification and fundamental safety risk management principles.

Meetings are held at least quarterly and may include program reviews, injury reviews, and reviews of employee concerns. All decisions involving change are voted on by the committee members. The committee may elect to raise issues to the attention of the management-level (Safety Management System Committee).

Facility inspections may be conducted instead of a regular committee meeting. All members of the Safety Committee can be part of the inspection team.

Employees may, verbally or in writing, share a safety/security concern with a Safety Committee member who will bring the concern to the committee's attention. Any Safety Committee member can bring employee concerns to the Safety Committee. If the Committee members believe that an employee concern has identified a hazard that might result in immediate injury to any employee, he/she may contact their Supervisor or a member of the Safety Department. All other committee members are responsible for reporting employee concerns and hazards, providing recommendations to mitigate hazards, and participating in facility inspections.

Safety Management System Committee

The SMSC is GoTriangle's highest-level safety committee and is chaired by the GoTriangle's Chief Safety Officer. The Chief Operating Officer alternately chairs the committee. The SMSC is comprised of GoTriangle executives and senior leadership team, key staff, employees, and meets quarterly, or as needed, to review reports on safety, accident trends, major accidents, urgent/safety critical concerns or hazards, internal/external audit findings, certification recommendations, items referred from the Employee Safety Committee (ESC), and other items of concern to the SMSC for comment, direction, resolution, and execution. Minutes are maintained and disseminated to members of the committee. The final results of these meetings are communicated within GoTriangle as a whole through SMS monthly or quarterly publications.

GoTriangle has established a SMSC to support and oversee the implementation of our SMS and to promote interagency coordination, transparency, and action. Members of this committee are subject matter experts (SME) appointed by the Accountable Executive and include the following:

- Chairman – Chief Safety Officer
- Member – Chief Operating Officer
- Member – Director of Transit Operations
- Member – Transit Service Supervisor
- Member – Operations and Paratransit Managers
- Member – Bus Operator III

- Member – Manager of Fleet Maintenance
- Member – Facilities Manager
- Member – Mechanic Level III
- Member – Bus Training Coordinator
- Member – Quality Assurance Manager
- Member –Training and Development Manager
- Member – Human Resources Manager
- Member – Procurement Manager

The SMSC meets quarterly (or as needed) and has the following responsibilities:

- Reviews the timely collection of information related to hazards, potential consequences, and safety events;
- Reviews reported hazards and support the analysis of hazards;
- Monitors and analyzes trends in hazards and safety events;
- Monitors and evaluates the effectiveness of mitigations implemented to address assessed safety risk and reports findings to the Accountable Executive;
- Monitors and evaluates the effectiveness of corrective actions implemented to address non-conformances and to prevent the recurrence of safety events, and reports findings to the Accountable Executive;
- Monitors industry data and reports from FTA, NCDOT, and oversight authorities, industry associations, and manufacturers and other vendors;
- Determines the adequacy of the training provided to the individuals responsible for maintenance, operations, and other personnel who are assigned duties related to the SMS; and
- Supports day-to-day implementation and operation of GoTriangle's SMS.

Employee Safety Committee (ESC)

Employee Safety Committee (frontline level) – The purpose of this committee is to bring management and Department employees together to discuss the SRM process, review trends, and analysis, and discuss safety concerns (at a minimum) to achieve and maintain a safe, healthful workplace environment. All safety hazards reported are jointly evaluated by the ESC are reviewed by the Chief Safety Officer during monthly meetings. This committee is composed of management, and department employee representatives whose duties include monitoring, developing, and reviewing safety issues and practices for all employees. Committee members investigate and assist in the resolution of safety issues. Meetings are held monthly, and members are selected annually.

The ESC meets monthly and has the following responsibilities:

- Chairman–Chief Safety Officer
- Member–Customer Service
- Member–Maintenance
- Member–Paratransit
- Member–Operations
- Member–Facilities
- Member–Safety
- Member–Administrative
- Non-employee Members–Departments

Accident and Incident Review Committee

In compliance with GoTriangle's Accident Investigation Procedures, GoTriangle's Accident and Incident Review Committee reviews the results of GoTriangle accident and incident investigations and makes final determinations regarding preventability, causal factors, and discipline. GoTriangle's Accident and Incident Review Committee consists of seven members that represent Management, Employees, Operations, and Maintenance. The Chief Safety Officer chairs the committee.

All committee documentation is stored on the shared (S) Drive\ASP\SMS folder\documents\safety committee

4.6 Employee Safety Reporting Program (ESRP)

The purpose is to establish an Employee Safety Reporting Program (ESRP) is a fundamental source for employees reporting safety concerns and hazard identification. As stated in the Safety Management Policy Statement, GoTriangle is determined to provide a safe working environment for its employees, passengers, and the general public. To ensure success, GoTriangle has developed an ESRP to enable employees to report any safety risk or perceived risk to a safety committee member, supervisor, CSO, or a member of senior management staff. This commitment provides appropriate senior management involvement with the necessary resources to establish an effective employee safety reporting program as a viable tool for employees to voice their safety concerns to the highest level of the organization; and will ensure no disciplinary action are being taken against any employee who communicates a safety concern through the ESRP unless such disclosure indicates, beyond any reasonable doubt the following:

- An illegal act;
- Gross misconduct and/or negligence; and
- A deliberate or willful disregard of GoTriangle's rules and procedures.

GoTriangle's frontline personnel are our best source of information on safety hazards throughout our system. Nobody knows more about the transit system's actual safety performance than the employees who deliver the service.

The ESRP allows each employee to report detailed information and observations whether they are drivers in service, maintenance staff, or other on-duty employees. This program dovetails with other methods currently in place to proactively identify hazards. Those methods include but are not limited to, the following:

- Pre/Post Trip Inspections
- Preventive Maintenance Inspections
- Employee Evaluations
- Facility Maintenance Inspections
- Service Planning and Employee Committee (SPEC)
- Training Ride-Alongs
- Rider and Public Complaint/Compliment Process
- Safety and Employee Meetings
- Incident/Accident Trends Analysis
- Safety Committee

To collect information critical to the safety of our operations, GoTriangle uses two types of employee reporting:

- **Mandatory**: As specified in GoTriangle's Bus Operations, Paratransit and Maintenance Work Rules and Procedures Manual, GoTriangle's Safety Policy, and Near-Hit Reporting Program, employees must report certain information related to the occurrence of safety events and non-compliance with safety rules.
- **Voluntary**: For all other situations, GoTriangle encourages its employees to report any safety condition, safety concern, or safety issue in good faith to their supervisor or senior management without fear of discipline, reprisal, or penalty. GoTriangle offers employees several different methods for reporting, and reports can be made anonymously.

Mandatory Safety Reporting

GoTriangle requires its employees to report the occurrence of safety events meeting the thresholds specified in section 617 of GoTriangle's Bus, Maintenance, and Paratransit Operations Departmental Work Rules and Procedural Manual, 2019, and the Accident Investigation Program. This includes safety events as defined in the Accident Investigation Program and FTA's PTASP regulation, §673.5.

GoTriangle requires employees to immediately report these events via radio, when possible, to the Dispatch Office or the first available supervisor if radio contact is not an option. All employees must fill out GoTriangle's Employee Accident-Incident Form as soon as possible and provide information to support GoTriangle's event investigation process, as necessary.

GoTriangle employees also must report non-compliance with safety rules identified in the Work Rules and Procedures Manual and the Accident Investigation Program. If an employee fails to report or reports false information regarding non-compliance with these safety rules, GoTriangle may take disciplinary action. Reports must be made to the employee's supervisor immediately following the event or by no later than the end of shift.

In cases of an employee self-reporting non-compliance with safety rules identified in the Accident Investigation Program, GoTriangle may consider a non-punitive response. Any discipline will be determined on a case-by-case basis by the department heads with the assistance of the Safety and Training Department, in coordination with the Accident and Incident Review Committee.

Voluntary Employee Safety Reporting Program

To maximize available safety information and ensure that safety concerns are reported freely and without prejudice, GoTriangle has established a process through which employees and contractors can report safety conditions, unsafe acts/practices, and/or near-miss incidents without fear of discipline, reprisal or penalty. Examples of the types of information reported include:

- Safety hazards in the operating environment (for example, bus route, facilities or city road conditions)
- Policies and procedures that are not working as intended (for example, insufficient time to complete pre-trip inspection)
- Events that senior managers might not otherwise know about (for example, near misses in a bus garage or bus lot)
- Information about why a safety event occurred (for example, radio communication challenges between dispatchers and operators)

Acceptable means of reporting safety conditions include:

- Emailing report to GoTriangle's Safety Department at safetyreporting@GoTriangle.org (anonymous or voluntarily)
- Completing the Near-Miss Report Form and placing the form in the safety collection box at the employees' work facility or emailing the form to GoTriangle's Safety Department at safetyreporting@GoTriangle.org.
- Submitting Operator Comment on Post Trip Inspection Form (mechanical issues, damage, defects).
- Submitting Facility Maintenance concerns on the Facility Maintenance Repair Form (building, bus lot, restrooms, heating, and air-conditioning).
- Notifying Operations Bus/Paratransit Dispatch on bus route or service area safety concerns (environmental, road hazards, vehicle safety hazards).
- Providing verbal or email notification to the Chief Safety Officer, managers, supervisors, or senior management.

GoTriangle's Accountable Executive is responsible for ensuring protections for employees who report safety conditions to senior management. GoTriangle provides employees who voluntarily report safety conditions in good faith with protections from any form of discipline, retribution, or penalty, consistent with State and Federal guidelines and regulations.

When requested, employees providing information related to safety conditions will be kept anonymous and protected from discipline, retribution, or penalty to the extent permissible by law.

While GoTriangle places a very high value on employees reporting important safety information, in cases where the reporting employee engaged in an illegal act, committed gross negligence, or deliberately or willfully disregarded regulations or procedures, GoTriangle reserves the right to pursue disciplinary action in accordance with current GoTriangle policy.

Under the Chief Safety Officer's direction, the Safety Department leads the collection, analysis, resolution, and monitoring of safety conditions and feedback through the voluntary ESRP. The Safety Department ensures employee reports are entered into the safety information system worksheet and reviews these reports with the SMSC during quarterly meetings or as needed. The Safety Department also maintains documentation of the policies and specific protocols related to the ESRP. Safety reports are stored electronically, for a minimum of three years, and in hard copy format for future review, trending, and analysis.

Voluntary ESRP Process

The following steps outline GoTriangle's voluntary ESRP process. More information is available in GoTriangle's Voluntary Employee Safety Reporting Procedures:

- Employee or contractor submits a safety report.
- The Safety Department personnel formally records the report on the safety incident reporting worksheet as soon as possible. The safety personnel acknowledges its receipt to the reporter, if possible (i.e., the reporter is not anonymous).
- The Safety Department initially reviews the report to determine if:
  - Further immediate action must be taken to prevent harm;
  - The report is complete, or further information is needed; or
  - The safety concern or issue requires further investigation.

- When additional information is needed, and the report is not anonymous, the Safety Department follows up with the reporter. For anonymous reports, the Safety Department may follow up with supervisors or GoTriangle's subject matter experts.
    - Further investigation may lead to identifying hazards and potential consequences and the determination that the reported safety condition must go through GoTriangle's SRM process.
    - Employee reports focused on reported deficiencies and non-compliance with rules or procedures will be forwarded to appropriate management personnel for resolution through the Safety Assurance process and tracking through the safety incident reporting worksheet.
- For employees providing their contact information:
    - Safety Department staff will provide specific verbal or written feedback on employee reports through the GoTriangle's SRM process and employee reports where monitoring was implemented, or no further action was taken.
    - CSO or management personnel will report back to employees regarding actions taken through the Safety Assurance process will take place to address reported deficiencies and non-compliance with rules or procedures.
    - Records of communication with reporting employees will be documented on GoTriangle's safety incident reporting worksheet.
- The Safety Department prepares a monthly report for the Employee Safety Committee to review the voluntary ESRP reports and actions taken to address them. The ESC also supports the investigation and resolution of reports.
- The SMSC prepares and delivers a quarterly report for the Accountable Executive summarizing the results of the voluntary ESRP (including resolutions and the status of reports) and offering recommendations, as appropriate from reports placed on the safety risk register.

GoTriangle's contracted services contractors that receive 5307 funds are required per FTA 673 to have a formal ESRP. GoTriangle's Chief Safety Officer will perform an on-site visit and review the contractor's ESRP communication, monitoring of the contractor's ESRP methods for effectiveness to ensure that it meets program requirements established by GoTriangle's ASP. GoTriangle's Chief Safety Officer, in coordination with GoTriangle's Director of Regional Partnerships will review contractor's documentation of employees' safety concerns and mitigation results in a formal report submitted quarterly or as needed to GoTriangle's Safety Department.

5) SAFETY RISK MANAGEMENT

5.1 Safety Risk Management Process

Safety Risk Management (SRM) is a formalized, proactive approach for driving GoTriangle's continuous safety efforts. SRM provides the structural elements and guides program development necessary to ensure hazardous conditions are identified, assessed for risk level and safety risk is mitigated to an acceptable level, throughout GoTriangle's operations.

GoTriangle uses the SRM process, which describes Safety Hazard Identification, Safety Risk Assessment, and Safety Mitigation, to address system changes to ensure the safety of our operations, passengers, employees, contractors, vehicles, and facilities. The SRM process identifies hazards and their potential consequences are identified, assessed for potential safety risks, and resolved As Low As Reasonably Practicable (ALARP) and acceptable to GoTriangle's executive decision-making team responsible for allocating resources. This does not mean the elimination of all safety risks. The SRM process provides GoTriangle with a tool to determine what can harm the system and we have to taken the necessary precautions to minimize harm and assess if future mitigations are needed. GoTriangle's SRM process

results are documented in our Safety Risk Register in GoTriangle's safety information system and are maintained for a minimum of three (3) years.

GoTriangle's Accountable Executive has appointed the Chief Safety Officer to lead the SRM process and will work closely with the Safety Committees to identify hazards and consequences, assess potential consequences of the hazard, and mitigate the risk if necessary.

GoTriangle's Chief Safety Officer leads GoTriangle's SRM process, with support from GoTriangle's Safety Department and ensures that trained safety personnel work with GoTriangle's subject matter experts to identify hazards and consequences, assess the safety risk the consequences of hazards, and mitigate safety risk, as necessary. In carrying out its SRM process, GoTriangle uses the Department of Defense, Standard Practice, and System Safety MIL-STD-882E.

GoTriangle provides training to all personnel to identify hazards while also providing tools to enable personnel to report these risks. Once the risk has been identified, GoTriangle conducts an assessment of the risk to determine the necessary response and response time. The response may include further investigation or monitoring, action(s) to mitigate the hazard, and follow-up assessment to ensure appropriate and effective action taken.

GoTriangle takes a proactive approach to manage safety risks to appropriately allocate resources to those areas of highest safety risk and unacceptable safety risks. GoTriangle's SRM process applies to:

- Existing GoTriangle operations and maintenance procedures
- Changes to GoTriangle's public transportation systems
- Design of new GoTriangle public transportation service, vehicles, equipment, and capital projects

Key terms used in our SMS process include:

- **Event**: Any accident, incident, or occurrence
- **Hazard**: Any real or potential condition that can cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure belonging to GoTriangle or damage to the environment.
- **Risk**: Composite of predicted severity and likelihood of the potential effect of a hazard
- **Risk mitigation**: Method(s) to eliminate or reduce the effects of hazards
- **Consequence**: An effect of a hazard involving injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment

Figure 2: Safety Risk Management Process

| HAZARD AND CONSEQUENCE IDENTIFICATION | SAFETY RISK ASSESSMMENT | SAFETY RISK MITIGATION |

Safety Hazard Identification- Identify as many credible hazards that may result in harm or damage to the operating system under study. These hazards may come from observation, incidents, new systems, or changes to existing systems.

Safety Risk Mitigation - Implement the safety risk control/mitigation measures and document/track the process.

5.1.1. <u>Safety Hazard and Consequence Identification</u>

The first step in the SRM process is to identify the hazards within the system. Safety hazard identification is a continuous process that involves establishing methods or processes to identify hazards and their consequences. It must be used by, is applicable to all levels of the organization in efforts to address them before they escalate into incidents or accidents. Hazards and potential consequences are identified, analyzed for potential impacts and severity on the transit system, and resolved in a manner acceptable to management. While identifying every hazard is virtually impossible, implementing an active employee reporting program can greatly increase GoTriangle's ability to identify and eliminate or control hazards to acceptable levels of risk. Through the implementation of GoTriangle's SRM, it has established a formal process for hazard identification. Additionally, GoTriangle communicates with peers across the state, FTA, and NCDOT to identify common hazards impacting multiple systems.

GoTriangle identifies hazards and potential consequences from a variety of sources, including the following:

- Voluntary ESRP and mandatory safety reporting program;
- Results from the review of Apollo camera technology video from our vehicles, including scored Supervisor Observation events (driver-specific or aggregated trends of at-risk behaviors);
- Meetings and workshops with employees to discuss safety concerns;
- Results of employee surveys and outreach;
- Monthly safety committee meetings with members from each department;
- Monthly shop talk meetings;
- Quarterly Supervisor's group meetings;
- Results of reports documenting GoTriangle's Safety Assurance activities, highlighting safety concerns and changes, including the following:
  - Pre-trip and post-trip vehicle inspection reports that identify bus safety concerns to the manager of fleet maintenance and transit operations leadership;
  - Results of routine observations of the workplace by management personnel;
  - Results of regular ride checks, a driver proficiency assessment, and rule compliance assessments;
  - Information collected from reports and investigations of safety events; and
  - Information collected from other Safety Assurance activities, including maintenance reports, vehicle inspection reports, system inspection reports, quality inspections and reports, and special studies or reviews.
- Results of condition assessments undertaken for the Transit Asset Management plan;
- Results of inspections, audits, and observations performed by Safety Department personnel;
- Review of the drawings and specifications for new or modified equipment or facilities;
- Findings or recommendations made as a result of audits, reviews, studies, or assessments from internal or external departments or agencies;
- Information from customer reports and reports of unsafe behavior from the public and law enforcement;
- Information from industry associations, manufacturers and other vendors, and oversight authorities, such as the North Carolina Department of Transportation, as well as state and local transportation agencies; and

- Information from FTA, including safety directives, bulletins, alerts, technical assistance, and regulations and recommended practices.

GoTriangle's Safety Department, SMSC, Employee Safety Committee, and subject matter experts identify hazards and consequences from these sources. For sources not managed by the Safety Department, GoTriangle departments provide reports and hazard information to the Safety Department using forms and notification protocols established by the SMSC. GoTriangle departments also provide subject matter experts to support the identification of hazards and consequences from available reports and information sources.

For all sources, the Safety Department's SRM Lead reviews information collected to identify specific hazards and consequences and determine the potential impact on transit operations and employees' health and safety. The SRM Lead, working with GoTriangle departments, ensures that all hazards reported to or identified by the Safety Department is documented in the safety information system.

GoTriangle's contracted services contractor that receive 5307 funds is required to have a formal SRM process and to identify hazards and consequences. GoTriangle requires quarterly (or as needed) summary reports regarding hazards and consequences identified by the contractor and their sources. GoTriangle's Chief Safety Officer, in coordination with GoTriangle's Director of Regional Partnerships, also performs on-site visits and SRM documents review of the contractor's SRM process to ensure that it meets program requirements established by GoTriangle.

5.1.2   Safety Risk Assessment

GoTriangle assesses safety risk associated with identified safety hazards and their consequences using its safety risk assessment process, specified in GoTriangle's SMS Safety Risk Assessment Procedures. This process includes assessing of the likelihood and severity of the consequences of hazards, including existing mitigations, and prioritizing hazards based on safety risk to focus available resources on the most serious hazards requiring resolution.

As described in the GoTriangle SMS Safety Risk Assessment Procedure, the SRM Lead, with support from Safety Department staff, manages GoTriangle's safety risk assessment activities. In some instances, safety risk assessment may be performed by other GoTriangle departments, with the results reported to the GoTriangle Safety Department or SRM Lead for incorporation into the Safety Risk Register in GoTriangle's safety information system.

To conduct the assessment, the SRM Lead may assemble a small team of subject matter experts based on their knowledge of the factors and potential consequences of a hazard and its potential consequence(s) under assessment. Additionally, GoTriangle may use outside resources with specialized expertise in the safety risk assessment process or a transit technical discipline.

As specified in the GoTriangle SMS Safety Risk Assessment Procedures, GoTriangle's safety risk assessment process has five steps:

- Step 1: Collecting Information;
- Step 2: Assessing Severity;
- Step 3: Assessing Likelihood;
- Step 4: Determining the Safety Risk Index; and
- Step 5: Documenting Results. Each step is summarized below.

Step 1: Collecting Information

GoTriangle's SRM Lead collects information on identified hazards and its potential consequence(s). For each identified hazard, the SRM Lead adds a line item in the Safety Risk Register of GoTriangle's safety information system worksheet to provide background and support assessment. Typical information collection activities include:

- Reviewing GoTriangle's safety information system worksheets and records to identify information relevant to the hazard and its potential consequence(s);
- Interviewing employees and contractors that work in the area or discipline where the hazard and potential consequence(s) have been identified;
- Conducting a walkthrough of the affected area or system, generating visual documentation (photographs and/or video), and taking any measurements deemed necessary;
- Conducting interviews with subject matter experts to gather potentially relevant information on the hazard and potential consequence(s);
- Reviewing any documentation associated with the hazard (records, reports, procedures, inspections, technical documents, etc.);
- Contacting other departments or agencies that may have association with or technical knowledge relevant to the hazard or its potential consequence(s);
- Reviewing any past reported hazards of a similar nature;
- Reviewing information provided by FTA or an oversight authority; and
- Evaluating tasks and/or processes associated with the hazard and its potential consequence(s)

Step 2: Assessing Severity

The SRM Lead, working with a small team, if one is assigned, will assess the severity of the impact of the worst credible potential consequence(s) of the hazard if it/they occurred, taking into account existing mitigations. This includes the impact to people, systems, equipment, and the environment. The assessment must be credible and follow the criteria in the Safety Risk Severity table based on MIL-STD 882E. This matrix uses four severity levels:

1. Catastrophic
2. Critical
3. Marginal
4. Negligible

The categorization of hazards is consistent with risk-based criteria for severity; it reflects the principle that not all hazards pose an equal amount of risk to personal or system safety.

Hazard severity is a subjective determination. With historical data, an objective determination applicable specifically to GoTriangle can be derived. The determination reflects a credible event that could be anticipated to result from human error, procedural deficiencies, design inadequacies, component failure, or malfunction.

