Thursday, March 29, 2021
1:30-3:00 PM
Virtual meeting hosted in
Parks and Recreation Administration Building
1141 Massachusetts St

To participate or provide public comment register via zoom: Virtual Meeting Registration

Written public comment must be received by the MPO by 5:00 p.m. on the day before the meeting. Send correspondence electronically to mpo@lawrenceks.org. Comments received after the deadline will not be posted and there is no guarantee that such comments will be considered. The MPO is sensitive to members of the public who may not have access to technology. For those persons, written comments may be dropped in the Utility Billing Drop Box, located at the cut-out at 6th Street and New Hampshire Street. Comments should be marked for the **MPO ITS Plan**.

**The MPO will provide a method at the Parks and Recreation Administration Building for individuals without access to the internet or a telephone - and only such persons - to observe or participate in the meeting.*

Intelligent Transportation Systems (ITS) Steering Committee Agenda

1. **Zoom Meeting Preamble**
2. **Introductions**
3. **Public Comment**
4. **Kickoff Meeting Notes (Discussion)**
5. **Plan Update Process (Discussion)**
6. **Existing and new ITS Projects (Discussion)**
   - **a.** Word document of projects attached. We will use a Mural during the meeting.
   - **b.** Provide comments by 5 pm on April 5
7. **Next Meetings**
   - Meeting 3 - April 13 @ 10:30
   - Meeting 4 - April 26 @ 1:30

Special Accommodations: *Please notify the Lawrence-Douglas County Metropolitan Planning Organization (L-DC MPO) at (785) 832-7700 at least 72 hours in advance if you require special accommodations to attend this meeting (i.e., qualified interpreter, large print, reader, hearing assistance). We will make every effort to meet reasonable requests.*

The L-DC MPO programs do not discriminate against anyone on the basis of race, color, or national origin, according to Title VI of the Civil Rights Act of 1964. For more information or to obtain a Title VI Complaint Form, see www.lawrenceks.org/mpo/title6 *or call (785) 832-7700.*

MEETING NOTES

Intelligent Transportation Systems (ITS) Steering Committee
Thursday, March 4, 2021
1:30-3:00 PM
Virtual meeting hosted in
Parks and Recreation Administration Building
1141 Massachusetts St

	Agency	Stakeholder		Agency	Stakeholder
	FTA	Eva Steinman	X	Lawrence	Nick Hoyt
X	FHWA	David LaRoche	X		Dustin Smith
X	KDOT	Shari Hilliard – Michael Flory, Taylor McHenry, Garry Olson	X		Caleb Pettengill
X	KTA	David Jacobsen	X		Michael Aldridge – Micah Seybold (Alt)
X	KC Scout	Randy Johnson	X		John William
	Baldwin City	Ed Courton	X		Rob Neff
	Eudora	Branden Boyd			Kevin Fussell
			X	Douglas County	Chad Voigt
			X	Lawrence Transit	Adam Weigel
			X	KU On Wheel	Aaron Quisenberry
	Staff			**Public**	
X	L-DC MPO	Jessica Mortinger	X	Auston Jacobsen	
X	L-DC MPO	Ashley Bryers	X	Nikhila Gunda	
X	L-DC MPO	Sarah Buford			
X	L-DC MPO	Ari Leyva			

1. **Zoom Meeting Preamble (1:32pm)**

2. **Introductions –** Introductions were made.

3. **What is Intelligent Transportation Systems (ITS) -** Presentation given by Ashley Bryers.
   - View our Current ITS Plan at - https://lawrenceks.org/mpo/its
   - National ITS Reference Architecture - https://local.iteris.com/arc-it/index.html
   - Edmond, Oklahoma ITS Video- https://youtu.be/_B1mRv-1qRM
   - Tennessee DOT ITS Video - https://youtu.be/aZjDftmrE28

4. **Plan Update Process**

Intelligent Transportation System (ITS) Plan Update

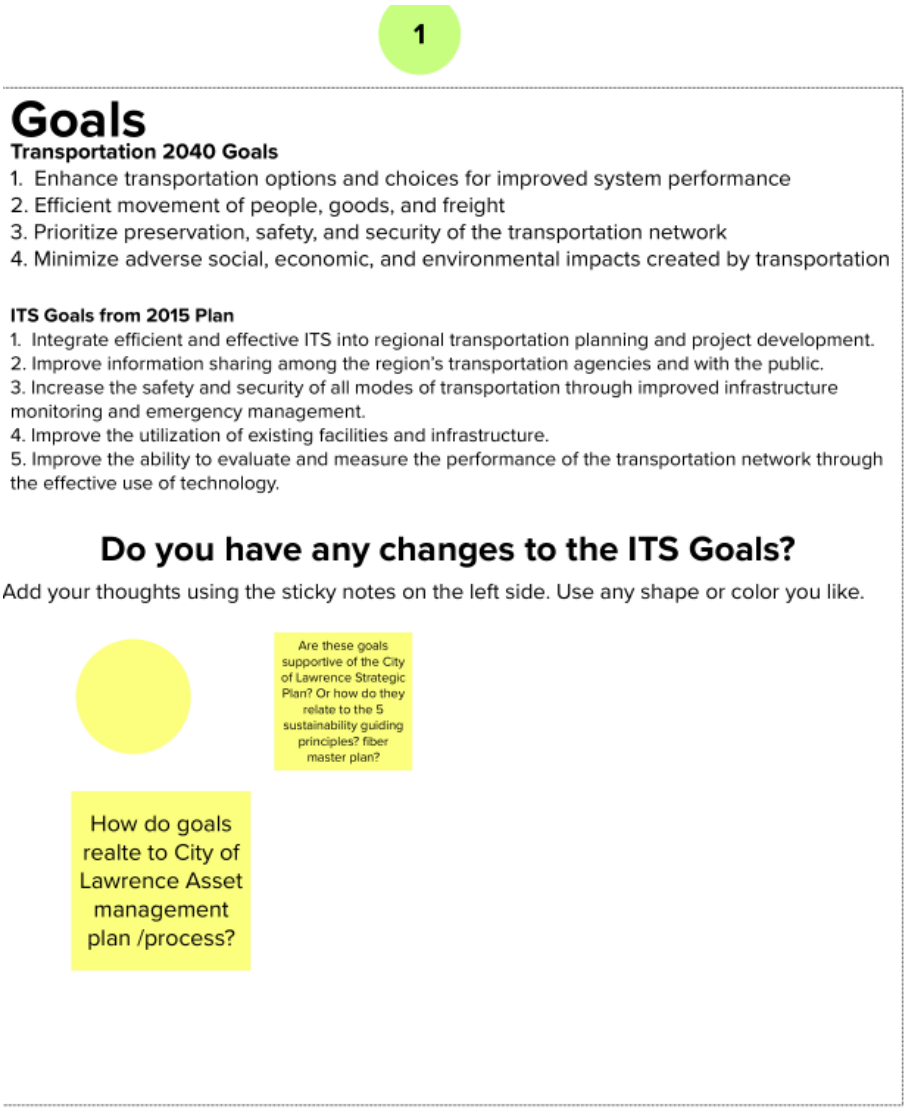
Task	March 4 @ 1:30 - 3:00	March 29 @ 1:30 - 3:00	April 13 @ 10:30 - Noon	April 26 @ 1:30 - 3:00	May	June
Development						
Steering Committee	Kickoff	Meeting 2	Meeting 3	Meeting 4		
Meeting Topic	Overview, Discuss ITS needs, & Verify goals (T2040 & ITS)	Discuss projects (new & old)	Discuss timeline, priorities & necessary agreements	Review draft plan		
Homework	Review & comment on ITS needs & Review existing projects for Meeting 2	Provide any further comments on projects	Review & comment on necessary agreements	Review & comment on draft plan		
Review						
15-day public comment period					Anticipated - May 6 - May 21*	
Document public comments & make necessary edits					X	
TAC/MPO Policy Board consideration of ITS Plan						Anticipated - June 1 & June 17*
Pending Policy Board approval post online and send to KDOT, FHWA, and FTA						X

* Anticipated dates. The final dates depend on how the planning process advances.

2.25.21

** Public participation process includes: Newspaper advertisement, email to subscription list, place document online and at public locations - Baldwin City Public Library, Eudora City Hall, Lawrence Public Library, Lecompton City Hall, and MPO Office, send to TAC and Policy Board for review

5. ITS Goals and Transportation 2040 Goals Discussion



6. ITS Needs: Discussion of needs identified in the last plan

The committee worked through each agenda item.

a. Arterial/Traffic Management Needs

1

Goals

Transportation 2040 Goals

1. Enhance transportation options and choices for improved system performance
2. Efficient movement of people, goods, and freight
3. Prioritize preservation, safety, and security of the transportation network
4. Minimize adverse social, economic, and environmental impacts created by transportation

ITS Goals from 2015 Plan

1. Integrate efficient and effective ITS into regional transportation planning and project development.
2. Improve information sharing among the region's transportation agencies and with the public.
3. Increase the safety and security of all modes of transportation through improved infrastructure monitoring and emergency management.
4. Improve the utilization of existing facilities and infrastructure.
5. Improve the ability to evaluate and measure the performance of the transportation network through the effective use of technology.

Do you have any changes to the ITS Goals?

Add your thoughts using the sticky notes on the left side. Use any shape or color you like.

Are these goals supportive of the City of Lawrence Strategic Plan? Or how do they relate to the 5 sustainability guiding principles? fiber master plan?

How do goals realte to City of Lawrence Asset management plan /process?

