LEGAL NOTICE

REQUEST FOR QUALIFICATIONS
SEALED PROPOSAL 14-199

For

Consultant Services – Gateway Green Light Program
CMAQ-5414(623)

For

ST. CHARLES COUNTY GOVERNMENT
ST. CHARLES, MISSOURI

St. Charles County is seeking Statement of Qualifications for **Consultant Services - Gateway Green Light Program.** The County reserves the right to terminate the contract for reasons of violations by the successful proposer of any term or condition of the contract by giving thirty (30) days written notice stating the reasons therefore and giving the party ample time to remedy the deficiencies.

INSTRUCTIONS

One [1] signed original and five [5] signed copies of the statement of qualifications must be received in a sealed envelope plainly marked **"14-199 Consultant Services - Gateway Green Light Program, CMAQ-5414(623)"** with the due date and time in the lower left corner of the envelope.

An authorized representative of the company/person submitting the statement of qualification must sign it in blue ink.

Statements of Qualifications must be submitted to the St. Charles County Finance Department, 201 North Second Street, Room 541 St. Charles, MO 63301 prior to **11/07/2014 at 2:00 PM**.

St. Charles County reserves the right to accept and/or reject any and all proposals.

INQUIRIES

Any questions or clarifications concerning this Request for Qualifications must be submitted in writing via E-mail (preferred), mail or fax to:

Kurt Mandernach, Purchasing Manager
St. Charles County Government
Finance Department
201 North Second St
St. Charles, Missouri 63301
Fax: (636)949-7589
purchasing@sccmo.org

For questions or inquiries concerning the specifications please contact:
John Greifzu, Director
St. Charles County Government
Transportation Department
201 North Second St
St. Charles, Missouri 63301
Fax: (636)949-3074
jgreifzu@sccmo.org

Prohibited Communication

Contact with any representative, other than through the procedure outlined in the section titled "Inquiries", concerning this request is prohibited PRIOR TO PROPOSAL DUE DATE. Representative shall include, but not be limited to, all elected and appointed officials, and employees of St. Charles County and their Agents within St. Charles County.
Any Offeror engaging in such prohibited communications prior to proposal due date may be disqualified at the sole discretion of St. Charles County.

Proposal Response from (please complete)

_____
Name of Company or individual

TERMS AND CONDITIONS

- No additions, deletions, corrections, or adjustments will be accepted after submissions are opened.

- The electronic version of this proposal/RFQ is available upon request. The document was entered into WORD for Microsoft Windows. The Purchasing Office does not guarantee the completeness and accuracy of any information provided on the electronic version. Therefore, respondents are cautioned that the hard copy of this proposal/RFQ on file in the Purchasing Office governs in the event of a discrepancy between the information contained in or on the electronic version and that which is on the hard copy.

- An authorized officer of the company submitting the response must sign all copies, in blue ink.

- Vendors must submit six [6] signed copies of their statement of qualifications; one is to be an original and so marked.

- Prices for services should not be included in submitted responses

- St. Charles County will not award any proposal to an individual or business having any outstanding amounts due from a prior Contract or business relationship with the County or who owes any amount(s) for delinquent Federal, State or Local taxes, fees and licenses.

- Sealed submissions received after the designated time of the receipt of the sealed statements will not be opened.

- The successful firm is specifically denied the right of using in any form or medium the names of St. Charles County or any other public agency of St. Charles County Government for public advertising unless express written permission is granted.

- All firms must possess the necessary and appropriate business and/or professional licenses in their field.

- Award will be made to the firm best qualified and capable of performing the desired work, subject to successful contract negotiations.

Employment of Unauthorized Aliens Prohibited (*Missouri Revised Statutes* Section *285.530)*

As a condition for the award of any contract or grant in excess of five thousand dollars by St. Charles County to a business entity, the business entity shall, by sworn affidavit and provision of documentation**, affirm its enrollment and participation in a federal work authorization program **(E-Verify)** with respect to the employees working in connection with the contracted services. Every such business entity shall sign an affidavit affirming that it does not knowingly employ any person who is an unauthorized alien in connection with the contracted services. [RSMO 285.530 (2)]

An employer may enroll and participate in a federal work authorization program **(E-Verify)** and shall verify the employment eligibility of every employee in the employer's hire whose employment commences after the employer enrolls in a federal work authorization program. The employer shall

Proposal Response from (please complete)

_____
Name of Company or individual

retain a copy of the dated verification report received from the federal government. Any business entity that participates in such program shall have an affirmative defense that such business entity has not violated subsection 1 of this section. [RSMO 285.530 (4)]

Any entity contracting with St. Charles County shall only be required to provide the referenced affidavit on an annual basis. A copy of the affidavit in included in this proposal request. Vendors may choose to send the required documentation using one of the following options:

- Send the notarized affidavit and E-Verify MOU signature page to: St. Charles County, Attn: Purchasing Manager, 201 N Second Street, Room 541, St. Charles, MO 63301prior to responding to any solicitations; **OR**
- Send the notarized affidavit and E-Verify MOU signature page along with a proposal solicitation response.

These documents will be kept on file. The notarized affidavit will remain current for **one year** from the date of the notarized affidavit.

***** PLEASE NOTE:***

Acceptable enrollment and participation documentation consists of a valid copy of the signature page of the E-Verify Memorandum of Understanding, completed and signed by the Contractor, and the Department of Homeland Security - Verification Division

The online address to enroll in the E-verify program is:

https://e-verify.uscis.gov/enroll/StartPage.aspx?JS=YES

OPEN RECORDS

Any and all information contained in or submitted with the proposal becomes a public record subject to the Missouri Sunshine Law when a contract is executed or all proposals are rejected. If Proposer believes that any information contained in or submitted with the proposal is protected by the Missouri Sunshine Law, Proposer must clearly identify what information Proposer believes is so protected and must also clearly identify the legal basis therefor.

Proposal Response from (please complete)

_____
Name of Company or individual

RFQ 14-199

Consultant Services – Gateway Green Light Program

CMAQ-5414(623)

St. Charles County (referred to hereafter as County) seeks a qualified consultant to assist the County in the system operations, maintenances, and management of the Gateway Green Light Program in St. Charles County.

Qualifications are due on **Friday, November 7, 2014 at 2:00 p.m.** local time to the following address:

Kurt Mandernach
Purchasing Manager
St. Charles County Government
201 North Second St, Suite 541
St. Charles, MO 63301

Late proposals will be returned unopened. Six (6) copies of the proposal are required. **Faxed or emailed proposals will not be accepted.**

Proposal Response from (please complete)

_____
Name of Company or individual

Table of Contents

Section I: Scope of Work

St. Charles County is seeking assistance of a consultant for design, project management, and procurement of fiber optical cable, Bluetooth Vehicle Travel Time Sensors, Turn Movement Count Cameras, Wireless Vehicle Detection, Dynamic Message Signs, and CCTVs and construction engineering and inspection services during the implementation of the project.

The consultant will be responsible for all aspects of work needed to complete the project requirements as outlined in the County's CMAQ application, attached hereto as Exhibit A, which includes but not limited to the following.

- Design, project management, procurement and construction engineering and inspection,
- Quality of the data assurance, and
- Submittals as required by MoDOT's local road program.

The consultant will also be responsible for project documentation and submittals associated with a federal aid project including but not limited to field logs and diaries, reimbursement requests, and other submittals as required by MoDOT's local road program.

Section II: Qualifications for the Project

Statements of Qualifications (SOQ) are due on **Friday, November 7, 2014 at 2:00 p.m.** local time to the following address:

Kurt Mandernach
Purchasing Manager
St. Charles County Government
201 North Second St, Suite 541
St. Charles, MO 63301

1. Letter of Interest. The responding firm must provide a letter of interest (2-3 pages maximum) that summarizes the firm's approach to the project and why the firm is particularly qualified to complete the work for this project. The letter must include name, phone number, and email address of the person who the County should contact in the event that questions arise regarding the firm's submission.

2. Qualifications. Responses must indicate the qualifications of the responding firm and its subcontractors in on similar ITS projects. The response should include the following:

    a. Experience summaries of key personnel to be assigned to the project.

    b. A team organization chart.

    c. References

3. Project Approach
4. Staffing Plan
5. Schedule
6. Subcontractors List
7. Disadvantage Business Enterprise (DBE) List (DBE Goal 0%)
8. Statement of Qualification (RSMo 8.285 through 8.291)
9. Affidavit of Compliance with the Federal Work Authorization Program
10. E-Verify Memorandum of Understanding (15 CSR 60-15.020)

Section III: Evaluation Criteria

The qualifications submitted by each consultant or consultant team will be evaluated according to the following criteria, in order of priority and points as assigned:

1. Experience, qualifications, and technical competence of the consultant relative to comparable projects within the last five (5) years. This section of the consultant's proposal should outline its experience and that of its subcontractors, project manager, and assigned individuals on similar ITS projects and the Gateway Green Light Program. A total of 20 points is available. This section of the consultant's proposal should be limited to 10 pages.

a. Experience of the consultant and subcontractor(s)

b. Experience of the project manager

c. Experience of other assigned individuals

d. Related project experience

2. *Project Approach*. This plan should provide a description of the consultant's approach to deliver the desired services. This section should outline the various task and deliverables. A total of 40 points is available. This section of the consultant's proposal should be limited to 30 pages.

a. Understanding of the scope of work

Proposal Response from (please complete)

_____

Name of Company or individual

b. Understanding of technical requirements and options

c. Description of the consultant's approach to provide the services requested herein

d. Value added services, description of additional services offered by the consultant not included in the scope of work but considered important to support ongoing operations of the Gateway Green Light Program.

3. *Staffing Plan*. This section should provide the consultant's plan and staffing requirements to provide the services outlined in its Project Approach. This section should describe the consultant's methodology of staff assignments to insure the education, training, and experience of the assigned individual is appropriate match for the task or duty. A total of 20 points is available. This section of the consultant's proposal should be limited to 5 pages.

a. Name project manager and other assigned individuals

b. List duties of project manager and other assigned individuals

4. *Schedule*. This section should provide the consultant's schedule including project milestones and deliverables. A total of 30 points is available (design and procurement documents completed within 3 months = 30 points, 6 months 20 points, 9 months = 10 points, more than 9 months = 0 points). This section of the consultant's proposal should be limited to 2 to 3 pages.

Section IV: Selection Procedures

A consultant will be selected by St. Charles County and its project partners, which includes MoDOT and local jurisdictions, after analysis of all information provided in the proposals. Respondents should be available for interviews prior to the selection of a consultant. The respondent, if interviewed, shall have its project manager and any other key individuals at the interview. The County may elect not to conduct interviews and reserves the right to negotiate a contract, including the scope of work and contract price, with any respondent.

This request does not commit the County to award a contract, to pay any costs incurred in preparation of a response to this invitation, or to procure or contract for services or supplies. The County reserves the right to accept or reject any or all responses received as a result of this request, or to cancel this request in part or in its entirety if it is in the best interest of the County to do so. Respondents shall not offer any gratuities, favors or anything of monetary value to any officer, employee, agent, or director of the County or its project partners for the purpose of influencing favorable disposition toward either their proposal or any other proposal submitted as a result of the Request for Proposals.

The County reserves the right to suggest to any or all respondents to this RFQ that such respondents form into teams or organizations deemed to be advantageous to the County in performing the scope of work. The County will suggest the formation of such teams when such relationships appear to offer combinations of expertise or abilities not otherwise available.

Respondents have the right to refuse to enter into any suggested relationship.

All proposals submitted hereunder become the exclusive property of the County.

Proposal Response from (please complete)

_____

Name of Company or individual

Exception Sheet

If the item(s) and/or services proposed in the response to this proposal is in any way different from that contained in this proposal or proposal, the proposer is responsible to clearly identify all such differences in the space provided below. Otherwise, it will be assumed that the proposer's offer is in total compliance with all aspects of the proposal.
Below are the exceptions or differences to the stated specifications (attach additional sheets as needed):

Date: _____

Signature: _____

Title: _____

Company: _____

Proposal Response from (please complete)

_____
Name of Company or individual

THIS FORM MUST BE COMPLETED AND ENCLOSED WITH THE PROPOSAL

Audit Clause for Contracts

Examination of Records

The Contractor's records must include, but not be limited to, accounting records (hard copy, as well as computer readable data), written policies and procedures, subcontractor files, indirect cost records, overhead allocation records, correspondence, instructions, drawings, receipts, vouchers, memoranda, and any other data relating to this contract shall be open to inspection and subject to audit and/or reproduction by the County Auditor, or a duly authorized representative from the County, at the County's expense. The contractor must preserve all such records for a period of three years, unless permission to destroy them is granted by the County, or for such longer period as may be required by law, after the final payment. Since the Contractor is not subject to the Missouri Sunshine Law (Chapter 610, RSMo), information regarding the Contractor's operations, obtained during audits, will be kept confidential.

The Contractor will require all subcontractors under this contract to comply with the provisions of this article by including the requirements listed above in written contracts with the subcontractors.

Vendor Information

Company Name: _____

Business Address: _____

_____

Business Hours: _____

Phone: _____ Fax: _____

Email address: _____

Contact Person: _____

Authorized Signature: _____
(Indicates acceptance of all proposal terms and conditions)

Date: _____

Proposal Response from (please complete)

_____
Name of Company or individual

AFFIDAVIT OF WORK AUTHORIZATION

The proposer/contractor who meets the section 285.525, RSMo definition of a business entity must complete and return the following Affidavit of Work Authorization.

Comes now _____ **(Name of Business Entity Authorized Representative)** as _____ **(Position/Title)** first being duly sworn on my oath, affirm _____ **(Business Entity Name)** is enrolled and will continue to participate in the E-Verify federal work authorization program with respect to employees hired after enrollment in the program who are proposed to work in connection with the services related to contract(s) with the County for the duration of the contract(s), if awarded in accordance with subsection 2 of section 285.530, RSMo. I also affirm that _____ _____ **(Business Entity Name)** does not and will not knowingly employ a person who is an unauthorized alien in connection with the contracted services provided to the contract(s) for the duration of the contract(s), if awarded.

In Affirmation thereof, the facts stated above are true and correct. (The undersigned understands that false statements made in this filing are subject to the penalties provided under section 575.040, RSMo.)

_____ _____

Authorized Representative's Signature **Printed Name**

_____ _____

Title **Date**

_____

E-Mail Address

Subscribed and sworn to before me this _____ of _____. I am
(DAY) **(MONTH, YEAR)**

commissioned as a notary public within the County of _____, State of
(NAME OF COUNTY)

_____, and my commission expires on _____.
(NAME OF STATE) **(DATE)**

_____ _____

Signature of Notary **Date**

Proposal Response from (please complete)

_____

Name of Company or individual

Exhibit A

FY 2015-2018 TRANSPORTATION IMPROVEMENT PROGRAM
CONGESTION MITIGATION AND AIR QUALITY IMPROVEMENT (CMAQ) FUNDS
NEW PROJECT APPLICATION

Clear Form and Create New Project | Retrieve Existing Project | Update/Save Project

PROJECT RECORD NUMBER 268933 Clear All Fields

Before starting new applications, select "Clear Form and Create New Project". Applications with no record number cannot be saved. The project number will be needed it if you wish to retrieve/edit/print the application at a later time.

Select one:

- ☐ In progress
- ☐ Preliminary complete (ready for comments)- Due February 13, 2014
- ☒ Final complete - Due March 13, 2014
  Signatures, Supplemental Information, and Application Fee - Due March 13, 2014

A. SPONSOR INFORMATION

Sponsoring Agency: St Charles County

Chief Elected Official: Mr Steve Ehlmann - County Executive

Address: 100 N 3rd Street
Suite 318

City: St Charles **State:** MO **Zip:** 63301

Email: jgreifzu@sccmo.org

Project Contact: John Greifzu **Title:** Director of Transportation

Address: 201 N 2nd Street
Suite 423

City: St Charles **State:** MO **Zip** 63301

Phone: 636-949-7490 **Fax:** 636-949-7407

E-mail: jgreifzu@sccmo.org

Application Contact: James Gilbert - gba Systems Integrators

E-Mail: jgilbert@gbasi.com **Phone:** 913-626-8148

B. PROJECT INFORMATION

Project Title: Gateway Green Light Phase 3 - St Charles County

Project Limits (i.e., Taylor Ave to Moss St or over Moss Creek - include map.):

See attached maps showing countywide locations of ITS devices and commmunication infrastructure systems to be installed.

Is this project a continuation of, or is it otherwise related to, another project that previously was programmed in the TIP? If so, explain this relationship.

Yes. This is Phase 3 of the Gateway Green Light Project which expands upon several previous CMAQ signal, communication, and ITS installation projects within multiple cities in St Charles County. The proposed ITS improvements will be designed and installed to be compatible with the ATMS and countywide communicaiton systems implimented as part of GGL Phases 1 and 2.

Has your agency previously competed for funds for this specific project? If so, when?

No.

Does your agency own and maintain this facility? No **If no, a letter of support is required from the facility owner.**

Project Length (Miles): 111.35

Federal Functional Roadway Classification (per East-West Gateway): Principal Arterial <03>

(URL for functional classification maps: http://www.ewgateway.org/trans/funcclass/funcclass.htm)

Right of Way

Will additional right of way or easement be acquired?: No

If yes, give details below:

- **Estimated additional right of way (in acres) needed:**
- **Estimated permanent easements (in acres) needed:**
- **Estimated temporary easements (in acres) needed:**
- **Any residential or commercial displacements anticipated? If yes, give details on how many and if they are residential and/or commercial.**

Right of way acquisition by:

Right of way condemnation by:

Utility Coordination

Will coordination with utilities be required? Yes **If yes, check the appropriate box to select the type of utility. Then give the names of the utility companies.**

Electric	✓	Ameron UE
Phone	✓	AT&T
Gas	✓	Laclede Gas
Water	✓	Missouri American Water Co and city owned facilites within project limits
Cable TV	✓	Charter Cable
Storm Sewer		
Sanitary Sewer		
Other		

Please give detail concerning potential utility conflicts / problems / issues:

Existing traffic signal structures will be utilized whenever possible for the installation of new ITS detection and remotely monitored CCTV devices.

New fiber optic cable and conduit systems, as well as any new arterial route Dynamic Message Signs, will be designed and constructed to miss existing utility installations and infrastructure. Any potentail utility conflict will be resolved through design field reviews and investigtation, and preliminary concept designs will be modificed to eliminate the potential conflict as part of final plan preperations.

Utility coordination completed by: Local Agency

Intelligent Transportation Systems (ITS) Architecture:
Projects must comply with the regional ITS standards as set forth in the document titled *Bi-State St. Louis Regional ITS Architecture*, April 2005 as well as *Congestion Management Process*

C. PROJECT JUSTIFICATION

Please describe 1.) the proposed improvement, 2.) the transportation problem the improvement will address, 3.) the effect the improvement will have on the problem.