Table 1: Severity Categories

Severity Categories		
Severity	**Category**	**Criteria**
Catastrophic	1	May cause death, system loss, or severe disruption of service system wide.
Critical	2	May cause severe injury, severe occupational illness, major system damage, or major system-wide disruption of service.
Marginal	3	May cause minor injury, minor occupational illness, minor system damage, or minor system disruption of service.
Negligible	4	Less than minor injury, occupational illness, system damage, or less than minor system disruption of service.

Step 3: Assessing Likelihood

The SRM Lead, working with a small team, if one is assigned, will assess the likelihood of the worst credible potential consequence(s) of the hazard, taking into account existing mitigations. GoTriangle follows the criteria in the Safety Risk Likelihood table adapted from MIL-STD 882E. The table includes six likelihood levels:

A. Frequent
B. Probable
C. Occasional
D. Remote
E. Improbable
F. Eliminated

Likelihood measures how often you think something will happen over a specific period of time or sample. Calendar days, weeks, months, years or decades are often used as time periods to support assessments of likelihood. Choose the likelihood level that best fits the frequency of the risk based on either the individual item description or the system or vehicle fleet description.

Table 2: Likelihood Levels

Likelihood Levels			
Likelihood	**Level**	**Individual Item**	**System or Vehicle Fleet**
Frequent	**A**	Likely to occur to an individual.	Continuously experienced in the system
Probable	**B**	May occur several times in the life of an item.	May occur frequently in the system
Occasional	**C**	Likely to occur sometime in the life of the item.	May occur several times in the system
Remote	**D**	Unlikely, but possible to occur in the life of an item.	Unlikely, but can be expected to occur at some time in the system
Improbable	**E**	So unlikely, it can be assumed occurrences may not be experienced in the life of an item.	Unlikely, but possible to occur in the system
Eliminated	**F**	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.

Step 4: Determining the Safety Risk Index (Severity and Likelihood of Consequences)

GoTriangle has adopted a system for assessing the level of risk from MIL-STD 882E that assigns an alphanumeric rating for each potential consequence to prioritize safety risk. This risk assessment system is used for each identified hazard to determine what action(s) must be taken to correct or document the hazard risk. The SRM Lead, working with a small team, if one is assigned, will combine the assessed severity and likelihood into a safety risk index.

Table 3: Risk Assessment Matrix

Risk Assessment Matrix				
Likelihood/Severity	**Catastrophic (1)**	**Critical (2)**	**Marginal (3)**	**Negligible (4)**
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

After identifying the severity level and likelihood category, the Risk Assessment Matrix will identify the Safety Risk Category. This will provide guidance for addressing the hazards based on the risk category.

This risk assessment system has been incorporated into the formal safety analysis process which enables GoTriangle decision-makers to understand the amount of risk involved in accepting the hazard in relation to (schedule, cost, operations) to reduce the hazard to an as low as reasonable practical (ALARP) level.

This step assists GoTriangle's SRM lead in rating the tolerability of the safety risk as:

- **Low (Acceptable without Review)** – GoTriangle determines that existing mitigations adequately address safety risk, and management review is not necessary.

- **Medium (Acceptable with Existing Mitigations and Management Review)** – GoTriangle determines that mitigations currently in place adequately address safety risk with management review, as specified in *GoTriangle Safety Risk Assessment Procedures*. Evaluations of existing mitigations include observation and analysis by subject matter experts and the review of any historical data related to the hazard and consequence under assessment. When necessary, evaluation of the effectiveness of mitigations may include reaching out to external transit experts and discussions with peer transit agencies facing similar concerns.

- **Serious (Acceptable with Monitoring and Management Review)** – GoTriangle requires management review, as specified in *GoTriangle Safety Risk Assessment Procedures*, and ongoing monitoring activities to determine if the safety risk mitigation is ineffective, inappropriate, or not implemented as intended.

- **High (Unacceptable; Management Approval required)** – GoTriangle requires action to mitigate safety risk. GoTriangle will suspend service or activities related to hazards with a high safety risk index until the safety risk has been mitigated to an acceptable level. As specified in *GoTriangle Safety Risk Assessment Procedures*, management approval is required before resuming suspended activities.

Risk Tolerability Non-Consensus Procedures
In situations where there is non-consensus on Hazard Risk Assessment rating, the Subject Matter Expert will take the lead in providing information to the Manager of Safety, Security, and Training and Operations Manager to promote a resolution for consensus. If consensus is not reached, the CSO will make the final decision.

Table 4: Criteria by Index

Safety Risk Index	Criteria By Index
HIGH	Unacceptable—Management Approval Required
SERIOUS	Acceptable with Monitoring and Management Review
MEDIUM	Acceptable with Existing Mitigations and Management Review
LOW	Acceptable without Review

Step 5: Documenting Results

The SRM Lead will open the Safety Risk Register of GoTriangle's safety information system folder, and enter required information, including the hazard, hazard type, identification source and date, and the hazard's consequences, including the worst credible potential consequence(s), and the existing mitigations (hard and soft) that address the worst credible potential consequence(s), assessments regarding severity and likelihood of the worst credible potential consequence(s), and any related or supporting documentation. Required management reviews and approvals will also be documented in the system.

Policies and Procedures

The Safety Department maintains the policies, procedures, checklists, and forms that support safety risk assessment activities. The SRM Lead records the results of the safety risk assessment process in the Safety Risk Register. Completed safety risk assessments and supporting attachments, documented in the Safety Risk Register module of the safety information system worksheet, will be periodically reviewed by the SMSC.

GoTriangle's contracted services contractor that receives 5307 funds is required per FTA 673 to have a safety risk assessment process. GoTriangle's Chief Safety Officer, in coordination with GoTriangle's Director of Regional Partnerships, will review the safety risk documentation submitted by the contractor, including the contractor's Safety Risk Register. After the post-review, the contractor must submit to GoTriangle's Safety Department a quarterly or as needed an action plan to mitigate any deficiencies.

5.1.3 Safety Risk Mitigations

To create a consistent matrix throughout GoTriangle, the following describes each portion of the risk matrix to classify a hazard. Once the hazard is classified as risk, the color chart details the next steps for the mitigation process. The Risk Analysis Form documents the decision-making process outlined below. All information from this form is documented in the GoTriangle Risk Register spreadsheet in the SMS Documentation folder on the GoTriangle shared drive.

GoTriangle has created the following matrix to select the severity of a risk. Each category defines the severity from the following:

- Death
- Injury
- Illness
- Damage to the facilities, equipment, rolling stock, or infrastructure
- Loss of the facilities, equipment, rolling stock or infrastructure
- Damage to the environment
- Economic loss
- Preventable Accident economic loss

Based on the safety risk assessment results, the safety risk associated with the worst credible potential consequences of identified hazards will be resolved through the development and implementation of mitigations. Mitigations may:

- Eliminate the safety risk of a hazard;
- Reduce the likelihood of the potential consequences of a hazard; and/or
- Reduce the severity of the potential consequences of a hazard.

The goal of GoTriangle's safety risk mitigation process is to eliminate the hazard if possible. When a hazard cannot be eliminated, GoTriangle will reduce the associated risk to the lowest acceptable level within the constraints of cost, schedule, and performance by applying the design order of precedence specified in MIL-STD 882E:

- Eliminate hazards through design selection;
- Reduce risk through design alteration;
- Incorporate engineered features or devices;
- Provide warning devices; and
- Incorporate signage, procedures, training, and personal protective equipment.

The supervisor or project manager with oversight of the organizational entity will develop mitigations, supported by the SRM Lead, the SMSC, and GoTriangle's subject matter experts. The department head or manager of the impacted department will approve the safety risk mitigation. Depending on the nature of the safety risk or mitigation, additional approvals may be required from Agency Leadership and Executive Management and/or the Accountable Executive.

Safety risk mitigations must include milestones, schedule, budget, and the individual(s) responsible for implementation. As specified in the Safety Risk Mitigation, GoTriangle will monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended. This activity may include the use of mitigation monitoring plans.

The supervisor or project manager that developed the mitigation will be responsible for providing the mitigation information to the SMS Lead to put in the safety risk register in the safety information system. The SMSC will review the status of actions to implement mitigations and report any findings or concerns to the Accountable Executive. The Safety Department will include information on the development and implementation of safety risk mitigations in quarterly reports shared throughout the agency, as specified in GoTriangle's SMP statement.

GoTriangle's Chief Safety Officer monitors the contracted service contractor's safety risk mitigation process through quarterly on-site records reviews and mitigation documentation submitted by the contractor.

Mitigation Decision and Tracking

Based on the decision(s) from the Risk Assessment Matrix and during the SMS implementation, a mitigation strategy is created to track findings and timeframes within the GoTriangle's Safety Risk Register. All actions taken to mitigate risk will be the CSO's responsibility to documented and linked to the initial deficiency or hazard identification step.

Mitigations that have been implemented are tracked on Safety Management logs by the Department/Division and at a minimum, the Safety Risk Register. The person assigned the mitigation will be responsible for tracking and reporting on the mitigation status through closure.

Safety Data Acquisition and Analysis

The Safety Department monitors the safety performance of the various GoTriangle operations. Accident, incident, injury and other safety data are collected throughout the organization and analyzed to determine the organization's trends. The safety data collected is analyzed to determine if safety performance meets established safety objectives. The accident and incident data helps identify service areas that generate a higher percentage of accidents or potential for higher accident rates.

The safety data collected includes injuries to passengers, GoTriangle personnel and the public; hazardous equipment failures; unacceptable hazardous conditions; and rules and procedures violations. The Safety Department analyzes safety-related data for the purpose of implementing corrective action to assist in the prevention or reoccurrence of hazards

6   SAFETY ASSURANCE

Safety Assurance involves processes within GoTriangle's Safety Management System that function to ensure the implementation and effectiveness of safety risk mitigation to meet or exceed safety objectives.

6.1 Safety Performance Monitoring and Measurement

GoTriangle uses Safety Performance Monitoring and Measurement to evaluate our compliance with operations and maintenance procedures. Also, to determine whether our existing rules and procedures are sufficient to control our safety risk; and identify new hazards to determine the need to make changes to improve policies, employee training and service delivery. The CSO will monitor operations and maintenance procedures through observation, data analysis, communication, and safety updates to identify mitigation strategies that may be ineffective. If mitigation actions are ineffective, additional strategies will be developed through key and impacted staff feedback.

Safety Performance Monitoring and Measurement activities serve as a check on GoTriangle's SRM process. The monitoring activities are designed to ensure that safety risk mitigations are effective and implemented as intended; to collect safety performance data that will help GoTriangle anticipate future safety events and mitigate or prevent them, and analyze the safety risk of any new practices or procedures the Agency adopts.

Safety Performance Monitoring and Measurement activities also include investigating safety events to identify causal factors and analyzing the information from safety reporting, including data about safety failures, defects, and conditions.

Compliance with and Sufficiency of Operations and Maintenance Procedures

GoTriangle operations are governed by bulletins, rules, notices, and standard operating procedures (SOPs). Bulletins are universal and provide direction to all employees; rules govern bus system's daily operations, and SOPs provide detailed information and instructions for performing specific tasks. Bulletins, rules, and procedures are reviewed and approved by the department heads and management staff.

GoTriangle bus maintenance is governed by maintenance manuals, instructions, bulletins, and vendor information. Maintenance procedures are established by the Manager of Fleet Maintenance and modified by the Transit Operations Director when needed.

To ensure compliance with and sufficiency of operations and maintenance procedures, GoTriangle carries out the following activities:

- **Ride-Along Evaluations**: A ride-along provides an opportunity for one-on-one interaction between GoTriangle Operators and GoTriangle Transit Service Supervisors and Behind-the-Wheel trainers. During these evaluations, GoTriangle supervisors and trainers perform firsthand observations of the Operator's driving habits and provide immediate verbal and written feedback. A ride-along is designed to uncover and point out unsafe practices, and give positive reinforcement for safe driving practices. A ride-along can occur as a reactive measure (post-event rides or rides initiated in response to customer complaints or documented violations of safety rules) or proactively, such as

when the Operator is learning a new bus route or receiving other types of Operator refresher instruction. The results of a ride-along are documented in Operator's employee and training folders.

- **Verification of Transit Training Compliance:** Bus Operator Training staff are responsible for ensuring bus operators comply with training requirements. Accordingly, Bus Training personnel are responsible for notifying Operators of available classes scheduled throughout the year so that they can complete the required refresher training annually or as needed.

- **Random Observations:** Transit Service Supervisors and Trainers may conduct observations of Bus Operators for compliance with traffic laws, GoTriangle operating rules, and procedures. Any observed rule violations will be documented and submitted to the Transit Operations Division Manager or Manager of Safety, Security and Training.

- **Behavior-Based Safety Observations:** Managers or safety personnel observe employees performing their assigned tasks and evaluate their actions based on GoTriangle's safety policies and procedures and task-specific processes or procedures, if applicable. After each session, the manager or safety personnel discusses what they observed with the employee and discuss any unsafe or potentially unsafe actions they may have observed. Sessions focus on constructively and positively reinforcing safe actions, gaining employee commitment to identify and avoid unsafe actions, and encouraging two-way communication about safety-related concerns. The manager or safety personnel performing the observations immediately addresses and acts on any observed life-threatening and unsafe behaviors. Any GoTriangle employee can stop an unsafe act.

- **Vehicle and Facility Inspections and Records Reviews:** Trained personnel from the maintenance and facility department conduct and document monthly safety inspections at the maintenance and operations facilities for vehicles and infrastructure. These personnel also perform records reviews and trend analyses regarding vehicle and facility inspection results to focus follow- up activities. Results are documented on standard GoTriangle departmental forms.

- **Video Monitoring:** GoTriangle's onboard monitoring system allows management staff the opportunity to review video footage on buses. When an event on a bus takes place, the supervisor, safety personnel, and trainers can request video footage download once the vehicle returns to the main base through the recording system. Operations and Safety staff review video events as needed to ensure timely coaching, retraining, or discipline for unsafe acts.

- **Supervisor Observation:** Supervisors conduct monthly Supervisor Video Observations to identify unsafe operator driving behavior before having an event. Coachable events are addressed one-on-one with operators by supervisors and training personnel. Coachable events are electronically documented in the Safety Department's folders. Additionally, supervisors review recordings when operators self-report non-compliance with safety rules or as a result of other employee reports. Operations staff also notify the Manager of Fleet Maintenance of any events that related to the Maintenance Department for coaching, retraining, and/or discipline.

Managers of GoTriangle's Operations and Maintenance Departments report on these activities monthly (or as needed) to the Chief Safety Officer. Each report documents, for the previous month, the results of:

- Rules compliance activities in the department, including coaching, retraining, or discipline for unsafe acts,
- Inspections of the department's equipment and infrastructure elements,
- Quality control and quality assurance assessments and reviews in the department, and
- Supervisor observations of activities performed in the department.

Data and information are analyzed to identify trends and allow monthly and annual comparisons.

Based on these reports, the Chief Safety Officer works with the managers in each department to review and investigate findings with implications for agency-wide compliance with and sufficiency of operations and maintenance procedures, and determine the root cause and contributing factors for any issues.

The Chief Safety Officer presents the results of the reviews and investigations to the SMSC quarterly. The SMSC determines what action is required and directs pertinent department personnel to document and track actions taken in the agency's safety information system.

Monitoring Safety Risk Mitigations

GoTriangle monitors safety risk mitigations to determine if they may be ineffective, inappropriate, or not implemented as intended. GoTriangle supervisors, managers and subject matter experts, working with the GoTriangle Safety Department, develop mitigation monitoring plans for mitigations implemented through GoTriangle's SRM process. The SMSC approves mitigation monitoring plans and tracks them through the Safety Risk Register worksheet of GoTriangle's safety information system.

Mitigations found to be ineffective, inappropriate, or not implemented as intended must go through the SRM process. The Safety Department oversees and tracks the assignment of responsibilities and timelines for implementing new mitigations and eliminating mitigations that are no longer necessary or effective.

To measure the effectiveness of existing safety risk mitigations, which may not have been assessed yet through GoTriangle's SRM process, GoTriangle's Safety Department and SMSC also:

- Review results from safety event investigations;
- Monitor employee safety reporting;
- Monitor the service delivery and operational environment;
- Monitor operational functions to verify that operations activities are carried out in accordance with standard operating procedures (SOPs);
- Monitor maintenance functions to verify that maintenance activities are carried out in accordance with SOPs;
- Review results of internal safety audits and inspections;
- Review results of safety inspections by external entities; and
- Analyze operational and safety data to identify emerging safety concerns.

During SMSC meetings, a standing agenda item focuses on the results of these reviews and monitoring activity. Based on its assessment of the situation, the SMSC and the Chief Safety Officer will determine whether the additional investigation and/or monitoring is required or if the specific issue or condition needs to be addressed through GoTriangle's SRM process.

GoTriangle's purchased transportation services contractor that receives 5307 funds is required per FTA 673 to have a safety risk mitigation monitoring process. GoTriangle's Chief Safety Officer, in coordination with GoTriangle's Director of Regional Partnerships, will review the safety risk mitigation monitoring process through quarterly records reviews and documentation submitted by the contractor. After the post-records review, GoTriangle's provides to the contractor any identified deficiencies in the monitoring process for corrective action.

The Safety Department ensures that GoTriangle carries out and documents all monitoring activities. The Safety Department reports the Accountable Executive and/or executive management results as directed by the Accountable Executive or SMSC. Specific procedures on how to carry out safety risk mitigation monitoring activities and forms to document those activities are on the shared drive: (S:\Agency Safety Plan\Safety Management System\Documents.

Safety Event Investigations to Identify Causal Factors

GoTriangle maintains documented procedures for conducting investigations of safety events (accidents, incidents, and occurrences, as defined in 49 CFR Part 673) to find causal and contributing factors and review the existing mitigations in place at the time of the safety event. *GoTriangle's Accident Supervisor Investigation Standard Operating Procedures Manual* contains specific procedures for conducting safety investigations.

Operations and maintenance management are responsible for immediately notifying the Safety Department of any safety event that meets GoTriangle's notification level thresholds. The Safety Department notifies the Accountable Executive (or designated personnel) of any events that resulted in a fatality, serious injury, or property damage to GoTriangle's vehicles or private vehicles that may exceed $25,000. The Safety Department ensures that all safety events are recorded and tracked on a Safety Event Log worksheet in the Safety Department folder.

The Safety Department also ensures compliance with reporting thresholds, requirements, and processes defined in *FTA's NTD Safety and Security Policy Manual*.

GoTriangle's general safety investigation process consists of five basic phases.

- **Secure the scene**: a trained Accident Investigation Supervisor secures the accident-incident scene with a priority to protect life, identify injuries, and then property.
- **Fact gathering**: Record facts pertinent to understanding the circumstances leading to the safety event.
- **Create a sequence of events**: Outline a timeline with the sequence of events.
- **Data analysis**: Analyze the information obtained through fact gathering and sequence of events to assess the safety risk and determine the root cause.
- **Establish conclusions**: Draw conclusions from the collected and analyzed information based on:
  - Pre-Event, Event and Post-Event Matrix
  - Findings that point out additional hazards that have the potential to introduce safety risk but did not play a direct role in the event.
  - Other findings that have the potential to improve the safety of the transit system.

General Investigation Process

Safety Event Investigation Procedures

GoTriangle's safety event investigation procedures follow these steps:

- Bus Operators or Transit Service Supervisors notify Dispatch of the safety event. The Operator of the affected transit vehicle follows seven basic emergency steps outlined in the Bus Operations and Paratransit Work Rules Procedural Manual, 2019:
  - Stay calm.
  - Assess the situation.
  - Obtain help.
  - Protect people, then property.
  - Reassure and assist the passengers.
  - Secure the scene.
  - Gather information.

- Dispatch immediately notifies Operations Management and the designated Safety Department representative listed on the notification roster.
- The accident investigation supervisor is activated and sent to the scene of the safety event.
- The accident investigation supervisor arrives at the scene as soon as possible with tools to conduct the investigation. (The Accident Investigation Supervisor Standard Operating Procedures (SOP) provides a list of these tools.)
- The Accident Investigation Supervisor secures the scene and collects facts about what occurred, including interviewing the Operator involved, if possible.
- The Accident Investigation Supervisor begins the investigation process and formulating the sequence of events, which includes but is not limited to the following:
  - Noting the environmental factors surrounding the safety event, such as lighting and visibility, road surface conditions, climate, and weather conditions.
  - Collecting vehicle and roadway evidence, including vehicle condition and position for all vehicles involved in the incident.
  - Observing debris and vehicle fluids.
  - Making exterior damage assessments.
  - Photographing the scene.
  - Sketching the field.
  - Interviewing other drivers; witnesses; passengers; fire, emergency medical services, and police personnel at the scene.
  - Interviewing maintenance personnel, if necessary, at a later date.
  - Making a drug-and-alcohol testing decision.
  - Finalizing the vehicle event and incident report form.

Identifying Causal and Contributing Factors

GoTriangle is committed to examining all safety events to determine causal and latent organizational factors contributing to the safety event. This includes examining:

- Process;
- People/human factors;
- Management decision-making and resource support;
- Equipment, tools, and materials;
- Operating environment;
- Environmental issues;
- Existing relevant mitigations; and
- Other causes and contributing factors, as appropriate.

The Accident Investigation Supervisors prepare an event timeline and make recommendations based on this causal analysis and send the supervisor report to the Safety Department for immediate action (if necessary) and integration into their analysis of the event.

Accident and Incident Review Committee

GoTriangle's Accident and Incident Review Committee reviews information on all catastrophic accidents-incidents and major mechanical failures defined in the Accident Supervisor Investigation SOP that occur on GoTriangle property or involving GoTriangle vehicles, equipment or employees. The Accident and Incident Review Committee does not review minor accidents or occurrences defined in the Accident

Supervisor Investigation SOP. All minor accidents and occurrences are reviewed by the Employee Safety Committee and Safety Department personnel.

GoTriangle's Accident and Incident Review Committee consists of members that represent management, operations, maintenance, and other subject matter experts as needed. The Chief Safety Officer chairs the committee. The review committee determines whether:

- The accident or incident was preventable or non-preventable;
- Personnel require discipline or retraining;
- The causal factor(s) indicate(s) an unexpected or previously unconsidered operating condition or situation or existing mitigation that may be ineffective, inappropriate, or not implemented as intended; or
- The accident or incident appears to involve underlying organizational causal factors beyond just individual employee behavior.

