Getting to MARC: Information on transportation options to the MARC offices, including directions, parking, transit, carpooling, and bicycling, can be found online. If driving, visitors and guests should enter the Rivergate Center parking lot from Broadway and park on the upper level of the garage. An entrance directly into the conference area is available from this level.

Parking: Free parking is available when visiting MARC. Visitors and guests should park on the upper level of the garage. To enter this level from Broadway, turn west into the Rivergate Center parking lot. Please use any of the available spaces on the upper level at the top of the ramp.

Special Accommodations: Please notify MARC at (816) 474-4240 at least 48 hours in advance if you require special accommodations to attend this meeting (i.e., qualified interpreter, large print, reader, hearing assistance). MARC programs are non-discriminatory as stated by Title VI of the Civil Rights Act of 1964. For more information or to obtain a Title VI Complaint Form, call 816-474-4240 or visit our webpage.

OGL STEERING COMMITTEE AGENDA
Monday, July 24, 1:30 PM
MARC - Board Room

Welcome & Introductions

1. Approval of April 24 Committee Minutes* (page 3)

2. Two Minute Agency Updates

3. ITS Regional Architecture Presentation
   • Work will begin soon that will involve the region in this effort

4. Incident / Diversion Signal Timing Update

5. OGL and Regional Traffic Signal Map Proposal (page 6)

6. Signal Phasing and Timing (SPaT) Challenge Presentation (page 7)

7. Automated Signal Performance Measures Update (page 9)
   • Video presentation and update from April 2016

8. Video Recording Proposal / Discussion (page 17)
   • Capabilities now exist for recording. Discuss merits of video recording.

9. Marketing and Communications Proposal (page 18)

10. STP 2017-2018 Federal and Local Funds and Agreements Update

11. 2017 CMAQ MO Construction Project Update

12. Quarterly Operations Update (page 22)

13. Quarterly Budget Report
Other Business

- Missouri's 2017 Highway Safety & Traffic Blueprint Conference September 27-29
- MoVITE Fall Meeting, October 4-6
- TSMO training July 27th, 12-1. See ITS Heartland

Next Regularly Scheduled Meetings: Monday, October 23, 2017, January 22, 2018

Adjournment

*Action Items
Welcome & Introductions
Meeting started at 1:30. Steve welcomed all and conducted introductions

1. Approval of January 23 Committee Minutes* (page 2)
   It was noted to correct that Griffin Smith was noted two times in the attendance list

2. Committee Action Items* (page 5)
The scope of this project is to add 35 CCTV’s and a fiber connection in KCMO as well as to add 5-6 signals in Grandview, and 5 signals in Blue Springs to the OGL Program. They are expected to be on board by early next year. A consultant will be hired with the current RFP to help prepare PS&E and provide construction inspection. The RFP for the project solicitation had 3 submittals, SRF, TREKK and TranSystems. Selection team chose TREKK. A question was asked if ATMS Software system’s engineering would be a part of this contract, and it was explained that it would be a separate solicitation. The committee voted to accept the choice of TREKK and to continue to execute a contract.

   OGL IT network support consultant selection -- RFP was closed at noon today. This current contract expires the end of May. The responses were from, Daryl Kelly LLC, PQC Tech. and gbaSI. Contract to be just under $25k for two years. Committee approval is not technically required but is an FYI for the committee. Ray suggested that if anyone on the committee would like to be a part of the selection process, let him know in the next few days. It was recommended from one of the committee members to consider strongly to stay with the current provider if things are going well due to the challenge of a new IT company having to ramp up to understand the OGL network.

3. Two Minute Agency Updates
MODOT announced the expansion of more of their signals being online with a project for construction later in the year. Derek also announced that Colbern road will be under construction for the greater part of the summer. Shawnee announced nine additional signals that have placed online but as a part of the Shawnee system and not a part of the OGL program. Overland Park reported that construction is under way on 435 which has caused heavier volumes on their arterials. Independence reported a CMAQ project that will replace their OGL controllers starting in 2019.

4. **Waze System and Contract Presentation – Overland Park**
Shawn Gotfredson provided a presentation of their work with Waze. Waze will sign a contract with any agency for free. Drivers can input crashes, construction delays and police actions. They can do so hands free. Agencies receive data into a dashboard that their agency can view. The city can also enter crashes which they spot and report to Waze. The reason an agency may want to partner with Waze is it offers yet another way to get agency information to users. OP can help you get started and discuss the agreement. Waze does control logos and press releases. OP suggested some future ideas might be to integrate the data into freeway and arterial systems and to have the ability to remove old crashes. Olathe noted they are in negotiations with Connected Signals and Garmin.

5. **Presentation – Signal Phasing and Timing (SPaT) Challenge** (page 6)
Ray provided a short presentation on the SPaT challenge [http://www.transportationops.org/spatchallenge](http://www.transportationops.org/spatchallenge). This program is asking DOT’s (or other agencies) to deploy 20 intersections by 2020. This work includes deployment of DSRC (dedicated short range communications) that provides data about the intersection to vehicles. Part of the reason for OGL discussion is due to this being relatively low hanging fruit in the push toward connected signals. Some signal controllers have this capability now and the technology is available to do this. There is cost to do this that may include new controller, DSRC devices and other work.

Ray suggested that OGL will come back to the July meeting with a proposal for deployment of a project in the Kansas City area.

In general, the OGL committee should begin to be more plugged into the connected vehicle efforts and discuss the pro and con of moving into this future technology.

6. **Strategic Plan update** (page 7)
The work on the strategic plan began in January after authorization was given for the new plan. Priority focus has been on determining what to advance and when to advance it. Technology planning is to include updates with network, security and servers. Q1 2018. Sub-item Central System Software Evaluation refers to the Systems engineering / system requirements RFP in the works to evaluate the regions needs. Planning work is on-going that includes better OGL program documentation that may include operations policies, TSM&O diversion planning and other elements. Marketing / Communications – MARC is working internally on marketing planning to better develop what elements of traffic signal work should be communicated to the public by MARC or by the agencies. Performance management is targeted for Q3 2017.

7. **Presentation on network security and system backup** (page 8)
Barry presented on OGL’s part in a MARC wide effort to create a disaster recovery plan. A one-page document on OGL was included in the meeting packet.

