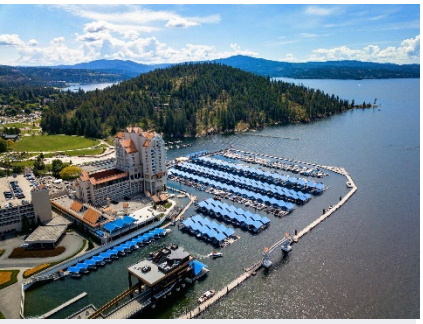
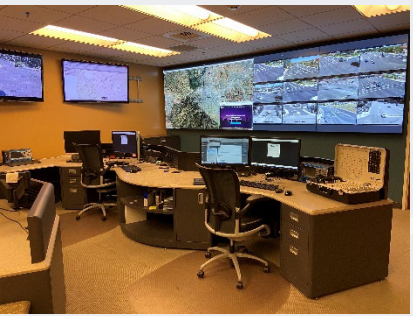
# Concept of Operations (ConOps)
# Kootenai Regional Transportation Management Center
# Final



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Kootenai MPO

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# 1 INTRODUCTION

The Kootenai Metropolitan Planning Organization (KMPO), located in northern Idaho, is bordered by the Spokane, WA metropolitan area to the west, Bonner County and Canada to the north, Benewah County to the South, and Shoshone County to the East. KMPO includes the Coeur d'Alene-Post Falls urbanized area, which has experienced significant growth in recent years, and is forecasted to continue rapid growth for the next 20 years. The recent unanticipated growth has put a strain on the existing transportation system, experienced by the community as roadway bottlenecks, poor intersection levels of service, unreliable travel times, an overall lack of readily accessible motorist information, and unpredictable incident management on highways including I-90. In response to this growth and its impact on transportation, KMPO is investigating the deployment of a Kootenai Regional Traffic Management Center (KRTMC) to improve traffic management and enhance mobility.

The Kapsch TrafficCom USA, August 2020 KMPO Feasibility Study for the Kootenai County Traffic Management Center included completing a needs assessment, completing project planning, and creating a preliminary Concept of Operations. Federal regulation (23 CFR 940.11) requires that any ITS project funded in whole or in part with Highway Trust Funds must be based on a Systems Engineering Analysis (SEA), and that the level of effort should be commensurate with the scale of the project. This phase of the development of the Kootenai Regional Traffic Management Center (KRTMC) will include the preparation of the following System Engineering Analysis documents:

- Existing Conditions - updated from Feasibility Study
- ConOps update from Feasibility Study (This Document)
- Systems Requirements
- Verification Plan
- Validation Plan

## 1.1 PURPOSE & OVERVIEW

This Concept of Operations (ConOps) describes the operational characteristics for a Traffic Management Center (TMC) to be deployed in the Kootenai County ID Region, hereinafter referred to as the KRTMC. This effort reflects ongoing initiatives by local stakeholders to deliver improved transportation services throughout the region, by leveraging multi-agency resources and capabilities. This ConOps is intended to provide a high-level user-oriented view of the proposed KRTMC that focuses on needs and functions that must be met. The document identifies what stakeholders want the system to do and documents roles and responsibilities for all stakeholders. Needs documented in the ConOps drive development of system (and subsystems) requirements, which form the basis for an overall system design (and operational approach). The Systems Engineering (SE) process includes steps for verification and validation testing/evaluation to ensure that the resulting system design can be traced back to the requirements and underlying needs identified in this ConOps.

This document, and the underlying approach in its development, is based on guidelines found in FHWA Rule 940 and employs the FHWA's 'SET-IT' tool for guidance in its development. This ConOps document builds upon the findings and results of the "Feasibility Study" – Kootenai Traffic Management Center Project, August 2020" developed for Idaho Transportation Department (ITD) and the KMPO. Many of the concepts identified in that study

are brought forward to this document for completeness. Those findings were further discussed and refined during this current process.

This document describes the current state of operations, the reasons for change, and defines operations for the future KRTMC in terms of ITS functions/features and supporting operations as defined in the National ITS Architecture. As such, this document provides key linkage between the needs regional stakeholders are seeking to address, the system requirements derived from those needs, and the ITS functionalities to meet the requirements. This ConOps is intended to be a 'living document' that will be updated over time as the concept for the KRTMC is improved and changes through design and development. The following sections are included in this document:

- **Section 1: Introduction** provides background and scope of the project as well as foundational information.
- **Section 2: References** identifies all documents and resources used to develop this ConOps.
- **Section 3: Current Situation** describes the existing conditions in Kootenai County as well as vision, goals, objectives, and stakeholders of the KRTMC. Operational and Support environments are also described.
- **Section 4: Justification for and Nature of Changes** provides a description of why the KRTMC is needed as well as stakeholder needs and functions the KRTMC will aim to meet.
- **Section 5: Concepts for the Proposed System** defines the operational and system components of the proposed KRTMC to meet the needs defined in previous sections. ITS Service Package Physical and Enterprise view information is also described in this section.
- **Section 6: Operational Scenarios** describe various example situations and corresponding procedures that explain processes the KRTMC will follow as part of the KRTMC system operation.
- **Section 7: Summary of Impacts:** provides descriptions for Operational and Organizational impacts, and impacts during development to be expected.
- **Section 8:** Glossary of terms and acronyms.
- **Section 9:** Appendix which includes full size diagrams that could not be included in document body.

As the ConOps is finalized and stakeholders agree on its content, a System Requirements document will be developed to specify the technical requirements for designing and procuring all necessary components for the KRTMC. This document will align directly with the information detailed in this ConOps. The requirements specified will carry through the entirety of the project process to validate the system components and ensure all needs are met through deployment. This ConOps serves as a foundational document in the SE process and in the general project development process. It is important that Stakeholders review and provide input to this document during review. Stakeholder input is solicited with this version of the document and any missing Service packages will be added in a subsequent version.

## 1.2 SCOPE

The Kootenai Metropolitan Planning Organization (KMPO) region has experienced significant growth in recent years and is forecasted to continue rapid growth for the next 20 years. The development in the region has put a strain on the existing transportation system, experienced by the community as roadway bottlenecks, poor intersection levels of service, unreliable travel times, and lack of accessible motorist information, and unpredictable incident management on major highways including I-90. The KMPO region does not have a traffic operations center that can manage and optimize traffic along key transportation corridors to minimize congestion and improve safety. The key urban arterial signal systems are not coordinated and/or managed centrally to help reduce congestion, improve safety, and travel times along these corridors.

In response to this growth and its impacts on the transportation network, KMPO in collaboration with the local Municipal agencies and Idaho Transportation Department (ITD) are developing a plan and Concept of Operations (ConOps) for the development and implementation of a Regional Traffic Management Center (KRTMC) to improve safety and reduce congestion in the region. The current project needs, and planned goals, functions, systems, organization, roles, and responsibilities are summarized in this document.

Foundational work for this effort was initiated and documented as the Feasibility Study performed in 2020.

Relevant information/analysis has been brought forward and is reflected in this ConOps. However, specifics regarding how needs identified in the 2020 study could be addressed (in the form of high-level requirements drawn from the National ITS Architecture) were significantly refined during stakeholder reviews in early 2023 as part of this project effort. Consequently, the breadth of services described in this ConOps is more narrowly focused than the system described in the 2020 Feasibility Study.

As proposed, the KRTMC will address current and projected stakeholder needs to include:

- Reduction of roadway traffic bottlenecks
- Improvement of poor intersection levels of service
- Enhancement of travel time performance and reliability
- Ability to centrally manage and operate signals and ITS assets
- Improvement of traveler information services
- Improvement in ability to manage incidents on major arterial corridors and highways

Through meeting these needs the KRTMC aims to:

- Provide capability to actively manage traffic signals on arterials
- Provide situational information and performance metrics on key and regional roadways
- Provide coordinated incident management capability
- Promote corridor management and traveler information
- Improve interagency coordination
- Provide all the above from a centralized Traffic Management Center (TMC) facility

# 2 REFERENCES

**Table 1.1** lists the references used to develop the concepts in this document.

**Table 2.1: References**

| # | Document (Title, source, version, date, location) |
|---|---|
| 1 | ISO/IEC/IEEE 29148 – Systems and Software Engineering Life cycle processes – Requirements Engineering, 1 Edition, November 2018 |
| 2 | Feasibility Study and Operational Concept – Kootenai Traffic Management Center Project, August 2020 |
| 3 | American National Standards Institute (ANSI/AIAA-G-043-1992) – Concept of Operations Standard |
| 4 | Kootenai Metropolitan Transportation Plan |
| 5 | Regional TMC Facilities & Operations Plan Existing Conditions Technical Memorandum, February 28, 2023 |
| 6 | US Department of Transportation ARC-IT V9.1 National Architecture Reference website: https://www.arc-it.net/html/architecture/architecture.html |

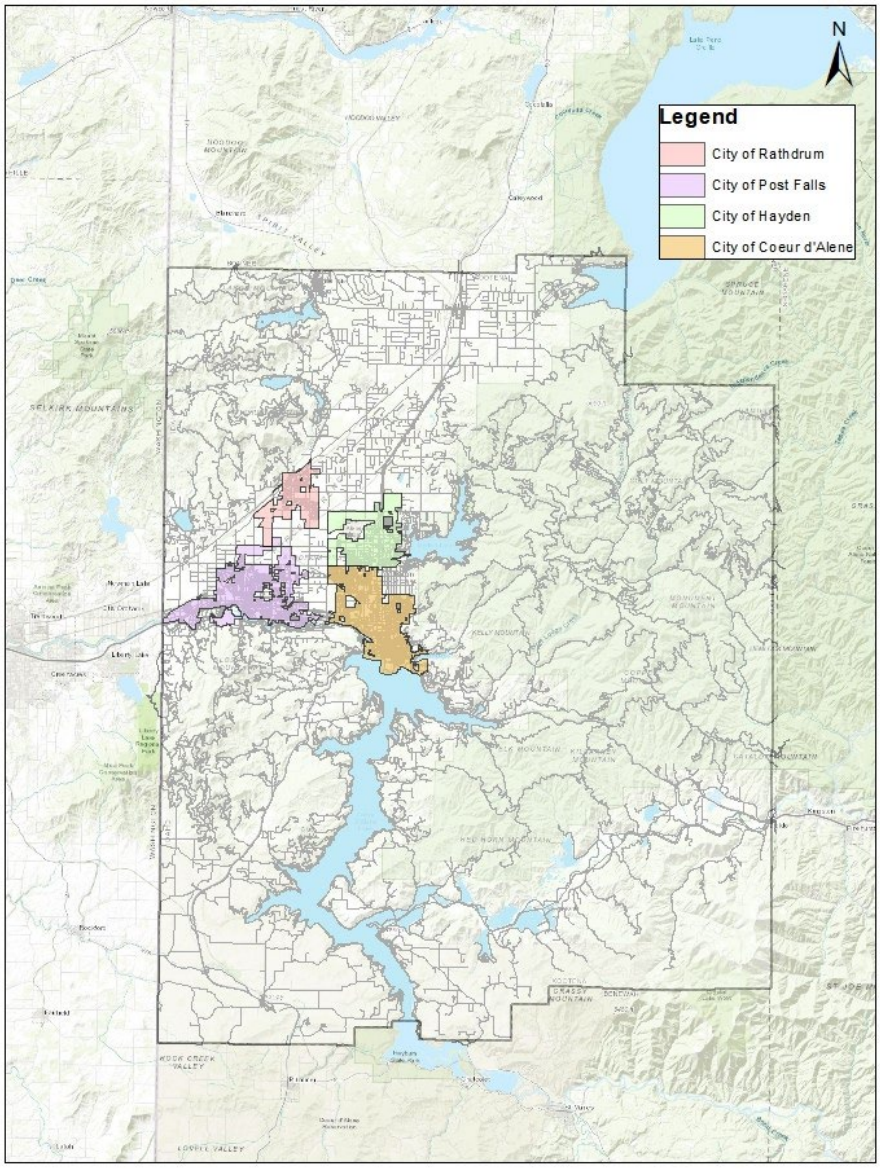
# 3 CURRENT SITUATION

This section describes background information for Kootenai County including, the vision, goals, and objectives of KRTMC deployment, the road networks contained within county limits as well as characteristics of the networks that establish the need for integrated transportation management. Network impact attributes include major traffic generators, regional demand and usage, and the types and frequency of events that impact arterial and corridor operations.

## 3.1 BACKGROUND, OBJECTIVES, AND SCOPE

The KMPO area, located in northern Idaho, is bordered by the Spokane, WA metropolitan area to the west, Bonner County and Canada to the north, Benewah County to the South, and Shoshone County to the East. This region includes the Coeur d'Alene-Post Falls urbanized area, which has experienced significant growth in recent years, and is forecasted to continue rapid growth for the next 20 years. **Figure 3.1** shows the extent of Kootenai County along with the limits of the Cities of Post Falls, Coeur d'Alene, and Hayden.

**Figure 3.1 - Kootenai County**



As previously noted, traffic impacts as experienced by the community include roadway bottlenecks, poor intersection levels of service, unreliable travel times, an overall lack of readily accessible motorist information, and unpredictable incident management on major highways and I-90. Because there is not currently a regional center for managing the transportation networks, the intent of the proposed KRTMC is to alleviate these impacts. This will be done by managing existing and planned traffic systems and integrating with systems from other jurisdictions to improve congestion and reduce travel time in the region.

The following Cities and Agencies are identified as participating Stakeholders in this collaborative KRTMC effort. All stakeholders have an operational role and were involved in the development of the Feasibility Study for the KRTMC. All stakeholders were given opportunities to participate in the development of KRTMC stakeholder needs which have guided the Service packages to be identified for this ConOps. Stakeholder roles and responsibilities are described in subsequent sections of this document:

- Kootenai Metropolitan Planning Organization (KMPO)
- Idaho Transportation Department 1 (ITD)
- Kootenai County Area Transportation Team (KCATT)
    - Idaho Transportation Department District 1 (ITD)
    - City of Coeur d'Alene
    - City of Post Falls
    - City of Hayden
    - City of Rathdrum
    - East Side Highway District
    - Post Falls Highway District
    - Lakes Highway District
- Emergency Service Providers
    - Idaho State Police (ISP)
    - Local City Police Departments
    - Kootenai County 911 Center (StateComm Coeur D' Alene)
    - State Communications Center
- Kootenai County Transit (CityLink)

### 3.1.1 Vision & Goals

The Kootenai KRTMC Project is a collaborative effort between the KMPO and the member agencies of the Kootenai County Area Transportation Team (KCATT), which includes the Idaho Transportation Department, the City of Coeur D'Alene, the City of Post Falls, the City of Hayden, the City of Rathdrum, the East Side Highway District, the Post Falls Highway District, the Lakes Highway District, and many local Emergency Services providers. Since the completion of the Feasibility Study, only the name has changed from KTMC to KRTMC, and the vision is still the same. As previously stated, KCATT defined the Vision for this KRTMC as:

**"The Kootenai TMC's (KTMC) purpose is to improve the quality of life for residents, travelers and those conducting business in the Kootenai County region through a shared approach to better surface transportation. KTMC's mission is to lead the advances in technology and multi-agency collaboration that improve mobility, reliability and safety on the regional transportation network."**

The KRTMC will serve as the foundation of systems satisfying stakeholder needs to reach this vision and it will enable focused traffic management operations across jurisdictional boundaries for all stakeholders to address the

traffic impacts that have occurred due to unforeseen growth in Kootenai County. Project stakeholders have identified at least six goals for the KRTMC project. Consistent with the information provided in the Feasibility Study, the primary goals for the KRTMC are listed in **Table 3.1.**

**Table 3.1: KRTMC Goals**

| | GOALS |
|---|---|
| 1 | Provide Professional Staff to support the freeway and arterials operations and maintenance of the county |
| 2 | Improve the efficiency of member agency's staffs to focus on core services besides transportation operations |
| 3 | Increase throughput of people throughout the county |
| 4 | Improve travel time reliability |
| 5 | Improve incident management |
| 6 | Enable real-time travel decisions |

### 3.1.2 Objectives

The KRTMC objectives will encompass operation and maintenance of the county traffic systems and integration with surrounding agencies for real-time operation of the transportation network. The KRTMC will provide efficient and reliable travel throughout the region, by dedicating staff for KRTMC operations and inter-agency coordination that does not exist today. Completing these goals, in part by deploying a traffic center; installing and upgrading traveler information devices, enhancing detection and communications systems, and upgrading signal control mechanisms. These actions will help realize improved congestion, decreased travel time, improved safety, and quicker incident response times. With integrated network operations, upgraded device installments, and enhanced communications, a foundation will be set for management of the total capacity and demand of the traffic system in relation to the changing conditions that will occur within the region in the future.

Several meetings and workshops were held to get stakeholder input and guide the decision-making process for the project. To achieve the project goals and maintain the scope, objectives for each goal were identified based on stakeholder input. Goals and corresponding objectives are shown in **Table 3.2** which was derived from the Feasibility Study. Strategies for transportation systems management and operations (TSM&O) in the region were also defined in alignment with the goals set out as part of the KRTMC. Further detail on these strategies and how they coincide with the KRTMC goals and objectives can be found in the Feasibility Study.

**Table 3.2: KRTMC Goals & Objectives**

| GOALS | OBJECTIVES |
|---|---|
| **Provide Professional Staff to support the freeway and arterials operations and maintenance of the county** | • Consolidate traffic operations staff to improve inter-agency coordination,<br>• Allow some agencies to focus on core services. |
| **Improve the efficiency of member agency's staffs to focus on core services besides transportation operations** | • TMC Coalition,<br>• Consolidated Staff,<br>• Professional Team to focus on traffic operations, |
| **Increase throughput of people throughout the county** | • Reduce Congestion,<br>• Maximize the efficient use of any spare capacity, such that delays on other saturated networks may be reduced,<br>• Improve pre-planning (e.g., developing response plans) for incidents, events, and emergencies that have regional implications. |

| GOALS | OBJECTIVES |
|---|---|
| **Improve travel time reliability** | • Reduce overall trip and person travel time through the county,<br>• Improve travel predictability,<br>• Maximize the efficient use of any spare capacity, such that delays on other saturated networks may be reduced,<br>• Improve commercial vehicle operations through and around the county, |
| **Improved incident management** | • Provide/expand means for communicating consistent and accurate information regarding incidents and events between networks and public safety agencies,<br>• Provide an integrated and coordinated response during major incidents and emergencies, including joint-use and sharing of response assets and resources among stakeholders, and development of a common policies and processes,<br>• Provide comprehensive and on-going training program – involving all networks and public safety entities – for regional events and incident management. |
| **Enable real-time travel decisions** | • Expand existing ATIS systems to include mode shifts as part of pre-planning. ("Mode shifts" are people changing travel between single-occupant travel, high-occupancy travel, transit, walk, bike, etc.),<br>• Expand coverage and availability of ATIS devices,<br>• Obtain accurate, real-time, status of the regional network and cross-network connections. |

## 3.2 DESCRIPTION OF CURRENT SITUATION

A separate Existing Conditions Technical Memorandum has been prepared as part of this KRTMC Systems Engineering Analysis effort. The reader is encouraged to review that document for further details of existing stakeholder conditions. This section provides a high-level discussion of those findings.

There is no existing regional TMC to coordinate traffic and incident management on a regional level in Kootenai County. Instead, each operating agency within the County maintains and operates their respective road networks through separate systems. The information in **Table 3.3** was provided in the Feasibility Study and indicates the existing Roles and Responsibilities that each stakeholder provides to the region in terms of infrastructure and traffic management.

**Table 3.3: Stakeholder Roles & Responsibilities**

| Traffic Related Roles | Idaho Transportation Department | City of Coeur D'Alene | City of Hayden | City of Post Falls | City of Rathdrum | Idaho State Police | Kootenai MPO | Kootenai County | Lakes Highway District | East Side Highway District | Post Falls Highway District |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Police | | ■ | ■ | ■ | ■ | ■ | | | | | |
| Fire | | ■ | ■ | ■ | ■ | | | | | | |
| Emergency Services | | ■ | ■ | ■ | ■ | ■ | | ■ | | | |
| Transit Services | | | | | | | | ■ | | | |
| Traffic Signal System | ■ | ■ | ■ | ■ | □ | | | | | | □ |
| Monitoring/Detectors | ■ | ■ | ■ | ■ | ■ | | | ■ | | | |
| DMS | ■ | | | | | | | | | | |
| Roadway Construction | ■ | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ |
| Roadway Maintenance | ■ | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ |
| Winter Roadway Maintenance | ■ | | | | | | | | ■ | ■ | ■ |
| Public Works | | ■ | ■ | ■ | ■ | | | | | | |
| Data Warehouse<br>□ Provides data to | ■ | □ | □ | □ | □ | □ | ■ | □ | □ | □ | □ |
| Modeling | ■ | | | | | | ■ | | | | |
| Internet Traveler Information/511 | ■ | | | | | | | | | | |

■ **Directly Supports**
□ **Indirectly Supports**

As identified by this table, there is a need for cross-agency coordination and sharing of resources between partner agencies within Kootenai County. This is further emphasized in **Figure 3.1** by analysis of various highways and major arterials that intersect and interconnect the three major cities of Post Falls, Coeur d' Alene and Hayden.

**Figure 3.2** provides a visual depiction of the current agency stakeholder operations, as far as management of traffic and incident management. As noted, existing conditions do not allow for timely coordination across agencies – as they all operate within separate operational domains. This is designated in this diagram by solid lines between all agencies and no network communications between them. All traffic data on Idaho 511 available to the public traveler is provided by local entities. Any additional data to be disseminated from other agencies would have to be conveyed to ITD by those agencies (incident on arterial, hazard, freeway back-up, EMS activity, etc.) and would require Traffic Operations staff located in their respective agency locations to convey that event for publishing.

Figure 3.2 - Current Traffic Operations

## 3.3 SUPPORT ENVIRONMENT

Kootenai County is the third most populous county in the state of Idaho and is located at the southern end of the Idaho Panhandle. The county seat and the largest city in the county is Coeur d'Alene. The population reported by for Kootenai County in the US Census 2018 is approximately 161,505. The latest available figures show continued increases in 2021 (179,789), and in 2023 (181,223 – according to World Population Review). Kootenai County includes the cities of Athol, Coeur d'Alene, Dalton Gardens, Fernan Lake Village, Harrison, Hauser, Hayden, Hayden Lake, Huetter, Post Falls, Rathdrum, Spirit Lake, Stateline, and Worley. According to the US Census Bureau, the county has a total area of 1,316 square miles, of which 1,244 square miles is land and 71 square miles is water. Most of the water area is the county's primary attraction, i.e., Lake Coeur d'Alene. It is surrounded by Bonner County in the north, Benewah County in the south, Shoshone County in the east, and Spokane County (Washington State) in the west.

The Kootenai County region consists of different roadway networks as listed below, all of which are experiencing increased congestion due to high growth rates, and visitor travel in the area:

- Arterials
- Freeway
- Ports of Entry
- Transit
- Freight Routes

### 3.3.1 Existing ITS Operations

The development of the KRTMC will enhance management and operations of Intelligent Transportation Systems (ITS) which will facilitate coordination and management of the existing roadway networks within the region. The following summary of ITS Operations was primarily obtained from the Feasibility Study and remains consistent. All roadway networks will benefit operationally from the development of the KRTMC based on the needs described, however the Freeway and Arterial networks should specifically see advantage.

ITD is the largest partner agency responsible for ITS operations and systems in the project area. The ITS infrastructure currently deployed by ITD in Kootenai County area includes:

- Road Weather Information System (RWIS) stations
- Dynamic Message Signs (DMS)
- CCTV cameras and Video Detection Systems (VDS)
- Traffic Signal Controllers at freeway ramp entrances as well as state highway intersections.

Most of these transportation systems are supported by a combination of fiber optics, twisted wire pair, and/or wireless (dedicated P2P microwave and cellular router) networks, employing both Ethernet and Serial based communications. ITD also provides travelers traffic information via the Idaho 511 website for traffic/traveler information dissemination - ITD's traffic website https://511.idaho.gov/.

Many of the systems employed by ITD are interconnected but are deployed on self-contained closed network systems used by, serviced, and managed by ITD staff only. Much of the data and functionality provided by these systems is not shared with other agency partners, as the network infrastructure and systems required to share these assets is not in place for that level of cooperation. The other larger partner agencies, such as City of Post Falls, and City of Coeur D'Alene, also employ an inventory of ITS equipment and/or communications infrastructure and do not coordinate or share these systems across agencies. Like ITD these agencies employ closed networks with no interconnect to partner agencies. Many of these city entities have additional roles in interfacing Police, Fire, and Emergency Services, making their ITS operations and roles in that effort as complicated as ITD's.

### 3.3.2 Existing ITS and Traffic Signal Software

To alleviate the traffic issues stakeholders are facing, central control of their traffic signal systems will be critical. There are several different software platforms currently being used to manage their ITS devices and signal controllers in the County. These include:

- Econolite Centracs (Traffic Signal Management) – City of Post Falls/ Idaho Transportation Department (ITD)
- Siemens Tactics (Traffic Signal Management) – City of Coeur D'Alene
- Parsons iNET (Freeway Management) – Idaho Transportation Department (ITD)

ITD is working on an upgrade to the Parsons iNET software platform. It is assumed for this ConOps, that this software platform will be an option for the KRTMC. Licensing of Centracs and Tactics software will also be considered for the KRTMC. No other agency has central traffic signal software in operation.

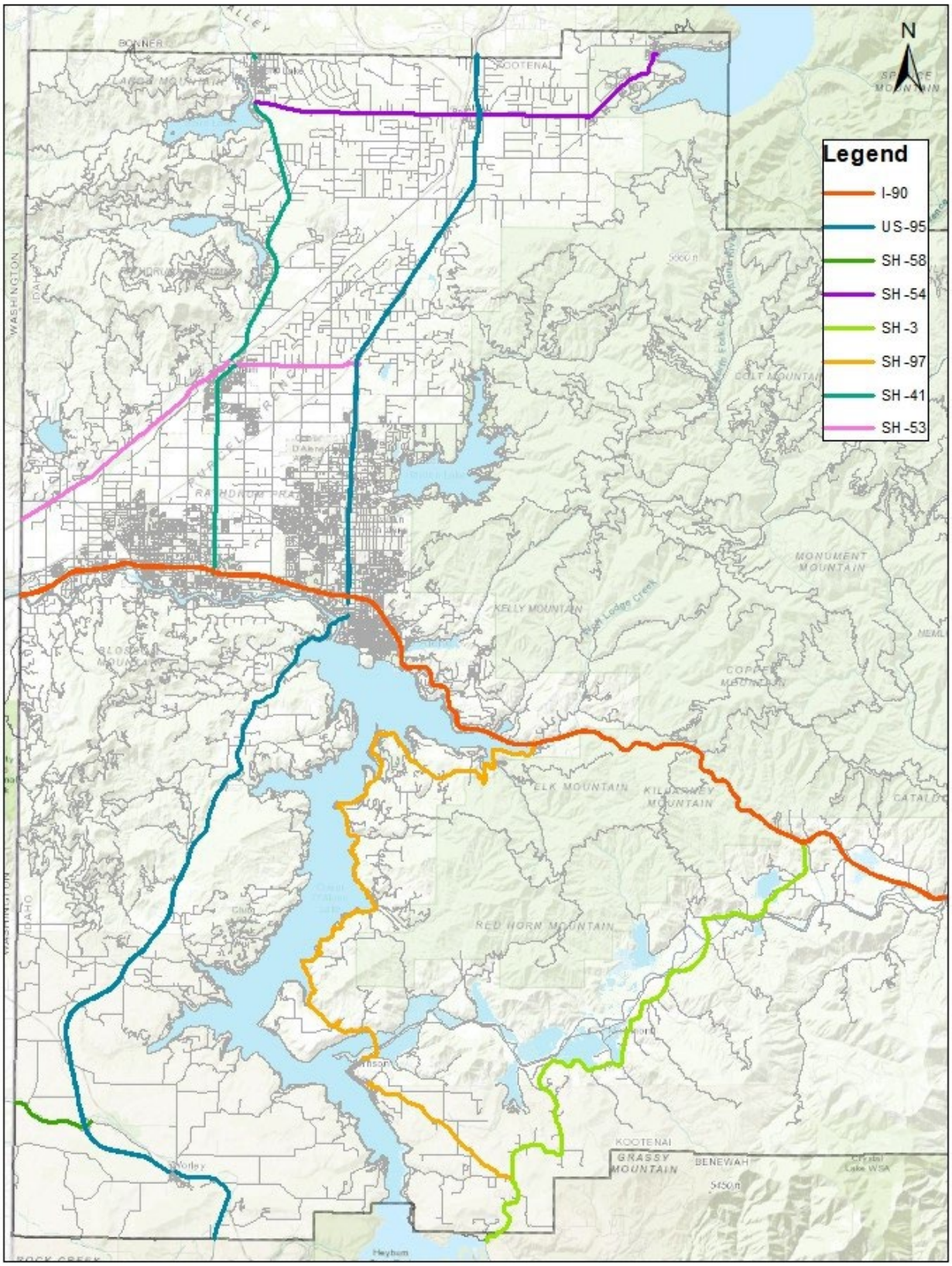
### 3.3.3 Arterial Street Network

Efficient management of arterial traffic is a major aspect of TMC operations. The Kootenai County region has an extensive arterial network managed through monitoring, detection and traffic signal control which has been greatly impacted by the unexpected growth in the area. Enhancing the management of these arterials through KRTMC signal timing adjustment and control will improve capacity without physical construction and improve day-to-day traffic flow as well as in response to incidents. There are several principal arterials in Kootenai County that are designed to carry high traffic volumes and serve a high proportion of through trips and long-distance travel. Typically, these principal arterials have at least two lanes in each direction with curbs and sidewalks. There are approximately 251 lane miles of principal arterials in Kootenai County.

