

09/23/2014

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
TIA PROJECT CONCEPT REPORT



Project Type: ITS P.I. Numbers: 0011392
GDOT District: 2 County: Richmond
Federal Route Number: N/A MPO ID Number: RC07-000121
State Route Number: Multiple State Routes

Project will provide ITS and Traffic Signal components and capabilities throughout Augusta - Richmond County including fiber-optic infrastructure, CCTV surveillance cameras, traffic signal cabinet network communications upgrades, and TMC/TOC equipment.

Submitted for approval:

Local Government Representative

9-23-2014

DATE

District Engineer/Consultant & Firm

URS Corporation

9-23-2014

DATE

TIA Project Manager

9-25-14

DATE

TIA Program Manager

26 Sep 2014

DATE

GDOT TIA Regional Coordinator

Michael D Dover

9/26/2014

DATE

GDOT State TIA Administrator

9/29/2014

DATE

Approval:

Concur:

GDOT Director of Engineering

9/30/14

DATE

Approve:

GDOT Chief Engineer

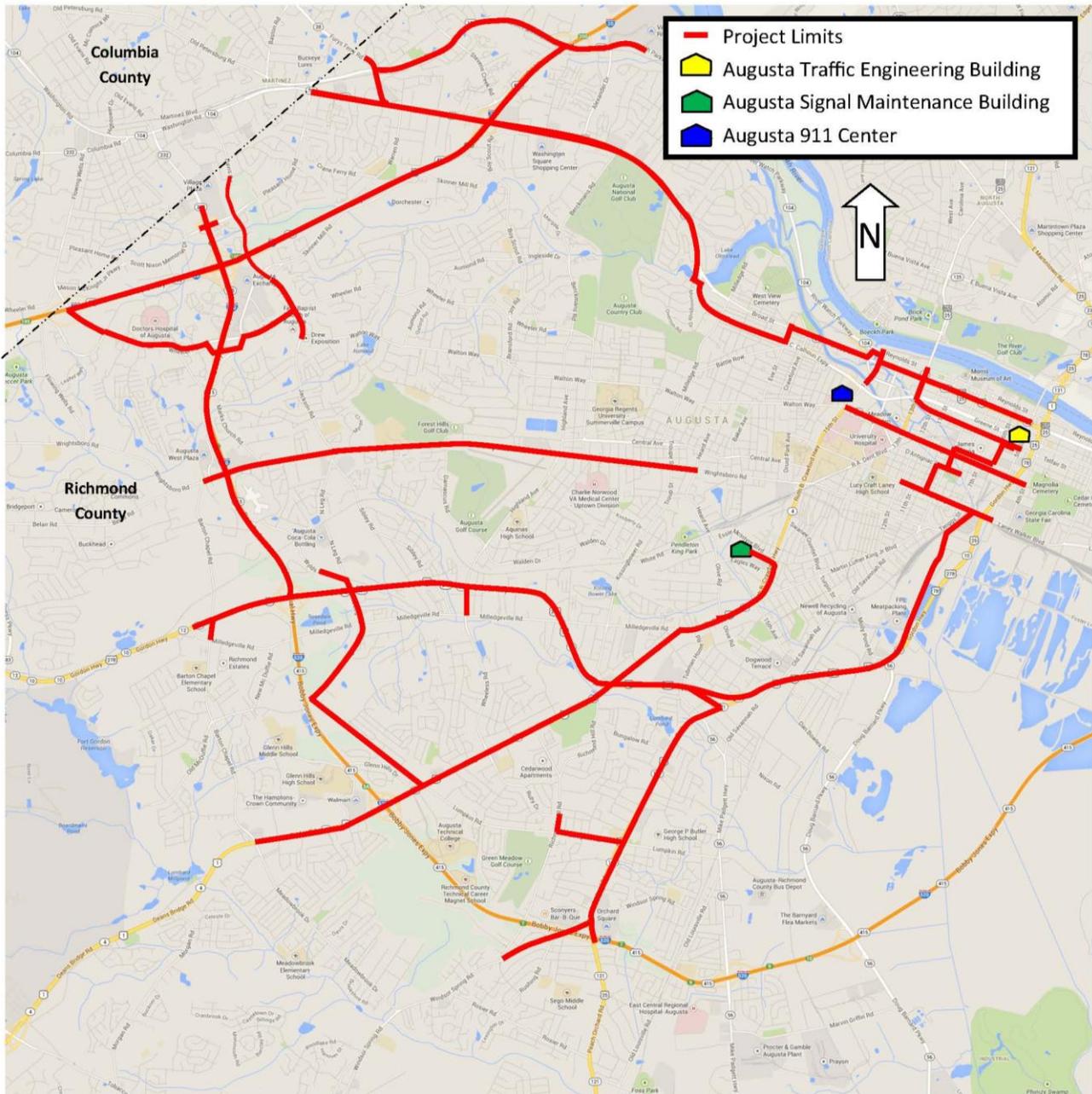
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DATE

PROJECT LOCATION

Location of project tentative limits within Richmond County is shown in Figure 1.

FIGURE 1: Project Map



PLANNING & BACKGROUND DATA

Project Justification Statement:

The recently completed update of the ARTS ATMS Master Plan (completed in December 2013) identified and documented the needs for this project.

As the costs of roadway widening and right-of-way continue to grow and stress the capital budgets of municipalities around the country, more and more of them are turning to technology to improve their traffic flow and maximize the efficiency of the existing roadway networks.

Weekday commuter traffic into downtown Augusta, weekend shopping, and recreational traffic (i.e., Masters Tournament, etc.) in the Augusta-Richmond area have increased over the years along with the commercial and residential development. With growth in population and increasing traffic demand resulting in increased congestion levels and incidents, there is a need to:

- Expand and update the traffic and emergency management operations, capabilities and coordination to improve traffic flow,
- Maximize the efficiency of the existing roadway networks, and
- Improve public safety vehicle response times and intersection safety.

Intended Benefits:

1. Fiber optic network communications connectivity will result in a reduction in traffic signal system down time, improved operations and reduced vehicle delays. The project will provide the capability to remotely monitor and configure system components and provide the necessary network bandwidth that allows for CCTV video surveillance cameras to be deployed at critical intersections
2. Fiber optic network communications connectivity will improve overall system maintenance resulting in significant cost savings. City Traffic Operators will be able to remotely monitor, troubleshoot and optimize each intersection from the City's TMC and will have the capability to send the right technician with the right tools to address the problem because they will have already diagnosed the problem remotely using the system
3. The project will provide CCTV surveillance cameras at intersections and corridors with high crash frequencies to facilitate traffic and emergency management operations. The incorporation of CCTV cameras will allow City Traffic Operators to respond to incidents and coordinate with emergency responders and law enforcement agencies, remotely review

traffic signal issues, and other operations along the roadway/corridor in a more efficient and timely manner.

4. A video sharing system will be available for the real-time video feeds from the CCTV cameras to be shared with emergency responders, internal and external stakeholders, and the public, through an upgraded City website. Critical real-time video streams from active incident sites will allow emergency responders to better assess the current incident scene and conditions prior to arriving at the scene. The system will also provide the traveling public the necessary information to make informed decisions on taking alternative routes to their destination.
5. The project will also upgrade the TMC located at the City's Traffic Engineering Building in Downtown Augusta. The TMC will be equipped with a series of computers, servers and display monitors. It will receive traffic signal system information and multiple simultaneous video feeds from the CCTV cameras through the fiber optic network which will enable City traffic engineers and operators to track signal operations and traffic flows and remotely adjust signal coordination and timing.

Description of the Proposed Project:

This project involves the expansion and/or upgrade of Intelligent Transportation System (ITS) and Traffic Signal Control components and capabilities along multiple local and state roads within Richmond County.

This project proposes deployment of approximately 34 miles of reliable fiber optic infrastructure, network Ethernet equipment to existing signalized intersections / traffic signal cabinets, approximately 65 CCTV surveillance cameras at intersections and along the corridors with high crash frequency to better monitor traffic flow conditions and better respond to incidents, video sharing system including video streaming hardware, software and upgrades to the existing City traffic website, and hardware and software upgrades and expansion to the City TMC, Traffic Signal Maintenance Building and the 911 Dispatch Center to provide operational flexibility and maintenance oversight of the system.

The proposed field ITS devices will utilize existing power sources, cabinets and poles wherever possible to minimize construction time and limit environmental impacts. It is expected that no new cabinets or poles will be required. The ITS devices provided under this project will communicate with the Augusta TMC via the new Ethernet network using new Augusta fiber optic infrastructure throughout the County.

The City of Augusta will be the operator of this system and will monitor and control all elements of this project from the Augusta TMC. Real-time video feeds provided by this project will be utilized

by the City of Augusta and shared with other agencies and the public through an upgraded City traffic website (currently www.augustatraffic.com)

Figures 2, 3, and 4 show the tentative proposed scope and ITS / traffic signal components and features included in the project.