GoTriangle's Accident and Incident Review Commitee refers its findings to the Safety Department for further analysis and potential examination through GoTriangle's SRM process. Information on causal factors identified or confirmed by GoTriangle's Accident and Incident Review Committee is filed in the CSO's office.

GoTriangle's purchased transportation services contractor must immediately notify GoTriangle's Chief Safety Officer of any safety event that meets defined minimum thresholds. GoTriangle also monitors the purchased transportation services contractor's safety investigation processes by reviewing investigation reports, causal analysis activities, and the contractor's response to investigation reports and causal analysis findings. The contractor is required to submit documentation on safety investigation activities to GoTriangle.

The Safety Department maintains all documentation of GoTriangle's investigation policies, processes, forms, checklists, activities, and results.

Safety Compliance Assessment and Inspection

Drug and Alcohol Compliance

GoTriangle Management administers the GoTriangle Substance Abuse program, which complies with 49 CFR Parts 40 and 655, the Drug Free Workplace Act, and GoTriangle's Substance Abuse Policy. GoTriangle employees are required to submit to drug and alcohol tests as a condition of employment under GoTriangle's policy. All GoTriangle employees receive at least 60 minutes of training on the effects and consequences of prohibited drug use on personal health, safety, and the work environment, and on the signs and symptoms that may indicate prohibited drug use.

Supervisors and/or other GoTriangle officials authorized to make reasonable suspicion determinations receive at least 60 minutes of training on the physical, behavioral, and performance indicators of probable drug use and at least 60 minutes of training on the physical, behavioral, speech, and performance indicators of probable alcohol abuse. Mandatory personnel re-training in substance abuse is not required, however, GoTriangle Safety personnel periodically update the prohibited substances literature, which is posted in common areas throughout GoTriangle facilities.

Contractors are made aware of the GoTriangle Drug and Alcohol program requirements in the language set forth in the Contractor's Entry Safety Briefing. A statement in the document advises all Contractor employees that they are strictly prohibited from engaging in the non-prescriptive use, sale, distribution, dispensation, manufacture, or transfer of controlled substances. Contractors or their employees must not

possess alcohol or non- prescription drugs on GoTriangle property or other worksites, on or off duty. Employees of contractors must not report to duty or remain on duty if impaired by alcohol or drugs.

Safety Sensitive Employees, as defined by GoTriangle, include those who:

- Operate revenue vehicles.
- Maintain revenue vehicles.
- Control the movement of revenue vehicles.

Internal Safety Reporting Programs

The Chief Safety Officer and Employee Safety Committee routinely review safety data and information captured in employee safety reports, safety meeting minutes, customer complaints, and other safety communication channels. When necessary, the Chief Safety Officer and Employee Safety Committee ensure that the issues and concerns are investigated or analyzed through GoTriangle's SRM process and elevated to the SMSC if further decision-making actions are needed.

The Chief Safety Officer and Employee Safety Committee also review internal and external reviews, including audits and assessments, compliance with operations and maintenance procedures, and safety risk mitigations' effectiveness. The Chief Safety Officer discusses relevant safety issues and concerns with the Accountable Executive and executive management.

Internal Safety Audits and Annual Review

An internal safety audit program, overseen by the Safety Department, measures the effectiveness of the ASP in achieving the overall objectives of the plan and compliance with its requirements. GoTriangle's internal safety audit program is designed to:

- Ensure safety observations are conducted by supervisory or safety staff during system maintenance, operations, and modification.
- Verify compliance with management's safety objectives, as stated in Section 4 of the ASP.
- Ensure compliance with operating rules, regulations, standards, codes, and procedures.

Internal Safety Reviews

It is the objective of the Internal Safety Review Program to verify on an on-going basis that safety processes have been developed and implemented in accordance with the GoTriangle PTASP throughout GoTriangle's operations and services. It is also the objective of GoTriangle's Internal Safety Review Program to assess the effectiveness of the safety processes; to identify process deficiencies, potential hazards, and system risks; and to recommend SMS improvements.

The internal safety audits will be focused on the content of the PTASP to include the four (4) components of GoTriangle's SMS. The Safety Department is responsible for scheduling the internal safety audits on an annual basis. Safety Assurance internal review processes include:

- Safety Data Acquisition and Analysis – includes evaluating the processes used to collect and analyze safety-related data and the processes used to determine trends related to safety performance monitoring.
- Accident/Incident Reporting and Investigation – includes evaluation of GoTriangle's processes for notifying outside agencies, including FTA, NCDOT, and OSHA, as well as processes for identifying accident/incident causes.

- Internal Safety Reviews – entails a review of the internal safety review process to ensure all GoTriangle PTASP components are reviewed through an established review cycle. The review includes evaluating practices used to develop checklists and perform internal safety reviews, document, and track review findings, and assign responsible parties and schedules for addressing review findings.
- Rules/Procedures Reviews – includes a review of GoTriangle's processes for reviewing operating and maintenance rules and procedures affecting safety to ensure they remain applicable and correct.
- Facility and Equipment Inspections – includes identification of facilities and equipment subject to regular safety-related inspections and testing, processes reporting, documenting and tracking deficiencies, hazards, and corrective actions.
- Maintenance Audits/Inspections – includes identification of systems and facilities subject to a maintenance program, along with established maintenance cycles and required documentation of maintenance performed on these systems and facilities. This also includes inspection and audit of procedures and work practices to identify deficiencies, trends, and signs of sabotage, and the methods used to document and track deficiencies, hazards, and corrective actions.
- Additionally, the revised Internal Safety Audits will be designed to help GoTriangle monitor operations and identify any safety risk mitigations that may be ineffective, inappropriate, or not implemented as intended.

7) SAFETY PROMOTION

7.1 Competencies and Training

Safety promotion ensures that GoTriangle employees and contractors are aware of policies and procedures related to ageny operations's safety, and specifically as related to their areas of work. GoTriangle's comprehensive safety training program applies to all GoTriangle employees directly responsible for safety, including:

- Bus vehicle operators
- Dispatchers
- Maintenance technicians
- Managers and supervisors
- Agency Leadership and Executive Management
- Chief Safety Officer
- Safety and Training Department personnel
- Accountable Executive

Training has been developed for each designated position throughout the agency, appropriate to the position's safety-related job responsibilities and role in the SMS. This training includes instruction and testing to verify individuals in positions are adequately trained, and refresher training and recertification requirements to ensure employees remain current on the agency's policies and procedures. Basic training requirements for GoTriangle employees, including frequencies and refresher training, are documented in the GoTriangle's Safety Training Matrix on the shared drive: (P:\Agency Safety Plan\Safety Management System\Safety Training Matrix and the Employee's Training folder.

Operations safety-related skill training includes the following:

- New hire bus operator classroom and hands-on skill training;

- Bus operator refresher training;
- Bus operator retraining (recertification or return to work);
- Skill training for bus maintenance service attendants;
- Classroom and on-the-job training for transit service supervisors at the time of external hire or internal promotion; and
- Safety event investigation training, including the Transportation Safety Institute (TSI) Fundamentals of Bus Collision Investigation and on-the-job training.

Vehicle maintenance safety-related skill training includes the following:

- Ongoing vehicle maintenance technician skill training;
- Ongoing skill training for vehicle maintenance supervisors;
- Safety event investigation training for vehicle maintenance supervisors;
- Ongoing hazardous material training for vehicle maintenance technicians and supervisors, parts room assistants; and
- Training provided by vendors.

Facility maintenance safety-related skill training includes the following:

- Ongoing facility maintenance technician skill training;
- Ongoing skill training for facility maintenance manager;
- Ongoing hazardous material training for facility maintenance technicians and manager; and
- Ongoing fire prevention training for facility maintenance technicians and manager

GoTriangle participates in the Voluntary Bus Safety Training Program outlined in FTA's Public Transportation Safety Certification Training Program regulation, 49 CFR Part 672. GoTriangle's designated Safety Department personnel will complete the following curricula, in accordance with the Program's specifications:

- SMS Awareness (e-Learning)
- Safety Assurance (virtual instructor-led)
- SMS Principles for Transit (classroom)
- Transit Safety and Security Program managed by TSI
  - Effectively Managing Transit Emergencies
  - Transit Bus System Safety
  - Fundamentals of Bus Collision Investigation

Following the conclusion of this training, designated personnel will complete refresher training that includes, at a minimum, one hour of safety oversight training.

GoTriangle also conducts SMS initial and refresher training on basic SMS principles and the mandatory and voluntary ESRP for frontline and supervisory operations and maintenance employees.

7.2 Safety Communication

In accordance with GoTriangle's SMP statement, GoTriangle actively encourages the open sharing of information on all safety issues throughout our organization. To ensure effective communication throughout the agency, GoTriangle has established formal processes and approaches, including:

- **Dissemination of safety and safety performance information throughout GoTriangle's organization.** The communication of safety performance information follows the top-down, agency-wide model of the agency's SMS. The Chief Safety Officer is responsible for reporting on the agency's safety performance to the Accountable Executive. These reports may include, but not limited to, performance relative to the agency's safety performance targets, updates related to mitigation monitoring plans, and unusual events

According to guidance distributed by the Chief Safety Officer, leadership throughout the agency (including senior executives, directors, managers, and supervisors) is responsible for communicating safety performance information with their teams.

The Safety Department is responsible for using the safety hazards log and safety risk register to develop regular status reports on safety risk mitigations for dissemination to the SMSC for discussion.

The Safety Department also issues quarterly reports to the SMSC on GoTriangle's safety performance and progress in meeting the safety objectives outlined in the SMP statement throughout the agency.

- **Communication of information on hazards and safety risk relevant to employees' roles and responsibilities throughout the agency.** As part of new-hire training, GoTriangle distributes safety policies and procedures, included in the Work Rules and Procedures Manual, to all employees. GoTriangle provides training on these policies and procedures and discusses them during safety talks between supervisors and bus operators and vehicle maintenance technicians. For newly emerging safety issues or safety events at the agency, GoTriangle's Chief Safety Officer issues bulletins or messages to employees that are reinforced by supervisors in one-on-one or group discussions with employees. GoTriangle's Training Department also develops materials and courses to explain the rationale behind changes to policies, procedures, and work instruction that address hazards and safety risks relevant to employees' roles and responsibilities.

  The Safety Department works with GoTriangle's executive, CSO, and management teams (representing all appropriate functions) to define specific, safety-related information that GoTriangle needs to communicate to different employee groups. GoTriangle also uses multiple approaches to communicate pertinent safety information to the Board of Trustees, management, and individual employees across all GoTriangle functions, as appropriate.

- **Explaining actions taken in response to employee reporting.** GoTriangle provides targeted communications to inform employees of safety actions taken in response to reports submitted through the ESRP, such as newsletters, handouts and flyers, safety talks, updates to bulletin boards, one-on-one discussions between employees and supervisors.

The Safety Department works with each operating function to ensure that all SMS and safety communication-related activities take place as scheduled. The Safety Department also maintains documentation of communication processes and procedures and records of safety communications.

GoTriangle's contracted services contractor must have safety communication methods in place to communicate GoTriangle's safety policy statement and safety objectives to employees. GoTriangle's Chief Safety Officer, in coordination with GoTriangle's Director of Regional Partnerships, regularly monitors contractor safety communication activities to ensure the contractor is supporting GoTriangle's safety and SMS mission and complying with GoTriangle's requirements. GoTriangle's Chief Safety Officer documents these monitoring activities and results in formal reports and audits.

Documentation of ASP and SMS Implementation Activities

GoTriangle's Chief Safety Officer is responsible for maintaining the Agency's documents, which set forth its PTASP, including those documents related to the implementation of its SMS, and results from SMS processes and activities. The ASP and SMS documents include in whole, or by reference, the programs, policies, and procedures that GoTriangle uses to carry out its ASP. All ASP and SMS documents are maintained for a minimum of three years after they are created.

For reviews, investigations, audits, or other purposes, any ASP or SMS related documents will be made available upon request by FTA, NCDOT, and other Federal and State entities having jurisdiction.

8) **ADDITIONAL INFORMATION**

GoTriangle and its contractors will maintain documentation related to the implementation of its SMS; the programs, policies, and procedures used to carry out this ASP; and the results from its SMS processes and activities for three (3) years after creation. This documentation will be available to the Federal Transit Administration or other Federal or oversight entity upon request, and maintained on the shared drive, Agency Safety Plan: P:\Agency Safety Plan\SMS\Documentation.

Part 673 Definitions of Terms Used in the Plan

Accident: FTA defines an accident as an event that involves any of the following: A loss of life; a report of a serious injury to a person; a collision of public transportation vehicles; a runaway train; an evacuation for life safety reasons; or any derailment of a rail transit vehicle, at any location, at any time, whatever the cause. For purposes of GoTriangle Bus Operations an accident will include but not be limited to events arising out of the operations of the bus, such as vehicle collisions when contact is made with another vehicle, equipment (forklift, sweeper, tug), person, bike, gate arm, or other object, and customer bumps, trips and falls while boarding, on board or exiting the bus.

Accountable Executive: A single, identifiable person who has ultimate responsibility for carrying out the Public Transportation Agency Safety Plan of a public transportation agency; responsibility for carrying out the agency's Transit Asset Management Plan; and control or direction over the human and capital resources needed to develop and maintain both the agency's Public Transportation Agency Safety Plan, in accordance with 49 U.S.C. 5329(d), and the agency's Transit Asset Management Plan in accordance with 49 U.S.C. 5326.

Chief Safety Officer: An adequately trained individual who has responsibility for safety and reports directly to a transit agency's chief executive officer, general manager, president, or equivalent officer.

Equivalent Authority: An entity that carries out duties similar to that of a Board of Directors, for a recipient or sub-recipient of FTA funds under 49 U.S.C. Chapter 53, including sufficient authority to review and approve a recipient or sub-recipient's Public Transportation Agency Safety Plan.

Event: Any Accident, Incident, or Occurrence.

FTA: Federal Transit Administration. An agency within the U.S. Department of Transportation.

Hazard: Any real or potential condition that can cause injury, illness, or death to personnel; damage to or loss of system service, equipment or property; or damage to the environment, rolling stock, or infrastructure that disrupts the operations of a transit agency.

Hazard Risk The composite of predicted severity and likelihood of the potential effect of a hazard.

Hazard Risk Mitigation: A method or methods to eliminate or reduce the effects of hazards.

Incident: (FTA SMS definition) An event that involves any of the following: A personal injury that is not a serious injury; one or more injuries requiring medical transport; or damage to facilities, equipment, rolling stock, or infrastructure that disrupts the operations of a transit agency.

Investigation: The process of determining the causal and contributing factors of an accident, incident, or hazard, for the purpose of preventing recurrence and mitigating risk.

National Public Transportation Safety Plan: The plan to improve the safety of all public transportation systems that receive Federal financial assistance under 49 U.S.C. Chapter 53.

NCDOT: The North Carolina Department of Transportation. The designated State Safety Oversight Agency (SSOA) for the State of North Carolina.

Occurrence: An Event without any personal injury in which any damage to facilities, equipment, rolling stock, or infrastructure does not disrupt the operations of a transit agency.

Passenger: A person who is on board, boarding, or alighting from a bus transit vehicle for the purpose of travel.

Performance Measure: An expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets.

Performance target: A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Transit Administration (FTA).

Public Transportation Agency Safety Plan: The documented comprehensive agency safety plan for a transit agency that is required by 49CFR673.

Responsible Accident: The employee or operator had a reasonable opportunity to avoid the accident but failed to do so.

Risk: The composite of predicted severity and likelihood of the potential effect of a hazard.

Risk Register: an information management tool used to document Safety Risk Management and Safety Assurance activities. It records the hazards identified by the transit agency, the potential consequences associated with the hazards, initial safety risk ratings, new mitigations implemented to eliminate or minimize the risk associated with the hazard, revised safety risk rating, and mitigation monitoring measures and activities to ensure the implementation and effectiveness of mitigations.

Risk Mitigation: A method or methods used to eliminate or reduce the effects of hazards.

Safety: Freedom from harm resulting from unintentional acts or circumstances.

Safety Assurance: Processes within a transit agency's Safety Management System that functions to ensure the implementation and effectiveness of safety risk mitigation.

Safety audit: A review or analysis of system elements for compliance with the Safety requirements. Audit methods may include interviews, document and record reviews, firsthand observations of operations and maintenance activities, spot checks, inspections, and visual examinations and measurements.

Safety Events: Total number of reportable events and rate per total vehicle revenue miles by mode. The safety events measure captures all reported safety events that occur during transit operations and the performance of regular supervisory or maintenance activities. A reduction in safety events will support efforts to reduce fatalities and injuries, as well as damages to transit assets. Measuring the number of safety events

by mode over vehicle revenue miles provides a safety event rate from which future performance can be compared.

Safety Management System (SMS): A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures. SMS defines the activities by which safety management is undertaken by an organization in order to achieve acceptable levels of safety. SMS also defines the method of identifying hazards and controlling risks in a work and operational environment and continually monitors these methods for effectiveness.

Safety Risk Management: A process within a Bus Transit Agency Safety Plan for identifying hazards and analyzing, assessing, and mitigating safety risk.

Safety Risk Management Log: An information management tool for tracking identified hazards, rating the hazards, any mitigation and how the hazard is resolved. Unacceptable and Undesirable Hazardous Conditions must be captured in the Risk Register.

Safety Management Policy: A transit agency's documented commitment to safety, which defines the transit agency's safety objectives and the accountabilities and responsibilities of its employees in regard to safety.

Safety Management System (SMS): The formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of a transit agency's safety risk mitigation. SMS includes systematic procedures, practices, and policies for managing risks and hazards.

Safety Promotion: A combination of training and communication of safety information to support SMS as applied to the transit agency's public transportation system.

Safety Risk Management: A process within a transit agency's Public Transportation Agency Safety Plan for identifying hazards and analyzing, assessing, and mitigating safety risk.

Serious Injury (FTA SMS definition): Any injury which: (1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received; (2) Results in a fracture of any bone (except simple fractures of fingers, toes, or noses); (3) Causes severe hemorrhages, nerve, muscle, or tendon damage; (4) Involves any internal organ; or (5) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

State of Good Repair: The condition in which a capital asset is able to operate at a full level of performance.

State Safety Oversight Agency (SSOA): An agency established by a State that meets the requirements and performs the functions specified by 49 U.S.C. 5329(e) and the regulations set forth.

System Reliability: The mean distance between major mechanical failures by mode. The System Reliability measure expresses the relationship between safety and asset condition. The rate of vehicle failures in service, defined as mean distance between major mechanical failures, is measured as revenue miles operated divided by the number of major mechanical failures. This is a measure of how well a fleet of transit vehicles is maintained and operated. The Federal Transit Administration (FTA) recognizes the diversity of the transit industry and that agencies have varied equipment types with varied rates of performance. Therefore, this measure allows agencies to develop safety performance targets that are specific to their own fleet type, age, operating characteristics, and mode of operation.

System Safety: The application of engineering and management principles, criteria, and techniques to achieve acceptable risk, within the constraints of operational effectiveness throughout the system and throughout the life cycle of the system.

Transit Asset Management Plan: The strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life cycles, for the purpose of providing safe, cost-effective, and reliable public transportation.

Unacceptable Hazardous Condition: A hazardous condition determined to be an unacceptable risk according to an established evaluation matrix which evaluates the severity and probability of the risk.

ACRONYMS

Acronym	Definitions
AE	Accountable Executive
ALARP	As Low as Reasonably Practicable
ASP	Agency Safety Plan (also referred to as a PTASP in Part 673)
CAMPO	Capital Area Metropolitan Planning Organization
CDL	Commercial Driver's License
CFR	Code of Federal Regulations
CSO	Chief Safety Officer
DCHC	Durham-Chapel Hill-Carrboro Metropolitan Planning Organization
EDR	Electronic Data Recorder
ESRP	Employee Safety Reporting Program
FTA	Federal Transit Administration
MPO	Metropolitan Planning Organization
MTBE	Mean Time Between Events
NCDOT	North Carolina Department of Transportation
NPTSP/NSP	National Public Transportation Safety Plan
NTD	National Transit Database
Part 673	49 CFR Part 673 (Public Transportation Agency Safety Plan)
SA	Safety Assurance
SGR	State of Good Repair
SME	Subject Matter Expert
SMP	Safety Management Policy
SMS	Safety Management System
SOP	Standard Operating Procedure
SP	Safety Promotion
SPI	Safety Performance Indicator
SPT	Safety Performance Target
SRM	Safety Risk Management
SSOA	State Safety Oversight Agency
TAM	Transit Asset Management
U.S.C.	United States Code
VRM	Vehicle Revenue Miles

Appendix A: Potential Sources of Hazard Information

Job Hazard Analyses (JHA)
Conducting inspections and audits includes conducting site surveys and personnel interviews to evaluate employee work practices and work environments. The inspection portion of this method is used daily by all personnel during the performance of their normal job duties and requires little more than an attentive eye or the use of safety checklists.

Daily Operating Logs
The Safety Department maintains a safety events log of all activities on each shift, including hazards, adverse events and unusual events affecting the system.

Operator observations
It is the responsibility of all employees to identify and report hazards and unsafe conditions. Provided necessary mechanisms for reporting unsafe conditions as required per the Safety Risk Management Process. Inspection or observation portions of this method is used daily by all personnel during the performance of their normal job duties and requires little more than an attentive eye or the use of safety checklists.

Maintenance reports
The primary means by which a department will be informed of a hazard is through self-identification. This is done either through employees or through management techniques such as inspections and audits or reviews of daily operating reports to identify trends. Establish and implement procedures to assure that the vehicle fleet is properly maintained and available in a safe operating condition. Ensure that any safety and quality audits findings of the day-to-day maintenance operations are properly addressed and their appropriate corrective actions are implemented in a timely manner.

Inspection Results
An essential element of the GoTriangle System Safety Program is regular inspection of all system facilities and equipment to ensure safe and effective operation. Safety and Training personnel work closely with Maintenance and Facilities Operations to ensure that appropriate checklists and procedures are in place for fire/life safety, industrial and occupational safety requirements are met. Establish and implement a pre-trip and post-trip inspection program. Maintain proper maintenance documentation in support of maintenance inspection activities.

Internal Safety Investigations
Safety assurance activities are required to ensure a proactive approach to identifying hazards before they become accidents or incidents, and to verify that safety and security programs have been developed and implemented. Conducting inspections and audits includes conducting site surveys and personnel interviews to evaluate employee work practices and work environments.

Accident and incident Reports
Conducting comprehensive investigations of events to determine their underlying causes often leads to the identification of hazards not readily identifiable during daily operations or through inspections, audits, or through employee, customer, or contractor reports. Once identified, the hazards are eliminated or controlled. Ensure that any safety accident investigations or incidents are properly addressed and their appropriate corrective actions are implemented.