Be as specific as possible. Attach additional sheets as needed.

ITS Infrastructure. This project would include additional infrastructure identified during the feasibility study and further defined and prioritized by the GGL Board. It would include additional CCTVs, turning movement cameras, dynamic message signs, and bluetooth and sensys traffic flow detectors. The project would also expand the communication network as needed to further reduce commercial cellular communications and expand the fiber network. Anticipated total cost: $2,011,000.

In support of the above summaries, please see attached the following documents for additional information:

Attachment A - GGL Phase 3 Project Justification Report

Attachment B1 - GGL Phase 3 ITS Deployment Map

Attachment B2 - Existing GGL Fiber Infrastructure

Attachment B3 - Existing GGL Signal Installations

Attachment B4 - Existing GGL PTZ Camera Installations

Attachment B5 - Existing GGL Traffic Detection Installations

Attachment B6 - Existing GGL Dynamic Message Sign Installations

Attachment C - GGL Phase 3 Detailed Cost Estimate

Attachment D - Gateway Green Light Feasibility Study

Also attached is the required "cmaqdata for Application #268933.xlsx". Information in this spreadsheet was compiled from existing traffic count data and reports, recorded speed data from previous studies, measured speed data from the GGL BlueTooth traffic detection system, and route segment lengths from Google Maps or design plan sets.

Type of Project

Check the box below that best describes the primary benefit of the proposed improvement. More information can be found in Appendix A of the CMAQ workbook.

Transit

- ☐ System Startup
- ☐ Transfer Center
- ☐ Vehicle Replacement
- ☐ New Vehicle
- ☐ Park-and-Ride Facilities
- ☐ Other (specify): _____

Traffic Flow Improvements

- ☑ Traffic Signal Interconnect
- ☐ Traffic Signal Replacement
- ☐ New Traffic Signals
- ☐ Signal Controller Upgrades
- ☐ Intersection Improvements
- ☑ Roadway Bottleneck Elimination
- ☑ Other (specify): ITS Improvements

Ride Share

- ☐ Rideshare Program
- ☐ Vanpool/Carpool Program
- ☐ Park-and Ride Facilities
- ☐ Reverse Commute Program
- ☐ Other (specify): _____

Pedestrian and Bicycle

- ☐ Bicycle Parking Improvements
- ☐ Bicycle Lanes
- ☐ Pedestrian Ways
- ☐ Other (specify): _____

Diesel Retrofits

- ☐ Diesel Engine Replacement.
- ☐ Installation of After Treatment Hardware
- ☐ Other (specify): _____

Inspection Maintenance Program / Other

- ☐ Alt Fuel Project
- ☐ Enhanced I-M Program
- ☐ Mechanic Training Program
- ☐ Transit Information/Marketing
- ☐ Educational Program
- ☐ Other (specify): _____

D. EMISSIONS DATA (REQUIRED)

Attach all applicable data identified in the CMAQdata.xls spreadsheet (found on the TIP application page) for the type of project being proposed. Provide all information from the area of primary benefit. Please contact East-West Gateway staff if any of the information requested is unclear or unavailable, or if there are questions concerning applicability. Failure to include required data will result in rejection of project application. Additional project data may be submitted and is encouraged.

Note: **East-West Gateway staff will calculate the emission reduction(s).**

D. FINANCIAL PLAN

Please complete the following expenditure tables and attach a detailed cost estimate (an example is included in Appendix B of the workbooks).

Federal funds must not exceed 80% of the total cost. Fiscal years are federal fiscal years (October 1 through September 30). In Illinois, federal funds are available for FY 2015. In Missouri, federal funds are available for FY 2015 and FY 2016.

PROJECT BUDGET	FY 2015	FY 2016	FY	TOTAL
PE/Planning/ Environ. Studies	174867.00			174867.00
Right-Of-Way				0.00
Implementation	0.00	1748670.00		1748670.00
Construction Engineering	0.00	87434.00		87434.00
Implementation Total	0.00	1836104.00	0.00	1836104.00
PHASE TOTAL	174867.00	1836104.00	0.00	2010971.00

SOURCE OF FUNDS	FY 2015	FY 2016	FY	TOTAL
CMAQ Funds	139893.00	1468883.00		1608776.00
Other Fed. Funds* *Source:*				0.00
Other State Funds* *Source:*				0.00
Local Match Funds* *Source:* St Charles County	34974.00	367221.00		402195.00
Other Funds* *Source:*				0.00
TOTAL	174867.00	1836104.00	0.00	2010971.00

Will any other individual, business, local public agency or other third party provide matching funds or be requested to provide matching funds in the future for this project? If yes, include a letter of support for this project from the third party that confirms their commitment to provide match or acknowledges that the sponsor may seek matching funds from the third party in the future. The letter must also document the third party's support of the proposed scope of work of the project as it is listed in the project application.

Standard TIP Project Development Schedule Form (many stages can occur concurrently)

Activity Description	Start Date (MM/YYYY)	Finish Date* (MM/YYYY)	Time Frame (Months)
Receive Notification Letter	07/2014		
Execute Agreement (Project sponsor & DOT)	08/2014	11/2014	3.0
Engineering Services Contract Submitted & Approved [1]	10/2014	12/2014	2.0
Obtain Environmental Clearances (106, CE-2, etc.)	01/2015	04/2015	3.0
Public Meeting/Hearing			
Develop and Submit Preliminary Plans	12/2014	03/2015	3.0
Preliminary Plans Approved	03/2015	05/2015	2.0
Develop and Submit Right-of-Way Plans			
Review and Approval of Right-of-Way Plans			
Submit & Receive Approval for Notice to Proceed for Right-of-Way Acquisition (A-Date) [2]			
Right-of-Way Acquisition			
Utility Coordination	03/2015	05/2015	2.0
Develop and Submit PS&E	05/2015	06/2015	1.0
District Approval of PS&E/Advertise for Bids [3]	06/2015	08/2015	2.0
Submit and Receive Bids for Review and Approval	08/2015	09/2015	1.0
Project Implementation/Construction	10/2015	08/2016	10.0

***Finish date must match fiscal year for each for each milestone listed below:**

1. **Preliminary engineering obligated - PE/Planning/Environ. Studies**
2. **Right of way obligated - Right-Of-Way**
3. **Construction/implementation funds obligated - Implementation/Construction Engineering**

FY 2015 = 10/2014 - 09/2015
FY 2016 = 10/2015 - 09/2016
FY 2017 = 10/2016 - 09/2017
FY 2018 = 10/2017 - 09/2018

Financial Certification of Matching Funds

This is to assure sufficient funds are available to pay the non-federal share of project expenditures for the following projects to be funded under the provisions of MAP-21. Only one certification per sponsoring agency is necessary.

Project Title	**Non-federal Amount**
Gateway Green Light Phase 3 - St Charles County	402195.00

Sponsoring Agency: St Charles County

Chief Elected Official (or Chief Executive Officer):

Name (Print): Steve Ehlmann - County Executuve

Signature: _____

Date: _____

Chief Financial Officer:

Name (Print): Robert Schnur

Signature: _____

Date: _____

E. Person of Responsible Charge Certification

The key regulatory provision, 23 CFR 635.105 – *Supervising Agency,* provides that the State Transportation Agency (STA) is responsible for construction of Federal-aid projects, whether it or a local public agency (LPA) performs the work. The regulation provides that the STA and LPA must provide its full-time employee to be in "responsible charge" of the project.

The undersigned employees(s) of the Project Sponsor will act as person of responsible charge. If at any point the employee leaves the LPA, the LPA is responsible for finding a suitable replacement and notifying East-West Gateway. If the person of responsible charge is found to not be a full-time employee of the LPA, it will result in the loss of federal funds for this project. One employee can act as person of responsible charge for all three phases.

Person of responsible charge – design phase

Name: John Greifzu

Title: Director of Transportation E-mail: jgreifzu@sccmo.org

Signature: _____

Person of responsible charge – right of way acquisition phase

Name: John Greifzu

Title: Director of Transportation E-mail: jgreifzu@sccmo.org

Signature: _____

Person of responsible charge – construction phase

Name: John Greifzu

Title: Director of Transportation E-mail: jgreifzu@sccmo.org

Signature: _____

F. Title VI Certification

The Project Sponsor shall comply with all state and federal statutes relating to nondiscrimination, including but not limited to Title VI and Title VII of the Civil Rights Act of 1964, as amended (42 U.S.C. §2000d and §2000e, et seq.), as well as any applicable titles of the "Americans with Disabilities Act" (42 U.S.C. §12101, et seq.). In addition, if the Grantee is providing services or operating programs on behalf of the Department or the Commission, it shall comply with all applicable provisions of Title II of the "Americans with Disabilities Act".

The undersigned representative of the Project Sponsor hereby certifies that it has policies and procedures in place to comply with Title VI of the Civil Rights Act of 1964.

Name Belinda Little, Director of Human Resources

Signature _____

G. Right-of-Way Acquisition

To be completed by Missouri project sponsors only.

The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) have the right and responsibility to review and monitor the acquisition procedures of any federally funded transportation project for adherence to The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970." Those projects found in non-compliance may jeopardize all or part of their federal funding.

A. The Project Sponsor hereby certifies that ANY right of way, and/or permanent or temporary easements necessary for this project, obtained prior to this application, were acquired in accordance with The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

B. The Project Sponsor also certifies that any additional right of way, and/or permanent or temporary easements, subsequently required to complete the project, will be acquired according to The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

_____

Certification Signature

H. Reasonable Progress

To be completed by Missouri project sponsors only.

Attached is a copy of the resonable progress policy adopted by the East-West Gateway COG Board of Directors.

The undersigned representative of the Project Sponsor hereby certifies that he/she has read this policy and understands its requirements. The representative acknowledges that failure to meet all of the reasonable progress requirements could result in federal funds being revoked and returned to the regional funding pool, as dictated by the policy.

Certification Signature: _____

EAST-WEST GATEWAY
Council of Governments
Creating Solutions Across Jurisdictional Boundaries

Policy on Reasonable Progress

Reasonable Progress

For projects or programs included in the Transportation Improvement Program, "reasonable progress" will have been made if the project has advanced to the point of obligating all federal funds programmed for that project in the current fiscal year, regardless of the phase of work (i.e., Preliminary Engineering (PE), Right of Way Acquisition (ROW), or Plans Specifications and Estimates (PSE)/Construction). If a project fails to obligate the programmed federal funds by September 30 of the current year, the funding will be forfeited and returned to the regional funding pot. Actual progress toward implementation is measured against the schedule submitted by the project sponsor in the project application.

Policy Procedures and Enforcement

Projects that do not obligate all federal funds by the September 30 suspense date will be removed from the TIP, and the federal funds associated with those projects will be returned to the regional funding pool for redistribution. The removal of projects from the TIP will require no further Board action and the sponsor would have to repay any federal funds already spent if the funding is forfeited.

If a project is realizing delays that will put the federal funding at risk of forfeiture (i.e., not meet a September 30 deadline), the project sponsor will have the opportunity to ask for consideration of a "one-time extension" in their project schedule. The one-time extension can only be requested for the implementation/construction phase of the project. The extension request will only be considered once a year, and has to be made before June 1 of the current fiscal year of the TIP.

To be considered for this extension the sponsor has to demonstrate on all counts: a.) The delay is beyond their control and the sponsor has done diligence in progressing the project; b.) Federal funds have already been obligated on the project or in cases that no federal funds are used for PE and/or ROW acquisition, there has been significant progress toward final plan preparation; c.) There is a realistic strategy is in place to obligate all funds.

One-time extensions of up to three (3) months may be granted by East-West Gateway staff and one-time extensions greater than three (3) months, but not more than nine (9) months, will go to the Board of Directors for their consideration and approval. Projects requesting schedule advancements will be handled on a case-by-case basis(subject to available funding) and are subject to the Board adopted rules for TIP modifications.

EAST-WEST GATEWAY
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Policy on Reasonable Progress

Project Monitoring

An extensive monitoring program has been developed to help track programmed projects and ensure that funding commitments and plans are met. Monthly reports are developed and posted on the East-West Gateway website, utilizing project information provided by the IDOT and MoDOT District offices. Additionally, project sponsors are contacted, at least every three months, by EWGCOG staff for project status interviews.

Gateway Green Light – Phase III

Attachment A – Project Justification

The goal of this project is to reduce travel times, delays, fuel consumptions, greenhouse gas emissions, and crash incidents within St Charles County through the continued deployment of the Regional Advanced Traffic Management System. This project is Phase 3 of the Gateway Green Light (GGL) program. The initial feasibility study for the Gateway Green Light Program is attached as Appendix D.

Project Location

The project outlined is primarily within the municipalities of Cottleville, Dardenne Prairie, Lake St Louis, O'Fallon, St. Charles, St Peters, and Wentzville within the County of St Charles in the State of Missouri. There are also components of the proposed ITS infrastructure improvements located with St Charles County proper and within State of Missouri Highway rights-of-way.

Existing Conditions

The project area is generally a mature, urbanized section of the St. Louis metropolitan region. The transportation road system is primarily in place with minimal opportunities for expansion.

I-70, the backbone of this transportation network, typically operates in a "start-stop" mode during the peak hours between Route 79 and Missouri Route 370. This segment of I-70 is the second most heavily traveled segment in the state, carrying over 150,000 vehicles per day. Additionally, this segment is the oldest in the nation (built in 1956) and is landlocked from over 50 years of adjacent development.

Gateway Green Light – Phase III

The project area contains 337 traffic signals that are owned and operated by 9 jurisdictions. The City of St. Peters (75 signals) also has a centralized signal system. The Missouri Department of Transportation, which owns and operates approximately 110 signals within the project area, operates a centralized signal system from its Traffic Management Center (TMC) in St. Louis County.

As part of the GGL Phase 1 and Phase 2 projects numerous vehicle detection devices, Dynamic Message Signs, and much of the backbone wide area communication network has been designed and installed throughout the urbanized area of the county. Additionally, a central Advanced Traffic Management System (ATMS) has been procured and installed for monitoring and management of the GGL traffic flows. The GGL ATMS is co-located at the MoDOT TMC, allowing for the sharing of resources and information between the two fully compatible MoDOT and GGL traffic management systems and networks. Please see Attachments B2 – B6 for detailed layouts of existing fiber, signal, and ITS device installations associated with the GGL program, including MoDOT and partner agency installations.

To date, GGL owns over 44.5 miles of fiber optic communication cables and associated infrastructure, and shares and assists with maintenance of an additional 44.75 miles of MoDOT fiber for backbone communications and system linkages. GGL also utilizes of over 22.3 miles of St Peters fiber as part of overall traffic signal and ITS network infrastructure. In total, the GGL organization has full or shared responsibility to manage and maintain over 111 miles of fiber communication infrastructure.

Gateway Green Light – Phase III

Project Details

The Phase III project includes tasks as listed below which will enhance the existing infrastructure and system devices to better manage travel and traffic operations of the region's transportation network on a day to day basis. The project will also provide real-time information to motorists regarding travel conditions on the areas interstates, state routes, and major arterials within the county. Please see Attachment B1 – GGL Phase 3 ITS Deployment Map for a general layout of the proposed installations.

The enhanced fiber and detection systems will provide more accurate and better information to improve response times for incident management. With the enhanced ITS systems made possible by this project, drivers can be better informed and traffic can rerouted onto parallel corridors with reserve capacity to minimize and alleviate congestion. Partner agencies will also be able to quickly react to change traffic conditions and incidents to improve traffic conditions.

Predetermined incident management plans will be able to be more accurately implemented and managed due to the increased coverage of the Closed Circuit Television (CCTV) monitoring systems and the additional traffic detection devices deployed. The systems arterial travel sensors and detectors will trigger preset alarms when traffic flow rates and delay measurements fall outside of predetermined limits and norms. These alarms will notify the ATMS operators of issues, and can be enabled to automatically trigger event management plans to adjust traffic signal timing plans, alternate route selection, and messaging.

Gateway Green Light – Phase III

Task 1

Complete the design and installation of approximately 8.1 miles (42,800 LF) of fiber optic backbone communication links on three corridors within the County (please see Attachment B1 for details). These corridors are Elm Street in St Charles (2.7 miles), Technology Drive in Lake St Louis (2.0 miles), and Main Street/Tom Ginnever Rd in O'Fallon (3.4 miles). If funding allows, the route of W. Terra Lane/Highway A in the cities of O'Fallon & Wentzville will also be included in the project as an Add Alternate.

The fiber optic (FO) links that are proposed to be built as part of the GGL Phase III project will complete the project network infrastructure architecture as defined in the GGL Phase II project, and provide critical links that need to be constructed for redundant communication rings for network viability and stability. These proposed links will enable the countywide ITS communication system to self-heal and reroute communication links, reducing the possibility of area wide communications failure due to cable cuts or power outages.

A significant additional benefit of the Lake St. Louis and The O'Fallon area connections is the creation of a communication link that facilitates real-time traffic monitoring capability within these communities by dispatch and alarm personnel. This real-time monitoring will greatly improve first response times and reduce the time needed to clear traffic incidents along major arterials. Faster clearance times directly impact and reduce traffic congestion levels and overall traffic delays.

These new fiber links will also allow for the installation of additional CCTV monitoring locations and the interconnection to additional traffic signals via fiber, enhancing and improving the overall network capabilities and reducing the dependence on cellular technologies for communication to these locations.

Gateway Green Light – Phase III

Task 2

Procure and install up to 43 additional traffic measurement sensors and detectors on major arterials around St Charles County. These additional vehicle sensors will fill gaps in the existing arterial detection network and bring more complete travel and delay data to the Traffic management Center (TMC) for incident identification and associated traffic management tasks. These additional traffic monitoring devices were identified as necessary as part of the GGL Phase 2 project but funding was not available for installation as part of that project.