FIGURE 2: Proposed Fiber Communications

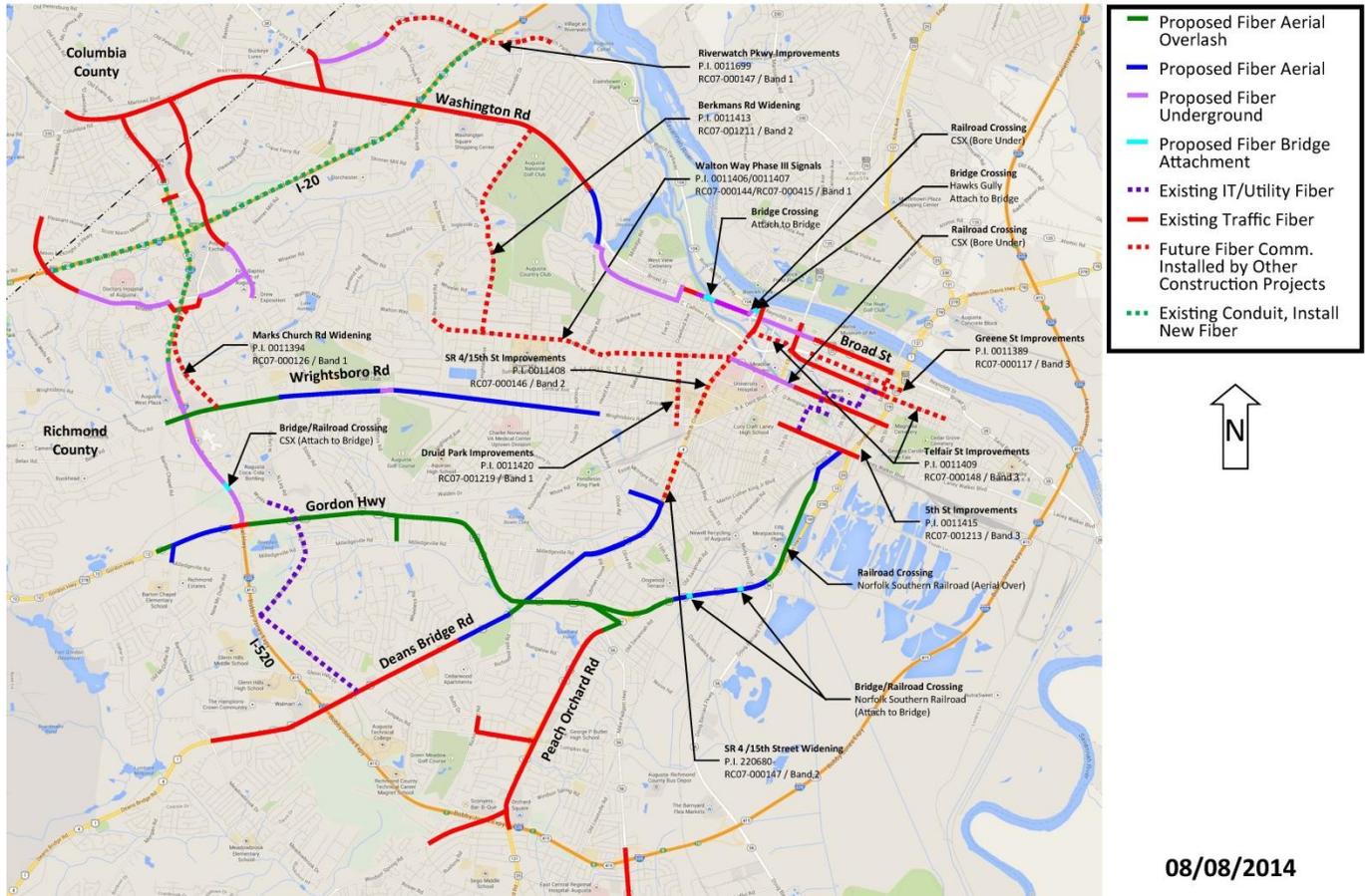
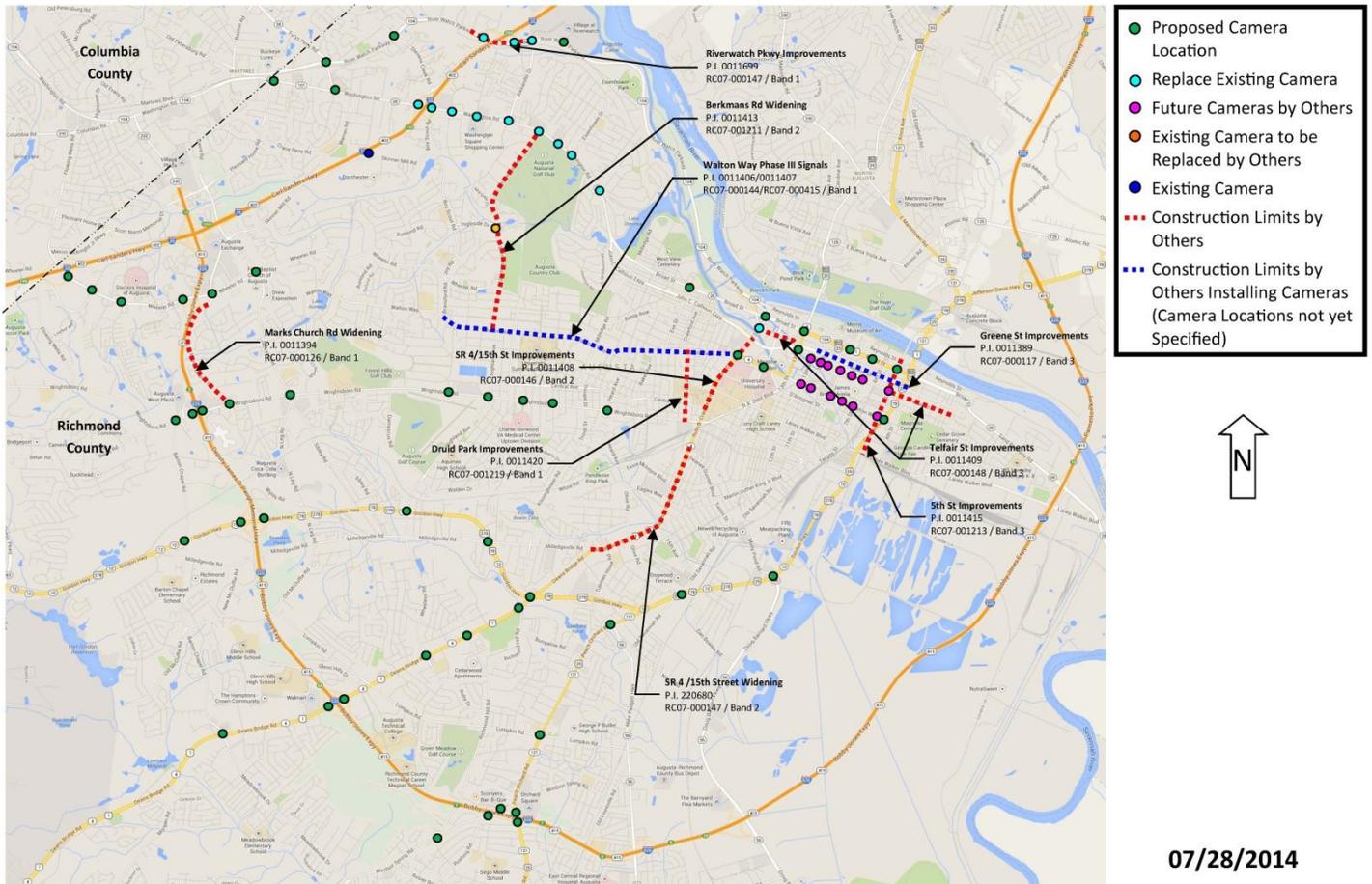
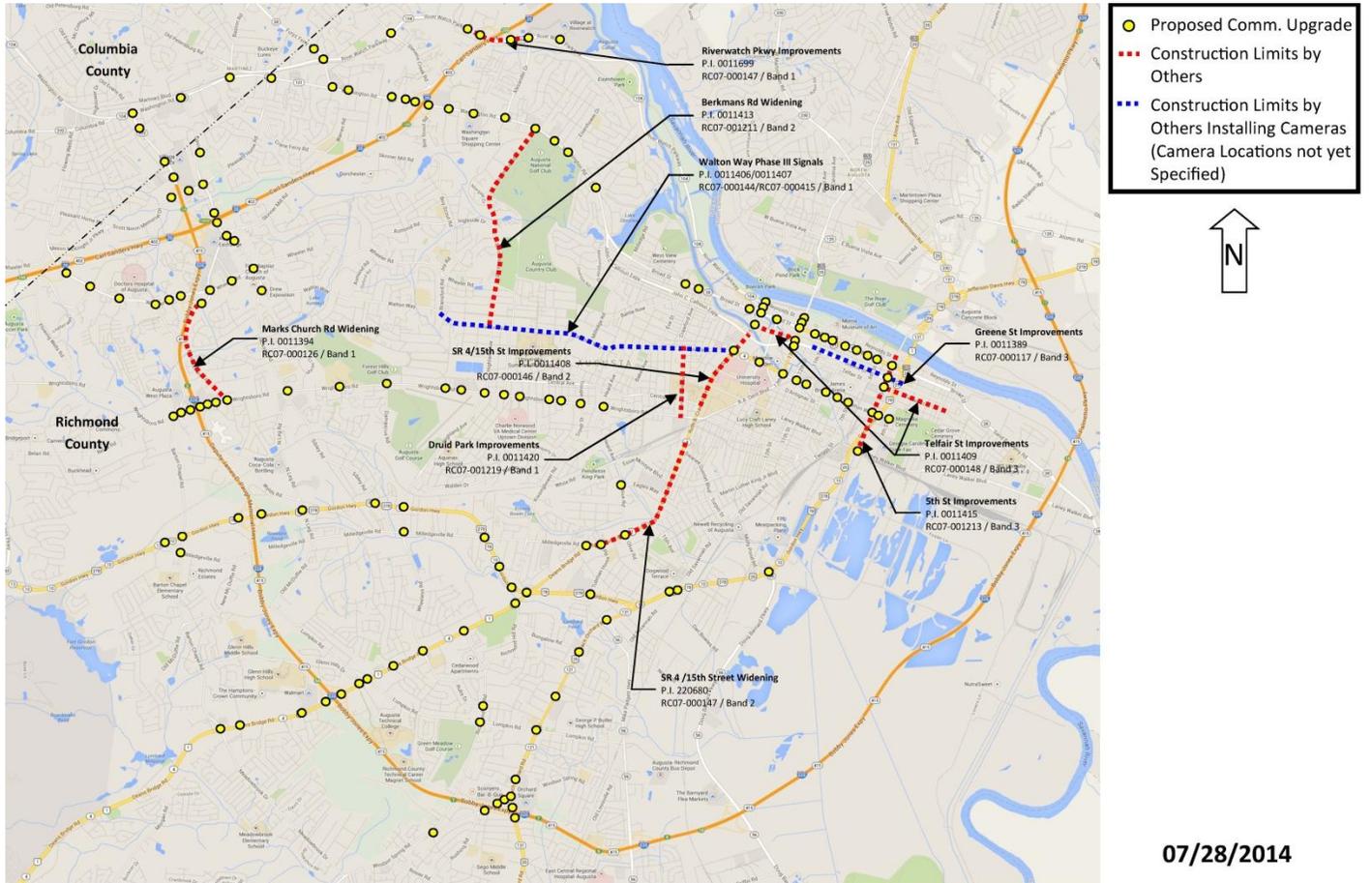


FIGURE 3: Proposed CCTV Locations



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FIGURE 4: Proposed Cabinet Upgrade Locations



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Federal Oversight: Exempt State Funded TIA Other

MPO: Augusta Regional Transportation Study (ARTS) **MPO Project ID:** 371-041110-T13049121

Regional Commission: Central Savannah River Area **RC Project IDs:** RC07-000121

Congressional District(s): 12

Projected Traffic: AADT

This project does not address roadway capacity; therefore, projected traffic counts are not required.

Functional Classification:

- SR 104/Riverwatch Parkway – *Urban Principal Arterial Street/Urban Freeway and Expressway*
- SR 28/Washington Road – *Urban Principal Arterial Street*
- Wrightsboro Road – *Urban Principal Arterial Street*
- US 78/US 278/Gordon Highway – *Urban Principal Arterial Street*
- US 1/Deans Bridge Road – *Urban Principal Arterial Street*
- Windsor Spring Road – *Urban Principal Arterial Street*
- 5th Street – *Urban Principal Arterial Street/ Urban Principal Collector Street*
- US 25/Peach Orchard Road – *Urban Principal Arterial Street*
- Walton Way – *Urban Minor Arterial Street*
- Walton Way Extension – *Urban Minor Arterial Street*
- Wheeler Road – *Urban Minor Arterial Street*
- US 25 BUS/SR 28/SR 104/Broad Street – *Urban Minor Arterial Street*

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? No Yes

Will Context Sensitive Solutions procedures be utilized? No Yes

DESIGN AND STRUCTURAL DATA

This project proposes to install ITS / traffic signal elements along the project corridors.

No additional roadway design capacity or other roadway work is included or being added on this project.

Major Structures:

Proposed fiber optic cable for this project is anticipated will need to cross five (5) bridges at the following locations:

Structure ID	Existing Condition	Proposed Solution
245-0013-0	Bridge located on Gordon Hwy/SR 10/US 1 at Norfolk Southern Railroad (734126P); 275’ long bridge, 100’ wide deck, 22.2499’ vertical clearance, passes over railroad	Attach conduit to under bridge deck and install traffic communications fiber optic cable
245-0014-0	Bridge located on Gordon Hwy/SR 10/US 1 at Norfolk Southern Railroad (732964Y); 262’ long bridge, 100’ wide deck, 23.6664’ vertical clearance, passes over railroad	Attach conduit to under bridge deck and install traffic communications fiber optic cable
245-5010-0	Bridge located on New Savannah Road at Oats Creek; 44’ long bridge, 35’ wide deck, passes over Oats Creek	Over-lash traffic communications fiber optic cable to existing copper wire and messenger
245-0120-0	Bridge located on Murray Road (SBL) at Hawks Gully; 240’ long bridge, 52’ wide deck	Attach conduit to under bridge deck and install traffic communications fiber optic cable
	I-520 bridge over CSX, north of Gordon Hwy	Attach conduit to bridge deck and install traffic communications fiber optic cable

Major Interchanges/Intersections:

None Expected

Structures:

None Expected

Utility Involvements:

Power service will be required for proposed ITS devices. It is expected that all proposed ITS sites will utilize existing power service (via existing traffic signal cabinets) and service points at each proposed location versus calling for new/additional service points. In addition, new fiber optic communications cable proposed on this project will be attached to existing utility poles within the project limits. Both new messenger as well as over-lashing of fiber optic cable to existing messenger is expected.

The following utilities/agencies are anticipated and will be coordinated with for this work:

- AT&T – Telephone and Utility Pole Owner
- Georgia Power Company – Power and Utility Pole Owner
- Jefferson Energy Cooperative – Power and Utility Pole Owner
- Comcast, Inc. – Communications – Joint Use Pole Owner
- Level 3 – Communications – Joint Use Pole Owner
- WOW / Knology – Communications – Joint Use Pole Owner
- Augusta - Richmond County Public Works / Traffic Engineering Division

Traffic control during construction:

Shoulder closures and/or lane closures will be necessary during installation of underground conduit and fiber optic cables, as required.

Public Interest Determination Policy and Procedure recommended (Utilities)? No Yes

SUE Required: No Yes

Railroad Involvement: No Yes

Complete Streets - Bicycle, Pedestrian, and/or Transit Warrants:

Warrants met: None Bicycle Pedestrian Transit

Right-of-Way: *Project will be constructed within existing Right of Way and Easements.*

Required Right-of-Way anticipated: No Yes Undetermined

Easements anticipated: None Temporary Permanent Utility Other

Anticipated number of impacted parcels: 0

Displacements Anticipated: 0

Businesses: 0

Residences: 0

Other: 0

Transportation Management Plan [TMP] Required: No Yes

Design Exceptions to FHWA/AASHTO controlling criteria anticipated:

None Expected

Design Variances to GDOT Standard Criteria anticipated:

None Expected

ENVIRONMENTAL DATA

Anticipated Environmental Document:

Augusta, GA will certify that compliance with applicable local, state, federal environmental requirements has been completed. Augusta, GA will submit “Environmental Certification”.

GEPA: Type A Letter Type B Letter
NEPA: CE EA/FONSI

Project Air Quality: *(On-system projects only)*

Is the project located in a PM 2.5 Non-attainment area? No Yes
Is the project located in an Ozone Non-attainment area? No Yes
Is a Carbon Monoxide hotspot analysis required? No Yes

MS4 Compliance – Is the project located in an MS4 area? No Yes

Project is located in Augusta, GA MS4 service area

Environmental Permits/Variations/Commitments/Coordination anticipated: *(Describe anticipated effects to ecology, history, archeology, air & noise, public involvement, etc. & the effect on the environmental document)*

None expected – Project is expected to have minor to no land-disturbing activities and completely within existing rights of way. Based on the low-impact nature of the proposed project, no adverse effects are anticipated to ecological, historical, or archaeological resources. The project should not be a cause for air quality concern. Noise impacts are not considered under GEPA.