Security: Note NTCIP is not a secure protocol as controller’s operating systems are not secure. MARC is working to protect them with firewalls at each pod. Each wireless access unit is also configured to not allow “cross talk.” This minimizes damage that can be done to a small area if field cabinets were compromised. All wireless connections are encrypted. Tower/pod locations are physically secured. MODOT’s building is
now more secure at the front door as you have to be let into the building if you are not badge credentialed. All network equipment has admin passwords. MARC consultant has already tested vulnerabilities from the Internet. OGL recommends agencies use supplemental cabinet pad locks. Please inform OGL staff when users are leaving employment. Passwords used on the OGL system should be strong, unique and kept secret. OGL staff is also considering an RFP to hire a consultant to perform a security audit.

8. **TransSuite Demo of new features and advancements**
   Barry provided a brief demonstration of some of the latest features of TransSuite.
   - New version received Jan 18
   - ATMS Map now uses map data supplied by Open Street Maps
   - Sepac 4.57 firmware has had initial integration into TransSuite. Comments/problems with that integration were supplied to TransCore 2/2/2017 and we are waiting for their response.
   - Click to place call from within the Management UI now includes an optional termination time.
   - It is now possible to set a controller’s time to any arbitrary date/time for testing purposes.
   - New Split Failures Report can help identify movements that are not clearing traffic

9. **STP 2017-2018 Funds & 2017 CMAQ Funds and Program Agreement Status**
   As of two weeks ago MODOT’s agreement has been received. KDOT’s has been in place for several months. The Kansas inter-local agreement has been a challenge, but all have been received and it has been sent to the attorney general on April 14\textsuperscript{th} and we are currently waiting for a response. On the Missouri side, out of nine partners, eight are in various stages or progressing and one has no progress from the city.

10. **Quarterly Operations Update** (page 9)
    Chris reported that Raymore and Belton radios have been upgraded. New timing plans have been implemented on 87th street in Lenexa. City of Merriam has started a bridge reconstruction project at I-35 and SMP. Folded into this project is three new PTZ cameras that were installed at the start of the work and are part of Merriam’s camera network that OGL federates with. Chris reported that an upgrade to the Genetec software will shortly be available. There is the possibility that this will alleviate some of the issues that the software has been having. Preventive maintenance throughout the OGL network will begin in the next few months.

11. **Quarterly Budget Report** (page 21)
    Ray reported the budget report is revamped due to accounting providing more information but might be too detailed. Missouri and Kansas monthly reimbursement invoices for April are ready to be sent. Ray covered the details of the budget spreadsheet. This quarter completes the 2015-2016 federal funds and April will start the 2017-2018 expenses. Budget targets are at 50% with the start time of last April. Note that legal fees have exceeded the budget as Stinson was engaged to help with the interlocal agreement. Some additional funds will be spent in this category for the ongoing work on the interlocal agreement. Service agreements are over budget due to the Solarwinds invoice of $11,008 being charged to the service agreement category rather than computer software.

12. **Other Business**
    No other business was reported

**Next Regularly Scheduled Meetings:** Monday, July 24, October 23, 2017

**Adjournment 3:11 PM**

*Action Items*
Operation Green Light Signal System Map Proposal

New public-facing OGL Map(s)

OGL currently has its traffic signal locations on a PDF map on MARC’S website. The map provides good details of the locations showing a dot at an intersection and is well labelled. The map is capable of scaled to allow for moving between the areas and to be able to zoom to an area as well as the ability to print and stitch together it desired. Currently, while the map is only updated occasionally, it’s a tedious process as well as the fact there are better methods to display the data. It is also does not show any details of the intersection or what agencies owns the signal.

New MARC website OGL map

In a recent meeting with MARC GIS staff, a map that could provide advanced functionality as well as much more detail was discussed. Below are details to show what could be developed on the map. Below is some possible functionality.

- Audience = local agencies management, city council, anyone who works with us and has trouble remembering where OGL is, possibly public.
- Info to include for each signal (click on it)
  - Main Street/Cross Street
  - Maintaining Agency
  - Contact info to report a problem
  - OGL yes/no
  - Detection (yes/no/some)
- Info to include for each corridor (click on it)?
  - Name of corridor?
- User should be able to filter signals displayed
  - Select agency(ies) to be visible.
  - Filter by OGL/non-OGL/both.
- Will we have info on non-OGL signals?
  - Will need info from agencies preferable in a GIS compatible format.
  - How to keep up to date ongoing basis may be more difficult.
  - With non-OGL signals we won’t necessarily be aware of added/removed signals.
**The Challenge:**
Equip at least one corridor (roughly 20 signalized intersections) in each of the 50 states with Dedicated Short Range Communications (DSRC) infrastructure to broadcast SPaT information by January 2020, and maintain operations for at least 10 years.

**What is SPaT:**
A Signal Phase and Timing (SPaT) message defines the current intersection signal light phases. The current state of all lanes at the intersection are provided, as well as any active pre-emption or priority.

**Why This Challenge/Goal is Needed:**
- To provide State and Local DOTs with an entry into DSRC based V2I Deployment (allow them to gain valuable procurement, licensing, installation, and operation experience)
- To promote future (more advanced) V2I deployments
- To show a commitment to automobile manufacturers and applications developers

"Fortunately, there is one fairly basic connected vehicle element which is relatively simple to deploy and fundamental to a number of applications, the “signal phase and timing” (SPaT) message. SPaT defines the actions of a traffic signal. It is obtained from a traffic signal controller via a standard query protocol and is broadcast by most DSRC roadside devices as a standardized data message."

- Blaine Leonard, Utah DOT ITS Program Manager

**Deployment Tools Will Be Available**
The following tools will be developed:
- Guidelines for selecting corridors
- Procurement guidance
- DSRC licensing information
- Installation guidance
- Estimated costs
- Identification of existing funding sources that agencies may consider

**Success in meeting the Challenge will be Measured**
The V2I Deployment Coalition will work with the National Operations Center of Excellence (NOCoE) to maintain a website to track progress using a national map to depict locations where:
- There is a commitment to deploy; and
- DSRC SPaT broadcast is operational.

**How to get involved?**
The Connected Vehicle SPaT Deployment Challenge is being led by the V2I Deployment Coalition TWG 1 and the AASHTO CAV WG. Information is available at: http://www.transportationops.org. Infrastructure Owners & Operators wishing to join the challenge, or others wishing to participate in the effort, may contact: Dean Deeter (AASHTO support liaison to both groups) at deeter@acconsultants.org
**Operation Green Light SPaT Challenge Proposal**

Following the April OGL steering Committee meeting, MARC staff were asked to pursue investigation of a proposed corridor. There are a number of corridors in the region that would be good candidate, but one corridor was analyzed.