VEHICLE DETECTION TYPE	LOCATION
Bluetooth Vehicle Travel Time Sensors	Zuembehl Rd & Hawks Nest Dr
Bluetooth Vehicle Travel Time Sensors	Duchesne Rd & Droste Rd
Bluetooth Vehicle Travel Time Sensors	West Clay St & Droste Rd
Bluetooth Vehicle Travel Time Sensors	West Clay St & Hawks Nest Dr
Bluetooth Vehicle Travel Time Sensors	Elm St & Elm Point Industrial Dr
Bluetooth Vehicle Travel Time Sensors	Elm St & Hunters Ridge Rd
Bluetooth Vehicle Travel Time Sensors	Elm St & Duchesne Dr
Bluetooth Vehicle Travel Time Sensors	Elm St & Kingshighway St
Bluetooth Vehicle Travel Time Sensors	Mexico Rd & Rock Creek Elementary
Bluetooth Vehicle Travel Time Sensors	Wentzville Pkwy & W Meyer Rd
Bluetooth Vehicle Travel Time Sensors	Wentzville Pkwy & Luetkenhaus Blvd
Bluetooth Vehicle Travel Time Sensors	Route A & Mexico Rd
Bluetooth Vehicle Travel Time Sensors	St Peters Howell Rd & McClay Rd
Bluetooth Vehicle Travel Time Sensors	Spencer R & Willot Rd
Bluetooth Vehicle Travel Time Sensors	McClay Rd & Thoele Rd
Bluetooth Vehicle Travel Time Sensors	Truman Rd & Ehlmann Rd
Bluetooth Vehicle Travel Time Sensors	Zuembehl Rd & Droste Rd
Bluetooth Vehicle Travel Time Sensors	Knaust Rd & Birdie Hills Rd
Turn Movement Camera	Route K & Mexico Rd
Turn Movement Camera	Mid Rivers Mall Dr & Mexico Rd
Turn Movement Camera	5th St & Ameristar Blvd
Turn Movement Camera	Wentzville Parkway & W Pearce Blvd
Wireless Vehicle Detection	Mexico Rd & Rock Creek Elementary
Wireless Vehicle Detection	Mexico Rd & First executive Ave
Wireless Vehicle Detection	Winghaven Blvd & St Lukes Medical

Gateway Green Light – Phase III

Wireless Vehicle Detection	Bryan Rd & Great Warrior
Wireless Vehicle Detection	Mid Rivers Mall Dr & Home Depot
Wireless Vehicle Detection	Mid Rivers Mall Dr & Ohmes Rd
Wireless Vehicle Detection	Salt River Rd & Mid Rivers Mall Dr
Wireless Vehicle Detection	Muegge Rd & Graystone Dr
Wireless Vehicle Detection	Muegge Rd & Old Muegge Rd
Wireless Vehicle Detection	Jungermann Rd & Queens Brooke Blvd
Wireless Vehicle Detection	Jungermann Rd & County Creek Dr
Wireless Vehicle Detection	Jungermann Rd & Orchard Hills Dr
Wireless Vehicle Detection	Route M & Pitman St
Wireless Vehicle Detection	Wentzville Pkwy & Home Depot
Wireless Vehicle Detection	Zuembehl Rd & Schnucks Entrance
Wireless Vehicle Detection	Salt Lick Rd & Timberbrook Dr
Wireless Vehicle Detection	Salt River Rd & Arrowhead Industrial Dr
Wireless Vehicle Detection	Mexico Rd & West Sunnyhill Dr
Wireless Vehicle Detection	Wentzville Parkway & Meyer Rd
Wireless Vehicle Detection	Spencer Rd & Shadowcreek Rd
Wireless Vehicle Detection	S. River Rd & S. Main St
Wireless Vehicle Detection	TR Hughes Rd & Wabash St

Task 3

Procure and install approximately five (5) CCTV cameras and associated network communication equipment on the fiber optic backbone along major arterials around St Charles County. These additional CCTV cameras will be used to monitor traffic flows, review adequacy of traffic management plans and signal operations, verify incident reports, and confirm remote detection reports of excessive delays or congestion. These installations were also identified an important camera sites as part of the GGL Phase 2 network master planning process but funding and prioritization of improvements did not allow them to be installed.

CCTV INSTALLATIONS	LOCATION
CCTV	Zuembehl Rd & Hawks Nest Dr
CCTV	West Clay St & Hawks Nest Dr
CCTV	Mid Rivers Mall Dr & Grand Teton Dr
CCTV	Muegge Rd & Greystone Dr
CCTV	Spencer Rd & Willot Rd

Gateway Green Light – Phase III

Task 4

DMS signs are one of the most visible and significant ITS devices to be installed for the GGL program. These installations are very valuable to the drivers for notification of traffic incidents, identification of alternate routes and diversions, and messaging regarding future construction activities. While very valuable for driver messaging, these installation are also one of the most expensive singular ITS components that will be installed.

The GGL master planning process being completed now envisions approximately 20 to 25 GGL DMS signs installed at significant arterial and freeway junctions across the County. These signs, in coordination with the MoDOT Gateway Guide Freeway Traffic Management DMS installations will provide a uniform and comprehensive system of managed messages that can be delivered tot drivers on the road as conditions dictate.

For the GGL Phase 3 project, we would procure and install 3 arterial scale Dynamic Message Signs (DMS) on Wentzville Parkway, Mo Rte 79, and Missouri Rte N. If funding allows, additional DMS installations will be completed at up to 10 add alternated locations to the project along primary arterials at critical driver decision points.

DMS INSTALLATIONS	LOCATION
DMS	SB Wentzville Parkway north of I-70
DMS	SB Mo Rte 79 - north of I-70
DMS	EB Route N - west of I-64
DMS – Add Alternate	SB Bryan Rd - north of Rte 364
DMS – Add Alternate	EB Mexico Rd - west of Rte K
DMS – Add Alternate	WB Mexico Rd - east of Rte K
DMS – Add Alternate	NB Rte K - south of Mexico Rd
DMS – Add Alternate	EB Mexico Rd - West of Mid Rivers Mall Dr
DMS – Add Alternate	WB Mexico Rd - east of Mid Rivers Mall Dr
DMS – Add Alternate	EB Highway P - west of Main St

Gateway Green Light – Phase III

DMS – Add Alternate	EB Mexico Rd - west of Muegge Rd
DMS – Add Alternate	SB Zuembehl Rd - North of Rte 94
DMS – Add Alternate	NB Rte 94 - south of I-64

Project Benefits

A well designed and implemented Advance Traffic Management System (ATMS) will significantly improve the ability to monitor, manage, and change traffic signal timings along regional arterials in real time to provide optimum traffic signal operations and promote efficient traffic flows. This system also integrates other ITS and traffic management assets into a centrally controlled system that greatly enhances and expands the abilities of the GGL management team to quickly respond to traffic operational and safety concerns.

By utilizing state of the art hardware, software, and communication systems, the region wide ATMS will provide for a greener, more environmentally responsible metropolitan area by reducing travel times, reducing delays, and lessening greenhouse gas emissions and their effects. This project will expand the existing systems previously deployed as part of the GGL Phases I and II to expand the optimization and efficiency of the existing roadway network, signal controls, and traffic management systems.

Numerous studies and reports have been completed in the recent past which documents the benefits and effectiveness of advanced traffic management systems and TOC management centers. Some studies have shown that delays can be reduces by up to 42% [(1)]. Others noted reduced stops by between 18 – 29% [(2)]. In Tysons Corner, Virginia, system enhancements and management activities decreased total annual emissions VO, CO, VOC, and NOx by 134,600 kilograms [(3)]. A study using

Gateway Green Light – Phase III

ITS Deployment Analysis Software (IDAS) was conducted by Eugene, Oregon to evaluate the potential benefits of a hypothetical adaptive signal control system along one corridor with 8 signalized intersections resulted in a 5:1 benefit-to-cost ratio [(4)].

It must also be mentioned that Intelligent Transportation Systems have proven invaluable to improving first responder's ability to detect, manage, and clear traffic incidents, therefore reducing potential for secondary incident, minimizing delays and congestion, and reducing fuel consumption due to long delays.

Project Summary

As demonstrated in multiple studies of ATMS deployments across the US, a fully functioning and comprehensive area wide ITS communication, detection, and monitoring program such as Gateway Green Light provides an 8-13% decrease in fuel consumption, a 7-14% decrease in emissions, 20-40% reduction in vehicle stops, 10-20% reduction in travel times, 10-15% increases in average speed, and a 20-40% decrease in average delay, as compared to an unmanaged roadway system.

The installation of the expanded fiber optic network with the managed communication system along the noted arterials in Task 1 will result in an immediate and measureable improvement to traffic operations along these highly utilized routes. It will enable traffic flows utilizing these arterial roadways to travel at higher, more uniform speeds with significantly less delays and congestion.

Additionally, the installation of additional CCTV system, DMS installations, and more comprehensive coverage of regional routes with traffic detection systems will enhance and improve the ability of the ATMS operators to

successfully manage traffic patterns and operations, thereby reducing emissions and improving traffic operations for all area drivers. With the increased coverage of CCTV, traffic detection, and DMS installations made possible by this project, it is expected that an additional 5%-10% improvement in traffic operations on these GGL routes is achievable.

It is inarguable that the ongoing implementation of traffic management technologies and procedures provided by the maturation and continued expansion of the Gateway Green Light Program will improve traffic operations and decrease vehicle emissions within St. Charles County and the entire St. Louis Metropolitan region.

REFERENCES

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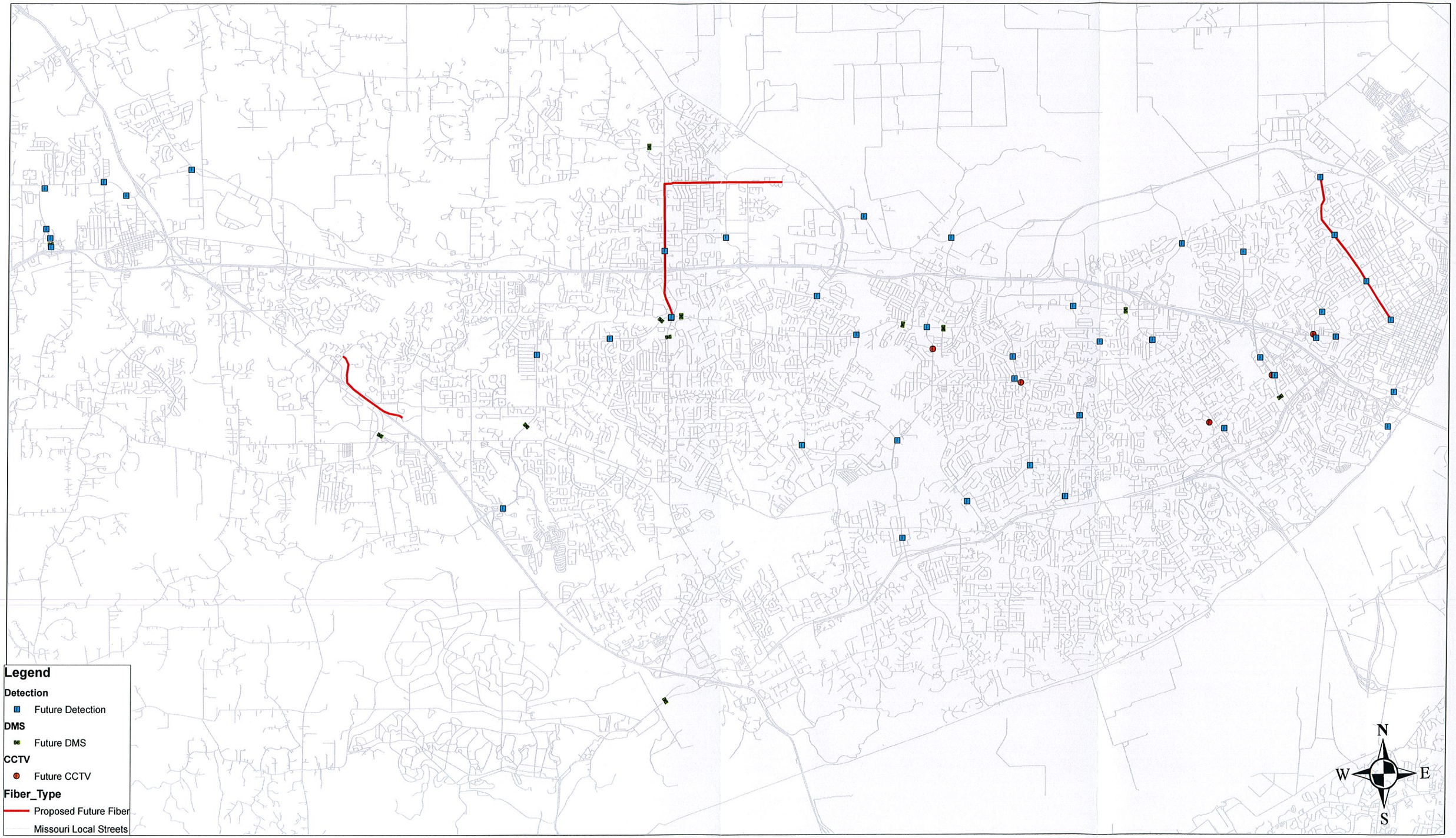
2. Greenough and Kelman, *ITS Technology Meeting Municipal Need – the Toronto Experience,* in 6th World Congress Conference on ITS, 1999, Toronto, Canada
3. White, J., *Traffic Signal Optimization for Tyson's Corner Network Volume I: Evaluation and Summary*, March 2000, Virginia, DOT
4. *Regional ITS Operation & Implementation Plan for the Eugene-Springfield Metropolitan Area*, November 2002, Oregon Department of Transportation, Prepared by DKS Associates.

Gateway Green Light Phase III

Attachment B1 - GGL Phase 3 ITS Deployment Map

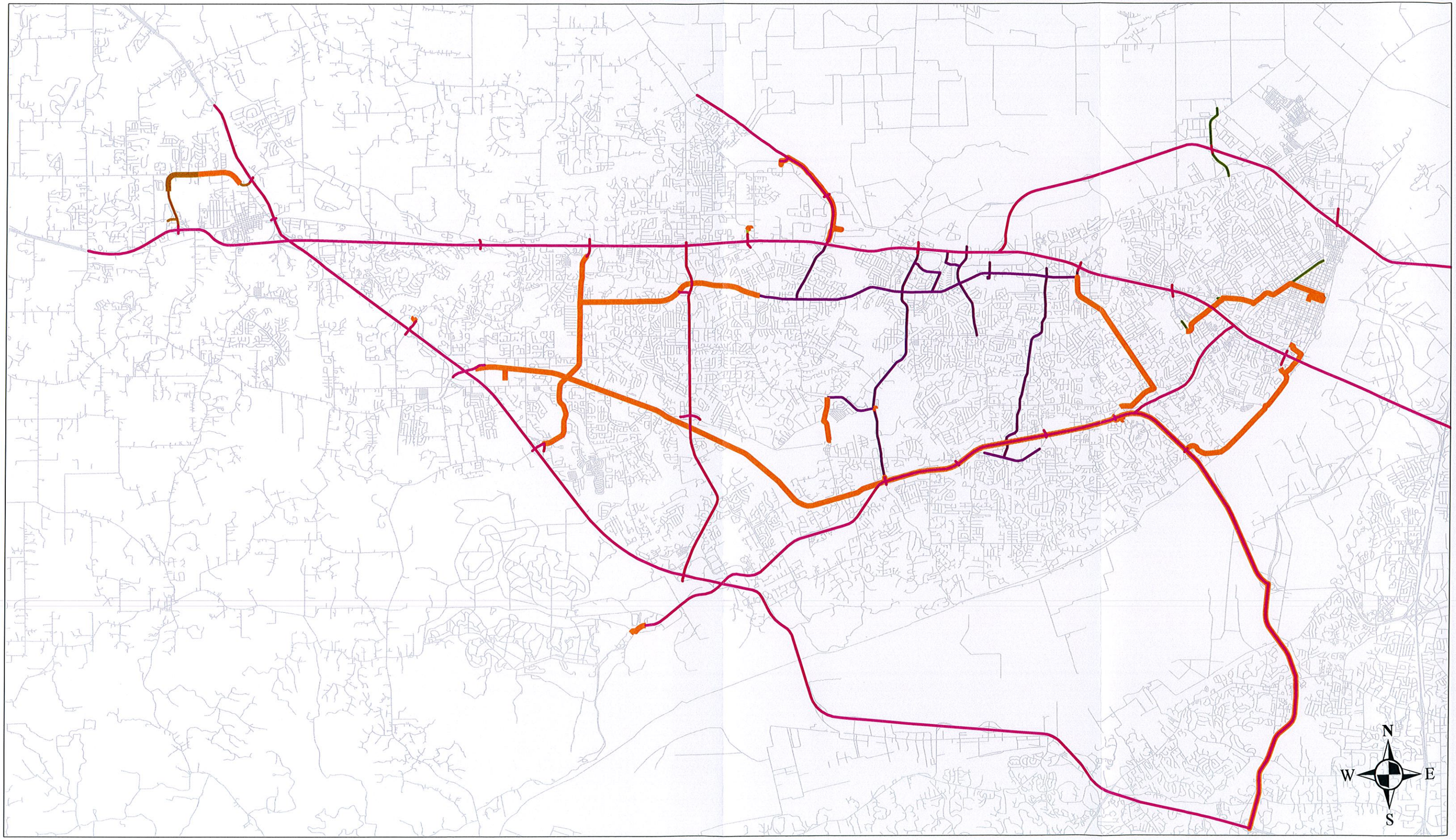
gba Systems Integrators, LLC



Gateway Green Light Phase III

Attachment B2 - Existing GGL Fiber Infrastructure

gba Systems Integrators, LLC



Gateway Green Light Phase III

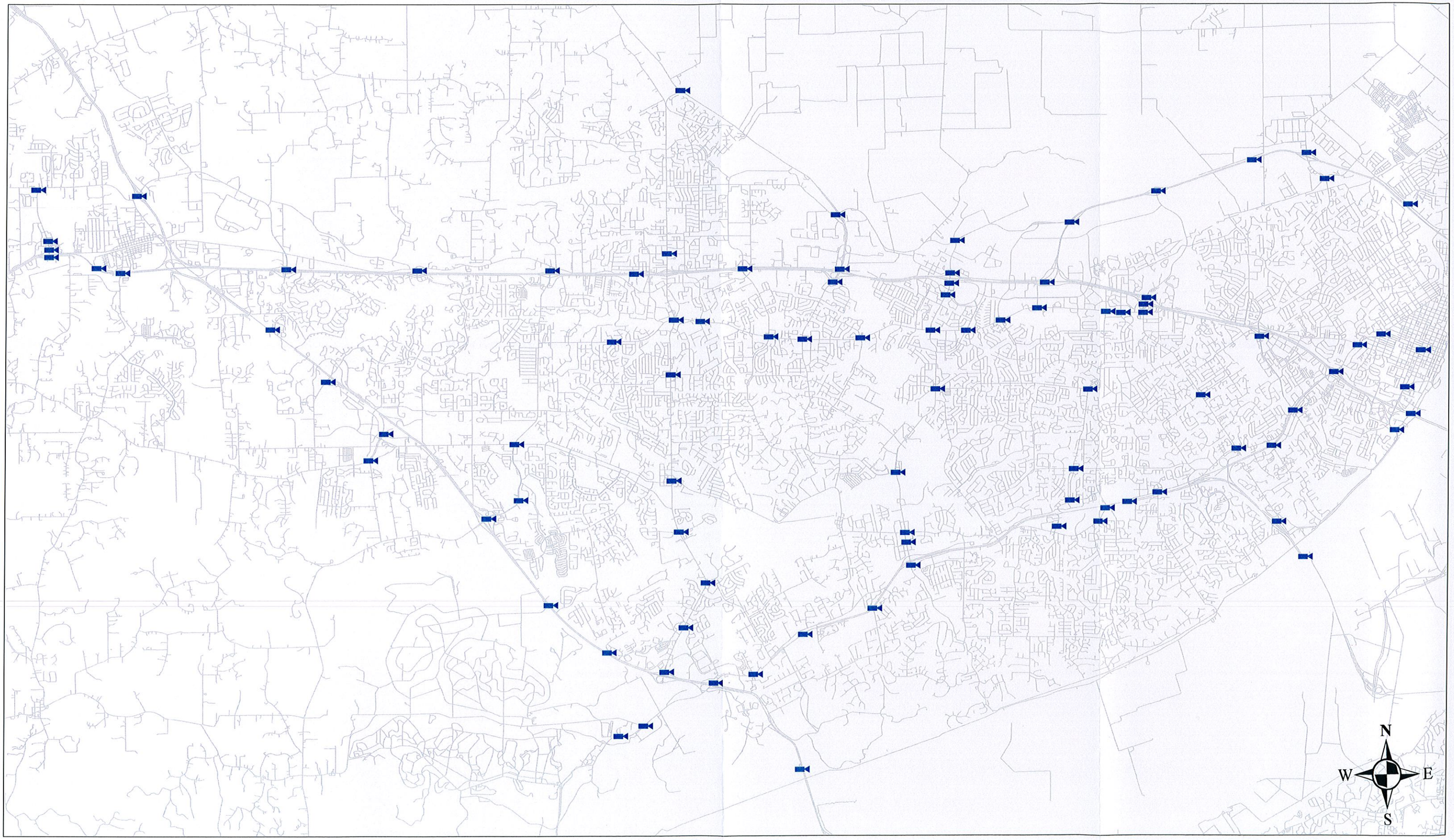
Attachment B3 - Existing GGL Signal Installations