The proposed project should not be a cause for public controversy, nor will it result in a detour, lane closures, or access limitations. Consequently, the need for public involvement is not anticipated.

Permitting for jurisdictional or state waters is not anticipated.

NEPA/GEPA Comments & Information:

No effects anticipated -- The project is being funded regionally through the TIA Fund and does not include any State or Federal funds. Augusta, GA will certify that compliance with applicable local, state, federal environmental requirements has been completed. Augusta, GA will submit “Environmental Certification”.

PROJECT RESPONSIBILITIES

Project Activities:

- Concept Development: URS Corporation
- Design: URS Corporation
- Right-of-Way Acquisition: N/A
- Relocation of Utilities: N/A
- Letting to contract: City of Augusta, GA
- Funding Source: 100% TIA Funds
- Supervision of construction: City of Augusta
- Providing material pits: None required
- Providing detours: None anticipated
- Environmental Studies/Documents/Permits: URS Corporation
- Environmental Mitigation: N/A
- Construction Inspection & Materials Testing: City of Augusta

Lighting required: No Yes

Coordination:

- Initial Concept Report Meeting date and brief summary: ARTS ATMS Master Plan, December 2013
- Concept meeting date(s) and brief summary: April 29, 2014, Minutes are in Attachment C
- PAR meetings, dates and results: Not required
- FEMA, USCG, and/or TVA: None anticipated
- Public involvement: None anticipated
- Local government comments: The City of Augusta is the sponsor of this project
- Railroad:
 1. I-520 at CSX, north of Gordon Hwy, railroad under
 2. (1) Gordon Hwy at Norfolk Southern, near Old Savannah Road, railroad under
 3. (2) Gordon Hwy at Norfolk Southern, near Old Savannah Road, railroad under
 4. New Savannah Road at Norfolk Southern, at-grade crossing
 5. River Watch Pkwy connector structure at CSX, near 15th Street, railroad under

- Other projects in the area:

The following projects due to close proximity to the proposed scope of work on this project will need to be coordinated with including:

- P.I. # 0011388 ; MPO TIP ID # RC07-000116 - SR 4/US 1 @ SR 10/US 78; Intersection Improvement
- P.I. # 0011389; MPO TIP ID # RC07-000117 - GREENE ST FROM SR 4 TO CR 480/EAST BOUNDARY ST; Sidewalks
- P.I. # 0011391; MPO TIP ID # RC07-000119 - HIGHLAND AVE FROM WRIGHTSBORO RD TO WHEELER RD; Turn Lane, C&G, Sidewalk, and Storm-Sewer System
- P.I. # 0011393; MPO TIP ID # RC07-000123 - JACKSON RD FROM WALTON WAY TO WRIGHTSBORO RD; Resurface & Reconstruction
- P.I. # 0011394; MPO TIP ID # RC07-000126 - MARKS CHURCH RD FROM WRIGHTSBORO TO WHEELER RD; Turn Lane, C&G, Sidewalk, and Storm-Sewer System
- P.I. # 0011396; MPO TIP ID # RC07-000129 - CR 371/NORTH LEG RD FROM SIBLEY RD TO WRIGHTSBORO RD; Intersection Improvement
- P.I. # 0011398; MPO TIP ID # RC07-000134 - PLEASANT HOME RD FM SR 104 TO WALTON WAY EXT; Resurface & Reconstruction
- P.I. # 0011401; MPO TIP ID # RC07-000138 - SR 104 FM CR 1499/15TH STREET TO COLUMBIA COUNTY LINE; Resurface & Reconstruction
- P.I. # 0011402; MPO TIP ID # RC07-000139 - SR 104 FROM SR 28 TO RIVER SHOALS PKWY; Adaptive Signals
- P.I. # 0011403; MPO TIP ID # RC07-000140 - SR 28 @ SR 104; Intersection Improvement
- P.I. # 0011404; MPO TIP ID # RC07-000141 - SR 104 @ CR 564/STEVENS CREEK ROAD; Intersection Improvement
- P.I. # 0011406; MPO TIP ID # RC07-000144 - CR 1507/WALTON WAY FM BRANSFORD ROAD TO MILLEDGE ROAD; Signals and Fiber Communications
- P.I. # 0011407; MPO TIP ID # RC07-000145 - CR 1507/WALTON WAY FROM DRUID PARK TO HEARD AVE; Signals and Fiber Communications
- P.I. # 0011408; MPO TIP ID # RC07-000146 - SR 4 FROM SR 28 TO CR 2207/CENTRAL AVE ; Bicycle/Ped. Improvements
- P.I. # 0011409; MPO TIP ID # RC07-000148 - GREEN ST/TELFAIR ST FROM 15TH ST TO EAST BOUNDARY ST; Sidewalks, C&G, and Storm-Sewer Reconstruction
- P.I. # 0011410; MPO TIP ID # RC07-000151 - CR 1505/WALTON WAY EXT FM ROBERT C DANIEL TO WALTON WAY; Resurface & Reconstruction

- P.I. # 0011413; MPO TIP ID # RC07-001211 - CR 486/BERCKMAN RD FM CR 601/CR 2379/WHEELER RD TO SR 28; Realignment
 - P.I. # 0011415; MPO TIP ID # RC07-001213 - 5TH STREET FROM LANEY WALKER BLVD TO REYNOLDS STREET; Sidewalks, C&G, and Storm-Sewer Reconstruction
 - P.I. # 0011419; MPO TIP ID # RC07-001218 - CR 2477/JAMES BROWN RD FM WRIGHTSBORO RD TO REYNOLDS ST; Resurface & Reconstruction
 - P.I. # 0011420; MPO TIP ID # RC07-001219 - CR 2304/DRUID PARK AVE FM WALTON WAY TO WRIGHTSBORO RD; Resurface & Reconstruction
 - P.I. # 0011421; MPO TIP ID # RC07-001220 - CR 2483/6TH ST FROM LANEY WALKER BLVD TO REYNOLDS ST; Resurface & Reconstruction
 - P.I. # 0011424; MPO TIP ID # RC07-001223 - SR 4 FROM CR 2664/RA DENT BLVD TO CR 2493/REYNOLDS ST; Bridge Repair & Restoration
 - P.I. # 0011699; MPO TIP ID # RC07-000142 - I-20 @ SR 104/RIVERWATCH; Intersection Improvement
 - P.I. # 220680; MPO TIP ID # RC07-000147 - SR 4/15TH ST FROM MILLEDGEVILLE ROAD TO GOVERNMENT STREET; Road Widening
 - P.I. # 250510; MPO TIP ID # RC07-000155 - CR 1501/WRIGHTSBORO RD FM JIMMIE DYESS PKWY TO I-520 RMP; Road Widening
- Other Coordination to Date:
None

Project Cost Estimate and Funding Responsibilities:

	Breakdown of PE	Breakdown of ROW	Breakdown of Reimbursable Utilities	Breakdown of CST	GDOT Project Management	Total Cost
By Whom	TIA	TIA	TIA	TIA	TIA	
Date of Estimate	8/13/2014	8/13/2014	8/13/2014	8/13/2014		
TIA Current Programmed Budget \$	\$1,000,000	\$0.00	\$0.00	3,504,500.00	\$45,500	\$4,550,000.00
Estimated \$ Amount	\$500,000	\$0.00	\$0.00	\$3,369,999	N/A	
Budget Contingency \$	\$60,000	\$0.00	\$0.00	\$572,900	N/A	
Total Estimated Cost	\$560,000	\$0.00	\$0.00	\$3,942,899	\$45,500	\$4,548,399

- Note: 1. Construction phase contains Utilities work, CEI & CMT in addition to other contingencies.
 2. All phases contain Augusta, GA Project Management Cost.

Scheduling – Responsible Parties’ Estimate:

- Time to complete the environmental process: 1 Month
- Time to complete preliminary construction plans: 3 Months
- Time to complete right-of-way plans: N/A
- Time to complete the Section 404 Permit: N/A
- Time of complete Make Ready work: 4 Months
- Time to complete final construction plans: 3 Months
- Time to complete the purchase of right-of-way: N/A

ALTERNATIVES

Preferred Alternative: This Project

Other Alternatives considered: Alternative 1: No Build

Comments/additional information:

None

ATTACHMENTS:

Attachment A – Concept of Operations

Attachment B – Project Cost Estimate

ATTACHMENT A
RICHMOND COUNTY ATMS
CONCEPT OF OPERATIONS

Concept of Operations

Augusta - Richmond County Advanced Transportation Management System (ATMS)

Project No:

Project Number: RC07-000121
P.I. Number: # 0011392
(Richmond County ATMS Master Plan Implementation)

Project Number: RC07-000137
P.I. Number: # 0011400
(Richmond County Emergency Preemption & Transit Signal Priority System)

Prepared for:

CITY OF AUGUSTA
505 TELFAIR STREET,
AUGUSTA, GA 30901

Prepared by:



400 NORTHPARK TOWN CENTER
1000 ABERNATHY ROAD, NE
SUITE 900
ATLANTA, GA 30328

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Document Control

Date	Version	Description
4-22-14	0.1	Draft for Internal Review
4-23-14	0.2	Corrections & revised and added tables showing operational needs and functional requirements
4-24-14	1.0	Draft Document for client review
8-13-14	2.0	Updated document for TIA use

1 INTRODUCTION / PURPOSE OF DOCUMENT

The Concept of Operations (ConOps) for this project describes the City of Augusta and stakeholders operational goals, needs and Intelligent Transportation Systems (ITS) solutions to improve transportation operations and incident management along the major arterial roadways within Richmond County.

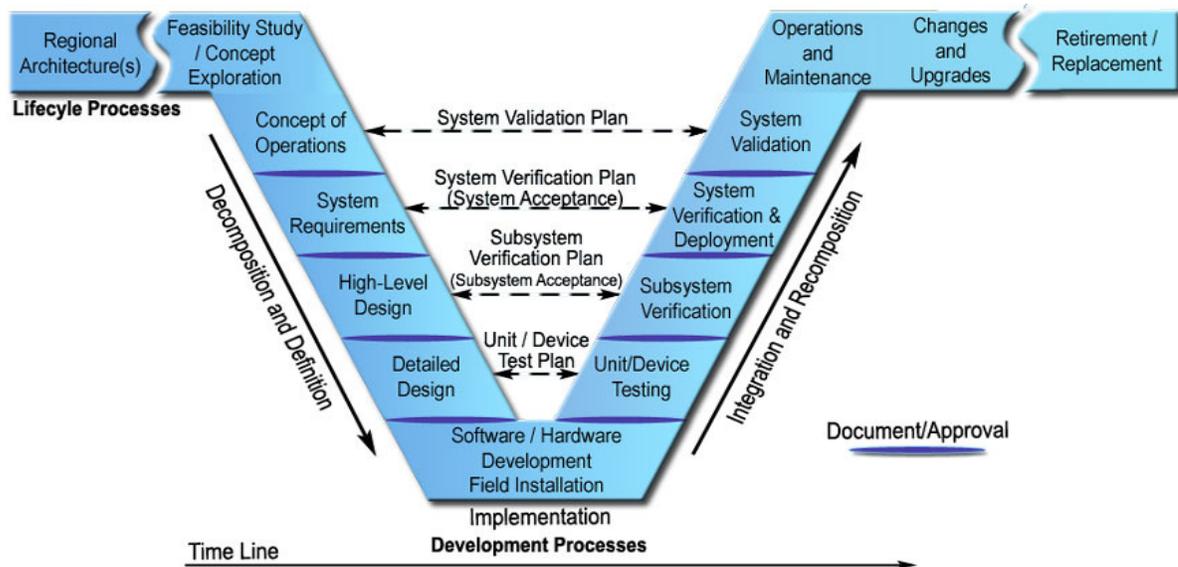
1.1 ConOps Development Process

The ConOps was developed using the Systems Engineering Model that has been developed for use on ITS projects by the United States Department of Transportation (USDOT) and the Federal Highway Administration (FHWA). The systems engineering process reduces the inherent risks associated with the development and deployment of technology related projects.

Depicted in Figure A-1, this process began with; 1) the development and update of regional/county ITS architecture, 2) identification of transportation and system issues, 3) documentation of stakeholder goals and needs, and 4) development of potential project concepts which were recently documented as part of the recently updated ATMS Master Plan. This document continues this process with 1) the development of a concept of operations, and 2) identification of operational / functional requirements.

Once these system engineering components are all completed and in place, they provide the clear requirements and foundation for high-level and detailed system design to proceed.

Figure A-1: Systems Engineering Process



1.2 Study Process / Referenced Documents

The City of Augusta and area stakeholders have previously identified their issues, needs and requirements for the project. The following primary document was referenced in the development of the ConOps as it documents these issues, needs, requirements as well as the existing system and current operations of the ATMS:

1. *ARTS MPO ATMS Master Plan Update (December 2013)*

Extensive use of this updated ATMS Master Plan has been used in the development of this ConOps and system requirements. This document can be accessed at: www.augustaga.gov.

