5.0 Miami Valley Regional ITS Architecture Interface Requirements

The functional flow diagrams developed by the ITS Management Committee for the Miami Valley Regional ITS Architecture provide a detailed look at the communications and data flows among regional stakeholders. Table 5.1 lists all available functional flow diagrams as defined in the National ITS Architecture. Of the 85 functional flow diagrams in the National ITS Architecture, 28 were initially selected as pertinent to the Regional ITS Architecture. The functional flow diagrams in bold are those that identify the various system components the regional architecture will utilize. The selected functional flow diagrams that are italicized are planned. Similarly, the flow definitions displayed in the diagrams represent existing and planned (italicized) information exchanges.

Functional flow diagrams for the selected activities are presented in this section along with a brief description from the National ITS Architecture and the regional application for what each diagram addresses.

As the regional ITS infrastructure develops, these functional flow diagrams can be modified and additional functional flow diagrams can be incorporated. The functional flow diagrams describe the system wide approach to ITS for the entire Miami Valley region. All of the interfaces outlined here were used to develop and document the architecture for further update in Turbo Architecture.

Table 5.1 National ITS Architecture Functional Flow Diagrams

Archived Data Management

- ***ITS Data Mart***
- ITS Data Warehouse
- ITS Virtual Data Warehouse

Public Transportation

- **Transit Vehicle Tracking**
- **Transit Fixed-Route Operations**
- **Demand Response Transit Operations**
- **Transit Passenger and Fare Management**
- **Transit Security**
- Transit Maintenance
- **Multi-modal Coordination**
- **Transit Traveler Information**

Traveler Information

- **Broadcast Traveler Information**
- **Interactive Traveler Information**
- Autonomous Route Guidance
- Dynamic Route Guidance
- ISP Based Route Guidance
- Integrated Transportation Management/Route Guidance
- Yellow Pages and Reservation
- Dynamic Ridesharing
- In Vehicle Signing

Traffic Management

- **Network Surveillance**
- **Probe Surveillance**
- **Surface Street Control**
- **Freeway Control**
- HOV Lane Management
- **Traffic Information Dissemination**
- **Regional Traffic Control**
- **Traffic Incident Management System**
- ***Traffic Forecast and Demand Management***
- Electronic Toll Collection
- Emissions Monitoring and Management
- Virtual TMC and Smart Probe Data
- Standard Railroad Grade Crossing
- Advanced Railroad Grade Crossing
- Railroad Operations Coordination
- Parking Facility Management
- Regional Parking Management
- Reversible Lane Management
- Speed Monitoring
- Drawbridge Management
- Roadway Closure Management

Vehicle Safety

- Vehicle Safety Monitoring
- Driver Safety Monitoring
- Longitudinal Safety Warning
- Lateral Safety Warning
- Intersection Safety Warning
- Pre-Crash Restraint Deployment
- Driver Visibility Improvement
- Advanced Vehicle Longitudinal Control
- Advanced Vehicle Lateral Control
- Intersection Collision Avoidance
- Automated Highway System
- Commercial Vehicle Operations

The functional flow diagrams in **bold** are those that identify the various system components the regional architecture will utilize. The selected functional flow diagrams that are *italicized* are planned.

Table 5.1 National ITS Architecture Functional Flow Diagrams (cont.)

Fleet Administration

- Freight Administration
- Electronic Clearance
- CV Administrative Processes
- International Border Electronic Clearance
- Weigh-In-Motion
- Roadside CVO Safety
- On-board CVO Safety and Freight Safety & Security
- CVO Fleet Maintenance
- **HAZMAT Management**
- Roadside HAZMAT Security Detection and Mitigation
- CV Driver Security Authentication
- Freight Assignment Tracking

Emergency Operations

- **Emergency Call Taking and Dispatch**
- Emergency Routing
- Mayday Support
- **Roadway Service Patrols**
- Transportation Infrastructure Protection
- **Wide Area Alert**
- Early Warning System
- Disaster Response and Recovery
- Evacuation and Reentry Management
- Disaster Traveler Information

Maintenance and Construction Management

- ***Maintenance and Construction Vehicle and Equipment Tracking***
- Maintenance and Construction Vehicle Maintenance
- **Road Weather Data Collection**
- **Weather Information Processing and Distribution**
- Roadway Automated Treatment
- **Winter Maintenance**
- Roadway Maintenance and Construction
- **Work Zone Management**
- Work Zone Safety Monitoring
- **Maintenance and Construction Activity Coordination**

The functional flow diagrams in **bold** are those that identify the various system components the regional architecture will utilize. The selected functional flow diagrams that are *italicized* are planned.

5.1 AD1: ITS Data Mart

This functional flow diagram provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and metadata management common to all ITS archives and provides general query and report access to archive data users. In the Miami Valley region, each traffic, transit, and emergency agency will maintain their respective archived data. Data sharing agreements among the stakeholders will be developed so that information is available in a common format.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