Committee Reviews
The Safety Committees work to develop acceptable corrective actions, however, the Director of Transit Operations is ultimately responsible for the safety of GoTriangle's operations and services, and ensuring a proactive approach in assisting GoTriangle management to identify and control hazards.

Industry Data and Governmental Sources (FTA, State Safety Oversight Agency)

It is critical for safety assurance at GoTriangle that safety-related data is acquired from various sources. Furthermore, analysis and distribution of that data to GoTriangle management and staff is also critical to ensuring safe operation and performance. In some instances, the acquired data is used to meet external reporting requirements for FTA and/or the SSOA. Trend analysis is performed on the acquired data as a means of identifying trends in accidents and occupational injuries in order to develop and implement corrective action to predict and prevent further occurrences.

Appendix B: GoTriangle 2018 Annual Performance

GoTriangle's Safety Performance Targets CY 2020 (based on the safety performance measures established under the National Public Transportation Safety Plan)						
Mode of Service	Fatalities (total)	Fatalities (per 100k VRM)	Injuries (total)	Injuries (per 100k VRM)	Safety Event (total)	Safety Events (per 100k VRM)	System Reliability (failures/VRM)
Fixed Route Bus (DO)	0	0.000	3	0.125	3	0.125	25,577
Fixed Route Bus (PT)	0	0.000	0	0	0	0.000	22,530
Paratransit (DO)	0	0.000	0	0	0	0.000	99,902
Vanpool (PT)	0	0.000	0	0	0	0.000	99,902

MEMORANDUM

TO: Operations and Finance Committee

FROM: Finance & Administrative Services

DATE: December 3, 2020

SUBJECT: **Wake Transit FY 2021 Q1 Proposed Amendment**

Strategic Objective or Initiative Supported
Implement the Wake Transit Plan with Transit Planning Advisory Committee

Action Requested
Staff requests that the GoTriangle Operations & Finance Committee recommend to the GoTriangle Board of Trustees funding of $1,100,000 currently allocated to reserve in the Wake Transit Adopted Plan to reimburse the federal interest in five (5) parcels located along the planned Greater Triangle Commuter Rail (GTCR) corridor in Wake County categorized by the FTA as Group 2 parcels. In order to retain the federal interest in these parcels, the GTCR had to be in project development by the end of 2019. When the decision was made not to move into project development in 2019, the FTA directed GoTriangle to reimburse the federal interest in the Group 2 parcels. Included in the scope of the amendment is the appraised value of the Group 2 parcels located in Wake County, demolition of a small, vacant structure located at 201 Morris St. in Morrisville, and contingency for additional potential expenses. FTA reviewed the appraisals and issued concurrence.

Background and Purpose
One major amendment listed below has been submitted for approval:
1. CRT Related – Wake County Property
    a. Allocate previously adopted funding from Reserve to GoTriangle.
    b. No financial impact.

As a part of the packet presented with this memorandum, the committee will find:
- Detailed Individual Project Amendment Request

At the time of the Operations and Finance Committee receiving this item, TPAC will have already reviewed and recommended this amendment to both the CAMPO Executive Board and the GoTriangle Board of Trustees. The CAMPO Executive Board approved this item during the November 18th Executive Board Meeting.

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Research Triangle Park, NC 27709
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Financial Impact

The proposed amendments, if recommended by this committee and approved by the Board of Trustees, will have no financial increase to the FY21 Wake Transit Work Plan.

Staff Contact(s)

- Steven Schlossberg, Budget and Finance Manager, sschlossberg@gotriangle.org, (919) 485-7590
- Saundra Freeman, CFO/Director of Finance and Administrative Services, sfreeman@gotriangle.org, (919) 485-7415

NC Capital Area Metropolitan Planning Organization

One City Plaza
421 Fayetteville Street
Suite 203
Raleigh, NC 27601

Staff Report

Agenda Date: 11/18/2020
To: Executive B

Agenda Item: 5.3

FY 2021 Wake Transit Work Plan - 1st Quarter Amendment Request
Bret Martin, MPO Staff

One (1) FY21 Wake Transit Work Plan amendment request was submitted by GoTriangle for the 1st quarter of the fiscal year. Documentation for the amendment request, including more information on the nature of the request as provided to the Wake County Transit Planning Advisory Committee (TPAC), is included in **Attachment A**. Per the adopted Wake Transit Work Plan Amendment Policy, the amendment request falls into the 'Major Amendment' category.

The requested amendment, if approved, would allocate $1.1 million from Project TC004-A (Project Development for Commuter Rail from Garner to Western Durham - Wake Share) to GoTriangle to reimburse the Federal Transit Administration (FTA) for its financial interest in five (5) parcels along the planned commuter rail corridor in Wake County. Also included in the scope of the request is the demolition of a structure on one of the parcels and a small contingency for additional potential expenses. The parcels were previously purchased by GoTriangle with FTA funds in support of a rail project under development in prior years. The FTA's ownership share in the parcels is 55.7 percent. This reimbursement would give GoTriangle a 100 percent ownership interest in the subject parcels. GoTriangle plans to retain the parcels for project-related uses, such as station facilities and laydown areas for construction and contractor access, should construction of a commuter rail project proceed.

The amendment request was released for public comment between August 7, 2020, and September 6, 2020. No public comments were received in response to the amendment request. The TPAC recommended approval of the request at its October 14th regular meeting with a finding that the scope for the requested project is appropriate for the continued implementation of commuter rail as envisioned in the Wake County Transit Plan and that funding the request does not involve an unwarranted re-appropriation of funds.

Requested Action: Consider approval of the FY 2021 Wake Transit Work Plan 1st quarter amendment request and authorization for the Executive Director to sign the applicable project-level agreement to the Executive Board

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ATTACHMENT A

WAKE COUNTY TRANSIT PLAN: IMPLEMENTATION

From: Bret Martin, Wake Transit Program Manager, Capital Area MPO

To: Wake County Transit Planning Advisory Committee (TPAC)

Date: 10/5/2020

Re: Summary of Requested FY 2021, 1st Quarter Work Plan Amendment

One (1) amendment request that impacts the Fiscal Years (FY) 2020 and 2021 Wake Transit Work Plans was submitted for consideration of approval in the 1st quarter of FY 2021. The amendment request was reviewed by CAMPO staff to determine the appropriate amendment type classification (major versus minor) as outlined in the Wake Transit Work Plan Amendment Policy. The amendment request is categorized as a 'Major Amendment' for the following reasons:

1) The requested amendment requires a change in budgeted reserves to allocate the requested funding to a specific project sponsor; and
2) The requested amendment involves the creation of a new project with a scope that goes beyond the scope of the original reserve allocation.

The amendment request was released for public comment from August 7, 2020, through September 6, 2020. No public comments were received.

The requested amendment, if approved, would allocate $1.1 million from Project TC004-A (Project Development for Commuter Rail from Garner to Western Durham – Wake Share) to GoTriangle to reimburse the Federal Transit Administration (FTA) for its financial interest in five (5) parcels along the planned commuter rail corridor in Wake County. Also included in the scope of the request is the demolition of a structure on one of the parcels and a small contingency for additional potential expenses. The request originally submitted by GoTriangle was for $1.4 million but was subsequently reduced to an updated requested amount of $1.1 million. The parcels were previously purchased by GoTriangle with FTA funds in support of a rail project under development in prior years. The FTA's ownership share in the parcels is 55.7 percent. This reimbursement would give GoTriangle a 100 percent ownership interest in the subject parcels. GoTriangle plans to maintain the parcels for project-related uses, such as station facilities and laydown areas for construction and contractor access, should construction of a commuter rail project proceed.

Attached to this memorandum are the following:

- Proposed FY 2021 Q1 Amendment List (released for public comment)
- Completed Amendment Request Form (released for public comment)
- Joint Budget & Finance/Planning & Prioritization Subcommittee Disposition Memo and Voting Record
- Maps Identifying the Subject Parcels and Relevance to the Commuter Rail Corridor

A scope and financial disposition for the amendment request was developed by the Planning & Prioritization and Budget & Finance Subcommittees and recommended to the TPAC at a joint meeting held on August 25th. The amendment request was first considered for recommendation of approval to the Wake Transit governing boards by the TPAC at its September 9th regular meeting, but the TPAC took action to table the request and cited the need to receive further supporting information identifying the locations of the subject parcels for evaluation of their relevance to the commuter rail corridor. Subsequent to the TPAC's September 9th meeting, GoTriangle provided this

ATTACHMENT A

WAKE COUNTY TRANSIT PLAN: IMPLEMENTATION

information and additional background information on the history of the subject parcels. Following is the additional information GoTriangle provided on the history of the subject parcels:

'GoTriangle has worked closely with the FTA on the utilization and disposition of properties acquired with New Starts funding in 2003 and 2004 for a regional rail project that did not advance to a full funding grant agreement. The FTA classified the parcels into four groups and issued written guidance in 2015 providing disposition instructions and conditions to be met in order to retain certain properties. GoTriangle provided a disposition and utilization plan to the FTA in 2016 and continues to provide regular updates. FTA agreed to allow GoTriangle to retain parcels on Lane Street for transit amenity storage as well as the parcels needed for the Raleigh Union Station Bus Facility (RUS Bus).

In order to retain the properties needed for the Greater Triangle Commuter Rail (GTCR) project, GoTriangle had to be in project development by the end of 2019. When the project did not advance to PD, the FTA directed GoTriangle to reimburse the federal interest in five parcels located in Wake County in a manner consistent with FTA C 5010.1E. Accordingly, GoTriangle may either sell the properties and return 55.7% of the proceeds to the FTA or retain the properties and reimburse the FTA 55.7% of the fair market value. These are the only remaining properties in Wake County owned by GoTriangle with a federal interest in them.   GoTriangle strongly recommends retaining the parcels as they are needed for the GTCR.

The alternative to paying back the federal share would be to sell the properties, but then we run the risk of needing to buy them back in the future at a higher price or not being able to repurchase them at all.

We feel that these properties are important for the commuter rail project and potentially other Wake Transit projects. We request that the governing boards authorize the Wake Transit Plan to pay $1.1 million dollars to buy out the federal shares of these five parcels.'

FY 2021, Quarter 1, Requested Wake Transit Work Plan Amendment

REQUESTED MAJOR AMENDMENT

Project ID #	Agency	Project Title	FY20 Original Funding Allocation	FY 21 Original Funding Allocation	FY21 Requested Funding Allocation	FY 21 Funding Impact	Reason for Major Amendment Status
			Capital Budget Amendment Request				
TC004-A	GoTriangle	Commuter Rail from Garner to Western Durham (Wake County Share)	$ 39,360,371.00	$ -	$ 1,100,000.00	$ -	The original $39,360,371 allocation for project TC004-A was placed in reserves in the Adopted/Amended FY 2020 Wake Transit Work Plan. This amendment request requires a change in budgeted reserves to allocate the requested funding to a specific project sponsor for a new but related project with an expanded scope beyond the scope of the original allocation.

Distributed for Public Comment on 8/7/2020

Public Comments Accepted Through 9/6/2020

Submit all comments to Bret Martin, Wake Transit Program Manager - Bret.Martin@campo-nc.us or 919-996-4410

Wake Transit Project ID #		FY 2021		FY START DATE
		Wake Transit Work Plan		7/1/2020
TC004A2		**Project Amendment Request Form**		
		Operating and/or Capital		

Type of Amendment   **Minor** ☐   **Major** ☑

Minor amendment – Required when there is:
A transfer of funds between budget ordinance appropriations but requires less than a 20% change to a project appropriation for projects equal to or greater than $500,000
A transfer of funds between budget ordinance appropriations but requires less than a $100,000 change to a project appropriation for projects less than $500,000
Any change that does not meet any criteria of a major amendment

Major amendment - Required when there is:
A project requested to be added to the Work Plan
A project requested to be removed from the Work Plan
Significant changes in scope of funded project
A transfer between budget ordinance appropriations that requires equal to or greater than a 20% change to a project appropriation for projects greater than $500,000
A transfer between budget ordinance appropriations that requires equal to or greater than a $100,000 change to a project appropriation for projects less than $500,000
Any change that requires a change in budgeted reserves or fund balance

New/Amended Project Name	Requesting Agency	Project Contact	Estimated Operating Cost	
CRT Related - Wake County Property	GoTriangle	Gary Tober - Director of Real Estate 919-485-7577	Base Year	$ -
			Recurring	$ -
Estimated Start Date	**Estimated Completion**	**Notes**	**Estimated Capital Cost**	
11/01/20	TBD	**Wake Transit Plan - Adopted Funding Cost Neutral**	Base Year	$ -
			Cumulative	$ -

Project Description	Enter below a summary of the project amendment and impact on approved plan.

Appraisals for five (5) parcels have been ordered that are instrumental in connection with the Commuter Rail Project. The Federal interest of these parcels are due by the end of calendar year 2020 to retain their availability in the overall Commuter Rail project. Representatives from Wake County have indicated that they wish to retain the parcels for future use. GoTriangle desires to utilize previously approved Wake Transit funding associated with the Commuter Rail (currently in reserve) to reimburse the federal portion of the parcels. The cost neutral amendment will guarantee that the parcels will be available for future use. The parcels are within Wake County adjacent to the proposed commuter rail corridor, and would be used for project-related purposes including construction of station facilities and/or for contractor access and laydown areas during construction. The FY21 Durham Transit Work Plan includes funding for repayment of the federal share of similar parcels along the commuter rail corridor in Durham County.

1. Enter Wake Transit Project ID(s) to Increase

Project ID	Project	Appropriation Category	Amount	Recurring Amount	Notes
TC004A2	Wake County - CRT Related Properties	CRT - GoTriangle	$ 1,100,000	$ -	Reallocate funds currently in reserve to GoTriangle. This amendment is cost neutral.
TOTAL			$ 1,100,000	$ -	

2. Wake Transit Project ID(s) to Reduce

Project ID	Project	Appropriation Category	Amount	Recurring Amount	Notes
TC004A	Commuter Rail from Garner to Western Durham	CRT - Reserve	$ 1,100,000.00	$ -	Reallocate funds currently in reserve to GoTriangle. This amendment is cost neutral.
TOTAL			$ 1,100,000	$ -	

3. Impact on Transit Plan Project Costs

From above, indicate whether amounts impact operating or capital budgets in Wake Transit Plan.	Estimated Operating Cost	Current Year	$ -
		Recurring	$ -
	Estimated Capital Cost	Base Year	$ -
		Cumulative	$ -

Project Justification / Business Case	Provide responses to _EACH_ of the questions below. Answer the questions as fully as possible. Enter Non-Applicable (N/A) as appropriate.

4. Is this New/Amended project Operating, Capital or Both?   Operating ☐   Capital ☑   Both ☐

5. What is the timeframe for the request? Are you requesting a full year of funds or a partial year to be annualized in future fiscal years?

The amendment has zero financial impact to the Wake Transit Plan. The requested amount (from reserve) will impact FY21 Q2 as the payment is anticipated to be disbursed to the FTA (Federal Transit Administration) during the quarter.

6. What is the expected outcome(s) if this request is funded? What is the alternative if the request is not funded?

Possession of many key parcels that are needed for the CRT project will be surrender. GoTriangle anticipates the price to reacquire the parcels will increase substantially if needed for a future project.

7. List below the Key Performance Indicators (deliverables) while this project is in progress. These performance measures will be reported quarterly. Are these the same measures as currently being reported?

a) Appraisals Completed

b) Payment Submitted to FTA

c) Payment Accepted by FTA

8. List any other relevant information not addressed.

9. Please enter estimated appropriations to support expenses identified above. Enter FY 2021 and the estimated annualized cost in FY 2022 using the 2.5% growth factor, if applicable. The spreadsheet will calculate 2023 and beyond by 2.5%. If your project is not expected to have recurring costs in FY 2023 and/or beyond, delete the calculation(s) in columns E-H.

Cost Break Down of Project Request							
OPERATING COSTS	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**
Growth Factors		2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Salary & Fringes			-	-	-	-	-
Contracts			-	-	-	-	-
Bus Operations:							
Estimated Hours			-	-	-	-	-
Cost per Hour			-	-	-	-	-
Estimated Operating Cost	-	-	-	-	-	-	-
Bus Leases			-	-	-	-	-
Park & Ride Lease			-	-	-	-	-
Other			-	-	-	-	-
Other			-	-	-	-	-
Subtotal: Bus Operations	-	-	-	-	-	-	-
Other: Administrative							
Other: Database Hosting			-	-	-	-	-
Other: Supplies and Materials			-	-	-	-	-
TOTAL OPERATING COSTS	-	-	-	-	-	-	-

10. Please enter estimated appropriations to support contractual commitments and other expenses related to proposed capital projects identified above.

CAPITAL COSTS	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**
Design/NEPA	$ -	-	-	-	-	-	-
Equipment	-	-	-	-	-	-	-
Land - Right of Way	-	-	-	-	-	-	-
TOTAL CAPITAL COSTS	-	-	-	-	-	-	-

Assumptions for Costs and Revenues Above:

11. Please state any assumption(s) used to calculate the capital and operating dollars and revenues shown above.

$1.1M is anticipated to be the amount needed. The amendment is cost neutral as GoTriangle desires the utilization of approved previous year CRT funding that is currently in reserve. Financial assumption is based on discussions with the FTA and preliminary results from the appraisals preformed on the parcels.

WAKE COUNTY TRANSIT PLAN: IMPLEMENTATION

Joint Disposition and Voting Record
Joint Meeting of the Planning & Prioritization and Budget & Finance Subcommittees

August 25, 2020 – 1:30pm-2:00pm

Per the Wake Transit Plan Amendment Policy, the TPAC Budget & Finance and Planning & Prioritization Subcommittees are tasked with jointly reviewing the quarterly Work Plan draft amendment list and amendment request forms when Major Amendment requests are submitted. The subcommittees consider appropriateness of changes in scope and, if applicable, financial choices and tradeoffs associated with the proposed amendments and create a disposition for TPAC consideration. Upon review of the disposition and related amendment requests, the TPAC will make recommendations to the GoTriangle Board of Trustees and CAMPO Executive Board for approval or disapproval of requested amendments to the Work Plan. Following is the voting record and disposition from the joint meeting of the Budget & Finance and Planning & Prioritization Subcommittees held on August 25th, where the requested amendment was reviewed.

Voting Members for Budget & Finance
CAMPO, Bret Martin
Wake County, Chris Dillon
City of Raleigh, Shavon Tucker
Town of Cary, Christine Sondej
GoTriangle, Steven Schlossberg
Town of Apex, Jenna Shouse
Town of Garner, Gaby Lawlor
Town of Fuquay-Varina, Allyssa Stafford

Voting Members for Planning & Prioritization
CAMPO, Bret Martin
Wake County, Chris Dillon
Town of Cary, Christine Sondej
City of Raleigh, David Walker
GoTriangle, Sharon Chavis
Town of Apex, Jenna Shouse
Town of Garner, Gaby Lawlor
Town of Fuquay-Varina, Allyssa Stafford

Other Attendees
CAMPO (TPAC), Stephanie Plancich
CAMPO, Evan Koff
Town of Cary, Tony Wambui
TJCOG, John Hodges-Copple

Amendment Request Description: The requested amendment, if approved, would allocate $1.4 million [later changed to $1.1 million] from Project TC004-A (Project Development for Commuter Rail from Garner to Western Durham – Wake Share) to GoTriangle to reimburse the Federal Transit Administration (FTA) for its financial interest in five (5) parcels along the planned commuter rail corridor in Wake County. GoTriangle has asserted that reimbursement of FTA's interest in these parcels is due by the end of calendar year 2020 to retain the parcels' availability to use for the planned commuter rail project. The parcels were previously purchased by GoTriangle with FTA funds in support of a rail project under development in prior years. The FTA's ownership share in the parcels is 55.7 percent. This reimbursement would give GoTriangle a 100 percent ownership interest in the subject parcels. GoTriangle plans to maintain the parcels for project-related uses, such as station facilities and laydown areas for construction and contractor access, should construction of a commuter rail project proceed.

WAKE COUNTY TRANSIT PLAN: IMPLEMENTATION

<u>Joint Disposition and Voting Record</u>
Joint Meeting of the Planning & Prioritization and Budget & Finance Subcommittees

August 25, 2020 – 1:30pm-2:00pm

Subcommittees' Disposition: The Planning & Prioritization and Budget & Finance Subcommittees found that the scope for the project requested to be funded is appropriate for the continued implementation of commuter rail as envisioned in the Wake County Transit Plan and that funding the request does not involve an unwarranted re-appropriation of funds. The allocation of funding to the requested project would come from a reserve allocation set aside for commuter rail project development (Project TC004-A) in the FY 2020 Wake Transit Work Plan. While the scope of the project requested to be funded does not fall within the original scope of Project TC004-A, moving funds from the original allocation in reserve was found to be an appropriate use of that funding as GoTriangle continues to plan for implementation of commuter rail.

Discussion: In the subcommittees' discussion of the amendment request, it was further discussed that this amendment request would remove FTA's financial interest in all properties in Wake County for which it had previously established an interest. It was also noted that the reimbursement to FTA of its financial interest in both Wake and Durham Counties should be tracked and accounted for when discussions on cost share for a commuter rail project occur between the two counties. In the subcommittees' discussion on the item, GoTriangle noted that it would reimburse Wake Transit as revenue to the Wake Capital Fund should a commuter rail project not proceed and that this particular provision will be detailed in GoTriangle's agreement with the tax district. CAMPO mentioned that GoTriangle will need to provide identifying information for the five (5) parcels, such as addresses, to attach to the scope to be included for the requested project in an amended Work Plan. Many subcommittee members requested that the TPAC and its subcommittees take a closer look at establishing rules and expectations for Wake Transit's involvement in real estate interests, including rules for disposal of real property assets, if necessary.