This challenge is for state and local public sector transportation infrastructure owners & operators (IO&Os) to deploy DSRC infrastructure with SPaT broadcasts in at least one coordinated corridor or network (approximately 20 signalized intersections) in each state by January 2020. Handouts were provided with details of the program and MARC has collected substantial information on the program.

This work is considered the low hanging fruit of the connect vehicle ie V2I deployments. Signal data is often already available and only needs to be broadcast by a dedicated short range communication devices (DSCR 5.9Ghz) at the intersections.

While there may be several corridors that would be good candidates, the OGL team selected the corridor on SW Trafficway and Shawnee Mission Parkway that runs from 27th Street in KCMO to Mission in Fairway and has 24 intersection. If would go through the cities of KCMO, Westwood and Fairway.

![Southwest Trafficway Corridor Map](image)

This corridor has ASC/3 and ASC/2 controllers. The ASC/2 would require upgrades to a capable controller. Controller upgrades would total $27,000. Also each intersection would require the installation of a DSCR device estimate at $5000 for a total of $120,000. Other costs could include consultant and/or contractor resources if needed. Two cabinets at Rainbow and Mission are small format cabinets and may not allow for additional equipment or will require a second cabinet.

MARC could pursue a project for the region using a combination of federal and local funds or local funds only. The procurement and construction of the project has not been fully investigated.

Conclusion: should the region wish further pursuit, other corridors, etc. MARC could lead an effort for further investigation.
Automated Traffic Signal Performance Measures (ATSPMs)

Source: FHWA EDC

ATSPMs modernize traffic signal management by providing high-resolution data to support objectives and performance-based maintenance and operations strategies that improve safety and efficiency while cutting congestion and cost.

There are more than 330,000 traffic signals operating in the United States, and highway agencies typically retime these signals on a three- to five-year cycle at a cost of approximately $4,500 per intersection. For the vast majority of these signals, citizen complaints are the primary measure of performance. Not having performance data drives retiming costs up by requiring software modeling to simulate performance, along with detailed, manually collected traffic data.

When agency professionals and consultants conduct retiming projects, they perform an ad hoc comparison of limited before and after travel-time data to demonstrate the effectiveness of optimization efforts. Typically, no ongoing performance measurement capability exists, and agencies rely on citizen complaints to reactively detect maintenance or operational deficiencies. This lack of active performance management compromises safety and efficiency and contributes to congestion. It also institutionalizes public dissatisfaction with the operation and maintenance of signalized intersections.

Why use ATSPMs?

The Federal Highway Administration (FHWA) is promoting automated traffic signal performance measures (ATSPMs) in the fourth round of Every Day Counts (EDC-4) as a means to improve on these traditional retiming processes by providing continuous performance monitoring capability. Signal retiming efforts can be based directly on actual performance without dependence on software modeling or expensive, manually collected data.

ATSPMs consist of a high-resolution data-logging capability added to existing traffic signal infrastructure and data analysis techniques. This provides agency professionals with the information needed to proactively identify and correct deficiencies. They can then manage traffic signal maintenance and operations in support of an agency’s safety, livability and mobility goals.

The technology is cost effective, as ATSPMs can be applied to a wide range of signalized intersections and use existing infrastructure to the greatest extent possible. ATSPMs will also support the validation of other technologies and operational strategies, such as adaptive signal control and emerging connected vehicle applications.

Benefits

- Increased Safety. A shift to proactive operations and maintenance practices can improve safety by reducing the traffic congestion that results from poor and outdated signal timing.
• Targeted Maintenance. ATSPMs provide the actionable information needed to deliver high-quality service to customers, with significant cost savings to agencies.
• Improved Operations. Active monitoring of signalized intersection performance lets agencies address problems before they become complaints.

State of the Practice

This technology is the outcome of a collaboration among FHWA, the American Association of State Highway and Transportation Officials (AASHTO), state departments of transportation (DOTs) and academic research efforts. Most recently, a Transportation Pooled Fund study, “Traffic Signal Systems Operations and Management,” led by the Indiana DOT with participation from the FHWA, 11 state DOTs, and the City of Chicago, produced an open source software option that provides a framework for continued innovation in data analysis techniques.

The collaborative development of ATSPMs has produced a number of implementation options to fit a range of agency capabilities and resources. Approximately 26 transportation agencies at both state and local levels are currently involved in implementing ATSPMs. The AASHTO Innovation Initiative led by the Utah DOT has resulted in early implementation of the technology in 12 states and a community of peers ready to share implementation experience.

Webinars/Videos

Innovation Spotlight

https://www.youtube.com/watch?v=iFNvw_ZdVyk
Automated Signal Performance Measures – 7/7/2017

On January 26-27, 2016 in Salt Lake City Utah, approximately 170 Traffic signal professionals gathered to learn about the efforts of the Pooled Fund Study (TPF-5(258)) that included Indiana DOT and Purdue University for High Resolution Traffic Signal controller data and UDOT’s work to develop and provide source code for software to acquire and utilize the data.

What is it:

- Automated Data collection 24/7
  - Controller collecting High-resolution (1/10th sec) event data as specified by Purdue event definitions, ideally with good advance detection lane-by-lane. Software (currently custom) collects the data into a DB.
  - Probe data (Inrix)
  - Speed data (Wavetronix advance proprietary data collection)

- Various automated performance measure reports generated using the stored data

Utah DOT has developed and expanded many of these reports and has made them available to view through their website [http://udottraffic.utah.gov/signalperformancemetrics/](http://udottraffic.utah.gov/signalperformancemetrics/) They have also made the custom back-end software they developed available to anyone to download and install and use free of charge. The software being custom however, they are not able to be IT support staff for all other agencies around the country who want to build similar systems.