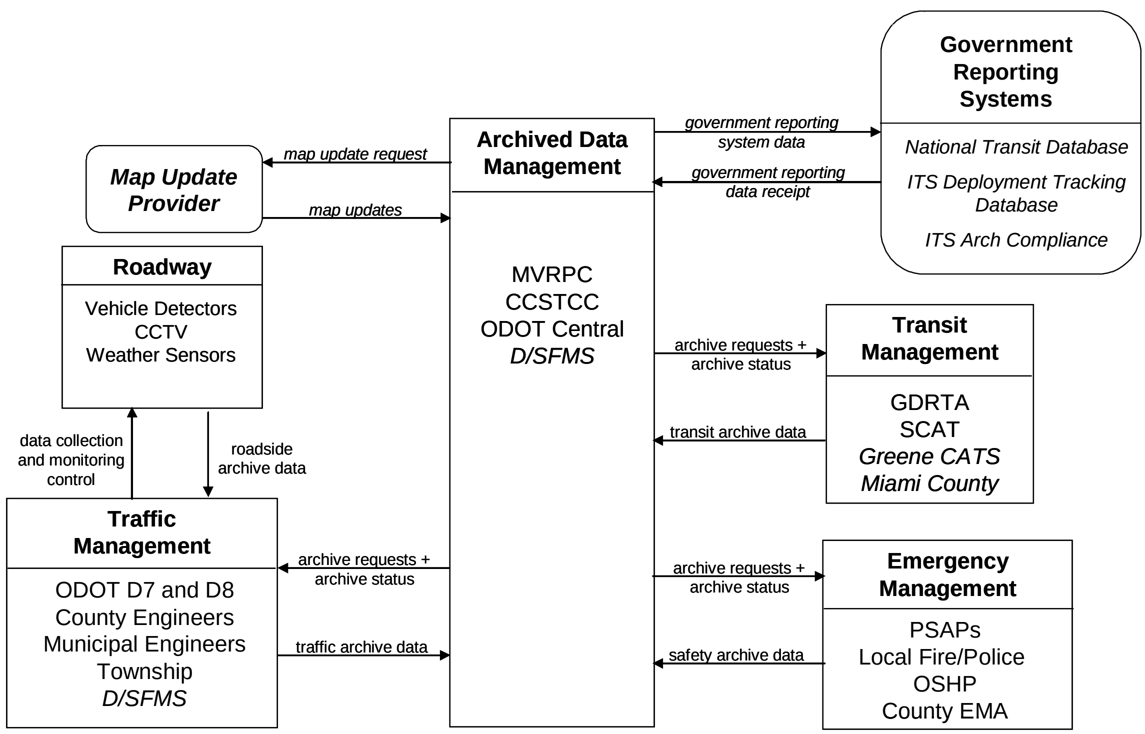

Figure 5.1 ITS Data Mart Functional Flow Diagram

5.2 APTS1: Transit Vehicle Tracking

This functional flow diagram monitors current transit vehicle location using an Automated Vehicle Location System. Because of its ability to provide exact vehicle locations in realtime, the AVL system is considered the backbone for the implementation of most other transit ITS systems. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider. GDRTA currently utilizes AVL technology to track the fixed route fleet. SCAT is planning to install AVL within the next five years.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

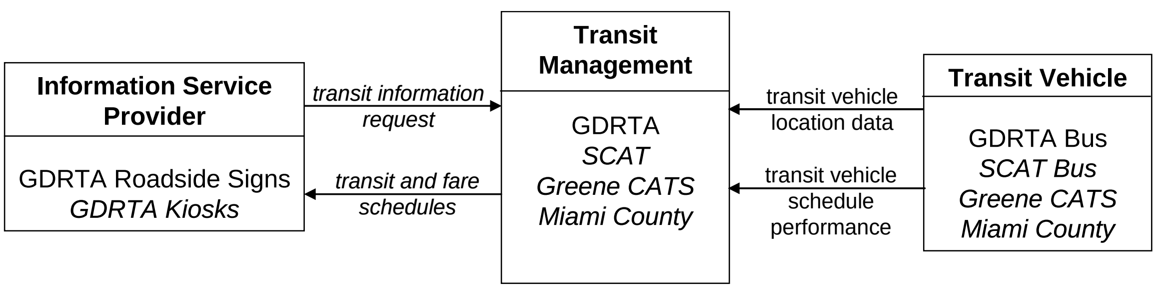

Figure 5.2 Transit Vehicle Tracking Functional Flow Diagram

5.3 APTS2: Transit Fixed Route Operations

This functional flow diagram performs vehicle routing and scheduling, as well as automatic operator assignment and system monitoring for fixed-route and flexible-route transit services. This service determines current schedule performance using AVL data and provides information displays at the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, air) to provide the public with integrated and personalized dynamic schedules. GDRTA utilizes the Trapeze software for scheduling routes and driver operations. Area transit providers also work with numerous social service agencies to coordinate transit itineraries for those agencies' clients.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

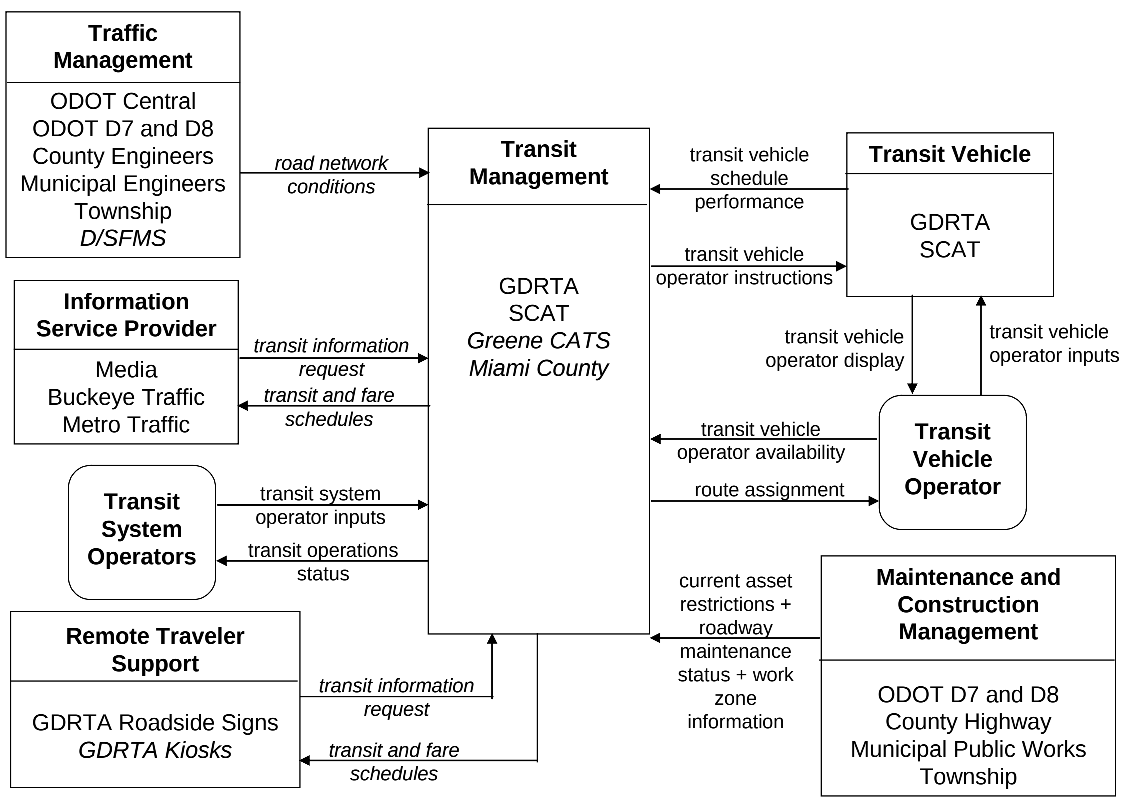

Figure 5.3 Transit Fixed Route Operations Functional Flow Diagram

5.4 APTS3: Demand Response Transit Operations

This functional flow diagram performs vehicle routing and scheduling as well as automatic operator assignment and monitoring for demand responsive transit services. In addition, this functional flow diagram performs similar functions to support dynamic features of flexible-route transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem. The ISP may either be operated by a transit management center or be independently owned and operated by a separate service provider. In the first scenario, the traveler makes a direct request to a specific demand response service. In the second scenario, a third party service provider, or social service agency, determines that the demand response service is a viable means of satisfying a traveler request and makes a reservation for the traveler. Demand response service is provided by GDRTA, SCAT, Greene CATS, and Miami County transit.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