1.3 Document Organization

The Concept of Operations document has been organized to give a broad overview and then provide additional details to meet the needs of the intended audience.

- *Section 2* begins with the overall Scope of the project – the road map that was used to develop the Concept of Operations. This section includes project need and

rationale, the intended audience of the document and users of the system as well as high-level information on the geographical boundary of the project.

- *Section 3* describes the existing operational conditions and user-oriented operational description and needs of the project from perspective of each major manager and user of the system and roadway network.
- *Section 4* offers a system overview of the proposed system. This section includes a set of figures that show the scope of the project design concept (field devices, equipment and infrastructure, TMC hardware & software) along with solutions that address the operational needs. It also describes initial City TMC staffing levels.
- *Section 5* provides operational scenarios from the perspective of the user using real-work operational scenarios to describe the proposed system capabilities and how they relate to each other and could be used / operated.

2 SCOPE OF PROJECT

2.1 Project Need / Rationale

As the costs of roadway widening and right-of-way continue to grow and stress the capital budgets of municipalities around the country, more and more of them are turning to technology to improve their traffic flow and maximize the efficiency of the existing roadway networks.

Weekday commuter traffic into downtown Augusta, weekend shopping, and recreational traffic (i.e., Masters Tournament, etc.) in the Augusta-Richmond area have increased over the years along with the commercial and residential development in this area.

With growth in population and increasing traffic demand resulting in increased congestion levels and incidents; there is a need for expanding and updating the traffic and emergency management operations, capabilities and coordination to reduce congestion, improve traffic flow and safety and to maximize the efficiency of the existing roadway networks and provide overall user benefits within the County.

2.2 Purpose for Developing the Concept of Operations

The Concept of Operations (ConOps) is a description of how the project(s) will be used from the viewpoint of the City of Augusta and area stakeholders. It is a description and rationale of the expected operations of the system under development and will serve as a vehicle for the City of Augusta and stakeholder's discussion and consensus to ensure that the project that is built is operationally feasible and associated requirements are identified to facilitate design, deployment and operations.

It defines who will be responsible for what and what the lines of communications are, define the environment in which the system will operate, and defines the user / systems requirements.

The information provided in the CoOps will provide the foundation and necessary starting point for providing detailed design and deployment of system / technology related projects.

This document provides a project specific ConOps for two (2) ATMS TIA design projects currently underway in Augusta / Richmond County including; 1) Richmond County ATMS Master Plan Implementation and 2) Richmond County Emergency Vehicle Preemption (EVP) and Transit Signal Priority (TSP) System.

This document will focus on the identification of project specific operational needs and system requirements from the user perspective to facilitate the development of these two projects and their deployment in regards to operating and maintaining them for optimal performance and maximum benefit to the public.

2.3 Intended Audience / Stakeholders

The intended audience of this document includes the following City of Augusta departments and agencies / stakeholders:

- City of Augusta Traffic Engineering Department
- City of Augusta IT Department
- City of Augusta Signal Maintenance
- City of Augusta Fire Department / Emergency Medical Services
- Richmond County Sheriff's Department / Law Enforcement
- City of Augusta 911 Dispatch Center / Emergency Management Agency (EMA)
- Augusta Public Transit
- Columbia County Traffic Engineering
- Aiken County Traffic Engineering
- Local Media Outlets / motorists / commuters

Others who may be interested in this document include GDOT, Georgia State Patrol (GSP), local media outlets, and others who are actively using, planning to use, or

advising other agencies on how to use ITS/traffic operations to manage traffic and increase safety across the county and region.

2.4 Boundary

The boundary of the area to be served by the project covers multiple arterial roadways as depicted in Figures A-2A & A-2B. ITS / traffic field devices and associated communications devices will be located along the arterial roadways and will be used to provide benefit to travelers on these roadways. Communication between the City TMC and the ITS / traffic field devices along the roadways must be provided.

Figure A-2A: TIA-0011392 Project Scope / Limits

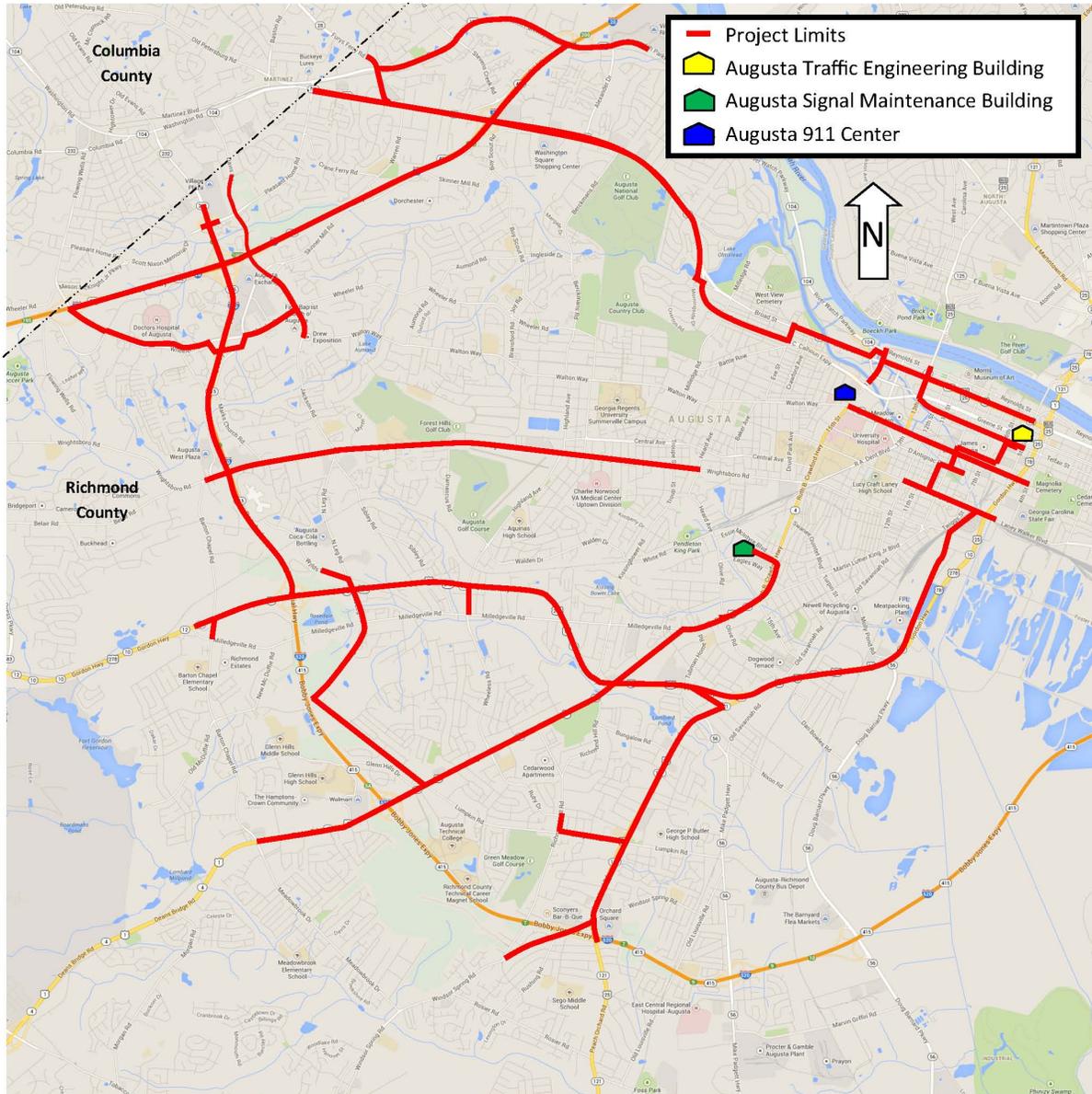
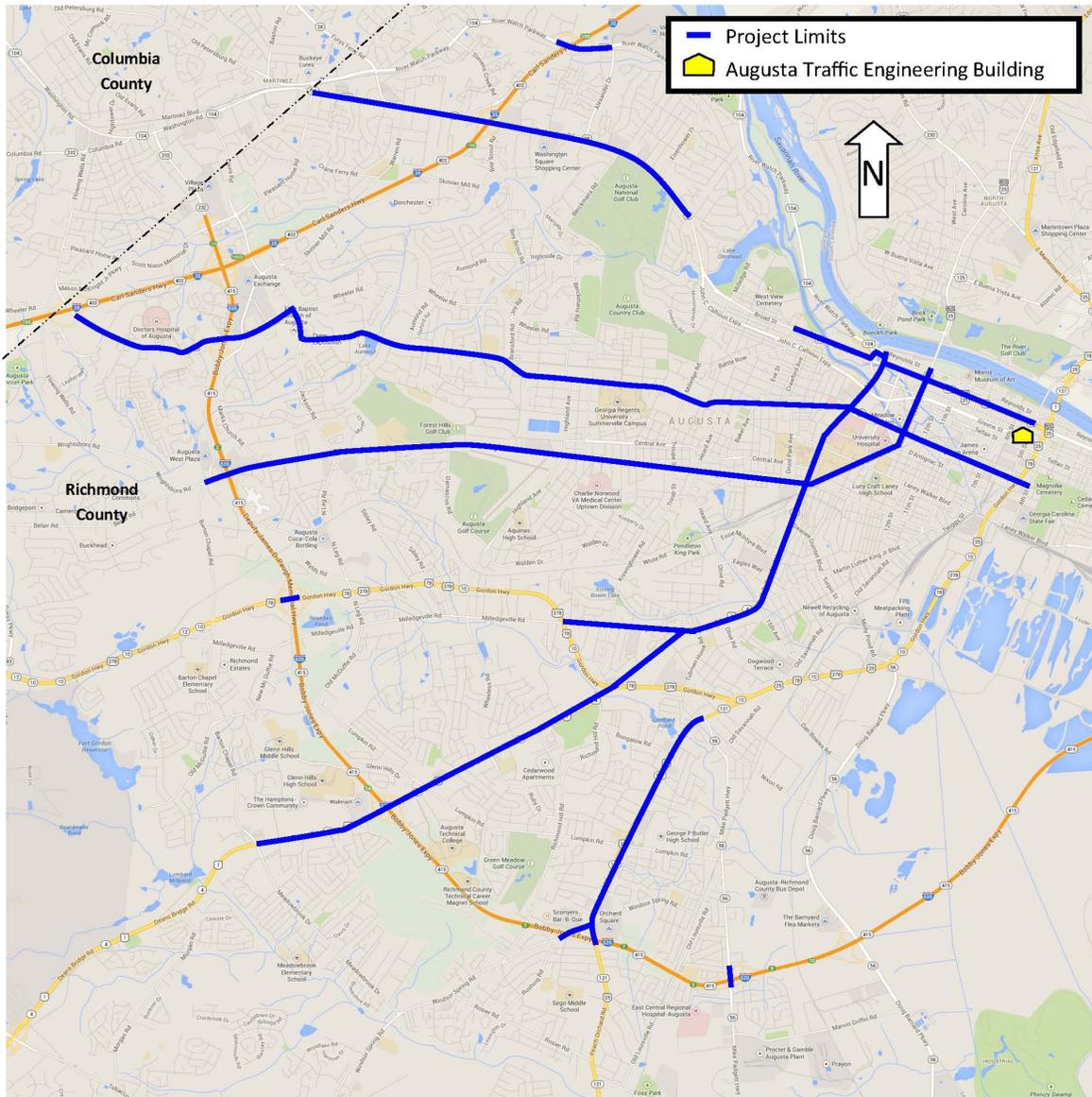


Figure A-2B: TIA-0011400 Project Scope / Limits



3 USER-ORIENTED OPERATIONAL DESCRIPTION AND NEEDS

This section gives a brief description of existing operational characteristics of the area roadway network as well as user-oriented operational description for each stakeholder along with associated their needs based on the updated ATMS Master Plan.

3.1 Existing Operational Characteristics

As the costs of roadway widening and right-of-way continue to grow and stress the capital budgets of municipalities around the country, more and more of them are turning to technology to improve their traffic flow and maximize the efficiency of the existing roadway networks.

Weekday commuter traffic into downtown Augusta, weekend shopping, and recreational traffic (i.e., Masters Tournament, etc.) in the Augusta-Richmond area have increased over the years along with the commercial and residential development in this area. Roadways at certain times of the day (AM / PM) are congested while some intersections frequently operate beyond design capacity. Traffic signals along the Augusta-Richmond County roadways are controlled by traffic signals via the City of Augusta traffic engineering department. There are a few existing slow-scan CCTV video cameras at selected intersections that are available to access via the City's web site (www.augustatraffic.com)

Traffic volumes are anticipated to increase over time as more residents move into the area and along the area roadways and more retail and other establishments are built along the routes. With this anticipated growth in population, traffic growth will result in increased congestion levels and incidents. There is a need for expanding and updating the traffic and emergency management operations, capabilities and coordination to reduce congestion, improve traffic flow and safety and to maximize the efficiency of the existing roadway networks and provide overall user benefits within the County.