Next Step: Discuss ITS Needs Identified in the [illegible]

bus dash cam video available

camera policy about traffic light cameras - city working on

review standards for camera needs/ review site location before placement

PTZ camera or 360 camera to see in all directions similar to 11th & mass/ city hall (not moveable/no zoom) for working crashes

2

Arterial/Traffic Management Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
Improve traffic flow at intersections through improved signal timing and control.	High	this week new timing plans for iowa, 6th, clinton pkwy, 31st st; other timing plans needed - bob billings, downtown, n 2nd, don't know where next
Improve traffic information dissemination.	High	traffic count data added to interactive GIS map; DMS boards - in progress on K10; stacked cars warning on k10
Improve event management.	High	
Implement or improve signal coordination.		have counts for south and ku baseketball, but not the plans; This year's traffic signal timing set up KU game timing; South Iowa Traffic timing plan want, ; want to do ku football timing plan and downtown timing plan
[illegible]prove incident detection.	Hi	need master plan of signal comunication - have camera; fiber master plan IT is developing - fiber to all signal intersections; added traffic cameras; need updated GIS; police goal camera on every traffic light
[illegible]prove parking [illegible]anagement and parking [illegible]nformation.	Medium	KTA truck parking info https://tpims.ksdot.org/tpims; Spring 2021 implementation of mobile parking system. LPR, kiosks in lieu of meters at lots.
Improve information sharing among agencies.	Medium	
Improve system operation monitoring.	Medium	exploring real time monitoring (seawave demo- 8 intersections) future possible deployment fiber connected intersections connected for monitoring; Transit dispatch monitors real-time bus locations thru AVL system; fiber to south Iowa would help - south of clinton pkwy
Improve arterial roadway traffic surveillance.	Low	
Reduce transit vehicle delay at key intersections.	Low	transit improvements for ITS will be identified as part of the transit center development?
Reduce emergency vehicle delays at signals.	Low	would be nice for police - think we have for fire and ems - gps preemption fairly new - need year

Any other needs to add?

Within the service areas, the needs have been prioritized as high, medium or low based on Stakeholder input.

High priority needs are those that were identified by a broad cross-section of Stakeholders and were considered very important to improving the efficiency and safety of the transportation network.

Medium priority needs were those that were identified by fewer Stakeholders, or were identified as less critical.

Low-priority needs are those that were identified by specific Stakeholders or were considered important to the Region but not critical at the present.

Description

This area addresses the management of the movement of all types of vehicles, travelers and pedestrians throughout the transportation network. It deals with information collection, dissemination, and processing for the surface transportation system. It covers both automated monitoring and control activities as well as decision-making processes (both automated and manual) that address real-time incidents and other disturbances on the transportation network, as well as managing travel demand as needed to maintain overall mobility.

Arterial / Traffic Management Needs

Examples of arterial/traffic management include: Signal Coordination; Centralized Control; Traffic Information Systems; Vehicle Detection Systems; Video Systems; Adaptive Signal Control; Traffic Management Systems/Centers; and Highway Rail Intersection Technologies.

b. Freeway Management Needs and Public Transportation Needs

3

Freeway Management Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
Improve traffic information dissemination.	High	
Improve information sharing among agencies.	High	
Improve inter-agency coordination.	High	
Improve incident detection.	Medium	
Improve system operation monitoring.	Medium	KTA cashless tolling system wide switch - no tollbooths at any - early 24 https://www.ksturnpike.com/cashless-tolling
Improve freeway traffic surveillance.		lawrence working to expand fiber to k10 interchanges - next few years cameras on toll plazas and some on 70 but not in DGCO not identified yet for K10 expansion K10/waka/27th camera 2020 - didn't have more than cell communication before, but was updated
Improve incident management in urban areas.	Low	

Any other needs to add?

4

Public Transportation Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
Improve multi-modal traveler information.	High	Transit priority to make real-time info GTFS-RT feed for app integration
Improve information sharing among agencies.	High	maybe look into Revel to link paratransit trips - rtac
Improve transit traveler information.	High	Real-time bus location information available on DoubleMap app Real-time signage to be included in transit center development
Reduce transit vehicle delay at key intersections.	Medium	transit preemption - would be helpful
Enable dissemination/ display of real-time bus arriv es.	Medium	Real-time bus location information available on DoubleMap app Real-time signage to be included in transit center development
Improve service planning (scheduling and run-cutting).	Medium	Contractor builds run cut in Excel currently. Possibility to expand Remix package to include scheduling.
Improve fare payment systems	Medium	PTAC interested in mobile fare payment. Fare free discussion as part of 2021 Route Redesign Study.
Improve regional and interregional trip planning.	Low	Possible Mobility Manager for future workload commitment Local Equiy considerations for education and trip planning
Automate passenger counting.	Low	APC installed on fixed route
Improve fleet management.	Low	Developing fleet replacement plan for more regular replacement

Any other needs to add?

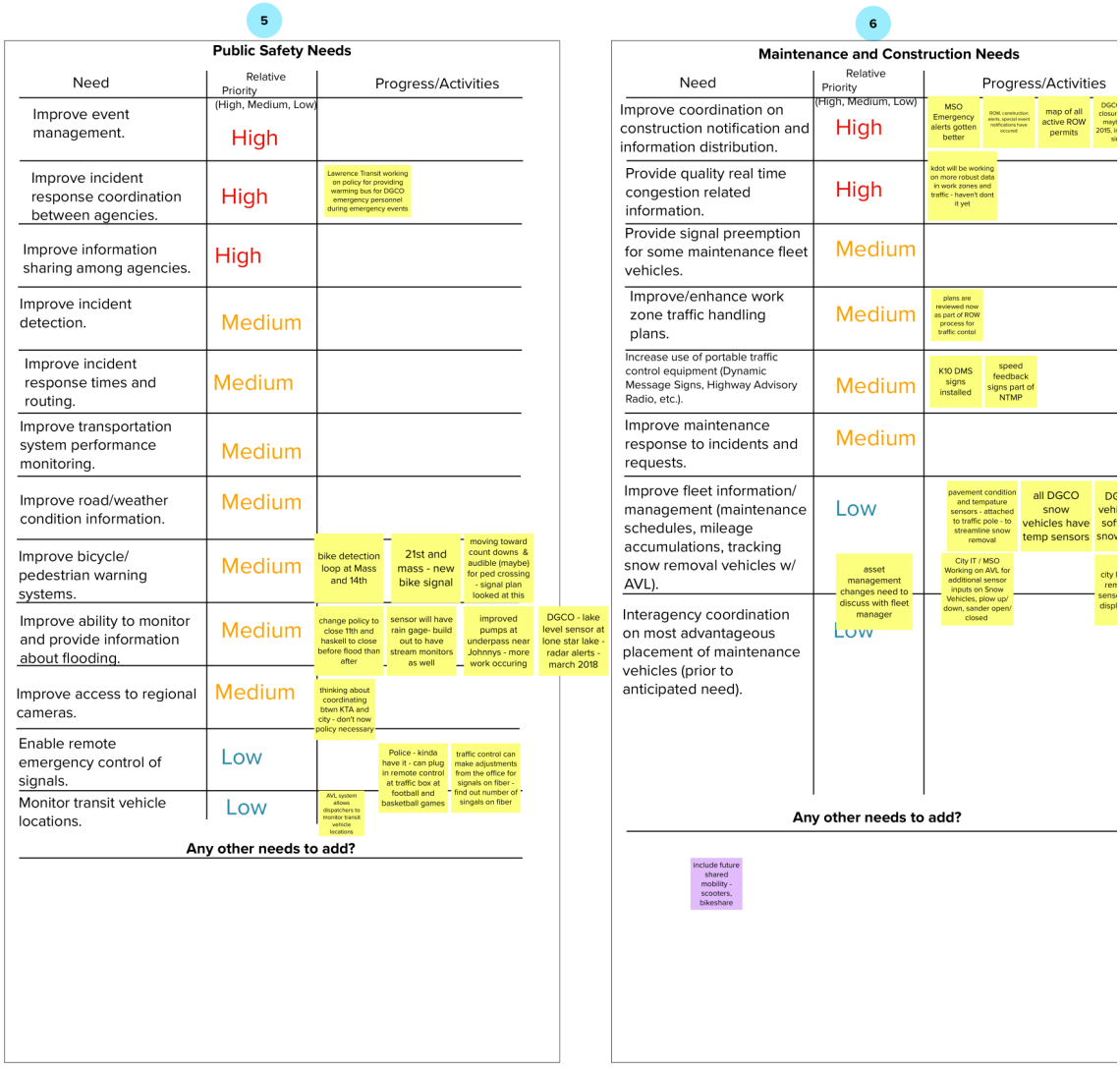
Description
This area addresses the management of the movement of all types of vehicles, travelers and pedestrians throughout the transportation network. It deals with information collection, dissemination, and processing for the surface transportation system. It covers both automated monitoring and control activities as well as decision-making processes (both automated and manual) that address real-time incidents and other disturbances on the transportation network, as well as managing travel demand as needed to maintain overall mobility.

Freeway Management Needs
Examples of freeway management systems include: Vehicle Speed Detection Systems; Video Systems; Ramp Metering; Variable Message Signs; Highway Advisory Radio; and Traffic Management Systems/Centers.

Description
This area addresses the management, operations, maintenance and security of public transportation to enable them to provide transit services that operate in a timely and efficient manner, delivering operational information, including multimodal information to the operators and users. This area covers both fixed route and demand response systems, as well as those passenger rail systems operated by transit agencies.

Examples of public transportation systems include: Public Transportation Management; En-route Transit Information; Personalized Public Transit; Public Traveler Safety; Traveler Service Information; Ride Matching and Reservations; Smart Card Payment/Transaction Systems.

c. Public Safety Needs and Maintenance and Construction Needs



Description

This area addresses the management by public safety agencies of emergencies or incidents in the transportation network including those relating to HAZMAT materials that are transported through the transportation network. It covers public safety (police, fire, and emergency medical services) agencies using emergency management services to improve their response to emergency situations. The area also addresses how emergency operations centers interact with transportation and public safety agencies to support response to disasters and for evacuations impacting the transportation network.

Examples of public safety systems include: Incident Detection; Incident Management; Hazardous Materials Response and Handling; Emergency Notification and Personal Security; Emergency Vehicle Management; Advanced Dispatching and Response Systems.

Description

This area addresses the monitoring, maintaining, improving, and managing roadway physical condition and its associated infrastructure equipment, as as the available resources necessary to conduct these activities. This area includes work zone management and safety, and the dissemination of maintenance and construction activities to other centers.