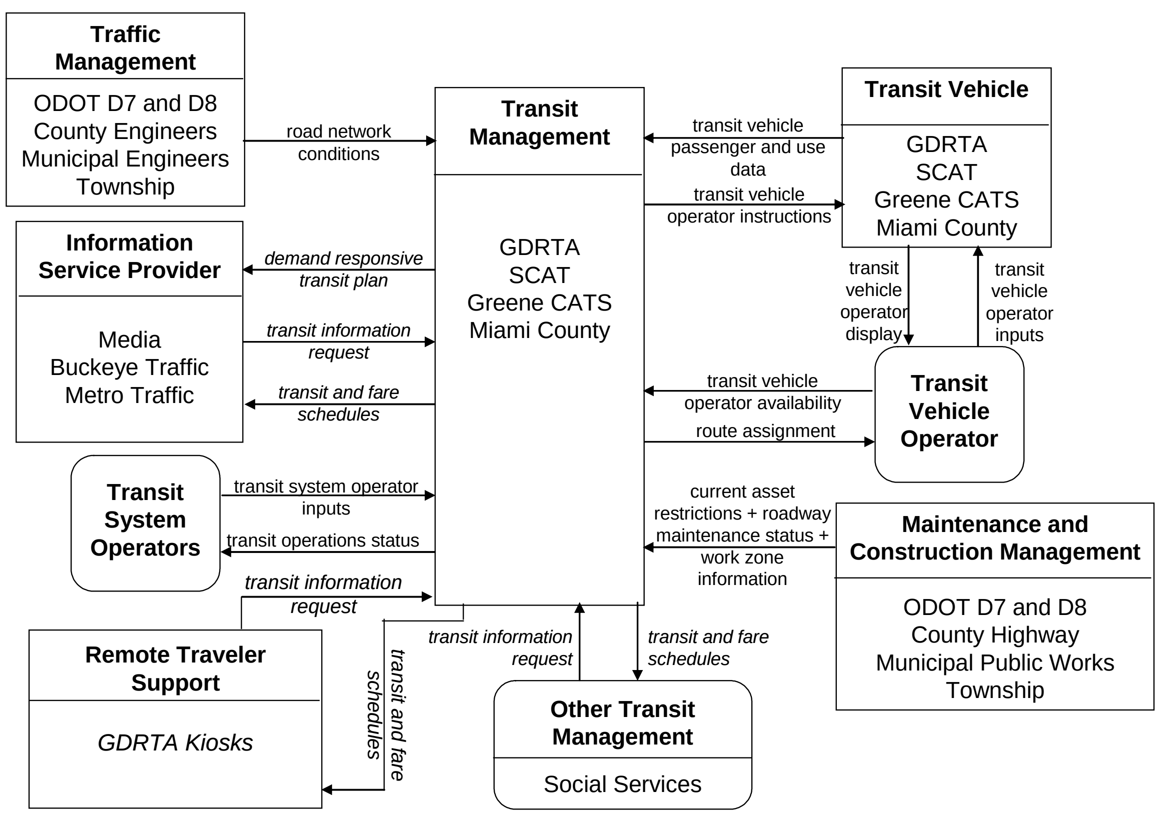

Figure 5.4 Demand Response Transit Operations Functional Flow Diagram

5.5 APTS4: Transit Passenger and Fare Management

This functional flow diagram manages passenger loading and fare payments on-board transit vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Advanced fare media, and smart cards in particular, make fare payment more convenient for the transit user and financial management of fare revenues more secure and efficient for the transit agency. Sensors mounted on the vehicle permit the operator and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allows electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem. GDRTA plans to install a smart card enabled farebox system within the next five years.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

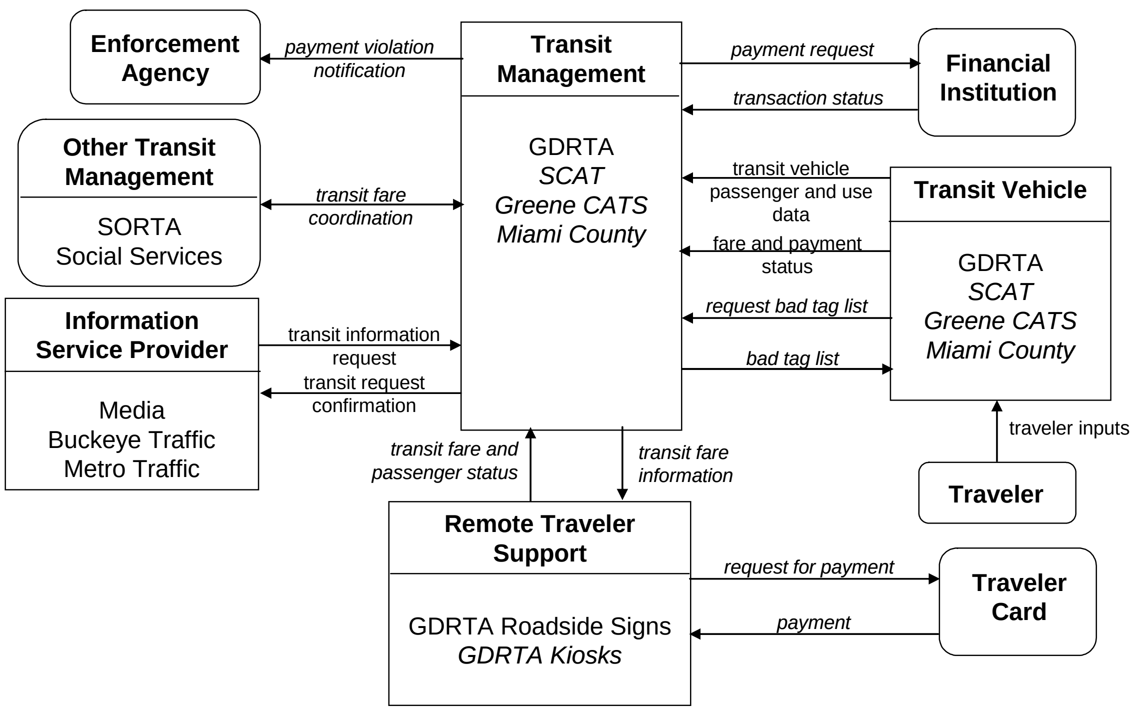

Figure 5.5 Transit Passenger and Fare Management Functional Flow Diagram

5.6 APTS5: Transit Security and Safety

This functional flow diagram provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms. In addition this functional flow diagram provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure. The surveillance equipment includes video and/or audio systems. The sensor equipment includes threat sensors and object detection sensors as described above as well as, intrusion or motion detection sensors and infrastructure integrity monitoring. GDRTA has video monitoring at some of the major transit hub locations. Video images are captured but currently are not monitored; in the event of an incident the stored video images can be retrieved for analysis.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