Vote: A motion was made by David Walker (City of Raleigh) and seconded by Bret Martin (CAMPO) to forward this disposition to the TPAC. The subsequent vote was unanimous.
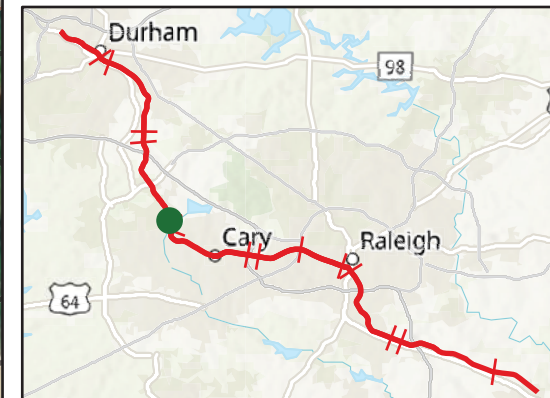
FTA-assisted Parcels (Cary)

Anticipated commuter rail use: construction laydown, park and ride

Potential other transit uses: additional parking to support proposed Downtown Cary multi-modal facility including park and ride for BRT and other bus services and potential longer-term joint development

Potential other non-transit uses: affordable housing, mixed-use development, public facility, parkland, municipal parking
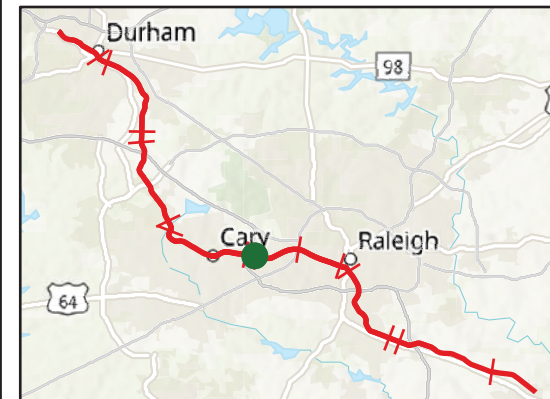
Chapel Hill Rd

E Durham Rd

Adams St

Wilkinson Ave

232 North Harrison Avenue

228 North Harrison Avenue

N Harrison Ave

N Academy St

Ambassador Loop

Hillsboro St

E Cedar St

Durham

Cary

Raleigh

Streets

Parcels

NCRR Corridor

1" = 200'

N
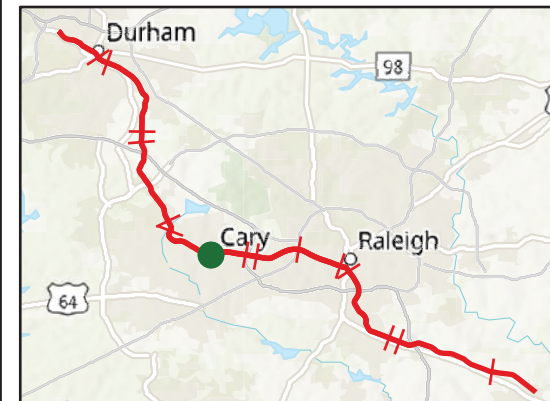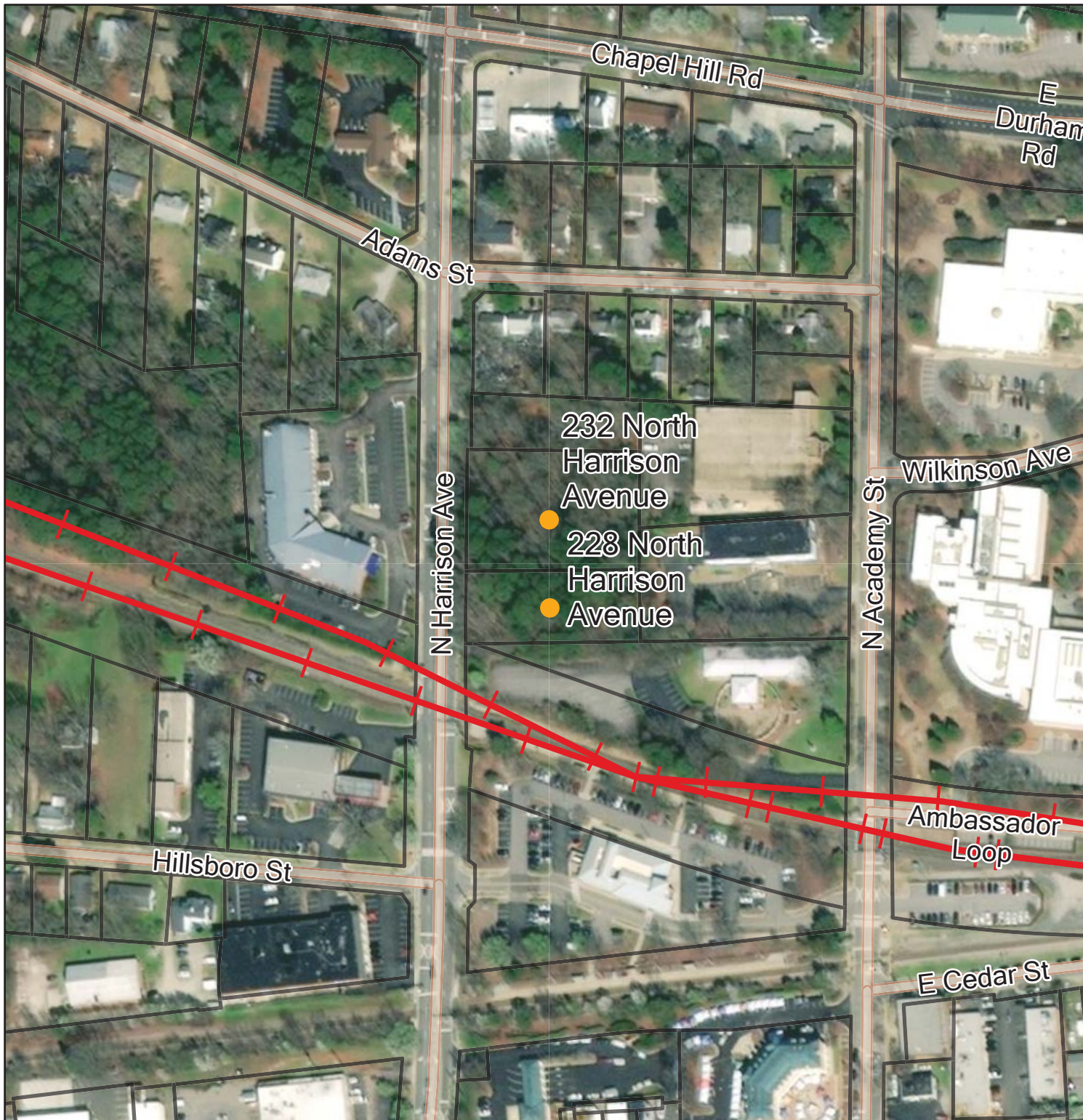
FTA-assisted Parcels (Morrisville)

Anticipated commuter rail use: construction access, possible street access to adjoining parcel

Potential other non-transit uses: parkland, open space

201 Morris St.

Cotten Dr

Morris St

Page St

Church St

Ashe St

Chapel Hill Rd

Aviation Pkwy

Morrisville Carpenter Rd

Page St

Franklin Upchurch Sr St

Durham

98

Cary

Raleigh

64

Streets

Parcels

NCRR Corridor

N

1" = 200'

Esri, CGIAR, USGS, GeoEye, Microsoft, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

FTA-assisted Parcels (Raleigh)
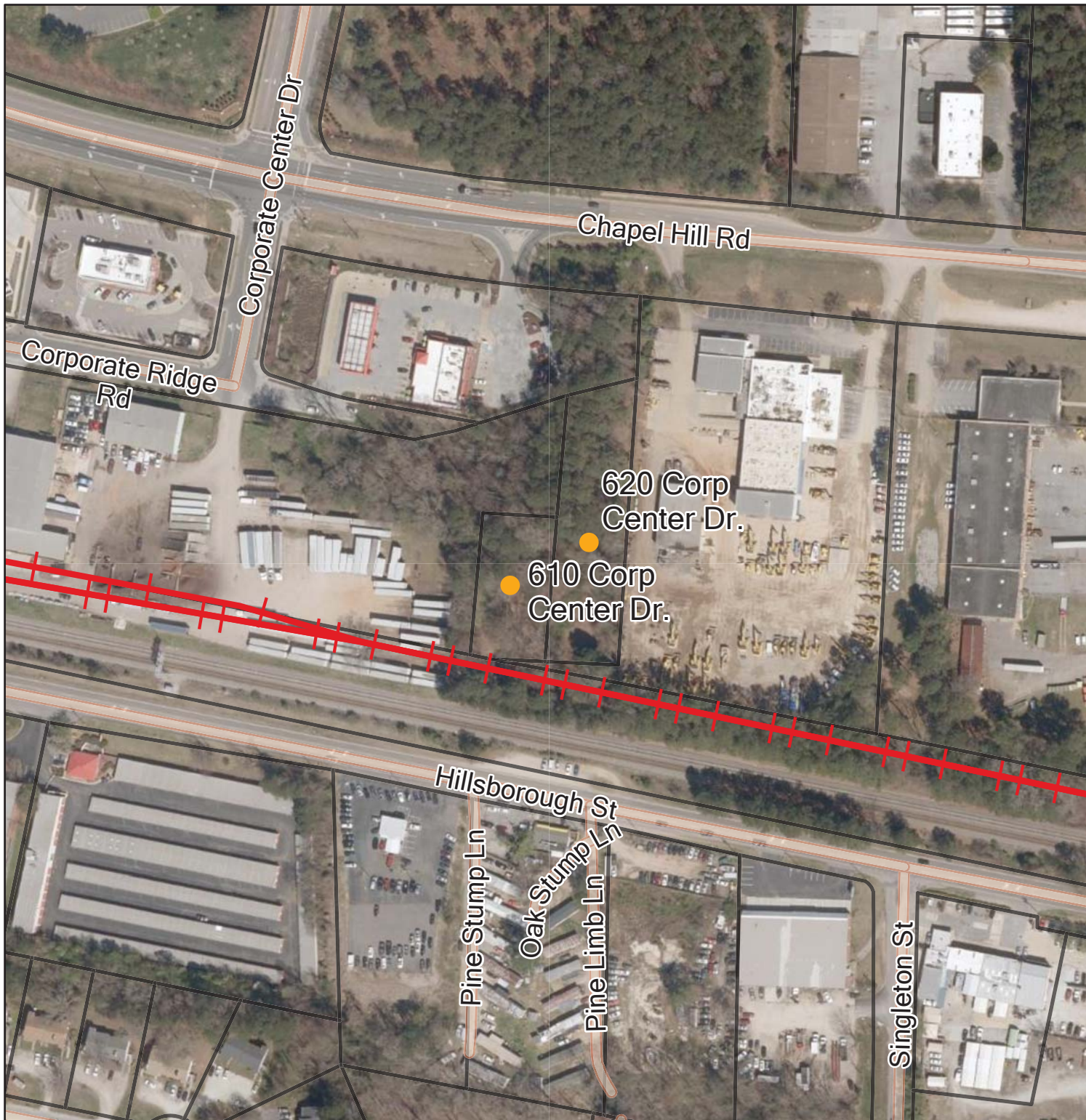
Anticipated commuter rail use: station access, park and ride, possible construction laydown/access

Potential other non-transit uses: light industrial development

620 Corp Center Dr.

610 Corp Center Dr.

Corporate Center Dr

Chapel Hill Rd

Corporate Ridge Rd

Hillsborough St

Pine Stump Ln

Oak Stump Ln

Pine Limb Ln

Singleton St

Durham

Cary

Raleigh

Streets

Parcels

NCRR Corridor

N

1" = 200'

Esri, CGIAR, USGS, City of Raleigh, GeoEye, Microsoft, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

Regional Transit
Technology Integration Plan

December 2019

Prepared for

Prepared by

Table of Contents

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Executive Summary

We are living in a time of unprecedented change: rapid growth, an explosion of new technology options, and new people moving into the Raleigh-Durham region. These changes provide the GoForward regional partners – GoCary, GoDurham, GoTriangle, GoWakeAccess – and other regional transportation providers an opportunity to transform the region by making it more navigable, sustainable and welcoming.

The way people use transit and, to some extent, the role of transit as a mobility provider in the region are rapidly changing. Technology is providing new ways to pay for transit – and to get the best value without purchasing an expensive pass. It's also spawning powerful new planning and management tools for customers and agencies alike. These new functions can enhance the customer experience, grow ridership and provide management tools, data and analytics to help make the transit service more effective, responsive, targeted and efficient.

With these changes in mind, the GoForward partners have drafted a new Regional Transit Technology Integration Plan. The Plan includes technology innovations that will improve, simplify and streamline the customer experience by integrating trip planning, fare payment, wayfinding, and trip guidance. It will help reduce trip times and increase on-time performance while it improves safety and operating efficiency.

A constellation of technologies powers the Plan. It includes new and updated Automatic Fare Collection (AFC) systems, Computer Aided Dispatch and Automatic Vehicle Location (CAD/AVL) systems, Real Time Bus Information (RTBI) systems, Automatic Voice Annunciation (AVA) systems, Passenger Information Display Systems (PIDS), Collision Avoidance Systems (CAS), and Traffic Signal Priority (TSP) systems. These systems will help the regional partners provide a more integrated and efficient regional transit network that can more easily integrate with other mobility providers and modes of transport. They underpin a Plan that will lead to providing faster, more cost-effective, comfortable, convenient, safe, and reliable transit service.

Roadmap

The Regional Transit Technology Plan was developed by the GoForward partners to ensure that they would optimize future technology investments. The Plan includes a technology roadmap that will help the partners ensure that technology investments are

- aligned with regional and agency goals and objectives
- reflect best practices and industry trends
- consider agency priorities and available resources,
- identify synergies and opportunities to capture greater value, and
- consider opportunities for early wins

As they were developing the roadmap, the agencies considered regional goals and objectives for Wake, Durham and Orange counties. For example, the plan was developed to be aligned with the four 'big moves' those noted in the Wake County Transit Plan – connecting the region, connecting communities, creating frequent, reliable urban mobility, and enhancing access to transit. Both the Durham and Orange Transit Plans are currently being revisited and will be updated as the Durham Orange Light Rail project is no longer moving forward.

wsp

These regional goals are echoed in the partner agency plans including GoTriangle's 2017-2021 Strategic Plan. They are to improve mobility in the region; assure high-quality customer service through direct operation and partnerships; and encourage sound growth patterns.

The partners also considered best practices and industry trends for both AFC and ITS technology components of their roadmap. Aside from leveraging technology to maximize efficiencies, AFC and ITS systems are benefiting from significant innovation from firms in related sectors such as manufacturers of both heavy-duty and light-duty vehicles. These firms are investing in the sector and commercializing valuable new technologies. Ever more cost-effective services and greater system integration capabilities are simplifying and speeding installation.

A summary of the key alignment considerations for the Regional Transit Technology Integration Plan is shown below in Table 1:

Table 1: Key alignment considerations for the Regional Transit Technology Integration Plan

	Agency and Regional Goals	Best Practices and Industry Trends	Agency Priorities	Opportunities for Early Wins
AFC	New fareboxes and mobile ticketing application can offer new functionality to enhance customer experience	Open payments, and fare capping included in new offerings	AFC is an agency priority to improve customer experience. The roadmap is based on agency readiness, but offers opportunities for acceleration	New fareboxes and mobile ticketing application can offer new functionality and convenience for customers
CAD/AVL	New, integrated CAD/AVL systems are key ITS building blocks that can enhance customer service, and improve regional coordination	New CAD/AVL systems are central to bus operations and are moving toward more complete integration with other AFC and ITS systems	New CAD/AVL systems are a priority for most of the partners and a new system is being implemented at GoRaleigh	Identifying funding to accelerate CAD/AVL systems across the partners would facilitate regional coordination and mobility
RT Bus Info	Real Time Bus Information systems that provide accurate information across routes and systems improves the customer experience and facilitates regional mobility	Many new CAD/AVL systems are based on the Real Time General Transit File Specification (GTFS-RT) and provide real time information	Ensuring continuity of real time bus information is a priority for the agencies.	The partners are developing a strategy to maintain service despite loss of vendor support in mid-2020
PIDS	Passenger information display systems improve the customer experience and facilitate mobility	Some agencies are having success with firms that fund and operate PIDS that include advertising	Agencies consider customer information, services and amenities a high priority	The partners may wish to consider a pilot project with interested vendor(s)
CAS/VSS	Collision avoidance systems and vehicle security systems make systems safer and more effective, reducing delays and improving service	Collision avoidance systems are becoming more sophisticated with expanding coverage and greater speed and functionality	Agencies consider CAS/VSS top priorities for risk management and savings	Several partners are installing CAS/VSS and should consider evaluating more sophisticated systems
TSP	The region will be deploying transit signal priority systems to speed service on new Bus Rapid Transit routes which will create more frequent, reliable transportation as they connect the region	Transit signal priority systems are becoming more cost-effective as their adoption increases	GoRaleigh and GoDurham have been evaluating TSP and believe it will be a valuable tool to reduce trip time and improve performance	New BRT activities will facilitate further development of TSP systems

The figure below shows the current five-year regional technology integration roadmap for the region. The current roadmap includes technologies that the partner agencies have identified as critical to realizing regional goals and objectives including Wake County's "four big moves." The roadmap is constrained by agency resources – both available funds and their resources available to deliver significant new technology projects. Additional funding could help improve regional alignment and expedite implementation of key technologies such as new CAD/AVL and vehicle radio systems that would yield additional opportunities for "early wins."

Figure 1: Five-Year Technology Roadmap

Roadmap	2020	2021	2022	2023	2024
Automated Fare Collection					
Bus Fare Collection					
GoCary		▮			
GoDurham					▮
GoRaleigh					
GoTriangle	▮	▮			
GoWake				▮	
Gen2 Mobile App					
GoCary			▮		
GoDurham			▮		
GoRaleigh			▮		
GoTriangle			▮		
GoWake			▮		
Business Intelligence					
BI System					
GoCary				▮	
GoDurham				▮	
GoRaleigh				▮	
GoTriangle				▮	
GoWake				▮	
Intelligent Transportation Systems					
Automated Passenger Counters					
GoCary		▮			
GoDurham					
GoRaleigh			▮		
GoTriangle		▮			
GoWake					
Computer Aided Dispatch / Automated Vehicle Location					
GoCary		▮			
GoDurham	▮				
GoRaleigh					
GoTriangle	▮				
GoWake				▮	
Collision Avoidance System					
GoCary		▮			
GoDurham					
GoRaleigh	▮				
GoTriangle				▮	
GoWake					
Real Time Bus Information					
GoCary	▮				
GoDurham					
GoRaleigh					
GoTriangle					
GoWake					

The Regional Transit Technology Integration Plan presents recommended action strategies over the next five years with an estimated capital funding range of $25 to $50 million. The Plan builds a pathway for the region to follow over the next five years and beyond.
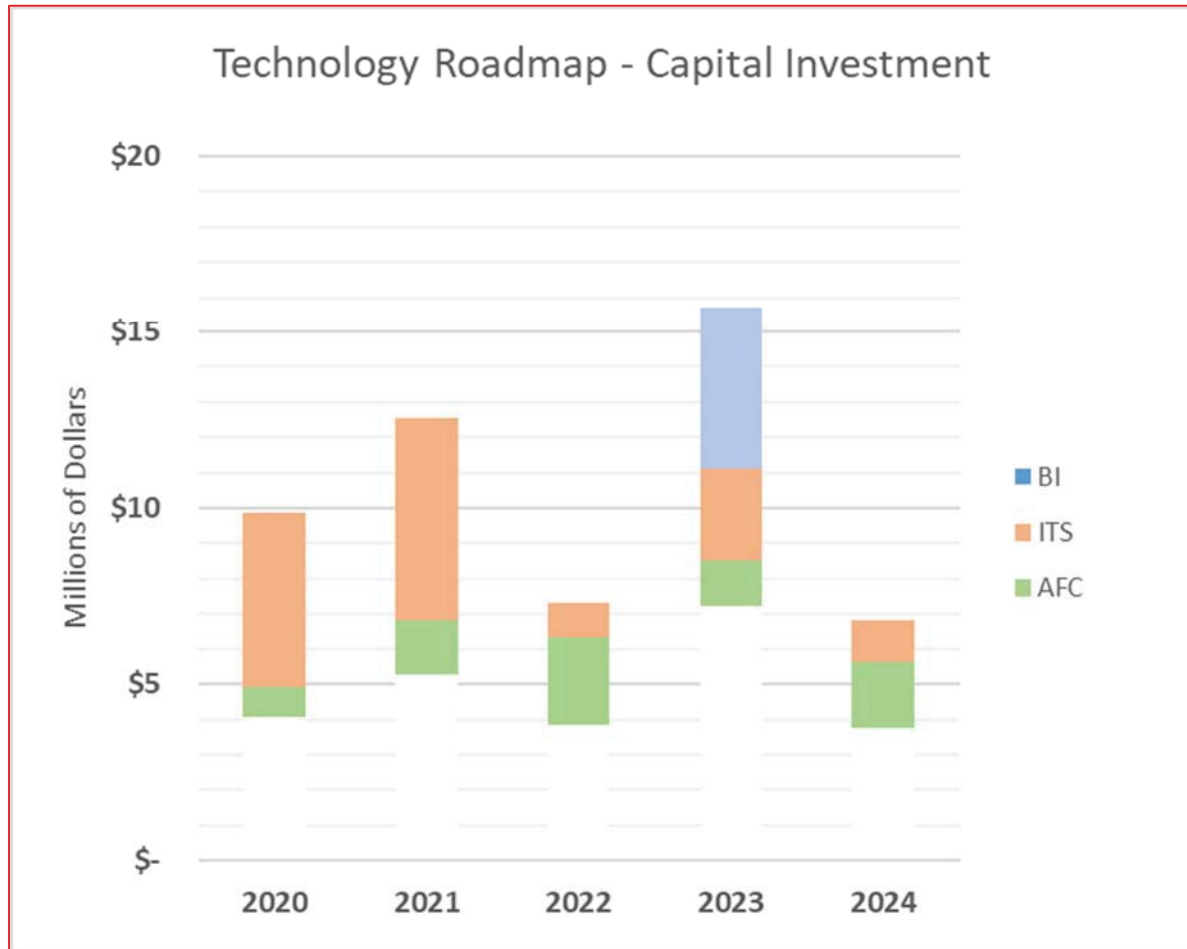

Figure 2: The technology roadmap is estimated to require between $25 and $50 million in capital investment over the next five years. Estimated ranges for AFC, ITS and Business Intelligence systems are shown above.

Recommendations and Next Steps

The technology roadmap provides an overview of the key systems and technologies that will help the GoForward partners and their partner agencies in the Research Triangle to realize their strategic objectives. The following recommendations and next steps will facilitate further development and implementation of the regional strategy:

- Implement a program to guide, encourage and govern regional technology investments to help realize optimal benefits

- Develop a regional enterprise architecture for strategic technologies that ensures integration and accommodates partner agency plans, capabilities and project delivery capacities

- Consider accelerating implementation of radio and CAD/AVL and AFC system upgrades using available funding resources. CAD/AVL and AFC systems are the foundations for improved customer service – including many customer amenities like onboard WiFi and integrated trip planning, payment, and guidance.