Examples of maintenance and construction systems include: Advanced Wo Zone Management and Traffic Control; Vehicle Detection Systems; Video Systems; Vehicle/Speed Detection Systems; Variable Message Signs; High Advisory Radio; Integration with Traffic Management Systems/Centers; Adv Dispatching and Routing Systems; Advanced Vehicle Tracking Systems; Fle Maintenance and Management Systems.

d. Traveler Information Needs and Commercial Vehicle Operations Needs

7

Traveler Information Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
Improve multi-modal information.	High	improved notices about lane closures and transit route changes - email and social media
Improve traffic information dissemination.	High	expanded social media for traveler info KDOT/ KTA; west bound K10 and woodland - KC Scout - could display messages
Provide quality real time congestion related information.	Medium	
Expand traveler information delivery methods.	Low	
Provide better road construction information and notification.	L	creating project websites for larger road projects; improved notices about lane closures and transit route changes - email and social media; constuction company puts up DMS X days before do work - new; GIS links directly to construction permits
Improve weather and road condition information.	Low	snow traffic camera - upgrade to the still shots

Any other needs to add?

Description

This area addresses the provision of both static and dynamic information about the transportation network to users both prior to and during their trips. It includes information about multi-modal options and transfers and the status of other transportation modes for use by the users. Providing static and dynamic signage information directly to drivers through in-vehicle devices is also covered by this area.

Examples of traveler information systems include: En-route Traveler Information; Pre-trip Traveler Information; Portable Event Management Systems; In-vehicle Route Guidance; Traffic Information; Variable Message Signs; Highway Advisory Radio; Internet, Media; Tourist Information Systems.

8

Commercial Vehicle Operations Needs

Need	Relative Priority (High, Medium, Low)	Progress/Act
Disseminate better information regarding limited alternative routes.	Medium	
Provide interstate/inter-region traveler information covering a wide area (targeted to commercial vehicle operators).	Medium	
Improve congestion management during seasonal/local events.	Medium	
Improve truck routing in rural/ small-towns.	Low	
Provide quality real time congestion related information.	Low	
Improve truck storage/ parking information (during major road closures).	Low	

Any other needs to add?

Description

This area addresses the management of the efficiency, safety, and c commercial vehicle fleets and the movement of freight. It includes a expedite the authorization process for freight to move across nation jurisdictional boundaries, activities that expedite inter-modal transfe and the operation of freight vehicles that exchange information on t carrier, the vehicle, the driver, and, in some cases, the cargo to enha operations and management.

Examples of commercial vehicle operations systems include: Comm Electronic Clearance; Automated Roadside Safety Inspection; On-bo Monitoring; Commercial Vehicle Administration Processes; Hazardo Incident Response; Commercial Vehicle Fleet Management; Service Agricultural Harvesting and Migration.

e. Integration Needs

No Longer a Category

9

Going to Determine Where to Put These Needs

ivities

Integration Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
Improve information sharing among agencies.	High	
Improve fiber optic network.	Medium	Fiber master plan in progress - internal scoring system Fiber improvements, 17 traffic signals connected to fiber since 2015 2018 - Connected 9 traffic signals (W 6th Street & Hampton Lane, W 6th Street & Folks Road, W 6th Street & Monterey Way, W 6th Street & Kasold Drive, W 6th Street & Lawrence Avenue, W 6th Street & Schlagle Road, W 6th Street & Rockledge Road, W 2nd Street & McDonald Drive, W 19th Street & Haskell Avenue. 2019 - Connected 1 new traffic signal (W 6th & Wisconsin Street) 2020 - Connected 3 traffic signals (W 6th Street & Kasold Drive, Quail Creek Drive, Bob Billings Parkway & Kasold Drive). 2021 - Connected 4 traffic signals (W 19th Street & Stewart Avenue, W 19th Street & Ousdahl, W 19th Street & Naismith Drive, W 22nd Terrace & Kasold Dr)
Develop interagency governmental agreements that would allow sharing of information, etc.	Medium	
Improve system compatibility.	Medium	
Provide central information clearinghouse.	Low	

Any other needs to add?

Next Step: Discuss ITS Needs Not Identified in the Last Plan

Parking M

Need	Re Priority (High, M

10-Year Parking Operations and Develop
During 2017, the City of Lawrence conducted
parking system serving downtown Lawren
Lawrence neighborhood and the neighborhoo
the University of Kansas. The consultant-led s
comprehensive evaluation of the parking sys
study area, including metering, enforcement,
parking issues, utilization and demand ana
system finances, development code requiren
parking, Public Transit's support of parking an
The 10-Year Parking Operations and Develop
approved by the City Commission on July 18,
lawrenceks.org/pds/parking/

operation of
ctivities that
ial and other
rs of freight
he motor
ance freight

ercial Vehicle
oard Safety
us Material
s to Assist

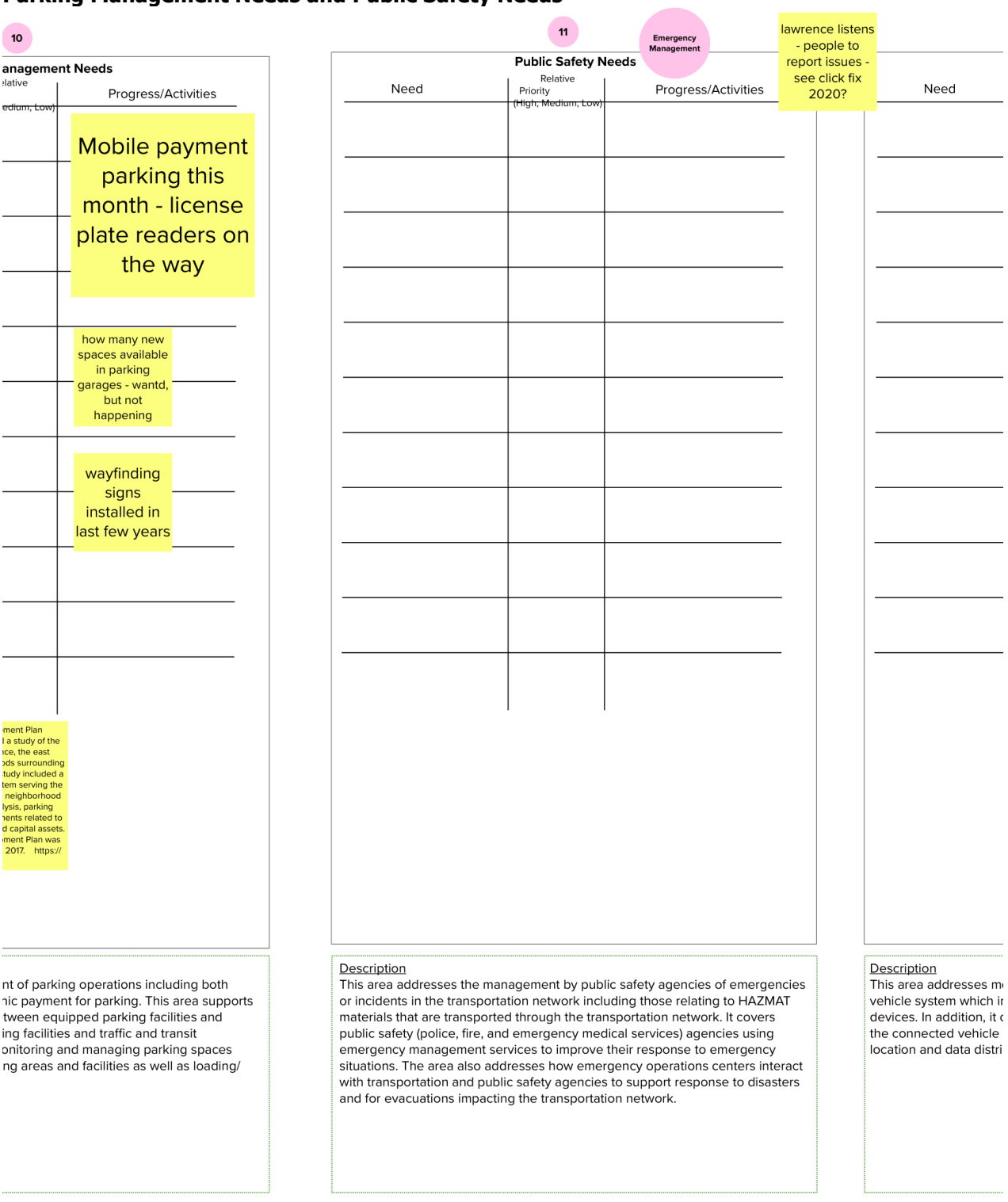
Description

Examples of Integration include: Integration of Systems; Integration with Traffic Management Centers; Determining Central vs. Distributed Control; Communications Infrastructure; Integration of Agencies; Resolution of Institutional Issues.

Description

This area addresses the manageme
space management and the electro
communication and coordination be
regional coordination between park
management systems. It includes m
and in lots, garages, and other parki
unloading zones.

f. Parking Management Needs and Public Safety Needs



nt of parking operations including both
nic payment for parking. This area supports
tween equipped parking facilities and
ing facilities and traffic and transit
onitoring and managing parking spaces
ng areas and facilities as well as loading/

Description
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Description
This area addresses m
vehicle system which i
devices. In addition, it
the connected vehicle
location and data distri

g. Support Needs and Sustainable Travel Needs

12

Support Needs

	Relative Priority (High, Medium, Low)	Progress/Activities
		city started developing map to show where snow removal vehicles have been

onitoring, maintaining, and managing of the connected
ncludes, centers, field equipment, vehicles, and traveler
covers the security and privacy of the communications in
environment as well as fundamental services, such as
bution, that support the full range of ITS services.

13

Sustainable Travel Needs

Need	Relative Priority (High, Medi	Progress/Activities
		electric vehicle charging stations added at SPL - derek for #
		transit will have 5 electric vehicles and charging infrastructure by 22
		ask jasmin about downtown charging stations

Description
This area addresses the operation of transportation system to minimize the environmental impact. It promotes a transportation system that balances accessibility, mobility, protection of human safety and environment. It covers all aspects of transportation system from optimizing traffic signals and ramp meters to managing HOV/HOT lanes, monitoring vehicle emissions and managing vehicle electric charging stations.