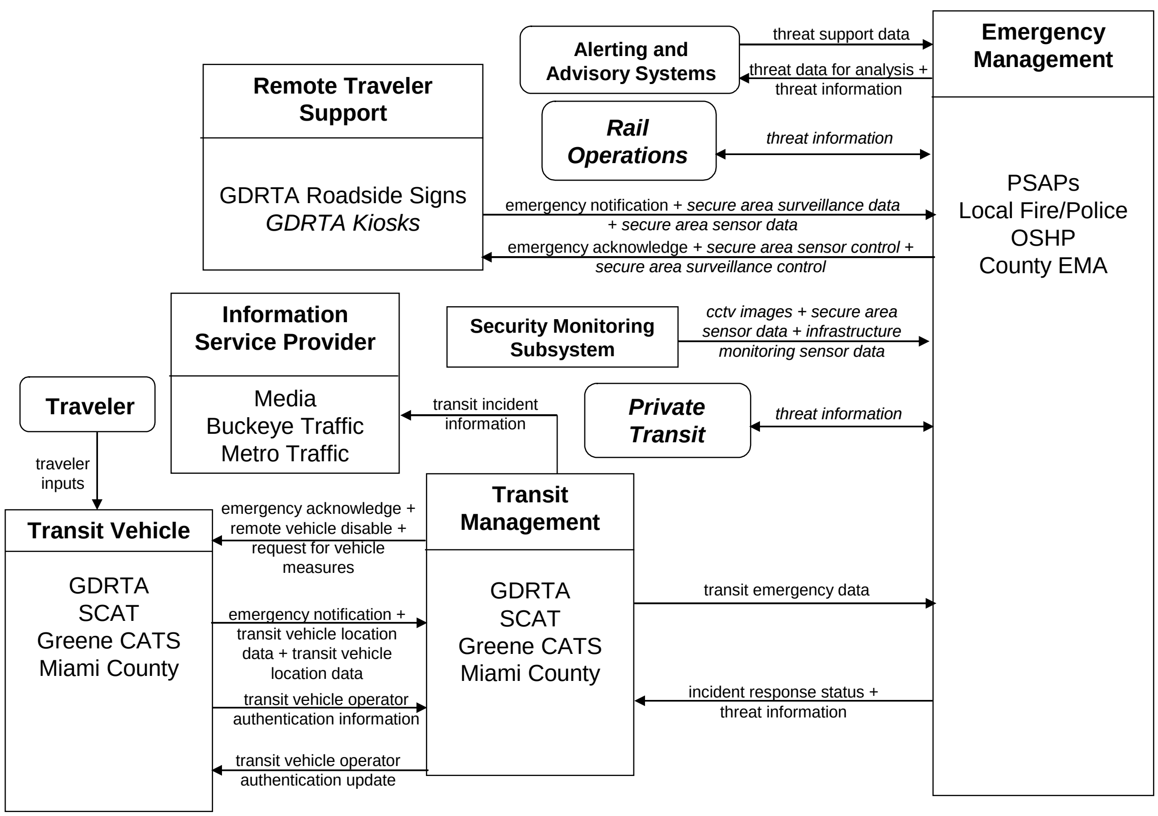

Figure 5.6 Transit Security and Safety Functional Flow Diagram

5.7 APTS7: Multi-modal Coordination

This functional flow diagram establishes two-way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency. In the Miami Valley region, there are plans to coordinate GDRTA, SCAT, Greene CATS and Miami County demand response transit information into a seamless, real time process enabling the transit traveler to plan trips across transit operator jurisdictions. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package. Transit signal priority in the region is in the planning stages at this time.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

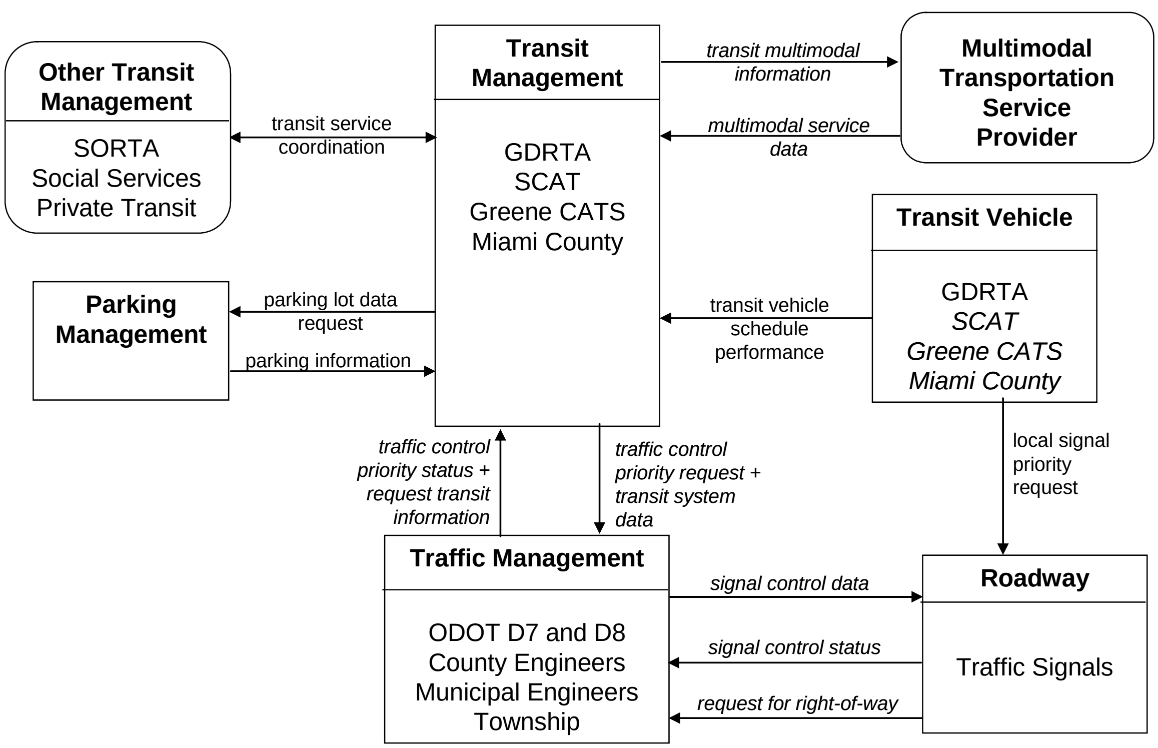

Figure 5.7 Multi-Modal Coordination Functional Flow Diagram

5.8 APTS8: Transit Traveler Information

This functional flow diagram provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. GDRTA is planning to implement AVA within the next five years. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this functional flow diagram. Social service agencies could also receive alerts to relay to clients without internet access. Currently, passengers communicate with the transit driver to obtain transfer and arrival information of other buses in the system. In the future, an on-board system would provide this information.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