This work has been in conjunction with work from Purdue University and the Pooled Fund study to develop the controller’s ability to generate this data. Currently 4-5 controller manufactures support this functionality with the trend to have this be part of most vendor’s controllers.
## Portfolio of Performance Measures:

<table>
<thead>
<tr>
<th>MOE</th>
<th>Usage</th>
<th>Documented in Monograph</th>
<th>Journal Papers (DOI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle Length</td>
<td>Verify consistent controller programming along corridor, and quickly evaluate performance of fully-actuated signals</td>
<td>✓</td>
<td>10.3141/2128-05</td>
</tr>
<tr>
<td>Green Time and Capacity</td>
<td>Verify controller behavior</td>
<td>✓</td>
<td>10.3141/2036-11</td>
</tr>
<tr>
<td>Count and Volume</td>
<td>Characterize vehicle demand by movement</td>
<td>✓</td>
<td>10.3141/2036-11</td>
</tr>
<tr>
<td>Volume-to-Capacity Ratio</td>
<td>Evaluate utilization of provided capacity</td>
<td>✓</td>
<td>10.3141/2036-11</td>
</tr>
<tr>
<td>Degree of Intersection Saturation</td>
<td>Evaluate overall intersection utilization</td>
<td>✓</td>
<td>10.3141/2128-05</td>
</tr>
<tr>
<td>Percent on Green, Arrival Type</td>
<td>Evaluate progression performance</td>
<td>✓</td>
<td>10.3141/2036-11</td>
</tr>
<tr>
<td>Purdue Coordination Diagram</td>
<td>Visualize progression performance over a variety of time-scales</td>
<td>✓</td>
<td>10.3141/2192-04, 10.3141/2259-06</td>
</tr>
<tr>
<td>Platoon / Flow Profile</td>
<td>Visualize progression performance for a given time period where a consistent cycle length occurs</td>
<td>✓</td>
<td>10.3141/2259-02</td>
</tr>
<tr>
<td>Estimated Queue Length</td>
<td>Estimate lengths of queues at intersections</td>
<td>✓</td>
<td>10.1016/j.trc.2009.02.003</td>
</tr>
<tr>
<td>Oversaturation Severity Index</td>
<td>Evaluate spatial and temporal characteristics of oversaturation in the street network</td>
<td></td>
<td>10.1016/j.trc.2010.01.003</td>
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<tr>
<td>Input-Output Delay</td>
<td>Estimate delay experienced by vehicles on movements where advance detection exists</td>
<td>✓</td>
<td>10.3141/2036-08</td>
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<tr>
<td>Maximum Vehicle Delay</td>
<td>Estimate delay experienced by vehicles on movements where stop bar detection exists</td>
<td></td>
<td>TRB Paper # 15-0385</td>
</tr>
<tr>
<td>Estimated Vehicle HCM Delay</td>
<td>Estimate delay experienced by vehicles based on HCM methodology</td>
<td>✓</td>
<td>10.3141/2259-03</td>
</tr>
<tr>
<td>Phase Termination Diagram</td>
<td>Visualize utilization of actuated phases</td>
<td>✓</td>
<td>10.3141/2355-03</td>
</tr>
<tr>
<td>Green Occupancy Ratio and Red Occupancy Ratio (GOR/OROR)</td>
<td>Estimate occurrence split failures where stop bar detection exists</td>
<td>✓</td>
<td>10.3141/2439-03</td>
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<tr>
<td>Platoon Characteristics</td>
<td>Estimate Robertson model parameters for vehicle platoons</td>
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<td>10.3141/2311-02</td>
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<tr>
<td>Coordination Optimization Potential</td>
<td>Estimate potential gains from adjusting signal timing for progression</td>
<td></td>
<td>(Unpublished)</td>
</tr>
<tr>
<td>Pedestrian Actuation Rate</td>
<td>Estimate utilization of intersection by pedestrians</td>
<td>✓</td>
<td>TRB Paper # 11-0220</td>
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<tr>
<td>Pedestrian Actuation to Service Time</td>
<td>Estimate delay experienced by pedestrians</td>
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</tr>
<tr>
<td>Estimated Pedestrian HCM delay</td>
<td>Estimate delay experienced by pedestrians based on HCM methodology</td>
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<td>10.3141/2080-05</td>
</tr>
<tr>
<td>Pedestrian Conflicting Volume</td>
<td>Help determine effectiveness of pedestrian treatments</td>
<td>✓</td>
<td>10.3141/2080-05</td>
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<td>Preempt Duration</td>
<td>Estimate amount of time that intersection is running limited service during preemption</td>
<td>✓</td>
<td>10.3141/2128-03</td>
</tr>
<tr>
<td>Preemption Event Diagram</td>
<td>Validate preemption operation</td>
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<td>10.3141/2128-03</td>
</tr>
<tr>
<td>Priority Time to Green</td>
<td>Characterize effectiveness of transit signal priority (or other forms of priority based control)</td>
<td>✓</td>
<td>(Monograph only)</td>
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<td>Controller Ping Response</td>
<td>Maintain communication systems</td>
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<td>10.3141/2355-03</td>
</tr>
<tr>
<td>Data Completeness</td>
<td>Maintain communication systems</td>
<td>✓</td>
<td>10.3141/2355-03</td>
</tr>
<tr>
<td>Detector Failure Heat Map</td>
<td>Maintain detection systems</td>
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<td>Unpublished</td>
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<tr>
<td>Corridor Travel Time</td>
<td>Evaluate performance of a corridor signal system</td>
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<td>10.3141/2192-04</td>
</tr>
<tr>
<td>Segment Speed</td>
<td>Evaluate performance of a corridor signal system</td>
<td></td>
<td>Unpublished</td>
</tr>
</tbody>
</table>
Examples:

- Purdue Coordination Diagram. Uses controller high-res data with advance detection to evaluate coordination performance on a specific phase.

![Purdue Coordination Diagram](image)

Cycle time is on the Y axis, time of day is on the X axis. Green line is the beginning of green for a certain phase, red line is the end of green. Black dots are detector actuations (cars arriving on the movement). Black dots between the green and red lines are good (vehicles arriving on green) black dots below the green are vehicles arriving on red. Can then be quantified to % arrival on green performance measure.

- Cumulative Frequency Diagram. Uses Probe travel time data. We may be able to do this from HERE data.

![Cumulative Frequency Diagram](image)

Here Red is before, Green is after some change, or just two different time periods. Curve moving to the left is lower travel time and lower delay. This would typically be for one time of day/direction. Steeper curve is better TT reliability.

- Phase Termination Diagram. Uses only high-res data from controller, no advance detection needed. Monitors health of an actuated phase:

- ROR<sub>5</sub> vs GOR plot. Red Occupancy Ratio (for the first 5 seconds of red after a green) vs Green Occupancy Ratio. Measures the health of an actuated phase. TransSuite should be able to build these charts with 1/sec data we have now with sufficient accuracy to be useful.

**Phase 8 ROR<sub>5</sub> vs. GOR**

One point per cycle. Top line ROR 100% means over capacity, latent demand. Bottom line 0% means under capacity, phase is clearing, completely, no vehicles for 5 seconds after red starts. Right line 100% means green is fully utilized by vehicles. Left line 0% means wasted green time with no vehicles present.