gba Systems Integrators, LLC

Gateway Green Light Phase III

Attachment B4 - GGL PTZ Camera Installations

gba Systems Integrators, LLC



Gateway Green Light Phase III

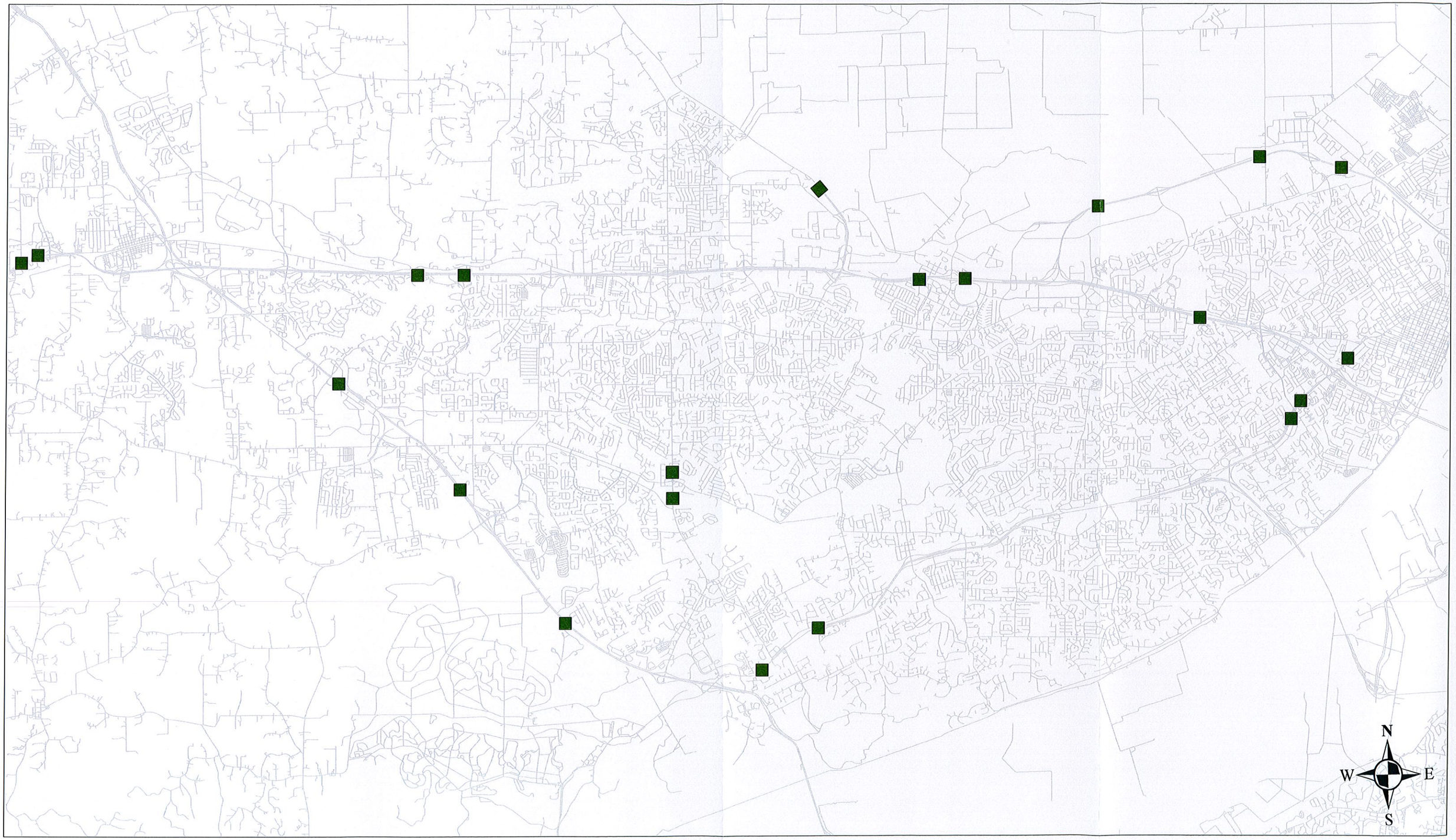
Attachment B5 - Existing GGL Traffic Detection Installations

gba Systems Integrators, LLC

Gateway Green Light Phase III

Attachment B6 - Existing GGL Dynamic Message Sign Installations

gba Systems Integrators, LLC



Attachment C
Construction Cost Estimate
St. Charles Gateway Green Light - Phase 3

VEHICLE DETECTION TYPE	LOCATION	Cost per Location
Bluetooth Vehicle Travel Time Sensors	Zuembehl Rd & Hawks Nest Dr	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Duchesne Rd & Droste Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	West Vlay St & Droste Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	West Clay St & Hawks Nest Dr	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Elm St & Elm Point Industrial Dr	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Elm St & Hunters Ridge Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Elm St & Duchesne Dr	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Elm St & Kingshighway St	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Mexico Rd & Rock Creek Elementary	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Wentzville Pkwy & W Meyer Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Wentzville Pkwy & Luetkenhaus Blvd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Route A & Mexico Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	St Peters Howell Rd & McClay Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Spencer R & Willot Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	McClay Rd & Thoele Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Truman Rd & Ehlmann Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Zuembehl Rd & Droste Rd	$ 4,500.00
Bluetooth Vehicle Travel Time Sensors	Knaust Rd & Birdie Hills Rd	$ 4,500.00
Turn Movement Camera	Route K & Mexico Rd	$ 25,000.00
Turn Movement Camera	Mid Rivers Mall Dr & Mexico Rd	$ 25,000.00
Turn Movement Camera	5th St & Ameristar Blvd	$ 25,000.00
Turn Movement Camera	Wentzville Parkway & W Pearce Blvd	$ 25,000.00
Wireless Vehicle Detection	Mexico Rd & Rock Creek Elementary	$ 14,000.00
Wireless Vehicle Detection	Mexisco Rd & First executive Ave	$ 14,000.00
Wireless Vehicle Detection	Winghaven Blvd & St Lukes Medical	$ 14,000.00
Wireless Vehicle Detection	Bryan Rd & Great Warrior	$ 14,000.00
Wireless Vehicle Detection	Mid Rivers Mall Dr & Home Depot	$ 14,000.00
Wireless Vehicle Detection	Mid Rivers Mall Dr & Ohmes Rd	$ 14,000.00
Wireless Vehicle Detection	Salt River Rd & Mid Rivers Mall Dr	$ 14,000.00
Wireless Vehicle Detection	Muegge Rd & Graystone Dr	$ 14,000.00
Wireless Vehicle Detection	Muegge Rd & Old Muegge Rd	$ 14,000.00
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Wireless Vehicle Detection	Jungermann Rd & County Creek Dr	$ 14,000.00
Wireless Vehicle Detection	Jungermann Rd & Orchard Hills Dr	$ 14,000.00
Wireless Vehicle Detection	Route M & Pitman St	$ 14,000.00
Wireless Vehicle Detection	Wentzville Pkwy & Home Depot	$ 14,000.00
Wireless Vehicle Detection	Zuembehl Rd & Schnucks Entrance	$ 14,000.00
Wireless Vehicle Detection	Salt Lick Rd & Timberbrook Dr	$ 14,000.00
Wireless Vehicle Detection	Salt River Rd & Arrowhead Industrial Dr	$ 14,000.00
Wireless Vehicle Detection	Mexico Rd & West Sunnyhill Dr	$ 14,000.00
Wireless Vehicle Detection	Wentzville Parkway & Meyer Rd	$ 14,000.00
Wireless Vehicle Detection	Spencer Rd & Shadowcreek Rd	$ 14,000.00
Wireless Vehicle Detection	S. River Rd & S. Main St	$ 14,000.00
Wireless Vehicle Detection	TR Hughes Rd & Wabash St	$ 14,000.00
	Subtotal	**$ 489,000.00**

Attachment C
Construction Cost Estimate
St. Charles Gateway Green Light - Phase 3

FIBER INSTALLATIONS	LOCATION		Cost per Location
Elm Street - St Charles	2.7 miles / 14,250 LF	$	250,000.00
Technology Drive - Lake St Louis	2.0 Miles / 10,750 LF	$	185,000.00
Main Street/Tom Ginnever - O'Fallon	3.4 miles / 18,000 LF	$	315,000.00
	Subtotal	**$**	**750,000.00**

CCTV INSTALLATIONS	LOCATION		Cost per Location
CCTV	Zuembehl Rd & Hawks Nest Dr	$	8,000.00
CCTV	West Clay St & Hawks Nest Dr	$	8,000.00
CCTV	Mid Rivers Mall Dr & Grand Teton Dr	$	8,000.00
CCTV	Muegge Rd & Greystone Dr	$	8,000.00
CCTV	Spencer Rd & Willot Rd	$	8,000.00
	Subtotal	**$**	**40,000.00**

DMS INSTALLATIONS	LOCATION		Cost per Location
DMS	SB Wentzville Parkway north of I-70	$	110,000.00
DMS	SB Mo Rte 79 - north of I-70	$	125,000.00
	Subtotal	**$**	**235,000.00**

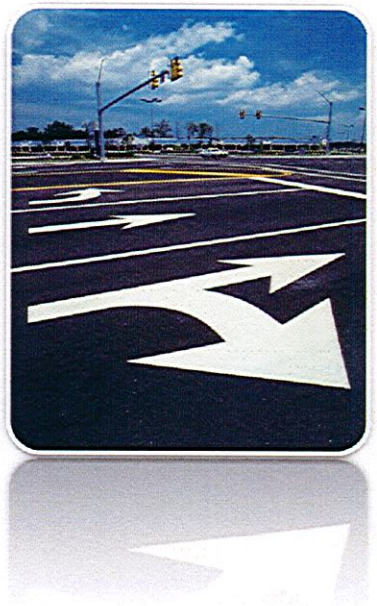
Base ITS Infrastructure Subtotal	**$**	**1,514,000.00**
Contingency (10%)	$	151,400.00
Mobilization (2.5%)	$	37,850.00
Traffic Control (3%)	$	45,420.00
Base Construction Total	**$**	**1,748,670.00**

Design & ITS Integration (10%)	$	174,867.00
Construction Period Services (5%)	$	87,434.00

Grand Total	**$**	**2,010,971.00**

Attachment F

Gateway St. Charles County Green Light



DRAFT Feasibility Study

Prepared by:

PARSONS BRINCKERHOFF

Prepared for:
St. Charles County, Missouri

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1.0 PROJECT BACKGROUND

Parsons Brinckerhoff has been retained by St. Charles County, Missouri to develop a Feasibility Study for the conceptual design requirements of an Advanced Transportation Management System (ATMS) as part of the Gateway Green Light Project. The project is constrained by an initial capital budget of $5 million from a Congestion Mitigation and Air Quality (CMAQ) grant awarded to the County. The goal of this study is to determine the feasibility of various communication options and possibility of implementing these strategies for the implementation of the ATMS system.

The Gateway Green Light project will procure an ATMS for St. Charles County, comprised of a multi-jurisdictional communication network. The system is anticipated to include communications connections to existing traffic signal controllers throughout the County, and may eventually include the deployment of Intelligent Transportation System (ITS) edge devices such as closed circuit television (CCTV) cameras, vehicle detection, dynamic message signs (DMS), optimized and adaptive signal control systems, and emergency vehicle preemption systems. The signal system of approximately 330 signals and ITS devices will be controlled by a central software solution, with additional control distributed to jurisdictions and entities that operate signals within the County such as the Missouri Department of Transportation (MoDOT). The initial deployment, which is the subject of this project and recipient of the aforementioned CMAQ grant, will serve to procure as much of the county-wide system and devices as possible within the stated $5 million budget. This feasibility study will summarize and leverage the information gained from the data collection process and frame the plan within the goals and objectives developed in cooperation with St. Charles County and the Gateway Green Light stakeholder agencies.

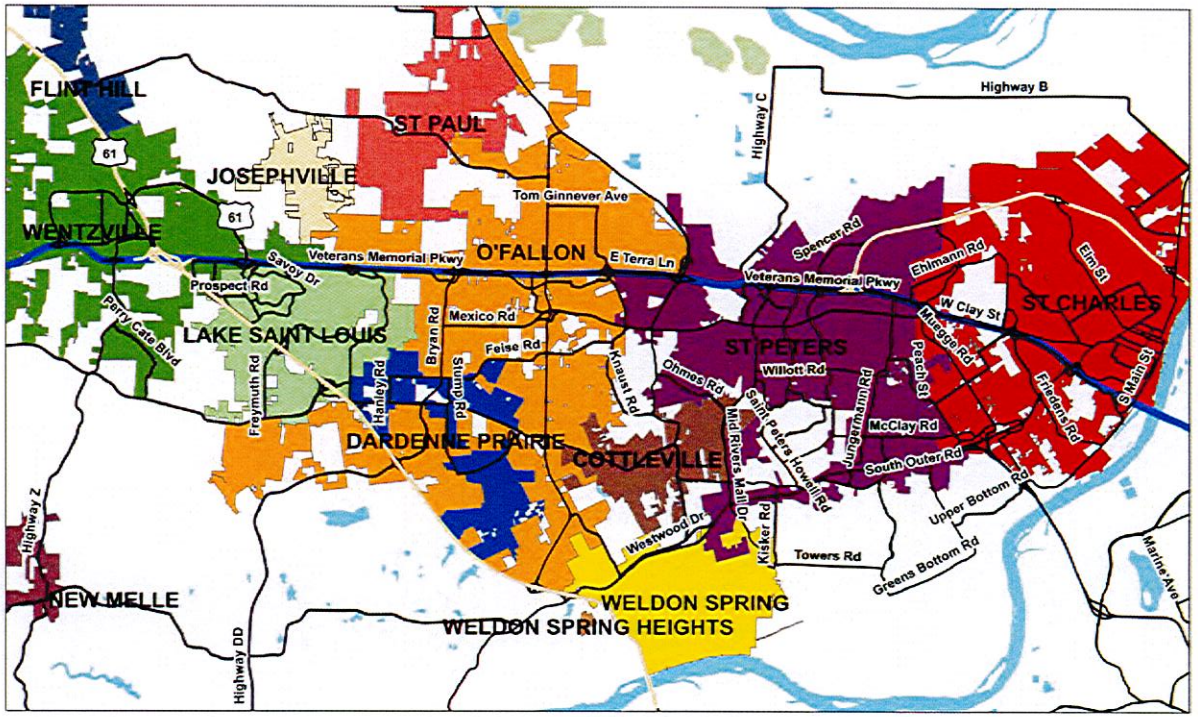


Figure 1.1: Municipalities within St. Charles County

This feasibility study will include a summary of the data collection performed, evaluate state of the industry communication technologies for the backbone, distribution and edge devices, provide analysis of alternatives including estimates of capital cost, operations and maintenance costs of the proposed system, as well as prepare recommendations and conclusions regarding the phased deployment and procurement of the overall communication infrastructure within the parameters of the available funding. Alternative communication backbone technologies such as fiber, cellular, wireless or leased service will be evaluated for their ability to provide a cost effective communications infrastructure for the Gateway Green Light signal system. The feasibility study will identify existing communication infrastructures to determine if they could be utilized for the routing of traffic signal data and video. The study will also evaluate the planned deployment of a county-wide wireless backbone, currently being constructed by St. Charles County and partially funded by the St. Louis Area Regional Response System (STARRS), to determine if it can be used to route traffic signal video and data from ATMS signals. The feasibility study will compare the capital, operations and maintenance costs of each communications technology in order to identify the most cost effective solution or hybrid solutions to be deployed as a phased implementation. Figure 1.1 shows the various municipalities that fall within St. Charles County.

2.0 GOALS AND OBJECTIVES

The goals and objectives of the creation of the centralized communications network have been communicated by St. Charles County and the stakeholders through their discussions with the Program Manager during project stakeholder meetings. The ultimate objective, achieved through a phased budget approach, will be the build out of a centralized ATMS system that includes communications to all 330 traffic signals within the County as well as additional existing and future ITS devices such as CCTV cameras, DMS, adaptive traffic signal systems and other devices.

A county-wide ATMS will allow for efficient use and improved management of shared resources located on the arterial roadway system. Additionally, the system will be used to implement routine and incident signal timings for general monitoring and incident management in a cross jurisdictional manner.

An initial set of ATMS goals and objectives were developed and prioritized as part of the funding request. These goals and objectives were then refined through stakeholder outreach and in developing ATSM software requirements. The communication network required to support the county-wide ATMS has remained a high priority as has the need to supply and install the various ATMS equipment within stated budget.