The major urban principal arterials in the County include Seltice Way, Prairie Avenue, US-95 through Coeur d'Alene and Hayden, and SH-41 through Post Falls. The County's rural principal arterials include SH-53, US-95 north of Hayden, US-95 from Coeur d'Alene to Benewah County line, and SH- 41 north of Prairie Avenue. The speed limits for principal arterials in Kootenai County are typically 35 to 45 mph in urban areas and 55 mph in rural areas. The most frequently traveled non-interstate highway, within Kootenai County, is the US-95 and State Highways 41, 53, and 54. US Highway 95, otherwise an interstate highway, is the main arterial that runs north-south through Kootenai County from Benewah to Bonner County. This arterial is a high-volume route for private vehicles and freight both in the rural and urban areas. US-95 is one of the major corridors through the Coeur d'Alene-Hayden urban area, with significant congestion throughout the corridor.

In August of 2020 the Feasibility Study was completed, improvements for US-95 were underway, and ITD was seeking to mitigate the congestion with regular signal spacing and a more adaptive signal system for greater efficiency, that work is ongoing today. It's important to note that US-95 holds significance in the area as it is a continuous north-south route from Nevada through Idaho into Canada.

**Figure 3.3 – Key Corridors – Kootenai County**



State Highway 41 extends from I-90 in Post Falls into Bonner County, north of Spirit Lake. It is anticipated that the use of the SH-41 corridor will continue to grow with the development of the Rathdrum Prairie. State Highway 54 is another corridor which extends from SH-41 to Bayview. Improvements for SH-54 include improved non-motorized facilities along the corridor from Spirit Lake to Athol and from Athol to Bayview. State Highway 53 is another highly traveled secondary primarily east-west highway, located approximately 3 miles north of I-90. It is an alternative interstate route from Washington into Idaho. **Figure 3.3** shows the key corridors in Kootenai County. The roadways that are most relevant to this effort include I-90, SH-41 and US-95 as these corridors run through the area where most of the existing signal controllers are located.

Minor arterials connect private and commercial traffic from lower roadway classifications to the larger transportation system. Examples of minor arterials include Government Way, Lancaster Ave, and Greensferry Road. There are approximately 303 lane miles of minor arterials in the County, with speed limits ranging from 35-45 mph. Collector streets in the County collect residential and rural traffic and direct it to minor or principal arterials. 15th Street in Coeur d'Alene, Hayden Avenue, Diagonal Road, and Fernan Lake Road are examples of collectors. There are over 1120 lane miles of collectors in Kootenai County. The speed limits of collectors are generally between 25 and 30 mph.

### 3.3.4 Freeway Network

Interstate 90 is the only federally classified freeway in Kootenai County. It is owned and maintained by ITD and totals approximately 36 miles (179 lane miles) of urban and rural interstates and ramps, and 15 interchanges. The speed limits along I-90 range from 65 mph to 75 mph. In Kootenai County, I-90 runs east-west and spans over the Cities of Post Falls and Coeur d'Alene. The freeway intersects SH-41 and continues through Coeur d'Alene, the largest city in northern Idaho, and intersects a business route and US-95. I-90 continues southeast towards the Coeur d'Alene River valley followed by Cataldo before passing into the Shoshone County.

### 3.3.5 Ports of Entry

Kootenai County does not have direct Ports of Entry to neighboring Canada but is affected by the two (2) ports of entries into Idaho from Canada. Traffic from Canada can enter via State Highway 1 in Porthill or via US Highway 95 in Eastport and travel via Boundary County, the most northern county in Idaho, and Bonner County before entering Kootenai County. The operations staff located in the KRTMC will need to know whether one or both ports of entry have delays or closures to inform the traveling public, including commercial vehicles accordingly.

### 3.3.6 Transit Network

Public transportation in Kootenai County is overseen by the KMPO. Currently, public transportation in the County is the least available and least utilized transportation option. However, over the last few years efforts have been and are continuing to be made, where the local jurisdictions have teamed up to implement the transit bus service.

The current Public Transportation in Kootenai County is in the form of Citylink, a public transit service, which was initiated in 2005. Citylink Transit is a unique public transportation partnership between the Coeur d'Alene Tribe, the State of Idaho, and Kootenai County. It provides fixed-route bus service throughout the metropolitan area of Kootenai County and to the northern rural portion of Benewah County. The Citylink transit operations are supported by federal grants, local government matches, and tribal funds. Municipalities linked by the fixed-route service include Coeur d'Alene, Post Falls, Dalton Gardens, Huetter, Hayden Lake, State Line Village, Fernan, Hayden, Worley, Plummer, Tensed, and DeSmet. The transit service has five interconnected routes that operate seven days a week, 365 days per year, and transport an average of 46,000 people per month.

The Citylink bus service is free, and passengers can take the bus at one of the 100 designated bus stops throughout the area. The urban routes and link route connect at the temporary Riverstone transit center site in Coeur d'Alene. The link and rural routes connect to the Coeur d'Alene Casino in Worley. Citylink also offers complimentary paratransit shuttle bus service, to customers who live on the Coeur d'Alene tribal reservation. This curb-to-curb minibus service is free of cost. The buses are also accessible to disabled passengers and can transport four bicycles.

Most Citylink buses are equipped with seating capacity of 33 people and a few bicycle racks. All buses are fitted with wheelchair lifts to accommodate the needs of North Idaho patrons.

### 3.3.7 Freight Network

I-90 is an important freight corridor for interstate commerce in and out of Kootenai County, as well as across the country, extending from the West Coast ports of the Pacific Northwest to Boston. Therefore, it is included on the National Freight Network designated by the USDOT, FHWA. I-90 also has direct access to west coast ports in Seattle and Tacoma which assist in receiving and shipping products because of import and export markets. It provides inland northwest products access to major markets such as Portland and Seattle, and east to Chicago.

Another high priority freight corridor is US-95 which extends from the Canadian border at Eastport, Idaho to the Oregon State border. It is the only main north-south route in northern Idaho which primarily carries intrastate and limited interstate north-south traffic. This is due to the excessive travel times caused by terrain and weather-related challenges that impact the cost of freight and goods movement. However, significant improvements are being made to US-95 which have led to reduced travel times. As the improvements continue, more interstate and international truck trips are expected to take advantage of US-95's shorter distance to access north Idaho and Canada in the future. Further regionally significant urban and rural freight corridors in Kootenai County include W. Seltice Way, US-95 (urban and rural), SH-53, and SH-54.

### 3.3.8 Traffic Generators and Events

Kootenai County has seen a rise in congestion on many of its key/priority corridors due to growth in transportation demand. Economic and population growth are believed to be the main reasons for the increase in traffic demand in the region. This belief is reinforced by the fact that Idaho was identified by the U.S. Census Bureau (2017) as the fastest-growing state in the country (in terms of population by percentage), with an annual population growth rate of 2.2 percent. Idaho has consistently been the fastest-growing state in the U.S. since 2013. This overall growth has caused growth in transportation network demand, leading to an increase in:

- Traffic volume
- Vehicle miles travelled
- Ridership/passenger counts
- Fuel expenditures

Kootenai County is known to attract a lot of tourists and visitors, given views of the scenic mountains, pristine lakes, parks, and recreational activities (e.g. hiking, hunting, fishing, bicycling, boating, and snow skiing) the region offers. Year-round Tourism, therefore, is one of the major contributors to the traffic growth that leads to an increase in out-of-county and out-of-state vehicles placing additional demands on the area's roadway network. Major events that typically take place annually have a significant impact on the region's network, in the passenger vehicles they attract as well as additional freight trucks that travel on the freeway. Recurring events requiring customized Maintenance of Traffic (MOT) in the region include:

- Coeur d'Alene Tribal Events
- Independence Day (July 4$^{th}$) Events
- Christmas/Holiday Related Events
- Ironman Competitions
- Film Festivals
- Street Fair
- Art Shows
- Golf Competitions
- Marathons Competitions
- Silver Mountain Ski Resort
- Silverwood October Halloween events
- On-going roadway and freeway expansions

# 4 JUSTIFICATION FOR AND NATURE OF CHANGES

This section describes the shortcomings of the existing situation that motivate development of the KRTMC. These are described as needs that drive the project scope as well as the identification of National Architecture ITS Service packages proposed to be employed for meeting those needs. As indicated in the Feasibility Study, the KRTMC will provide the Kootenai County region coalition partners the ability to proactively, and effectively prepare for and manage the traffic congestion experienced due to the events and growing population in the region. The focus of the KRTMC concept is on operational, institutional, and technical coordination of the County's different networks and cross-network connections within the region.

## 4.1 STAKEHOLDER NEEDS

A key tenet of the Systems Engineering (SE) approach is that the proposed system functions be aligned with stakeholder needs. One goal of the ConOps is to document this alignment, along with other important operational considerations such as institutional constraints, stakeholder roles, and standards. These goals, specific to the KRTMC development, were obtained from the previously completed Feasibility Study and refined for this ConOps effort. By utilizing the National ITS Architecture as its organizing framework, the logical system solutions (Service packages) for the KRTMC will ensure the following:

- The stakeholder needs are addressed,
- The ITS architecture requirements are employed that meet the stakeholder needs,
- The ITS functional elements are employed that address the requirement, and
- The ITS Service packages (i.e., sub-systems) are employed to deliver the ITS functional elements.

Utilizing this framework, stakeholder needs related to proposed KRTMC functionality/design are summarized in this section. Challenges (i.e., needs) identified by stakeholders fall into the following categories and are organized accordingly:

- Agency Coordination
- Proactive Operational & Control Strategies
- Arterials
- Freeways
- Incident Management / Field Operations
- Multi-Networks
- Institutional/Coordination Needs

**Table 4.1** encompasses all relevant stakeholder needs and provides a summary of the challenges associated. These needs were documented in the 2020 Feasibility Study and have since then been verified and refined during this effort. The stakeholder needs listed here have driven the identification of service packages described in this section as part of the project to meet those needs.

**Table 4.1: Stakeholder Needs and Associated Challenges**

| Need/Challenge |
|---|
| **Agency Coordination** |
| Support interagency data analysis and communications |
| **Proactive Operational & Control Strategies** |
| Ability to implement Active Transportation and Demand Management (ATDM) – Arterials, Coordinated Signal Timing, Access Management |
| Improve transportation operations safety |
| Improve transportation operations efficiency |
| Improve freeway performance – mitigate congestion |

| Need/Challenge |
|---|
| Improve freeway performance – improve safety |
| Improve freeway performance – enhance mobility |
| Minimize traffic incident response disruption to other system users |
| Reduce travel demand in congested areas |
| Provide effective travel choices in congested areas |
| Support changes in travel patterns |
| **Arterials** |
| Develop agency to agency system/center communications |
| Develop agency to agency system/center video sharing |
| Improve traffic flow between signalized intersections |
| Improve traffic flow between signalized intersection on detour routes |
| Improve signal system response to changing traffic conditions |
| Develop ability to monitor real-time traffic conditions (incl. speed and volume data) |
| Develop ability to utilize real-time traffic data to improve traffic operations |
| Develop ability to access to 911 / Emergency CAD data by Traffic Management Center for improved incident management along monitored corridors |
| Develop incident detection and notification |
| **Freeways** |
| Develop (accurate) freeway travel data |
| Develop mediums for distributing traveler information |
| Develop real-time accurate freeway travel times |
| Develop interagency data sharing (freeway travel speed time data) |
| Develop travel time information distribution to travelers |
| Develop travel time information to support operations of other agencies |
| **Incident Management/Field Operations** |
| Develop incident detection and notification systems |
| **Multi-Networks** |
| Travel time data distribution along arterials prior to freeway entrances |
| Communicate diversion routes to travelers |
| Develop improved traveler information – share travel condition data across all networks |
| More detailed real-time incident information |
| Traveler information across modes – especially travel time/ delay information |
| Development of multi-faceted incident response protocols |
| **Institutional/Coordination Needs** |
| Develop communications across networks |
| Develop data sharing among public and private agencies |
| Robust information-exchange capability among agencies |
| Develop accurate traffic condition monitoring (Repeat of MN-4) |
| Reduce incident detection time |
| Develop communications across networks |

## 4.2 JUSTIFICATION OF CHANGES

KMPO stakeholders have identified several User and System needs to be addressed through deployment of the services provided by the centralized KRTMC, based on the core operations and technology elements described in previous sections. This section summarizes the FHWA ITS Service packages proposed as part of the KRTMC and the new or modified aspects of the user needs, missions, objectives, environments, interfaces, personnel, or other factors that require a new or modified system(s).

The System Needs for each Service package are different than the Stakeholder Needs detailed previously, which align with proposed KRTMC functionality/design. These needs follow the format and descriptions specified in the National ITS Architecture service packages and are identified as part of the proposed system architecture. They describe the needs that are fulfilled by each service package and are designed to answer two basic questions in terms of each service package definition:

- What does the System need to do?
- What do users need from the System?

Service packages provide an accessible, service-oriented perspective to the system architecture used to describe the project. They represent the pieces of the physical view (i.e., the systems and devices and their interfaces) that are required to provide a particular ITS service. All service packages described in this section were assigned a 'low, medium, or high priority' based on the importance of the service in a successful KRTMC operation, and what was identified in the Feasibility Study. These priorities and needs were further refined and confirmed with stakeholders. Consistent with FHWA SET-IT tool practices, additional user needs refinements are presented for each service package and the needs met. Each proposed change is classified as 'essential, desirable, or optional' for each need met by the service package. The services draw from the operations and technology elements described and cover all relevant KRTMC functions for KMPO that range across data management, maintenance, and construction, specifically related to winter weather, traffic management and traveler information. The services packages identified in **Table 4.2,** and described in following subsections, are consistent with the National ITS Architecture Service packages and are considered as 'required' for the KRTMC to meet user needs.

**Table 4.2: KRTMC ITS Service Packages**

| ITS Service Packages | Priority |
|---|---|
| TM01: Roadway and Traffic Monitoring (ITD + Cities) | High |
| TM03: Traffic Signal Control (ITD + Cities) | High |
| TM05: Traffic Metering | Medium |
| TM06: Traffic Information Dissemination | High |
| TM07: Regional Traffic Management/Coordination | Medium |
| TM08: Traffic Incident Management System | High |
| MC01: Maintenance and Construction Vehicle and Equipment Tracking | High |
| MC03: Winter Operations/ Roadway Conditions | High |
| MC04: Winter Maintenance Information | Medium |
| MC06: Work Zone Management | Medium |
| TI01: Traveler Information Dissemination | High |
| DM01: ITS Data Warehouse | Medium |

### 4.2.1 TM01: Roadway and Traffic Monitoring (ITD + Cities)

This service package aligns with the monitoring and detection needs of the proposed KRTMC. The package includes traffic detectors, other monitoring equipment, supporting field equipment, and center-to-field communications to transmit collected data back to the KRTMC. 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 Traveler Information Center (TIC) physical object. The data derived from these components 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 TMC). While the ITS resources identified with this service package are shared through the KRTMC, this service package is identified for both ITD and Cities separately due to ownership and existing implementations of these systems.

**Table 4.3** summarizes the TM01 needs and priorities.

**Table 4.3: TM01: Infrastructure-Based Traffic Monitoring Needs Addressed**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to be able to monitor the road network using infrastructure devices to detect and verify incidents and support implementation of traffic operational strategies. | Essential |
| 2 | Traffic Operations need to be able to monitor the infrastructure devices used for road network monitoring to detect faults in equipment or communications. | Essential |
| 3 | Traffic Operations need to be able to send network monitoring data to other centers to support traveler information. | Essential |

### 4.2.2 TM03: Traffic Signal Control (ITD + Cities)

This service package encompasses the traffic signal control aspects of KRTMC operation, including the central control and monitoring equipment, communication links, and signal control equipment that support traffic control at signalized intersections on the arterial network. A range of traffic signal control systems are represented by this service package ranging from fixed-schedule control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This service package is generally an intra-jurisdictional package. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would also be represented by this package. Coordination of traffic signal systems using real-time communications is covered in the TM07-Regional Traffic Management service package. This service package is consistent with typical traffic signal control systems. While the ITS resources identified with this service package are shared through the KRTMC, this service package is identified for both ITD and Cities separately due to ownership and existing implementations of these systems.

**Table 4.4** summarizes the TM03 needs and priorities.

**Table 4.4: TM03: Traffic Signal Control Needs Addressed**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to be able to remotely control traffic signals at intersections under their jurisdiction | Essential |
| 2 | Traffic Operations need to be able to manage and implement control plans to coordinate signalized intersections. | Essential |
| 3 | Traffic Operations need to be able to monitor and control pedestrian crossing aspects of traffic signals to facilitate safe pedestrian crossings at the intersection. | Essential |
| 4 | Traffic Operations need to monitor the status of traffic signal control equipment. | Essential |

### 4.2.3 TM05: Traffic Metering

This service package provides central monitoring and control, communications, and field equipment that support metering of traffic. It supports the complete range of metering strategies including ramp, interchange, and mainline metering. This package incorporates the instrumentation included in the TM01 service package (traffic sensors are used to measure traffic flow and queues) to support traffic monitoring so responsive and adaptive metering strategies can be implemented. Also included is configurable field equipment to provide information to drivers approaching a meter, such as advance warning of the meter, its operational status (whether it is currently on or not, how many cars per green are allowed, etc.), lane usage at the meter (including a bypass lane for HOVs) and existing queue at the meter.

**Table 4.5** summarizes the TM05 needs and priorities.

**Table 4.5: TM05: Traffic Metering Needs Addressed**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to be able to monitor and control traffic metering equipment to regulate the flow of traffic on ramps, interchanges, and the mainline. | Desirable |
| 2 | Traffic Operations need to monitor the status of traffic metering equipment. | Desirable |
| 3 | Traffic Operations need to be able to implement control strategies utilizing the traffic metering equipment on ramps, interchanges, and on the mainline. | Desirable |

### 4.2.4 TM06: Dynamic Message Signs (DMS)/Roadside Information

This service package consists of the planned resources and functions for disseminating information from the KRTMC to drivers and the media. The package includes equipment that provides driver information such as dynamic message signs and information sharing via 511 or smartphones. A wide range of information is planned to be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, emergency alerts, and driver advisories. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management (MCM) Center allows real time information on road/bridge closures and restrictions due to MCM activities to be disseminated.

**Table 4.6** summarizes the TM06 needs and priorities.

**Table 4.6: TM06: Traffic Information Dissemination Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to be able to provide traffic and incident information to drivers using roadside devices such as dynamic message signs and smartphone/511. | Essential |
| 2 | Traffic Operations needs to monitor roadside devices used to provide traffic and traveler information to drivers. | Essential |
| 3 | Traffic Operations need to be able to provide traffic and incident information, including images to the media. | Desirable |
| 4 | Traffic Operations need to be able to provide traffic and incident information, including images to traveler information, transit, maintenance, and emergency centers. | Essential |

### 4.2.5 TM07: Regional Traffic Coordination

This service package contains the resources that allow for coordination among traffic management centers to support regional traffic management strategies. In this case, the services provided in this package will allow the proposed KRTMC to connect any necessary traffic management centers in regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control by adding communication links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control service package and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported by sharing of information through sharing of device control between traffic management centers.

**Table 4.7** summarizes the TM07 needs and priorities.

**Table 4.7: TM07: Regional Traffic Coordination Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to exchange traffic and incident data with other Traffic Management Centers to support regional coordination spanning jurisdictional boundaries. | Desirable |
| 2 | Traffic Operations need to exchange traffic control data with other traffic management centers to support inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. | Desirable |

### 4.2.6 TM08: Traffic Incident Management System

This service package encompasses KRTMC's Incident Management. The package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The package includes incident detection capabilities through roadside monitoring devices (e.g., CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through information at the State Communications Center terminal or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. Local management of the incident using an incident command system is covered by PS02.

**Table 4.8** summarizes the TM08 needs and priorities.

**Table 4.8: TM08: Traffic Incident Management System Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Traffic Operations need to detect and verify incidents on roadways using CCTV and field sensors. | Essential |
| 2 | Traffic Operations need to share incident information with other ITS centers to coordinate incident response. | Desirable |
| 3 | Traffic Operations need to obtain incident information from other ITS centers to coordinate incident response | Desirable |
| 4 | Emergency Operations need to be able to dispatch emergency assets to a traffic incident. | Essential |
| 5 | Traffic Operations need to coordinate requests for resources with emergency and maintenance centers to support cleanup after the incident. | Essential |

### 4.2.7 MC01: MCM Vehicle Winter Operations/ Snowplow Tracking

Winter weather management and operations is an important function of the KRTMC to enhance mobility on the transportation network and prevent incidents related to inclement weather. This service package tracks the location of snowplows to ascertain the progress of their activities. Checks can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations as well as warning travelers of snowplow operations ahead.

**Table 4.11** summarizes the MC01 needs and priorities.

**Table 4.9: MC01: Winter Operations/ Snowplow Tracking Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Maintenance and construction operations need to be able to track the location of maintenance and construction vehicles and other equipment to ascertain where their assets are. | Essential |

### 4.2.8 MC03: Winter Operations/ Roadway Conditions

This service package addresses roadway section based on environmental or atmospheric conditions. Treatments include fog dispersion, anti-icing chemicals, etc. The service package includes the environmental sensors that detect adverse conditions, the automated treatment system itself, and driver information systems (e.g., dynamic message signs) that warn drivers when the treatment system is activated.

**Table 4.12** summarizes the MC03 needs and priorities.

**Table 4.10: MC03: Winter Operations/ Roadway Conditions Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Maintenance and construction operations need to be able to automatically treat a roadway section based on environmental or atmospheric conditions. | Optional |
| 2 | Maintenance and construction operations need to be able to warn drivers when a roadway treatment system is activated. | Desirable |
| 3 | Maintenance and construction operations need to be able to monitor operational status of the environmental sensors that detect adverse conditions. | Essential |

### 4.2.9 MC04: Winter Maintenance Information

This service package supports monitoring of winter road maintenance including snowplow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.

**Table 4.13** summarizes the MC04 needs and priorities.

**Table 4.11: MC04: Winter Maintenance Information Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Maintenance and construction operations need to be able to collect environmental situation data from centers, field devices and private, commercial, specialty and public fleet vehicles to schedule winter maintenance activities, determine the appropriate response to weather events/conditions, and track and manage response operations. | Essential |
| 2 | Maintenance and construction operations need to be able to process current and historical data from multiple sources to provide enhanced support for winter maintenance operations. | Desirable |
| 3 | Maintenance and construction operations need to be able to create enhanced treatment plans for use by agency maintenance personnel. | Desirable |
| 4 | Maintenance and construction operations need to be able to provide winter maintenance instructions including treatment route, treatment application rates, start and end times, and other treatment instructions for vehicle operators. | Desirable |
| 5 | Maintenance and construction operations need to be able to provide winter road maintenance status to other centers. | Desirable |

### 4.2.10 MC06: Work Zone Management

This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.

**Table 4.14** summarizes the MC06 needs and priorities.

**Table 4.12: MC06: Work Zone Management Needs Addressed**

| Number | Need | Priority |
|---|---|---|
| 1 | Maintenance and construction operations need to be able to manage work zones and control traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. | Desirable |
| 2 | Maintenance and construction operations need to be able to inform the driver of upcoming work zones, including reduced speeds, lanes affected, and delays. | Essential |
| 3 | Maintenance and construction operations need to be able to coordinate work zone information with other agencies (e.g., traveler information, traffic operations, and other maintenance and construction centers). | Essential |
| 4 | Maintenance and construction operations need to be able to provide control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones. | Desirable |

### 4.2.11 TI01: Traveler Information Dissemination

This service package encompasses capabilities for a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies.

**Table 4.9** summarizes the TI01 needs and priorities.

**Table 4.13: TI01: Traveler Information Dissemination Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | Traveler Information needs to be able to collect timely, accurate, and reliable traffic, transit, and other road conditions data from multiple sources to broadcast the latest conditions affecting travelers. | Essential |
| 2 | Traveler Information needs to be able to inform as much of the traveling public as possible using any available broadcast media to increase mobility and safety through better information. | Essential |
| 3 | Travelers need access to timely, accurate, and reliable traffic, transit, and other travel conditions to make informed decisions about their travel. | Essential |

### 4.2.12 DM01: Transportation Data Warehouse

This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research, specifically related to KMPO's Transportation Data Archive. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physically distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.