**Thoughts for OGL**

Pros:
1. Automated, 24/7 recording of data/performance. Way more data than our current travel time run method which is also very labor-intensive.
2. Objective (once configured properly)
3. Could be used to tell us where timing has "deteriorated" and work is needed as it can tell us whether intersections service of vehicles has gotten better or worse.
4. State of the art for traffic signal performance measures
Cons:

1. Requires many controller upgrades (KCMO, OP, and Olathe almost have all ASC/3’s already so not for them)
2. Most valuable measures require advance detection lane-by-lane, which most signals on OGL system do not have outside of OP and Olathe and many cabinets will not even support this (NEMA Need TS-2 detection?)
3. Data cannot provide total network travel time or fuel impacts which are needed to quantify and monetize benefits of timing work.

Horizon:

Controller and Central system manufacturers will be building this into their systems. TransCore has acquired Utah's source code and built an installer for it that can ease installation and will integrate to some level with the TransSuite software. It is unclear to MARC staff how smooth this would be to pursue.

Currently ~354 out of 700 OGL intersections are ASC/3s, which support the High Definition data collection, but some might need firmware upgrades to do so. Several agencies also have many other non-OGL intersections with ASC/3s which are also on network.

Some of the performance measures that do NOT require the advance detection, we can already get with TransSuite's split log data, albeit not easily or in a pretty graphic.

One opportunity for implementing these performance measures, after the central software is in place, would be to install advance radar detection at all intersections along a corridor or route. This could be done in concert with our current efforts on Incident Management Diversion Routes, or along corridors that we might implement Traffic Responsive/Adaptive technologies. This addition would allow us to get automated counts, approach speeds, Purdue Coord diagrams and Percent Arrival on Green measures for the corridor as a whole. Purchasing Inrix data for the corridor would also be valuable but probably we would buy the entire region, not just a couple corridors.
Summary of types of Performance measures (from UDOT workshop)

References to this material:

1. Link to Posters and Presentations posted on web site
   http://docs.lib.purdue.edu/atspmw/2016/

2. Link to Flickr Album
   https://flic.kr/s/aHsktzacWH

3. Link to UDOT SPM Website:
   http://udottraffic.utah.gov/signalperformancemetrics/

4. Link to Nevada SPM Website:
   http://challenger.nvfast.org/spm/

5. Link to Seminole County Florida SPM Website:
   http://spm.seminolecountyfl.gov/signalperformancemetrics/


http://docs.lib.purdue.edu/jtrpaffdocs/3/


http://docs.lib.purdue.edu/jtrpaffdocs/24/
OVERVIEW

Since 2008 OGL has utilized the Genetec video monitoring software. Since that time over the span of many projects, the system has grown from only viewing KC Scout cameras to hosting over 100 cameras in 11 jurisdictions. The system also allows to connect with other Genetec systems in the region and share video images. The OGL system is currently connected to 8 other systems. They are: KC Scout, Overland Park, Lenexa, Shawnee, KCK, NKC, KCMO, and Merriam. Most recently using STP funds, 66 cameras were installed in 2015 with another 35 locations planned in 2018 using CMAQ funds. In 2010, the AARA project installed 56 CCTV’s. OGL staff has found it very beneficial using these cameras to monitor traffic across the region, identify detection issues and respond to incidents on the freeways and arterials. OGL staff has also been able to go back and look at recorded video on other systems when responding to a citizen inquiry or traffic signal malfunction that has been observed by staff, notified by the public or alerted from TransSuite.

DISCUSSION POINTS

- Policies and Procedures
  - Which cameras to record
  - Retention period – 3, 7, 15, 30 days, etc. Different times for different agencies? MO vs KS?
  - Video Requests
  - Cameras repairs/cleanings
  - Network uptime/outages

- Video Quality
  - # of cameras
  - Minimum requirements – Frame rate, resolution, etc.

- Hardware
  - May need more RAM or processors for server

- Software
  - No additional licenses needed

OUR PROPOSAL

OGL staff to begin discussing with agencies to get permission to record CCTV images to the OGL system. OGL will develop policies and procedures to guide the use, transmission, and dissemination of these images in conjunction with the owning agencies.

COST

The cost of implementing recording on the OGL Genetec Security Center system would be relatively low as minimal new server hardware or software would be needed. The only anticipated costs would be for disk storage space for the recorded images. We are anticipating that this would be less than $3000. This does not take into account any staff time in the future for video requests or any other IT related time.
I. Why Develop a Communications Plan?
   a. The Operation Green Light (OGL) program provides systems and services for the region’s traffic signal system, benefitting individual partner agencies and the region as a whole. The benefits of the program are typically only apparent to trained individuals who actively monitor and maintain the system.

   b. MARC and member agencies are proud of the OGL program. Relaying that pride in the program through communications with elected officials and the public has not been regular or structured.

   c. Stakeholders for the OGL program are a diverse group, representing industry professionals, local government staff, elected officials, regional and state leaders, and the public. Education about the program and communication with these various stakeholder groups will look different depending on each group’s needs.

   d. Communication of the program’s benefits to partner agency decision-makers is important because the program’s continued existence is contingent on the support of the program by participating agencies.

II. Purpose
   a. Developing a communications plan will assist OGL staff in making focused efforts to communicate program benefits and successes to identified stakeholders.

III. Communication Challenges
   a. OGL has limited resources, both personnel time and financial, to devote to program communications. Those limited resources must serve a large stakeholder group with diverse needs.

   b. OGL is a program based on leading industry technologies and systems that to the traveling public are often invisible. Communicating with stakeholder groups who may not be as familiar with the industry can be a challenge for those who work daily in the field. The communications plan implementation may be enhanced by utilizing the skills of personnel more familiar with marketing and outreach, such as MARC communications staff.

IV. Identified Stakeholders
   a. Stakeholders for the OGL program include:

   - Public
   - MARC agency
     - MARC management
     - OGL personnel
   - Partner agencies
OGL Steering Committee
- Public works staff
- Agency management
- Agency governance

b. Each stakeholder group has a unique set of needs in regards to how they interact with OGL and how information to the group is best dispersed.

V. Key Messages
a. The OGL program encompasses the Kansas City metropolitan region, with benefits crossing jurisdictional boundaries. Key messages should be framed to appeal to all stakeholders, although the detail of the message and delivery may vary depending on the audience. Supplemental messages may also be developed to provide each partner agency specific information about the direct benefits to their jurisdiction.