Descri
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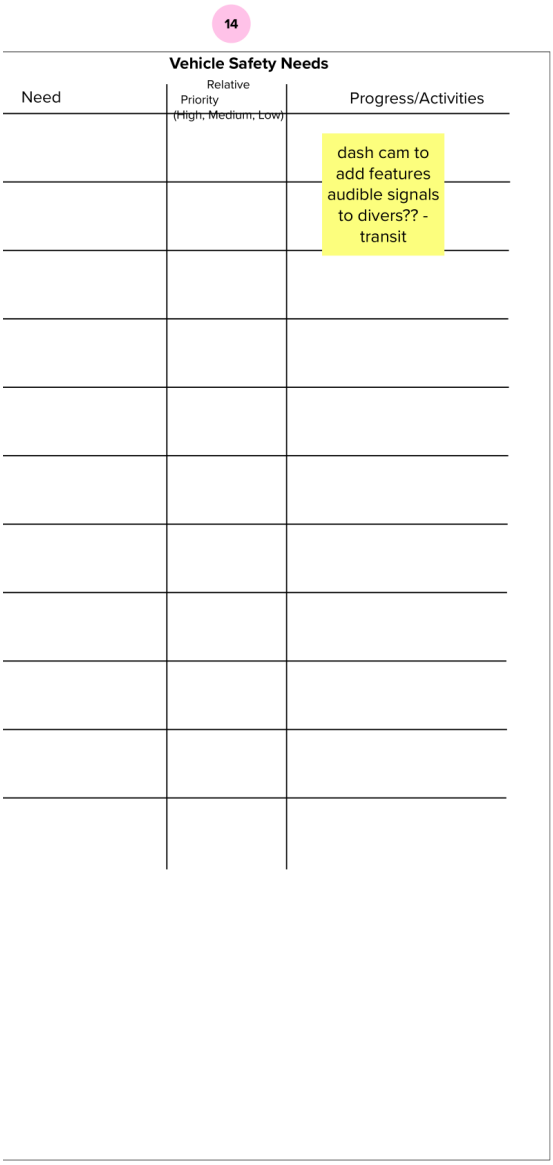
h. Vehicle Safety Needs and Weather Needs

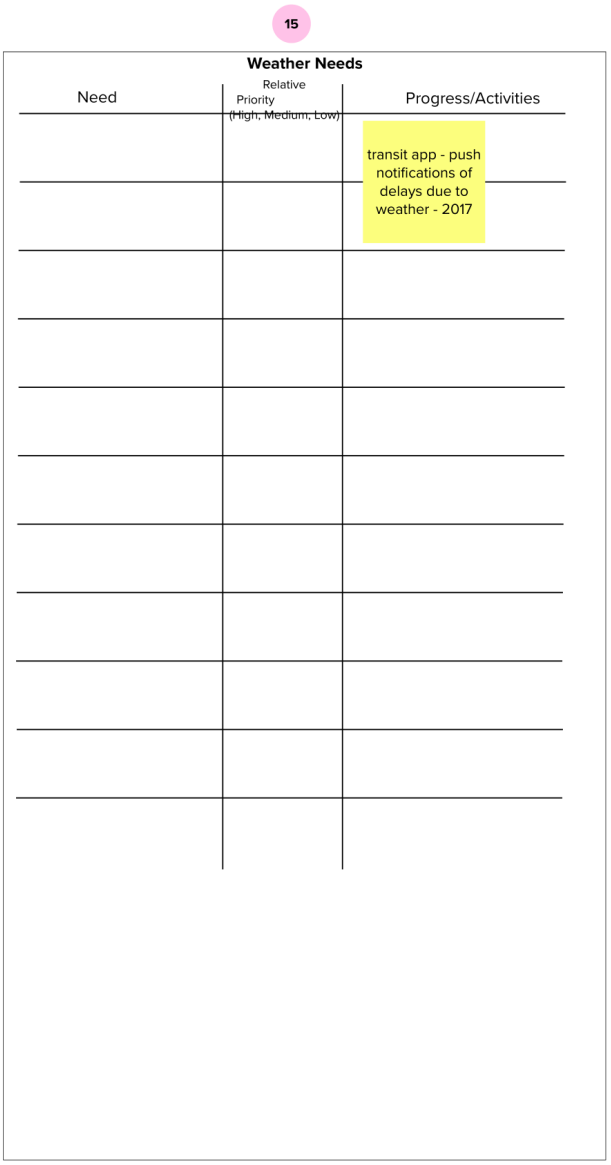


14

Vehicle Safety Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
		dash cam to add features audible signals to divers?? - transit

ɔtion
ea addresses the vehicle's safety for automated, connected and non-
ed vehicles. Its focus is on the enhancement of safety, security and
ıcy in vehicle operations, by warnings and assistance to users or input to
ɛration of the vehicle.



15

Weather Needs

Need	Relative Priority (High, Medium, Low)	Progress/Activities
		transit app - push notifications of delays due to weather - 2017

Description
This area addresses activities that monitor and notify users and transportation network managers of weather and environmental conditions that have an impact on the road transportation network and its users.

7. **Next Meeting –** Meeting adjourned at 2:59pm.
   - Meeting 2 - March 29 @ 1:30
     - Prepare for the meeting by reviewing the existing projects (will send out)
   - Meeting 3 - April 13 @ 10:30
   - Meeting 4 - April 26 @ 1:30

Intelligent Transportation System (ITS) Plan Update

Task	March 4 @ 1:30 - 3:00	March 29 @ 1:30 - 3:00	April 13 @ 10:30 - Noon	April 26 @ 1:30 - 3:00	May	June
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Meeting Topic	Overview, Discuss ITS needs, & Verify goals (T2040 & ITS)	Discuss projects (new & old)	Discuss timeline, priorities & necessary agreements	Review draft plan		
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Review						
15-day public comment period					Anticipated - May 6 - May 21*	
Document public comments & make necessary edits					X	
TAC/MPO Policy Board consideration of ITS Plan						Anticipated - June 1 & June 17*
Pending Policy Board approval post online and send to KDOT, FHWA, and FTA						X

* Anticipated dates. The final dates depend on how the planning process advances.

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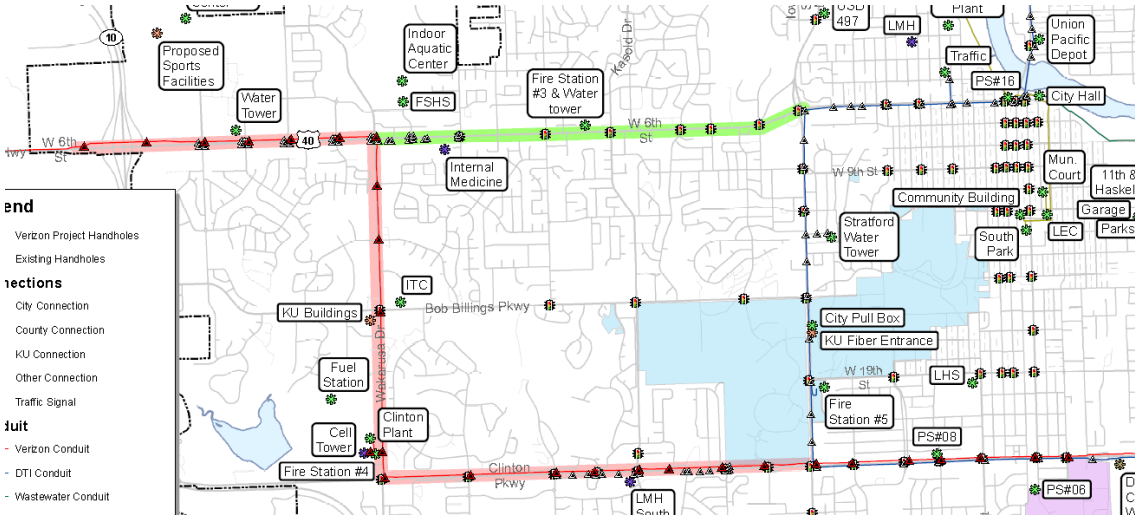
** Public participation process includes: Newspaper advertisement, email to subscription list, place document online and at public locations - Baldwin City Public Library, Eudora City Hall, Lawrence Public Library, Lecompton City Hall, and MPO Office, send to TAC and Policy Board for review

1.1.1 Signal Coordination and Control Expansion Project

Description:

This project will expand the use of signal coordination in specific corridors in the City of Lawrence. The City is expanding its fiber optic network and will connect twelve more intersections along two corridors to the Traffic Operations Center, for a total of 31 connected intersections. The project will add multiple cameras along the connected intersections. This project will enable signal coordination and adaptive control of signals at these intersections through control at the Traffic Operations Center.



Timeframe: Near-term (next three years)	*Project Areas:* • 6th Street from Wakarusa to Iowa Street. • 6th St from K-10 to Wakarusa; on Wakarusa from 6th Street to Clinton Parkway; and on Clinton Parkway/23rd St from Wakarusa to O'Connell Road.
Lead stakeholder: • **City of Lawrence Municipal Services and Operations**	*Other Stakeholders:* • KDOT
Need(s) Addressed: • Improve traffic flow at intersections through improved signal timing and control. • Implement or improve signal coordination.	*ITS Service Packages:* ATMS03: Traffic Signal Control → TM03: Traffic Signal Control

Estimated Cost:

The project cost is approximately **$740,000**. This cost includes cameras, controllers, fiber optic network, design and installation.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Travel times in the corridors.
- Congestion levels in the corridors.
- Vehicle delay at intersections.

1.1.2 Camera Deployment and Image Sharing Project

Description:

This project expands upon the Traffic Signal Control Coordination Expansion Project by adding the new cameras to the City's available inventory of traffic images.

The project will implement improved image-sharing technology at the City of Lawrence Traffic Operations Center to improve real-time sharing of images with other agencies in the Region. This will allow the Traffic Operations Center to view images from KTA's two cameras on the Turnpike in Douglas County, and be able to share real-time images to the Region's emergency responders and traffic management agencies via the Internet.

The City of Lawrence will be able to share camera images but will not share control of City cameras. Only the Traffic Operations Center will be able to control their pan-tilt-zoom functions.

Timeframe: Near-term (next three years)	*Project Areas:* • Citywide. • Turnpike Exits 202 and 217
Lead stakeholder: • **City of Lawrence Municipal Services and Operations**	*Other Stakeholders:* • City of Lawrence Police • Douglas County Emergency Communications • KTA • KDOT • KC Scout
Need(s) Addressed: • Improve arterial roadway traffic surveillance. • Improve access to regional cameras. • Improve incident detection. • Improve freeway traffic surveillance. • Improve information sharing among agencies.	*ITS Service Packages:* • ATMS01: Network Surveillance (This service package doesn't exist in RAD-IT. The old definition is below) This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem. • ATIS06: Transportation Operations Data Sharing (This service package doesn't exist in RAD-IT. The old definition is below) This service package makes real-time transportation operations data available to transportation system operators. The Information Service Provider collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes this information available to transportation system operators, facilitating the exchange of qualified, real-time information between agencies. Using the provided information, transportation system operators can manage their individual systems based on an overall view of the regional transportation system. The regional transportation operations data resource represented by the Information Service Provider may be implemented as a web application that provides a web-based access to system operators, an enterprise database that provides a network interface to remote center applications, or any implementation that supports regional sharing of real-time transportation operations data.