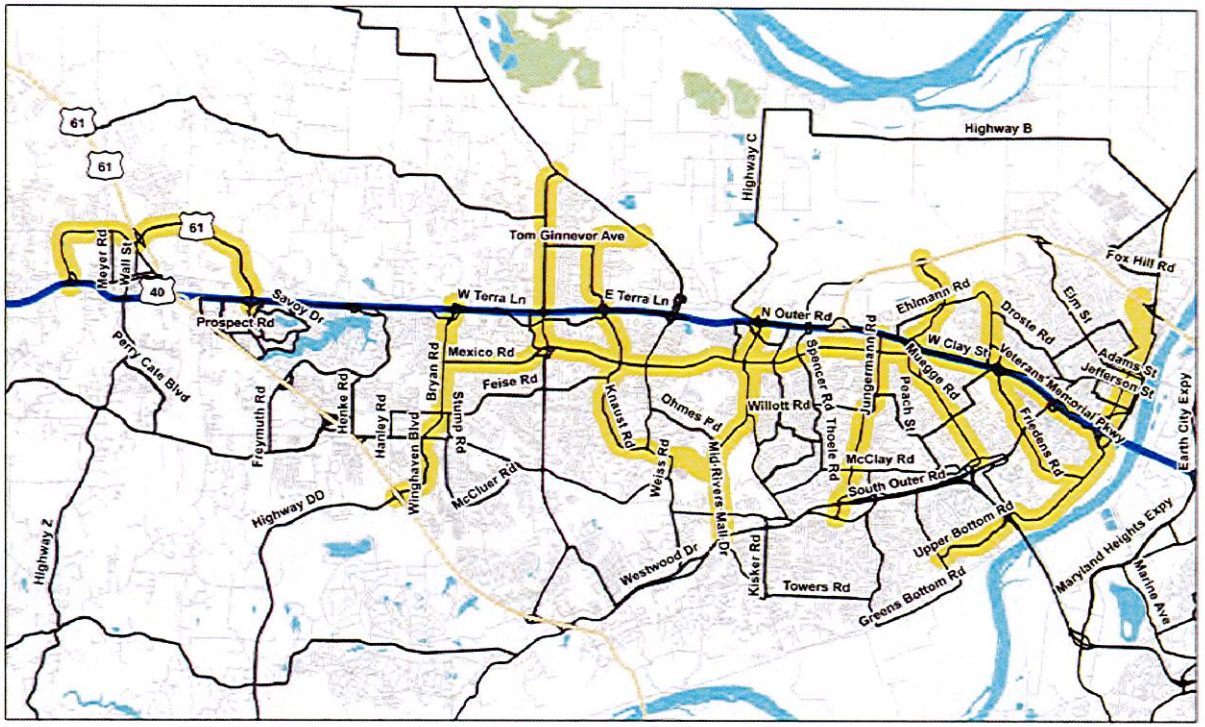


Figure 2.1: Priority Corridors for Phase 1

The original goals of supplying and installing additional ITS devices such as CCTV cameras, DMS, emergency vehicle preemption, and travel time sensors on corridors have taken second priority to deploying the actual distribution and backbone communications to existing signals connected to the ATMS, but are anticipated to be added in a phased budget approach. Such ITS deployments would be initiated based on roadway average daily traffic (ADT) figures at thresholds of 30,000, 20,000 10,000 and 5,000 vehicles per day. The original goals, in order of priority, can be summarized as follows:

1. Build the required communication network, including a county-wide high speed data network to support a county-wide ATMS.
2. Supply and install ATMS software and hardware needed to manage all signals in the county from a centralized location.
3. Develop coordinated signal plans.
4. Supply and install various devices needed for an adaptive signal system on designated priority corridors.
5. Supply and install supporting ITS devices such as vehicle detection video cameras, CCTV, DMS, emergency vehicle preemption and travel time sensors on corridors with average daily traffic (ADT) of 30,000 vehicles per day or more.
6. Supply and install various devices such as vehicle detection video cameras, CCTV, DMS, emergency vehicle preemption and travel time sensors on corridors with average daily traffic (ADT) of 20,000 vehicles per day or more.

7. Supply and install various devices such as vehicle detection video cameras, CCTV, DMS, emergency vehicle preemption and travel time sensors on corridors with average daily traffic (ADT) of 10,000 vehicles per day or more.
8. Supply and install various devices such as vehicle detection video cameras, CCTV, DMS, emergency vehicle preemption and travel time sensors on corridors with average daily traffic (ADT) of 5,000 vehicles per day or more.

Further discussions with St. Charles County and stakeholders led to the development of a list of priority corridors within the County. The initial improvements (optimization and controller upgrades shall target the following priority corridors listed in Table 2.1 below. In addition, these priority corridors will be the most likely candidate locations for adaptive signal control technology when deployed in the region. The priority corridors are shown in Figure 2.1.

Table 2.1 Priority Corridors for Phase 1

Priority Ranking	Corridor
1	Mexico Road/Veterans Memorial Parkway from Bryan Road to 5th Street
2	Bryan Road/Winghaven Boulevard from West Terra Lane to I-64
3	Mid Rivers Mall Drive from Route 364 to Salt River Road
4	Muegge Road/Cave Springs Road/Truman Boulevard from Route 364 to Route 370
5	5th St./S. River Road/Arena Pkwy/Upper Bottom Road from Jungs Station Road to Little Hills Expressway
6	Jungermann Road from Veterans Memorial Drive to Old Hwy 94
7	Route K/Main Street/Route M from Mexico Road to SR 79
8	Wentzville Parkway/Route A from I-70 SOR to Veterans Memorial Parkway
9	Friedens Road/Zumbehl Road from South River Road to Ehlmann Road
10	Cottleville Parkway/Knaust Road/Belleau Creek/T. R. Hughes from Mid Rivers Mall Drive to SR 79

3.0 EXISTING CONDITIONS

3.1 SIGNAL INVENTORY

A traffic signal controller inventory was prepared for every signalized intersection within St. Charles County. The County contains a total of 341 traffic signals that are owned and operated by the following nine jurisdictions within Missouri.

- City of Cottleville
- City of Dardenne Prairie
- City of Lake Saint Louis
- City of O'Fallon
- City of St. Charles
- City of St. Peters
- City of Wentzville
- MoDOT, St. Louis District
- St. Charles County

It should be noted that St. Charles County maintains the signals within the City of Cottleville.

The approached undertaken to develop the traffic signal controller inventory varied depending on the location of the controller. For the priority corridor signals, the individual jurisdictional agencies were asked to supply information which was merged with information collected in the field by visits to each signal controller. Less information was collected for non-priority corridor signals. The signal information collected was summarized in a Geographic Information System (GIS) database for the 163 priority corridor signals and 178 Non-Priority Route signals. Table 3.1 summarizes the data collected for each signal.

All but four traffic signal controllers within St. Charles County are Eagle EPAC models M10, M40, M42 or the IP addressable M50 series (non-NTCIP compliant). Remaining signals include three Econolite ASC/3-1000 controllers and one ASC/2-1000 controller. Three of these are maintained by Dardenne Prairie, with the other maintained by St. Charles County. Of the newer M52 models in use, none have NTCIP compliant firmware in place.

Table 3.1 Traffic Signal Inventory Data

Item	Priority Route	Non-Priority Route
Agency	X	X
Cross Street	X	X
Interconnect Type	X	X
Controller Brand and Model	X	
Controller Date	X	X
Load Switch Assignments	X	
Left Turn Protection	X	
Storage Bay Lengths	X	
Cabinet Print Picture	X	X
Controller Main Menu Picture	X	X
Route	X	X
Master	X	
Vehicle Detection (video brand and model, induction loops)	X	
Software Version	X	X
Cabinet Date	X	X
Lane Designations	X	
Speed Limit for each Approach	X	
Cabinet Pictures	X	
Preemption (optical or pushbutton)	X	

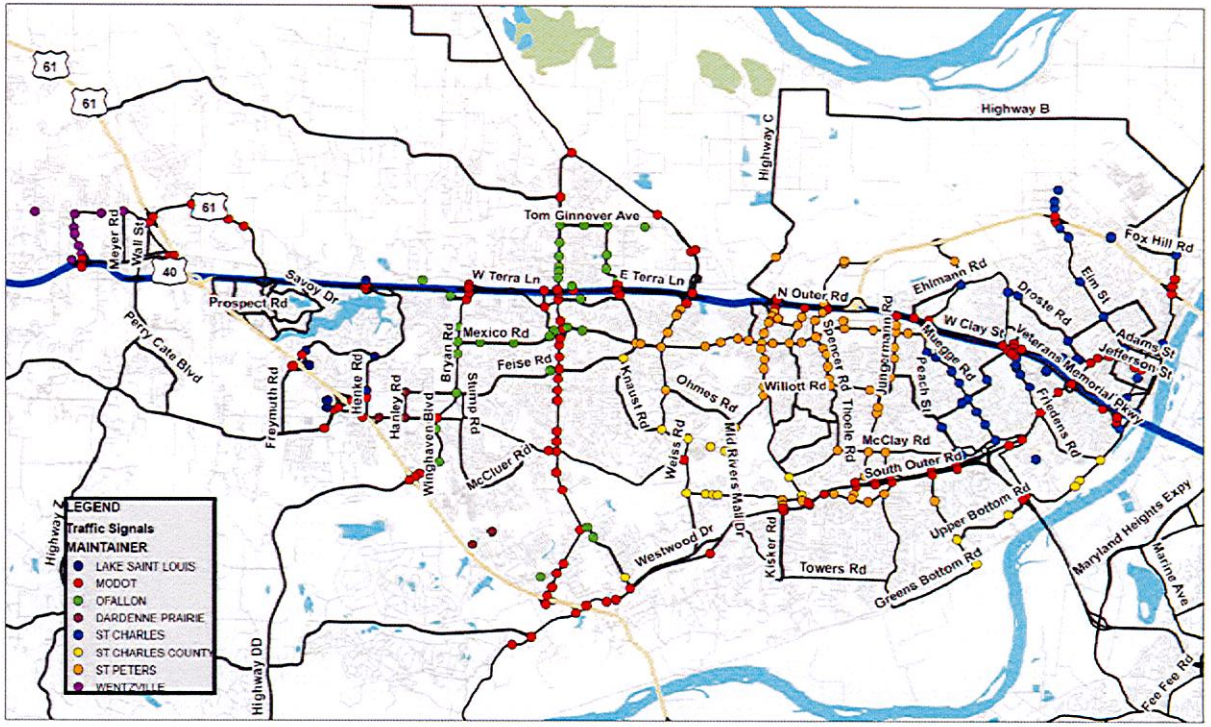


Figure 3.1: Traffic Signals by Maintaining Agency

Figure 3.1 identifies the traffic signals by maintaining agency. The maintaining agency is not always the owner of the traffic signal. St. Charles County provided initial GIS mapping of the signal locations within the County. This data was cross-verified against the stakeholder surveys and other data collected as part of the study to refine the exact locations and determine the maintaining agency for each signal.

Table 3.2 provides an existing traffic signal summary for each jurisdiction. The largest stakeholder, MoDOT, owns and operates 140 traffic signals within the project area connected through a centralized ACTRA signal system managed at MoDOT's Traffic Management Center (TMC) in Chesterfield in St. Louis County. The City of St. Peters maintains 81 signals through its centralized ACTRA system at the City of St. Peters City Hall building. A complete compilation of signal inventory data is available electronically.

Table 3.2 Existing Traffic Signal Inventory

Jurisdiction	No. of Traffic Signals	No. of Traffic Signals on Priority Routes
Cottleville	5	3
Dardenne Prairie	6	0
Lake St. Louis	6	0
MoDOT	140	51
O'Fallon	33	23
St. Charles City	46	20
St. Charles County	12	7
St. Peters	81	50
Wentzville	12	9
TOTAL	**341**	**163**

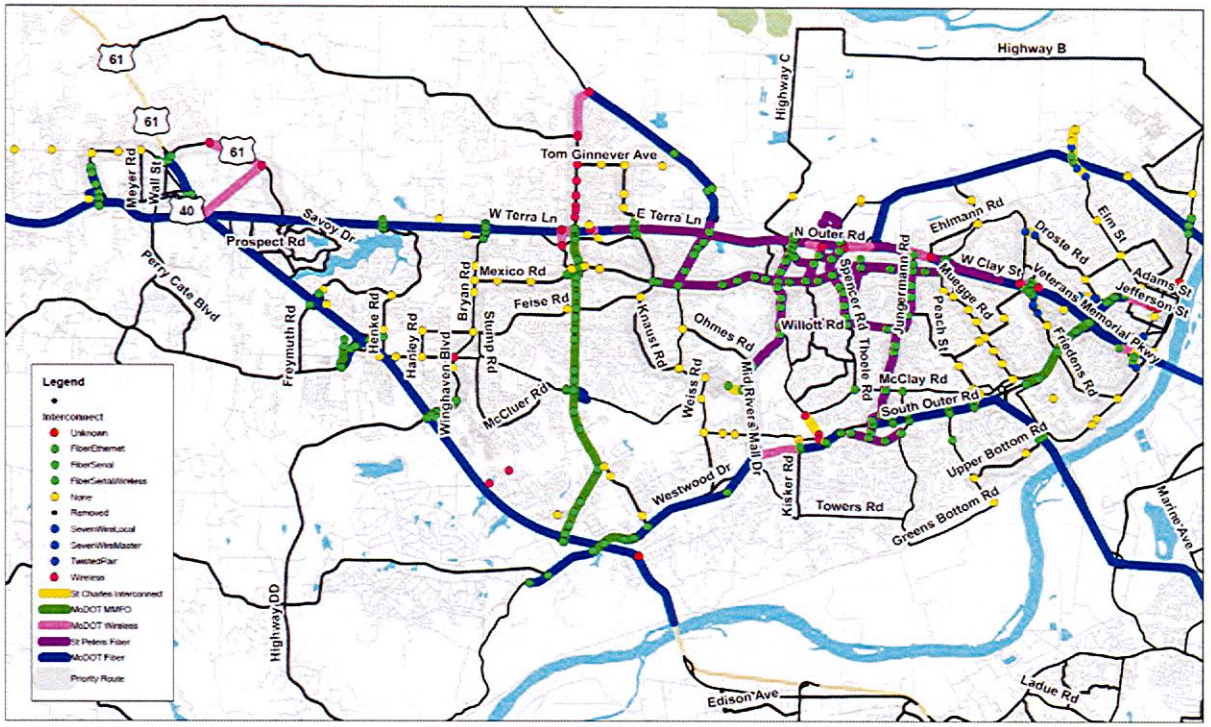


Figure 3.2: Traffic Signal Interconnect

3.2 COMMUNICATIONS

A communications inventory was also created from information gained from the signal inventory and from stakeholder outreach. Agencies provided information regarding how their traffic signals are connected on the initial stakeholder surveys as well as through verification during stakeholder meetings. City of St. Peters provided GIS mapping data for their fiber locations. In addition, MoDOT provided design plans (not necessarily as-built plans) for each of their fiber design projects in St. Charles County. It was found that various communication methods are used within St. Charles County. These include direct fiber Ethernet connection, fiber serial connection via multimode cable, wireless connection (radio and cellular), twisted pair, as well as seven wire master/local configuration. Figure 3.2 indicates the communications methods for each of the signal controllers in St. Charles County.

As can be seen from Figure 3.2, various agencies have different communications in place for their signals.

City of Cottleville

The City of Cottleville does not have any signals interconnected. However, the City does have unterminated fiber running between their traffic signal cabinets located near the entrances to St. Charles Community College.

City of Dardenne Prairie
Dardenne Prairie's traffic signals currently have no interconnect.

City of Lake Saint Louis
The City of Lake Saint Louis has multimode fiber along Ronald Reagan Drive between Hawk Ridge Drive and Lila Lane.

City of O'Fallon
The City of O'Fallon only has fiber terminated (not connected) in approximately three cabinet locations (Mexico Road/Home Depot and Winghaven Boulevard at St. Lukes Medical and Phoenix Parkway). The City also has one wireless connection at TR Hughes Boulevard at Widel Lane/Public Works Drive.

City of St. Charles
The City of St. Charles has a twisted pair interconnect located along Zumbehl Road between the Dierbergs north entrance and Lake Court. The City also has a seven-wire connection along Fifth Street between Boones Lick Road and South River Road, along West Clay Street between Droste Road and Westbury Drive, along Droste Road between Zumbehl Road and Westborough Drive, and along Elm Street/New Town Boulevard between Fountain Lakes Boulevard and Elm Point Industrial. Construction plans are currently being prepared for the installation of fiber interconnect along New Town Boulevard between Mueller Road and Elm Point Industrial. This will replace the existing 7 conductor interconnect at this location. In addition, construction plans are being prepared for the installation of fiber interconnect along Hackman Road between McClay Road and Old Route 94.

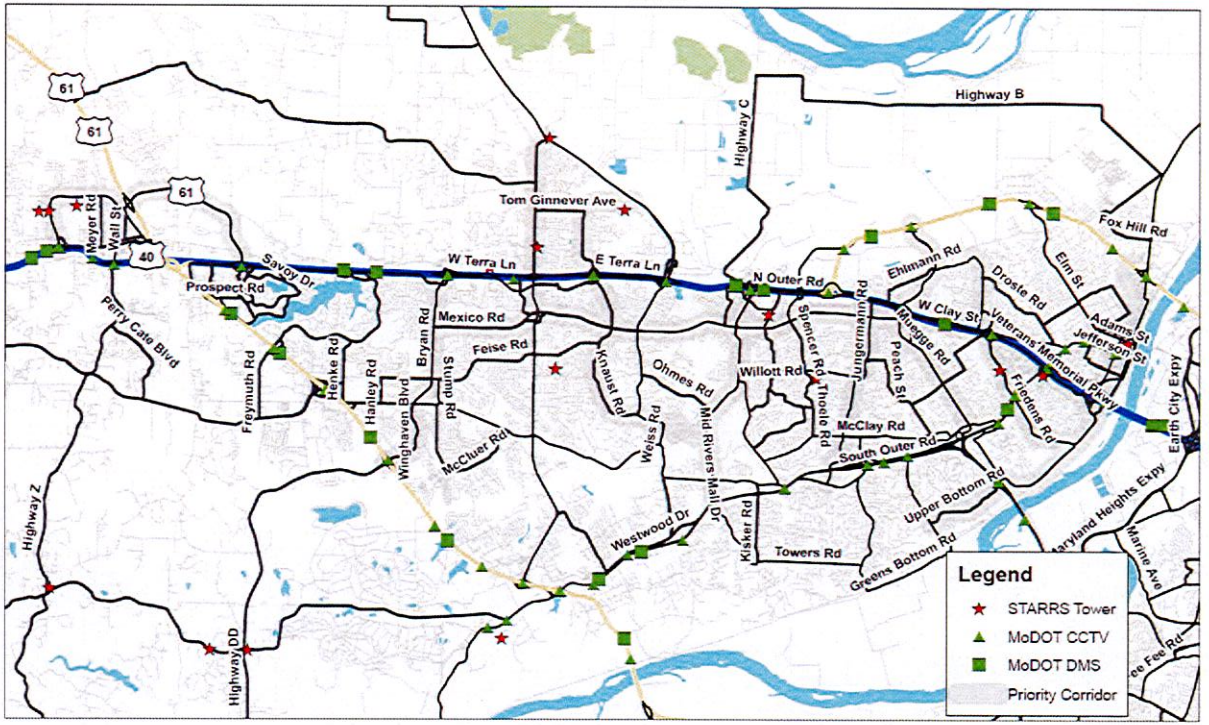


Figure 3.3: Existing ITS Equipment

St. Charles County
St. Charles County has wireless interconnect along St. Peters-Howell Road between McClay Road and Toelle Drive signals. These two signals are also connected wirelessly to the signal at Central School Road to the south (a City of St. Peters owned signal).