**Table 4.10** summarizes the DM01 needs and priorities.

**Table 4.14: DM01: Transportation Data Warehouse Needs**

| Number | Need | Priority |
|---|---|---|
| 1 | System operators need to be able to store data for long term access by themselves and other operators. | Desirable |
| 2 | System operators need to be able to query for and receive archive data products containing freeway data, tolling data, arterial data, parking data, transit and ridesharing data, incident management data, safety-related data, Commercial Vehicle Operations (CVO) data, environmental and weather data, vehicle and passenger data and intermodal operations data. | Essential |
| 3 | System operators need to be able to manage data processing about data archive functions, including data aggregation, data tagging (processed, edited, raw, transformed, etc.), data storage timing and longevity, data quality analysis, data formatting and metadata assignments. | Desirable |

# 5 CONCEPTS FOR PROPOSED SYSTEM

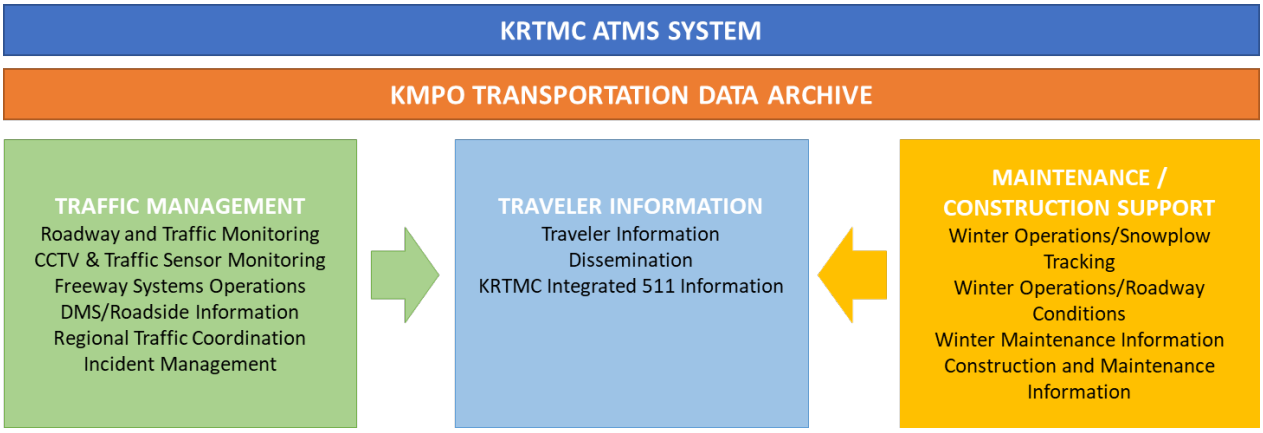
This section provides information on the key components of the KRTMC system with a focus on organizational and operational aspects. An overview of the KRTMC is included, as well as diagrammatic descriptions of the proposed systems with information on how systems will interconnect as relevant to the ITS service packages identified. The concepts of the proposed system are described using FHWA system architecture views based on the USDOT Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT), and subsequently tailored to meet the needs and vision of the KRTMC. More information about ARC-IT can be found at the ARC-IT website.

## 5.1 BACKGROUND, OBJECTIVES, AND SCOPE

The proposed KRTMC will provide a centralized operations center for traffic management, incident detection and response, as well as supplementary traveler information sharing for the KMPO region. It will achieve this by supporting regional interagency coordination efforts and using interface access for monitoring and/or control of allied agency ITS assets. The KRTMC will serve as a facilitator with access to information from across the region and will provide the proverbial "40-thousand-foot" traffic conditions view.

Under the proposed concept, KRTMC staff will have the ability to adjust signal timing plans to improve traffic operations in the event of a significant incident or event. This will require coordination among the various agencies in advance so that appropriate response strategies are in place and approved by the respective city or agency. The process of signal timing plan development is intended to be a key aspect in the development of regional incident management plans. **Figure 5.1** provides an overview of the proposed KRTMC system. As shown, the KRTMC will coordinate across all management systems to incorporate traffic management, traveler information, and maintenance/construction support while maintaining a general data archive with all information.

**Figure 5.0 – KRTMC System Overview**




As currently envisioned, the KRTMC will share and utilize roadway monitoring and traveler information system assets belonging to other agencies – primarily ITD. The KRTMC will require interface connectivity for either control, as is the case for CCTV cameras in the KMPO region, or for monitoring of data (but no control) for assets such as weather sensor stations, monitoring the locations of snowplow, and monitoring the location and status of maintenance/construction activities. **Table 5.1** provides a summary of KRTMC-ITS Asset interface characteristics.

**Table 5.1: KRTMC – ITS Asset Interface Characteristics**

| Asset | Interface Description | Functional Area |
|---|---|---|
| CCTV | Control for PTZ Operations<br>Imagery Display at KRTMC | Incident Detection/ Management<br>Traveler Information |
| RWIS | Monitoring of Station Readings | Roadway Monitoring |
| Snowplows | Monitoring of Current Location | Incident Detection<br>Traveler Information |
| Maintenance & Construction | Monitoring of Current Work Locations<br>Monitoring of Status (Completion) | Incident Detection<br>Traveler Information |
| DMS | Control for Message Display | Incident Management<br>Traveler Information |
| Idaho 511 | Integration (Authorized User) for Posting Messages/Alerts/Camera Views/Speeds/etc. | Traveler Information |
| Traffic Signals | Control for Implementation of Timing Plans | Incident Management<br>Signal Coordination |
| ITD/KMPO Database | Archive to Archive Data Exchange | Planning |

### 5.1.1 Services & Functions

The envisioned KRTMC will utilize/share existing and new traffic systems and provide access to, and integration with, existing regional transportation management resources. This will provide KMPO stakeholders with a centralized traffic system for managing and coordinating incident response, to include disseminating traveler information and improving traffic flow along arterials. The KRTMC will also serve as the regional transportation data archive, providing information to support future incident response planning. The focus of the system will be to enable centralized monitoring of the regional transportation network, arterials, and freeways alike.

As illustrated previously in **Figure 5.1**, most sub-systems are clustered under Traffic Management and Maintenance/Construction Support. The functionalities of these subsystems will in turn provide the services for monitoring and situational awareness needed by KRTMC staff to disseminate traveler information and conduct incident management. Traveler information, at this point, will be provided through services related to roadside units (i.e., DMS) and through integration with ITD's 511 TraveliQ Event Reporting System (ERS).

The core KRTMC Operational functions are summarized in **Table 5.2**. Operations are organized according to ITS architecture functions to facilitate tracking in ITS physical diagrams presented in subsequent sections of this document.

**Table 5.2: KRTMC Core Operations Summary**

| Operations/ ITS Functional Element | Description |
|---|---|
| Roadway Basic Monitoring | Technologies supporting 'Roadway Basic Monitoring' monitors traffic conditions using fixed equipment such as loop/video detection and CCTV cameras. |
| Roadway Field Management Station Operation | Technologies supporting 'Roadway Field Management Station Operation' supports direct communications between field management stations and the local field equipment under their control. |
| Roadway Signal Control | Technologies supporting 'Roadway Signal Control' includes the field elements that monitor and control signalized intersections. It includes the traffic signal controllers, detectors, conflict monitors, signal heads, and other ancillary equipment that supports traffic signal control. It also includes field masters, and equipment that supports communications with a central monitoring and/or control system, as applicable. The communications link supports upload and download of signal timings |

| Operations/ ITS Functional Element | Description |
|---|---|
| | and other parameters and reporting of current intersection status. It represents the field equipment used in all levels of traffic signal control from basic actuated systems that operate on fixed timing plans through adaptive systems. It also supports all signalized intersection configurations, including those that accommodate pedestrians. In advanced, future implementations, environmental data may be monitored and used to support dilemma zone processing and other aspects of signal control that are sensitive to local environmental conditions. |
| Environmental Information Collection | Technologies supporting Maintenance, Construction, and Management (MCM) Environmental Information Collection' collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. |
| MCM Traffic Information Dissemination | Technologies supporting 'MCM Traffic Information Dissemination' use dynamic message signs to disseminate traffic and road conditions, closure and detour information, incident information, driver advisories, and other maintenance-related data. |
| MCM Vehicle Tracking | Technologies supporting 'MCM Vehicle Tracking' tracks the location of maintenance and construction vehicles and other equipment. Vehicle/equipment location and associated information is presented to the operator. |
| MCM Winter Maintenance Management | Technologies supporting 'MCM Winter Maintenance Management' manage winter road maintenance, monitoring snowplow locations, roadway treatment (e.g., salt spraying and other material applications), and other snow and ice control operations. It monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations. |
| MCM Work Zone Management | Technologies supporting 'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance, and construction centers) for better coordination management. Work zone speeds, delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones. |
| MCV Vehicle Location Tracking | Technologies supporting 'MCV Vehicle Location Tracking' monitors vehicle location and reports the position and timestamp information to the dispatch center. |
| Emergency Data Collection | Technologies supporting 'Emergency Data Collection' collect and stores emergency information that is collected during operations by the Emergency Management Center. This data can be used directly by operations personnel, or it can be made available to other data users and archives in the region. |
| Emergency Response Management | Technologies supporting 'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special events, and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple KMPO agencies |

| Operations/ ITS Functional Element | Description |
|---|---|
| | before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards. |
| TMC Basic Monitoring | Technologies supporting 'TMC Basic Monitoring' remotely monitor and controls traffic sensor systems and/or monitoring (e.g., CCTV) equipment, and collect, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other regional centers/agencies. The collected information is provided to traffic operations personnel and made available to other centers/agencies in the region. |
| TMC Data Collection | Technologies supporting 'TMC Data Collection' collect and stores information that is created during traffic operations performed by the KRTMC. This data can be used directly by operations personnel, or it can be made available to other data users and archives in the region. |
| TMC Incident Dispatch Coordination (State Communications Center Terminal) | Technologies supporting 'TMC Incident Dispatch Coordination' formulates and manages an incident response that considers the incident potential, incident impacts, and resources required for incident management. It provides information from a State Communications Center Terminal to support incident response. |
| TMC Roadway Equipment Monitoring | Technologies supporting 'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to KRTMC Operations Personnel (and reports failures to the appropriate maintenance managers. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, etc.) and devices (dynamic message signs, cameras, traffic signals, etc.). |
| TMC Signal Control | Technologies supporting 'TMC Signal Control' provide the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic monitoring equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of the KRTMC and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc. |
| TMC Traffic Information Dissemination | Technologies supporting 'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs. |
| TIC Data Collection | Technologies supporting 'Traveler Information Center (TIC Data Collection)' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers. |

| Operations/ ITS Functional Element | Description |
|---|---|
| TIC Traveler Information Broadcast | Technologies supporting 'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles. |
| Roadway Environmental Monitoring | Technologies supporting 'Roadway Environmental Monitoring' measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed or to other field devices to support communications to vehicles. A broad array of weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other metrics. |
| TMC Regional Traffic Management | Technologies supporting 'TMC Regional Traffic Management' supports coordination between regional TMCs to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor. |
| Roadway Traffic Information Dissemination | Technologies supporting 'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios. |
| Emergency Response Management | Technologies supporting 'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special events, and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple KMPO agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards. |
| Archive Data Repository | Technologies supporting 'Archive Data Repository' collect data and catalogs data from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It includes the capability to define a data registry that allows registration of data identifiers or data definitions for interoperable use throughout a region. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions. |

### 5.1.2 ITS Technology Elements

In deploying the KRTMC, it is envisioned that many different subsystems (i.e. technology elements including hardware and software) will be required in the KRTMC. This will be true both in the KRTMC and in the field and will be used by all the project partners. Based on User Needs identified, and consistent with the ITS National Architecture, Technology Elements anticipated to be utilized for KRTMC operation are listed in **Table 5.3** with corresponding ITS functions.

**Table 5.3: Technology Elements and Associated ITS Functions**

| Technology Elements | ITS Functional Element |
|---|---|
| County and Municipal CCTV, County Field Equipment, County Traffic Signals, ITD CCTV, ITD Detectors, ITD RWIS Sensors, Municipal Field Equipment, Municipal Traffic Signals | Roadway Basic Monitoring |
| County and Municipal CCTV, County Traffic Signals, Municipal Traffic Signals | Roadway Field Management Station Operation |
| County and Municipal CCTV, County Traffic Signals, Municipal Traffic Signals | Roadway Signal Control |
| Environmental Roadway Sensors | MCM Environmental Information Collection |
| Snowplow Location Monitoring (Data Feed) | MCM Vehicle Tracking |
| Signal Control Access (ATMS Access) | TMC Signal Control |
| County Websites, 511 TraveliQ ERS, ITD Websites, Municipal Websites | Transportation Information Data Collection |
| County Websites, 511 TraveliQ ERS, ITD Websites, Municipal Websites | Traveler Information Dissemination |
| ITD Anti-Icing Equipment | Roadway Environmental Monitoring |
| ITD Dynamic Message Sign (DMS) | Roadway Traffic Information Dissemination |
| Data Application (for KRTMC Transportation Data Archive) | Archive Data Repository |

## 5.2 OPERATIONAL CONSIDERATIONS AND CONSTRAINTS

Kootenai County KRTMC stakeholders reviewed the initial requirements derived from the needs documented in the 2020 Feasibility Study and subsequently updated in November 2022. Additional stakeholder input was provided for ITS functional elements documented in the following table. **This guidance, in the form of non-functional requirements, constraints, and considerations, provides information which will need to be incorporated into subsequent detailed design tasks**; they are included in this ConOps for high-level ITS design. Please note that only requirements eliciting additional input/considerations that could impact implementation are listed in **Table 5.4.**

**Table 5.4: Stakeholder Constraints and Considerations**

| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| The system shall monitor, analyze, and distribute traffic images from CCTV systems under remote control of the center.<br><br>Roadway Basic Monitoring | Provides KRTMC staff with real-time imagery of roadway for observation of traffic, early detection of incidents, verification/ incident details for incident notification.<br><br>During incidents KRTMC staff will use the imagery to provide enhanced situational awareness support to incident commanders. | Provide ability for KRTMC PTZ control<br><br>Prevent unauthorized viewing | PTZ control for D1 currently shared by ITD D1 and HQs (ITD)<br><br>ITD could provide CCTV streaming service (ITD)<br><br>Incident response will be commanded by agencies – not KRTMC manager |
| The system shall return sensor and CCTV system fault data to the controlling center for repair.<br>Roadway Basic Monitoring | Provides KRTMC staff with notification of faults/ issues with CCTV system requiring maintenance to minimize unexpected downtime/ loss of coverage. | KRTMC to have full operational control of CCTV w/ PTZ | KRTMC Partners to repair and maintain their respective equipment (ITD) |
| The system shall remotely control traffic signal controllers.<br><br>KRTMC Signal Control | KRTMC staff will have capability to implement signal control plans in response to incidents/ traffic conditions to minimize impacts of incidents. | KRTMC will have access/ permissions to enable implementation of pre-determined signal timing plans to respond to incidents | Will require prior coordination with agencies (Post Falls)<br><br>Potential impacts of various signal timing plan changes need to be established/ understood by KRTMC staff prior to implementation (Coeur d'Alene) |
| The system shall manage (define, store, and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule.<br><br>KRTMC Signal Control | | KRTMC staff will have capability to access pre-determined signal plans. | Will require prior coordination with agencies (Post Falls)<br><br>Potential impacts of various signal timing plan changes need to be established/ understood by KRTMC staff prior to implementation (Coeur d'Alene) |

| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| The system shall remotely control dynamic messages signs for dissemination of traffic and other information to drivers.<br><br>KRTMC Traffic Information Dissemination | KRTMC staff will use DMS to alert notify drivers of incidents ahead, provide alternative routing advisories, and other time sensitive traveler information. | System shall include capability to create and store messages in advance for display on DMS in the future | Will require integration with Idaho State Communications Office and other entities which currently provide dispatch and have control over DMS/VMS signs on the State highway System.<br><br>Messaging would require pre-approval.<br><br>Coordination/notification with State Comm on posting<br><br>Would require Compatibility/ integration with iNET (ITD) |
| The system shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information.<br><br>KRTMC Regional Traffic Management | KRTMC will support sharing of incident information among traffic management agencies/ centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within key KMPO corridors. | The KRTMC shall provide notifications to regional agencies as appropriate. | |

| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| The system shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g., signs, sensors, signals, cameras, etc.).<br><br>KRTMC Regional Traffic Management | KRTMC staff will coordinate information such as messages to be posted at specific DMS or signal control plan scenarios to be implemented to ensure coordinated incident response across the KMPO. | | |
| The system shall collect traveler information for distribution including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information.<br><br>Traveler Information Reception | KRTMC system will provide notifications to appropriate agencies / Incident management teams for situational awareness/ response support.<br><br>System will provide notifications to drivers regarding incidents/ conditions affecting travel. | System shall be integrated/ provide data / video feeds to ITD 511 system.<br><br>Shall provide notifications to drivers via website / text messaging to subscribers/ 511 system. | ITD has 511 system (ITD) |
| The system shall disseminate weather information to travelers.<br><br>Vehicle Traveler Information Reception | System will provide notifications to drivers regarding conditions affecting travel. | System integrated to enable delivery of RWIS/ weather data to public via KRTMC website system. | ITD has 511 TraveliQ ERS system (ITD)<br><br>ITD has RWIS data (ITD)<br><br>No KRTMC control inputs to RWIS instruments |
| The system shall disseminate event information to travelers.<br><br>Vehicle Traveler Information Reception | System will provide notifications to drivers regarding incidents/ conditions affecting travel. | Same as TI 101 above. | ITD 511 system |

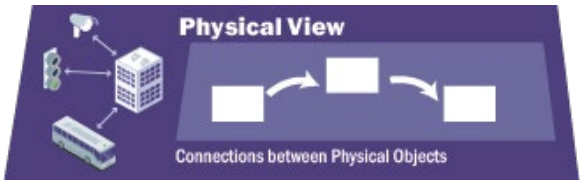
| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| The system shall disseminate customized traffic and highway condition information to travelers, including incident information, detours and road closures, recommended routes, and current speeds on specific routes *upon request.*<br><br>TIC Interactive Traveler Information | Notifications to drivers via website / text messaging to subscribers/ 511 system. | System shall be integrated/ provide data / video feeds to ITD 511 system.<br><br>Shall include capability to generate customized responses based on driver request. | ITD has 511 system (ITD) |
| The system shall disseminate customized maintenance and construction information to travelers, including scheduled maintenance and construction work activities and work zone activities *upon request.*<br><br>TIC Interactive Traveler Information | | System shall be integrated/ provide data / video feeds to ITD 511 system.<br><br>Shall include capability to generate customized responses based on driver request. | ITD has 511 system (ITD) |
| The system shall disseminate customized weather information to travelers *upon request.*<br><br>TIC Interactive Traveler Information | | System shall be integrated/ provide data / video feeds to ITD 511 system.<br><br>Shall include capability to generate customized responses based on driver request. | ITD has 511 system (ITD) |
| The system shall disseminate customized event information to travelers *upon request*.<br><br>TIC Interactive Traveler Information | | System shall be integrated/ provide data / video feeds to ITD 511 system.<br><br>Shall include capability to generate customized responses based on driver request. | ITD has 511 system (ITD) |

| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| KRTMC shall include State Communications Center terminal | The terminal will provide KRTMC staff with information regarding activities being dispatched, improving KRTMC staff situational awareness to support more rapid travel notifications. | KRTMC shall include State Communications Center terminal | Terminal will enable KRTMC to observe only – no dispatch/control function for KRTMC staff.<br><br>Will require close coordination/ User Agreement/ MOA with state.<br><br>MOA will include restrictions on disclosure of non-public side communication |
| The system shall monitor the locations of all maintenance and construction vehicles and other equipment under its jurisdiction.<br><br>MCM Vehicle Tracking (SNOWPLOWS ONLY) | Real-time snowplow location data will allow the KRTMC to provide notifications to drivers to warn of downstream plows (and potential congestion) so that drivers can adjust routes, speed/ travel time expectations.<br><br>Provide notifications to agencies regarding snowplow operations so they might adjust operations as necessary. | KRTMC shall integrate information from the Snowplow GPS system. | Location data limited to snowplows.<br><br>Data to KRTMC would not include details regarding operating functions of the snowplows |
| The system shall present location data to center personnel for the fleet of maintenance and construction vehicles and other equipment.<br><br>MCM Vehicle Tracking (SNOWPLOWS ONLY) | Same as MC 101. | Same as MC 101. | Location data limited to snowplows.<br><br>Data to KRTMC would not include details regarding operating functions of the snowplows |

| ITS Functional Element | Operational Description/ Benefits | Stakeholder Added Nonfunctional and Functional Requirements | Considerations and Possible Constraints |
|---|---|---|---|
| The system shall track the current location of maintenance and construction vehicles.<br><br>MCV Vehicle Tracking (THE KRTMC WILL NOT HAVE THIS CAPABILITY BUT WILL INSTEAD HAVE THE LOCATIONS OF SNOWPLOWS PROVIDED) | Same as MC 101. | Same as MC 101. | Location data limited to snowplows. |
| The system shall assess the current status of all winter maintenance activities, including actual work activities performed, current locations and operational conditions of vehicles, materials and equipment inventories, field equipment status, etc.<br><br>MCM Winter Maintenance Management | This information will allow the KRTMC staff to identify potential areas of congestion – prior to commencement/or in progress of construction and maintenance activities and provide notification to drivers. | Data will be limited to real-time information regarding current work locations (and work activities). | Would also include operational considerations such as weekly briefings to support posting of advanced notifications on DMS, 511, etc. |
| The system shall collect data from centers.<br><br>Archive Data Repository | In this case “center” may refer to other regional transportation agencies as well as the KRTMC in Spokane. This will assist regional agencies in the analysis of traffic patterns and operations leading to improved incident management response plans. | | |
| The system shall include capabilities for archive-to-archive coordination.<br><br>Archive Data Repository | Same as DM 131 above. | | |
| The center shall collect traffic management data such as operational data, event logs, etc.<br><br>KRTMC Data Collection | Same as DM 131 above. | | |

# 5.3 DESCRIPTION OF THE PROPOSED SYSTEM

The following subsections describe the proposed KRTMC with a Physical View as well an Enterprise View of the project ITS architecture.

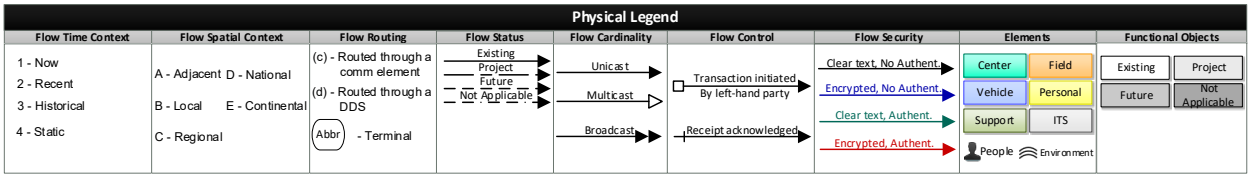



The Physical View describes the transportation systems and the information exchanges that support ITS for a project. In this view, the ITS Architecture is depicted as a set of integrated Physical Objects (Subsystems and Terminators) that interact and exchange information to support the Architecture service packages. Physical Objects are defined to represent the major physical components of the ITS Architecture. Physical Objects include subsystems, and terminators that together provide a set of capabilities that are more than would be implemented at any one place or time. Subsystems are Physical Objects that are part of the overall Intelligent Transportation System and provide the functionality that is 'inside-the-boundary' of ITS. Terminators are Physical Objects that lie at the boundary of ITS and supply information needed by ITS' functions or receive information from ITS. Functional Objects break up the subsystems into deployment-sized pieces and define more specifically the functionality and interfaces that are required to support a particular service package. Information Flows depict the exchange of information that occurs between Physical Objects (Subsystems and Terminators). The information exchanges in the Physical View are identified by Triples that include the source and destination Physical Objects and the Information Flow that is exchanged. Much more details regarding Physical Views may be found at https://www.arc-it.net/html/viewpoints/physical.html ARC-IT 9.1 FHWA ITS Refence Architecture site.

## 5.3.1 Physical Views

The physical view of the KRTMC system architecture is illustrated and defined in the follow-on sections. Two layers of this architecture are presented. The first or highest level, Layer 0, is a comprehensive view which includes the physical objects or system elements shown with high-level connectivity. Later sections present Layer 2 physical context diagrams to support a presentation of operational sub-systems or functions as related to each service package employed by the project. A third, Layer 1 view, presents Layer 0 along with their functionalities for the various project elements, this view is provided in the Appendix section. **Figure 5.1** serves as the legend for the physical drawings, as produced by SET-IT.

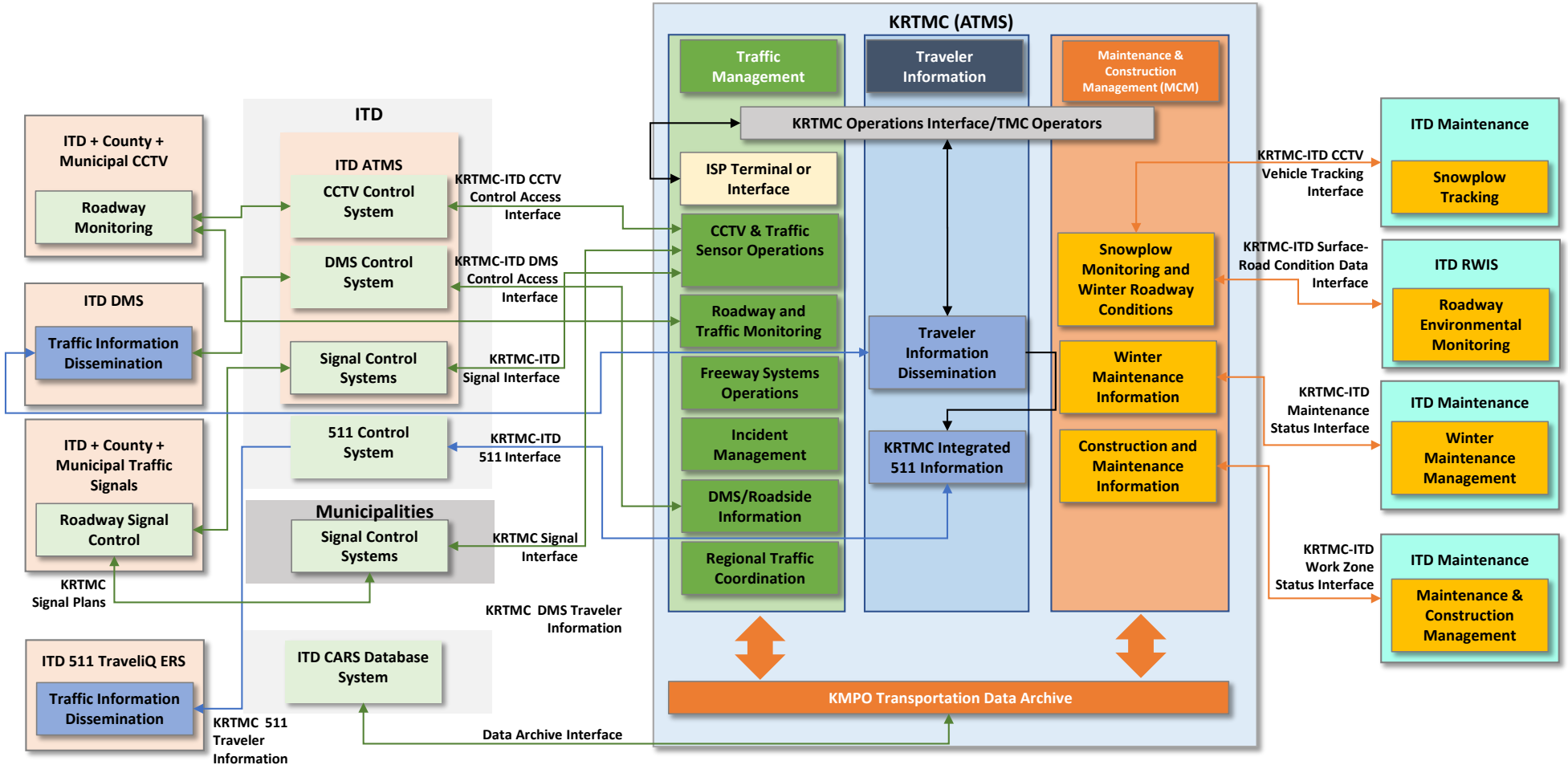
**Figure 5.1 – System Overview Diagram Legend**




### 5.3.1.1 System Overview – Layer 0

**Figure 5.2** provides a Layer 0 equivalent high-level overview of the envisioned KRTMC system. As illustrated in this figure, the KRTMC will provide a centralized operations center for partner agency ITS Elements and incident detection/response. It will also provide a center that can deliver supplementary traveler information for the KMPO region using interface access for monitoring and/or control of allied agency assets. This diagram was created to simplify the Layer 0 and Layer 1 Physical Diagrams produced by SET-IT, which are much more complicated and detailed. The Layer 0 and Layer 1 SET-IT produced diagrams are included in the Attachment Section for completeness. Physical context diagrams follow in **Section 5.3.1** for each service package employed by the project.