Estimated Cost:

The project cost is related only to new control software for existing cameras. The estimated cost for implementation of image sharing technology is **$60,000**.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Travel times in the corridors.
- Incident response times.
- Impact of images on traffic management.

1.1.3 Transit Traveler Information Improvements Project

Description:

This project will provide real-time transit vehicle arrival times to transit passengers at bus stops and through the Internet. Lawrence Transit and KU on Wheels are already able to provide this information via an app to passengers' phones, and this project will increase information distribution through the use of electronic signs and the web.

The electronic signs will be deployed at key stops that are heavily used or are frequent transfer points. An example location is the planned transit center. The signs display "next bus" arrival times. The web site will allow passengers to track the actual location of buses.

Timeframe:

Near-term (next three years)

Project Areas:

- Up to twelve bus stops, locations to be determined.

Lead stakeholders:

- **KU on Wheels**
- **Lawrence Transit**

Need(s) Addressed:

- Improve multi-modal traveler information.
- Improve transit traveler information.
- Expand traveler information delivery methods.
- Improve transit efficiency and information sharing.
- Monitor transit vehicle locations.
- Enable dissemination/ display of real-time bus arrival times.

ITS Service Packages:

- APTS08: Transit Traveler Information → PT08: Transit Traveler Information

Estimated Cost:

The estimated cost for this project is approximately $1500 per vehicle for a fleet of 18 vehicles, and up to twelve signs costing between $6,000 and $10,000 per location. **The total estimated cost is $96,000 to $144,000**. This cost assumes that existing vehicle location technology on the buses will be used.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Transit ridership.
- Transit passenger satisfaction.

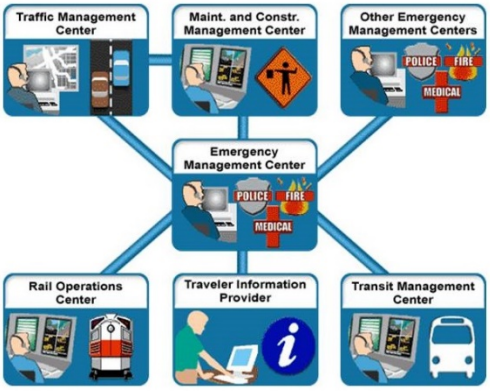
1.1.4 Interagency Information Sharing Project

Description:

This project will provide a platform for the Region's agencies to improve inter-agency information sharing about incidents and events occurring in real-time and planned in the Region with other agencies. The Region's agencies will work together to develop strategies for communicating incident and event information.

It is envisioned that the platform may be simple, but used by all key Stakeholders to share information.

Note that the City of Topeka is currently deploying a similar solution using KDOT funding. The L-DC Region may benefit from coordinating with and gaining insight from Topeka and Shawnee County.



Timeframe:

Near-term (next three years)

Project Area:

- Lawrence-Douglas County Region

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Other Stakeholders:

- City of Lawrence Police
- Douglas County Emergency Communications
- Douglas County Public Works
- Douglas County Sheriff's Office
- KDOT
- KTA
- KU on Wheels
- University of Kansas
- Lawrence Transit
- Local Cities
- Local Cities Emergency Services
- KC Scout

Need(s) Addressed:

- Improve information sharing among agencies.
- Improve event management.
- Improve inter-agency coordination.
- Improve incident response coordination among agencies.
- Improve incident response times and routing.
- Improve coordination on construction notification and information distribution.
- Interagency coordination on most advantageous placement of maintenance vehicles (prior to anticipated need).

ITS Service Packages:

- ATIS06: Transportation Operations Data Sharing (This service package doesn't exist in RAD-IT. The old definition is below)

This service package makes real-time transportation operations data available to transportation system operators. The Information Service Provider collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes this information available to transportation system operators, facilitating the exchange of qualified, real-time information between agencies. Using the provided information, transportation system operators can manage their individual systems based on an overall view of the regional transportation system. The regional transportation operations data resource represented by the Information Service Provider may be implemented as a web application that provides a web-based access to system operators, an enterprise database that provides a network interface to remote center applications, or any implementation that supports regional sharing of real-time transportation operations data.

- ATMS08: Traffic Incident Management System → TM08: Traffic Incident Management System
- MC10: Maintenance and Construction Activity Coordination → MC08: Maintenance and Construction Activity Coordination

Estimated Cost:

The estimated cost of Interagency Information Sharing is **$100,000**. This estimate is based on the amount The City of Topeka and KDOT agreed to for the Topeka-Shawnee County solution and it is assumed that a similar cost will apply in the L-DC Region.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Incidence clearance times.
- Incident response times.
- Satisfaction of emergency response agencies.

1.1.5 Work Zone Management Project

Description:

Work Zone Management will create an integrated implementation of technologies to improve the safety and efficiency of work zones. Devices include existing portable message signs, cameras to monitor traffic and operations in work zones, radio broadcasts to inform travelers of maintenance and construction activities and potential delays, portable barriers that can be controlled by maintenance crews, and locally-controlled signals to improve flow and manage traffic.

The work zone management systems will be portable and allow for monitoring of conditions at the Traffic Operations Center.

Timeframe:

Near-term (next three years)

Project Area:

- Work zones in the City of Lawrence

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Need(s) Addressed:

- Improve/enhance work zone traffic handling plans.
- Increase use of portable traffic control equipment (Dynamic Message Signs, Highway Advisory Radio, etc.).

ITS Service Packages:

- MC08: Work Zone Management → MC06: Work Zone Management
- MC09: Work Zone Safety Monitoring → MC07: Work Zone Safety Monitoring

Estimated Cost:

The estimated costs for work zone management assume each unit includes a video camera, Highway Advisory Radio, portable Dynamic Message Sign, and portable Traffic Management System for a unit cost of $102,000 to $152,000. Work Zone Management may also require a software upgrade at the Traffic Operations Center to manage the mobile equipment at a cost of $18,000 to $22,000. **Total estimated cost for a work zone management system is $120,000 to $174,000**. This estimate is based on the federal ITS Knowledge database[1].

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Reduced crashes and injuries in work zones.
- Traffic flow in work zones.
  - Traffic speeds in work zones.

[1] http://www.itsknowledgeresources.its.dot.gov/its/benecost.nsf/files/bclldepl2011update/$file/ben_cost_less_depl_2011%20update.pdf

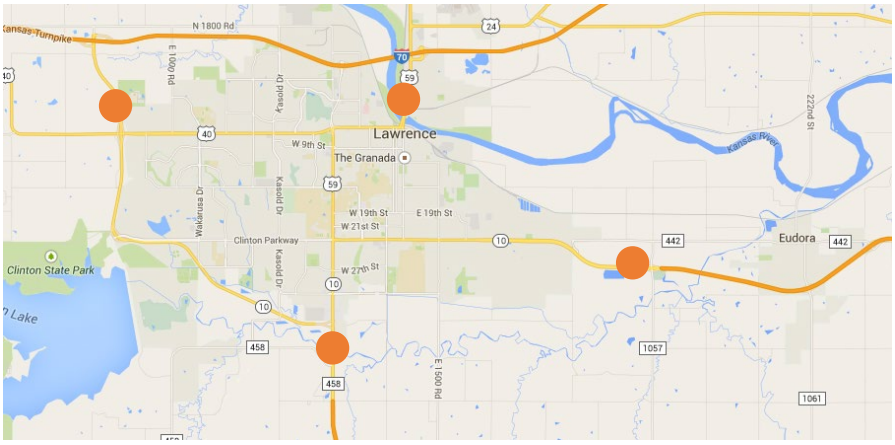
1.1.6 Dynamic Message Signs Project

Description:

This project will deploy approximately four permanent Dynamic Message Signs at strategic locations in the Region to aid in providing traffic information to the public and managing congestion and event traffic. The signs will be owned by KDOT and operated by KC Scout through its center in Kansas City. The City of Lawrence Municipal Services and Operations and KTA will also be able to post messages to the signs from the City's Traffic Operation Center.

The DMS will provide event, detour, parking and other information to travelers as they enter the City of Lawrence. Locations will be selected prior to critical travel decision points to encourage travelers to take alternate routes when there is congestion on main roads.

A camera will also be installed at each DMS location. The cameras will be used to monitor the status of the DMS. They will also be able to provide traffic images to KC Scout, KTA and the City of Lawrence.



Timeframe:	*Project Areas:*
Near-term (next three years)	• Southbound US-59 south of the Turnpike • Westbound K-10 east of the City • Eastbound K-10 north of K-40 • Northbound US-59 south of the South Lawrence Trafficway
Lead stakeholder: • **City of Lawrence Municipal Services and Operations**	*Other Stakeholders:* • KDOT • KTA • KC Scout

Need(s) Addressed:	*ITS Service Packages:*
• Provide quality real time congestion related information. • Improve traffic information dissemination. • Provide better road construction information and notification. • Disseminate better information regarding limited alternative routes. • Improve congestion management during seasonal/local events.	• ATMS01: Network Surveillance (This service package doesn't exist in RAD-IT. The old definition is below) This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem. • ATMS06: Traffic Information Dissemination → TM06: Traffic Information Dissemination

Estimated Cost:

The estimated cost of the DMS and camera deployments **is $225,000 to $300,000 per site, for a total estimated cost of $900,000 to $1,200,000**. This estimate is based on the cost of KDOT's recent DMS deployments.

Performance Measures:

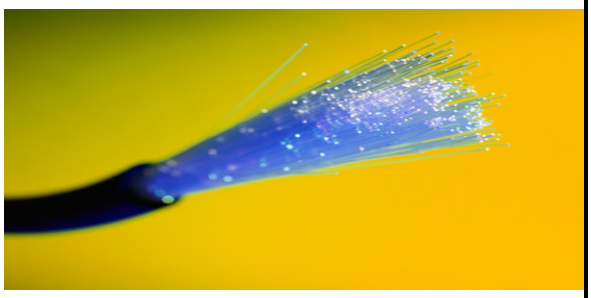
The effectiveness of this project can be measured through the following measures:

- Traffic flow during events.
- Level of usage of signs.
- Survey of travelers to determine changes in travel behavior.