3.2 City of Augusta Traffic Engineering / Signal Maintenance

Description / Current Condition: The City Traffic Engineering Department has a primary function of providing Traffic Management services with a main focus on managing traffic signals, maintaining and adjusting timing plans, while the City Signal Maintenance performs overall maintenance on the traffic signal equipment along city local roadways. Maintaining a reliable and efficient network of traffic signals is one of the best measures the City can take to improve traffic operations. Ways that the City can improve traffic signal operations include optimizing signal timing operations, interconnecting signal controllers and synchronizing their system clocks to enable remote operations from the TMC via the ACTRA / INSYNC software, and utilizing CCTV installed at signalized intersections to verify maintenance requests and to monitor traffic operations. The conversion of the corridor communications to fiber-based Ethernet, the installation of CCTV cameras, and other potential traffic signal upgrades all will contribute to efficiency of the Traffic Management task.

The City TMC also supports Incident and Emergency Management operations through coordinating with Augusta Fire, Augusta Sheriff and other emergency, law enforcement, and maintenance management agencies to identify incidents, provide traffic control and request/provide the necessary resources to clear incidents quickly and effectively. In addition, the City TMC coordinates with and supports the Augusta Sheriff, GDOT and other agencies, as required or applicable, in Special Events Management and route diversion (off of I-20 or I-520 onto City streets) operations during events that impact traffic on the major arterial routes / corridors within the county.

Operational Need / Assessment:

ID	Need Description
N-1	Provide a system that is able to view / monitor traffic and incidents that occur along the major arterial routes/corridors and at key intersections and be able to provide better traffic management support to law enforcement, emergency responders and other agencies is needed
N-2	Provide a communications system that is reliable and available for connecting existing traffic signal cabinets and CCTV cameras and other devices

N-3	Provide a system that provides the capability to remotely access both field devices and TMC equipment, infrastructure and subsystems
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Proposed Solution(s):

ID	Functional Requirement (Solution)
F-1	Provide CCTV video surveillance cameras at multiple key intersections and along major routes / corridors along with video display monitors and video management software at the TMC
F-2	Expand and upgrade communications systems using fiber-based technology and infrastructure to support the traffic signal system, CCTV video surveillance system, and other ITS/Traffic network equipment and systems
F-3	Provide upgrades to existing traffic signal cabinets including; network equipment and fiber connectivity
F-4	Provide remote system capability to approved City users to monitor, manage, run diagnostics and provide traffic signal controller firmware upgrades from the TMC, as required
F-5	Provide the capability to allow authorized City personnel to remotely access and manage the City TMC ITS/traffic applications as well as providing the capability for another facility to function as a back-up TMC in the scenario the City TMC goes down for any reason during an emergency
F-6	Provide upgrades (hardware and/or software) to the City TMC, City Signal Maintenance Building and the 911 Center to support the proposed system and infrastructure expansion and upgrades

3.3 City of Augusta Fire Rescue Department / Emergency Medical Services

Description / Current Condition: Generally speaking, Emergency Medical Services, Fire Rescue Departments provide on-site medical treatment to persons involved in crashes. Since time is of the essence whenever responding to injury crashes, these agencies must respond quickly. Any hesitation can be the difference between life and death. An important goal for the City is minimizing the length of time roads or lanes are closed due to incidents. Congestion mitigation following incidents on the corridor is a challenge given that many segments are already congested during peak hours. Priority should be placed on notifying neighboring city agencies when there is an incident, so that they can be made aware that traffic may be adversely affected there and to request for assistance when necessary.

Therefore, these agencies must communicate with the City TMC and the Sheriff Office to initiate a timely and appropriate response and the appropriate resources are made available to manage the incident. Information obtained by personnel at the crash scene and images obtained from cameras provide valuable information for determining the nature and extent of crashes, and other incidents.

Emergency responders primary concern at an incident is safety; however they are also interested in clearing an incident scene as quickly as possible to limit the time of exposure to responders and others on the scene. Response time is another critical component that greatly influences safety for the public which can become an issue with congested routes/corridors and intersections en-route to an incident scene.

Operational Need / Assessment:

ID	Need Description
N-4	Provide a system that will improve response time for emergency responders en-route to accident/incident scenes, reduces emergency responder transport times to downtown Augusta from neighboring counties and improves overall safety for both emergency responders and the public
N-5	Provide the capability for the 911 Dispatch Center, mobile emergency responders and sheriff units to have access to real-time City CCTV video streams to determine appropriate resources, severity of the incident and/or possible route adjustments prior to arrival at the scene

Proposed Solution:

ID	Functional Requirement (Solution)
F-7	Provide an emergency vehicle preemption (EVP) system to reduce critical response times to an incident / emergency scene along major routes / corridors thus improving overall safety to both the public as well the emergency responder
F-8	Provide an emergency preemption system that permits interoperability between county systems which will allow the emergency responders from both Columbia and Aiken Counties to reduce their transport times to the downtown hospital district in downtown Augusta
F-9	Provide a web-based video sharing system with the capabilities to allow for real-time City CCTV surveillance video (monitoring only) and other information (incident location, etc.) along the area roadways

3.4 City of Augusta Sheriff / Law Enforcement

Description / Current Condition: The Augusta Sheriff Office provides enforcement services for Augusta-Richmond County, including the various transportation elements within the region. The Sheriff Office is primarily responsible for providing local emergency response services to the region as well as being an active participant in incident detection and monitoring.

Operational Need / Assessment:

ID	Need Description
N-6	Provide the capability for the 911 Dispatch Center, mobile emergency responders and sheriff units to have access to real-time City CCTV video streams to determine appropriate resources, severity of the incident and/or possible route adjustments prior to arrival at the scene

Proposed Solution:

ID	Functional Requirement (Solution)
F-10	Provide a web-based video sharing system with the capabilities to allow for real-time City CCTV surveillance video (monitoring only) and other information (incident location, etc.) along the area roadways

3.5 Augusta 911 Dispatch Center / Emergency Management Agency (EMA)

Description / Current Condition: Dispatchers rely on reliable traffic information, such as knowing about lane closures due to incidents or construction and maintenance activities as well as severity and details of the accident/incident scene.

Operational Need / Assessment:

ID	Need Description
N-7	Provide the capability for the 911 Dispatch Center, mobile emergency responders and sheriff units to have access to real-time City CCTV video streams to determine appropriate resources, severity of the incident and/or possible route adjustments prior to arrival at the scene

Proposed Solution:

ID	Functional Requirement (Solution)
F-11	Provide the Augusta 911 Dispatch Center and designated others (as directed by the City) with access to the City's video surveillance allowing them to display and PTZ control real-time video from the area roadways on video monitors at the 911 Dispatch Center

3.6 Augusta Public Transit

Description / Current Condition: Augusta Public Transit operates fixed routes and para-transit services to residents within the County. Travel delays as a result of congested bus routes and intersections cause inefficient and unreliable services being provided to the public.

Operational Need / Assessment:

ID	Need Description
N-8	Provide a system that allows for better operational efficiency in transit operations and more reliable services is needed.

Proposed Solution:

ID	Functional Requirement (Solution)
F-12	Provide a transit priority system (TSP) at selected intersections and corridors

3.7 Columbia and Aiken Counties

Description / Current Condition: Both Columbia and Aiken counties are included for working with Richmond County on coordinated traffic signal systems crossing jurisdictional / county lines to provide a seamless and optimize system for motorists traveling along a route / corridor from one county to the other. In addition, ambulance services from both Columbia and Aiken counties transport patients in emergency situations to the hospital district in downtown Augusta. Congested routes/corridors and intersections increases their transport times.

Operational Need / Assessment:

See *Operational Need # N-4* for description

Proposed Solution:

See *Functional Requirement (Solution) # F-8* for description

3.8 Local Motorists / Commuters

Description / Current Condition: Local motorists / commuters on area roadways are typically making short-distance trips within the City and/or County or to an adjacent city or county along the local roadway network. Local motorists expect these roadways to have limited traffic signal stops and a predictable mean speed, especially during non-peak hours. Most commuters seek consistent commute times, so real-time trip information (i.e., video, travel time info, incident locations, etc.) would be important to them, especially since their route options may be limited.

Operational Need / Assessment:

ID	Need Description
N-9	Provide a traffic system that is more reliable, available and coordinated
N-10	Provide the capability to access real-time video of area roadways to allow the motorist to determine if they want to take an alternate route to their destination as a result of an accident and heavy congestion

Proposed Solution:

ID	Functional Requirement (Solution)
F-13	Upgrade traffic cabinets with network equipment and fiber optic connectivity to the TMC
F-14	Provide a web-based video sharing system with the capabilities to allow for real-time City CCTV surveillance video (monitoring only) and other information (incident location, etc.) along the area roadways

4 PROPOSED SYSTEM OVERVIEW

The purpose of this section is to provide a high-level, conceptual design description of the proposed system including field devices and locations, field infrastructure, communications network equipment, TMC hardware and software components and other materials along the major arterial routes / corridors within the county that address the operational needs and solutions mentioned in Section 3 of this document.

The two (2) ATMS TIA design projects currently underway in Augusta / Richmond County including; 1) Richmond County ATMS Master Plan Implementation and 2) Richmond County Emergency Vehicle Preemption (EVP) and Transit Signal Priority (TSP) System are described below.

4.1 Richmond County ATMS Master Plan Implementation

This project involves the expansion and upgrade of ATMS/ITS and Traffic Signal Control components and capabilities along multiple local arterial and state roads within Richmond County. Project would provide enhanced and improved traffic signal and management operations, incident/emergency management and surveillance capabilities as well as fill-in gaps in the existing communications coverage within Richmond County. Improvements and upgrades to be provided under this project would include the following:

Field Components –

Description -- would include multiple ITS/traffic field devices and fiber optic communications equipment and infrastructure as follows:

- a. *Fiber Optic Communications* – would include approximately 34 miles of new fiber optic infrastructure (i.e., both overhead/aerial and underground) to expand the existing and/or planned fiber comm. to support improved traffic signal operations, support video surveillance and other. To the extent possible, fiber would be installed overhead/aerial on existing utility poles (with new messenger or over-lashing to existing).

- b. *CCTV Video Surveillance System* – would include approximately 65 CCTV IP cameras (H.264) located at intersections and along the major arterial routes and corridors to better monitor traffic flow conditions and better respond to incidents. Cameras will primarily be mounted to traffic signal mast arm pole extensions to provide comprehensive video surveillance coverage at key / critical intersections with high accident rates and along high congestion corridors. Video Management Software would be provided, as required or needed, to monitor and control all cameras.
- c. *Cabinet Communications Upgrades* – would include communications network upgrades to traffic signal cabinets to provide hardened Ethernet switches to provide IP network communications to/from the signalized intersection.
- d. *Supporting Infrastructure* -- The proposed project ITS devices will utilize existing power sources, cabinets and poles wherever possible to minimize construction time and limit environmental impacts. It is expected that no new field cabinets or poles will be required. The ITS devices provided under this project will communicate with the Augusta TMC/TOC via a new Ethernet network using new Augusta fiber optic infrastructure through the County.

Anticipated Benefits --

- 1. Fiber optic communications expansion and cabinet network communications upgrades is expected will provide the City with a more reliable system resulting in as reduction in traffic signal down time, provide better coordination with decreased congestion along routes / corridors, provide the capability to remotely monitor and configure system components reducing maintenance cost and providing faster response to system failures, and provide the necessary network bandwidth that allows for CCTV video surveillance cameras to be deployed at multiple critical intersections and along corridors to facilitate overall incident management and response.
- 2. Fiber optic communications network upgrades is expected will allow for monitoring in real-time of traffic signal intersection controller and other

system equipment operations and performance. Each traffic signal cabinet upgraded on this project will be provided with an Ethernet switch and fiber optic connectivity allowing for centralized network monitoring of the system's health and performance. City Traffic Operators will be able to remotely monitor, troubleshoot and optimize each intersection from the City's TMC and will have the capability of receiving warnings of traffic signal failures and addressing them from the TMC as opposed to waiting for someone to call in an issue and having to send a staff member out to the intersection. Of course, some instances will require hands-on attention, but the new system will significantly reduce the incident identification and response times.

3. Expansion of CCTV surveillance cameras at intersections and corridors with a high crash frequency is expected will facilitate traffic and emergency management operations, coordination and improve safety. The incorporation of CCTV cameras will allow City Traffic Operators to monitor, verify, confirm and respond to incidents and coordinate with emergency responders and law enforcement agencies, remotely review traffic signal issues, and other operations along the roadway/corridor in a more efficient and timely manner.

TMC Expansion and Upgrades –

Description -- would include system and space expansion of the Augusta-Richmond County TMC including; operator consoles and workstations, servers, office furniture, network equipment, video display monitors, equipment racks, software, network and AV cabling and remote access capabilities. Capabilities would also be provided at the Augusta 911 Center including the 911 Dispatch Room and the Emergency Management Center room.