Figure 5.2 – KRTMC Physical Architecture - Layer 0 System Overview Diagram



#### 5.3.1.2 Physical Context Diagrams

A 'context diagram' provides the context for a system element by showing all the interfaces for that element. This section includes a context diagram for each service package element used in the project. Detailed diagrams for all the KRTMC sub-systems (service packages/sub-systems) are provided in the following figures. Each interconnect in these diagrams includes a set of defining characteristics. These characteristics are described in **Table 5.5** below.

**Table 5.5: Physical Interconnect Characteristics**

| Interconnect Characteristics | Values | Characteristic Value Description | Graphic Appearance |
|---|---|---|---|
| **Encryption** | True | Information flows on this interconnect must be encrypted | **Red**, if Authentic ability is also True; **Blue** if Authentic ability is False |
| | False | Information flow encryption is not required | Black, if Authentic ability is also False; **Green** if Authentic ability is True |
| **Authentic ability** | True | Information flows on this interconnect must include a digital signature (signed certificate credential) | **Red**, if Encryption is also True; **Green** if Encryption is False |
| | False | Information flow signature is not required | Black, if Encryption is also False; **Blue** if Encryption is True |
| **Cardinality** | Broadcast | Information flows on this interconnect are sent to all potential recipients that are within range | Double, filled arrowheads on the destination |
| | Multicast | Information is sent to multiple specific recipients | Single, open arrowhead on the destination |
| | Unicast | Information is sent to a single specific recipient | Single, filled arrowhead on the destination |
| **Bidirectional** | Yes | Information flows on this interconnect may flow in either direction | Arrowheads on both the source and destination end |
| | No | Information flows on this interconnect flow in one direction only | Arrowheads on the destination end |
| **Status** | Existing | Information flows on this interconnect are deployed today | Solid line |
| | Project | Information flows are going to be developed and deployed as part of this KRTMC 042523 reclassification | Dashed line |
| | Future | Information flows on this interconnect are not planned currently but may be part of a future deployment | Dotted line |
| | TBD | As user defined status values are added to the project the Legend in SET-IT may show additional Flow Status values than shown in the legend above. | Varies based on the # of user defined status values |

Figure 5.3 – TM01: Roadway and Traffic Monitoring (ITD)

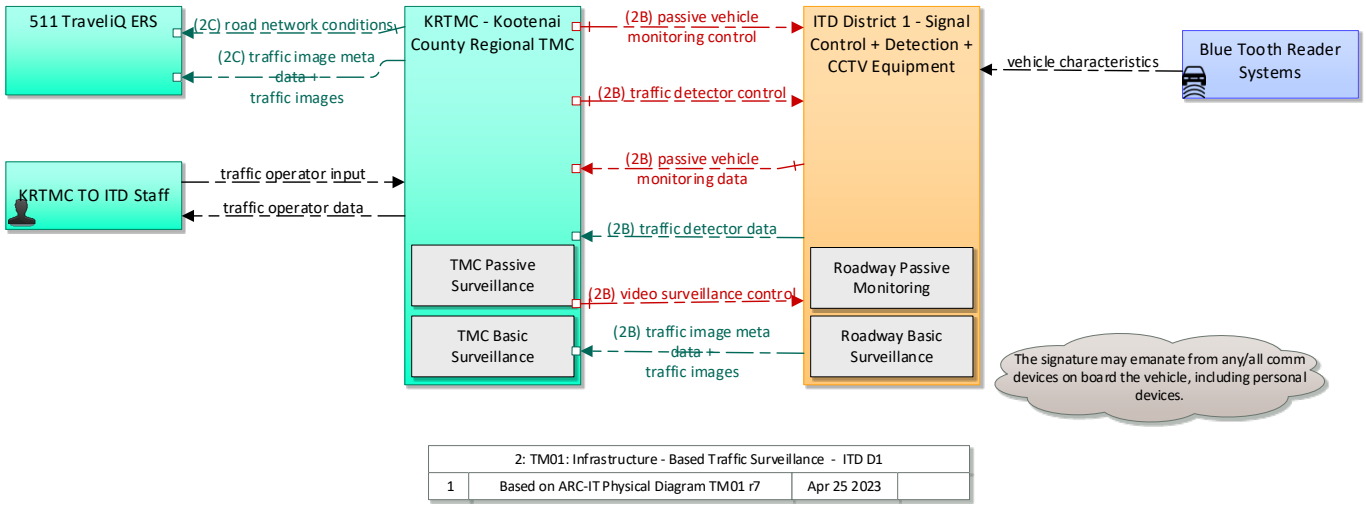



Figure 5.4 – TM01: Roadway and Traffic Networking (Cities)

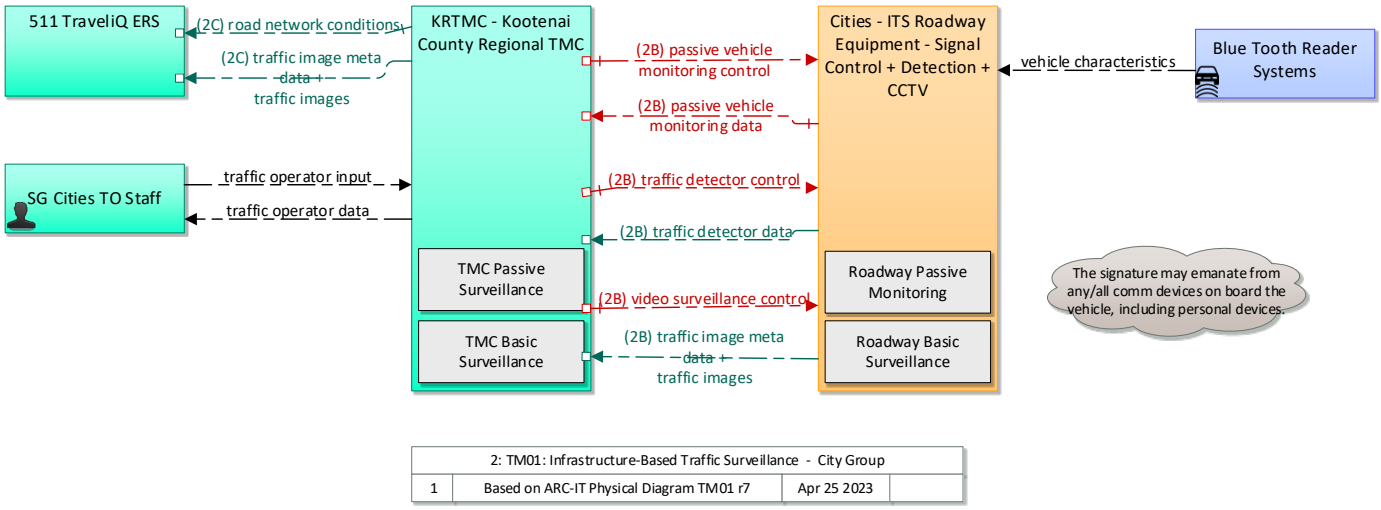
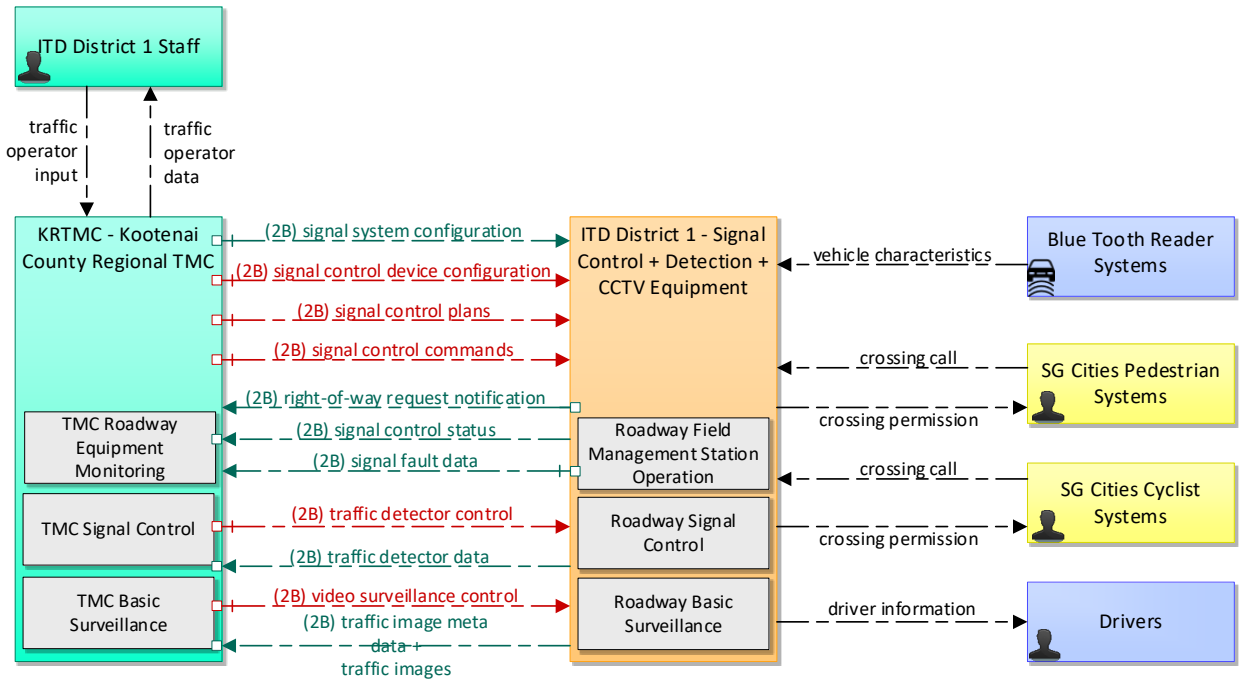
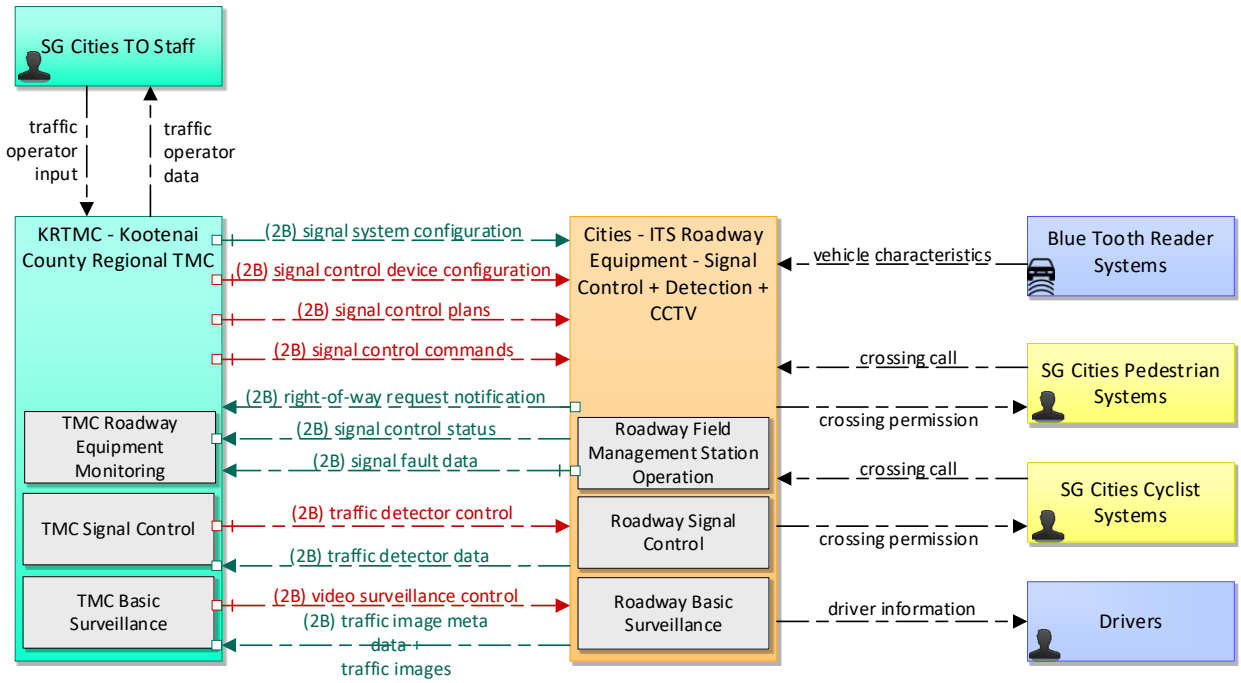


Figure 5.5 – TM03: Traffic Signal Control (ITD)




| 2: TM03: Traffic Signal Control ITD D1 | | | |
|---|---|---|---|
| 1 | Based on ARC-IT Physical Diagram TM03 r7 | Apr 25 2023 | |

Figure 5.6 – TM03: Traffic Signal Control (Cities)




| 2: TM03: Traffic Signal Control - City Group | | | |
|---|---|---|---|
| 1 | Based on ARC-IT Physical Diagram TM03 r7 | Apr 25 2023 | |

Figure 5.7 – TM05: Traffic Ramp Metering

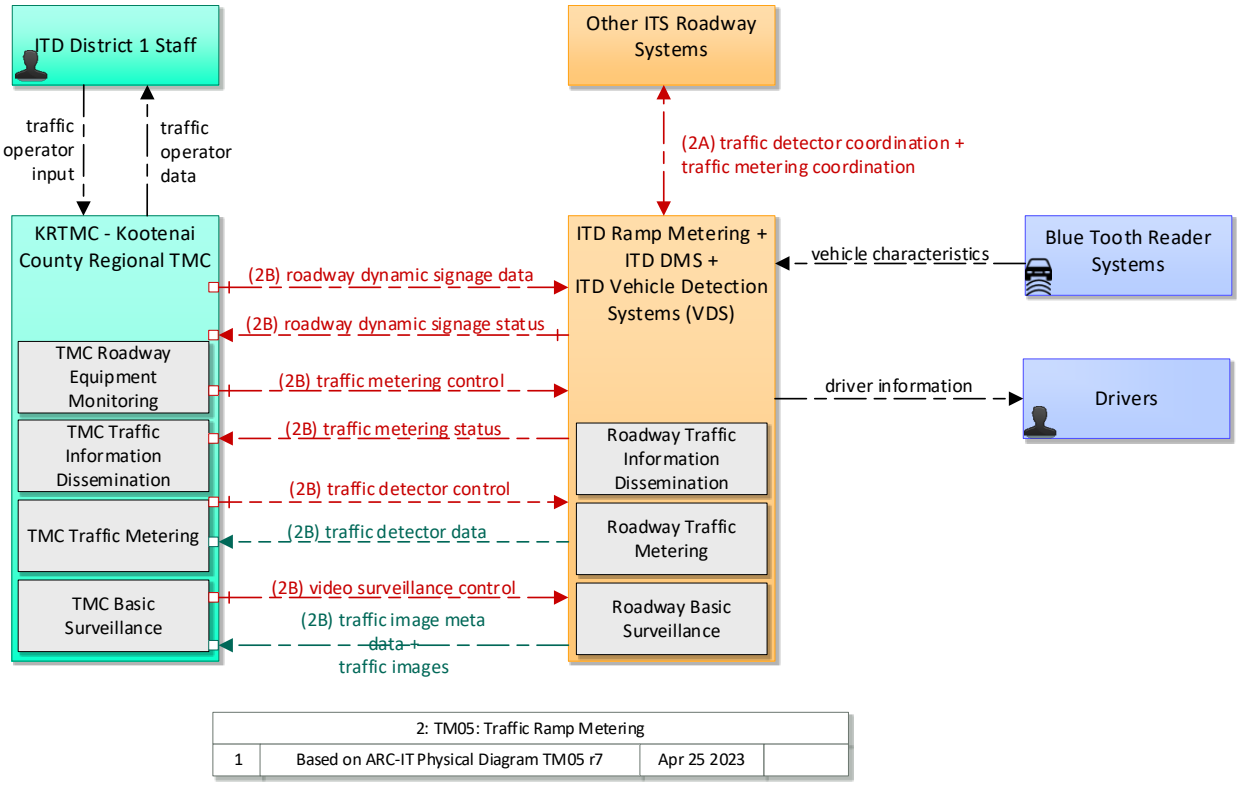



Figure 5.8 – TM06: Traffic Information Dissemination

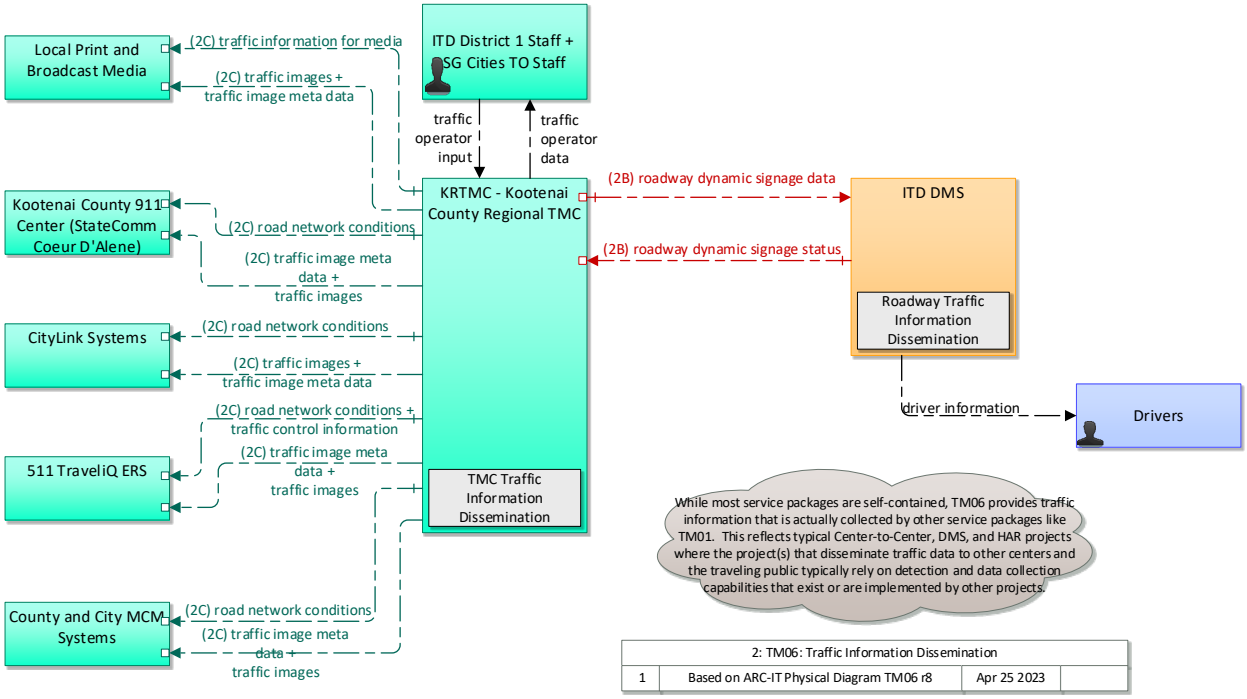


**Figure 5.9 – TM07: KRTMC Regional Traffic Management/Coordination**

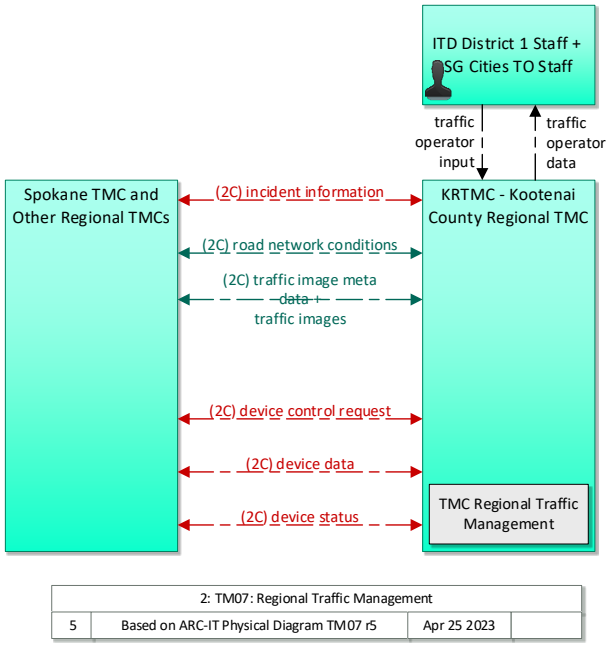



**Figure 5.10 – TM08: KRTMC Traffic Incident Management System**

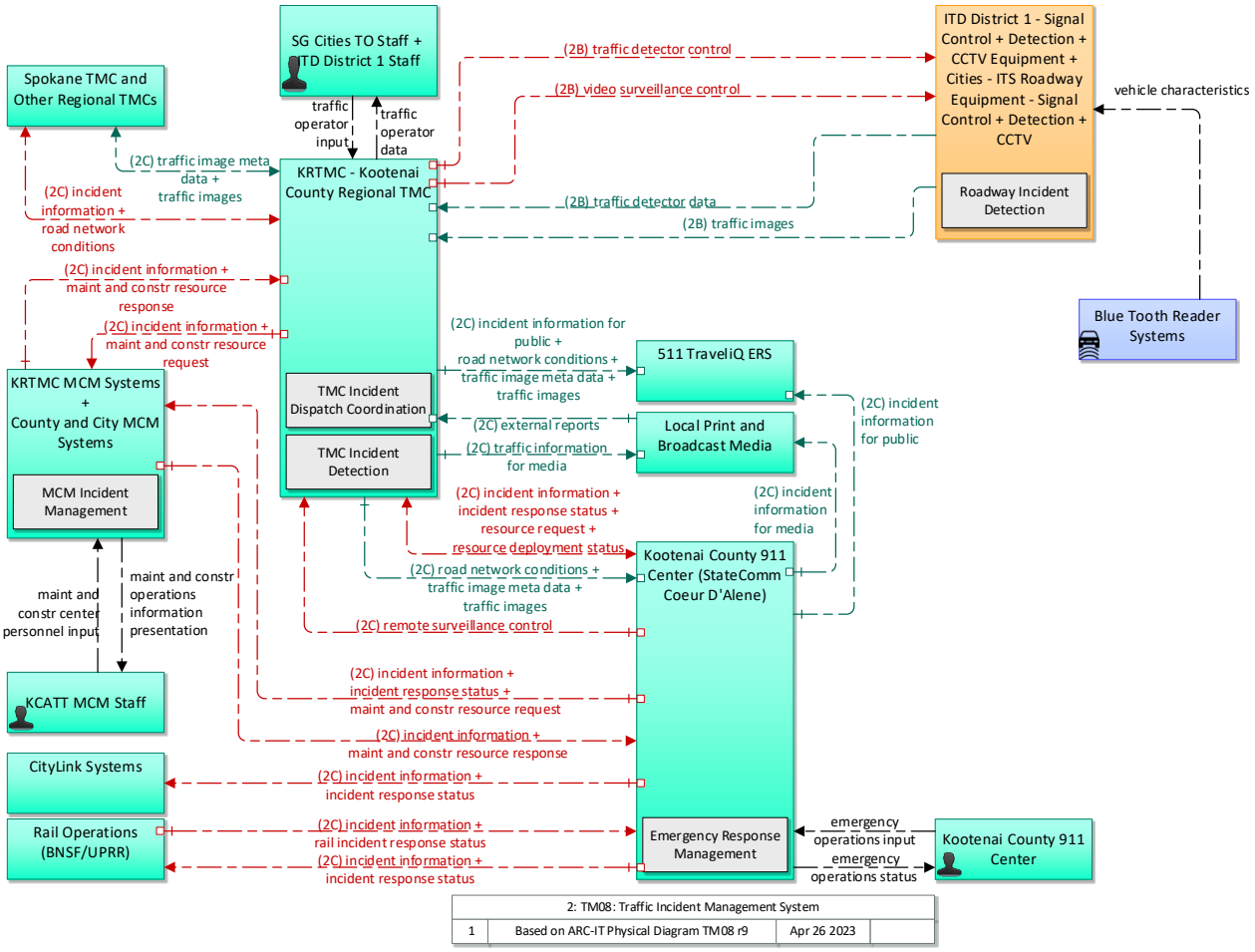
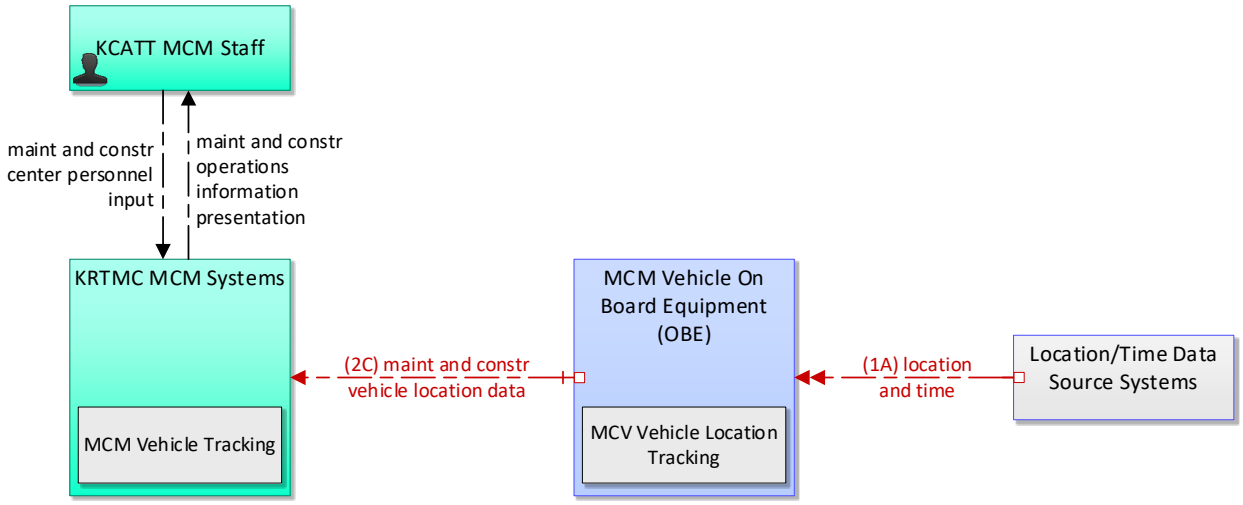
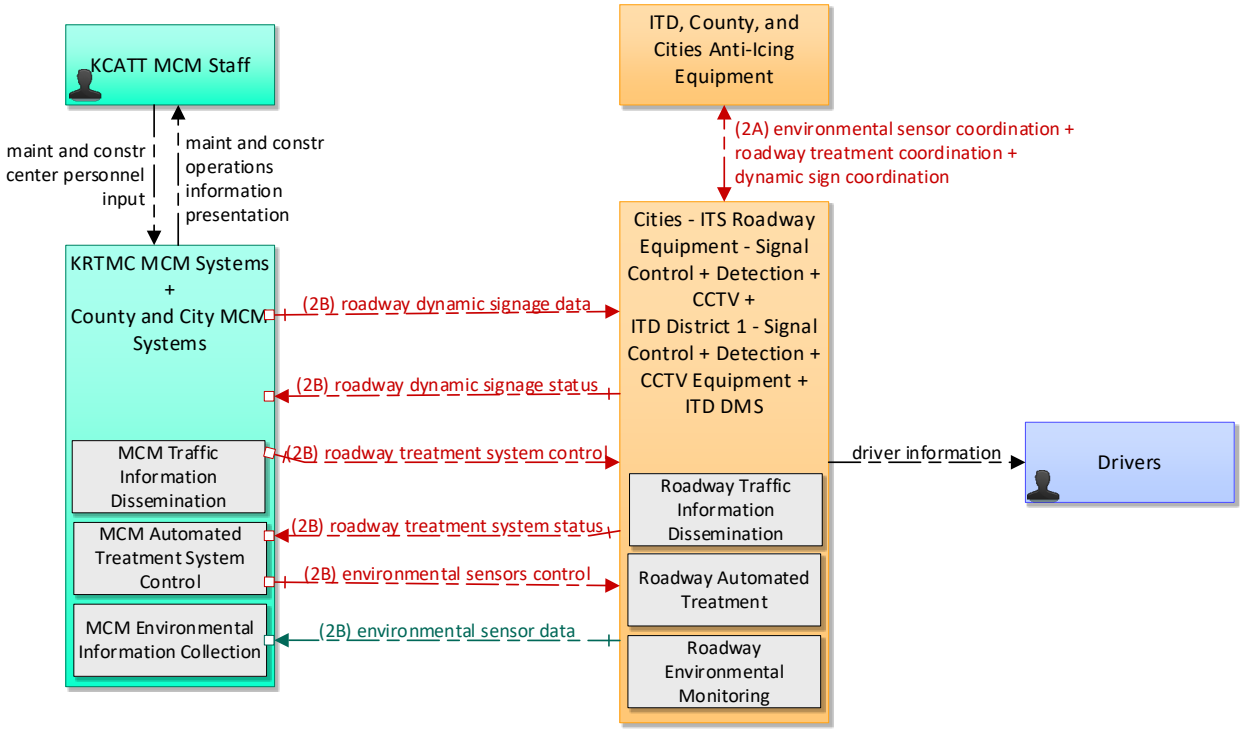