1.1.7 Fiber Communications Expansion Project

Description:

This project will expand the deployment of the Region's communications network that is available for the exchange of transportation data. It will primarily use fiber optic, but also use alternative data communications where fiber is not feasible or cost-effective. Alternate technologies may include cellular and microwave. The purpose is to increase the connectivity of devices and agencies in the Region for improved data collection, device management and information sharing.



The City of Lawrence already has significant fiber connectivity, including to 31 signals and all of its traffic cameras. This project would expand that network to integrate other agencies and devices. It is important to note that the deployment of fiber will be done with other Stakeholders who will also benefit from using the communications network.

Timeframe:

Medium-term (three to six years)

Project Areas:

- 23rd & Iowa (10/59 Hwy) south to the South Lawrence Traffic Way
- 19th & Haskell to 19th & Iowa Streets
- 9th & Massachusetts Streets to 9th & Iowa
- 15th & Iowa to 15th & Wakarusa Streets

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Other Stakeholders:

- Douglas County Public Works
- KDOT
- KTA
- University of Kansas
- KC Scout
- Private communications providers

Need(s) Addressed:

- Provide quality real time congestion related information.
- Improve traffic information dissemination.
- Improve information sharing among agencies.
- Improve event management.
- Improve inter-agency coordination.
- Improve incident response coordination among agencies.

ITS Service Packages:

No specific ITS Service Packages are directly addressed by this project. However, improved communications significantly improves virtually all other ITS Projects in the Region.

Estimated Cost:

The estimated cost of the Communications Expansion is:

- $144,000 for 23rd & Iowa (10/59 Hwy) south to the South Lawrence Traffic Way
- $169,000 for 19th & Haskell to 19th & Iowa Streets
- $113,600 for 9th & Massachusetts Streets to 9th & Iowa
- $212,800 for 15th & Iowa to 15th & Wakarusa Streets

The total estimated cost is $839,400. This cost estimate has been developed by the City of Lawrence.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Number of devices connected.
- Number of agencies sharing information.
- Data exchange rates among devices and centers.

1.1.8 Event and Incident Management Project

Description:

The Incident and Event Management Improvements Project will expand upon several near-term projects: the deployment of DMS, the increased collection and sharing of traffic images, and the improved information sharing among agencies. It will also utilize the expanded communications network to link management centers.

This project will improve the real-time communication and coordination among emergency responders and traffic management to coordinate event traffic management plans, respond to incidents in real-time, and provide travelers with congestion, parking and alternative transportation mode information. The project will define means for all agencies in the Region to exchange information as needed.

KC Scout currently performs regional event and incident management in the Kansas City region and provides a solid template for the L-DC Region to emulate. In addition, software used by KC Scout may be suitable for the L-DC Region and provide interoperability among the regions.

Timeframe:

Medium-term (three to six years)

Project Areas:

- Lawrence-Douglas County Region

Lead stakeholder:

- **Douglas County Emergency Communications**

Other Stakeholders:

- City of Lawrence Police
- City of Lawrence Municipal Services and Operations
- Douglas County Public Works
- Douglas County Sheriff's Office
- KDOT
- KTA
- KU on Wheels
- KU
- Lawrence Transit
- Local Cities
- Local Cities Emergency Services
- KC Scout

Need(s) Addressed:

- Improve incident management in urban areas.
- Improve event management.
- Improve incidence response coordination between agencies.
- Improve coordination on construction notification and information distribution.
- Provide quality real time congestion related information.
- Improve maintenance response to incidents and requests.

ITS Service Packages:

- ATIS06: Transportation Operations Data Sharing (This service package doesn't exist in RAD-IT. The old definition is below)

This service package makes real-time transportation operations data available to transportation system operators. The Information Service Provider collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes this information available to transportation system operators, facilitating the exchange of qualified, real-time information between agencies. Using the provided information, transportation system operators can manage their individual systems based on an overall view of the regional transportation system. The regional transportation operations data resource represented by the Information Service Provider may be implemented as a web application that provides a web-based access to system operators, an enterprise database that provides a network interface to remote center applications, or any implementation that supports regional sharing of real-time transportation operations data.

- MC10: Maintenance and Construction Activity Coordination → MC08: Maintenance and Construction Activity Coordination

Estimated Cost:

The estimated cost for this Project includes improved software to detect incidents at the Traffic Operations Center, increased use of portable and fixed message signs, Highway Advisory Radio and interagency data integration. **Costs of similar projects in other states have ranged from $800,000 to $2,000,000.** This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Traffic flow during events.
- Level of usage of signs.
- Survey of travelers to determine changes in travel behavior.

1.1.9 Transit Management Improvements

Description:

Transit Management Improvements will be a series of technology upgrades to both Lawrence Transit and KU on Wheels vehicles. The improvements include systems that allow transit to better manage and plan its services though better data collection and analysis tools. Improved software will help develop more efficient and scheduling and route plans.

Electronic fareboxes will reduce the use of cash on transit and more efficiently collect fares, leading to shorter dwell times at stops. The electronic fareboxes will also be linked to the existing vehicle location tracking and collect data on ridership by route, location and time.

Timeframe:

Medium-term (three to six years)

Project Areas:

- City of Lawrence

Lead stakeholders:

- **Lawrence Transit**
- **KU on Wheels**

Need(s) Addressed:

- Automate passenger counting.
- Improve service planning (scheduling and run-cutting).
- Improve fare payment systems.

ITS Service Packages:

- APTS02: Transit Fixed-Route Operations → PT02: Transit Fixed-Route Operations
- APTS04: Transit Fare Collection Management → PT04: Transit Fare Collection Management
- APTS10: Transit Passenger Counting → PT07: Transit Passenger Counting
- APTS06: Transit Fleet Management → PT06 Transit Fleet Management

Estimated Cost:

The estimated cost of the transit management improvements includes approximately $12,000 to $14,000 per vehicle for on-board technology that includes electronic fareboxes, and $60,000 to $100,000 for improved fixed-route management software. The cost also includes an estimated $1,500 to $2,500 per vehicles for transit information onboard vehicles through signs or audio. **The total estimated cost is $300,000 to $392,000.**

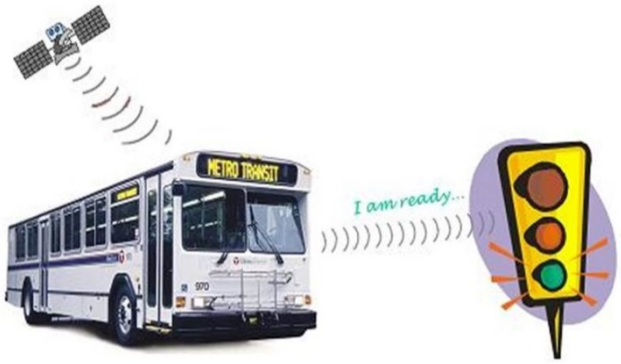
Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Transit ridership.
- Operations cost per transit trip.
- Survey of transit passenger satisfaction.

1.1.10 Transit Signal Priority Project

Description:



The Transit Signal Priority will equip Lawrence Transit fixed-route buses with a device that alerts a traffic signal controller that the bus is present and would like an early or extended green light. The signal controller, or Traffic Operations Center determines whether it is feasible to shift the signal cycle at the intersection in order to expedite the bus's movement through the intersection.

Transit Signal Priority will only be deployed around the Lawrence Transit Center, the location of which has not been determined. The purpose of signal priority near the Center will be to help prevent buses from being delayed or overflowing the Center, as well as to keep buses on schedule and ensure transfer connections can be made. Transit Signal Priority requests from buses may be based on a variety of factors that include a bus's current adherence to schedule, the number of riders on the bus, or the headway between buses on the same route.

Note that this project will require a review of State and City law regarding the use of devices to provide green lights to vehicles.

Timeframe:	*Project Areas:*
Medium-term (three to six years)	• Lawrence Transit Center (location to be determined)
Lead stakeholders:	*Other stakeholders:*
• **Lawrence Transit**	• City of Lawrence Municipal Services and Operations
Need(s) Addressed:	*ITS Service Packages:*
• Reduce transit vehicle delay at key intersections.	• APTS09: Transit Signal Priority → PT09: Transit Signal Priority

Estimated Cost:

The estimated cost of this project includes on-board technology ranging in cost from $900 to $2,100 per vehicle, and intersection control hardware and software that ranges from $5,000 to $10,000. Assuming 18 vehicles and up to six intersections, **the estimated total cost is $46,000 to $98,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Transit ridership.
- Transit schedule adherence.
- Impact on traffic flow and congestion.

1.1.11 Signal Beacons Project

Description:

The Signal Beacons Project provides a low-technology way to provide travelers of alerts of roadway conditions. The beacons will be located along the roadway ahead of points of safety concern, such as potential roadway flooding locations, or an upcoming traffic signal that a driver should be made aware of.

The beacons will be connected to other field devices. For example, a flood warning beacon will be connected to a weather sensor that detects water level on the roadway. The beacon will trigger when the sensor detects water higher than a preset threshold. In the case of a traffic signal warning beacon, the beacon may only alert drivers when the signal they are approaching is red. Or, it may simply warn at all times of the presence of the signalized intersection ahead.

Timeframe:

Medium-term (three to six years)

Project Areas:

- Locations throughout the Lawrence-Douglas County Region

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Other stakeholders:

- Douglas County Public Works
- KDOT

Need(s) Addressed:

- Improve incident detection.
- Improve road/weather condition information.
- Improve ability to monitor and provide information about flooding.

ITS Service Packages:

- ATMS24: Dynamic Roadway Warning → TM12: Dynamic Roadway Warning

Estimated Cost:

The estimated cost of this project is approximately $7,000 to $10,000 per site for roadway and environmental sensors, and for the flashing beacon that is triggered by the sensor. Costs may vary based on the availability of power and communications at beacon sites. **The total estimated cost for twelve sites is $84,000 to $120,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Reduction in stranded vehicles.
- Accuracy of flood detection.
- Change in travel behavior.