Anticipated Benefits --

1. Upgrades to the City's TMC located at City's Traffic Engineering Building in Downtown Augusta including the addition and/or upgrade

of operator workstations / computers, network equipment, servers, display monitors and fiber network connectivity is expected to provide enhance capabilities to operate, monitor and remotely optimize the overall system and its performance. It will receive traffic signal system information and multiple simultaneous video feeds from the CCTV cameras through the fiber optic network which will enable City traffic engineers and operators to track signal operations and traffic flows and remotely adjust signal coordination and timing.

2. Addition of video monitors and video sharing capability at the City's Traffic Signal Maintenance Building and the 911 Dispatch Center is expected will provide improved coordination and provide real-time video and other information on incidents and events as they are happening along the area roadway networks.

Remote access capabilities –

Description -- would use a web-based software platform with appropriate security measures. This would also provide the capability for equipping another facility (i.e., 911 Center) to functionally provide back-up capabilities to the system if the Augusta TMC goes off-line for any reason.

Anticipated Benefits --

1. Remote access capability is expected would provide continuity and un-interrupted traffic and incident/emergency operations during an emergency situation by providing the capability for another facility to function as a back-up TMC in the case where the City TMC goes down for any reason.

Figures A-3 and A-4 show the proposed scope and ITS / traffic signal components and features included in the project.

FIGURE A-3: Fiber Communications Coverage

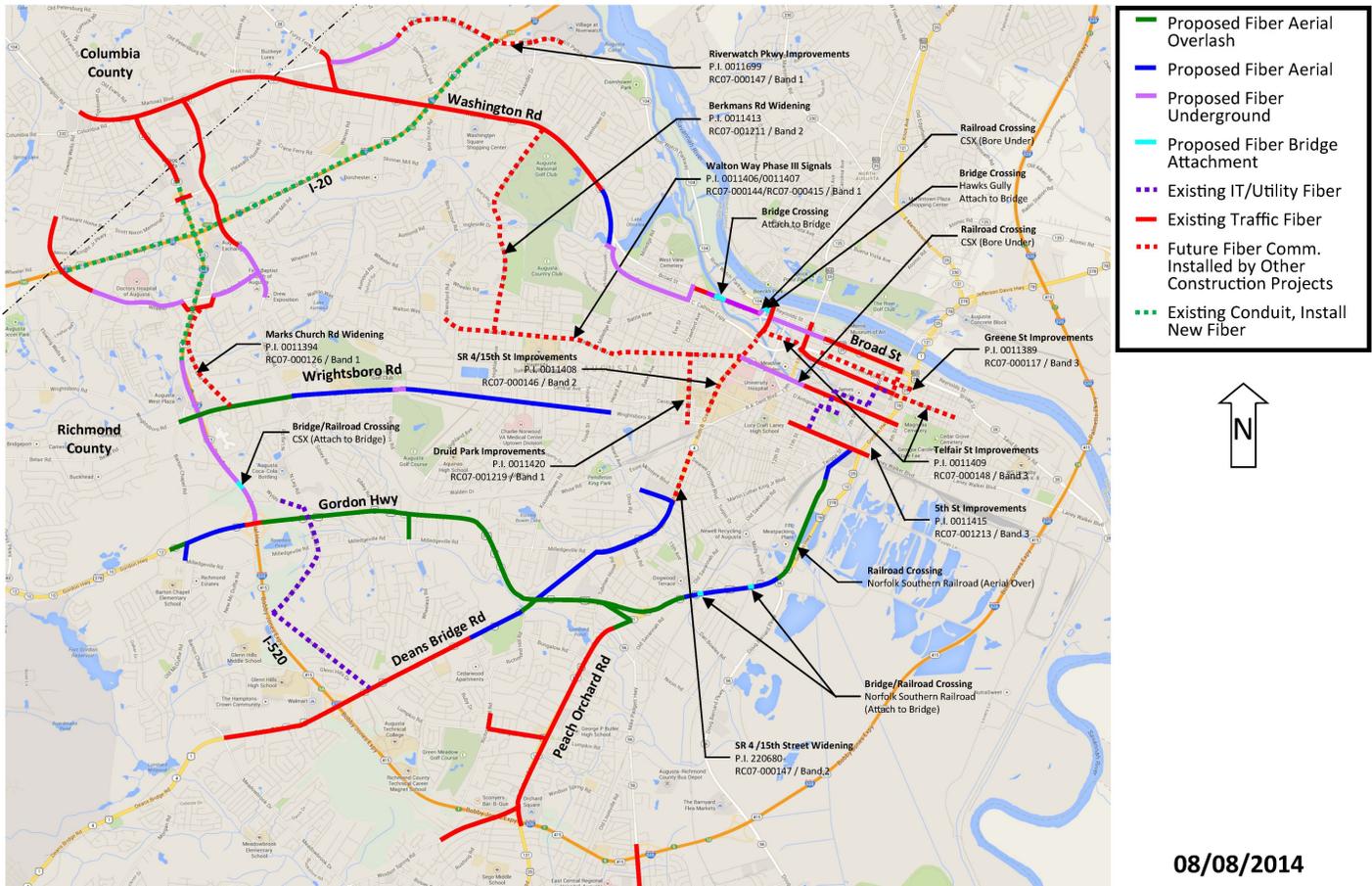
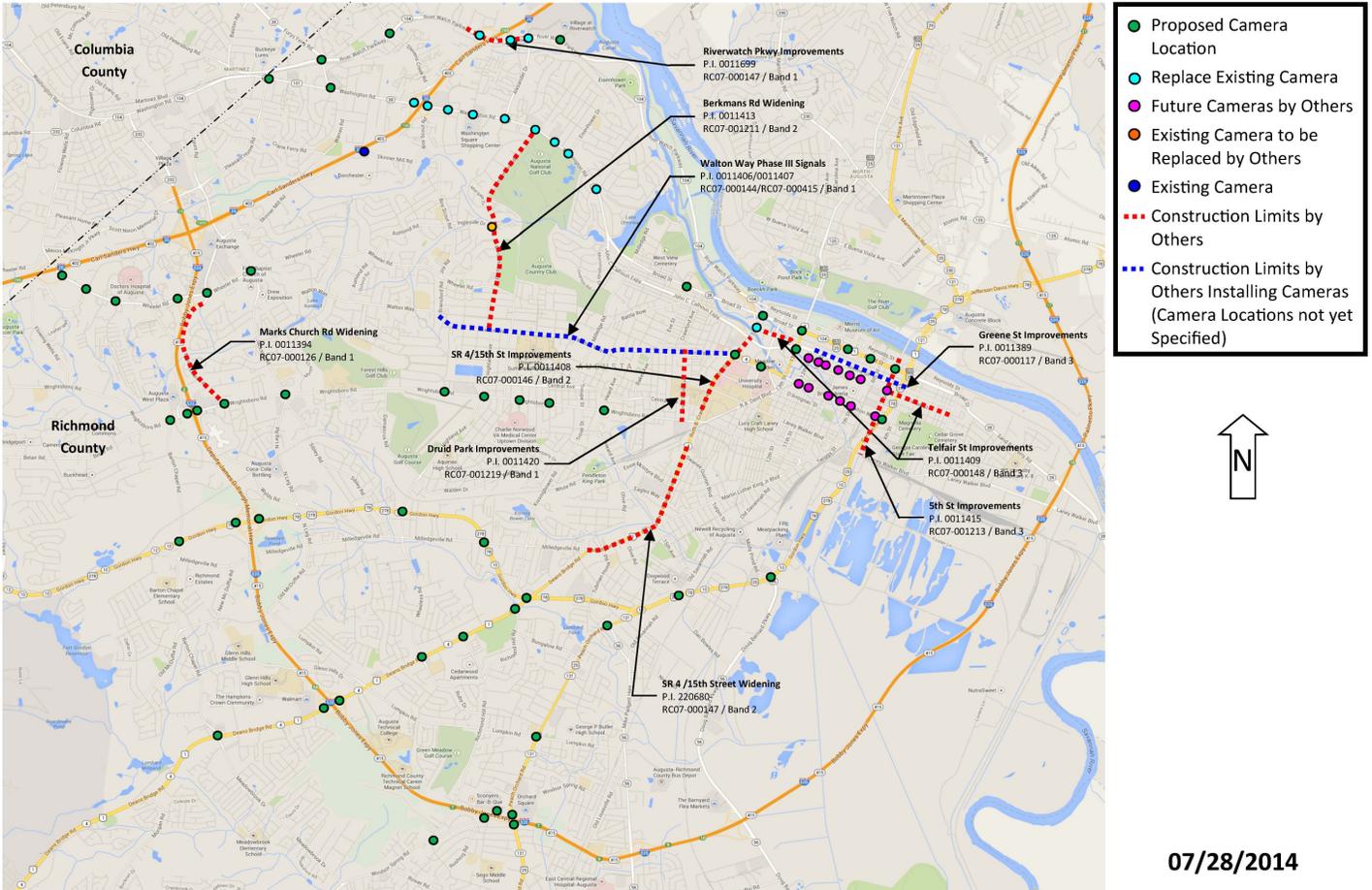


FIGURE A-4: CCTV Expansion



Richmond County Video Sharing System –

Description -- would include flexible, cost effective and secure video sharing capabilities throughout the County to transportation agencies, emergency responders, public agencies, media outlets, as well as the public. The recommended video sharing system concept would include the following features and capabilities:

- a. Capable of supporting the proposed CCTV camera video streams as well as the 12 video streams currently on www.augustatraffic.com. Upgrades (IP cameras, fiber / network connectivity) to existing cameras will be made as determined by the City.
- b. Video would be in a standard open format available at selectable bandwidths that could be accessed via personal computers, websites, intranets, internet, and through handheld / mobile devices (including; iPhone/iPad, Android Phone/Tablet, Blackberry). Provide support for all major browsers including; Firefox, Safari, IE, and Chrome.
- c. The secure video portal would be capable of being accessed by any designated partner agency, media outlet, law enforcement and emergency first responder, free of charge with proper login information from any intranet and/or internet connection.
- d. Depending on the cameras that a user is authorized to see, the video portal would be capable of being used as a map-based (Google map) view with several concurrent cameras or as a list-based Video Wall of multiple concurrent cameras.
- e. The solution would also include the capability to track current traffic incidents in Richmond County and allow the user to automatically choose and display the closest cameras to the event.
- f. Provide dedicated commercial-grade broadband Internet service at the TMC with both high bandwidth upstream and downstream performance – existing

broadband Internet service will be evaluated to potentially support streaming video to the web.

- g. The City of Augusta will be the operator of this system and will monitor and control all elements of this project from the Augusta TMC. Real-time video feeds provided by this project will be utilized by the City of Augusta and shared with other agencies and the public through an upgraded City traffic website (www.augustatraffic.com).

Anticipated Benefits --

1. A cost effective video sharing system is expected will allow for the real-time video feeds from the CCTV cameras to be shared with emergency responders and other stakeholders including the public through an upgraded City website. Critical real-time video streams from active incident sites will allow emergency responders to better assess the current incident scene and conditions prior to arriving at the scene as well as revising route selections as needed to the scene based on real-time congestion conditions.
2. This will also permit dispatch and other operators to better assess the incident conditions, type and situation in order to dispatch the appropriate and needed resources to the incident / emergency scene.
3. The system will also provide the traveling public the necessary information to make informed decisions on possibly taking alternative routes to their destination.

4.2 Emergency Vehicle Preemption and Transit Signal Priority System

This project would provide Emergency Vehicle Preemption and Transit Signal Priority capabilities at selected intersections and on vehicles within Richmond County.

Description -- The system will include the following features and capabilities.

- a. System will be provided at approximately 120 intersections, approximately 35 fire department vehicles, and approximately 23 Augusta Public Transit fixed route buses as determined by the City.
- b. System will permit for multiple agencies to use the same system (interoperable) – i.e., emergency responders, transit agency, law enforcement agencies and other counties.
- c. The design will be compatible with existing traffic controllers and will minimize traffic disruption / delays at the intersection due to priority requests.
- d. Software will be provided at Augusta TMC as part of traffic signal system upgrades supporting Augusta Fire, Augusta Sheriff and Augusta Public Transit. Coordination with Columbia and Aiken Counties will be provided to allow emergency responders (ambulance service providers) to use the same system en-route to downtown Augusta. A centralized location will be established to provide automatic system / firmware upgrades to all vehicles using the system
- e. Project may also include other Traffic Signal Upgrades including replacement of traffic signal cabinets and traffic signal controllers.