**Figure 5.11 – MC01: MCM Vehicle and Snowplow Equipment Tracking System**



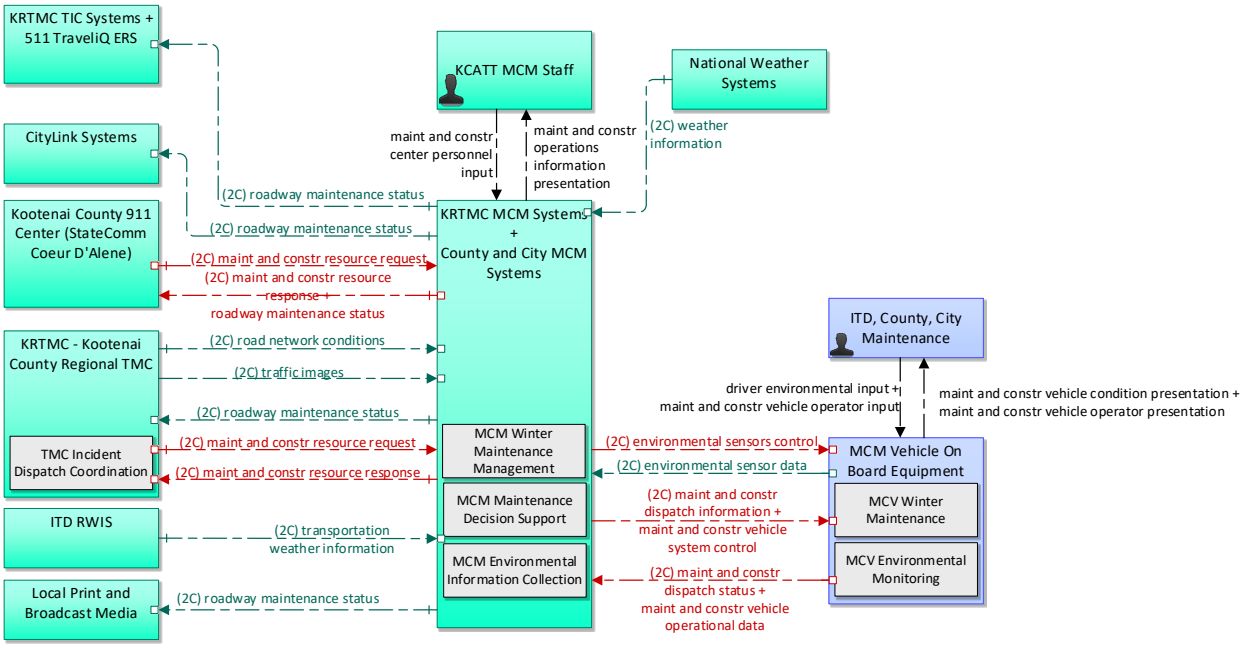

| 2: MC01: Maintenance and Construction Vehicle and Equipment Tracking | | | |
|---|---|---|---|
| 1 | Based on ARC-IT Physical Diagram MC01 r1 | Apr 26 2023 | |

**Figure 5.12 – MC03: Winter Operations / Roadway Conditions Management**




| 2: MC03: Winter Operations / Road Conditions Management | | | |
|---|---|---|---|
| 1 | Based on ARC-IT Physical Diagram MC03 r3 | Apr 25 2023 | |

## Figure 5.13 – MC04: Winter Maintenance




## Figure 5.14 – MC06: Work Zone Management

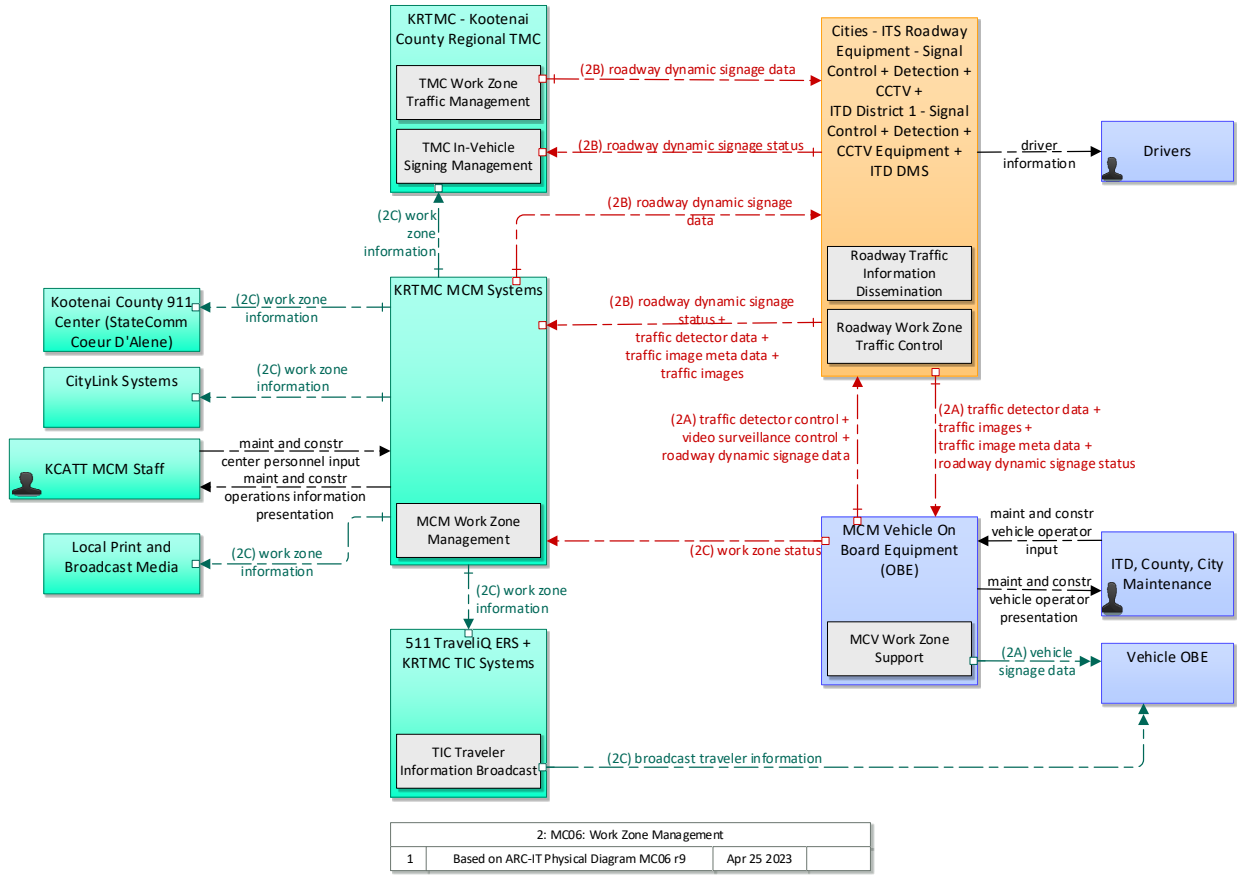


**Figure 5.15 – TI01: Broadcast Traveler Information Dissemination**

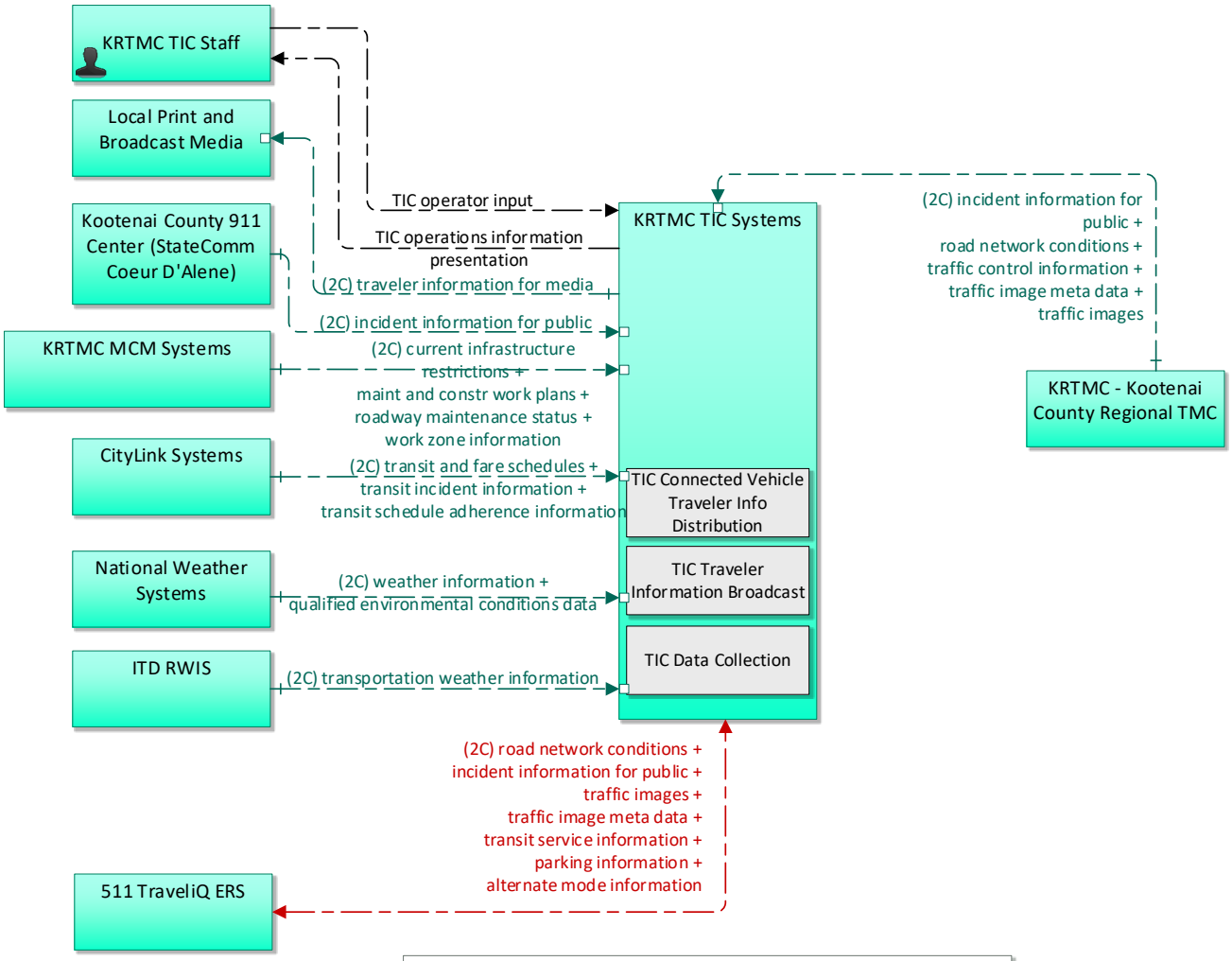
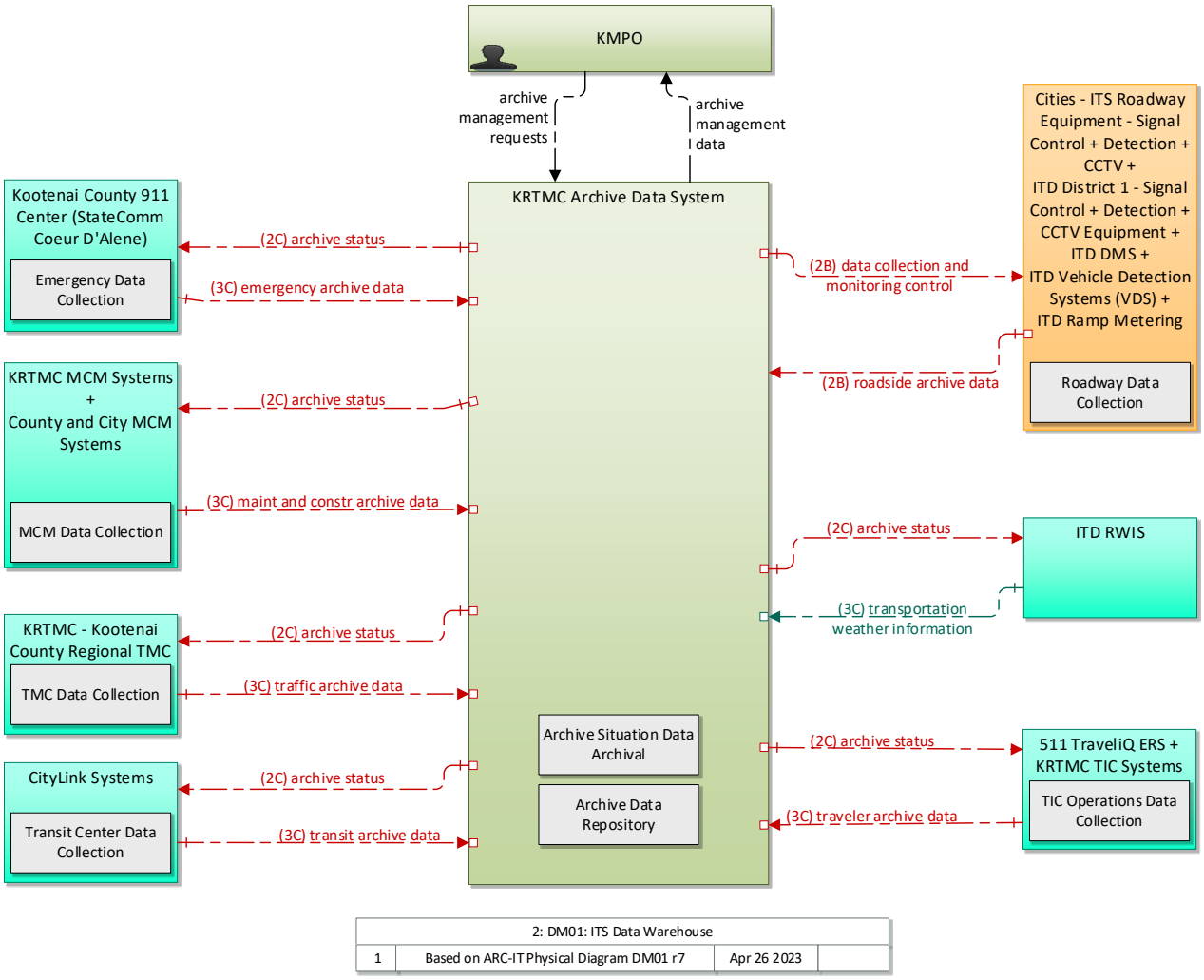
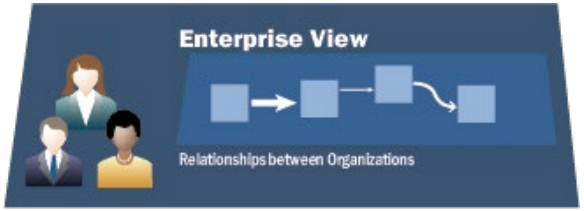


**Figure 5.16 – DM01: ITS Data Warehouse**



### 5.3.2 Enterprise View – Stakeholders Roles and Agreements




The ITS Architecture Enterprise View describes the relationships between organizations and users, and the roles those entities play in the delivery and consumption of ITS services. Relationships between entities are dependent on the roles those entities take in the delivery of user services. The building blocks of ARC-IT's Enterprise View are Enterprise Objects that interact to exchange information, manage, and operate systems beyond the scope of one organization. Enterprise View focuses on the relationships between those Enterprise Objects, but also defines how Enterprise Objects interact with Physical Objects, which appear in the Enterprise View as Resources. The relationships between Enterprise Objects are organized as various types of Coordination: an agreement or contract intended to achieve the common purposes necessary to implement and deliver an ITS service. The relationship between an Enterprise Object and a Resource is a Role: owns, operates, develops, installs, maintains, etc. Stakeholders take the position of Enterprise Objects when they participate in ITS. Stakeholders have needs – capabilities they require from ITS to accomplish a goal or solve a problem. The Enterprise view describes the enterprises or stakeholders and their relationships between each other. The enterprise view is based on the roles those organizations play within the transportation environment. For the KRTMC, the focus of stakeholder relationships is built upon the interface characteristics of the proposed system. **Table 5.6** lists and defines the roles the Stakeholders perform in the Enterprise View.

**Table 5.6: Enterprise View – Stakeholder Roles**

| Role Name | Description |
|---|---|
| Manages | The Enterprise that is accountable for performing actions with a Resource, typically in support of one of the key operations-related roles (operates, installs, maintains). This authority is typically delegated by the Enterprise with the "Owns" role, and commonly accomplished by delegation to Human E-Objects with the "operates", "installs" or "maintains" roles, depending on the context. |
| Operates | An Enterprise controls the functionality and state of the target object. |
| Owns | An Enterprise has financial ownership and control over the target object. |

**Table 5.7** represents the Layer 0 Enterprise Elements Summary table for the KRTMC. The table describes each of the major stakeholders and their major elements as illustrated in the Layer 0 diagram. It also provides the roles they play with respect to the elements in the physical view.

**Table 5.7: Major Stakeholders and Elements Layer 0**

| Stakeholder | Asset | Interface Description | Functional Area | Role |
|---|---|---|---|---|
| ITD (District 1) | CCTV | Control for PTZ Operations<br>Imagery Display at KRTMC | Incident Detection/ Management<br>Traveler Information | Owns, Operates, Manages |
| | RWIS | Monitoring of Station Readings | Roadway Monitoring | Owns, Operates, Manages |
| | Snowplows | Monitoring of Current Location | Incident Detection Traveler Information | Owns, Operates, Manages |

| Stakeholder | Asset | Interface Description | Functional Area | Role |
|---|---|---|---|---|
| | DMS | Control for Message Display | Incident Management Traveler Information | Owns, Operates, Manages |
| | 511 | Integration (Authorized User) for Posting Messages/Alerts | Traveler Information | Operates |
| | Traffic Signals | Control for Implementation of Timing Plans | Incident Management | Owns, Operates, Manages |
| | ITD Database | Archive to Archive Data Exchange | Planning | Operates |
| City of Coeur d'Alene | Traffic Signals | Control for Implementation of Timing Plans | Incident Management | Owns, Operates, Manages |
| City of Hayden | Traffic Signals | Control for Implementation of Timing Plans | Incident Management | Owns, Operates, Manages |
| City of Post Falls | Traffic Signals | Control for Implementation of Timing Plans | Incident Management | Owns, Operates, Manages |
| Idaho State Police | State Communications | Monitoring for Incident Detection | Incident Detection | Owns, Operates Manages |
| KRTMC | Regional TMC | All | All | Integrates, Operates, Manages |

The table below lists and defines the primary relationships between stakeholders, as employed in an Enterprise View Diagram. It also identifies types of agreements typically employed by stakeholders cooperating in ITS projects. The section that follows, **Section 5.3.2.1,** presents the Enterprise View Diagram for the KRTMC project and shows the Agreements to be expected between stakeholders for this project.

**Table 5.8 – Enterprise View – Types of Stakeholder Relationships**

| Relationship | Type | Description |
|---|---|---|
| Maintenance Data Exchange Agreement | Agreement | An agreement that states one entity will provide data related to maintenance of an application component to the other entity. |
| Application Interface Specification | Agreement | The definition of an interface between two application components that operate on two distinct pieces of hardware. The Application Interface Specification is specific to the application in question. |
| Device Placement and Operations Agreement | Agreement | An agreement that enables the controller of a physical device to install it (to make it operational) at a fixed location controlled by another entity. |
| Information Exchange Agreement | Agreement | An agreement to exchange information, which may include data or control information; the exact information to be exchanged may vary from agreement to agreement. |

| Relationship | Type | Description |
|---|---|---|
| Operations Agreement | Agreement | An agreement where one entity agrees to operate a device or application on behalf of another, device/application controlling entity. |
| Installation Agreement | Agreement | An agreement whereupon one party installs a system on behalf of a second party. |
| Service Usage Agreement | Agreement | An agreement between the provider of a service and a user. Stipulates the terms and conditions of service usage. |
| Vehicle Operating Agreement | Agreement | An agreement whereupon the controller of a vehicle grants another entity permission and rights to operate the vehicle. |
| Device Usage Agreement | Agreement | Agreement between the owner of a device and an operator of the device, granting the operator permission to use the device. Specifies who is responsible in the case of device failure and application failure, describes parameters of use including communications provisions, and sets expectations of device and application performance. |
| Information Provision Agreement | Agreement | An agreement where one party agrees to provide information to another party. This is a unidirectional agreement. |
| Expectation of Information Provision | Expectation | An expectation where one party believes another party will provide it information whenever such information is likely relevant to the recipient. |
| Expectation of Data Provision | Expectation | An expectation where one party believes another party will provide data on a regular and recurring basis, and that that data will be useful to the receiver in the context of the receiver's application. This thus includes some expectation of data fields, timeliness, quality, precision, and similar qualities of data. |
| Information Exchange and Action Agreement | Agreement | An agreement to exchange information, which may include data or control information; the exact information to be exchanged may vary from agreement to agreement. This also includes a specification for action that shall, should or may be taken by one party in response to this information. |

#### 5.3.2.1 Enterprise - Layer 0 Diagram

**Figure 5.17** presents the Layer 0 Enterprise Diagram for the KRTMC project. This is a very detailed diagram; it is an output of the FHWA SET-IT tool and used to depict the relationships between the stakeholders and the expected agreements that will be needed. This diagram is also presented in larger 11x17 format in the Appendix Section. The links identified in this diagram represent anticipated Agreements to be expected between stakeholders. For completeness **Table 5.9** presents these anticipated agreements in tabular form. It lists and defines the relationships, or points of coordination, that exist between the stakeholders in **Figure 5.17**. It should be noted that some relationships may be bidirectional. Many of these agreements may be combined and represent guidelines only but are also a detailed depiction of what may be needed as the project is built out and deployed.

**Figure 5.17 – Layer 0 Enterprise Diagram for the KRTMC**

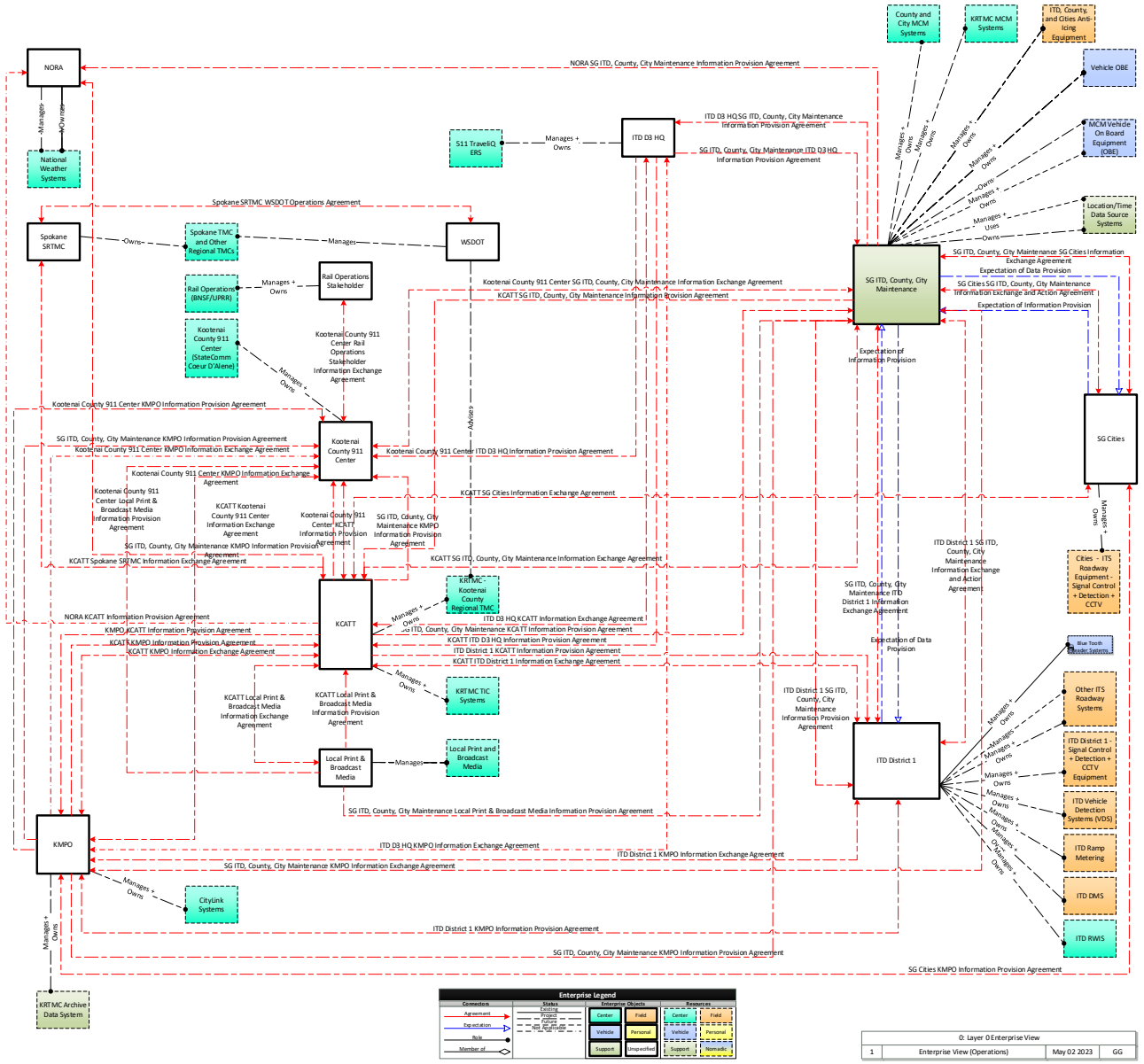


**Table 5.9 – Enterprise Architecture - Stakeholder Relationships**

| Stakeholder 1 | Stakeholder 2 | Relationship Type | Bidirectional |
|---|---|---|---|
| ITD D3 HQ | ITD District 1 | Information Provision Agreement | No |
| ITD D3 HQ | KCATT | Information Exchange Agreement | No |
| ITD D3 HQ | KCATT | Information Provision Agreement | No |
| ITD D3 HQ | KMPO | Information Exchange Agreement | No |
| ITD D3 HQ | KMPO | Information Provision Agreement | No |
| ITD D3 HQ | Kootenai County 911 Center | Information Provision Agreement | No |
| ITD D3 HQ | Local Print & Broadcast Media | Information Provision Agreement | No |
| ITD D3 HQ | NORA | Information Provision Agreement | No |
| ITD D3 HQ | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| ITD D3 HQ | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| ITD District 1 | ITD D3 HQ | Information Provision Agreement | No |
| ITD District 1 | KCATT | Information Exchange Agreement | No |
| ITD District 1 | KCATT | Information Provision Agreement | No |
| ITD District 1 | KMPO | Information Exchange Agreement | No |
| ITD District 1 | KMPO | Information Provision Agreement | No |
| ITD District 1 | NORA | Information Provision Agreement | No |
| ITD District 1 | SG Cities | Information Exchange and Action Agreement | No |
| ITD District 1 | SG Cities | Information Provision Agreement | No |
| ITD District 1 | SG ITD, County, City Maintenance | Expectation of Information Provision | No |
| ITD District 1 | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| ITD District 1 | SG ITD, County, City Maintenance | Information Exchange and Action Agreement | No |
| ITD District 1 | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| KCATT | ITD D3 HQ | Information Exchange Agreement | No |
| KCATT | ITD D3 HQ | Information Provision Agreement | No |
| KCATT | ITD District 1 | Information Exchange Agreement | No |
| KCATT | ITD District 1 | Information Provision Agreement | No |
| KCATT | KMPO | Information Exchange Agreement | No |
| KCATT | KMPO | Information Provision Agreement | No |
| KCATT | Kootenai County 911 Center | Information Exchange Agreement | No |
| KCATT | Kootenai County 911 Center | Information Provision Agreement | No |
| KCATT | Local Print & Broadcast Media | Information Exchange Agreement | No |
| KCATT | Local Print & Broadcast Media | Information Provision Agreement | No |
| KCATT | NORA | Information Exchange Agreement | No |
| KCATT | NORA | Information Provision Agreement | No |
| KCATT | SG Cities | Information Exchange Agreement | No |
| KCATT | SG ITD, County, City | Information Exchange Agreement | No |