- Improve/maintain safety and mobility across jurisdictional boundaries
  - Cross-jurisdictional partnerships
  - Signal coordination
  - Congestion reduction
  - Use of innovative technologies within the region
- Environmental benefits
  - Air quality – emissions reductions
  - Fuel savings
- Cost savings through program efficiency
  - Travel time reduction – time savings
  - Fuel savings – reduced fuel costs

VI. Delivery Methods
a. Several methods to deliver key messages to stakeholders have been identified. How each stakeholder group is communicated with will be dependent on the needs of the stakeholder and the message content being delivered. Representatives from individual stakeholder groups will be interviewed to determine the preferred method of communication as well as information they are most interested in receiving. Methods to maximize efforts by grouping communications and relying on other MARC communications efforts will be incorporated to minimize the time required by OGL and MARC staff.

- Print
  - Reports
    - Quarterly reports presented at Steering Committee meetings
      - Update quarterly report with quick-read dashboard
      - Retain ease of production for OGL staff
  - Brochures
    - Evaluate if brochure is a useful tool
      - If yes, update brochure with current program details

Page 19 of 34
- Snapshot pages
  - Standard verbiage for agency use in program correspondence
- MARC publications
  - MARC annual report
- Verbal
  - In-person meetings
    - Meetings with agency contact once per year
  - Council/meeting presentations
    - OGL staff presence at council/agency meetings as requested
- TV
- Radio
- Videos
  - Travel time video (currently on website)
- Electronic
  - Website
    - Update website with current information
      - Interactive system map
      - Quick program highlights/messages
  - Social Media
    - Facebook
    - Twitter
    - Blogs
      - MARC – Transportation Matters
      - Environmental Program?
  - MARC E-Newsletter
    - Management Matters
    - Agency newsletters/communications?
  - Electronic program description
    - Standard verbiage for agency use in program correspondence

VII. Communications Schedule and Responsibilities

a. Once communications media and stakeholders are identified, efforts will be incorporated into an overall schedule. The schedule will include regular recurring communications as well as identified one-time efforts. The schedule will incorporate a responsibility matrix for the content and dissemination of each communication element.
OGL Communications Plan - Development of Key Messages

Message #1

OGL improves and maintains mobility across jurisdictional boundaries.

Public Benefit: Reduced travel time, improved travel speed, fuel savings, reduced congestion

Economics: Use of innovative technologies, cross-jurisdictional partnerships, share resources and talents

Environment: Reduce fuel usage, reduce vehicle emissions

Message #2

OGL partnerships can improve driver experience.

Time: Improve travel speed, reduce travel time, reduce congestion

Financial: Fuel savings, jurisdictions share resources

Experience: Move traffic more efficiently, less stop and go (interruption across jurisdictional boundaries)

***Additional: Develop messages to educate on OGL program – lack of knowledge/understanding by public/non-traffic agency leadership on program/activities/benefits of OGL.

Message opportunities: MARC/Agency newsletters (internal and external), Tweets, Facebook, YouTube (video segments), MARC/Agency websites

Sample messages:


Agency(ies) tweet (sample): KC and OGL re-timed State Line Rd, improved travel time by -%.

Articles: Short one-paragraph blurbs focusing on OGL program, specific corridor improvements or results of re-timing (emission reductions, reduced travel time, fuel savings, etc.). May also be an opportunity for basic signal operations education.

Video: Can make videos illustrating improvements due to signal re-timing of corridors.

Website: Utilize OGL/MARC website for current updates on project progress, initiatives, new technologies, etc.
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Introduction

Operation Green Light (OGL) is a bi-state regional effort to improve traffic flow and reduce vehicle emissions. Managed by the Mid-America Regional Council (MARC), Operation Green Light works with federal, state and local agencies to operate a system that coordinates traffic signal timing and communication between intersections across jurisdictional boundaries.

This report details the work performed on the Operation Green Light communications network during the 2nd Quarter (April, May, and June) of 2017 and highlights of signal timing and agency coordination. OGL currently monitors/operates 699 signals and manages over 1200 network devices. These devices include intersection controllers, wireless radios, switches, cameras, routers, serial-to-IP converters and servers. For more information on the program, visit http://www.marc.org/Transportation/Commuting.

Operations Summary

A summary of the operational results and activities of the OGL program staff during the reporting period is presented below.

Repair tickets

- OGL staff actively responded to 16 repair tickets, representing about a 24% decrease compared to last quarter.

Corridor Timing Efforts

- 5/17 – Holiday schedules for major US holidays were implemented on select corridors
- 5/23 – New timing plans were implemented on Little Blue Pkwy in Independence, MO
- 6/24 – Weekend plans were updated on US-40 by M291
- Various construction updates and new AM plan on Colbern Rd in April and May
- Various changes to timing plans at Shawnee Mission Pkwy & I-35 and vicinity for roadwork lane closures

Training Sessions/Panels/Events

- April – Ray Webb completed Connected Vehicles 101 course offered by CITE
- 4/4 – Barry Viss conducted TransSuite training
- 5/1 – Chris Jenkins and Barry Viss attended Radwin Training in Merriam, KS
- 5/4 – OGL staff attended webinar for Using Performance Measures to Justify Signal Systems on Arterials
- 5/24 – Scott Cutshall and Chris Jenkins attended Intelight controller training held at MoDOT district office
- 6/15 – OGL staff attended webinar Are Your Traffic Signals Ready for Automated Traffic Signal Performance Measures?
- 6/22 – OGL staff attended webinar Overview of TSMO – Laying a Foundation

Additional Information

- OGL staff set up and scheduled the Miovision equipment to conduct 25 counts. Most of these were 13-hour turning movement counts and the remaining were 24-hour ADT counts.
Notes on Operations Summary

1. Repair ticket levels used by OGL staff are defined in Exhibit I Scope of Services as follows:
   - Minor – investigate and resolve communication problem within 5 business days, weather permitting
   - Major – investigate and resolve communication problem within 2 business days, weather permitting
   - Critical – investigate and resolve communication problem within 24 hours, weather permitting

System Hardware/Software Activities/Issues

The following list represents major software or hardware activities performed during the 2nd Quarter of 2017:

- 4/25 – OGL’s Genetec Security Center system was upgraded to version 5.5
- 6/6 – Ceragon radio links were upgraded between Pod7 Bennington and Pod8 Sheraton
- 6/8 – Ceragon radio links were upgraded between Pod5 KCMO City Hall and Pod6 Barry Rd
- 6/27 – OGL TransSuite system was upgraded to version 17.3.1
- Pod7A Raymore water tower repainting was completed and all equipment at the tower and surrounding signals was upgraded to the new Radwin radios.
**Interagency Coordination**