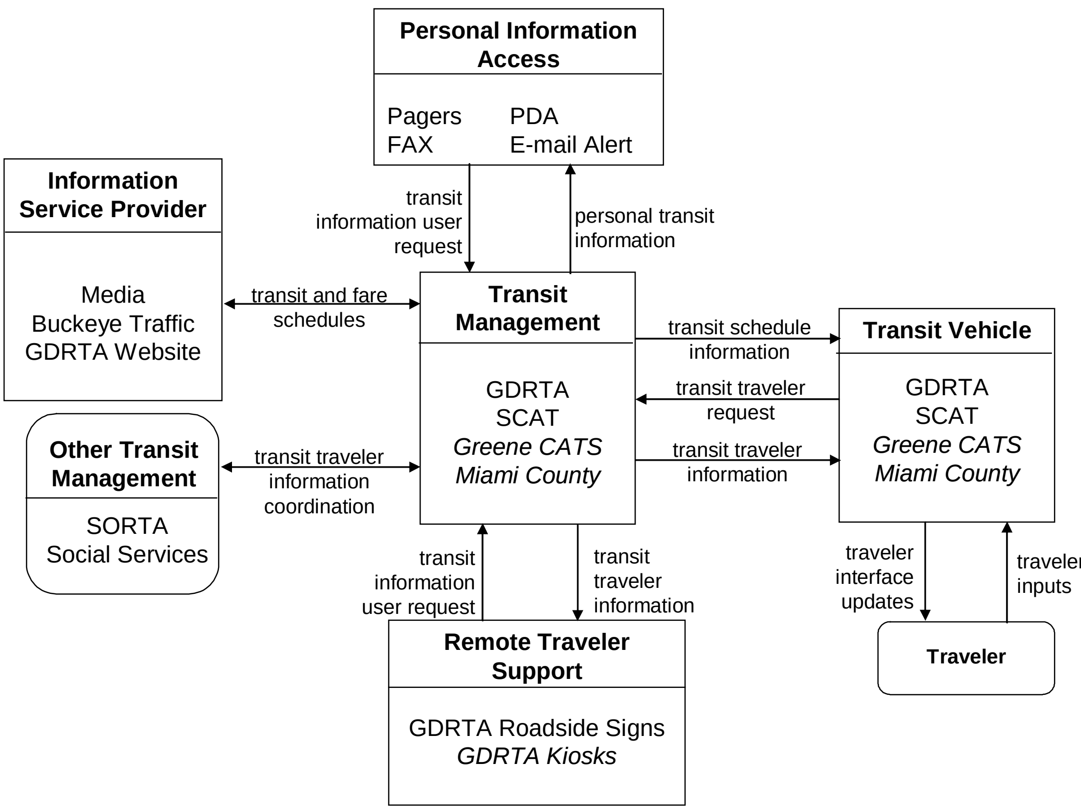

Figure 5.8 Transit Traveler Information Functional Flow Diagram

5.85 APTS09: Transit Signal Priority

This service package determines the need for transit priority on routes and at certain intersections and requests transit vehicle priority at these locations. The signal priority may result from limited local coordination between the transit vehicle and the individual intersection for signal priority or may result from coordination between transit management and traffic management centers. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

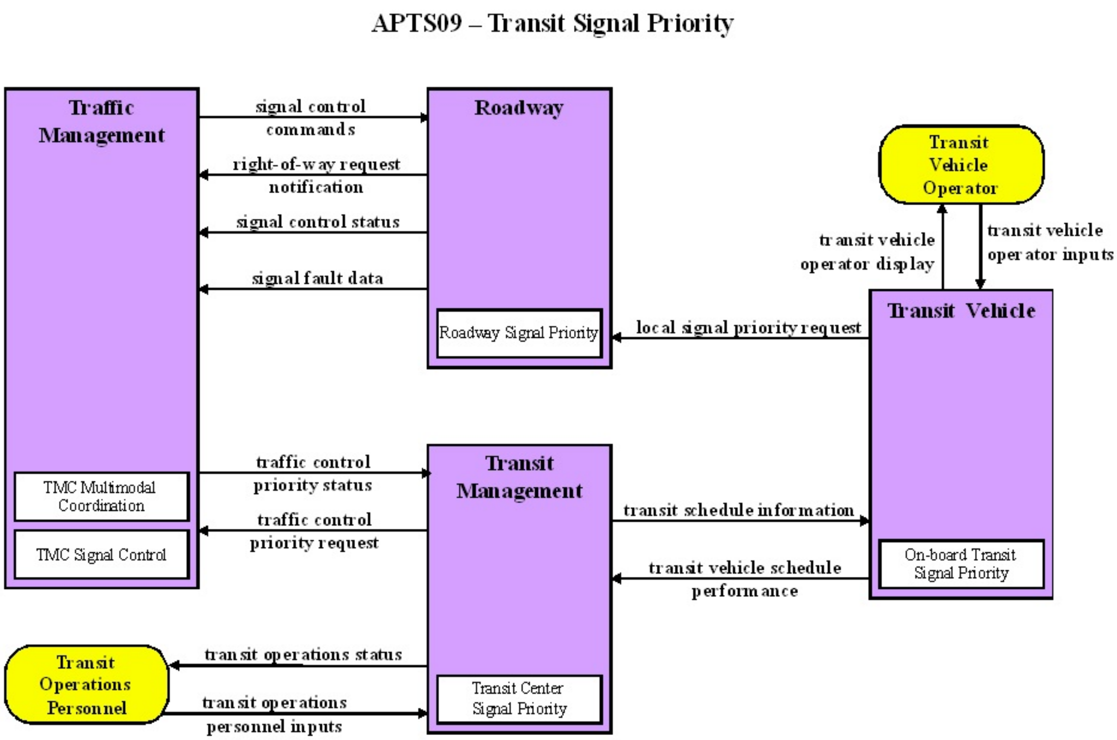

Figure 5.85: Transit Signal Priority Functional Flow Diagram

5.9 ATIS1: Broadcast Traveler Information

This functional flow diagram collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions. Different from the functional flow diagram ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this functional flow diagram relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources. Two examples of broadcast traveler information in the Miami Valley area include GDRTA next bus information at major bus stops in their service area and DMS and HAR messages provided by the D/SFMS.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