City of St. Peters
The City of St. Peters has a large number of interconnected signals. Fifty-six signals are connected via fiber Ethernet connection. Fourteen are interconnected via fiber (serial) connection and one signal has wireless connection (St. Peters-Howell at Central School Road)Only nine signals in St. Peters have no interconnect.

City of Wentzville
The City of Wentzville will soon have a fiber (serial) connection to its signal at West Pearce Boulevard and Bear Creek Drive (this signal is being

relocated from the Best Buy/Kohl's entrance). In addition, fiber exists along Wentzville Parkway between William Dierberg Drive and Interstate 70 westbound ramps. This fiber is currently terminated in the controller cabinets, but is expected to be connected in early 2012. In addition, existing (empty) interconnect conduit was installed along Wentzville Parkway between the QT service station entrance and Luetkenhaus Boulevard.

MoDOT-St. Louis District

MoDOT will have communications to all but approximately three of their traffic signals in St. Charles County once the Route 364 extension and signal upgrades are complete. The three exceptions include Route 94 at Route 67 near Alton, Old Highway N at the Interstate 64 South Outer Road, and Route 94 at Fox Hill which is maintained by the City of St. Charles. The majority of the signals are connected on MoDOT owned dedicated fiber. Most have Ethernet connections, with additional signals connected via multimode fiber serial connections (former closed loop systems were brought online in this way). Approximately eighteen signals have wireless equipment, these include three signals along Route A near the GM plant, the intersection of Highway N at Winghaven, along with signals near Interstate 70 at Route K, TR Hughes Boulevard, Zumbehl Road, and along north and south outer roads of West Clay and Veterans Memorial Parkway along Interstate 70. In addition, MoDOT has approximately three signals in the project area that utilize a cellular connection.

Table 3.3 provides a summary of the types of interconnect to the existing traffic signal cabinets in St. Charles County.

Table 3.3 Existing Interconnect for Traffic Signals

Type of Interconnect	No. of Traffic Signals
No Interconnect	90
Twisted Pair	17
Wireless	28
Fiber Optic	202
Unknown	4
TOTAL	341*

*Includes flasher signals at mid-block pedestrian crossings

3.3 ITS EQUIPMENT

Several stakeholder agencies currently maintain ITS equipment. MoDOT has the largest array of equipment as part of their St. Louis District ATMS network. These devices include CCTV cameras, DMS, remote traffic microwave sensors (RTMS), arterial in-pavement detection, and lane control signals. CCTV cameras with pan-tilt-zoom (PTZ) capability and DMS are located along Interstates 64 and 70, and along Routes 364, 370, 67 and 94 in St. Charles County. These cameras are typically located at interchanges and are tied into the MoDOT ATMS through existing fiber optic cable in conduit. The DMS are typically located between interchanges to provide motorists with information regarding prevailing roadway conditions. RTMS detectors are radar-based roadside pole-mounted detection systems located along Interstate 70 and Route 364 that provide presence, volume, occupancy, speed and classification information. MoDOT deployed Sensys in-pavement detectors along route 94 from Interstate 64 to Interstate 70. These detectors are used for arterial performance measurement through measurement of travel times along this corridor. In addition, MoDOT maintains three lane control systems in St. Charles County to manage lane closures at river crossings. These can be found along Route 364 at Upper Bottom Road and along Interstate 64 west of the Missouri River in Weldon Spring and east of the Missouri River in Chesterfield. In

addition, MoDOT maintains signal preemption equipment that was not inventoried as part of this study.

The City of St. Peters also maintains eleven (11) CCTV cameras located along Mid Rivers Mall Drive, Mexico Road, Jungermann Road and at Interstate 70 and Salt Lick Road.

MoDOT, the City of St. Peters and St. Charles County also have portable DMS. St. Charles County has eleven (11) portable DMS in their inventory.

Table 3.4 shows the number and type of devices in use throughout St. Charles County and Figure 3.3 shows the locations of this ITS equipment across the County.

Table 3.4 ITS Equipment in St. Charles County

ITS Equipment Type	MoDOT	St. Peters
CCTV Camera	62	11
Dynamic Message Sign (DMS)	28	0
Freeway RTMS	85	0
Arterial In-pavement Detection	12	0
Lane Control Signals	9 (three sets of 3 signals each)	0

3.4 MICROWAVE NETWORK

The St. Charles County deployment of a microwave network is anticipated to be completed by mid-year 2013. Once complete, the network, which is partially funded by and a part of the regional STARRS network, will be a microwave digital network supporting 700/800 MHz land mobile radio creating an interoperable inter-county communication network across St. Louis, St Charles, Franklin, St. Clair, Madison, Monroe and Jefferson counties in Missouri and Illinois as well as the City of St. Louis. The towers, microwave, and miscellaneous infrastructure is valued at $10 million.

Microwave/STARRS tower locations are still being finalized but are anticipated to be located at the O'Fallon, Wentzville and St. Peters police departments, the O'Fallon water tower, New Melle Ambulance, Ameren UE facility as well as at the cities of St. Charles, Wentzville, Schluersburg and Weldon Spring. Although the timing of the tower construction precludes a 2012 communications option for the purposes of this project, they were evaluated as potential sites for point-to-point, point-to-multipoint, and LTE communication nodes for use in the new ATMS system. Additional information regarding the towers and use as part of the proposed communication alternatives is described in Section 7.0. Proposed microwave/STARRS tower locations are shown in Figure 3.3.

3.5 SUMMARY

In summary, an extensive traffic signal and ITS equipment inventory was performed for all of St. Charles County. This resulted in the compilation of data concerning all St. Charles County existing traffic signals, their locations and cabinet details, as well as existing ITS devices (CCTV cameras, DMS, freeway/arterial detectors and lane control signals). Inventories were processed into spreadsheets as well as into mapping for both

Geographic Information Systems (GIS) shapefile format and Google Earth mapping (.KMZ file). This existing conditions inventory was the first step in the process to perform feasibility analysis for bringing the required remaining traffic signals and other ITS equipment onto a County-wide ATMS system. It was found that nearly eighty percent (80%) of the County's signals are already connected, primarily through MoDOT and City of St. Peters fiber optic cable. The bulk of the priority corridors already have existing communications through connection with either the MoDOT ATMS or the City of St. Peters system, although approximately forty-eight (48) are not yet connected to any system. Of the non-priority routes, approximately forty-six (46) signals need communications connection. It was also found that approximately half of existing traffic signal controllers countywide are Model M40 or older (non-NTCIP compliant), which will require upgrading as part of the Gateway Green Light ATMS project in order to achieve desired communications bandwidth results. For signals not currently having communications connections, migration to the new ATMS would require establishment of network connectivity via the methods explored later in this study. The various communication technology alternatives for this are discussed in Section 7.0.

4.0 EDGE DEVICES

The Gateway Green Light Advanced Transportation Management System (ATMS) for St. Charles County, Missouri at full build out will include a network of devices, including signals, vehicle detectors, video cameras, DMS and other mobile devices with communications integrated throughout the system. ATMSs reduce traffic congestion in urban environments through deployment of state-of-the-art sensing, communications and data-processing technologies. ATMSs utilize information provided by roadside traffic sensors to provide optimal traffic control strategies within the roadway network and to provide incident monitoring assistance. Real-time solutions capable of automatically adjusting to changes in traffic conditions are possible through the system. The systems also rely on information dissemination to motorists via DMS or other means to provide relevant traffic information and travel recommendations. This section will discuss the various edge devices to be used in the Gateway Green Light ATMS.

4.1 TRAFFIC SIGNALS

Traffic signals are electrically powered traffic control devices that assign right of way to conflicting vehicular and pedestrian traffic movements at intersections. Traffic signals make up the largest portion of an ATMS system in terms of sheer number of devices. Three-hundred forty-one (341) traffic signals across nine different jurisdictions will be part of the Gateway Green Light system. An effective arterial management system will actively improve the operation of traffic signal systems across these jurisdictions by employing techniques to improve traffic flow and reduce congestion. Traffic signals can sometimes create additional congestion and delay if improperly designed, installed or maintained. Correctly designed and operated traffic signals installed at warranted locations provide for the orderly movement of traffic, increase intersection capacity and reduce crashes. Coordination, phasing and timing of traffic signals is of great importance and often provide the most benefit from an ATMS.

Signal timing changes can be made on a routine basis or for detour or diversion events. Adaptive traffic control methods can also be implemented at the traffic signal controllers along a corridor. Traffic signals are comprised of several components, namely the cabinet which includes the controller, conflict monitor, load switches and in some cases a battery back-up unit. Control cabinets and components are manufactured to two major standards in the United States: National Electrical Manufacturers Association (NEMA) and Type 170. The majority of traffic signal controllers in St. Charles County are NEMA type Eagle EPAC controllers, models M40, M42 and M52. Existing older controllers may require an upgrade to model M52, which is fully Ethernet compatible and/or a firmware upgrade to ensure National Transportation Communications for ITS Protocol (NTCIP) compliancy.

4.2 DETECTION

Detectors are devices used with actuated controllers to sense the presence of vehicles or pedestrians to award right of way on the basis of actual demand. Detectors can be stop bar detectors or advance detectors upstream of the intersection. Each detection zone requires a sensor unit housed in the controller cabinet. Common types of detectors in use in the region include induction loops, video detection, magnetic detectors, and microwave or radar detectors.

Induction Loop Detectors

Conventional inductance loop detectors are commonly used, and are made up of a loop or coil of wire embedded in the pavement, the lead-in cable and the detector unit housed in the signal controller. These systems are used throughout St. Charles County for stop bar and some advance detection. Loop detectors are a mature, highly reliable, well-understood technology insensitive to inclement weather and with flexibility for a wide range of applications. Disadvantages include the pavement cuts required for installation, possible damage due to milling and grinding operations,

no remote monitoring and maintenance that requires lane closure(s).

Video Detection Systems

Video detection systems are also widely used within St. Charles County. Brands in use include primarily Autoscope and Iteris. The capability to export video from the controller is also possible depending on the model. Video detection systems are desirable for pavement preservation, maintenance or safety reasons. Advantages of this system are that saw cuts are not necessary in new pavement or where pavement is in poor condition and sawing could cause further deterioration. Detection zones can be changed to accommodate intersection geometric changes and changes in traffic flow. Troubleshooting the detector can also take place at the cabinet rather than in the roadway. Video detection may be used in locations where joint placement prohibits the use of sawed loops (e.g. bridge decks). One video camera may be capable of covering more than one detection zone. The cost of a video detection system is approximately twice the cost of a standard induction loop system. Disadvantages include camera motion due to wind and impacts due to inclement weather including sun glare and shadows or ice build up on camera lenses.

Magnetic Detectors

Magnetic detectors measure changes in the earth's magnetic field. The roadway sensor is placed in a hole drilled into the roadway surface. Lead-in cable can be used, or else radio technology completes the connection to a roadside pole mounted stations. The Sensys brand is currently being used in St. Charles County. The Sensys Wireless vehicle detection system employs ruggedized pavement-mounted magneto-resistive sensors to detect the presence and movement of vehicles. The Sensys vehicle sensors are wireless, transmitting real-time detection data via radio to nearby roadside access points that then communicate the data to the local traffic controller. MoDOT has Sensys intersection-only detection at Route K at Interstate 70 as well as advance detection at Route A and Mexico Road. MoDOT also recently installed the Sensys detection system along Route 94/Route 364 in St. Charles County for arterial travel time performance measurements.

Microwave Freeway Detection

Remote traffic microwave sensors (RTMS) systems provide true presence detection of vehicles in multiple zones (lanes). These detectors can be forward-looking or side-fired, and are mounted roadside on poles to analyze the difference in frequency between transmitted and received reflected signals to measure distance to targets. These devices are typically used for freeway detection or mid-block on multi-lane arterials. Side fired RTMS systems are in use by MoDOT along Interstate 70 and Route 364.

4.3 CCTV CAMERAS

Closed-captioned television cameras can be used to monitor traffic incidents and roadway conditions in real-time. Live camera views can be utilized by an operator to quickly assess the remote situation and initiate a timely response. Cameras can be analog or Internet Protocol (IP) based. IP cameras are widely accepted and are fast becoming industry standard. The advantages of IP cameras include: Power Over Ethernet (POE) which reduces installation costs since both video and power can be routed via the same Category 5 (CAT 5) cable; remote network diagnostics; ability to route audio and pan-tilt-zoom signals via the same CAT 5 cable which reduces installation costs and allows for easy future camera upgrades; and mega-pixel resolution capability. IP cameras are a true digital solution. In all cameras, the CCD device (which changes video images into electrical signals) creates analog signals. These signals are then digitized for use by the camera's digital signal processing circuitry. Analog cameras require a conversion back to analog for transmission via coaxial cable.

MoDOT currently maintains nearly sixty analog CCTV cameras (manufactured by Cohu Electronics) along Interstate 70, and 64, and along Routes 364, 370 and 94 and is in transition to purchase IP-based cameras in the future.

Microwave Detector

CCTV

4.4 DYNAMIC MESSAGE SIGNS

Dynamic message signs are roadside stationary traffic control devices capable of displaying one or more alternative messages that provide travelers with near real-time, traffic-related variable messages. DMS are used to warn, regulate, route and manage traffic. Similar to static signs, DMS message standards and requirements are guided by the Manual on Uniform Traffic Control Devices (MUTCD). MoDOT operates DMS along Interstates 70 and 64 and Routes 364 and 94 through its TMC in Chesterfield.

DMS can be used for the following types of messages, and these messages should be prioritized by the agency.

- Emergencies (such as evacuations or closures)
- Hazardous or uncommon road conditions
- Traveler information and suggested alternative routes
- Child abductions
- Travel times
- Ozone alerts
- Advance date/time of incidents such as lane closures, etc
- Approved standard public service messages

Dynamic Message Sign

4.5 OTHER DEVICES

Other devices include mobile (portable) changeable message boards that can be relocated along a corridor to warn motorists of construction operations or other unusual conditions.

Portable Message Sign

Pedestrian crossing signals, including those at mid-block locations, may also be used as part of an ATMS. Flashing lights that are activated only when a pedestrian is attempting to cross can enhance crosswalk detection by motorists. The flashing lights, in conjunction with advanced warning signs for the lights, can provide warning to motorists and can be connected to the ATMS.

School flashing beacons may also be used to alert drivers that they are in a school zone, children are likely to be present, and the speed limit is lower than in normal conditions when the beacon is flashing.

In addition, emergency vehicle preemption equipment can be found in signal systems. Traffic signal preemption allows the normal operation of traffic lights to be preempted, often to assist emergency vehicles in order to stop conflicting traffic and allow right–of-way for the emergency vehicles. This type of system may be used by light-rail or bus rapid transit systems to allow public transportation priority access through intersections to improve commute times. At this time, no existing transit systems are in place in St. Charles County.

Pedestrian Crossing

5.0 SOFTWARE REQUIREMENTS

Software requirements were developed with the stakeholder team in an effort to identify potential system user needs that must be incorporated as part of the ATMS system. These software requirements are related to the overall objectives of the system as a whole and were developed to address existing and desired capabilities for the system, including desired integration of edge devices. Figure 5.0 indicates the overall process followed in the development of the software requirements.

Initially, draft requirements were developed from other projects across the country that were similar in scope to the proposed St. Charles County system. These draft requirements were distributed to stakeholders with a request for input and were further refined based on discussions held with stakeholders in October 2011. This refined list of requirements was then sent to multiple vendors with a request to provide an actual demonstration relative to the draft requirements developed. Three vendor demonstrations were held on November 29 and 30, 2011 at the St. Charles County government building. Transcore (TranSuite), Telvent (MIST) and Econolite (CENTRACS) conducted presentations of their software and demonstrated their respective software's capabilities with regard to the draft set of specific requirements. Following these presentations, the stakeholders discussed the presentation and gave feedback with regard to their individual agency needs. Based on these discussions and the feedback received, the requirements were further refined. Final requirements will be developed with the stakeholders and solicited as part of a software procurement package to be released by St. Charles County in coordination with the communications and signal upgrades construction.

ATMS Platform Requirements and Special Provision Development Process

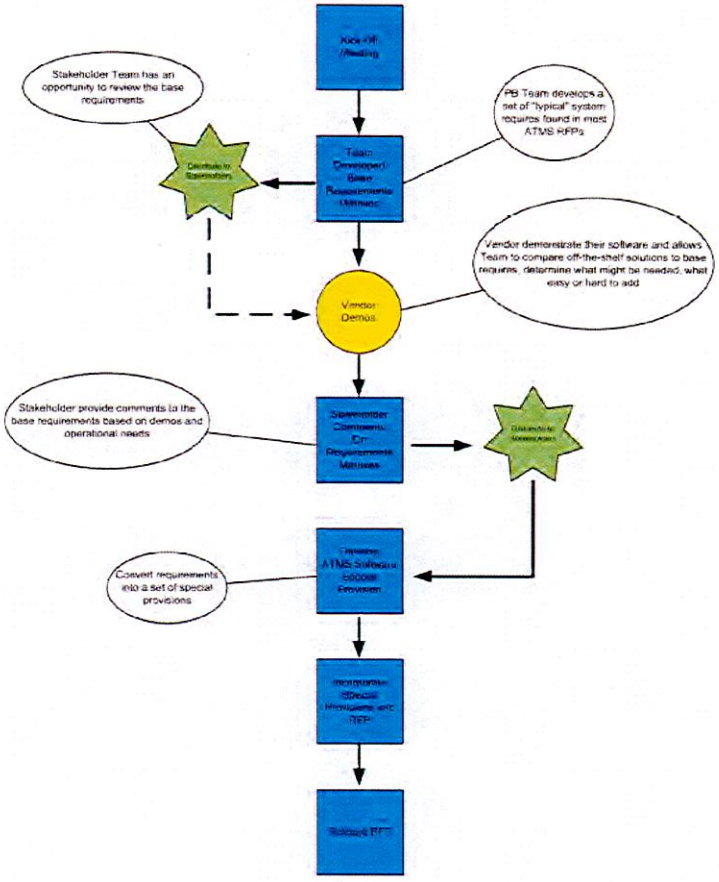


Figure 5.1: ATMS Requirement Development Process

6.0 BASIC ARCHITECTURE AND SERVER SITES

6.1 OVERVIEW

Using the dedicated fiber optic backbone option, new fiber optic cable (24 strand singlemode) will be routed from the traffic signal cabinets to the nearest MoDOT fiber signal cabinet. At the MoDOT fiber signal cabinet, existing dark (unused) fiber will be utilized to route signals to the MoDOT TMC.