During the 2nd Quarter, OGL staff participated in the following interagency activities:

- 4/3, 4/6, 4/10, 4/13, 4/17, 4/20, 4/24, 4/27 – Barry Viss worked from the KCMO operations center
- 4/3 – OGL staff met with GBA to discuss K7 & Speaker signal configuration
- 4/5 – Ray Webb and Barry Viss attended the IMRCP Stakeholders webinar
- 4/6 – OGL staff met with Olsson staff in reviewing/updating of OGL strategic plan
- 4/6 – OGL staff met with KDOT and GBA staff about K7 & Speaker signal configuration
- 4/11 – Ray Webb presented at the MO STP Priorities Committee meeting
- 4/13 – OGL and KCMO staff met to discuss RFP responses for CMAQ CCTV project
- 4/14 – OGL staff attended webinar on The SPaT Challenge
- 4/19 – Ray Webb attended meeting at MARC regarding Technology and Autonomous Vehicle

**Strategy Coordination**

- 4/20 – OGL staff participated in monthly OGL Regional TransSuite Status meeting
- 4/24 – OGL staff participated in the OGL Steering Committee Meeting
- 4/27 – Ray Webb attended TSMO Program Plan Development Roundtable meeting
- 5/1, 5/4, 5/8, 5/11, 5/15, 5/18, 5/22, 5/25 – Barry Viss worked from the KCMO operations center
- 5/5 – Ray Webb attended a 435 Design build/TSMO meeting at MoDOT district office
- 5/8 – Barry Viss met with KCMO staff to discuss current projects
- 5/10 – OGL staff met with Olsson, MoDOT, & KCMO staffs to discuss OGL Diversion Planning for I-70/US40/I-435
- 5/10 – OGL staff met with Independence and MoDOT staff to review signal timings for Little Blue Pkwy & US40
- 5/12 – OGL staff met with MoDOT staff to discuss I-470 closing in Lees Summit for bridge demolition
- 5/18 – OGL staff participated in monthly OGL Regional TransSuite Status meeting
- 5/25 – Ray Webb attended a TSM&O Planning meeting at MARC
- 5/31 – OGL and Olsson staff held Bi-Weekly conference call for timing status updates
- 6/1, 6/5, 6/8, 6/12, 6/15, 6/19, 6/22, 6/26, 6/29 – Barry Viss worked from the KCMO operations center
- 6/2 – Barry Viss met with KC Scout staff to discuss coordination and safety enhancements on US-71
- 6/13 – Chris Jenkins met with Lees Summit staff to discuss TransSuite integration
- 6/14, 6/28 – OGL and Olsson staff held Bi-Weekly conference call for timing status updates
- 6/15 – OGL staff participated in monthly OGL Regional TransSuite Status meeting
- 6/20 – OGL staff met with MoDOT and the new State Highway Safety and Traffic Engineer
- 6/22 – Barry Viss met with KCMO staff regarding Main St TSP
- 6/29 – Chris Jenkins met with MoDOT staff to discuss TransSuite integration
Quarterly Repair Ticket Statistics by Month

In the 2nd Quarter of 2017, OGL staff created and responded to 16 repair tickets in the Kansas City area. This number represents a decrease of about 58% compared to the 2nd Quarter of 2016 and a 24% increase compared to the 1st Quarter of 2017. All repair tickets are shown by month in Figure 1.

Figure 1 – Quarterly Repair Ticket Statistics by Month

Additional Repair Ticket Details:

Figure 2 – Monthly Repair Ticket Statistics / Prior 15 months

Figure 2 shows the number of repair tickets that OGL staff responded to for the last 15 months. It is intended to show long-term trends in incidents that are occurring on the OGL network.
Additional Statistics

OGL Network Pod Diagram

Figure 3 shows the overall design of the OGL Network and Pod Locations. It is noted that the different color of lines between the Pods are representing the different type of network connections. A black line represents a FCC licensed link, an orange line represents a fiber optic connection, and a light blue line represents an unlicensed radio link. The OGL network now has 2 wireless rings as seen in the diagram.

Figure 3 – OGL Network Pod Diagram
Repair Tickets by Network Pod

OGL staff is continually working on improving the reliability of the OGL network. Therefore, staff monitors and tracks which network pods continually have incidents. Figure 4 shows the number of repair tickets for each Pod and Figure 5 shows the number of repair tickets year-to-date for each Pod.

Figure 4 – Repair Tickets by Network Pod

![Figure 4 – Repair Tickets by Network Pod]

Figure 5 – Repair Tickets by Network Pod / Year – to – date

![Figure 5 – Repair Tickets by Network Pod / Year – to – date]
**Repair Tickets by Equipment Type**

**Figure 6 – Repair Tickets by Equipment Type**

Figure 6 shows the number and percentage of incidents that occur for each equipment type for the quarter.

![Pie chart showing repair tickets by equipment type for the quarter.]

**Figure 7 – Repair Tickets by Equipment Type / Year – to – Date**

Figure 7 shows the percentage of repair tickets year – to – date for each equipment type.

![Pie chart showing repair tickets by equipment type year-to-date.]

Repair Ticket Statistics by Severity Level

Figure 8 – Repair Ticket Statistics by Severity Level

Figure 8 shows the number and percentage of incidents by severity level for the quarter.

Figure 9 – Repair Ticket Statistics by Severity Type / Prior 15 months

Figure 9 shows the number of incidents by severity type that OGL staff has managed in the last 15 months.
Summary of Critical Events
The OGL staff responded to 0 critical events during the 2nd Quarter of 2017.

Preventative Maintenance
Each year at the Pod locations for the OGL network, preventative maintenance is performed according to Exhibit I Scope of Services.
There was no preventative maintenance performed in the 2nd quarter of 2017.

CCTV Operations
As part of the MO American Recovery and Reinvestment Act and the 2015 OGL CCTV and Network Enhancement project, 118 CCTV cameras were constructed at critical locations throughout the region. Since final installation, these cameras have routinely proven valuable to manage traffic and signal timing. During times of timing plan implementation, construction and detours, OGL staff, operations staff and signal electricians have routinely used these cameras to observe traffic and signal operations. Through the use of CCTV combined with TransSuite, malfunctions can be investigated remotely for a variety of issues including detection problems and timing concerns saving time investigating the issue in the field.

A bridge rehab project started in Merriam that installed 3 CCTV locations as part of the project to help oversee operations. They were installed in order to observe traffic during bridge construction. These continue to be heavily used to respond to incidents or timing changes in the construction zone.