- Continue to leverage regional procurements and develop a strategic regional sourcing plan to optimize value and minimize implementation delays

- Include provisions to require system integration in vendor agreements

- Consider PIDS systems that are partially or wholly funded by advertisements

Introduction

The GoForward regional partners (GoTriangle, GoRaleigh, GoDurham, GoCary and WakeACCESS) retained WSP to help develop a regional plan to integrate technologies that support transit operations. The partners will use the plan to improve customer service and enhance operational performance across the three-county region.

Project Understanding

The regional partners are interested in developing a regional technology integration plan to help them identify steps that may be taken by the transit agencies jointly and individually to advance the strategic business objectives of the five partner agencies and the three-county region as a whole. The partners would like the plan to help them align the technology assets that support fixed-route, on-demand and paratransit services and improve them according to industry trends and best practices. The study should focus on technologies that support key transit functions such as

- Automated fare collection (AFC)
- Customer information and experience management
- Service planning
- Vehicle dispatch and communications
- Vehicle monitoring and security
- Vehicle and facility operation and maintenance, and
- Resource planning and management

The Partners would like the plan to foster regional integration but acknowledge the requirements and priorities of the individual regional partners. It should highlight standards and practices that will facilitate integration while affording flexibility in deployment. The plan should also identify risks that could affect technology deployments as well as strategies to mitigate them.

Reference Documents

2040 Cary Community Plan

Central Durham Transportation Study (movedurham.org)

Chapel Hill Short Term Transit Plan

Durham County Bus Rail Investment Plan

Durham County Transit Plan

GoTriangle Strategic Plan 2017-2021

GoTriangle Short-Range Transit Plan

Orange County Transit Plan

Wake County Fare Integration Study

Wake County Transit Plan

Western Wake Comprehensive Operational Analysis

Approach

The Regional Partners set out to develop a regional technology integration strategy that

- Helps the partners and the region advance their strategic goals and objectives
- Leverages industry trends and best practices
- Includes opportunities for near-term wins
- Is embraced by both customers and stakeholders

Report Contents

This report summarizes the recommended framework that will help the regional partners leverage their technology assets to provide better service to the region and operate more effectively. It is the culmination of the work of the inter-agency study team that worked closely together to identify alignment opportunities based on regional goals, distill priorities based on business objectives, highlight potential benefits and balance them against resource requirements and available capacity. The report provides an overview of key transit technologies, summarizes how they might be aligned for optimal regional results, and provides a roadmap along with recommendations to help the three-county region and the partner agencies move forward.

Glossary of Terms

Application Programming Interface (API): an interface or communication protocol between a client and a server.

Automated Fare Collection (AFC) Systems: enable transit agencies to collect, process and manage revenue collection activities.

Automated Passenger Counter (APC): electronic device that is available for installation on transit vehicles that accurately records boarding and alighting data.

Automated Voice Annunciation (AVA): a system on transit vehicles that provides an audible announcement of transit information, such as the approaching stop, during the trip.

Bus Rapid Transit (BRT): high-quality bus-based transit that delivers fast and efficient service. BRT systems may include dedicated lanes, traffic signal priority, enhanced stations, off-board fare collection, etc.

Commercially off the shelf (COTS): used to describe products that are ready-made and available for sale to the general public.

Collision Avoidance Systems (CAS): a system that uses radar, LiDAR, or some other detection method and is designed to prevent or reduce the severity of collisions.

Computer Aided Dispatch / Automatic Vehicle Location (CAD/AVL): the use of computers and Global Positioning Systems (GPS) in dispatching and tracking a fleet of transit vehicles. CAD/AVL systems usually result in added costs of operating and maintaining additional computer equipment, but agencies benefit from improvements to customer service through real-time information.

Driver Control Units: functions as an interactive communication platform for the bus and its equipment.

General Transit Feed Specification (GTFS): a common format for public transportation schedules and associated geographic information.

Intelligent Transportation Systems (ITS): a variety of technology-based systems, techniques, and methods used to relieve congestion, improve road and transit safety, and increase economic productivity.

LiDAR: an acronym for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges.

Microtransit: a form of Demand Response Transit (DRT) that offers flexible routing and/or scheduling of minibus vehicles.

Mobility as a Service (MaaS): describes an idea of combined transportation services from private and public providers through a unified gateway that creates and manages the trip, such as a smartphone application, which users can pay for with a single account. MaaS is a concept that characterizes the shift away from personally-owned modes of transportation and towards mobility provided as a service.

National Transit Database (NTD): a federal reporting program for transit agencies receiving Federal Transit Administration funding that serves as the primary repository for all transit-related data and statistics in the United States.

Paratransit as a Service (PaaS): similar to MaaS, Paratransit as a Service combines transportation services offered by private and public providers for people with disabilities or who cannot use regular, fixed route transit.

Passenger Information Display System (PIDS): automated system for supplying users of public transportation with information about the nature and state of a public transportation service.

Pedestrian Warning Systems (PWS): a system that alerts pedestrians of the presence of the vehicle moving slowly in either drive or reverse using an audible warning player from a speaker mounted on the vehicle.

Predictive Maintenance Systems: techniques used to determine the condition of in-service equipment in order to estimate when maintenance should be performed.

Radio Frequency Identification (RFID): uses electromagnetic fields to automatically identify and track tags attached to objects.

State of Good Repair: an asset is considered to be in a state of good repair if it is in a condition sufficient for the asset to operate at a full level of performance.

Traffic Signal Priority (TSP): also referred to as Transit Signal Priority, includes a set of operational improvements that reduce dwell time of transit vehicles at traffic signals by holding green lights longer or shortening red lights.

Ticket Vending Machine (TVM): an electronic vending machine that allows riders to purchase single fares, add value to fare media, or generate proof-of-payment tickets from passes.

Zero Emission Bus (ZEB): buses that operate strictly on electricity powered batteries and not gasoline or overhead wires.

Background

The regional technology plan is intended to reflect regional objectives and priorities as well as partner goals, business objectives, and priorities. These key components were arrayed against the partners' current technologies and technology landscape. The partners then considered industry trends, best

practices along with opportunities and challenges, before highlighting alignment opportunities and developing a technology roadmap.

Agency Goals, Business Objectives, and Priorities

The WSP team met individually with each of the regional partners to discuss, understand and document their short and long-term business goals and objectives. Each agencies goals and objectives were revisited at the October 2019 road mapping workshop and are summarized below. As the process moved forward it became abundantly clear that each partner agency shares the common regional goals that include increasing and improving mobility, enhancing customer service, and improving regional coordination.

The partner agencies share three goals:

1. Improve Mobility

2. Enhance Customer Service

3. Improve Regional Coordination

GoTriangle

GoTriangle is building a transit network that will offer an even more convenient, seamless way to travel across the region. In doing so, GoTriangle is dedicated to access to transit in the Triangle.   Key priorities are the expansion of bus service, improvement to bus stops and shelters and implementation of a new 37-mile commuter rail system. Technology priorities are noted to be the upgrade of voice communications and dispatching, and procurement of new CAD/AVL and fare collection systems.

GoWakeACCESS

GoWakeACCESS key objectives are to provide new service to rural areas not served by existing fixed-route transit service, improve customer service for their passengers (new resources at Customer Service Center), and to create a centralized or inter-operable call center for scheduling and dispatching. The agency is open to exploring opportunities to use a common scheduling software to assign trips based on cost and demand rather than transit operator, and development of a Wake County travel training program to encourage use of the fixed-route network. Providing the customer more ownership of their ride, i.e. greater visibility into the timing of their vehicle's arrival and exploring Paratransit as a Service (PaaS) are areas the agency wishes to explore.

GoRaleigh

The agency is focused on the introduction of new Bus Rapid Transit services under the Wake Transit Plan in addition to other services such as connections to Garner, Rolesville and Knightdale. GoRaleigh has ongoing programs for a GoRaleigh/GoWakeACCESS ADA shared maintenance facility, and East Raleigh and Midtown Transit Centers, and are improving shelters for new and existing bus stops. Key technology priorities are implementing mobile ticketing and fare capping, improving real time bus information, and implementing collision avoidance systems.

GoDurham

GoDurham's long term objectives are to provide greater transportation options, positively impact traffic congestion and air quality and support local development policies. Some key programs are service quality improvement, improving on-time performance and reducing over-crowding on vehicles. Technology priorities for GoDurham are to remove cash from on-board the vehicles, provide an Origin to Destination mobility app, integrate parking and transit mobility, improve real time bus information,

introduce a traffic signal priority system for transit vehicles and improve the effectiveness of their paratransit system.

GoCary

GoCary wishes to increase the service and frequency of their fixed route service and improve reliability and the efficiency of interconnections with other transit services. The agency seeks to provide best-in-class transit services and is working on bus stop improvements. Major capital projects include a feasibility study for a Downtown Cary Multi-Modal Transit Center and a new Bus Operations and Maintenance Facility. Technology priorities include an improved fare collection system, implementation of an integrated and connected ITS system, improved customer services in the area of the call center and providing customer information, improved efficiency of paratransit services and improvements to the business management information systems.

Regional Objectives and Priorities

The Triangle region is one of the fastest growing metropolitan regions in the United States and this growth has precipitated a move to improve and expand transit services in the region. Among the region's key goals are those noted in the Wake County Transit Plan, which are described as four 'big moves':

• connecting the region

• connecting communities

• creating frequent, reliable urban mobility

• enhancing access to transit.

GoTriangle's regional goals in its 2017-2021 Strategic Plan echo those in the Wake County Transit Plan. They are to improve mobility in the region; assure high-quality customer service through direct operation and partnerships; and encourage sound growth patterns.

The Durham County Transit Plan, adopted in 2017, states that goals are to 'continue to develop an exceptional public transportation system … that provides greater transportation options for Durham residents and

Figure 3: Key regional goals and objectives

employers, positively impacts traffic congestion and air quality and supports local development policies.'

The Orange County Transit Plan, also adopted in 2017 and developed in coordination with the Durham County Transit Plan describes goals as 'improving overall mobility and transportation options, providing geographic equity, supporting improved capital facilities, encouraging transit supportive land use and providing positive impacts on air quality.'

Both the Durham and Orange Transit Plans are currently being revisited and will be updated as the Durham Orange Light Rail project is no longer moving forward.

Industry Trends, Best Practices

Transit ITS (Intelligent Transportation Systems) and Automated Fare Collection (AFC) technologies are evolving at an increasing pace. The following section provides an overview of some of the key practices and industry trends for both ITS and AFC technologies.

ITS Practices and Trends

Transit ITS technology involving communications, data collection and control and improved customer experience continues to advance, taking advantage of many light duty automotive based systems which are some of the drivers of innovation in this field. Heavy duty trucks are another area where advances lead to innovation and standards for communication, data, and compatibility. All of this will drive the ability for multiple platforms to integrate with other provider's technology seamlessly for use by the transit industry. Many systems will provide the same or similar services now, but the speed of communication and the ability, availability and types of data storage will advance as the market and technology grow.

Bus manufacturers have departments devoted to new technology and the customer demands, integration, and testing including support, training and warranty.   The APTA bus procurement guidelines have sections dedicated to the individual systems (TS 45 for bus data communications, TS 76 for farebox, TS 86 for communication APC, Radio, Security Cameras etc.) which will aid in the procurement of regionally compatible systems.

Most systems have some level of continuing system/data recurring costs on a monthly or yearly basis (such as cellular plans at a minimum) and this practice will continue. These costs can be rolled into service contracts with component suppliers, service providers or bus manufacturers. Review of the contract language will be critical to identify and plan for recurring monthly and yearly fees. Yearly software license fees, fees for hosting software, maintenance, changes and support of AVA stops, as well as subscriptions for service can be costly and must be planned for.

Most new ITS systems have the capability to interface with other vendor hardware and software using open architecture and open automatic programming interfaces (APIs). These open systems provide system owners with greater hardware and software options which can also make systems more cost effective. Specifying open systems in future procurements will provide the partners with more flexible systems.

AFC Practices and Trends

Innovative technologies are emerging which will allow each agency in the region to partner together and provide a coordinated transit service to residents in the Raleigh/Durham region. Today these direct trips often overlap are not coordinated regionally. Each transit agency has different route fare and transfer policies. There is no single regional value pass or fare media to encourage passengers to take advantage of the multiple transit service opportunities.

Almost all agencies have purchased Genfare fareboxes over the past decades and now strive to maximize the customer experience while minimizing dwell time with this aged equipment. This region has a unique opportunity to carefully plan a regional fare system that will benefit all partners, especially transit passengers. Fare systems that support automated fare collection practices are becoming the

norm. These technologies include new forms of fare system architecture (account-based systems) and fare media (such as smart cards, mobile phone applications and near-field communications).

The next generation of fare system in the Raleigh/Durham region should be a non-proprietary open architecture system; have an expandable and flexible design that can evolve as needs and technology change; be simple for customers to use and for the regional agencies to manage; be stable and compliant with security standards; and use leading, yet proven technology for fare payment that maximizes fare media already held by customers. All fare products and value loaded by customers should be stored in the account- based backend and all validation should be equipped with real-time communications.

Opportunities and Challenges

The GoForward partners recognize that the region faces both opportunities and challenges as it adopts, implements, operates and maintains technology solutions. The opportunities include implementing new automated dispatching solutions (CAD/AVL) that significantly improves information available to both customers and managers; realizing additional benefits to regional customer service (the region has already achieved benefits from regionalizing the customer call-center); and planning ahead for the next generation of mobile ticketing and its greater capabilities and cost efficiencies.

The challenges facing the partners include supporting and maintaining new technologies; ensuring that there is adequate funding for them; encouraging technological innovation, coordinating planning, implementation and operation through an effective governance structure; and procuring, implementing, and acclimating to systems before the industry is ready to replace them.

Technology Alignment

In the process of developing the Regional Technology Integration Strategy, the GoForward partners identified opportunities for technology alignment. These alignment opportunities are based on regional and agency goals, objectives and priorities; best practices and industry trends; as well as current plans and capacity to fund and deliver projects. Alignment opportunities for each major technology opportunity are summarized below.

Voice and Data Communications

The Current Voice and Data Communications Environment
Communication technologies are heavily dependent on the available infrastructure and devices that are used to transmit voice and data. Communications infrastructure is critical to the planned integration and implementation of transit ITS technology being considered by the regional partners. It supports the exchange of critical information – both audio and data – between drivers, dispatchers, emergency responders, and supervisory personnel. It can also support WiFi access for passengers.

GoCary uses a cellular system to communicate with its drivers and provides WiFi access to passengers. This works well for GoCary but limits its capability to quickly communicate with groups of GoCary drivers or with other partner agencies.

GoDurham recently upgraded its radio system to the APX6500 hand-held model and has no reported problems. WiFi on GoDurham buses is heavily used by passengers and has reported issues with bandwidth throttling during periods of high usage.

GoRaleigh has updated the voice and data communication systems in most of its buses, which are equipped with Motorola APX4500 radio systems. Data is transferred using the Verizon cellular system, which also provides cell service to passengers. Not all buses are equipped with WiFi for passengers, but the service works well on those that are equipped.

GoTriangle's current radio network suffers from signal dropouts in certain areas and its aging equipment is beyond its useful life and will no longer be supported by the manufacturer. Its APX4500 and hand-held APX6500 have reported communication problems with other regional transit partners resulting in missed connections. GoTriangle uses a Verizon based cellular network for data communication.

GoWakeAccess uses Motorola XTL2500 radios on one channel and its system is working effectively. Data is transmitted using tablet computers on the Verizon cellular system and tablets. Voice and data are currently not integrated nor a component of a CAD/AVL system. GoWakeACCESS does not provide WiFi access for its passengers.

The GoForward partners would like to improve their ability to communicate and transmit data. Agencies like the GoForward partners are moving from analog to digital based radio voice and data communication. Connected vehicles are sharing data with each other (like google traffic or WAVE). Voice over Internet Protocol (VOiP) is available through almost all cellular providers. Talk to text and canned communication is a common means of communication and CAD systems provide additional features which utilize this option

Cellular based communication using data terminals, text, talk, WAN and focused broadcast messages to buses and support operations is available in a variety of configurations and can be scaled for use by the individual partners. Some will only utilize a simple hand-held radio for communications while others will require data and voice capability. New ITS systems have significant capability to transfer video, audio, location, and number of passengers on a vehicle in real time or near real time with the use of a buses AVL system. Current 4G technology is adequate for existing data and voice communication and future systems will be faster with the implementation of 5G service. As 5G becomes more prominent, route-planning technology, especially for buses can be greatly enhanced. A reduction in wait times and real-time updates, for example, will make transit systems more efficient and easier for the everyday traveler to navigate.

Partner Plans and Priorities for Voice (and Data) Communications/Radio Environment

Planned replacement of older CAD/AVL systems will greatly enhance the capability to transfer data and voice communications using cellular channels. The features inherent to the latest models of CAD/AVL systems provide user friendly and intuitive means of transfer of data, texts and emergency broadcasts. Specifications for new ITS systems should emphasis open architecture and open API for future expansion and flexibility. Data used to generate real time passenger information will be provided these same systems.

GoTriangle is seeking funding to replace the existing radio system which will not be supported by the end of 2019. They are comparing options for either the State or County system for purchase of new equipment including a base station. New radios combined with the planned new CAD/AVL system will provide better coverage and communication capabilities.

GoCary expressed a desire to move away from push to talk communication systems for their vehicles. Better abilities for regional communication was reported as a priority. They will be transitioning to a new operator contract (MV) in the near future and will negotiate a contract at that time.

GoDurham recently upgraded their system and will likely maintain the APX6500 system for 4-5 years. GoRaleigh and GoWakeACCESS did not report any changes to their current equipment in the near future.

Radio systems remain in use by many agencies as a backup for cellular communications and for the ability to communicate with service vehicles not equipped with cellular systems. There are options for replacement radio systems using either the State or County contracts for interoperability among agencies.

Alignment Benefits, Challenges
Alignment of voice and radio communications strategies will provide potential Operational cost savings through adherence to schedules, communication with other Partners, and real time information sharing. Safety and emergency situations can be addressed more easily and with a more focused approach using cellular based systems. GoTriangle has reported problems with wide area broadcasting of calls and would like to be able to communicate with specific buses without all other buses being involved and able to hear the broadcast.

Automated Fare Collection (AFC)

The Current AFC Environment
Four bus system operators (GoCary, GoDurham, GoRaleigh and GoTriangle) utilize Genfare validating fareboxes. GoRaleigh recently installed Genfare's Fast Fare fareboxes which is the current technology manufactured by the vendor, and the remaining three bus operators utilize Genfare Odyssey fareboxes which relies on several components that are no longer manufactured or supported. Fareboxes are largely mechanical pieces of equipment carefully calibrated sets of plastic gears, belts, sensors and circuit boards that pull in cash and coins deposited by cash-paying customers. With so many moving parts, the margin for error is small. Just like any other mechanical failure on a bus, fareboxes that break down while in service can cause a bus to be replaced or revenue not collected.

The fareboxes are in constant use with high rates of failure. Signs of excessive wear on the units are apparent. The Ticket Reader/issue Machine (TRiM) units within the fareboxes contain many moving mechanical components and have a high failure rate. In addition, the counting room vaults at many bus depots are dated technology. GoWakeACCESS utilizes a Routematch program which calculates the fare and cash payment is given to the driver.

The Genfare Odyssey fareboxes at GoCary, GoDurham and GoTriangle are near the end of their useful life and need to be replaced with new fareboxes. GoWakeACCESS does not use fareboxes, but if they want to automate the reconciliation of their revenue, they will need to install validating fareboxes. GoRaleigh is using the latest farebox technology and does not need to make any investment in fareboxes in the near future.

Partner Plans and Priorities for AFC
Improving revenue collection with new technologies and options presents tremendous opportunities to better engage and inform passengers and improve the efficiency and reliability of the regions' services. Experience from other regions suggests that a well-designed and implemented system based on

electronic fare payments can provide increased customer satisfaction, greater revenue accountability, improved data for service planning and operations, and enhanced service, especially when transitioning away from on-vehicle cash collections.

Mobile ticketing technology has become more relevant now than ever. The regional partners are pursuing a regional approach to mobile ticketing to help achieve their goal of using technology to enhance the passenger experience. Mobile ticketing can be a cost-effective technology improvement which can accommodate fare capping and other discount programs. While relatively new to the transit marketplace, this technology is proving to be an important factor in increasing rider adoption and improving efficiency in transit operations. Mobile ticketing is allowing public transportation to appeal to an entirely new audience that doesn't utilize public transit, as well as their current riders that are willing to ride more frequently.

Fareboxes need to be replaced with new technologies that are account-based, open-payment and open-architecture systems. This will provide greater security and flexibility, forward-compatibility with developing technology, ability to interact with a variety of payment sources, opportunity to replace equipment available from several suppliers, and provide a long life-span and lower life cycle costs.

Many of the Genfare Odyssey fareboxes are near the end of their useful life and need to be replaced with new fareboxes. An account based open architecture specification should be developed which will allow for greater system expandability. An open architecture will lay the foundation for potential integration with trip planning, rider sharing, and other services. Open architecture will also allow for the ability to share technology, applications, and payment media across the region.

Developing a robust transition plan will not only ensure a smooth transition for each agency and customers, it will also help guide the procurement process and implementation plan. The degree to which the region chooses to maintain, upgrade, or replace existing system elements will determine the scope of a new system procurement. While a full system replacement can provide more advanced features, it can cost a significant amount in cost and time. Leveraging legacy systems can extend the useful life of existing investments, and still provide core improvements and upgrades. The region should develop a comprehensive transition plan prior to the development of a technical specification.

Given the significant investment devoted to the existing fare system, and the high cost and potential risk associated with a full system replacement, a strategic upgrade analysis and detailing the results in a Concepts of Operations (ConOps) is recommended. ConOps have been developed and recommended as a best practice by several peer agencies and industry vendors. It can be used a living document that describes several critical aspects of the regions fare collection technology, procurement and operations. By understanding and discussing each of these aspects prior to procurement, the regional agencies can minimize risk.

The key decisions made in the development of the ConOps will impact the overall cost of the fare collection system. In addition to considering the costs of a single system integrator, additional cost scenarios should be developed for a strategic upgrade option as well as a split procurements approach. Updating the capital cost estimate is a key component of the ConOps.