| Stakeholder 1 | Stakeholder 2 | Relationship Type | Bidirectional |
|---|---|---|---|
| | Maintenance | | |
| KCATT | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| KCATT | Spokane SRTMC | Information Exchange Agreement | No |
| KMPO | ITD D3 HQ | Information Exchange Agreement | No |
| KMPO | ITD D3 HQ | Information Provision Agreement | No |
| KMPO | ITD District 1 | Information Exchange Agreement | No |
| KMPO | ITD District 1 | Information Provision Agreement | No |
| KMPO | KCATT | Information Exchange Agreement | No |
| KMPO | KCATT | Information Provision Agreement | No |
| KMPO | Kootenai County 911 Center | Information Exchange Agreement | No |
| KMPO | Kootenai County 911 Center | Information Provision Agreement | No |
| KMPO | NORA | Information Exchange Agreement | No |
| KMPO | SG Cities | Information Exchange Agreement | No |
| KMPO | SG Cities | Information Provision Agreement | No |
| KMPO | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| KMPO | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| Kootenai County 911 Center | ITD D3 HQ | Information Provision Agreement | No |
| Kootenai County 911 Center | KCATT | Information Exchange Agreement | No |
| Kootenai County 911 Center | KCATT | Information Provision Agreement | No |
| Kootenai County 911 Center | KMPO | Information Exchange Agreement | No |
| Kootenai County 911 Center | KMPO | Information Provision Agreement | No |
| Kootenai County 911 Center | Local Print & Broadcast Media | Information Provision Agreement | No |
| Kootenai County 911 Center | Rail Operations Stakeholder | Information Exchange Agreement | No |
| Kootenai County 911 Center | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| Kootenai County 911 Center | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| Local Print & Broadcast Media | ITD D3 HQ | Information Provision Agreement | No |
| Local Print & Broadcast Media | KCATT | Information Exchange Agreement | No |
| Local Print & Broadcast Media | KCATT | Information Provision Agreement | No |
| Local Print & Broadcast Media | Kootenai County 911 Center | Information Provision Agreement | No |
| Local Print & Broadcast Media | SG ITD, County, City Maintenance | Information Provision Agreement | No |

| Stakeholder 1 | Stakeholder 2 | Relationship Type | Bidirectional |
|---|---|---|---|
| NORA | ITD D3 HQ | Information Provision Agreement | No |
| NORA | ITD District 1 | Information Provision Agreement | No |
| NORA | KCATT | Information Exchange Agreement | No |
| NORA | KCATT | Information Provision Agreement | No |
| NORA | KMPO | Information Exchange Agreement | No |
| NORA | SG Cities | Information Provision Agreement | No |
| NORA | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| NORA | SG ITD, County, City Maintenance | Information Provision Agreement | No |
| Rail Operations Stakeholder | Kootenai County 911 Center | Information Exchange Agreement | No |
| SG Cities | ITD District 1 | Information Exchange and Action Agreement | No |
| SG Cities | ITD District 1 | Information Provision Agreement | No |
| SG Cities | KCATT | Information Exchange Agreement | No |
| SG Cities | KMPO | Information Exchange Agreement | No |
| SG Cities | KMPO | Information Provision Agreement | No |
| SG Cities | NORA | Information Provision Agreement | No |
| SG Cities | SG ITD, County, City Maintenance | Expectation of Information Provision | No |
| SG Cities | SG ITD, County, City Maintenance | Information Exchange Agreement | No |
| SG Cities | SG ITD, County, City Maintenance | Information Exchange and Action Agreement | No |
| SG ITD, County, City Maintenance | ITD D3 HQ | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | ITD D3 HQ | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | ITD District 1 | Expectation of Data Provision | No |
| SG ITD, County, City Maintenance | ITD District 1 | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | ITD District 1 | Information Exchange and Action Agreement | No |
| SG ITD, County, City Maintenance | ITD District 1 | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | KCATT | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | KCATT | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | KMPO | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | KMPO | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | Kootenai County 911 Center | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | Kootenai County 911 Center | Information Provision Agreement | No |

| Stakeholder 1 | Stakeholder 2 | Relationship Type | Bidirectional |
|---|---|---|---|
| SG ITD, County, City Maintenance | Local Print & Broadcast Media | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | NORA | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | NORA | Information Provision Agreement | No |
| SG ITD, County, City Maintenance | SG Cities | Expectation of Data Provision | No |
| SG ITD, County, City Maintenance | SG Cities | Information Exchange Agreement | No |
| SG ITD, County, City Maintenance | SG Cities | Information Exchange and Action Agreement | No |
| Spokane SRTMC | KCATT | Information Exchange Agreement | No |

# 6 KRTMC OPERATIONAL SCENARIOS

This section is intended to provide an overview of the major operational uses for the KRTMC. This is achieved using written story board scenarios that represent real life operations and system responses to the events and/or typical operation of the KRTMC. This is a typical approach used in ITS ConOps documents and therefore shown as part of this document. The scenarios presented here are the same as those presented in the 2020 Feasibility Study. They are provided as part of this ConOPs for completeness as a standalone document. The study identified the following representative scenarios for the KRTMC:

1. Daily Operations
2. Incident Response
3. Special Event
4. Construction and Maintenance

The underlying assumptions for all scenarios are that:

- Any required network improvements have been completed.
- Response plans have been developed and approved by network operators.
- Institutional agreements have been established so that the KRTMC operations staff are properly authorized to respond according to the agreed response plans and improvise as situations may dictate;
- Sufficient training and exercises have been conducted.

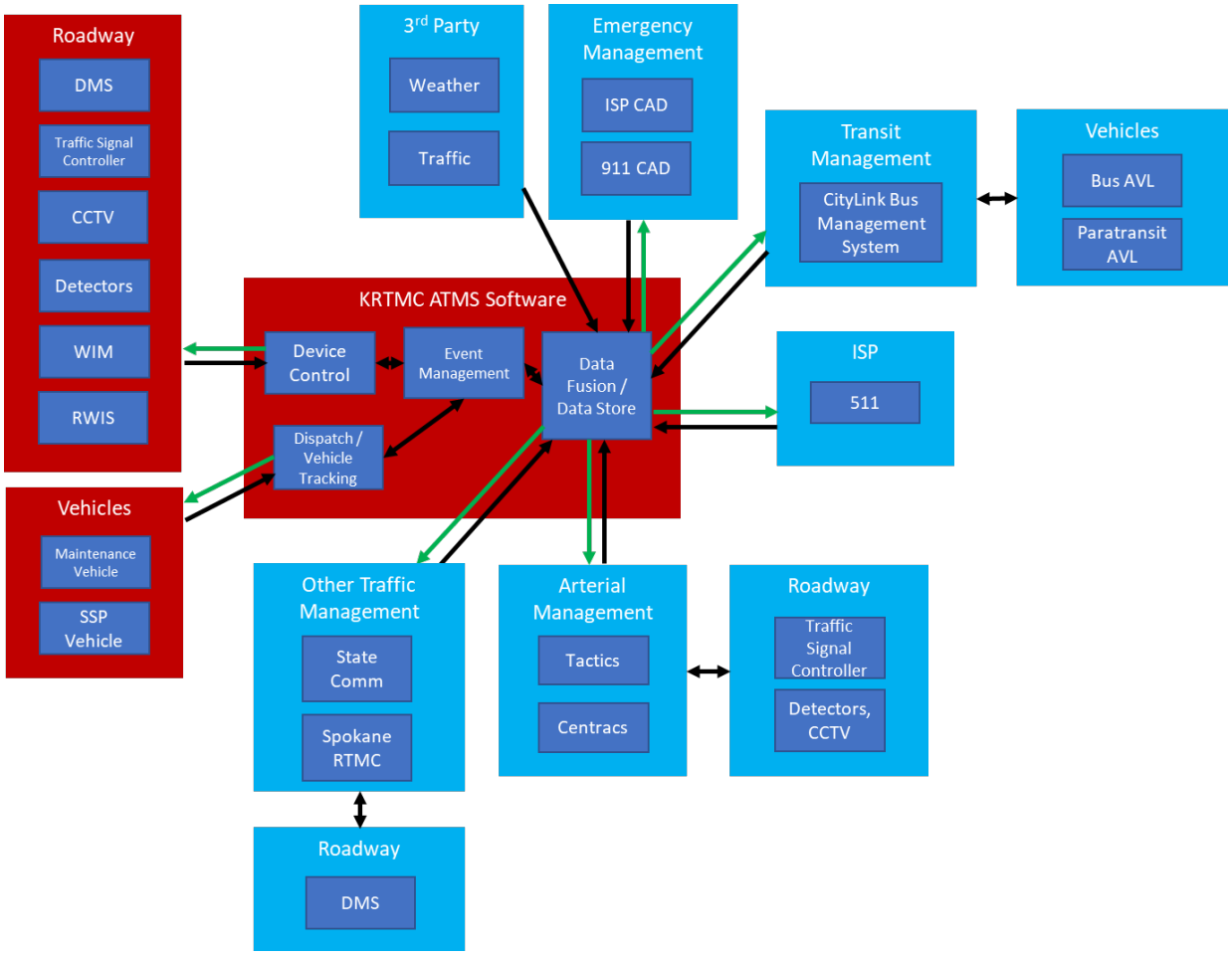
## 6.1 SCENARIO 1: DAILY OPERATIONS

Daily operations are primarily concerned with recurrent congestion caused by traffic demand exceeding the roadway capacity and temporal variations of traffic volumes. It is assumed that there are no accidents (roadway, transit, or arterial), road maintenance, weather events, or other random events that impact the networks and require an active response. The daily operations scenario forms the baseline for daily freeway, arterial, and transit operations in the Kootenai region. **Figure 6.1** depicts this scenario.

The KRTMC and non-member agencies monitor and operate their respective systems in accordance with their network-specific operational procedures and implements collaboration agreements (signal timing plans, DMS messages, etc.) that address routine traffic variations. The KRTMC collects real-time freeway and arterial data from the monitoring system (loop detectors, radar, blue tooth, and other sensors) on varying intervals based on the data source and uses data for monitoring, incident detection, reporting, and travel time calculations.

Traffic on arterials is managed by the KRTMC and non-member cities, whose monitoring and control networks are interconnected by the ITD fiber optic network, and the KRTMC ATMS software monitors the state and status of each signal system. As shown in **Figure 6.1**, the scope of this project is the ATMS System, the ITS devices, and the interfaces to non-member agencies; however, linkages between other systems and modifications to other systems may be needed to make the entire system of systems work as desired.

Figure 6.1 - KRTMC ITS Operations




### 6.1.1 Agency Roles & Responsibilities

The KRTMC ATMS system focus during daily operations is on automated information sharing/distribution and the operational efficiency at network junctions and interfaces. These strategies are "baseline" strategies that will also be applicable in other scenarios. In addition, accommodating or promoting modal and network shifts may become necessary under heavy congestion. The long-term strategies to manage the demand-capacity relationship are an ongoing activity. Baseline TSMO strategies, as well as roles and responsibilities of each agency, are shown in the following **Table 6.1**.

Table 6.1: TSMO Strategies and Agency Roles & Responsibilities

| TSMO Operational Strategies | Agency/Entity | Roles and Responsibilities |
|---|---|---|
| • Automated information sharing<br>• Advanced traveler information (511)<br>• En-route traveler information (3rd party, 511 and field devices) | ITD | 511 |
| | KRTMC | Coordinate regional operations |
| | | Monitor corridor performance |
| | | KRTMC ATMS |
| | | Monitor freeway and arterial traffic flow |

| TSMO Operational Strategies | Agency/Entity | Roles and Responsibilities |
|---|---|---|
| • Access to regional information by information service providers (ISPs)<br>• Parking Information<br>• Coordinated operation of arterial traffic signals<br>• Signal priority for transit<br>• Accommodate cross-network shifts for unusually heavy congestion | | Operate and maintain arterial and freeway field devices |
| | | Operate Safety Service Patrol |
| | | Conduct corridor technical management and development |
| | Non-Member City Traffic Divisions | Monitor arterial traffic flow |
| | | Operate arterial field devices |
| | | Maintain arterial field devices, and software |
| | Idaho State Patrol/ County Sheriff | Receive incident notification calls and respond to incidents |
| | | Notify other agency responders |
| | Local First Responders and Law Enforcement | Respond to incidents; Fire suppression; Medical assistance; Scene clearance |

The remaining scenarios were developed based on deviation from the baseline of "Daily Operations" – since many of the agencies deal with minor incidents as a routine, it was decided that they are a part of daily operations.

# 6.2 SCENARIO 2: INCIDENT RESPONSE

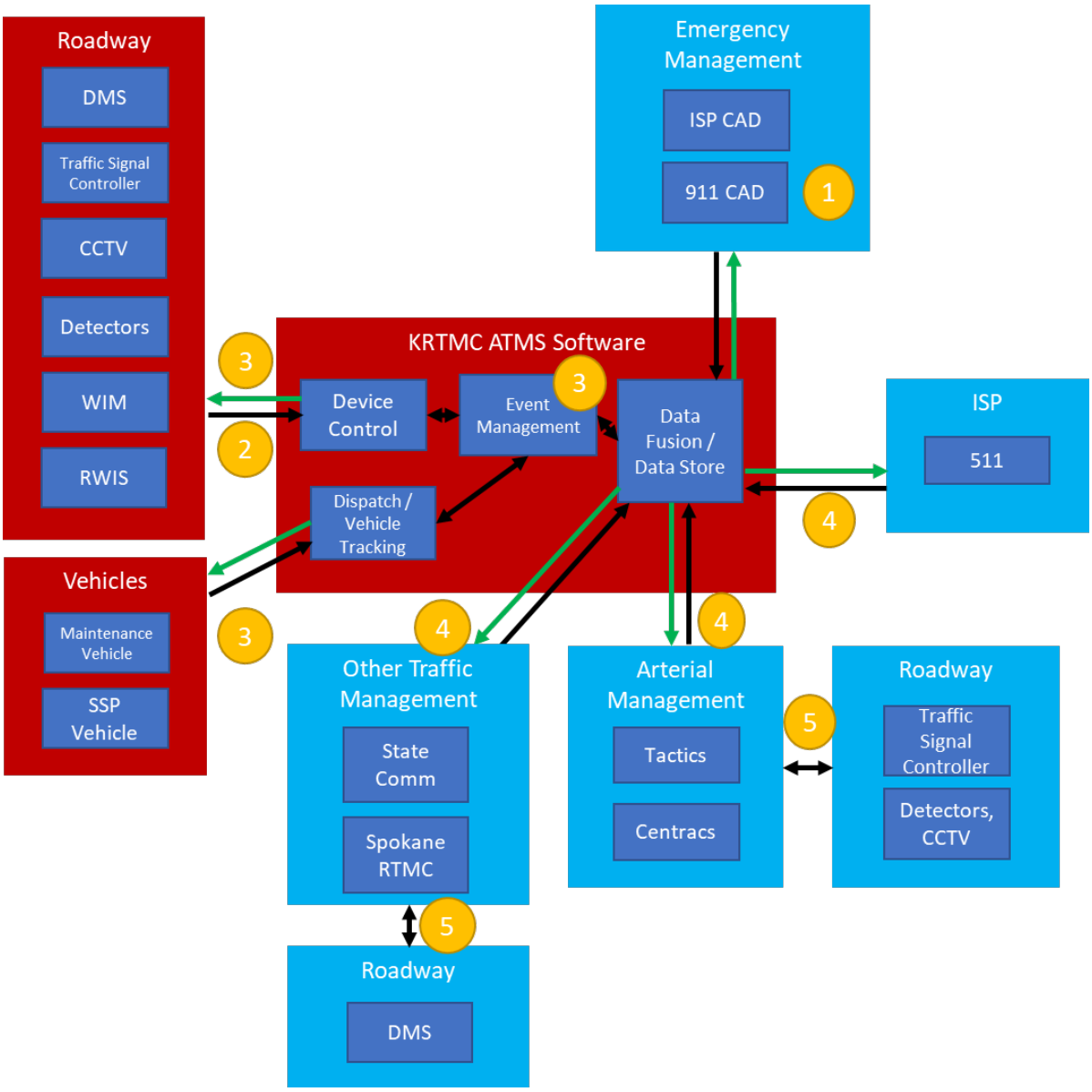
## 6.2.1 Freeway Incident (Minor and Major)

When deciding upon locations for scenarios multiple locations would require multiple response scenarios depending on location and time of day. To capture the various response strategies for a major incident, the corridor was divided into multiple sections and directions. Then based on time of day, the impact and necessary strategies could be determined. **Figure 6.2** depicts this scenario.

### 6.2.1.1 Incident Description

A commercial vehicle jackknifed on westbound I-90 just west of the N Spokane Street interchange at 6 a.m., spilling its load of boxes onto the freeway and closing the freeway in the westbound direction. The jurisdiction of the incident is the City of Post Falls.

Figure 6.2 - Major Freeway Incident Scenario




### 6.2.1.2 Assumptions

The assumptions used for this scenario are:

- No fatalities
- Hazardous materials spill due to at least 50 gallons of diesel fuel spilled.
- Long-term closure requiring mode shift and arterial diversions.
- Multiple coordinated responses needed to optimize the corridor.

### 6.2.1.3 Incident Description and Timeline

The incident timeline is the following:

1. I-90 traffic is flowing normally for the time of day, as commuters begin traveling into Spokane, Coeur D'Alene, and other areas for work. A Commercial Vehicle incident occurs on I-90 near the City of Post Falls; drivers immediately contact 911 to report the incident. Since the various 911 Computer Aided Dispatch

(CAD) systems are integrated into the KRTMC ATMC, the operators within the KRTMC are immediately notified of the potential incident and approximate location.

2. City of Post Falls police arrive on scene and begin initial determination of severity and approximate time for resolution. KRTMC Safety Service Patrol arrives on scene to assist with traffic control. KRTMC uses video cameras to verify the type of incident and number of lanes closed, and inputs incident information into the ATMS. KRTMC displays preliminary information on their DMS's east of the incident location. ISP arrives on scene and assumes incident command. The City of Post Falls Fire Department arrives on scene and assumes incident command.
3. KRTMC operator updates the ATMS to indicate major incident with a closure of more than 90 minutes. The member and non-member agencies are alerted through the ATMS alerting subsystem, and a previously approved response plan is recommended by the ATMS. Each agency's traffic signal system is modified either manually or automatically by the KRTMC ATMS, as determined by the Agency's profile. DMSs are updated on I-90 at major diversion locations by KRTMC and Statewide Comm; the ATMS modifies DMS on I-90 automatically based on the pre-agreed response plan. 511 systems are updated with the latest incident information.
4. Congestion builds in both directions of I-90 from drivers slowing to view the incident. Drivers begin to use arterials to get around incident location, and the KRTMC and non-member implement timing plans for the freeway diversions, and non-member agencies are requested to change timing plans on detour routes.
5. Non-member agencies begin changing the traffic signal timing plans along detour routes, State Comm and the Spokane KRTMC change DMS messages outside of Kootenai County. ISP completes investigation and contacts wrecker rotation.
6. HazMat response has begun to clean up the fuel spill. The commercial vehicle has been removed by a heavy wrecker, and clearance of the incident debris in the roadway has begun.
7. Clearance of incident is completed, and some capacity is restored to the freeway, interchange ramps have all re-opened. The ATMS system is updated, and the incident is closed, and all devices are returned to appropriate plans.

Applicable strategies, as well as roles and responsibilities of each agency, are shown in **Table 6.2**: Major Freeway Incident Scenario

**Table 6.2: Major Freeway Incident Scenario**

| TSMO Operational Strategies | Agency/Entity | Roles and Responsibilities |
|---|---|---|
| • Information sharing and distribution (as in baseline scenario)<br>• Operational efficiency at network junctions (as in baseline scenario)<br>• Common incident reporting system and asset management system<br>• Promote route/ network/ mode shifts via traveler information, (e.g., providing travel times on different networks)<br>• Opening freeway shoulders to traffic at certain locations<br>• Restrict/ reroute/ delay commercial traffic.<br>• Modify arterial signal timing to accommodate traffic shifting from freeway | ITD | Update 511 information |
| | KRTMC | Respond to and assist with incident clearance |
| | | Monitor freeway conditions |
| | | Operate field elements |
| | | Coordinate information dissemination |
| | | Suggest capacity-demand management measures |
| | | Monitor corridor conditions |
| | Non-member City Traffic Departments | Monitor arterial traffic flow |
| | | Adjust arterial signal timing |
| | Idaho State Patrol/ County Sheriff | Receive incident notification calls, enter CAD, and respond to incident |
| | | Notify other agency responders |
| | Local First Responders and Law Enforcement | Respond to accident for victim extraction, fire suppression, medical assistance |

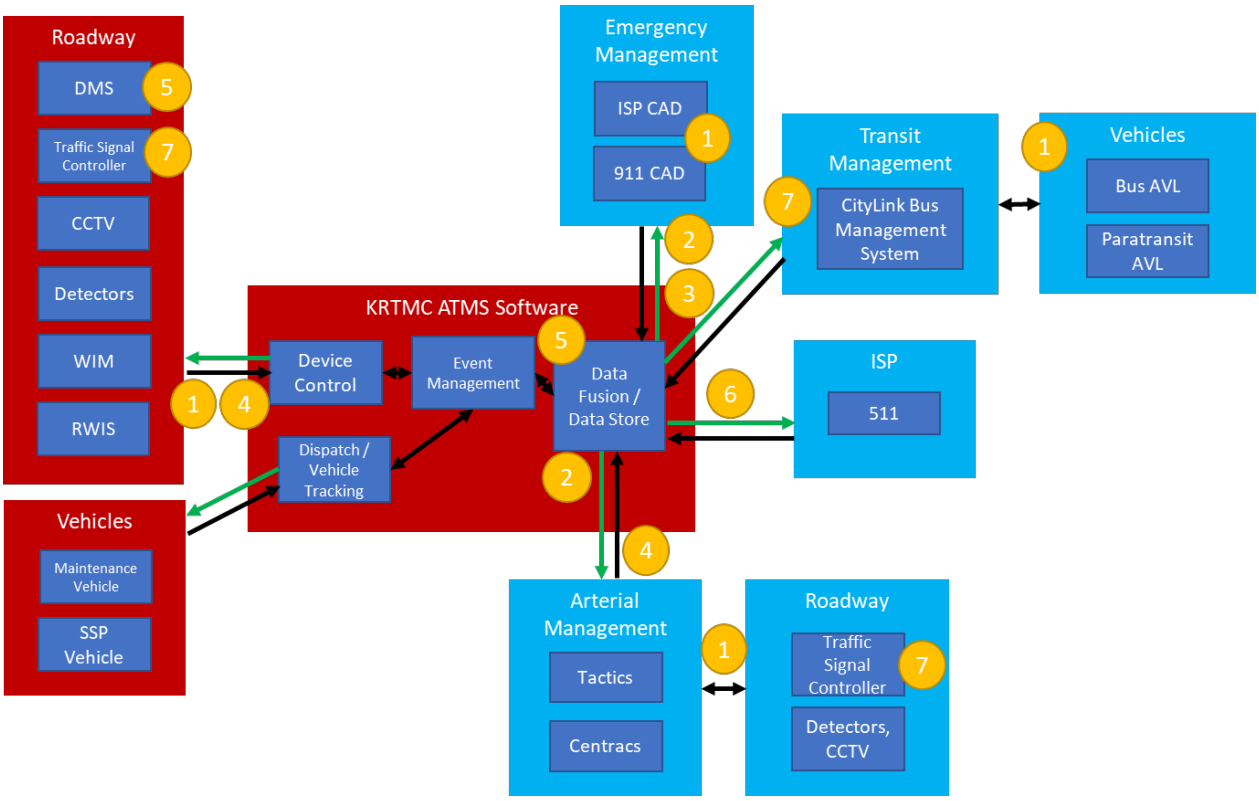
### 6.2.2 Arterial Incident

The arterial incident scenario is illustrated in **Figure 6.3** - Arterial Incident. This figure covers both minor and major incidents, with colored lines indicating additional communications and data exchanges required for major incidents. A major incident is defined as an event with one or more of the following characteristics:

- One or more fatalities or major injuries (e.g., requiring victim extraction and/or Life Flight missions).
- Arterial closure.
- HAZMAT incident; and
- Law enforcement action.

All other arterial incidents are categorized as minor.

**Figure 6.3 - Arterial Incident Scenario**




#### 6.2.2.1 Assumptions

The assumptions used for this scenario are:

- No fatalities
- Multiple coordinated responses needed to optimize the corridor

#### 6.2.2.2 Incident Timeline

The incident timeline is the following:

1. From cellular or landline 911 reports, the local police department (PD) is alerted to a possible incident on an arterial within their jurisdiction. The PD dispatch creates a new incident and transfers the incident to a dispatcher for PD response. In the event of injuries or possible injuries, paramedic units (typical response is one paramedic truck and a transport ambulance) are notified via telephone.
2. An alternate incident reporting source may be an arterial closed-circuit television (CCTV).
   a. Another alternate incident reporting source may be transit dispatchers receiving reports from bus

drivers on routes. These reports become transit "incidents" in the ATMS system and are passed to the Data Fusion system for further dissemination via 511.

3. The data fusion system acquires the incident data from the CAD system. The local jurisdiction traffic engineer receives an automatic incident notification from the ATMS. The ATMS disseminates law enforcement CAD data (traffic-related only) to all subscribed stakeholders as an "external" event for information only (until notified otherwise).
4. The PD dispatcher confirms the existence of the incident, exact incident location, and associated supplementary information as received from investigating officers. The data fusion system receives periodic CAD updates as they occur. Tow and recovery resources are called based on police officer radio reports.
5. KRTMC and the local jurisdiction exchange congestion and field device status information throughout the incident, including any nearby freeway incidents that might exacerbate the arterial incident.
6. The ATMS provides local stakeholders with current congestion information from surrounding freeways and any freeway device activation and associated messages.
7. Filtered information concerning the arterial incident and the response actions is disseminated to 511, and other TMCs.
8. The following additional actions are taken for major arterial incidents – the specific need for and order of action depends on the specific incident situation.
    b. The PD may activate emergency road closures to isolate the incident. This may include freeway on-ramps and off-ramps. This, in turn, requires coordination with the ISP and KRTMC.
    c. For extended arterial blockages or closures (major incident) pre-computed Signal Timing Plans may be activated on diversion routes by individual affected cities along the corridor.