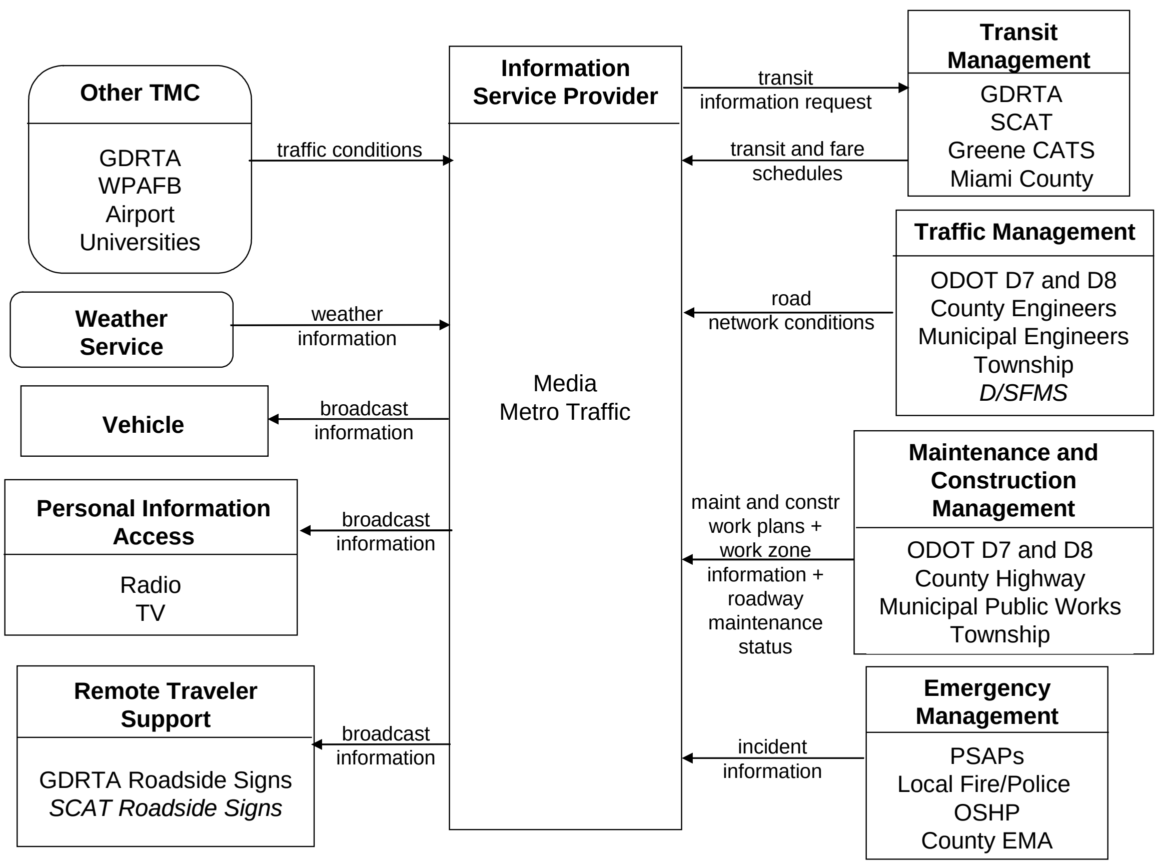

Figure 5.9 Broadcast Traveler Information Functional Flow Diagram

5.10 ATIS2: Interactive Traveler Information

This functional flow diagram provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required data communications between the traveler and Information Service Provider. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. Successful deployment of this functional flow diagram relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means. Several Miami Valley stakeholder agencies are planning to implement this type of interactive information service. For example, GDRTA and SCAT customers would be able to request an email or alert if their bus is delayed or reroutes due to an incident. The D/SFMS would also allow travelers to sign up for alerts when a major incident delays traffic along the area's freeways.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

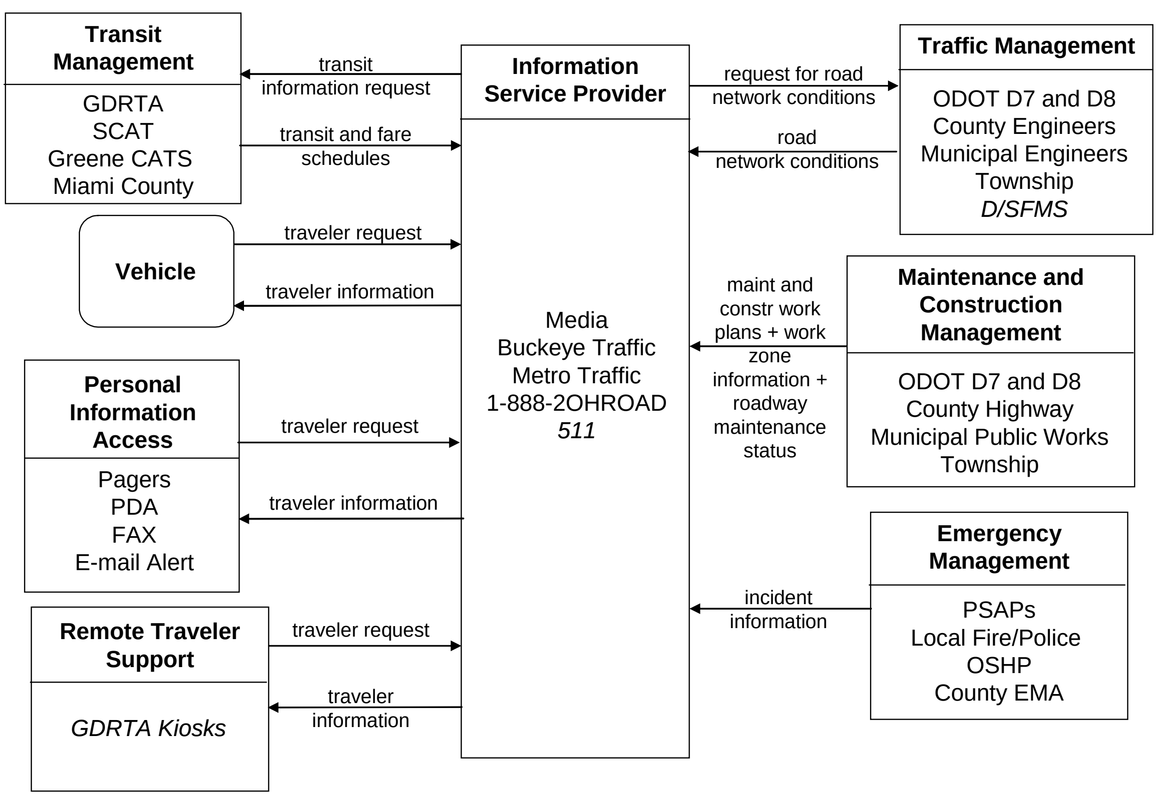

Figure 5.10 Interactive Traveler Information Functional Flow Diagram

5.11 ATMS01: Network Surveillance

This functional flow diagram includes traffic detectors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem (e.g. planned D/SFMS). The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this functional flow diagram 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 motorists and the Information Service Provider Subsystem. Currently, the city of Springfield uses traffic cameras to monitor several major intersections. Kettering and Moraine Engineers can view traffic images at certain intersections through the Police Department's CCTV deployment.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