Alignment Benefits, Costs, Challenges
Based on experience of other regions, full implementation of a regionally integrated fare payment system takes a significant amount of coordinated agency effort and funding and could take up to five years. The fare collection projects identified in this Technology Plan identify some near-term fare

coordination efforts that could help advance regional fare integration goals as well as prepare the region for capturing the benefits of a regionally integrated fare payment system.

Innovative technologies are emerging which will allow each agency in the region to partner together and provide a coordinated transit service to residents in the Raleigh/Durham region. Today these direct trips often overlap are not coordinated regionally. Each transit agency has different route fare and transfer policies. There is no single regional value pass or fare media to encourage passengers to take advantage of the multiple transit service opportunities.

Almost all agencies have purchased Genfare Odyssey fareboxes over the past decades and now strive to maximize the customer experience while minimizing dwell time with this aged equipment. This region has a unique opportunity to carefully plan a regional fare system that will benefit all partners, especially your passengers. Fare systems that support automated fare collection practices are becoming the norm. These technologies include new forms of fare system architecture (account-based systems) and fare media (such as smart cards, mobile phone applications and near-field communications).

The next generation of fare system in the region should be a non-proprietary open architecture system; have an expandable and flexible design that can evolve as needs and technology change; be simple for customers to use and for the regional agencies to manage; be stable and compliant with security standards; and use leading, yet proven technology for fare payment that maximizes fare media already held by customers. All fare products and value loaded by customers should be stored in the account-based backend and all validation should be equipped with real-time communications.

It is critical that the region follow best practices when implementing fare systems as careful attention should be made to the system design. The system design refers to the overall technical functional aspects of the system. This covers a broad cross section of elements from the fare media to the customer service support software. It is important to address policy issues in advance of system design, organize agencies to get involved early to ensure their specific needs and constraints are addressed, organize to reflect conflict as a governance approach should be developed, and clearly define the functional requirements of the system and the scope of services of the system contractor, including interfaces with other systems, customer use, and the agency responsibilities. Focus on functional requirements and avoid proprietary design.

CAD/AVL/AVA Systems

The Current CAD/AVL/AVA Environment
The Partners have a wide range of Computer Aided Dispatch/Automated Vehicle Location (CAD/AVL) systems – from newly installed systems with full functionality to older, end-of-life systems with waning functionality and support.

GoRaleigh has installed new ITS systems on its buses including a full suite of advanced functions including CAD/AVL, and Automated Voice Announcement (AVA) systems. Updated CAD software will allow better reporting, visibility of buses in service, review of performance parameters in addition to more accurate dispatch and operations support.

GoTriangle has a system which will not be supported by the manufacturer in the near future. Accurate bus location information is not available, reports are limited and dispatch of buses is done manually. GoTriangle is using APC data for scheduling and planning due to the existing problems with their AVL capabilities.

The GoCary CAD/AVL system is not functioning properly and is a maintenance burden which is providing limited use. Many features associated with the AVA are not integrating with the older hardware and software. GoCary is considering maintenance agreements to continue operational capabilities of the existing system.

GoDurham indicated their system needs replacement in 2021. The current ITS is functional, but with limited capabilities. Better tracking and reporting features are a major desire in addition to the ability to generate real time information.

GoWakeACCESS offers unique service and requires limited CAD/AVL features, but they are using an older computer tablet-based system which was listed as a priority for replacement to aid in dispatch and real time information.

Partner Plans and Priorities for CAD/AVL/AVA

During discussions with the different agencies, integration of the various ITS features into a functional system which provides the necessary data, communication and connectivity is crucial. GoRaleigh is in the final stages of a fully integrated CAD/AVL system which provides accurate data for AVA required stop announcements, GTFS in real time for passenger information and back office reporting capabilities.

Just as in the case with replacement of the fare collection systems, developing a plan for new CAD/AVL systems will not only ensure a smooth transition, it will also help guide the specification development, procurement process for each agency and implementation for the region. A replacement of the CAD/AVL system requires an understanding of the features and functions desired as the individual agency, and as a regional partner as well.

GoTriangle is in immediate need of replacement systems and GoDurham and GoCary need to plan for replacement ITS in year 2021. The systems in use were stated as not providing real time data, not having a capable cellular system and are an Operational burden. During interviews with the Partners and at the Roadmap workshop, real time passenger information was listed a priority by all agencies. Generating the data to support a real time information system requires a CAD/AVL system with cellular communication technology.

GoWakeACCESS requires limited ITS capabilities due to the nature of its service but would benefit from specific new CAD system features with AVL for dispatch and to aid in generating real time data. Their service still needs to have visibility of the individual vehicle location which a cellular connected AVL system offers. Their dispatch will require careful consideration of a CAD system coupled with the AVL to accommodate the dispatch and scheduling requirements of their operations.

Alignment Benefits, Costs, Challenges
CAD/AVL systems are the backbone of the ITS functionality. The hardware and software monitors the data flow, knows the vehicles real-time location, provides schedule adherence tracking, meets ADA requirements, as well as adding convenience for all customers by providing "Next Stop" announcement systems through the AVA system and the mobile cellular system. Newer CAD/AVL systems will benefit the regional partners through the sharing of accurate data, generating useful reports, and assisting with the timing of bus arrival information. Some of the goals for the new CAD/AVL systems include the following: improving on-time performance by disseminating continuous, real-time information to drivers, improving dispatch reliability and efficiency, improve scheduling and planning by providing more accurate data and reducing the schedule preparation time and staffing, improving scheduling and planning, and improving data management and reporting by automating data collection and improving

the accuracy and accessibility of the data. A regional procurement would help reduce costs, improve vendor support and improve contract terms.

Real time passenger information was mutually agreed as the area most in need of alignment to provide accurate information to the customers. Accurate bus location information and use in a variety of web and application-based programs would improve such areas as the riding experience for the public, provide agencies with the visibility needed to support each other at regional transit centers, possibly reduce costs. New CAD/AVL systems with cellular communications will provide this capability.

All five partners use Verizon as their cellular provider and should consider a unified business approach for pricing and service level efficiencies and maximum bandwidth allocations. This may be another valuable topic for the agencies to discuss.

Real-Time Bus Information

The Current Real Time Bus Information Environment
The GoForward partners were early adopters of the TransLoc system, which still provides bus arrival information for customers. The system worked relatively well for many years and initially it contributed to a reduction in calls to the customer service center. Over time the TransLoc system degraded and the information provided by it became less accurate. In addition, the system will no longer be supported by the vendor after June 2020. To complicate matters further, the accurate data needed to provide real time information is not available from several of the Regional Partners due to the age and capability of their CAD/AVL systems. GoRaleigh is installing a new CAD/AVL system which is expected to provide the information required, but the other partners will continue to rely on a static GTFS feed for predictive arrival information.

Partner Plans and Priorities for Real Time Bus Information
All of the regional partners believe it is a priority to provide accurate, valuable arrival and status information to their customers. They would like the new system to be more efficient – better integrated with their automate dispatching systems and based from the beginning on industry standards like GTFS-RT (General Transit Feed Specification – Real Time). They would also like to ensure that the system is more accurate and capable – for example, that it enables customers to see where their bus is and when it will arrive, even if it is currently completing another route before it begins their route.

The GoForward partners have established a working group to address the loss of service in 2020 and develop a bridge strategy to ensure continuous operation while a longer-term strategy, such as replacement and alignment of CAD/AVL systems, can be implemented.

Alignment Benefits, Challenges
The benefit of accurate travel data will result in fewer missed rides, fewer complaints, possibly increased ridership and regional connectivity as transit users are able to make their travel plans better. During interviews and discussions, real time data was ranked as one of the most important issues by the Regional Partners. Several of the partners will require new or updated CAD/AVL systems that will generate real time bus information. A unified approach, which specifies the functional and technical requirements for not only the agency, but the region should be carefully considered by the working group.

Vehicle Safety Systems / Collision Avoidance Systems

![WSP logo]

The Current Vehicle Safety/Collision Avoidance System Environment

Collision Avoidance Systems (CAS) such as RADAR, LiDAR, cameras and proximity sensors are used in various combinations to detect and warn of potential threats. Pedestrian Warning Systems are used to detect and warn pedestrians of a vehicles movement such as turning near crosswalks. Past pilot testing on passenger warning systems resulted in complaints due to the noise emitted from the buses to warn passengers when the buses were in residential areas.

Partner Plans and Priorities for Vehicle Safety/Collision Avoidance System

GoRaleigh conducted pilot testing of the most advanced Mobileye system which continuously monitors the road ahead and analyses the risks of forward collisions, unintended lane departures, tailgating, and pedestrian and cyclist hazards. GoWakeACCESS and GoCary use the camera-based Mobileye system which is mounted to the windshield for forward detection and warning. GoDurham and GoTriangle do not use Collision Avoidance Systems but will make it a priority in the near future.

Alignment Benefits, Costs, Challenges

A regional approach for the specification and procurement of vehicle safety systems such as collision avoidance will improve driver performance while reducing potential collisions. All partners recognize the inherent safety benefits to passengers, pedestrians and employees from the use of CAS as drivers grow accustomed to the alerts and anticipate them. Therefore, drivers naturally begin to keep a safer following distance or stop earlier in anticipation of the warning. Operational costs are also reduced as collision costs are steep, from replacement parts and vehicle down- time to late delivery charges, increased insurance premiums and more.

Automatic Passenger Counting (APC)

The Current APC Environment

APC systems are electronic machines that count the number of passengers that board and disembark at every bus stop. The accuracy of counting passengers from new APC systems is approaching 98 percent. Detection units can be located in multiple locations on the vehicles including using a variety of detection methodologies and the detectors are rugged and dependable. Data is capable of real time transfer through the AVL system and coordination with GPS location information and fare collection for data reconciliation and reporting. Together with AFC systems, this forms the technologies that many transit systems have. In systems that have them, they replace the schedule checks that previously collected ridership information manually and do not have rely on farebox data reporting which could be troublesome. When the Federal Transit Administration is satisfied the APC systems are calibrated correctly, ridership information can be used to fulfill National Transit Database (NTD) reporting requirements.

All agencies with the exception of GoWakeACCESS are utilizing APC technology to various degrees of success. GoDurham has 100 percent of their fleet operating and the system is providing extremely good accuracy. GoCary is in the process of certifying their APC data so it could satisfy NTD reporting requirements. GoTriangle is not as far along as their APC data cannot be used for scheduling and planning due to AVL problems. In addition, the APC system is not used to reconcile passenger counts from the Genfare fare system.

Partner Plans and Priorities for APC

The partners in the region would like to integrate their APC system with their AVL and AFC systems at some point in the future, but it is not a priority at this time. Prior to implementing a new APC system

the agencies should establish a data collection procedure that meets each agencies' needs, avoid unnecessary customization, and clarify the responsibilities from several departments within each agency as the working relationships could change because of this new technology.

Customer Amenities and Customer Service

The Current Environment for Customer Amenities and Customer Service
The Regional Partners currently provide various customer amenities including on-board WiFi and in the case of GoRaleigh, onboard device recharging. The partners planning to provide new and improved tools to help customers with trip planning, payment and real time guidance.

Partner Plans and Priorities
The partners are not only focused on amenities, like improved WiFi and a new mobile payment application, but they are also interested in improving the customer experience by streamlining the way people plan and pay for their trip. They are also interested in strengthening customer relationship management through their regional customer call center.

Customer Service
The major requirements for establishing and operating a Back Office System (BOS) which supports a regional call center consist of account management (e.g., customer account functions, customer communications, customer disputes, customer applications and user guides, customer statements, credit card notices, report capability, and credit card processing security), financial management (e.g., accounting features, credit card clearing house, and report capabilities), interface with a record management system and telecommunications which provide software for customers to communicate with the BOS.

A proper, well-designed project management approach is key to planning each task effectively and within tight time constraints. The management approach should be straightforward yet highly effective. All activities should be thoroughly planned before work begins, then diligently following the plan, monitor progress, and fine-tune the plan as necessary. The result of this common-sense approach consistently achieves high-quality output within agency budgets and schedules. Proper equipment and training manuals are also critical elements in achieving a long BOS life. These materials should be provided with significant information on the operation and components of the system. As these will probably be the only materials in hand, it would be imperative that the materials be made available as quickly as possible after completion of the design review. This will ensure the documents reflect the design agreements and that sufficient information is included to provide agencies with the necessary system component and software information.

In addition, as training will normally be provided once by the BOS Integrator, training requirements should be designed to provide audio/video support as well as subsequent refresher training. A well-defined testing plan is just as important as any other element of the BOS program. When designed properly, tests can identify critical difficulties and system problems well in advance of production or installation. Design testing should be performed upon fabrication of the initial item of each type of equipment and or software. This will vary depending on the design element and function of the BOS to ensure that it operates properly. Once all the hardware and software are tested, integration and acceptance testing should be performed. The system vendor's test plan and test scripts should be reviewed to ensure that no critical functionality is overlooked. The implementation schedule should be reviewed to confirm that adequate time has been allocated for testing and there is time in the schedule

for re-testing if required. Participation in factory, field and operational testing of the BOS should also be included.

Alignment Opportunities

Call centers should be viewed as a universal shared service, much as finance or human resources are services shared across an organization. Call centers are the hub of the customer experience and where more than 50% of all customer interactions take place. There are operational benefits attainable through call center technologies and after people, technology is often the second largest cost in operating a call center. Today call center technologies are many, varied and often complex. With telephony platforms, niche or point solutions for email, chat, interactive voice response (IVR) and short message service (SMS), customer relationship management (CRM) and back office systems. Many of these systems are integrated and tied together so that changing or upgrading a single technology can have impacts on others.

Of course, each center has different needs, goals and objectives for their center, so each regional call center is unique and based upon each agency's functional, operational and financial objectives. The optimal solution utilizes commercial off the shelf software and which utilize conversational natural-language capabilities and blend artificial intelligence (AI) to provide exceptional service to agency's customers. Personas based on demographics or customer preference further personalize the customer experience. By combining self-service with personalization, agencies can transform their call center system into a valuable asset for building customer relationships. Improving the customer experience with automation and AI-based innovations enable our voice and digital self-service system to understand the real meaning behind a question and then deliver only relevant answers. When an agent is needed, AI seamlessly transitions the customer, along with all their relevant information and context, to the right agent at the right time. This will serve up a better experience, reduce call volumes and improve first contact resolution. The technology solution should reflect best practices in business processes and gets the microapps up and running quickly. Using microapps with automatic support across voice and digital channels, including web chat, Facebook and mobile, allows us to design and personalize the whole customer journey in a single process. An open-access approach lets each call center system fully integrate with other third-party data sources including natural language processing and AI engines to create conversational self-service business process automation or intelligent apps. Built in service analytics gives us full visibility into how your customers move through their self-service journeys. Because it's easy to understand these journeys you will see significant savings in time customers spend on your system and it will be improving the customer experience through continual optimization. When customers contact call center agents, having context from previous voice and digital interactions creates a better experience.

The optimal technology solution should leverage public APIs which provide interaction into other agency systems that require integration. This will save each agency and its vendor valuable time and cost in designing, developing, testing and implementing innovative solutions. Payment card industry data card security standard (PCI DSS) compliance is a very important issue. The technology solution which allows customers to pay bills with a payment application that is used during an assisted expert interaction with your agents must be protected through PCI compliance. Data breaches are becoming more sophisticated, frequent and expensive; thus, the risk of reputation damage is at an all-time high. The PCI DSS is there to protect both agencies and their customer's data. When a customer makes a payment over the telephone, the sounds made by the key tones using dual tone multi frequency are masked so the agent can stay in contact with the customer throughout the entire call. As agents are on hand at every step of the payment process, any changes or errors can be dealt with instantly, which greatly improves customer satisfaction and reduces the number of abandoned calls.

The ultimate measure of how the regional call center operation is performing is through customer satisfaction surveying. A customer survey should be offered to all customers/all interactions. This is facilitated through the phone system. Post-contact surveys are supported by phone system and configurable; all reporting available within system and part of dashboards (Phone via IVR, Email link, and SMS/chat (once queue is active). Primary key indicators measured include customer satisfaction, first call resolution, and net promoter score. These measures could be used to incentivize and reward employees throughout the agency.

Opportunities and Challenges

Modern call centers have moved away from the traditional role of handling phone calls to providing a one-stop shop for customer relationship management. The goal is to provide a seamless customer experience at the lowest price point. Vendors offer all-in-one solutions for inbound, outbound, and omnichannel contact centers. Powered by cloud-based technology and AI capabilities, their software integrates with most modern CRM platforms such as Salesforce and ZenDesk.   In 2019, vendors offered plans ranging from $75 to $140 per month for each agent.

Mobility-as-a-Service

As transportation has evolved over the past several years, ride-hailing companies and shared mobility companies, including carsharing (Zipcar, Car2Go), bike sharing (Jump, Lime), scooter sharing (Bird, Lime, Razor), have spread the idea that mobility (provided by public and private entities) could be packaged together and provide a viable alternative to owning a car. The concept of combing the information, trip planning, and payment for mobility has been called Mobility-as-a-Service (MaaS).

Increasingly, most people do not make distinctions between public and private transportation options; rather, they assess modes by cost, convenience, comfort and travel time. Many people are comfortable taking a bus to work and then hailing an Uber or Lyft to go to dinner. However, today, you might have to consult several different smartphone apps to compare options and prices, and it can be difficult to combine modes for a single trip. MaaS offers an opportunity to make the overall transportation network more efficient and user-friendly by providing the ability to plan, book and pay for trips on a variety of modes using a single interface helping to improve access, convenience, while providing cost-effective travel options.

MaaS offers transit agencies the ability to create increasingly attractive incentives to take transit by providing more information on first/last mile access modes and more transparent information on things such as traffic congestion and parking costs. One day, it could be possible for transportation agencies to change fares/fees in real time in response to traffic congestion, emergency access needs or major travel demand changes. This would allow the transportation system to be used more efficiently by sending price signals for people who can switch to modes that have less of an impact on the system's capacity (e.g., taking transit or a bike rather than riding in a car).

Paratransit-as-a-Service

Paratransit provides a critical mobility service to some members of the Triangle region who otherwise cannot ride on the fixed-route network. However, paratransit is a relatively expensive and inefficient service. As technology improves, there is the potential to provide Paratransit-as-a-Service (PaaS) which includes a better customer interface and at a lower cost, either through new partnerships with service providers or better technology integration.

PaaS cam improve paratransit by improving the reservation system with more modern technologies which allow for spontaneous reservations, vehicle tracking and other customer-friendly benefits. An

improved reservation system could increase the number of rides offered per day which would reduce the cost per trip. While further exploration would be required, many transit agencies have successfully reduced their paratransit costs by partnering with a wider variety of service providers. For example, not all transit patrons require a wheelchair-enabled vehicle or direct door to door services. In these cases, less cost services can be procured through taxis or ride-hailing services reserving the more specialized services and vehicles for those who need a higher level of service.

Signal Priority

In a corridor that experiences frequent delays from traffic congestion that often puts buses behind schedule, there are agencies around the country implementing smart traffic signal technology. Traffic Signal Priority (TSP) is an operational improvement that uses technology to reduce time at traffic signals for transit vehicles by holding green lights longer or shortening red lights. When a bus is approaching an intersection, the intersection can detect the bus and modify the traffic signal timing to reduce the delay for the bus. Equipped with camera, the signals are designed to monitor the intersections and reprogram their own timing to respond more quickly to changing traffic conditions.

This technology employs artificial intelligence to coordinate traffic lights based on traffic conditions, which improves traffic flow and reduces average travel times. According to the National Association of City Transportation Officials (NACTO), 20 to 30 percent of bus travel is wasted sitting at signals or in congestion.

While it is not imperative for the region's transportation agencies to have the same signal vendors, the systems need to be compatible and coordinated. Without interoperability and coordination, the systems will not work efficiently and may induce traffic backups. If done right, smart signal systems are relatively inexpensive pieces of infrastructure that could provide a tremendous upgrade from the current, conventional, static signal systems, which operate according to set timing plans based on average volume of traffic expected during a given period time.

WSP

Technology Roadmap

The Regional Transit Technology Plan was developed by the GoForward partners to ensure optimization of future technology investments. The Plan includes a technology roadmap that will help the partners ensure that technology investments are

- aligned with regional and agency goals and objectives

- reflect best practices and industry trends

- consider agency priorities and available resources,

- identify synergies and opportunities to capture greater value, and

- consider opportunities for early wins

As they were developing the roadmap, the agencies considered regional goals and objectives for Wake, Durham and Orange counties. For example, the plan was developed to be aligned with the four 'big moves' those noted in the Wake County Transit Plan – connecting the region, connecting communities, creating frequent, reliable urban mobility, and enhancing access to transit.

These regional goals are echoed in the partner agency plans including GoTriangle's regional goals in its 2017-2021 Strategic Plan echo those in the Wake County Transit Plan. They are to improve mobility in the region; assure high-quality customer service through direct operation and partnerships; and encourage sound growth patterns.

These regional goals and partner agency plans were applied to the alignment opportunities developed by the regional partners. The alignment opportunities described earlier in this report provided a lens through which the partners could identify options to integrate and optimize technology investments that furthered their objectives.

The partners also considered best practices and industry trends for both AFC and ITS technology components of their roadmap. Aside from leveraging technology to maximize efficiencies, AFC and ITS systems are benefiting from significant innovation from firms in related sectors such as manufacturers of both heavy-duty and light-duty vehicles. These firms are investing in the sector and commercializing valuable new technologies. Ever more cost-effective services and greater system integration capabilities are simplifying and speeding installation.

Prioritization Methodology

With regional and agency goals and objectives as well as best practices and industry trends, in mind, the regional partners conducted an initial prioritization of key AFC and ITS technologies under consideration for the next five to ten years. The partner's priorities technologies based on five prioritization elements: their ability to improve the customer experience, improve operations, enhance safety and reduce risk, their ability to increase capacity, and their ability to reduce cost. Representatives from each agency scored potential technologies from 1 to 5 with five being the highest. Scores were collected and are presented below. These are initial results intended only as a first step toward refining the roadmap and affirming the general trajectory of the roadmap.

Prioritization Results

The results of the initial prioritization exercise are summarized in the table below. CAD/AVL was a top priority in three of the five categories and one of its by-products; real time bus information was the top priority in a fourth category. Other key priorities include VSS/CAS, communications systems and AFC improvements.