Anticipated Benefits --

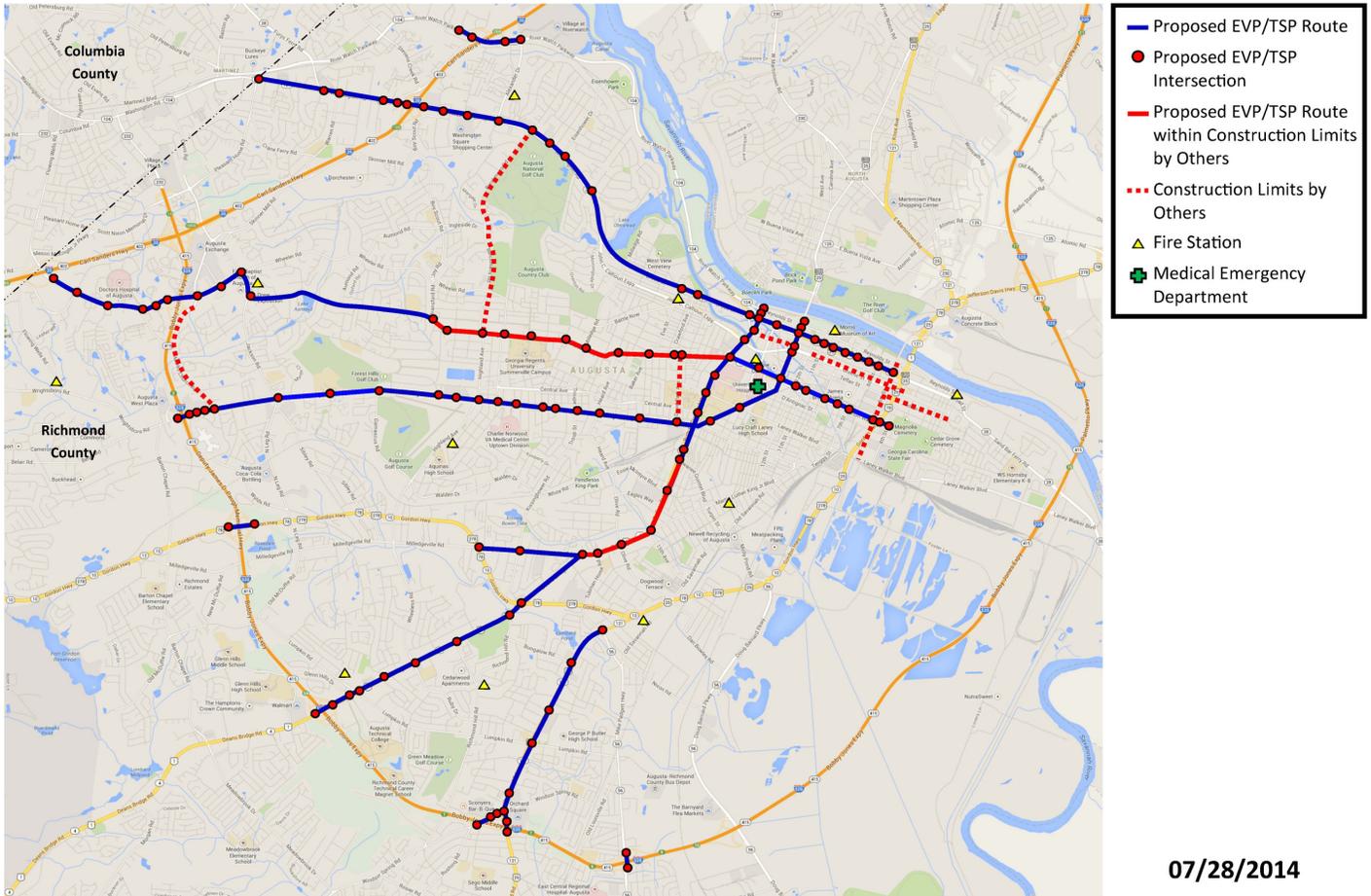
- 1. Public safety as well as emergency responders is expected to be improved by allowing emergency responders to decrease their response times and navigate through intersections safely through the use of an emergency preemption and transit priority system.
- 2. This same system is also expected will provide for better transit operational efficiency, reduce transit delays and fuel consumption, and improve on-time performance possible system usage by providing a more reliable and predictable transit services along key transit corridors.
- 3. Other traffic signal cabinet and intersection improvements (i.e., traffic signal cabinet replacements and controller upgrades) as determined



by the City would also provide a more efficient and reliable traffic signal control system.

Figure A-5 provides the EVP-TSP coverage anticipated / proposed for this project.

FIGURE A-5: EVP-TSP Coverage



07/28/2014

4.3 City TMC Operational Support Personnel

It is expected that existing City Traffic Engineering staff will initially staff and handle the TMC duties once the ITS / traffic components are upgrade and expanded. It should be noted that in some cases a single staff member could function (multi-task) in several roles and responsibilities as needed and reasonable. The recently completed ATMS Master Plan provides a detailed assessment of staffing needs along with recommendations for consideration by the City. TMC operating hours are expected will be during the morning and afternoon peak traffic periods (Monday-Friday) and on-call for weekends (Saturday-Sunday). It is also assumed that existing City administrative staff should be sufficient to cover any initial additional TMC operational duties and responsibilities as a result of this project.

The following are recommended TMC operational staff for the initial ATMS deployment project:

TMC Manager x 1

The TMC Manager will be responsible for the overall operation of the TMC. This position is expected to initially be filled by existing City Traffic Engineering Staff (part-time). The manager must have the authority to supervise the TMC Operator(s) and organize staffing and training schedules. The manager must be able to interact effectively with others in charge, including signal maintenance, public safety, information technology, higher levels of management, equipment vendors, suppliers, and the public. The manager should be well versed in the operation of all TMC systems and should develop and update standard operating procedures for the TMC.

TMC Operator x 1

The TMC Operator will be responsible for performing the day-to-day operations of the TMC. This position is expected to initially be filled by existing City Traffic Engineering Staff (part-time to full-time). As the system grows an additional operator should be considered to handle the added duties and responsibilities. The Operator

must be able to operate the basic TMC systems such as the surveillance cameras and traffic signal control software. The Operator does not need to be capable of developing traffic signal timing plans; however, they should be competent enough to upload/download signal timing databases as required by the Traffic Engineers and Technicians. The Operator must be capable of viewing signal operation and recognizing signal operational problems that need to be corrected.

TMC Systems Administrator x 1

The TMC Systems Administrator will be responsible for maintaining the computers and computer systems utilized in the TMC. This position is expected to initially be filled by existing City IT Staff (part-time). The Systems Administrator must understand the connectivity of the field devices to the system, including IP addressing. This administrator will most likely be a computer systems professional who is capable of supporting the TMC systems.

It should be noted that as the warranty period expires on network components provided under the ATMS deployment project, the City will need to consider whether current / existing City in-house staffing is sufficient (quantity and training) to service the network components and to keep the system working at optimal performance. Or, the City may choose to contract out specialty staff to service the City's field network devices and infrastructure.

5 OPERATIONAL SCENARIOS

The ConOps is easier to understand when the items that are addressed in the earlier sections of this document are expressed in the manner of real-world operational scenarios. Three such scenarios have been included in this section to help the audience better understand the items described in the two ATMS TIA design projects.

5.1 Signal Failure and Timing Updates

Monday Morning: It is a typical Monday morning in Augusta. George, a TMC Operator, arrives in the TMC and begins his work day. He settles into his chair at the main operator console, adjusts the console monitors, keyboard height, and logs into the system to begin his daily routine. Using the systems at his disposal he:

- Views surveillance video of the surface streets using City cameras to determine if any major traffic problems exist.
- Selects video feeds to be displayed on the display wall and his various monitors.
- Reviews all connected traffic signals to verify that they are on-line and operating properly.

George is notified that a citizen has complained about the operation of the traffic signal on Deans Bridge Rd at Gordon Hwy. Specifically, the citizen has complained that westbound traffic is not getting a left turn signal. George selects the surveillance camera at the intersection and puts the video image on one of his monitors. On a separate monitor, he brings up the data from the traffic signal controller at the intersection. Using the real-time video images in concert with the controller data, he realizes that the citizen is correct – westbound vehicles are not being recognized by the vehicle detectors at the intersection. He checks ACTRA and the CCTV camera for any failure information and attempts to remotely fix the problem. Unsuccessful, George prepares a maintenance ticket and uses the City radio at his console to call Pete, the City's Traffic Signal Technician, and asks him to correct the problem.

Using the systems available, the TMC staff can check the operation of many of the roadways and signals in the area. They can also verify operational complaints and in many cases, resolve the problem without sending crews to the scene. By verifying the complaints, crew time is not wasted driving to a signal just to determine that a problem does not exist.

Meanwhile, Alex, one of the City's Traffic Signal Engineers has entered the TMC to begin his day. He has been working the entire month developing new signal timing plans for signals along Wrightsboro Rd west of Heard Ave. This area has been getting a lot of traffic from the aquatic center, athletic complex and shopping centers. During the month, he has collected hours of video data of traffic on the route using the video recording software in the TMC computers. Viewed at high-speed playback, he is able to view traffic patterns over several hours in as little as a few minutes. This information has helped him in setting up his timing plans. Supported by field crews, Alex uses the computers in the work area of the TMC to download the new timing plans to the controllers in the field. Once the timing plans are downloaded and verified as operational, the field crews are dispatched to other tasks. Alex spends the next few hours observing traffic along the route using the surveillance cameras and connects to the individual traffic signals as necessary to make small adjustments in the timing plans.

Operating from the TMC, the signal engineer has access to a more comprehensive view of the impacts of his signal timing plan. Changes to the operation of any individual signal controller can be performed in less than the amount of time it would take for the signal engineer to drive from one intersection to the other, park his vehicle, access the signal controller and reprogram the database.

5.2 Major Downtown Traffic Incident

An emergency call about an accident at 13th Street at Telfair St comes into the Augusta 911 Dispatch Center. Laura, an Augusta 911 dispatcher, takes the call and reacts accordingly:

Recognizing this as a monitored intersection in the ATMS, Laura selects this intersection for viewing on the traffic workstation located in the dispatch center. With a full function TMC workstation, Laura has the same access to traffic cameras as operators at the TMC. She looks at the monitor and moves the camera around the intersection to locate the accident and quickly notices a minivan and a SUV have had a right-angle collision with damage to both the vehicles. She also notices that the people are injured. Laura enters information about the incident and the severity of the incident into the Augusta Sheriff CAD system and the system issues an emergency EMS/Fire/Sheriff dispatch. Since both the cars are damaged, a notification is sent to the towing truck company with details about the location of the incident and number of vehicles involved in the accident. This helps in faster clearance of the incident and ensures traffic gets back to normal conditions.

The 911 center uses the CCTV video to gather incident scene information in a few seconds and dispatches appropriate information to the emergency crew and the towing truck company which ultimately shortens the clearance time of the incident scene, hence less impact to drivers and improved safety for the sheriff department as they are out of the road quicker.

She further looks at the traffic backing on 13th St and Telfair St due to the accident vehicles and the emergency vehicles blocking the lane. Laura sends a message to the TMC center at the City of Augusta about the accident.

At the City TMC, Joe (the TMC operator on duty) is interrupted by the emergency request from the Sheriff, as an alert is flashed on his monitor. Joe switches from the preset video images to the intersection of 13th St and Telfair St and quickly notices the

impact of the accident on both the corridors. He calls the 911 center and coordinates with Laura to take control of the camera. Laura confirms that she doesn't require the camera anymore and Joe is now able to scan the area to access the impact of the accident. He reacts quickly to the incident by placing the intersection into an emergency mode. He sends an update to the City web-site and GDOT 511 which provides motorists information on the incident ahead and will help them reroute their commute avoiding further stress on the sheriff and the motorists. In addition, Susan headed to the MCC Medical Center is late for an appointment and is traveling west on Telfair decides to access the City's traffic website and pulls up the relevant live / real-time video on her iPhone to confirm the accident and associated congestion along the route she is taking and decides to take 7th St to Walton Way to the center due to the heavy congestion.

In 10 minutes, Joe notices that the EMS has dispatched the injured to the hospital, the sheriff has cleared the scene and the towing trucks have taken both the vehicles off the street. The traffic now begins to move slowly in both the directions and he takes the intersection out of the emergency mode. He also removes the information about the accident on City web-site and GDOT 511

With the communication between the Augusta Sheriff and the TMC at the City of Augusta, the sharing of incident and response information will help provide a safer and quicker clearance of the incident scene. This information can be valuable in determining appropriate traffic management actions by the TMC and shorter clearance time by the Sheriff department which in turn provides safer roads to the motorists.

5.3 Major I-20 Incident at River Watch Pkwy (Exit 200)

One Friday rainy afternoon in August about 1:00 PM there is a major accident on the I-20 Augusta Canal/Savannah River Bridge eastbound headed into South Carolina. The accident involves an overturned tractor-trailer that lost control on the wet pavement. The accident not only blocks all lanes on I-20 but also causes secondary rear-end accidents with two vehicles at the end of the queue. This completely closes I-20. Due to the

multiple accidents severe backups are caused on I-20 for commuters traveling eastbound. The 911 Center in Augusta starts immediately receiving calls from motorists. The information is verified by Jack, the 911 center dispatcher by viewing the appropriate CCTV camera video on the monitors in the dispatch room at the I-20 ramps at Washington Rd and at River Watch Pkwy and also confirmed with GDOT. The 911 Center dispatches Sheriff, Fire and Emergency Services as well as wrecker services to clear the incident as quickly as possible. The GDOT TMC is notified about the incident and their operator updates the NaviGator and 511 systems. The North Augusta TMC in Aiken County is also notified of the accident along with SCDOT.