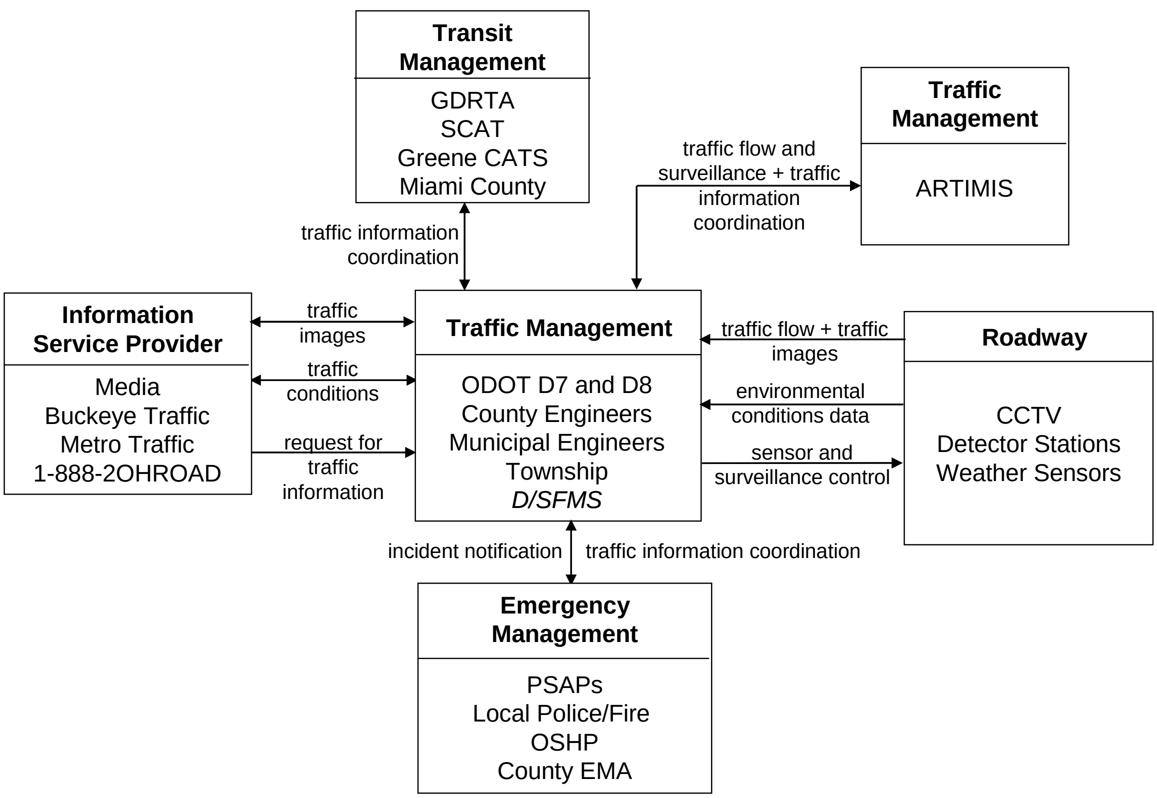

Figure 5.11 Network Surveillance Functional Flow Diagram

5.12 ATMS02: Probe Surveillance

This functional flow diagram provides an alternative approach for surveillance of the roadway network. One approach leverages wide area communications equipment that may already be in the vehicle (e.g. fixed route bus AVL) to support advanced traveler information services. The functional flow diagram enables traffic managers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports. In the Miami Valley region, GDRTA fixed route buses equipped with AVL will serve as probe vehicles. Location information will be transmitted to the D/SFMS or other traffic management subsystem where calculations of time and location will be made to determine traffic delays.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

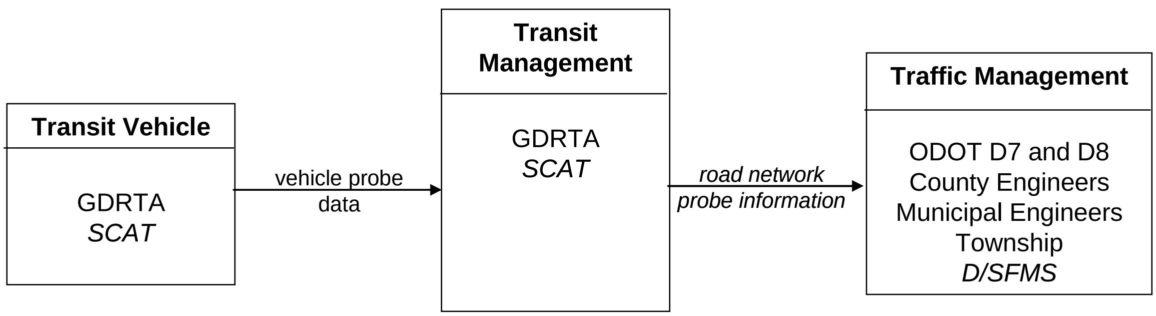

Figure 5.12 Probe Surveillance Functional Flow Diagram

5.13 ATMS03: Surface Street Control

This functional flow diagram provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this functional flow diagram 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. Examples of technology currently being used by Miami Valley stakeholders include the City of Springfield Opticom pre-emption, and video detection systems in Piqua, Dayton and Englewood. Additionally, general advisory and traffic control information can be provided to the driver while en route. This functional flow diagram is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This functional flow diagram is consistent with typical urban traffic signal control systems.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

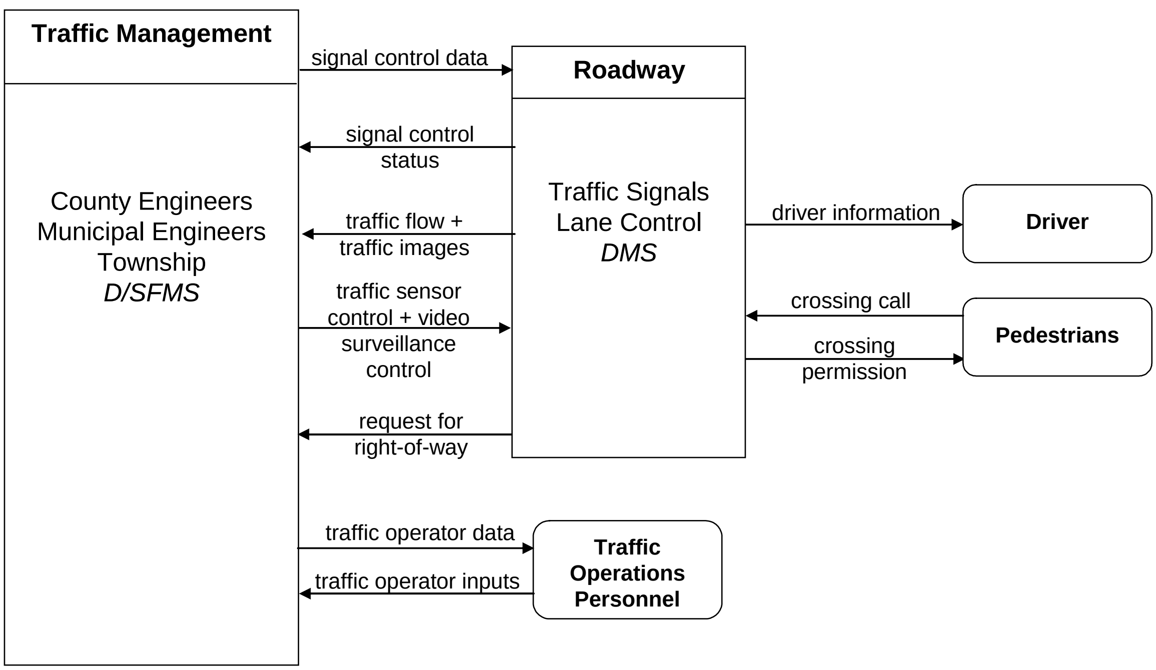

Figure 5.13 Surface Street Control Functional Flow Diagram

5.14 ATMS04: Freeway Control

This functional flow diagram provides a basic representation of the types of communications and roadside equipment needed to control the major aspects of Miami Valley's freeway systems; e.g., ramps, lanes and interchanges. This flow diagram is consistent with typical urban traffic freeway control systems. It incorporates the instrumentation included in the Network Surveillance functional flow diagram to support freeway monitoring and includes the capability to use surveillance information to detect incidents on the freeway. Additionally, this flow diagram illustrates how general advisory and traffic control information can be provided to the traveler while en route such as the planned variable speed limit signs on I-75.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