Table 2: Technology Priorities

Benefit Category	Top Technology Priorities
Customer Experience	Real Time Bus Information, Customer Service Center enhancements, Automated Fare Collection improvements, additional customer amenities
Operational Improvements	CAD/AVL, Real Time Bus Information
Safety and Risk Reduction	VSS/CAS, Voice/Radio
Potential Capacity Enhancements	CAD/AVL, MaaS/PaaS
Cost Reduction	VSS/CAS, CAD/AVL

The charts below illustrate the scores for the technologies under consideration within each benefit category. The bars show the range of scores registered with the midpoint shown as values.
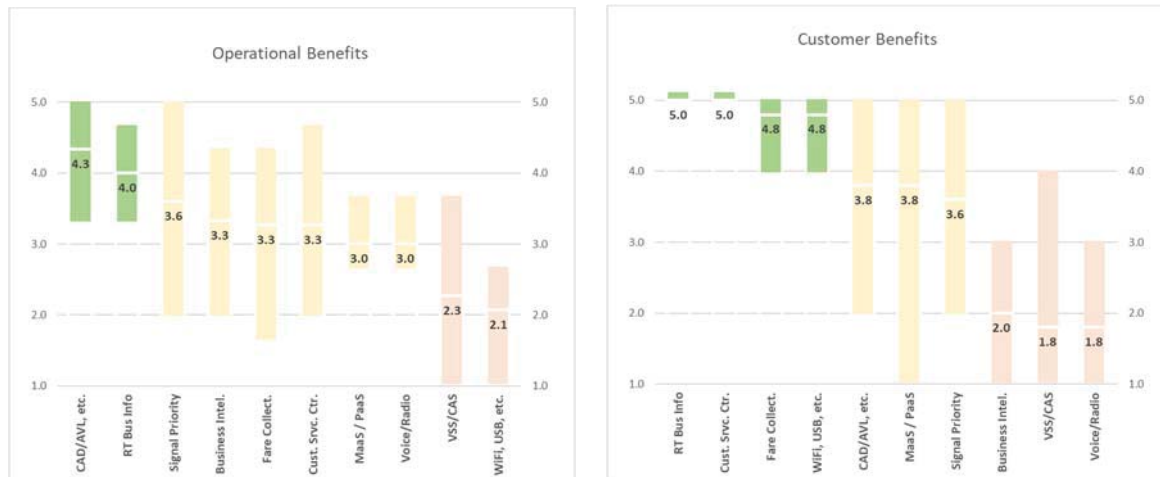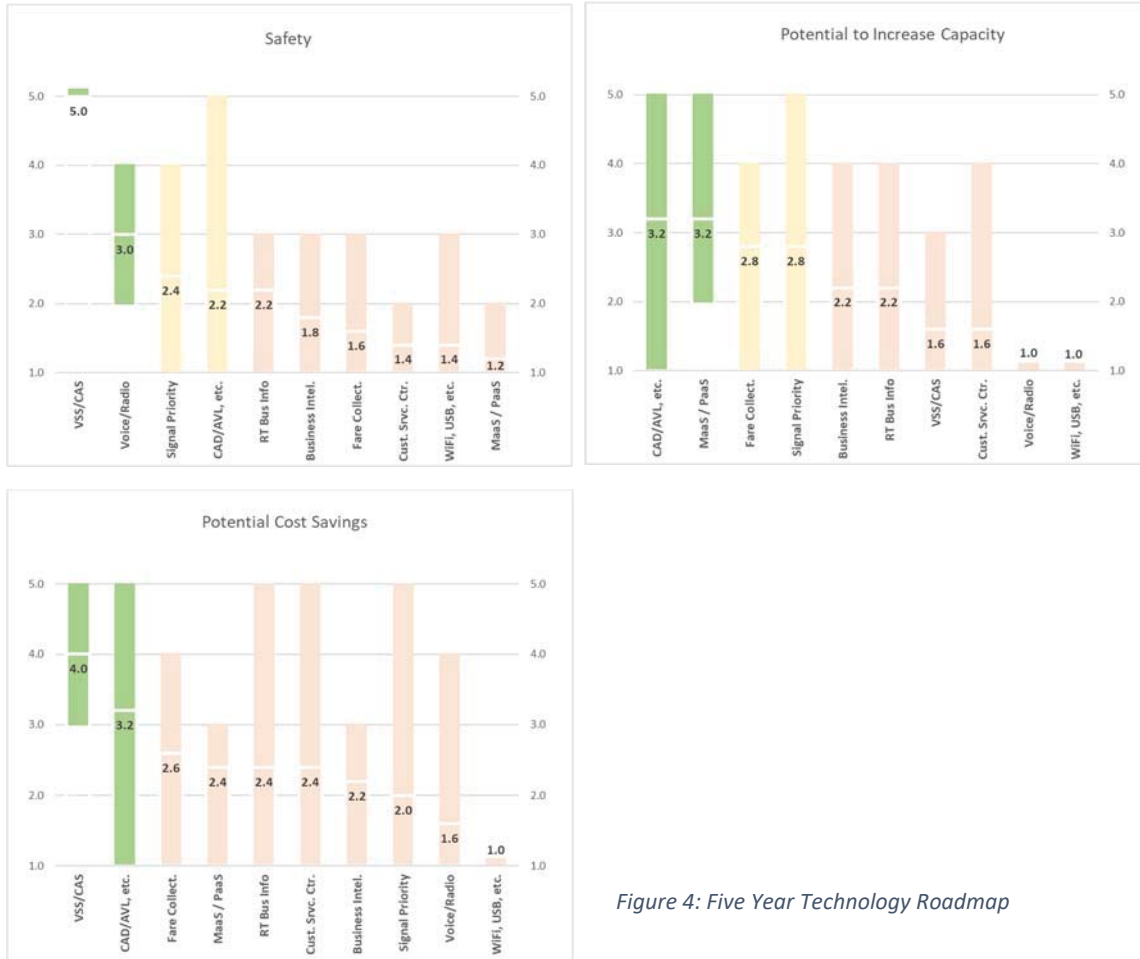
Figure 4: Five Year Technology Roadmap

Roadmap

The table below shows the current five-year regional technology integration roadmap for the region. The current roadmap includes technologies that the partner agencies have identified as critical to realizing regional goals and objectives including Wake County's "four big moves." The roadmap is constrained by agency resources – both available funds and their resources available to deliver significant new technology projects. Additional funding could help improve regional alignment and expedite implementation of key technologies such as new CAD/AVL and vehicle radio systems that would yield additional opportunities for "early wins."

Figure 5: Technology Roadmap

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Roadmap	2020	2021	2022	2023	2024
Business Intelligence					
BI System					
GoCary				▓	
GoDurham				▓	
GoRaleigh				▓	
GoTriangle				▓	
GoWake				▓	
Intelligent Transportation Systems					
Automated Passenger Counters					
GoCary		▓			
GoDurham					
GoRaleigh			▓		
GoTriangle		▓	▓		
GoWake					
Computer Aided Dispatch / Automated Vehicle Location					
GoCary		▓			
GoDurham	▓	▓			
GoRaleigh					
GoTriangle	▓	▓			
GoWake				▓	
Collision Avoidance System					
GoCary		▓			
GoDurham		▓			
GoRaleigh	▓				
GoTriangle				▓	
GoWake					
Real Time Bus Information					
GoCary	▓				
GoDurham	▓				
GoRaleigh	▓				
GoTriangle	▓				
GoWake	▓				

The Regional Technology Integration Plan presents recommended action strategies over the next five years with an estimated capital funding range of $25 to $50 million. The Plan builds a pathway for the region to follow over the next five years and beyond.

Figure 6: The technology roadmap is estimated to require between $25 and $50 million in capital investment over the next five years. Estimated ranges for Automated Fare Collection, Intelligent Transportation Systems and Business Intelligence systems are shown at right.

Technology Roadmap - Capital Investment

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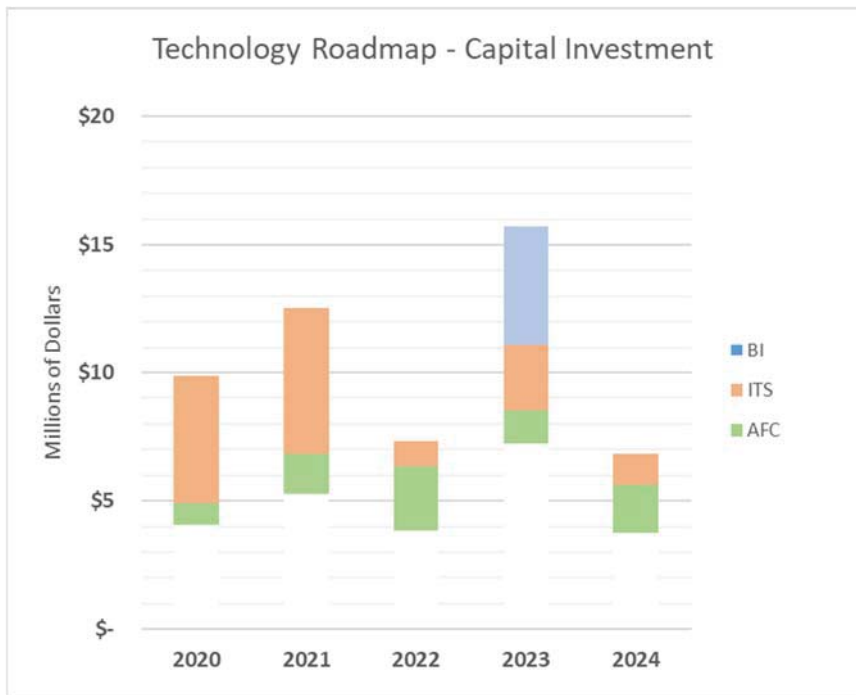
Funding

The Regional Technology Integration Plan outlines the vision for expanding technologies to current and future demand which may not be currently fully funded in the Wake County Transit Plan. There are a wide range of funding requirements over the next five years. When and how much additional funding will become available in the future will dictate the speed and extent to which technology improvements can be made.

The primary action item in this plan is to conduct a funding study to identify a dedicated and permanent funding source. The funding study will explore options for ongoing funding as well as improvements to the fare structures. While the final funding source or combination of sources will be determined through a process, the adoption of new sources of dedicated technology funding will trigger a need to revamp current organizational responsibilities.

Governance

Many public entities find that governing technology programs can yield significant benefits. These benefits include better alignment, more cost-effective technology investments and a suite of systems that provide real value to the enterprise. Well governed technology programs reduce the probability of implementing systems that are under-utilized and insufficiently supported.

Barriers to Adoption of New Technology

Organizational Barriers – It is often difficult to access IT staff and/or technical resources from each agency. This usually means that the agency must rely on its limited resources, identifying someone who is most interested but not necessarily appropriately trained to provide IT direction and support. This model has frequently led to the emergence of pockets of IT resources outside of the primary IT environment.

Past Practices – Perhaps the single biggest barrier to the effective acquisition and deployment of technology resources in transit is the condition of being wedded into past practices. The primary mechanism for moving to computerization has been to automate existing manual processes. Although transit agencies are more alike than different, a whole host of unique manual processes have developed at individual agencies over time. The business approach in the transit agency represents a major barrier to acquiring commercially off the shelf (COTS) technology to support primary functions and make transferability difficult across transit agencies of similar size despite significant commonality.

Training – Lack of training in existing hardware/software and related technologies and inadequate education regarding new developments in technology are critical barriers to success. Training needs to occur at two levels in transit agencies: training and development of IT staff where they exist and training and education of user department personnel in appropriate technologies.

Funding – Funding is a problem in two areas of transit: a lack of funding to acquire, update, and maintain critical technology and new technologies and specific funding opportunities that create uneven or inappropriate investment in particular technologies. Because most technology is acquired through capital grant funding, which is often dictated by particular events and timing, projects in this area do not always conform to strategic need.

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Management Architecture

Coordinated investment in technology is a valuable, but often elusive, objective. A common issue at many transit agencies is that various units – such as operations, planning and finance – choose and secure their own technology, and wait until acquisition is complete to request IT support. The result of this management philosophy has been the evolution of an uneven, disparate, inequitable technology infrastructure without adherence to agency-wide standards or architectures.

The resulting technology environment in transit consists of IT staff that exercises control mainly over the corporate systems and independent departments operating a variety of technology to support their individual and specific needs. Different agencies performing the same functions often have different technology to perform the same tasks. Very little control is exercised in the acquisition of technology, training, maintenance and support for these systems.

Duplication of information, lack of standardization in technology and insufficient control over the development of technology projects results in significant inefficiency and ineffectiveness at transit organizations and inequities in technology investments between individual departments within agencies as between regional agencies.

To provide appropriate centralized technology services and support an organization within an agency is created that can take the lead in developing a unified deployment strategy for an agency's technology environment. This approach could also be utilized to create a regional technology advisory committee.

Technology Governance Committee

There are two independent actions necessary to move a region's technology strategies into a position to fully support management information, technology investment, and the region's overall mission, goals, and objectives.

1.   Establish a technology investment process that reviews and approves the recommendations of the Technology Advisory Committee at the General Manager/senior staff level.

2.   Establish a Technology Governance Committee (TGC) of key staff from primary functional areas from each agency to recommend which technology investment decisions are best for the region. This committee would operate as the region's single focal point for developing recommendations for the acquisition and deployment of technology and establish and oversee regional technology policies and standards.

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Figure 7: Technology Governance Committee Process
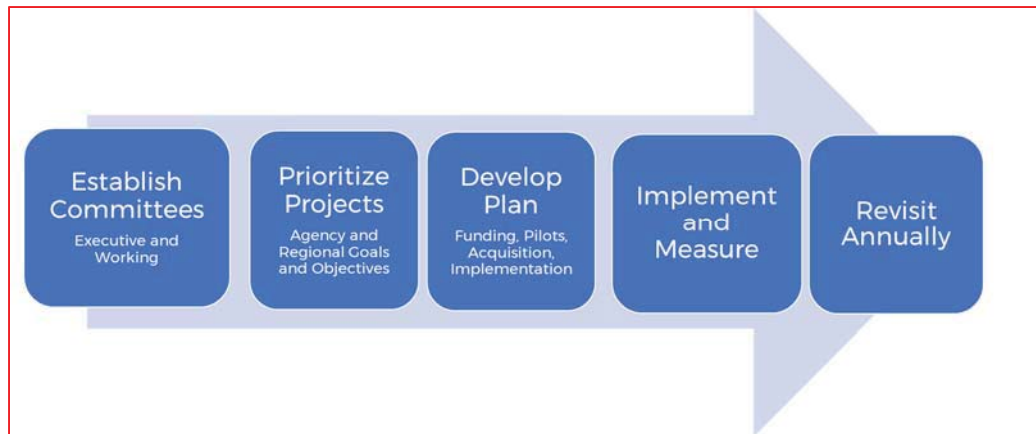
At least one person on the committee should be a technology expert who should operate as a peer at the senior management level. The expert's job is to challenge entrenched in-house thinking. He or she should not think negatively of technology-averse cultures and must be a skilled communicator who does not hide behind technology jargon or talk down to committee members. The expert should help the committee avoid dwelling on the difficulties of the work and emphasize instead the opportunities.

Conversations should focus on the big picture: technology strategy can be hard to distill and can be discouraging if the committee gets dragged down into technical detail. The technology expert must have not only a solid grounding in the regions' overall business needs, but also a holistic view of the agencies and its systems architectures. This is particularly important if the regional agencies choose to outsource any of its functions and connect multiple vendors across a regional network. The expert must also thoroughly understand the underlying dynamics governing changes in technology and their potential to alter each agency's economic outlook.

Generally speaking, the technology expert serves much the same function as the certified financial expert on an audit committee. As chair of the TGC, he or she helps balance the regions short-term business needs with long-term technology investments.

Many transit agencies lack skilled, business-oriented technology strategists. In the absence of such a person within the GoForward community, a technology consultant who can help sort out technology issues would be valuable, or perhaps, a General Manager or Chief Operating Officer who is actively managing technology.

The study team recommends that the TGC maintain a close relationship with the audit function at each agency. Technology systems involve many issues of critical concern including confidential information, financial accountability, data retention and disaster recovery.

Establishment of a Technology Oversight Committee (TOC) is also recommended. The TOC would include the General Manager and other senior staff from participating agencies as well as a senior manager with audit experience/responsibility. The purpose of the TOC is to provide oversight, advice and coordination of the development and implementation of strategic initiatives and related technology projects recommended by the TGC. The charter of the TGC should explicitly describe its relationship to

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the TOC and audit function, as well as its organization, purpose, oversight responsibilities, and meeting schedule.

The Capital Area Metropolitan Planning Organization (CAMPO) in partnership with the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHCMPO), the North Carolina Department of Transportation (NCDOT), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA) developed Intelligent Transportation System (ITS) Strategic Deployment Plan for the Triangle Region in 2010 with an update in 2019. It is recommended that the TGC foster a relationship with the governance apparatus for the Regional ITS Deployment Plan to coordinate on regional ITS solutions that include transit but operate in a space beyond the bus. It is recommended that a liaison with traffic engineering and extensive ITS implementation and regional coordination experience be identified to attend TGC meetings on an as needed basis.

The TGC establishes the proper linkage between each transit agency's management and their technology support staff. This committee represents key functional areas of each agency that use and/or need technology tools and will foster and promote region-wide technology ideas and solutions. The charter and responsibilities of this committee clearly establishes it as distinct from, but operating in an advisory capacity to, other committees/departments. Depending on the strategic interests and technology needs of the region, this committee has the authority to provide some or all of the following functions:

- Recommend a process and a cost-benefit methodology for the evaluation and prioritization of all technology projects.

- Develop a list of all technology projects based on all capital project submissions and review and evaluate all ongoing and proposed technology projects on an annual basis, within this context.

- Provide executive agency management with the information necessary to properly evaluate technology projects and investments.

- Recommend specific objectives and develop a Service Level Agreement process for technology.

- Link to each agency's annual budget process.

A specific TGC charter defines technology and delineates the minimum technologies over which the TGC has authority. It is important that the TGC and all the regional agencies adopt a definition of technology that is sufficiently broad and consistent with evolving contemporary standards. For example, the definition of technology, includes all those technologies that are information-based generate data that have application across the region, and/or involve standard computing platforms running on common communications infrastructures.

The overall intent of the Technology Investment Process is to set policy, prioritize the investment in information-related technologies, and help ensure that technology investment is in the best long term strategic interests of the region. As part of the process of overseeing technology investment, the TGC has the initial and principal responsibility to develop recommendations that would be reviewed and approved by the General Managers and senior management. The primary functions of a TGC are to:

- Advise senior management on policy for technology. This would include helping establish mission, goals, objectives, and technology standards for each agency and the region.

- Establish cost-benefit methodology and standards for all technology investment.

- Prioritize, schedule, and monitor all technology projects.

- Assure the conformity of project development with the program budgeting process.

- Arbitrate disputes between agency departments and IT support staff.

Table 3:   Technology Investment Process

Step 1 Annual Budget Process - Identify Mission, Goals and Objectives
Step 2 List all Technology Projects
Step 3 Prioritize Projects based on Mission, Goals and Objectives – Cost Benefit Analysis
Step 4 Project Management Process – Establish Manager and Team
Step 5 Performance Monitoring Process – Specific Manager and Team
Step 6 Project Completion – Assess additional project requirements

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Strategic Sourcing Alignment Opportunities

The Technology Governance and Oversight committees can also assist the region to advance a more strategic approach to procurements.   Regional procurements may yield greater value to the partners and the region in the form of consistent and advantageous terms and conditions, improved support, and better pricing. The TGC can help coordinate technology requisitions identified by each agency and work with agency procurement personnel and IT support staff for appropriateness, consistency, and adherence to the agency's standards and architectures, the following approach may be applicable.

- The TGC can help establish a list of generic technology standards appropriate for different types of staff and usage, emphasizing interoperability between agencies as well as interoperability with other ITS technologies where appropriate.

- The Committee can support Procurement and the IT support staff as they work together to establish vendor relationships and term contracts for these items. It can also create a "catalog" to facilitate hardware and software purchases.

- The agencies may elect to require that technology-related requisitions for noncatalog items require TGC agency review and approval prior to acquisition.

Suggested TGC Bylaws

The following suggested bylaws may be used as a guide when the TGC is created:

Committee Chair

The technology expert will serve as Chairperson of this committee. In the event the Chair is unable to attend a committee meeting, the Chair must designate an alternate from the committee members to run the meeting.

Members

Each Technology Governance Committee member will be appointed by the General Manager or other senior executive on advice of their respective senior staff. In the event a committee member can no longer serve on this committee, the respective senior will advise the General Manager or other senior executive on who should replace the committee member.

Invited Guests

With consent of the Committee Chair, committee members may invite guests from different areas of the agencies to attend advisory committee meetings. Guests can be any employee, contractor, or consultant and will not have voting rights.

Meeting Frequency

All meetings will be held on a monthly basis. Committee members should expect to commit approximately 3 hours per month in addition to the meeting time independently reviewing materials related to requests and other matters.

Meeting Structure

The Committee Chair will poll the membership and develop an agenda for each meeting which will be published at least one week before the meeting.

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Voting

Each voting member will cast one vote towards a recommendation for each reviewed technology project request or for any other matter the Committee Chair seeks guidance on. The Chair will have the authority to decide quorum and cast a tie-breaking vote.

Project Request Reviews

This committee will review project requests on an ad-hoc basis and will make a recommendation for approval or disapproval to Executive leadership. As required, the Committee Chair will present voting results and recommendations on project requests to Executive leadership.

Special Projects

The Committee Chair may use appropriate discretion to approve special projects that are critical to the region for Governance Committee review.   A special project is a project that requires new funding and is requested by one of the agencies. Internal agency technology projects do not require governance approval.

Support

All regional agencies IT departments will provide support to this committee as needed.

Next Steps

This report summarizes the work that the Regional Partners have initiated to coordinate and guide their efforts to ensure that technology investments are aligned for the benefit of the region. The Partners have laid the groundwork for their vital efforts to ensure that technology investments support regional and agency goals, improve mobility, enhance the customer experience and make the region an ever better and more productive place to live, work and play.

As the partners move forward, they should revisit the regional technology strategy to refine their prioritization of key technology investments, as well as the scope, schedule and estimated cost of the systems. These refinements will improve cost estimates and provide a better sense of when and how much funding will be required from agencies, the region and external sources (such as state and federal grant programs).

The partners should also consider formally adopting and implementing the Technology Governance and Oversight committees to encourage innovation, action and alignment of technology investments. These committees can help advance technology investments rationally and expeditiously.

The Technology Governance and Oversight committees can also assist the region to advance a more strategic and aligned approach to procurements.   Regional procurements may yield greater value to the partners and the region in the form of consistent and advantageous terms and conditions, improved support, and better pricing.