All traffic eastbound on I-20 begins detouring onto the Washington Rd east to 13th Street across the bridge to Martintown Rd then back to I-20 on the South Carolina side. The Augusta TMC operator pulls up the CCTV cameras along Washington Rd and confirms the heavy congestion beginning to build and updates the incident information on the City web-site and forwards the information to the GDOT 511 system alerting motorists about the heavy congested conditions along Washington Rd to 13th Street across the bridge into South Carolina.

Existing local agency portable trailer-mounted CMSs are deployed at pre-determined locations as the incident duration is expected to last for several hours. These CMS signs are updated with messages with accident information and information about the expected delays.

At 1:30 PM, the City TMC is instructed to deploy an emergency signal timing plan to help both eastbound and westbound traffic flow along Washington Rd. The signal timing plan deployed by the City has a high cycle length with maximum time given to Washington Rd to move maximum traffic from I-20 eastbound along Washington Rd to the 13th St bridge as quickly as possible. The City of Augusta has a SOP prepared in cooperation with other agencies for situations like this which describes the communications and signal timing plan activation protocols and procedures.

It was 3:00 PM when GDOT had successfully cleared the truck and the other accidents from the freeway. By this time there was still heavy congestion on I-20, Washington Rd

in Richmond County and Martintown Rd out to I-20 Exit 1 in North Augusta on the South Carolina side. The City TMC and other impacted agencies continue to check traffic conditions through access to real-time video streams from the Augusta CCTV cameras and update GDOT accordingly. By 5:00 PM, the traffic is cleared and traffic has returned to normal conditions and hence the TMC Operator(s) in coordination with other agencies decide to switch back to the normal signal timing plans.

By successful coordination between multiple agencies and traveler information dissemination through video sharing, portable CMS, 511 and web sites the motorist is kept informed about the incident and by using the predetermined signal timing plans conditions return to normal within a few hours of a major incident

ATTACHMENT B
PROJECT COST ESTIMATE

UNIT COST SUMMARY					
Pay Item No.	Unit Cost	UNIT	Pay Item Description	Qty	Total Unit Cost
FIBER OPTIC CABLE & INFRASTRUCTURE					
Pay Item No.	Unit Cost		Item Description	Qty	Total Unit Cost
647-2170	\$ 1,600.00	EA	PULL BOX, PB-7 -- F&I - assumes a mix of both types --use an average of costs for both types -- assumes pull box, materials, cable racks, etc.	61	\$97,040.00
682-9028	\$ 2,200.00	EA	ELECTRICAL COMM BOX - F&I - assumes traffic-rated pull box, materials, cable racks, etc.	3	\$6,600.00
682-6233	\$ 3.00	LF	CONDUIT, NONMETL, TP 3, 2 IN (HDPE) -- Mat only - assumes 1 x HDPE conduit. Assumes all conduit, all required bends, sweeps, couplers, plugs, etc.	44,783	\$134,347.50
682-6140	\$ 25.00	LF	CONDUIT, GRS, 4 IN -- Mat only - assumes 1 x GRS conduit attached to bridge crossings over railroads-- assumes conduit, all attachment materials, etc.	1,470	\$36,750.00
682-6540	\$ 9.00	LF	CONDUIT, FIBERGLASS, 4 IN -- Mat only - assumes 1 x Fiberglass conduit attached to bridge crossings -- assumes conduit, all attachment materials, etc.	420	\$3,780.00
935-1115	\$ 1.75	LF	OUTSIDE PLANT FIBER OPTIC CABLE, LOOSE TUBE, SINGLE MODE, 48 FIBER -- Mat only - to match sections of existing 48 strand cables	115,230	\$201,652.50
935-1117	\$ 2.30	LF	OUTSIDE PLANT FIBER OPTIC CABLE, LOOSE TUBE, SINGLE MODE, 96 FIBER -- Mat only - to match sections of existing 96 strand cables	86,480	\$198,904.00
935-1511	\$ 2.40	LF	OUTSIDE PLANT FIBER OPTIC CABLE, DROP, SINGLE MODE, 6 FIBER -- F&I - assume drop from fiber splice closure in either Pull Box or on OH Strand to term on FPP in cabinet	15,197	\$36,472.80
935-3105	\$ 725.00	EA	FIBER OPTIC CLOSURE, UNDERGROUND, 48 FIBER -- F&I - assumes mounted in Fiber Pull Box with appropriate hardware and prep of cable	1	\$725.00
935-3107	\$ 950.00	EA	FIBER OPTIC CLOSURE, UNDERGROUND, 96 FIBER -- F&I - assumes mounted in Fiber Pull Box with appropriate hardware and prep of cable	12	\$10,972.50
935-3205	\$ 825.00	EA	FIBER OPTIC CLOSURE, AERIAL (SEALED), 48 FIBER -- F&I - assumes mounted / attached to OH strand / messenger and prep of cable	13	\$10,995.00
935-4010	\$ 45.00	EA	FIBER OPTIC SPLICE, FUSION, TESTING, AND DOCUMENTATION -- F&I - includes butt-end splicing only -- assumes a lower cost due to quantities (mass splicing)	1,804	\$81,194.40
	\$ 50.00	EA	FIBER OPTIC SPLICE, FUSION, TESTING, AND DOCUMENTATION -- F&I - assumes 4 splices (typ.) per drop cable at each intersection (trunk to fiber drop cable)	621	\$31,050.00
			The below items are paid for as part of the 682 (Directional Bore) or 935 Pay Items (Fiber Optic Cabling) as applicable in addition to fiber optic connectors, marking and labeling, any upgrade or additional pole guying required and other ancillary items as req per design		
	\$ 130.00	EA	FIBER OPTIC SNOWSHOE -- F&I - assumes 2 per defined location. Includes attachment hardware and materials, etc.	268	\$34,840.00
	\$ 1.80	LF	AERIAL STRAND / MESSENGER CABLE, 1/4 IN, EHS -- F&I - assumes install of new strand/messenger, clamps, etc. (w/o fiber or lashing wire)	52,150	\$93,870.00
	\$ 16.00	LF	DIRECTIONAL BORE -- Under Dirt/ Concrete - Install only - assumes include boring operations, install of conduit, bore pits, termination / coupling, etc. (w/o fiber pulled)	43,208	\$691,320.00
	\$ 0.45	LF	LASHING / OVERLASHING -- F&I - assumes furnishing and install / attach of fiber cable with lashing wire, clamps, etc. to existing messenger / strand	95,250	\$42,862.50
	\$ 22.00	LF	DB UNDER RAILROAD -- F&I - assumes furnishing and install of outer conduit / sleeve, etc. for going under railroad (w/o fiber)	315	\$6,930.00
	\$ 32.00	LF	BRIDGE ATTACHMENT -- Over Railroad - Install only - assumes install of GRS sleeve, hangers, etc. (w/o fiber)	1,155	\$36,960.00
	\$ 32.00	LF	BRIDGE ATTACHMENT -- Over Roadway - Install only - assumes install of fiberglass conduit, hangers, etc. (w/o fiber)	420	\$13,440.00
	\$ 4.00	LF	PULL INTO EXISTING CONDUIT -- Install only - assumes install of fiber in existing conduit with pull rope. Includes proofing and other materials necessary	39,375	\$157,500.00
	\$ 1.50	LF	PULL INTO NEW CONDUIT -- Install only - assumes install of fiber in new conduit with new pull rope and tracer wire	44,783	\$67,173.75
	\$ 321,359	LS	MAKE READY COSTS -- F&I - see below worksheet (at bottom of this page)	1	\$321,359.38
				Sub-total	\$2,316,139.33
CABINET COMMUNICATIONS UPGRADES					
Pay Item No.	Unit Cost		Item Description	Qty	Total Unit Cost
682-6233	\$ 3.20	LF	CONDUIT, NONMETL, TP 3, 2 IN (HDPE) -- assumes 1 HDPE conduit from traffic cabinet to the utility pole to access trunk fiber cable (represent an avg per in) - incl pull drop	11,155	\$35,696.00
935-3501	\$ 525.00	EA	FIBER OPTIC PATCH PANEL (FPP) - 6 STR - WALL MOUNT -- assumes mounted in an existing Traffic Signal Cabinet at intersection, assumes termination of cable	67	\$35,175.00
939-2305	\$ 2,500.00	EA	FIELD SWITCH, TYPE C -- includes Layer 2 / 2+ switch with 2 x LX GBIC/SFPs per design, env hardened, Cat-5e patch cables, rack mounting HW, power supplies, power supply cables, and other ancillary components per design	63	\$157,500.00
939-230X	\$ 5,600.00	EA	FIELD SWITCH, TYPE F -- includes Layer 3 switch with GBIC/SFPs per design, env hardened, Cat-5e patch cables, rack mounting HW, power supplies, power supply cables, and other ancillary components per design	8	\$44,800.00
			In addition, the below item (FO patch cable) is paid for as part of the above 939 Pay Items (Field Switches)		
	\$ 25.00	EA	FIBER OPTIC PATCH CABLE -- assumes FO patch cables (4 min or as req per plans) from Field Switch to fiber patch panel (FPP) inside cabinet	310	\$7,750.00
				Sub-total	\$280,921.00
CCTV VIDEO CAMERA EXPANSION					
Pay Item No.	Unit Cost		Item Description	Qty	Total Unit Cost
936-1002	\$ 6,500.00	EA	CCTV SYSTEM ASSEMBLY, TYPE C -- assumes an IP camera with built encoder, compatible with VMS software per design	66	\$429,000.00
			The below items is paid for as part of the above 936 Pay Items (CCTV System Assembly) along with other ancillary components such as other CCTV interface equip, power supplies (low voltage), power supply cables, electrical service upgrades, terminal blocks, any vertical conduit rise and attachment HW, bonding and grounding of TVSS and other as req, etc.		
	\$ 700.00	EA	CCTV EXTENDED MOUNTING BRACKET -- vertical extension arm mount for dome and mounting to existing traffic signal mast arm pole upright	53	\$37,100.00
	\$ 3.10	LS	CCTV CABLE (CAT5e outdoor rated cable) -- assumes an IP camera, weather-proof connectors, termination - assumes use of PoE as determined during design	7,590	\$23,529.00
	\$ 110.00	EA	CAT 5E PoE SURGE -- Cat-5e PoE TVSS, bonded and grounded to existing ground	66	\$7,260.00
	\$ 175.00	EA	PoE INJECTOR -- assumes an IP camera with Cat-5e using PoE cable from cabinet to CCTV dome, bonded and grounded to existing ground	66	\$11,550.00
	\$ 400.00	EA	CABINET ELECTRICAL UPGRADES	66	\$26,400.00
	\$ 500.00	EA	REMOVE AND REPLACE --remove existing CCTV camera (on augustatrafic.com) and replace with new CCTV IP camera on fiber	13	\$6,500.00
				Sub-total	\$541,339.00
TMC SYSTEM UPGRADES AND EXPANSION					
Pay Item No.	Unit Cost		Item Description	Qty	Total Unit Cost
970-0010	\$ 3,800.00	EA	OPERATOR WORKSTATIONS -- F&I - assumes new complete WS with high-end video graphics card, client VMS and other S/W, etc.	3	\$11,400.00
970-0020	\$ 10,000.00	EA	VIDEO / SYSTEM / DISPLAY SERVERS -- F&I - assumes Video / Display Server, and others as required per design	5	\$50,000.00
970-0030	\$ 3,900.00	EA	FLAT PANEL VIDEO DISPLAY MONITORS -- F&I - assumes 40 to 55-inch flat panel, wall-mounted monitors as shown on concept drawings	6	\$23,400.00
970-0035	\$ 600.00	EA	VIDEO QUAD HW -- F&I - include video quad multiplexer for providing 4 in 1 video on monitors from 4 different sources, mounting hardware, power supplies, cable management, etc.	2	\$1,200.00
936-1200	\$ 500.00	EA	VIDEO DECODER (like AXIS P7701) - F&I - includes decoder, mounting, Cat-5e patch cables, HDMI/CA video cables, power supply, etc. per design	2	\$1,000.00
970-0050	\$ 15,000.00	EA	NETWORK SWITCH, LAYER 3 GIGE -- F&I - assumes new Core switch for Traffic Building (separate from City IT Core Switch)	1	\$15,000.00
970-0055	\$ 4,000.00	LS	OTHER NETWORK EQUIPMENT - F&I - assumes Ethernet switch with SFP uplink, Firewall, broadband internet modem, etc. (as coordinated with City IT)	3	\$12,000.00
970-0060	\$ 2,800.00	EA	EQUIPMENT RACK -- F&I - assumes new full Rack (if available existing rack space is not available)	2	\$5,600.00
970-0070	\$ 3,000.00	LS	TMC CABLING -- F&I - assumes Cat-6, HDMI/DVI, etc. routed within ceiling space and in walls	4	\$12,000.00
970-0080	\$ 50,000.00	LS	SOFTWARE -- F&I - assumes sharing Genelec Video Management Software (VMS) with Marshal's Office / project and other application S/W as required per design	1	\$50,000.00
				Sub-total	\$231,600.00