A bridge rehab project was started by MoDOT in Lees Summit in an area that has existing CCTV coverage. These cameras have been used to respond to incidents or timing changes in the construction zone.
## Traffic Signal Event Tracking

### SharePoint 2017, 2nd Quarter

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<td>Ped Recalling</td>
<td>Leawood</td>
<td>1</td>
<td></td>
<td>Independence</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MODOT</td>
<td>5</td>
<td>Other</td>
<td>Shawnee</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sight Obstruction</td>
<td>MODOT</td>
<td>1</td>
<td></td>
<td>MODOT</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total**: 189
MARC’s OGL program operates from STP Federal revenues on a reimbursement basis from MoDOT and KDOT who manage the funds. The local match according to agreements being executed for the years 2017-2018 is collected annually. Local funds are combined with federal STP funds to comprise the operations budget. The current federal funds to local target funding split is 50/50. Reimbursement of federal funds from MoDOT and KDOT are at an 80/20 split. Currently, local agreements are in progress. In Kansas, all agreements are in the form of a single interlocal agreement for the 15 agencies and currently require signature by the Kansas Attorney General’s office. Of the nine Missouri partners, five agreements remain to be processed which funds from KCMO have been paid for both 2017 and 2018 and from North Kansas City for 2017.

Items to note from the below budget summary:

- This quarter begins into the 2017 funds as of April.
- The budget is developed to show a two year budget.
- The % variance column can be used to compare variance to a 12.5% (3 or 24 months) progress.
- Since October 2016 budget, the two year budget has been modified as noted:
  1. Consultant / Contractor Services was increased $50,000
  2. Travel was reduced
  3. Rent was lowered as reflected by MARC’s smaller office footprint
  4. Equipment / supplies increased $30,000
  5. Telephone was changed to $38,00 due to combined categories and a change in service

The 2015-2016 funds ending March 2017 ended with $424,800.70 of local funds remaining. Funds collected for the current period minus the applied match results in $1,094,039 balance of local funds.
<table>
<thead>
<tr>
<th>Expenses</th>
<th>Two-Year Program Budget</th>
<th>Cumulative To Date</th>
<th>Balance</th>
<th>% Variance (Cumulative/Budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries, Fringe Benefits, Indirect Costs</td>
<td>$1,099,716</td>
<td>$126,410.06</td>
<td>$973,305.94</td>
<td>11.5%</td>
</tr>
<tr>
<td>Consultants/Contracted Services</td>
<td>$865,636</td>
<td>$131,923.56</td>
<td>$733,712.44</td>
<td>15.2%</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$10,000</td>
<td>$447.12</td>
<td>$9,552.88</td>
<td>4.5%</td>
</tr>
<tr>
<td>Meeting/Travel (In/Out of Region &amp; Registration)</td>
<td>$16,200</td>
<td>$662.24</td>
<td>$15,537.76</td>
<td>4.1%</td>
</tr>
<tr>
<td>Rent</td>
<td>$15,248</td>
<td>$1,908.02</td>
<td>$13,339.98</td>
<td>12.5%</td>
</tr>
<tr>
<td>Telephone/Maint.(Internet, mobile, ConferSave, USB modem)</td>
<td>$48,000</td>
<td>$4,090.48</td>
<td>$43,909.52</td>
<td>8.5%</td>
</tr>
<tr>
<td>Insurance</td>
<td>$8,000</td>
<td>$957.00</td>
<td>$7,043.00</td>
<td>12.0%</td>
</tr>
<tr>
<td>Postage</td>
<td>$200</td>
<td>$12.00</td>
<td>$188.00</td>
<td>6.0%</td>
</tr>
<tr>
<td>Equipment/Computer/Supplies</td>
<td>$249,000</td>
<td>$2,036.74</td>
<td>$246,963.26</td>
<td>0.8%</td>
</tr>
<tr>
<td>Service Agreements</td>
<td>$2,000</td>
<td>$82.00</td>
<td>$1,918.00</td>
<td>4.1%</td>
</tr>
<tr>
<td>Automobile Gas/Maintenance</td>
<td>$16,000</td>
<td>$205.51</td>
<td>$15,794.49</td>
<td>1.3%</td>
</tr>
<tr>
<td>Professional Memberships</td>
<td>$1,000</td>
<td>-</td>
<td>$1,000.00</td>
<td>0.0%</td>
</tr>
<tr>
<td>Training</td>
<td>$3,000</td>
<td>-</td>
<td>$3,000.00</td>
<td>0.0%</td>
</tr>
<tr>
<td>Utilities</td>
<td>$10,000</td>
<td>$1,115.35</td>
<td>$8,884.65</td>
<td>11.2%</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>$2,344,000.00</strong></td>
<td><strong>$269,850.08</strong></td>
<td><strong>$2,074,149.92</strong></td>
<td>11.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Two-Year Program Budget</th>
<th>Cumulative To Date</th>
<th>Balance</th>
<th>% Variance (Cumulative/Budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP Funding, KDOT</td>
<td>$450,000.00</td>
<td>$79,627.92</td>
<td>$370,372.08</td>
<td>17.7%</td>
</tr>
<tr>
<td>STP-Funding, MoDOT</td>
<td>$770,000.00</td>
<td>$136,252.15</td>
<td>$633,747.85</td>
<td>17.7%</td>
</tr>
<tr>
<td>Local Gov't Revenue - Required Match</td>
<td>$305,000.00</td>
<td>$53,970.01</td>
<td>$251,029.99</td>
<td>17.7%</td>
</tr>
<tr>
<td><strong>Total Revenues for Federal Grant</strong></td>
<td><strong>$1,525,000.00</strong></td>
<td><strong>$269,850.08</strong></td>
<td><strong>$1,255,149.92</strong></td>
<td>17.7%</td>
</tr>
</tbody>
</table>

Local Gov't Revenue - Designated to supplement Federal operations funds for program support

| Combined Revenues                           | $2,344,000.00           | $269,850.08        | $2,074,149.92    | 11.5%                        |

| Net                                         | $                        | $                  | $               | 11.5%                        |

Local Government Balances:

| Excess local funds from previous budget periods | $824,809.70 | Grants 40-65375 and 40-85200 |
| Funds collected for current budget period     | $323,200.00 | KCMO 2017 and 2018, NKC 2017 |
| **Total available**                           | **$1,148,009.70**      |                           |

Amount applied for current budget period (see above)

| Ending Balance June 30, 2017                  | $1,094,039.69          |                           |

| Reserve/Emergency (local funds)              | $300,000.00            |                           |