#### 6.2.2.3 Changes to Baseline Strategies

Emergency management for arterial incidents is handled through local police and another emergency service. When the incident is minor, the KRTMC will focus on information dissemination. When there is a major incident, the KRTMC focuses on information dissemination, cross-jurisdictional coordination, and freeway/arterial operation coordination. The KRTMC operator takes the lead in this scenario. Applicable strategies, as well as roles and responsibilities of each agency, are shown in the Table below.

**Table 6.3: Arterial Incident Scenario**

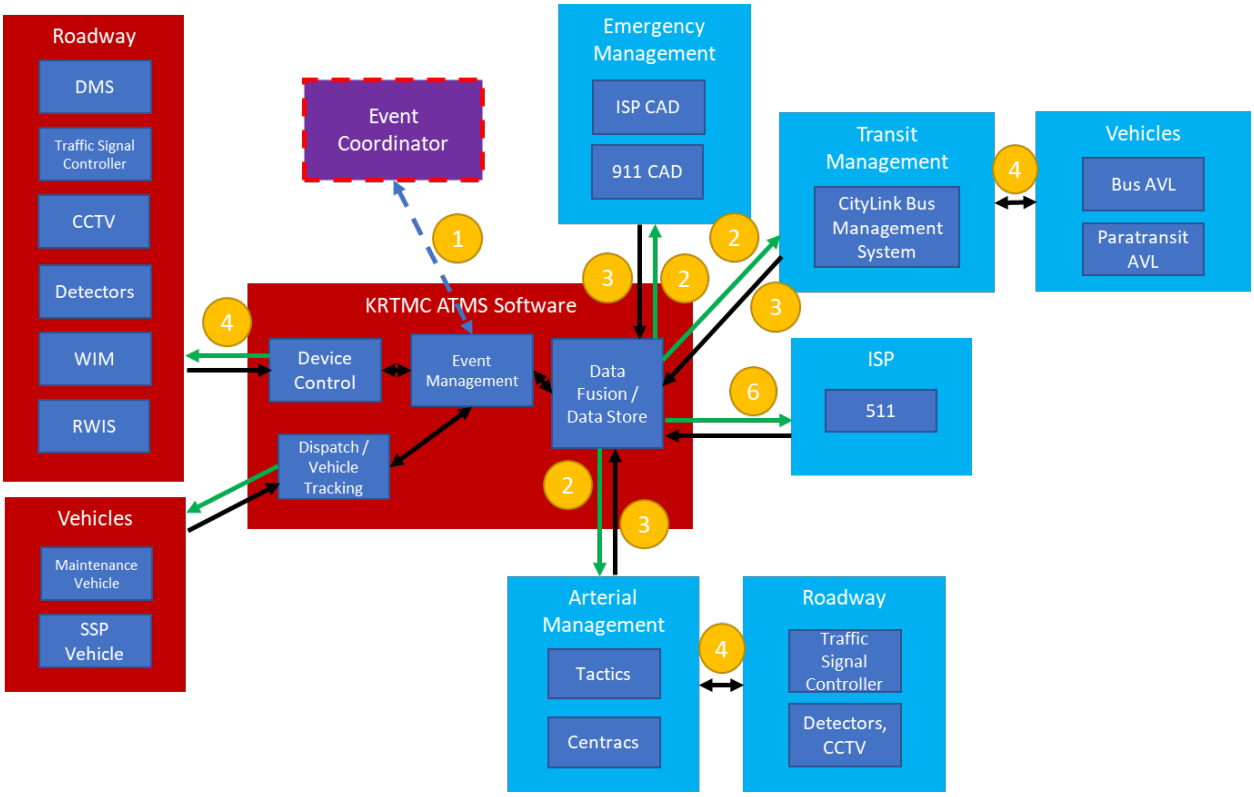
| TSMO Operational Strategies | Agency/Entity | Roles and Responsibilities |
|---|---|---|
| • Information sharing and distribution (as in baseline scenario)<br>• Operational efficiency at network junctions (as in baseline scenario)<br>• Common incident reporting system and asset management system<br>• Emergency road closure (including freeway off ramps)<br>• Modify arterial signal timing to accommodate traffic shifting from the incident location.<br>• Reroute Transit Vehicles | ITD | **Update 511 information** |
| | KRTMC | **Respond to off-ramp closure requests** |
| | | **Monitor freeway conditions** |
| | | **Operate field elements** |
| | | **Coordinate information dissemination** |
| | | **Suggest capacity-demand management measures** |
| | | **Monitor corridor conditions** |
| | City Traffic Divisions | **Monitor arterial traffic flow** |
| | | **Inform travelers via field devices** |
| | | **Adjust arterial signal timing** |
| | Idaho State Patrol/ County Sheriff | **Receive incident notification calls, enter CAD, and respond to incident** |
| | | **Notify other agency responders** |
| | Local First Responders and Law Enforcement | **Respond to accident for victim extraction, fire suppression, medical assistance** |

# 6.3 SCENARIO 3: SPECIAL EVENT

## 6.3.1 Incident Description

The distinguishing characteristic of a special-event scenario is the elevated need for coordination between regional networks. **Figure 6.4** depicts this scenario.

**Figure 6.4 - Special Event Scenario**




## 6.3.2 Timeline

The special event timeline is the following:

1. The event coordinator and other affected agencies develop a special event plan outlining traffic control strategy, security needs, etc. Special events are entered the ATMS from multiple sources depending on event needs.
2. The ATMS disseminates planned special event data to affected public safety agencies, transit agencies, KRTMC, ITD, and local jurisdiction traffic control systems.
3. The Data Fusion system receives special event inputs from affected agencies (public safety, transit, and traffic), which are sent to the ATMS.
4. KRTMC, transit, and local traffic agencies implement event services and traffic control strategies including field device activation and portable sign deployment, etc.
5. KRTMC and local jurisdictions use the ATMS to exchange device control and real time congestion and incident data as agreed by the plan.
6. The Data Fusion system provides special event data and traffic plans to the 511 system. The KRTMC operators disseminate real-time traffic conditions to the motoring public and other subscribers.

Special events require well-coordinated plans for managing expected traffic, as well as emergency response plans.

### 6.3.3 Changes to Baseline Strategies

Tabletop scenario sessions should be conducted to define the plans and train involved personnel. During the event, short-term, demand-capacity management, especially addition of transit capacity and priority for transit vehicles, are often needed. Information dissemination in advance, as well as during the event is important. The Event TOC / KRTMC is the lead for this scenario. Applicable strategies, as well as roles and responsibilities of each agency, are shown in the Table below.

**Table 6.4: Special Event Scenario**

| TSMO Operational Strategies | Agency/Entity | Roles and Responsibilities |
|---|---|---|
| • Information sharing and distribution (as in baseline scenario)<br>• Distribution of event management plan to the public in advance<br>• Operational efficiency at network junctions (as in baseline scenario)<br>• Coordinated scheduled maintenance activities on corridor networks to ensure available capacity at event<br>• Joint Transportation Operations Center<br>• Desktop sessions for enacting event plans<br>• Add transit capacity<br>• Reroute transit vehicles<br>• Provide transit priority (exclusive lanes, transit priority at traffic signals)<br>• Planned road closure and restrictions | ITD | Update 511 information |
| | Event TOC | Lead Role in coordination |
| | | Develop operational agreements between agencies and prepare event plan and incident response plan |
| | | Conduct desktop training sessions |
| | | Parking Management |
| | KRTMC | Monitor corridor conditions |
| | | Coordinate information dissemination |
| | | Close ramps, if necessary |
| | | Monitor freeway conditions |
| | | Operate field devices |
| | | Plans deployment of vehicles, portable DMSs, and appropriate DMS signing |
| | Non-member City Traffic Departments | Monitor arterial traffic flow |
| | | Inform travelers via field devices |
| | | Implement road closure/ restrictions |
| | | Plan parking access |
| | | Adjust arterial signal timing |
| | Idaho State Patrol/ County Sheriff | Street Patrol |
| | | Assisting in directing traffic |
| | Local First Responders and Law Enforcement | Respond to accident for victim extraction, fire suppression, medical assistance |

# 7 SUMMARY OF IMPACTS

Many current roles and responsibilities of the project stakeholders will continue to exist with the KRTMC project deployment; however, all operational tasks will be integrated through the KRTMC operations and interagency coordination, and cooperation will be enhanced with co-location of operations staff. None of this will come without expansion and upgrade of current systems, and agreements to operate each agency's traffic systems in cooperation with the KRTMC coalition. This section summarizes these impacts and provides an overview of required agency upgrades.

## 7.1 OPERATIONAL IMPACTS

The proposed KRTMC will allow stakeholder agencies, as well as road users, to share and receive information through the KRTMC. Enhanced network communications and integrated traffic systems are also proposed for coordination across jurisdictions to optimize traveler information sharing. Rather than being separated efforts, all agencies participating as part of the KRTMC coalition will have the ability to operate their systems and manage traffic through the scope of the KRTMC, as opposed to current organization and operations depicted in Section 3 **Figure 3.2**.

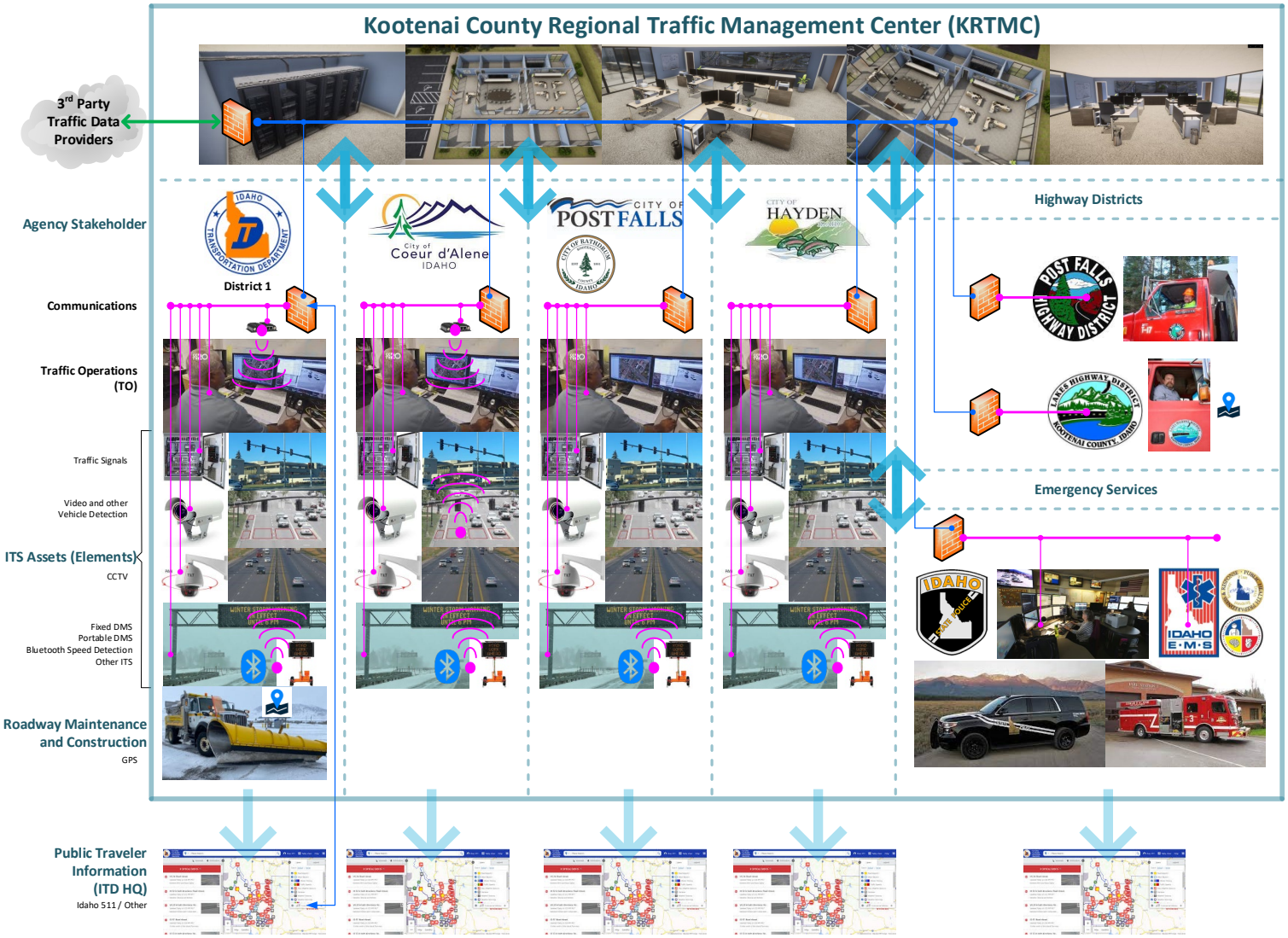
From an agency perspective, **Figure 7.1** provides a high level visual of how the KRTMC will operate. All roles and responsibilities previously identified for the separate agencies across Kootenai County (i.e. ISP, ITD, the Cities of Hayden, Rathdrum, and Coeur d'Alene, etc.) will continue to stay the same. However, the KRTMC will provide integration across all agencies, and will allow for enhanced access to traffic systems and data across jurisdictions. It is recommended the reader compare Figures 3.2 (before the KRTMC) to Figure 7.1 (after the KRTMC) for a visual of the operational impacts of the KRTMC.

A summary of the KRTMC impacts is listed below:

1. **The KRTMC will have full operational control over CCTV PTZ**
    a. Observe traffic, detect issues (debris, incidents, animal strikes, jumpers etc.),
    b. Used to notify incident mgmt. team, maintenance, ISP, local agency etc. as appropriate,
    c. Include lock outs to prevent off system PTZ viewing (include privacy zones),
    d. Permission access for stakeholders / supporting agencies (cities, highway districts, ISP, CFR, hospital).
2. **The KRTMC will have access to DMS/VMS, providing messages (closures, delays, incidents, critical weather etc.) to public:**
    a. Integration/coordination with State Comm, who currently provides dispatch and control over DMS/VMS signs,
    b. Messaging requires pre-approved scripts (No Happy Birthday Mom stuff),
    c. Coordination/notification with State Comm for any postings.
3. **The KRTMC will be involved in the Incident Management process:**
    a. Notifications to appropriate agencies and Incident Management Team,
    b. Driver Notifications via Web Site posting,
    c. Text message to subscribers,
    d. Improved data for Idaho 511 ( http://511.idaho.gov ).
    e. Monitor incidents to improve traffic notifications/situational awareness.
4. **The KRTMC will have access to RWIS site data:**
    a. Look but no touch RWIS instruments and data,
    b. Integrate more RWIS data into Website for public access,
    c. Notification of hazardous conditions being observed (511, website, DMS, etc.)
5. **The KRTMC will have a State Communications Center terminal:**
    a. Look but only observe activities being dispatched by State Comm (ISP, ITD, etc.),
    b. Restrict disclosure of non-public side communication (e.g., I-90 eastbound 4 vehicles 3 ejection fatalities on the road around the site),

   c. Provide State Comm / ISP situational awareness of traffic and incidents via CCTV,
   d. Driver notifications of closures and possible closure times via DMS,
   e. Will require close coordination with State Comm and probably a user agreement.
6. **KRTMC will be able to assist in Winter Operations notifications:**
   a. Identification of incidents, slide off' s obstructions etc.,
   b. Integration of Snowplow GPS (no plow data details) to inform public and agencies where plowing is occurring,
   c. Driver Notifications of plowing activity locations (to delay or understand long lines if they choose to proceed),
   d. Situational awareness improvement.
7. **KRTMC will have Construction and Maintenance activity awareness:**
   a. Driver notifications for activities underway,
   b. Weekly briefing to TMC on what will be occurring and where for DMS, Text, 511 and website notifications,
   c. Operational field data in real time for tracking congestion, website flow map, DMS travel time estimates, etc.

Figure 7.1 – Proposed KRTMC Operations

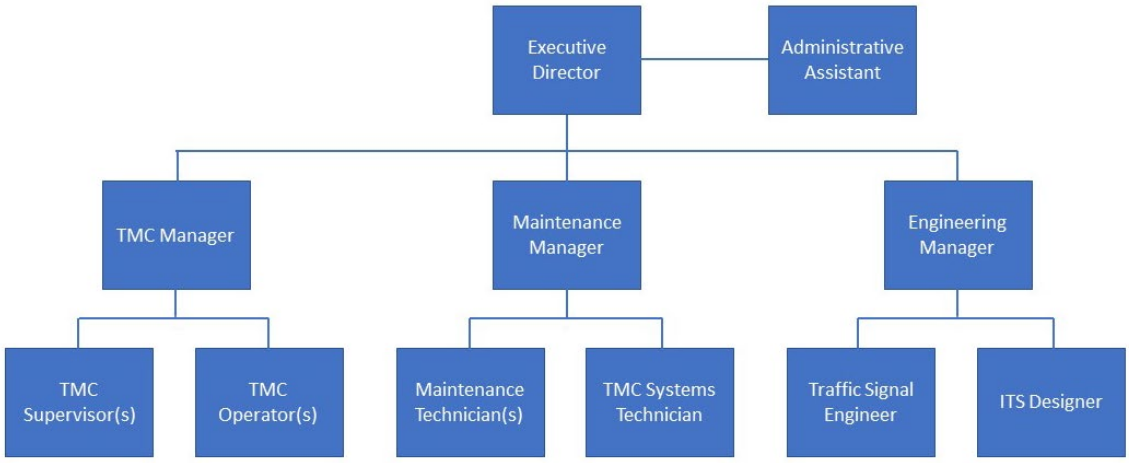


## 7.2 ORGANIZATIONAL IMPACTS

As stated in the Feasibility Study, the Kootenai KRTMC Coalition will be the lead organization when it comes to deploying strategies through the KRTMC for the Kootenai County Region and coordinating with neighboring jurisdictions and other TMC's. This was established by the project steering committee and a Coalition Agency was the preferred framework decided upon. This agency will consolidate traffic operations-related services within the county and provide the professional staff referenced in the project goals. The Coalition will be created as a new government agency funded through contributions by member agencies through the Kootenai MPO.

As the Feasibility Study indicates, it is proposed that the KRTMC have an Executive Director, a TMC manager, an Engineering Manager, a Maintenance Manager, several TMC Operations Technicians and Systems staff, and an administrative assistant. Further details on the staffing and organization of the KRTMC can be found in subsequent sections of this ConOps. The Coalition will be created as a new government agency funded through contributions by member agencies through the Kootenai MPO. Funding for the KRTMC Coalition will be planned through the Transportation Improvement Plan (TIP) process. As part of the coalition organization, the member agencies will serve on several committees in the oversight and operations of the coalition. **Figure 7.2** displays the proposed organizational chart for the KRTMC.

**Figure 7.2 - Proposed KRTMC Organizational Chart**




In alignment with information provided in the Feasibility Study, KRTMC's proposed governing structure will consist of two Councils and four Committees. The Executive Council and the Regional Transportation Coordination and Management Council (KRTMC) will be able to establish additional standing or ad-hoc Committees and/or project teams for specific tasks. Each Committee prepares and submits individual Committee accomplishments and work plans. The initial proposed Committees include:

- Traffic Operations Committee (TOC)
- Technology and Systems Committee
- Incident Management Committee
- Construction Coordination Committee

It is anticipated that initially, the KRTMC will operate from 7:00 AM to 7:00 PM daily. Within 2 years, the TMC will transition to 16-hour operation and within 5 years, 24-hour operation will occur.

**Table 5.9** lists some agreements stakeholders should consider for the KRTMC. These are provided as a guide to stakeholders and ultimately to the KRTMC Coalition. These agreements are defined by FHWA as best practice approach.

## 7.3 IMPACTS DURING DEVELOPMENT

To operate and maintain the KRTMC and fulfill the needs of the region, certain processes and assets need to be accounted for. This section summarizes new or modified capabilities, functions, processes, interfaces, and other changes needed to respond to the needs identified in the previous section. **Table 7.1** describes the high-level changes and additions required for each stakeholder/related agency to operate and maintain the proposed KRTMC. This table was derived from the Feasibility Study which provides further information on the necessary agency requirements.

**Table 7.1: Agency Changes & Additions for KRTMC Operation**

| Organization | Changes / Additions |
|---|---|
| ITD – District 1 | • Expand Fiber Optic Network and related communications<br>• Provide / Update Traffic Signal Controllers along state routes<br>• Expand Detector coverage<br>• Expand CCTV coverage<br>• Expand DMS coverage |
| KMPO | • Expand Regional Data Archive |
| City of Post Falls | • Expand Fiber Optic Network and related communications<br>• Connect Traffic Signal System to common communication network<br>• Expand Traffic Signal coverage, where needed<br>• Deploy Real-time detection along detour routes |
| City of Coeur d'Alene | • Expand Fiber Optic Network and related communications<br>• Upgrade legacy Traffic Signal Controllers<br>• Connect Traffic Signals to communication network<br>• Connect Traffic Signals to central signal software<br>• Connect Traffic Signal System to common communication network<br>• Expand Traffic Signal coverage, where needed<br>• Deploy Real-time detection along detour routes |
| City of Hayden | • Expand Fiber Optic Network and related communications<br>• Connect Traffic Signal System to common communication network<br>• Expand Traffic Signal coverage, where needed<br>• Deploy Real-time detection along detour routes |
| Lakes Highway District | • Deploy Real-time detection along detour routes<br>• Deploy vehicle tracking systems |
| East Side Highway District | • Deploy Real-time detection along detour routes<br>• Deploy vehicle tracking systems |
| Post Falls Highway District | • Deploy Real-time detection along detour routes<br>• Deploy vehicle tracking systems |
| Worley Highway District | • Deploy Real-time detection along detour routes<br>• Deploy vehicle tracking systems |
| Idaho State Police | • Deploy CAD Integration with regional traffic systems |

# 8 GLOSSARY

The following Glossary table defines selected project specific terms used throughout this Concept of Operations document, as well as SET-IT project files and diagrams.

**Table 8.1 : Glossary of Terms**

| Term | Definition |
|---|---|
| 511 TraveliQ ERS | 511 TraveliQ ERS (Event Reporting System) provided by the IBI Group (vendor). The 511 URL is: https://511.idaho.gov [511.idaho.gov] |
| Blue Tooth Reader Systems | Blue Tooth Reader Systems |
| Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV | Cities of Coeur d'Alene, City of Post Falls, City of Hayden, City of Rathdrum - ITS Roadway Equipment - Signal Control + Detection + CCTV Systems |
| CityLink Systems | Citylink is a public transportation service in parts of Kootenai County, Idaho. CityLink Transit Operations Data Interface to provide for sharing of video and other data can happen by manual process - future system interface. |
| County and City MCM Systems | County and City MCM Operations Systems: MCM Operations monitors and manages roadway infrastructure construction and maintenance activities. |
| Drivers | Traveling Public - Drivers |
| ITD District 1 | Idaho Transportation Department District 1 |
| ITD District 1 - Signal Control + Detection + CCTV Equipment | ITD District 1 - Signal Controllers, Detection, CCTV field systems |
| ITD DMS | ITD District 1 Dynamic Message Sign Systems |
| ITD Ramp Metering | ITD District 1 Freeway Ramp Metering Systems |
| ITD RWIS | ITD District 1 Road Weather Information Systems (RWIS) |
| ITD Vehicle Detection Systems (VDS) | ITD District 1 Vehicle Detection Systems (VDS) |
| ITD, County, and Cities Anti-Icing Equipment | ITD, County, City Stakeholder Group Anti-Icing Equipment |
| KCATT | Kootenai County Area Transportation Team (KCATT) - the KRTMC Coalition, consisting of ITD, KMPO, City of Coeur d'Alene, City of Post Falls, City of Hayden, City of Rathdrum, East Side Highway District, Post Falls Highway District, Lakes Highway District |
| KMPO | Kootenai County Metropolitan Planning Organization |
| Kootenai County 911 Center (StateComm Coeur D'Alene) | Kootenai County 911 Center (StateComm CDA). StateComm provides statewide traffic management center functions on state highways, under contract to ITD. ITD, StateComm, and the Idaho State Police (ISP) will coordinate incident response, but other transportation and emergency management agencies, emergency dispatch and police and fire agencies, may also be involved. |
| KRTMC - Kootenai Regional TMC | Kootenai Regional TMC ATMS System and physical operations |
| KRTMC Archive Data System | The KRTMC 'Archived Data System' collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations, and research applications. |
| KRTMC MCM Systems | KRTMC MCM Operations Systems: MCM Operations monitors and manages roadway infrastructure construction and maintenance activities. |
| KRTMC TIC Systems | (TIC = Transportation Information Center) The KRTMC TIC System collects, processes, stores, and disseminates transportation information to system |

| Term | Definition |
|---|---|
| | operators and the traveling public |
| Local Print and Broadcast Media | Local Print and Broadcast Media Data Interface (nothing automated initially, future implementation). Sharing of video and other data can happen by manual process |
| Location/Time Data Source Systems | (Location and Time Data Source <ITS>) The 'Location and Time Data Source' provides accurate position information. |
| MCM Vehicle On Board Equipment (OBE) | KRTMC Maintenance and Construction Management (MCM) Vehicle On-Board-Equipment (OBE) |
| National Weather Systems | National Oceanic and Atmospheric Administration (NORA) Data Interface |
| Other ITS Roadway Systems | Other ITS Roadway Systems - such as Pavement Sensors. |
| Rail Operations (BNSF/UPRR) | Regional Rail Operations Agencies (UPRR - Union Pacific Railroad Company, BNSF - Burlington Northern Santa Fe Railroad Company Data Interface |
| SG Cities | Stakeholder Group (SG) Cities of Coeur d'Alene, City of Post Falls, City of Hayden, City of Rathdrum |
| SG ITD, County, City Maintenance | Stakeholder Group (SG) Maintenance and Construction Operations for Idaho Transportation Department (ITD), City of Coeur d'Alene, City of Post Falls, City of Hayden, City of Rathdrum, East Side Highway District, Post Falls Highway District, Lakes Highway District |
| Spokane TMC and Other Regional TMCs | Spoke TMC and other regional TMCs (future) Data Interface |
| Vehicle OBE | (Vehicle OBE) The Vehicle On-Board Equipment (OBE) |

The following table contains an alphabetical listing of abbreviations and acronyms used in this document, as well as SET-IT project files and diagrams.