The new Gateway Green Light ATMS servers will be located at the MoDOT TMC. The MoDOT dark fiber utilized by this project will be patched into the new ATMS system via a new LAN switch. There are some MoDOT signal cabinets that are currently controlled by the existing MoDOT ACTRA traffic management system that will become a part of the Gateway Green Light system. The signals from these cabinets will be routed from the existing ACTRA system to the new ATMS via a new firewall.

At some locations new fiber will be routed from the traffic signal cabinets to the nearest City of St. Peters fiber signal cabinet. At the St. Peters fiber signal cabinet, existing dark fiber will be utilized to route signals to the St. Peters traffic management system. At the St. Peters traffic management system, the fiber will be patched to a fiber signal cabinet at Route 94 and Mid Rivers Mall Drive where it will be interfaced with a nearby MoDOT fiber signal cabinet. The signals will then be routed via MoDOT dark fiber to the MoDOT TMC.

There are some St. Peters traffic signal cabinets that are currently controlled by the existing St. Peters traffic management system that will become a part of the Gateway Green Light project. The signals from these cabinets will be routed from the existing traffic management system to the new ATMS via a new firewall. The signals will be converted to fiber and routed over St. Peters and MoDOT dark fiber to the MoDOT TMC. See Figure 6.1.

6.2 INTERFACE WITH EXISTING FIBER CABINETS

At an existing fiber signal cabinet a new interface cabinet and handhole (pull box) will be installed. Conduit will be routed from the new handhole to the existing fiber cabinet handhole, the new interface cabinet and to the existing signal cabinet being connected into fiber.

MoDOT or St. Peters (depending on which agency owns the fiber interface cabinet) will route a 12 strand singlemode fiber from the fiber cabinet into the new interface cabinet. The fiber will be terminated on patch panels and fiber optic jumpers will be installed within the fiber cabinet connecting the dark fibers. The patch panel within the interface cabinet will be the MoDOT or St. Peters demarcation point.

From the interface cabinet a new 24 strand singlemode fiber will be routed to the signal cabinet being connected via fiber. The next signal cabinet downstream will be connected via a new 24 strand singlemode fiber.

Within each signal cabinet being connected via fiber a ruggedized LAN switch will be installed and the signal cabinet will become a node on the Gateway Green Light Wide Area Network. See Figures 6.1 and 6.2.

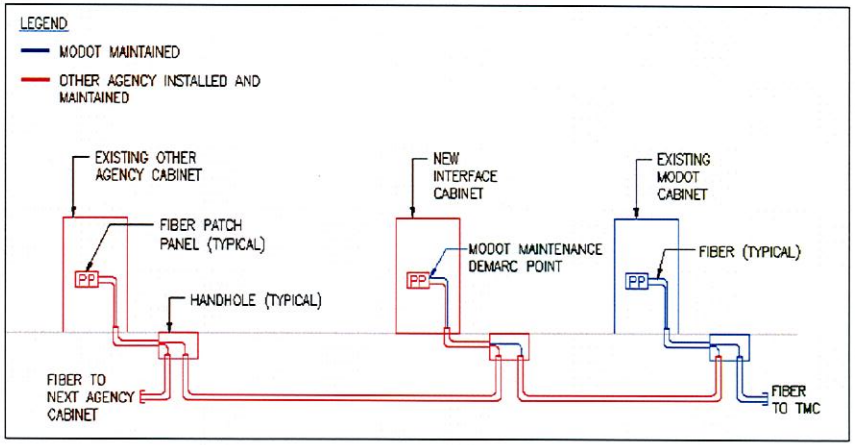


Figure 6.1: Fiber Interface and Demarc Detail

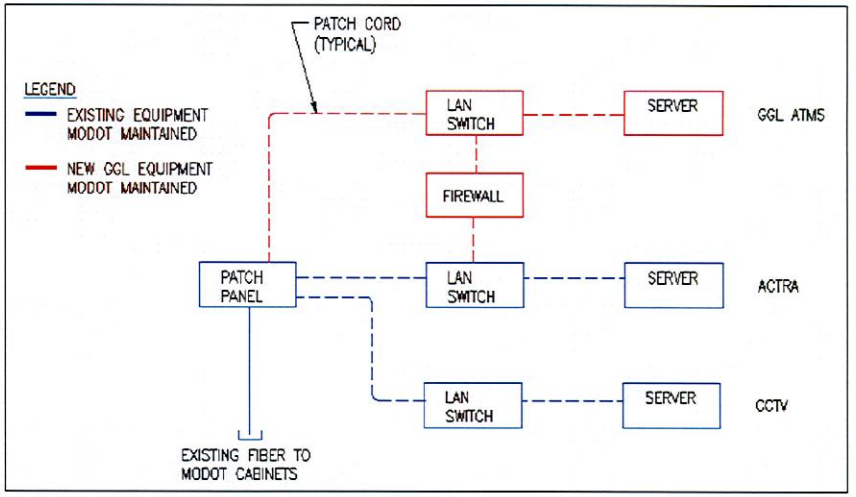


Figure 6.2: Network Diagram at MoDOT TMC

7.0 COMMUNICATIONS ALTERNATIVES

The Gateway Green Light Project is constrained by an initial capital budget of $5 million which includes communications, ATMS software and signal controller upgrades. The anticipated cost of the ATMS central software and hardware will be approximately $1 million, leaving approximately $4 million for communications and signal controller upgrades. This section will discuss the rationale used to determine the most suitable communications design within the available $4 million capital budget, while maintaining a reasonable operations and maintenance budget.

7.1 INTERFACE WITH EXISTING MODOT LAN

The existing MODOT network is a Cisco-based, 10/100 Mbps Ethernet local area network (LAN). Existing signal cabinets currently connected into MoDOT's existing ACTRA traffic management system will be routed into the new ATMS system. It is anticipated that MoDOT's IT Department will provide a firewall to establish a connection between networks.

The existing St. Peters network is a Cisco-based 10/100 Mbps Ethernet LAN. Existing signal cabinets currently connected into St. Peters existing traffic management system will be routed via fiber to the MoDOT TMC and connected into the new ATMS system. It is anticipated that St. Peters' IT Department will provide a fire wall to establish a connection between networks.

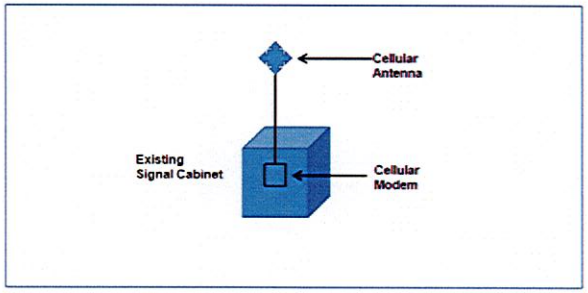
7.2 COMMUNICATION BANDWIDTH NEEDS

The communications backbone will provide the pathway and bandwidth for routing of telecommunication signals between the traffic signal controllers and the ATMS server. The ATMS server will be located in the MoDOT Traffic Management Center in Chesterfield, St. Louis County. Each traffic controller will be a node on the communications backbone. Each node will be comprised of an Ethernet switch and a converter if required to transmit Ethernet via the communication backbone.

It is assumed that all existing signal controllers that are not IP addressable and do not include NTCIP compliant firmware will be upgraded and replaced with a new controller. For example, controllers will be upgraded to a Siemens model M52 NEMA controller or similar. Such upgrades are necessary and are included in analysis of all communication alternatives in order to obtain modern equipment that can function in the most efficient manner with other components of the ATMS. Replacing older outdated controllers will provide the greatest communication capabilities for stakeholders moving forward and ensure reduced latency in communications between equipment.

The following five (5) communications backbone alternatives that could be implemented were evaluated:

- Leased Cellular
- Leased T1 Line Bandwidth
- LTE Dedicated Cellular Network
- Wireless Point to Point Radio
- Dedicated Fiber Optic Cabling



Cellular Communications

Leased Cellular and Leased T1 Line Bandwidth

These two backbone technologies can be implemented within the existing project budget of $4M. The main advantage to these technologies is the ease of installation. Installing a cellular modem and antenna at each cabinet is relatively simple and inexpensive. Adding modems in the future at new cabinets will also be relatively inexpensive. As long as the cabinet is located within the cellular network, communication can begin

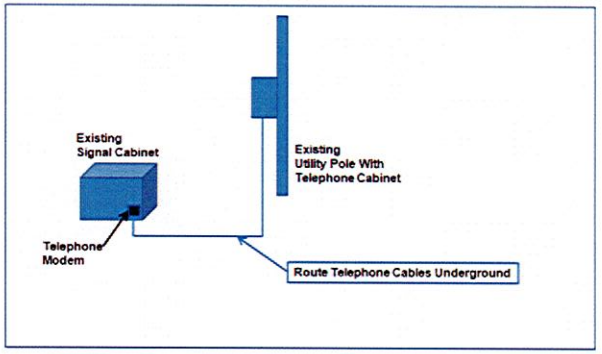
immediately. Obtaining leased T1 service is modestly more difficult since it requires coordination with the Local Exchange Carrier and the physical routing of a telephone line to each cabinet.

These technologies offer low initial costs but will require annual operations and maintenance expenditures via monthly service fees. The service fees cover the service provider's cost to own and maintain the backbone infrastructure and make a profit. Other disadvantages are limited bandwidth, unknown future cost increases and relying on a service provider to maintain the system and respond promptly to service interruptions. Agency budgets tend to be level or decreasing which puts stress on the agency when leased bandwidth service fees increase.

Bandwidth up to 1.5 Mb is typical with these technologies. While this would be sufficient to support the initial application for traffic signal controllers, it would not be adequate to support CCTV camera video. Leased Bandwidth technology could provide greater bandwidth by leasing additional T1 lines but this would require higher operations and maintenance costs.

Cellular and Leased Line could be used as an interim solution until additional capital budget becomes available to allow the installation of a backbone technology that provides larger bandwidth.

At the existing signal cabinets receiving the new leased cellular or T1 Line, a new hardened LAN Switch would need to be installed.

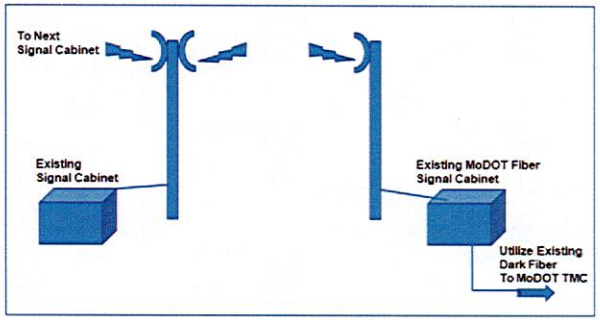


Leased Line Communications

LTE Dedicated Cellular Network

This backbone technology cannot be installed within the existing project budget of $4M and will require annual operations and maintenance expenditures for a service provider to maintain and operate the system. LTE (Long Term Evolution) is the next generation of wireless broadband technology. Deploying a dedicated network ensures that only St. Charles County cellular modems operate on the network. This provides for greater bandwidth possibilities since other subscribers would not be sharing the available bandwidth. Another advantage is that this technology would provide a communications backbone that would be owned and maintained by the stakeholders. Owning a backbone puts the owner in control since they are not at the mercy of a service provider for service interruptions and cost increases.

This technology is similar to leased cellular and would be comprised of cellular modems and antennas at each cabinet, LTE antennas and base stations at the microwave/STARRS towers and core equipment located at a centralized location. The base station at the microwave/STARRS towers would require a direct fiber or point-to-point wireless connection with the core equipment. The core equipment is comprised of three (3) racks that are seven feet tall of LTE equipment. Since the microwave/STARRS towers will not be installed until mid 2013, an existing cellular network could be utilized until the towers were constructed and the LTE wireless network is operational.



Wireless Point-to-Point Communications (Repeater)

The main advantage to LTE is the ease of installation. Installing a cellular modem and antenna at each cabinet is simple and inexpensive. As long as the cabinet is located within the LTE network, communication can begin immediately. Adding modems in the future at new cabinets will also be simple and inexpensive.

The disadvantages to LTE are limited bandwidth, costs associated with an annual service and maintenance agreement with the vendor, as well as relying on a service provider to maintain the system and respond promptly to service interruptions. Agency budgets tend to be level or decreasing which puts stress on the agency when leased bandwidth service fees increase.

Bandwidth up to 10 Mb in near proximity to the towers is typical with this technology. This would be sufficient to support the initial application and CCTV camera video. At the existing signal cabinets receiving the new LTE modems, a new hardened LAN Switch would need to be installed.

Note that stakeholders would not gain ownership or any other rights to an LTE or microwave network under this alternative since it would be an expansion of the St. Charles County microwave network.

Wireless Point-to-Point Radio

Unlicensed wireless point-to-point radio technology can be implemented within the $4M budget. Another advantage is that this technology would provide a communications backbone that would be owned and maintained by the stakeholders. Owning a backbone puts the owner in control since they are not at the mercy of a service provider for service interruptions and cost increases. Wireless radio technology will provide sufficient bandwidth to operate the ATMS system initially and allow for the addition of CCTV camera video in the future.

Wireless point-to-point radio technology is a line of site system. Obstacles such as trees, buildings, terrain would have an effect on the performance of the system and require additional repeater radio nodes be installed to transmit "around" such obstacles. This is a disadvantage in that it increases the capital costs of deployment because multiple "repeater" stations would need to be designed and constructed throughout the study area.

This backbone technology is a radio relay technology for transmitting digital signals between two locations on a line-of-sight radio path. Radio waves are transmitted between the two locations with directional antennas, forming a fixed radio connection between the two points. Long daisy-chained series of such links could be used to form a communication network backbone. The basic components required for operating a radio link are the transmitter, towers, antennas, and receiver.

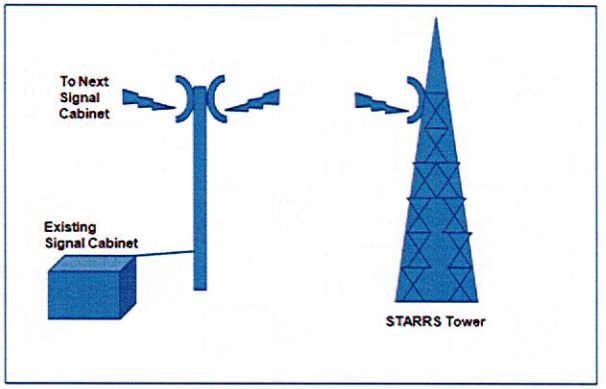
Unlicensed radio equipment avoids the delay and higher cost of the licensing process but there could be interference problems with other radio equipment. A licensed radio system is assigned a specific frequency and guaranteed that no other radios within the area will also be using the same frequency and causing interference. MoDOT currently uses licensed wireless systems in the region.

Consequently, unlicensed manufactures have begun incorporating more and more sophisticated modulation schemes into their equipment. For example, some equipment uses dynamic frequency selection technology that continuously scans the available band looking for clear spectrum and then assigns the active channel accordingly. This adaptive modulation (frequency-hopping) scheme constantly optimizes throughput and maintains link quality.

Although frequency-shifting schemes resist interference of a crowded spectrum, they are not immune. As the number of unlicensed systems increase, the unlicensed spectrum may become so noisy and unpredictable that many systems now working successfully today may become useless in the near future - especially in dense metropolitan areas.

The stationary nature and hardened construction of microwave antenna/radio systems lends itself to minimal preventative maintenance. Equipment is intended for outdoor use, temperature extremes and not affected by high winds if installed properly. Lightning protection is incorporated into the system. On an annual basis equipment and cable conditions should be inspected and connections tightened. Network management software is available for the owner to monitor system performance. Alarms can be established to notify the owner when performance is outside of expected parameters.

At the existing signal cabinets receiving the new point-to-point radios, a new antenna pole would be installed near the cabinet and conduit for power and communication cabling would routed into the cabinet. The base of the cabinet will be widened to allow for the new antenna pole conduit and cabling to enter the cabinet. Within the cabinets a power injector, transient voltage surge suppressor and a hardened LAN Switch would need to be installed.

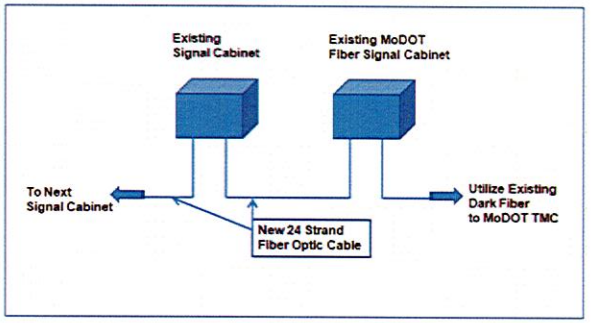


Wireless Point-to-Point Communications (STARRS Tower)

Dedicated Fiber Optic Cabling

Dedicated fiber optic technology cannot be implemented within the initial $4M budget. Approximately half of the existing signal cabinets are connected via dedicated fiber optic cabling. While this technology would require significant initial costs, the annual operations and maintenance costs are typically much lower than leasing bandwidth. Dedicated fiber optic technology will provide virtually unlimited bandwidth and would easily operate the ATMS system initially and allow for the addition of CCTV camera video in the future. Another advantage is that this technology would provide a communications backbone that would be owned and maintained by the stakeholders. Owning a backbone puts the owner in control since they are not at the mercy of a service provider for service interruptions and cost increases.

Fiber Optic Cable requires the installation of underground fiber optic cabling along the roadway right of way connecting each cabinet with either an existing St. Peters or MODOT fiber interface cabinet. For estimating purposes it will be assumed that the fiber optic backbone will be comprised of a 24 strand Single Mode Fiber Optic (SMFO) cable. At each existing St. Peters or MODOT fiber cabinets, existing dark fiber would be utilized for backhaul to the ATMS servers. At each St. Peters or MODOT fiber interface cabinet, a separate cabinet will be installed along with a Class 5 pull box. Conduit will be routed between the fiber interface cabinet and the new cabinet. The new cabinet will be the demarcation point between St. Peters or MODOT fiber optic cabling plant and the existing signal cabinets. Fiber will be routed from the interface cabinet and terminated at a patch panel within the new demarc cabinet.