1.1.12 Parking Management Systems Project

Description:

This project will improve the management of parking in the City of Lawrence and on the KU campus through the use of advanced technologies to track usage and space availability.

Vehicle count systems will monitor the usage of parking at City and KU lots. This information will be shared with the public to help them travel directly to where parking is located.

The system may also be able to dynamically control parking pricing to encourage travel patterns to parking lots with the most availability.

The parking management system will collect data to help parking management agencies develop parking plans. Information generated by the Parking Management Systems can also be shared by trip planning tools and through Regional traveler information systems.

Timeframe:

Medium-term (three to six years)

Project Areas:

- City of Lawrence parking structures and lots
- KU parking structures and lots

Lead stakeholders:

- **City of Lawrence Municipal Services and Operations**
- **KU Parking and Transit**

Need(s) Addressed:

- Improve parking management and parking information.

ITS Service Packages:

- ATMS16: Parking Facility Management (This service package doesn't exist in RAD-IT. The old definition is below)

This service package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This service package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment. Two other service packages, APTS04: Transit Fare Collection Management and ATMS10: Electronic Toll Collection also provide electronic payment services. These three service packages in combination provide an integrated electronic payment system for transportation services.

- ATMS17: Regional Parking Management → PM04: Regional Parking Management

Estimated Cost:

The estimated cost of this project is between $250,000 and $1,000,000. The cost is based on up to five parking structures participating and is dependent upon the technology deployed at each facility. The estimated cost is based on the range of costs for similar recent deployments reported in the federal ITS Knowledge database..

Performance Measures:

The effectiveness of this project can be measured through the following measures:

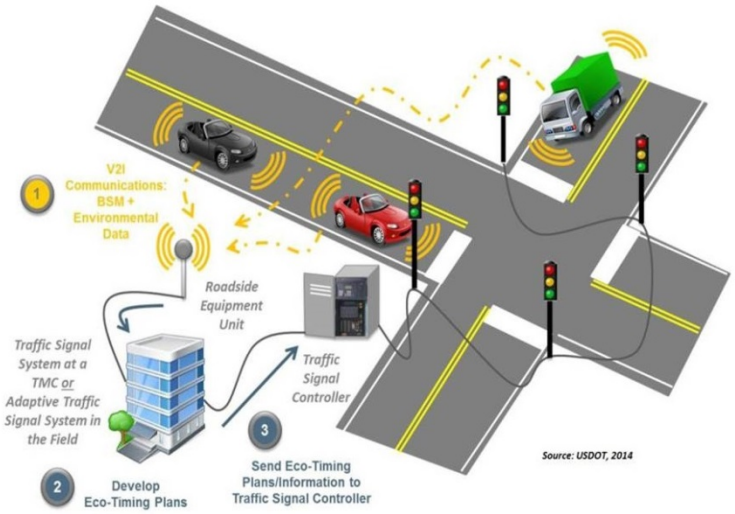
- Parking usage.
- Parking revenue.
- Traffic congestion during events.

1.1.13 Emergency Signal Preemption Improvements Project

Description:

The Emergency Signal Preemption Improvements Project will upgrade the Lawrence-Douglas County Fire-Medical vehicle ability to preempt signals by replacing the existing strobe-based system with vehicle-to-signal controller wireless communication.

Currently, fire and medical vehicles are able to preempt a signal as they approach it by sending a strobe light signal to a receiver near the signal. The receiver then sends a message to the signal controller to grant an immediate green light. The current system can be susceptible to security breaches, and may not function when the line of sight between vehicle and the receiver is blocked.



The upgraded system will use wireless communications that send an encrypted signal directly from the vehicle to the signal controller. The wireless communication is more reliable and can provide a more rapid response for the approaching emergency vehicle.

Timeframe:	*Project Areas:*
Long-term (six to ten years)	• Locations throughout the City of Lawrence
Lead stakeholder:	*Other stakeholders:*
• **Lawrence-Douglas County Fire Medical**	• City of Lawrence Municipal Services and Operations
Need(s) Addressed: • Reduce emergency vehicle delays at signals. • Enable remote emergency control of signals.	*ITS Service Packages:* EM02: Emergency Routing (This service package doesn't exist in RAD-IT. The old definition is below) This service package supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions, and suggested routing information are provided to enhance emergency vehicle routing. Special priority or other specific emergency traffic control strategies can be coordinated to improve the safety and time-efficiency of responding vehicle travel on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time conditions and has the option of requesting a route from the Traffic Management subsystem. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption and the transmission of alerts to surrounding vehicles. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.

Estimated Cost:

The estimated cost of this project includes on-board technology ranging in cost from $800 to $2,000 per emergency vehicle, and intersection control hardware and software that ranges from $5,000 to $10,000. Assuming 20 vehicles and up to 30 intersections, **the estimated total cost is $166,000 to $360,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Incident response times.
- Impact on traffic flow and congestion.

1.1.14 Bicycle/Pedestrian Warning Systems Project

Description:

Bicycle-Pedestrian Warning Systems will provide advanced notice of the presence of bicycles and pedestrians on or near the roadway to traffic. This will improve awareness by drivers and the safety of bicyclists and pedestrians.

The systems may be deployed in locations with heavy pedestrian and bicycle traffic, such as the downtown Lawrence area. The systems will automatically detect bicyclists and pedestrians and provide a warning, such as a flashing beacon or lights embedded in the roadway. The systems may also automatically trigger walk signals at intersections when pedestrians are present.

Note that this project may be coordinated with the long-term project for video detection, which can include the ability to detect and classify bicycles and pedestrians at intersections.

Timeframe:	*Project Areas:*
Long-term (six to ten years)	• Locations throughout the City of Lawrence
Lead stakeholder: • **City of Lawrence Municipal Services and Operations**	*Other stakeholders:* • Traveling Public
Need(s) Addressed: • Improve bicycle/pedestrian warning systems.	*ITS Service Packages:* • ATMS26: Mixed Use Warning Systems → VS12: Pedestrian and Cyclist Safety

Estimated Cost:

The estimated cost of a pedestrian/bicycle detection system is approximately $1,000 per intersection. The cost for a pedestrian crossing illumination system is $23,000 to $35,000 per location. Assuming twelve intersections with detection and four illuminated crosswalks, **the total estimated cost for this project is $108,000 to $152,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Reduction in bicycle/pedestrian crashes.
- Impact on traffic flow and congestion.

1.1.15 Weather Monitoring Project

Description:

This project will deploy road-weather sensors in the Region to improve the monitoring and response to weather conditions. The weather sensors will be able to collect wind, precipitation, images of the roadway, pavement conditions and ice or snow accumulation.

Information collected from the sensors throughout the Region will be shared to provide maintenance crews the ability to observe conditions at remote locations, and be able to plan and respond to severe weather.

The information can be used to determine when and how many winter maintenance vehicles to deploy, and what types of materials will be needed to clear the roadways for travel. The information may also be used by the 911 dispatch center to identify conditions and provide better routing to emergency vehicles.

Timeframe:

Long-term (six to ten years)

Project Areas:

- Lawrence-Douglas County Region

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Other stakeholders:

- Douglas County Emergency Communications Center
- Douglas County Public Works
- KDOT
- KTA

Need(s) Addressed:

- Improve weather and road condition information.
- Improve maintenance response to incidents and requests.
- Improve ability to monitor and provide information about flooding.

ITS Service Packages:

MC03: Road Weather Data Collection (This service package doesn't exist in RAD-IT. The old definition is below)

This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.

- MC04: Weather Information Processing and Distribution → WX02: Weather Information Processing and Distribution

Estimated Cost:

The estimated cost of the environmental weather stations including cameras is $33,000 to $50,000 per unit. Software for collecting and processing road weather information is approximately $9,000. Assuming six stations in the Region, **the estimated total cost is $207,000 to $309,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Time to clear roadways.
- Usage of maintenance equipment and materials.
- Incident response time.

1.1.16 Regional Virtual Data Warehouse Project

Description:

This project will develop a virtual method for agencies to share traffic, maintenance, transit, emergency and incident information. The Virtual Data Warehouse does not create a centralized location for data storage. Instead, each agency maintains its own data, but is able to share the data it chooses with other agencies though a Regional integration system.

Data may include both archives and real-time data such as signal timing, incident responses and video images. Authorized agencies will be able to use the information and images for managing traffic and incidents, and for maintenance planning.

Key functions of the virtual warehouse will be to provide a standardized format for sharing and retrieving Regional data in order to make it usable and to ensure that all regional Stakeholders are using the same information for their operations. The data will also have the potential for sharing with the general public.

While this project is important, its value is limited until the Region increases its ability to collect information through other ITS Projects identified in the near-, medium- and long-term.

Timeframe:

Long-term (six to ten years)

Project Areas:

- Lawrence-Douglas County Region

Lead stakeholder:

- **KDOT**

Other stakeholders:

- City of Lawrence Police
- City of Lawrence Municipal Services and Operations
- Douglas County Emergency Communications
- Douglas County Public Works
- Douglas County Sheriff's Office
- KTA
- KU on Wheels
- KU
- Lawrence Transit
- Local Cities
- Local Cities Emergency Services

Need(s) Addressed:

- Improve information sharing among agencies.
- Improve system operation monitoring.
- Improve coordination on construction notification and information distribution.
- Improve maintenance response to incidents and requests.
- Provide central information clearinghouse.

ITS Service Packages:

- AD3: ITS Virtual Data Warehouse → DM01: ITS Data Warehouse

ATIS06: Transportation Operations Data Sharing (This service package doesn't exist in RAD-IT. The old definition is below)

This service package makes real-time transportation operations data available to transportation system operators. The Information Service Provider collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes this information available to transportation system operators, facilitating the exchange of qualified, real-time information between agencies. Using the provided information, transportation system operators can manage their individual systems based on an overall view of the regional transportation system. The regional transportation operations data resource represented by the Information Service Provider may be implemented as a web application that provides a web-based access to system operators, an enterprise database that provides a network interface to remote center applications, or any implementation that supports regional sharing of real-time transportation operations data.

	• MC10: Maintenance and Construction Activity Coordination → MC08: Maintenance and Construction Activity Coordination

Estimated Cost:

The estimated cost of this project varies widely depending upon the level of deployment and standardization of data in the Region. **The cost of similar efforts in other parts of the United States ranged from a low of $15,000 to a high of $300,000**. It should be noted that an effort such as this requires a high level of effort to keep operational after deployment. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Amount of Regional information available to agencies.
- Amount of Regional information available to the public.