**Table 8.2 : Acronym List**

| Acronym/Abbreviation | Definition |
|---|---|
| ADA | Americans With Disabilities Act |
| ARC-IT | Architecture Reference for Cooperative and Intelligent Transportation |
| ATDM | Active Transportation and Demand Management |
| ATIS | Advanced Traveler Information System |
| ATM | Active Traffic Management |
| ATMS | Advanced Transportation Management System |
| AVL | Automated Vehicle Location |
| C2C | Center to Center |
| CAD | Computer Aided Dispatch |
| CCTV | Closed Circuit Television Camera |
| CDA | City of Coeur d'Alene |
| CHDN | City of Hayden |
| ConOps | Concept or Operations |
| CPF | City of Post Falls |
| CPU | Computer Processing Unit |
| CR | County Road |
| CRTHM | City of Rathdrum |
| CV | Connected Vehicle |
| CVO | Commercial Vehicle Operations |
| DI | Data Interfaces |
| DMS | Dynamic Message Sign |

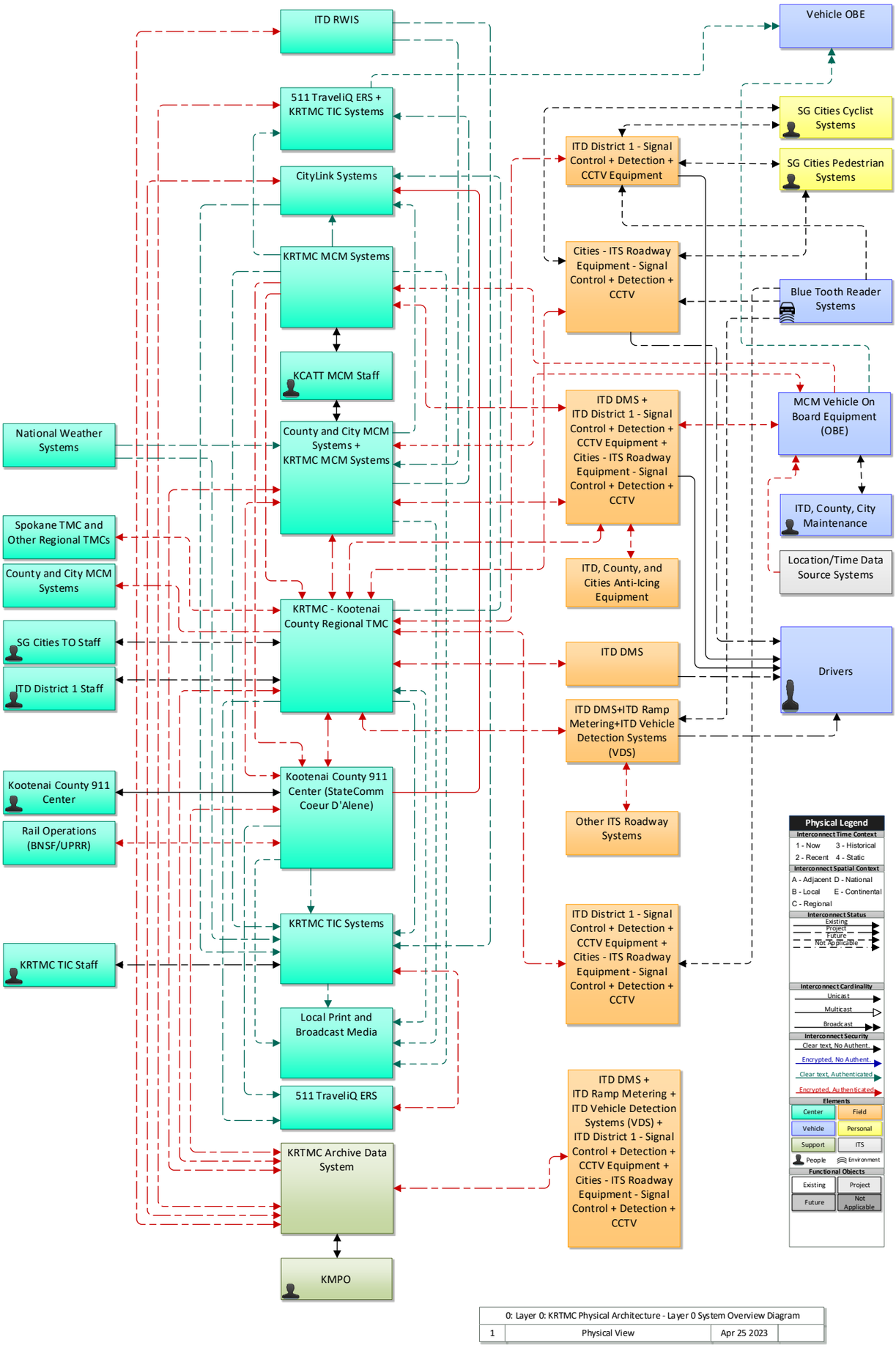
| Acronym/Abbreviation | Definition |
|---|---|
| DSS | Decision Support System |
| EMS | Emergency Medical Services |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| FTE | Full Time Equivalent |
| GIS | Geographic Information System |
| HAR | Highway Advisory Radio |
| HDES | Highway District - East Side |
| HDL | Highway District - Lakes |
| HDPF | Highway District - Post Falls |
| I- | Interstate Highway |
| ISP | Idaho State Police |
| ITD | Idaho Transportation Department |
| ITS | Intelligent Transportation System |
| JPO | Joint Program Office |
| KCATT | Kootenai County Area Transportation Team |
| KMPO | Kootenai Metropolitan Planning Organization |
| KRTMC | Kootenai Regional Traffic Management Center |
| LRTP | Long Range Transportation Plan |
| MCM | Maintenance, Construction, and Management |
| MOT | Maintenance of Traffic |
| mph | miles per hour |
| MPO | Metropolitan Planning Organization |
| PD | Police Department |
| RTCMC | Regional Transportation Coordination and Management Council |
| SET-IT | Systems Engineering Tool for Intelligent Transportation |
| SG | Stakeholder Group |
| SH- | State Highway |
| SOP | Standard Operating Procedure |
| SSP | Safety Service Patrol |
| TIP | Transportation Improvement Program |
| TMC | Traffic Management Center |
| TO | Traffic Operations |
| TOC | Traffic Operations Center |
| TSMO | Transportation Systems Management and Operation |
| TSP | Transit Signal Priority |
| US- | US Highway |
| VDS | Vehicle Detection System (video, radar, loops, other) |
| WSDOT | Washington Department of Transportation (WSDOT) |

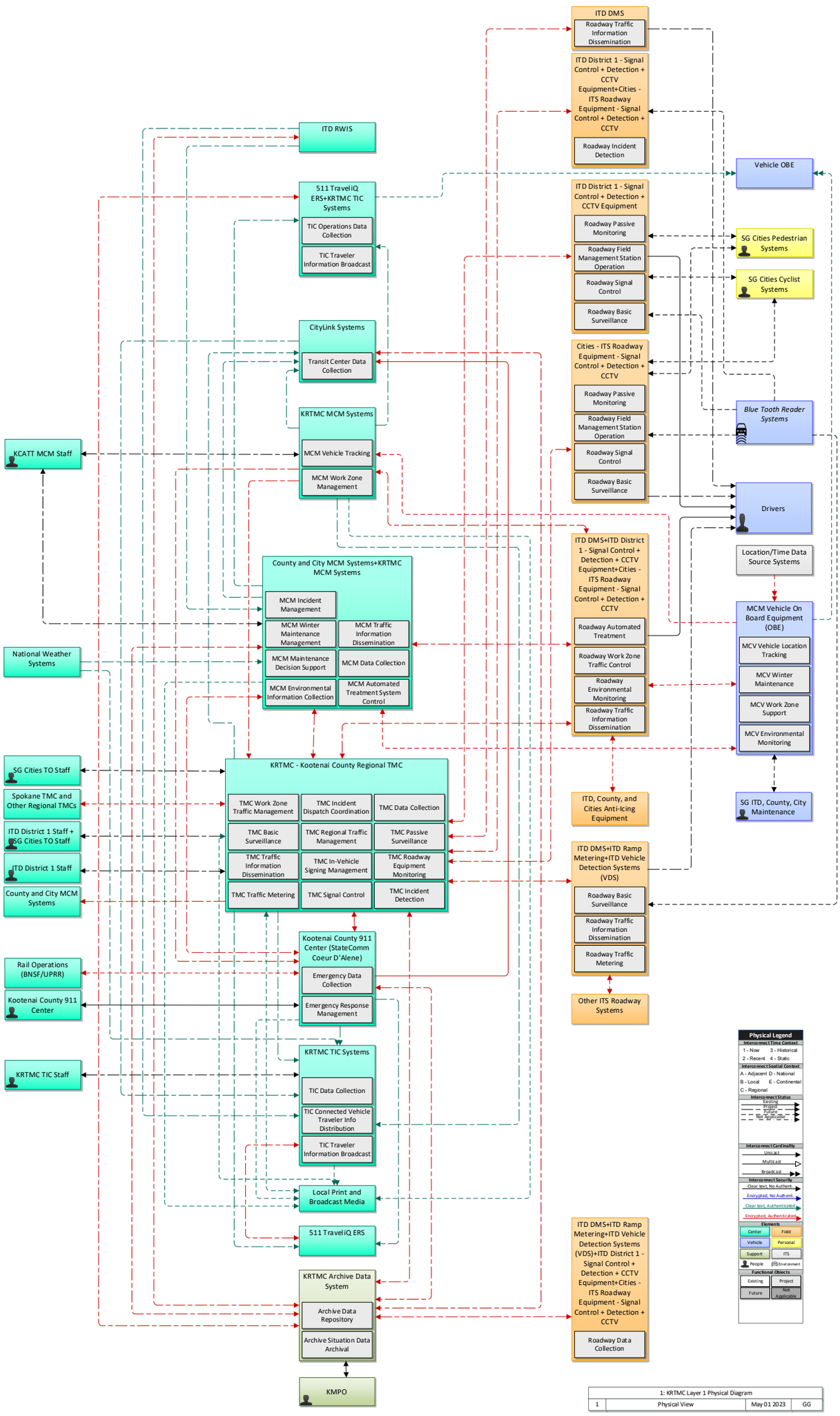
# 9 APPENDIX

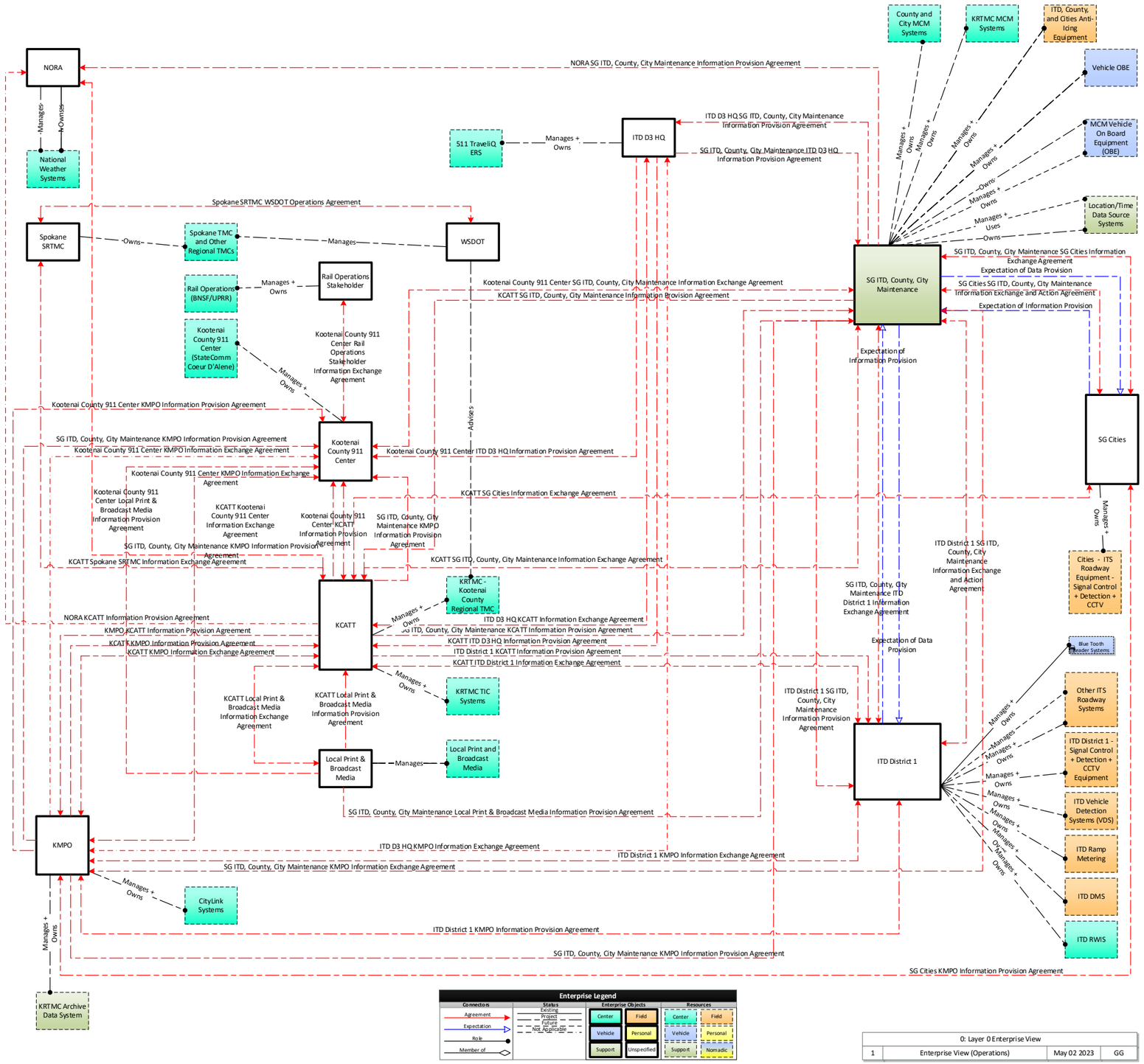
This section includes documents and diagrams intended to augment what has been provided in the body of the document. Attachments included are as follows:

Attachments:

1. Layer 0 – KRTMC Physical Diagram
2. Layer 1 - KRTMC Physical Diagram
3. Layer 0 – Enterprise Diagram


ITD RWIS
511 TraveliQ ERS + KRTMC TIC Systems
CityLink Systems
KRTMC MCM Systems
KCATT MCM Staff
County and City MCM Systems + KRTMC MCM Systems
KRTMC - Kootenai County Regional TMC
Kootenai County 911 Center (StateComm Coeur D'Alene)
KRTMC TIC Systems
Local Print and Broadcast Media
511 TraveliQ ERS
KRTMC Archive Data System
KMPO
National Weather Systems
Spokane TMC and Other Regional TMCs
County and City MCM Systems
SG Cities TO Staff
ITD District 1 Staff
Kootenai County 911 Center
Rail Operations (BNSF/UPRR)
KRTMC TIC Staff
Vehicle OBE
SG Cities Cyclist Systems
SG Cities Pedestrian Systems
ITD District 1 - Signal Control + Detection + CCTV Equipment
Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Blue Tooth Reader Systems
ITD DMS + ITD District 1 - Signal Control + Detection + CCTV Equipment + Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
MCM Vehicle On Board Equipment (OBE)
ITD, County, City Maintenance
Location/Time Data Source Systems
ITD, County, and Cities Anti-Icing Equipment
ITD DMS
Drivers
ITD DMS+ITD Ramp Metering+ITD Vehicle Detection Systems (VDS)
Other ITS Roadway Systems
ITD District 1 - Signal Control + Detection + CCTV Equipment + Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
ITD DMS + ITD Ramp Metering + ITD Vehicle Detection Systems (VDS) + ITD District 1 - Signal Control + Detection + CCTV Equipment + Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Physical Legend
Interconnect Time Context
1 - Now
2 - Recent
3 - Historical
4 - Static
Interconnect Spatial Context
A - Adjacent
B - Local
C - Regional
D - National
E - Continental
Interconnect Status
Existing
Project
Future
Not Applicable
Interconnect Cardinality
Unicast
Multicast
Broadcast
Interconnect Security
Clear text, No Authent.
Encrypted, No Authent.
Clear text, Authenticated
Encrypted, Authenticated
Elements
Center
Field
Vehicle
Personal
Support
ITS
People
Environment
Functional Objects
Existing
Project
Future
Not Applicable
0: Layer 0: KRTMC Physical Architecture - Layer 0 System Overview Diagram
1
Physical View
Apr 25 2023


ITD DMS
Roadway Traffic Information Dissemination
ITD District 1 - Signal Control + Detection + CCTV Equipment+Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Roadway Incident Detection
ITD RWIS
Vehicle OBE
511 TraveliQ ERS+KRTMC TIC Systems
TIC Operations Data Collection
TIC Traveler Information Broadcast
ITD District 1 - Signal Control + Detection + CCTV Equipment
Roadway Passive Monitoring
Roadway Field Management Station Operation
Roadway Signal Control
Roadway Basic Surveillance
SG Cities Pedestrian Systems
SG Cities Cyclist Systems
CityLink Systems
Transit Center Data Collection
Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Roadway Passive Monitoring
Roadway Field Management Station Operation
Roadway Signal Control
Roadway Basic Surveillance
Blue Tooth Reader Systems
KRTMC MCM Systems
MCM Vehicle Tracking
MCM Work Zone Management
KCATT MCM Staff
Drivers
ITD DMS+ITD District 1 - Signal Control + Detection + CCTV Equipment+Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Roadway Automated Treatment
Roadway Work Zone Traffic Control
Roadway Environmental Monitoring
Roadway Traffic Information Dissemination
Location/Time Data Source Systems
MCM Vehicle On Board Equipment (OBE)
MCV Vehicle Location Tracking
MCV Winter Maintenance
MCV Work Zone Support
MCV Environmental Monitoring
County and City MCM Systems+KRTMC MCM Systems
MCM Incident Management
MCM Winter Maintenance Management
MCM Traffic Information Dissemination
MCM Maintenance Decision Support
MCM Data Collection
MCM Environmental Information Collection
MCM Automated Treatment System Control
National Weather Systems
SG ITD, County, City Maintenance
KRTMC - Kootenai County Regional TMC
TMC Work Zone Traffic Management
TMC Incident Dispatch Coordination
TMC Data Collection
TMC Basic Surveillance
TMC Regional Traffic Management
TMC Passive Surveillance
TMC Traffic Information Dissemination
TMC In-Vehicle Signing Management
TMC Roadway Equipment Monitoring
TMC Traffic Metering
TMC Signal Control
TMC Incident Detection
SG Cities TO Staff
Spokane TMC and Other Regional TMCs
ITD District 1 Staff + SG Cities TO Staff
ITD District 1 Staff
County and City MCM Systems
ITD, County, and Cities Anti-Icing Equipment
ITD DMS+ITD Ramp Metering+ITD Vehicle Detection Systems (VDS)
Roadway Basic Surveillance
Roadway Traffic Information Dissemination
Roadway Traffic Metering
Kootenai County 911 Center (StateComm Coeur D'Alene)
Emergency Data Collection
Emergency Response Management
Rail Operations (BNSF/UPRR)
Kootenai County 911 Center
Other ITS Roadway Systems
KRTMC TIC Systems
TIC Data Collection
TIC Connected Vehicle Traveler Info Distribution
TIC Traveler Information Broadcast
KRTMC TIC Staff
Local Print and Broadcast Media
511 TraveliQ ERS
ITD DMS+ITD Ramp Metering+ITD Vehicle Detection Systems (VDS)+ITD District 1 - Signal Control + Detection + CCTV Equipment+Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
Roadway Data Collection
KRTMC Archive Data System
Archive Data Repository
Archive Situation Data Archival
KMPO
Physical Legend
Interconnect Time Context
1 - Now
3 - Historical
2 - Recent
4 - Static
Interconnect Spatial Context
A - Adjacent
D - National
B - Local
E - Continental
C - Regional
Interconnect Status
Existing
Project
Future
Not Applicable
Interconnect Cardinality
Unicast
Multicast
Broadcast
Interconnect Security
Clear text, No Authent.
Encrypted, No Authent.
Clear text, Authenticated
Encrypted, Authenticated
Elements
Center
Field
Vehicle
Personal
Support
ITS
People
Environment
Functional Objects
Existing
Project
Future
Not Applicable
1: KRTMC Layer 1 Physical Diagram
1
Physical View
May 01 2023
GG


NORA
National Weather Systems
Manages
Owns
NORA SG ITD, County, City Maintenance Information Provision Agreement
511 TravelIQ ERS
ITD D3 HQ
Manages + Owns
ITD D3 HQ SG ITD, County, City Maintenance Information Provision Agreement
SG ITD, County, City Maintenance ITD D3 HQ Information Provision Agreement
County and City MCM Systems
KRTMC MCM Systems
ITD, County, and Cities Anti-Icing Equipment
Vehicle OBE
MCM Vehicle On Board Equipment (OBE)
Location/Time Data Source Systems
Spokane SRTMC WSDOT Operations Agreement
Spokane SRTMC
Owns
Spokane TMC and Other Regional TMCs
Manages
WSDOT
Rail Operations (BNSF/UPRR)
Rail Operations Stakeholder
Kootenai County 911 Center (StateComm Coeur D'Alene)
Kootenai County 911 Center Rail Operations Stakeholder Information Exchange Agreement
Kootenai County 911 Center SG ITD, County, City Maintenance Information Exchange Agreement
KCATT SG ITD, County, City Maintenance Information Provision Agreement
SG ITD, County, City Maintenance
SG ITD, County, City Maintenance SG Cities Information Exchange Agreement
Expectation of Data Provision
SG Cities SG ITD, County, City Maintenance Information Exchange and Action Agreement
Expectation of Information Provision
Expectation of Information Provision
SG Cities
Kootenai County 911 Center KMPO Information Provision Agreement
SG ITD, County, City Maintenance KMPO Information Provision Agreement
Kootenai County 911 Center KMPO Information Exchange Agreement
Kootenai County 911 Center
Kootenai County 911 Center ITD D3 HQ Information Provision Agreement
Advises
Kootenai County 911 Center KMPO Information Exchange Agreement
KCATT SG Cities Information Exchange Agreement
Kootenai County 911 Center Local Print & Broadcast Media Information Provision Agreement
KCATT Kootenai County 911 Center Information Exchange Agreement
Kootenai County 911 Center KCATT Information Provision Agreement
SG ITD, County, City Maintenance KMPO Information Provision Agreement
SG ITD, County, City Maintenance KMPO Information Provision Agreement
KCATT Spokane SRTMC Information Exchange Agreement
KCATT SG ITD, County, City Maintenance Information Exchange Agreement
ITD District 1 SG ITD, County, City Maintenance Information Exchange and Action Agreement
SG ITD, County, City Maintenance ITD District 1 Information Exchange Agreement
Cities - ITS Roadway Equipment - Signal Control + Detection + CCTV
KRTMC - Kootenai County Regional TMC
KCATT
Manages + Owns
NORA KCATT Information Provision Agreement
KMPO KCATT Information Provision Agreement
KCATT KMPO Information Provision Agreement
KCATT KMPO Information Exchange Agreement
ITD D3 HQ KCATT Information Exchange Agreement
SG ITD, County, City Maintenance KCATT Information Provision Agreement
KCATT ITD D3 HQ Information Provision Agreement
ITD District 1 KCATT Information Provision Agreement
KCATT ITD District 1 Information Exchange Agreement
Expectation of Data Provision
Blue Tooth Reader Systems
KRTMC TIC Systems
KCATT Local Print & Broadcast Media Information Exchange Agreement
KCATT Local Print & Broadcast Media Information Provision Agreement
ITD District 1 SG ITD, County, City Maintenance Information Provision Agreement
Other ITS Roadway Systems
ITD District 1 - Signal Control + Detection + CCTV Equipment
ITD Vehicle Detection Systems (VDS)
ITD Ramp Metering
ITD DMS
ITD RWIS
Local Print & Broadcast Media
Manages
Local Print and Broadcast Media
ITD District 1
SG ITD, County, City Maintenance Local Print & Broadcast Media Information Provision Agreement
KMPO
ITD D3 HQ KMPO Information Exchange Agreement
ITD District 1 KMPO Information Exchange Agreement
SG ITD, County, City Maintenance KMPO Information Exchange Agreement
CityLink Systems
ITD District 1 KMPO Information Provision Agreement
SG ITD, County, City Maintenance KMPO Information Provision Agreement
SG Cities KMPO Information Provision Agreement
KRTMC Archive Data System
Enterprise Legend
Connectors
Agreement
Expectation
Role
Member of
Status
Existing
Project
Future
Not Applicable
Enterprise Objects
Center
Field
Vehicle
Personal
Support
Unspecified
Resources
Center
Field
Vehicle
Personal
Support
Nomadic
0: Layer 0 Enterprise View
1
Enterprise View (Operations)
May 02 2023
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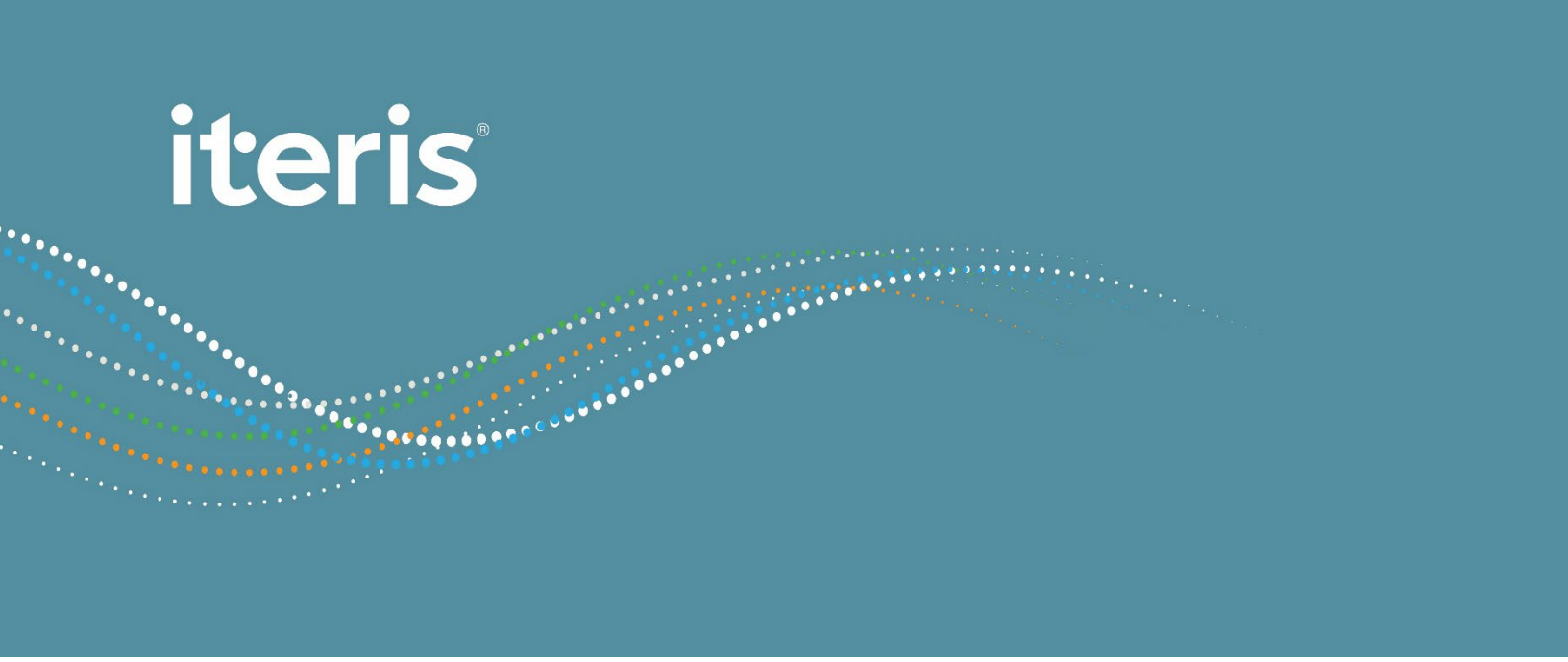

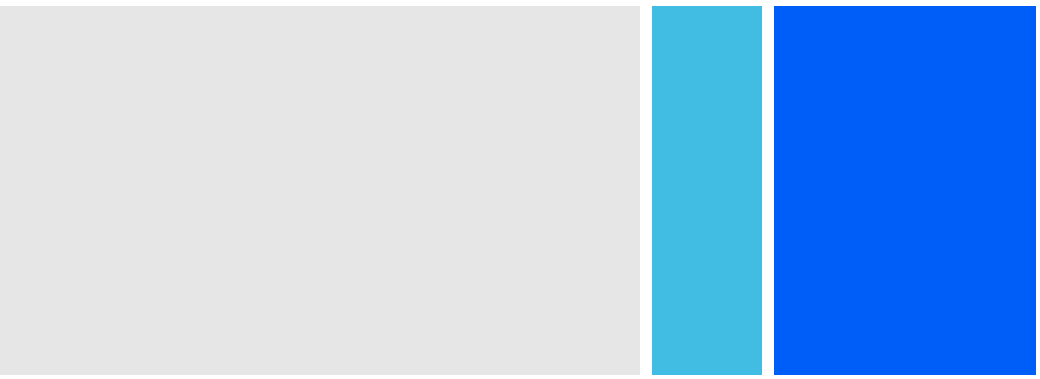

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