Fiber Optic Communications

At the existing signal cabinets receiving the new fiber optic cable, a new Class 5 pull box would need to be installed and the base of the cabinet must be widened to allow for the new fiber optic conduit and cable to enter the cabinet (assuming insufficient conduit capacity at the controller). Within the cabinets the fiber will be terminated on patch panels. A new hardened LAN Switch would need to be installed.

7.3 ALTERNATIVE COSTS

The table below illustrates the costs associated with each communication technology alternative, inclusive of the capital and operations and maintenance (O&M) annual costs. Different recurring O&M costs are associated with each particular technologies and deployment configuration. These costs include labor required to keep the system running and are associated with the number of maintenance personnel required, labor hours and training, as well as other recurring operational costs.

Table 7.1: Communication Alternative Comparison

Communication Alternative	Provide Required Bandwidth?	Cost Within Budget?	Capital Cost	O&M Annual Cost
Dedicated Fiber Optic Cabling	Yes	No	$5,600,000	$35,100
Wireless Radio	Yes	Yes	$2,058,000	$83,700
Leased Cellular	No	Yes	$853,600	$58,900
Dedicated Cellular LTE	Yes	Yes	$2,600,000*	$500,000*
Leased T1	No	Yes	$1,045,000	$82,700

*Cost reflects discount from cost-share with other County departments. The annual cost would be shared among multiple parties.

The following summarizes the annual operation and maintenance costs for each alternative.

Wide area network (WAN) equipment includes 117 ruggedized LAN switches. The total installed cost of the WAN equipment is $351,000. Annual O&M costs for the WAN equipment is assumed to be ten percent (10%) of the installed cost or $35,100. Ten percent (10%) of installed costs is an industry standard typically used by IT contractors and represents what an owner would expect to pay for extended warranty, preventative maintenance and software maintenance/upgrades per year.

For a dedicated fiber optic alternative, the capital costs would include WAN equipment in addition to fiber and conduit costs, but it is assumed that annual operations and maintenance costs associated with this are negligible.

Wireless Radio equipment includes: (108) Radios and antennas. The total installed cost of the radio equipment is $486,000. Annual O&M costs for the radio equipment is assumed to be 10% of the installed cost or $48,600. Ten percent (10%) of installed cost is an industry standard typically used by wireless contractors and represents what an owner would expect to pay for extended warranty, preventative maintenance per year. Wireless O&M costs will also include $35,100 for the WAN equipment.

Cellular and Leased Line T1 O&M costs include: monthly service fees ($23,800 – cellular, $47,600 – Leased Line) plus $35,100 for the WAN equipment.

Dedicated Cellular LTE equipment includes one (1) core equipment package, fifteen (15) base stations, one-hundred eight (108) modems and fifteen (15) point-to-point wireless microwave nodes. The total installed cost of the dedicated cellular LTE equipment is $8,650,000. Motorola suggests the annual operations and maintenance costs would be ten percent (10%) of the core equipment and five percent (5%) of the field equipment. Dedicated cellular O&M cost will also include $35,100 for the WAN equipment.

8.0 SUMMARY AND RECOMMENDATIONS

8.1 COMMUNICATIONS

Cellular (non-dedicated) and Leased Line alternatives involve leasing the backbone from a service provider. Leasing a backbone is the lowest initial capital cost option. Alternatives such as Dedicated Fiber, Wireless Point-to-Point and Dedicated Cellular LTE involve the stakeholders owning and maintaining the backbone. Owning a backbone has the highest initial capital cost, but greatest long-term benefit. Since the capital cost for options that result in owning the backbone are roughly within reach of the target budget, particularly using a phased approach, it is recommended that alternatives involving a leased backbone be eliminated from consideration.

In general, it is recommended that the Gateway Green Light stakeholders own and maintain a dedicated communications backbone. Installing and maintaining a dedicated backbone is the highest initial cost, but it would put Gateway Green Light stakeholders in a position of control since they would not be at the mercy of a service provider for service interruptions and cost increases. It is therefore recommended that Gateway Green Light leverage the opportunity of a County purchased LTE network which will provide nearly full coverage for low- to mid-bandwidth edge devices. This network will create a flexible and dedicated communications backbone. Combined with the considerable existing fiber network, Gateway Green Light can take advantage of existing infrastructure while also centralizing communications to numerous remote locations in the simplest and most cost-effective manner.

Given that the total cost of the LTE alternative represents over half of the total project budget, a phased approach should be used in order to implement ancillary improvements such as signal upgrades and deployment of new edge devices. A phased approach would establish communications to all existing unconnected controllers, upgrade a majority of controllers, and establish communications between MoDOT and St. Peters fiber systems. When additional capital funds become available, the remaining controllers would be upgraded and additional edge devices can be deployed. Phases for deployment can be determined as funding becomes available; however, it is anticipated that nearly all communication requirements for full build-out will be established with the initial project. Figure 8.1 (see last page in document) depicts the Phase 1 communications network that is recommended.

It should be noted that any fiber sharing for MoDOT tie-in locations as well as backhaul on dark fiber will require a memorandum of understanding and a "fair value" reimbursement for the use of the dark fiber will be required by MoDOT. This nominal value is estimated at $0.06/LF for every two stands of a 72 strand fiber and $0.11/LF for every two strands on a 24 strand fiber. These costs are documented in Table 8.1 below.

8.2 EDGE DEVICES

The desire for deployment of CCTV, DMS and other edge devices is largely viewed as a secondary priority to establishing communications, upgrading signal controllers, procuring ATMS software and deploying adaptive signal control on at least an initial corridor. Given the recommendation for a mostly fiber communications network and the high bandwidth that affords the project, deployment of CCTV in particular is a logical aspect of system expansion and in-fill. The scope of this feasibility study and limited availability of data precludes a detailed recommendation as to where this expansion might occur. However, the following parameters are offered given what is currently known and recommended for the Gateway Green Light ATMS.

CCTV Locations

CCTV deployments are generally anticipated to be limited depending on local jurisdiction appetite for monitoring and maintenance. Assuming full system coverage is not desired or warranted, CCTV locations are suggested to follow a basic prioritization as follows:

1. corridors or intersections where fiber optic access is available,
2. high incident locations,
3. intersections or corridors that are highly susceptible to variable traffic flow such as special events and/or incident detour routes,
4. high volume corridors or intersections (by order of daily and/or hourly volume), and
5. locations that might otherwise warrant CCTV monitoring, including video monitoring of an adaptive signal network or DMS location.

Additional parameters to consider when locating CCTV sites include availability of ROW, power, and line-of-sight, typically verified with a bucket truck to the anticipated elevation of the camera. Only a nominal quantity, if any, CCTV are anticipated in the initial phase of Gateway Green Light.

DMS Locations

Arterial DMS are likely to be a viable component of the long-term Gateway Green Light ATMS deployment. As previously mentioned, MoDOT currently has arterial DMS in St. Charles County. With low-bandwidth requirements, future locations of DMS will not be constrained to locations with fiber. However, because of the higher capital cost, ROW requirements, and potential roadside hazard that permanent DMS represent, a detailed placement study is recommended in order to properly plan for DMS from a system-wide approach. No DMS are anticipated in the initial phase of Gateway Green Light.

Mid-Block Detection

Mid-block detection is also a viable component of the long-term Gateway Green Light ATMS deployment. In addition to gathering basic speed, volume and occupancy data for stand-alone purposes, mid-block detection can be utilized for the collection and monitoring of arterial travel times along a corridor. Such data can be used to determine benefits from signal coordination plans in place in a particular corridor. Mid-block detection data can be used as an input for certain adaptive signal control systems, and recommendation of mid-block detection solutions should be made in conjunction and deployed with the selection of adaptive signal control systems in the study area.

8.3 PROCUREMENT

Various forms of procurement for the initial phases and project(s) required to implement the Gateway Green Light project have been considered and discussed. In addition, a logical bundling of project components that provides the highest likelihood of competitive bidding has been proposed. For the procurement itself, a design-bid-build format is recommended based on the technology being procured and the high level of existing data that has been gathered to date. While not every detail is currently known (e.g. detailed as-build fiber splice diagrams have not been collected or are not available), there is a high level of confidence that the proposed LTE and fiber architecture and availability of dark fiber is adequate to meet the project objectives. For this reason, a book-job (schematic) form of design is recommended. Using this format, some detailing and/or field verification will be procured as part of the successful contractor's responsibility.

In terms of bundling procurements in the most logical and orderly fashion, the following two procurements are recommended to encompass the initial $5M grant budget:

1. Phase 1, Procurement 1: Communications and signal upgrades (design-bid-build, book-job format)
2. Phase 1, Procurement 2: ATMS software and adaptive signal control (specification bid)

The second procurement should be timed so that the construction timeline of the communications network is well defined. Table 8.1 summarizes the rough procurement and deployment schedule for the Phase 1 portion of the system.

Table 8.1: Procurement and Deployment Schedule

Item	Month and Duration																		
	2012									2013									
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Procurement 1																			
Procurement 2																			
Communications																			
Signal Upgrades																			
Software																			
Initial Corridors On-line																			
Controller Programming																			
Optimized Signal Timing Implementation																			
Phase 1 Completion																			

8.4 COST SUMMARY

Table 8.2 (next page) summarizes the costs associated with the full deployment of the recommendations discussed in this Section. The various project components are separated so that individual costs can be reviewed. Table 8.3 (following page) details the first phase deployment (two procurements described above) given the $5M capital budget.

Table 8.2: Deployment Cost Summary

Item	Cost	Notes
Communications		
Fiber (full build-out)	$5,600,000	Includes signal upgrades
Cellular	$7,500 per site	To be installed in initial phases then removed as fiber network is expanded.
Fiber Sharing (MoDOT dark fiber – 72 Strand)	$0.06 per LF	Cost per 2-strands
Fiber Sharing (MoDOT dark fiber – 24 Strand)	$0.11 per LF	Cost per 2-strands
Signal Upgrades		
Controller Upgrade	$3,500 per controller	
Firmware Upgrade	$500 per controller	
ATMS Software	$1,000,000	Includes ancillary equipment and initial maintenance and support agreement.
CCTV	$30,000 per site	Quantity and locations to be determined in future phases.
DMS	$95,000 per site	Quantity and locations to be determined in future phases.
Mid-Block Detection	$20,000 per location	Initial phase to defer to Adaptive Location only
Adaptive Signal Control	$50,000 per intersection	Initial quantity to be determined based on budget constraints. Cost includes detection.
Emergency Vehicle Pre-Emption	$8,000 per intersection	

Table 8.3: Phase 1 Cost Summary

Item	Unit Cost	Quantity	Cost
LTE Lower Core Communications	$2,600,000	1 Lump Sum	$2,600,000
Fiber – Connections to Existing Systems	$30,000 per location	2	$60,000
Cellular Communications	$4,000 per site	75 Sites	$300,000
Backhaul Connections	$10,000	1 EA	$10,000
Fiber Sharing (24 Strand, MoDOT dark fiber)	$0.11 per LF	21,000 LF	$2,310
Signal Upgrades	$3,500 per controller	115 EA	$402,500
Firmware Upgrades	$500 per controller	115 EA	$57,500
ATMS Software and Maintenance Agreement	$650,000	1 Lump Sum	$650,000
Contractor OTDR Testing and Shop Drawings	$60,000	1 Lump Sum	$60,000
Professional Services – Data Collection, Planning, Design, Procurement and Signal Optimization	$550,000	1 Lump Sum	$550,000
Professional Services – Construction Phase	$300,000	1 Lump Sum	$300,000
TOTAL COST			**$5.0M**

Note: Cost estimateand quantities will be refined with preparation of the procurement documents.

Final locations for initial communications to be determined.

Figure 8.1: Proposed Phase 1 Communications Network

The CMAQ data.xls spreadsheet must be completed for all CMAQ projects.
Each project type is listed below:

Traffic Flow - ITS, Signal Interconnection, Signal Optimization, Flashing Yellow Arrows, Two-Way Turn Lanes, Channelization, Ramp metering, arterial management, diversion plans
Intersection - Roundabout, New Traffic Signal, Turn Lanes at intersection only
Transit Bus Replacement
Rideshare - Ridefinders Marketing, Transit Usage Education, etc.
Bike Ped - New Shared Use Path, Sidewalk improvements must be non-recreational
Park and Ride - New Park and Ride/Expanded Park and Ride

The project sponsor is required to input the data into the spreadsheet. Input data in the tab that best relates to your project. EWG staff will use the data to complete the emissions analysis. To assist with a quicker evaluation, please include the CMAQdata.xls spreadsheet as a separate file along with the electronic application and include it within the completed application.

If your proposed project does not meet the criteria of a project type listed above, you must contact EWG staff no later than Friday, February 28, 2014 for guidance.
This form is due along with project applications on Thursday, March 13, 2014 at 4 PM

Also:
Input project ID to match with application
Supporting documentation must be attached to project application (i.e. calculations for reduction in SOV, speeds, vehicle delay, etc.)
Sponsor should include bike/ped elements where applicable as part of roadway project

TRAFFIC FLOW

Project ID:	#268933 - Gateway Green Light Phase 3

Each segment should be one roadway affected by project. Most projects will have only one segment. However, projects with larger influence may include multiple segments. Contact EWG staff to clarify.

For traffic flow projects, vehicle mix assumed to be constant.

Describe Bike/Ped Elements:	

	Route	Limit 1	Limit 2
Segment 1	Rte K	I-64	I-70
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	38,200	41,153	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	6.55	6.55	
Average speed (mph)	29.22	32.03	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck
Use Peak Hour Volume for worst peak hour of day (weekday AM or PM)

	Route	Limit 1	Limit 2
Segment 2	Mid Rivers Mall Dr	Rte 94	I-70
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	31,700	34,150	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	4.75	4.75	
Average speed (mph)	24.53	26.63	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 3	Muegge Rd	Mexico Rd	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	22,100	23,808	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.25	3.25	
Average speed (mph)	20.97	23.30	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 4	Elm Street	Kingshighway	I-270
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	17,800	19,176	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	2.70	2.70	
Average speed (mph)	17.00	19.50	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 5	Bryan Rd	Mexico Rd	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	27,500	30,363	Assumes 2.0% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	4.39	4.39	
Average speed (mph)	23.86	25.93	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 6	Zuembehl Rd	I-70	Rte 94
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	19,275	20,765	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	1.55	1.55	
Average speed (mph)	18.04	20.39	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 7	Mexico Rd	Bryan Rd	Caves Springs Road
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	29,000	31,242	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	9.47	9.47	
Average speed (mph)	27.51	29.61	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 8	Rte 94	Rte D	West Clay
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	39,200	42,230	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	12.78	12.78	
Average speed (mph)	40.22	43.13	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 9	5th/S River/Arena	1st Capital	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	26,750	28,818	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	5.80	5.80	
Average speed (mph)	28.37	30.60	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 10	Wentzville Parkway	I-70 SOR	Rte 61 NBOR
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	18,300	20,205	Assumes 2.0% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	9.47	9.47	
Average speed (mph)	22.41	25.17	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 11	Jungermann Rd	Veterans Mem Dr	Old Rte 94
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	20,300	21,869	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.95	3.95	
Average speed (mph)	23.04	25.19	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 12	Spencer Rd	Rte 370	Willot
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	24,275	26,151	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.25	3.25	
Average speed (mph)	24.90	26.84	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 13	Salt Lick/Birdie Hills	I-70 SOR	Knaust Rd
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	19,730	21,255	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	2.70	2.70	
Average speed (mph)	22.12	24.90	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

TRAFFIC FLOW

Project ID:	#268933 - Gateway Green Light Phase 3

Each segment should be one roadway affected by project. Most projects will have only one segment. However, projects with larger influence may include multiple segments. Contact EWG staff to clarify.

For traffic flow projects, vehicle mix assumed to be constant.

Describe Bike/Ped Elements:	

	Route	Limit 1	Limit 2
Segment 1	Rte K	I-64	I-70
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	38,200	41,153	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	6.55	6.55	
Average speed (mph)	29.22	32.03	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck
Use Peak Hour Volume for worst peak hour of day (weekday AM or PM)

	Route	Limit 1	Limit 2
Segment 2	Mid Rivers Mall Dr	Rte 94	I-70
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	31,700	34,150	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	4.75	4.75	
Average speed (mph)	24.53	26.63	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 3	Muegge Rd	Mexico Rd	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	22,100	23,808	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.25	3.25	
Average speed (mph)	20.97	23.30	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 4	Elm Street	Kingshighway	I-270
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	17,800	19,176	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	2.70	2.70	
Average speed (mph)	17.00	19.50	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 5	Bryan Rd	Mexico Rd	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	27,500	30,363	Assumes 2.0% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	4.39	4.39	
Average speed (mph)	23.86	25.93	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 6	Zuembehl Rd	I-70	Rte 94
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	19,275	20,765	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	1.55	1.55	
Average speed (mph)	18.04	20.39	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 7	Mexico Rd	Bryan Rd	Caves Springs Road
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	29,000	31,242	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	9.47	9.47	
Average speed (mph)	27.51	29.61	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 8	Rte 94	Rte D	West Clay
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	39,200	42,230	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	12.78	12.78	
Average speed (mph)	40.22	43.13	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 9	5th/S River/Arena	1st Capital	Rte 364
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	26,750	28,818	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	5.80	5.80	
Average speed (mph)	28.37	30.60	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 10	Wentzville Parkway	I-70 SOR	Rte 61 NBOR
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	18,300	20,205	Assumes 2.0% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	9.47	9.47	
Average speed (mph)	22.41	25.17	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 11	Jungermann Rd	Veterans Mem Dr	Old Rte 94
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	20,300	21,869	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.95	3.95	
Average speed (mph)	23.04	25.19	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 12	Spencer Rd	Rte 370	Willot
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	24,275	26,151	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	3.25	3.25	
Average speed (mph)	24.90	26.84	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck

	Route	Limit 1	Limit 2
Segment 13	Salt Lick/Birdie Hills	I-70 SOR	Knaust Rd
Required Input Data / Assumptions	**Current**	**Future**	**Remarks**
ADT (veh/day), or	19,730	21,255	Assumes 1.5% Growth Rate for 5 Years
Peak Hour Volume (veh/hr)			
Section length (mi)	2.70	2.70	
Average speed (mph)	22.12	24.90	Avg Speed increase due to Coordination and ATMS management

Vehicle mix assumed to be 70% passenger car, 20% passenger truck, and 10% light commercial truck