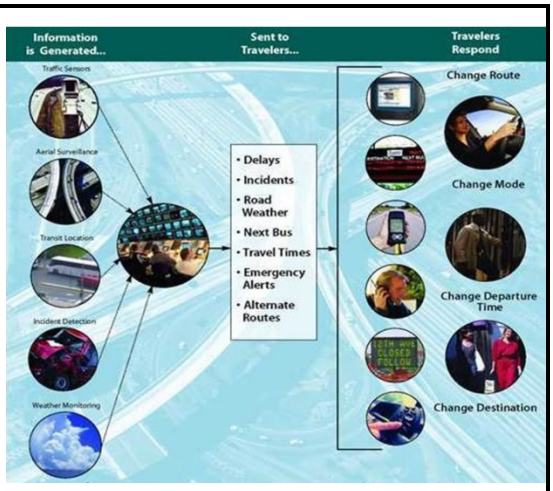
1.1.17 Journey Trip Planner Project

Description:

The Journey Trip Planner will be an online tool available to travelers through their computers and personal devices that allows them to plan trips using one or more modes, including personal vehicle, transit, bicycle and pedestrian.

The Journey Trip Planner will be interactive and allow the user to enter their origin and destination as well as the planned time of travel and preferred mode(s) of travel. The Trip Planner will provide information such as traffic conditions, real-time parking availability, routing, schedules and costs for various modes.

The Trip Planner can encourage travelers to use transit, carpool, use park-and-ride facilities and complete trips by foot, bicycle and bus for events and commutes.



Note that for the Trip Planner to be useful it will require reliable information on all modes of travel and parking from the Region's Stakeholders. Much of the needed information will be collected through other projects in this Plan. Also note that significant efforts have been made by the private sector to develop Journey Planners that use publicly available data. The L-DC Region may benefit from leveraging private-sector applications that use data provided by the Region's Stakeholders through a Virtual Data Warehouse.

Timeframe:

Long-term (six to ten years)

Project Areas:

- Lawrence-Douglas County Region

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Other stakeholders:

- Douglas County Public Works
- KDOT
- KTA
- KU on Wheels
- KU
- Lawrence Transit
- Local Cities
- Private Sector Information Services
- Traveling Public

Need(s) Addressed:

- Improve multi-modal traveler information.
- Provide interstate/inter-region traveler information covering a wide area.
- Improve transit traveler information.
- Improve multi-modal information.
- Expand traveler information delivery methods.

ITS Service Packages:

- ATIS01: Broadcast Traveler Information → TI01: Broadcast Traveler Information
- ATIS02: Interactive Traveler Information → TI02: Personalized Traveler information
- APTS07: Multi-modal Coordination → PT14: Multi-modal Coordination
- APTS08: Transit Traveler Information → PT08: Transit Traveler Information

Estimated Cost:

The estimated cost of similar projects in the United States have ranged from approximately $300,000 to $570,000 for hardware, software and deployment. Additional hardware, such as DMS or kiosks can significantly increase the overall project cost. For the L-DC Region, it is assumed that DMS deployed in previous projects will be used, and **the total estimated cost is $300,000 to $570,000**. This estimate is based on the federal ITS Knowledge database.

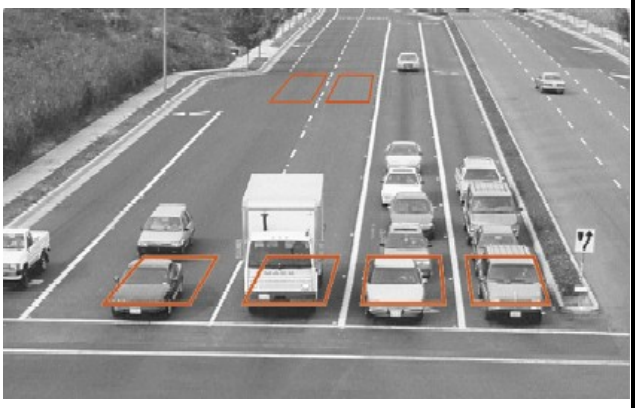
Performance Measures:

The effectiveness of this project can be measured through the following measures:

- Use of modes other than personal vehicle.
- Average travel time in the Region

1.1.18 Traffic Detection Improvements Project

Description:



The Traffic Detection Improvements Project will replace existing traffic detection devices with advanced detection equipment at intersections to better classify vehicles and pedestrians and provide better response. The improved detection equipment may include video detection or other devices that can not only detect the presence of vehicles, but also be to identify what types of vehicles they are, including commercial trucks and buses.

The detection equipment may also be able to identify and classify pedestrians and bicycles at intersections. Once bicyclists and pedestrians are detected, the intersection can respond accordingly by providing a green when only a bicycle is present, or automatically triggering a walk sign for the pedestrian.

The Traffic Detection Improvement Project can be coordinated with the Bicycle/Pedestrian Warning Systems Project to detect bicycles and pedestrians.

Timeframe:	*Project Areas:*
Long-term (six to ten years)	• City of Lawrence

Lead stakeholder:

- **City of Lawrence Municipal Services and Operations**

Need(s) Addressed:	*ITS Service Packages:*
• Improve traffic flow at intersections through improved signal timing and control. • Improve bicycle/pedestrian warning systems.	ATMS01: Network Surveillance (This service package doesn't exist in RAD-IT. The old definition is below) This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.

Estimated Cost:

The estimated cost of video detection at intersections is approximately $32,000 to $64,000 per intersection. The hardware and software to process traffic information from images and use it to manage signals is $134,000 to $164,000. Assuming twenty intersections will be equipped, **the total cost of this project is estimated to be $774,000 to $1,444,000**. This estimate is based on the federal ITS Knowledge database.

Performance Measures:

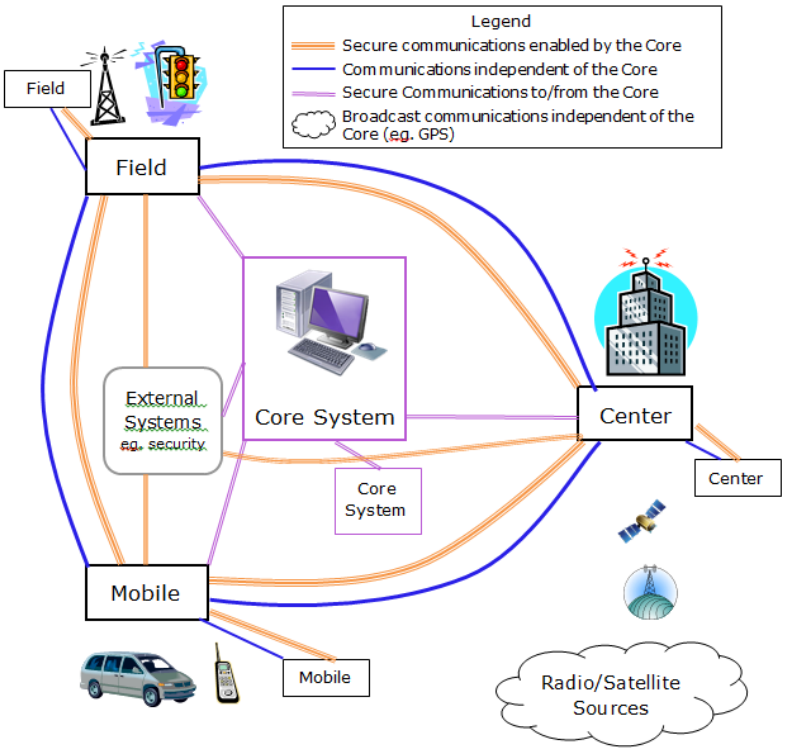
The effectiveness of this project can be measured through the following measures:

- Traffic flow at intersections.
- Reduced bicycle/pedestrian crashes.

1.1.19 Connected Vehicles - update

The ITS Projects identified in this plan encompass the plans of the L-DC Region as of 2015. It is important to note that transportation technologies are rapidly evolving and the Region should be aware of changes that are coming from both the public and private sectors. Specifically, the transition to "connected vehicles" may significantly impact the way vehicles and the transportation network interact. Figure 7 provides a conceptual illustration of connected vehicles.

Figure 1: Conceptual Image of Connected Vehicles



Federal Connected Vehicle Research can be viewed at the United States Department of Transportation ITS Joint Program Office web site.[2] The following excerpt highlights the connected vehicle research.

> …Critical improvements are needed to make surface transportation safer, smarter, and greener and ultimately enhance livability for Americans. Part of this transformation to our transportation system can be achieved through connectivity. Connected vehicles have the potential to transform the way Americans travel through the creation of a safe, interoperable wireless communications network that includes cars, buses, trucks, trains, traffic signals, cell phones, and other devices. Like the Internet, which provides information connectivity, connected vehicle technology provides a starting point for transportation connectivity that will potentially enable countless applications and spawn new industries.
>
> Connected vehicle applications provide connectivity:
>
> - Among vehicles to enable crash prevention
> - Between vehicles and the infrastructure to enable safety, mobility, and environmental benefits
> - Among vehicles, infrastructure, and wireless devices to provide continuous real-time connectivity to all system users.

[2] ITS JPO Connected Vehicle Research - http://www.its.dot.gov/connected_vehicle/connected_vehicle_research.htm

Update this section

The National ITS Architecture used to update the L-DC Regional ITS Architecture is Version 7.0. However, it is expected that the advances in connected vehicles will have significant impacts on the National ITS Architecture. Version 7.0 was superseded by Version 7.1 after this project began, and eventually Version 8.0 will be developed. Version 8.0 will likely have significant changes regarding connected vehicles.

There is also a Connected Vehicle Reference Implementation Architecture (CVRIA)[3] that is in development. The CVRIA is "being developed as the basis for identifying the key interfaces across the connected vehicle environment which will support further analysis to identify and prioritize standards development activities. CVRIA will also support policy considerations for certification, standards, core system implementation, and other elements of the connected vehicle environment."

Because the CVRIA is in development, it is not appropriate to reference at the Regional level. However, the L-DC Region must be aware of connected vehicles activities at the national and state level and incorporate them as they are completed and adopted.

[3] CVRIA web site - http://www.iteris.com/cvria/index.html