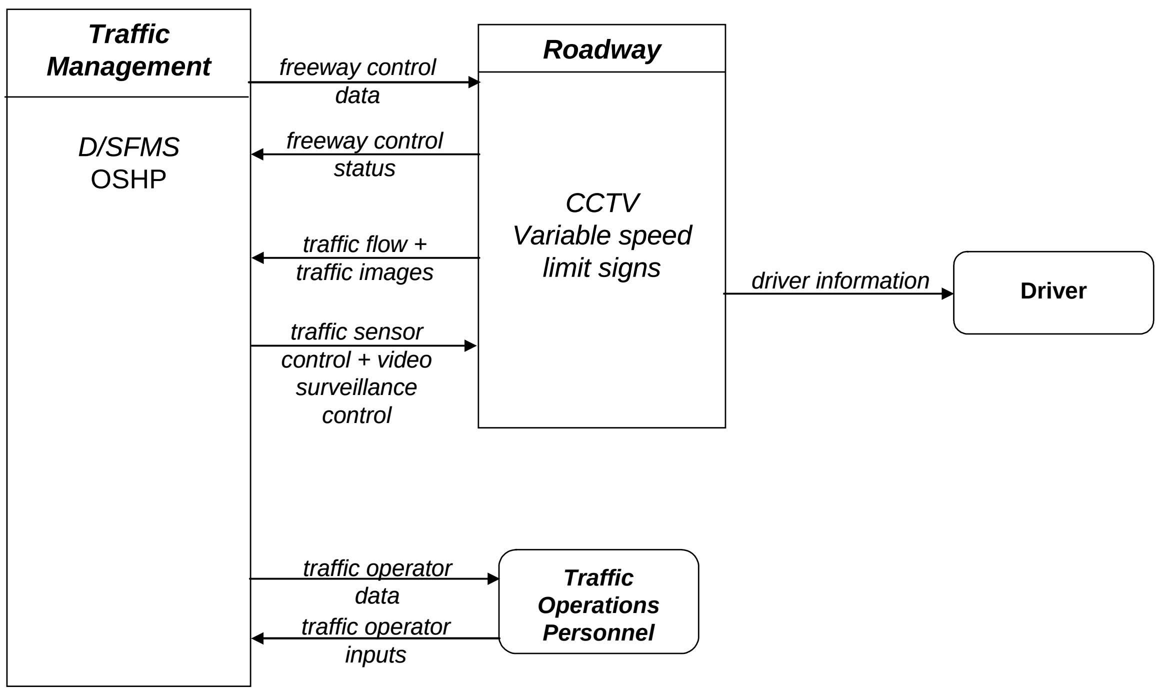

Figure 5.14 Freeway Control Functional Flow Diagram

5.15 ATMS 06: Traffic Information Dissemination

This functional flow diagram allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package provides a tool that can be used to notify drivers of incidents; careful placement of the roadway equipment provides the information at points in the network where travelers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center (e.g. D/SFMS) to the media, Transit Management, Emergency Management, and Information Service Providers. A link to the Maintenance and Construction Management subsystem allows real time information on road/bridge closures due to maintenance and construction activities to be disseminated. Currently, the cities of Kettering, Moraine and Springfield air traffic images on the local public cable station during the morning rush hour. This allows travelers to check travel conditions and alter travel plans based on current conditions.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

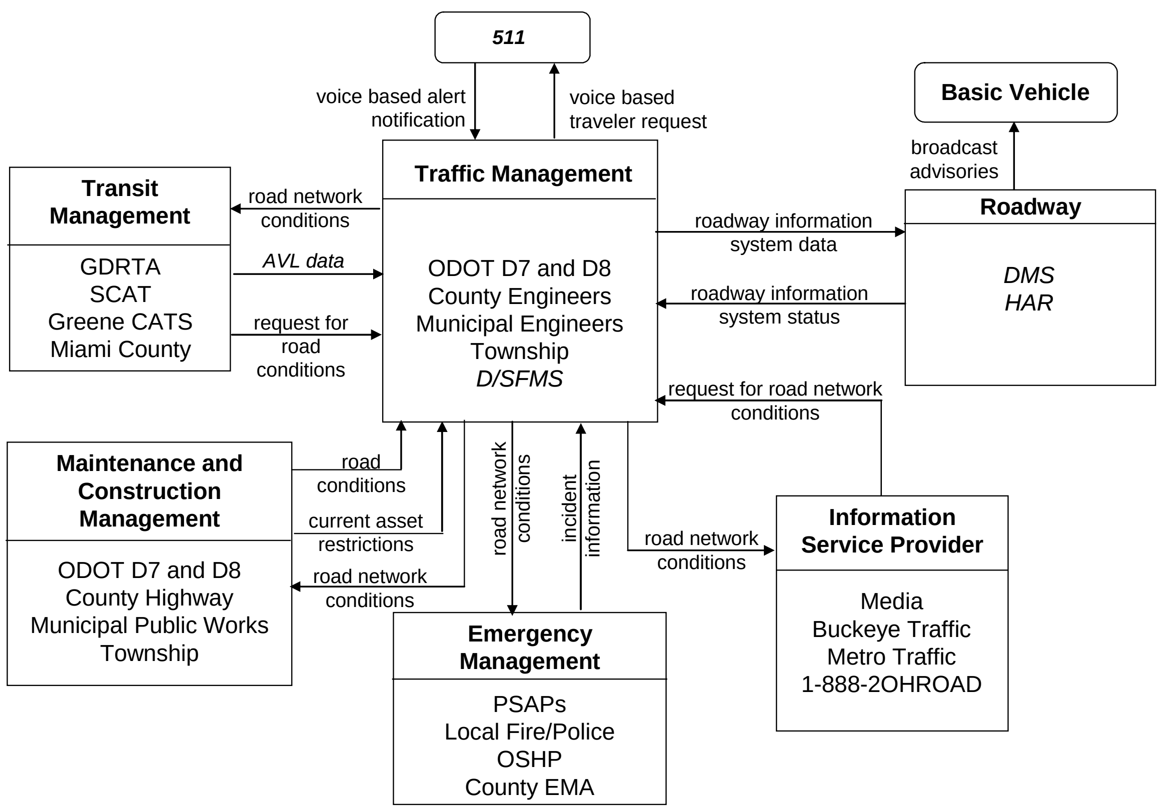

Figure 5.15 Traffic Information Dissemination Functional Flow Diagram

5.16 ATMS07: Regional Traffic Control

This functional flow diagram provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This functional flow diagram advances the Surface Street Control and Freeway Control Functional flow diagrams by adding the communications links and integrated control strategies that enable integrated interjurisdictional traffic control. For example, the D/SFMS and ARTIMIS could share traffic information as it relates to travel along the I-75 corridor. Also, Moraine and Kettering coordinate traffic control across local arterials. 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 Surface Street Control and Freeway Control Functional flow diagrams and adds hardware, software, and wireline communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of control between traffic management centers.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

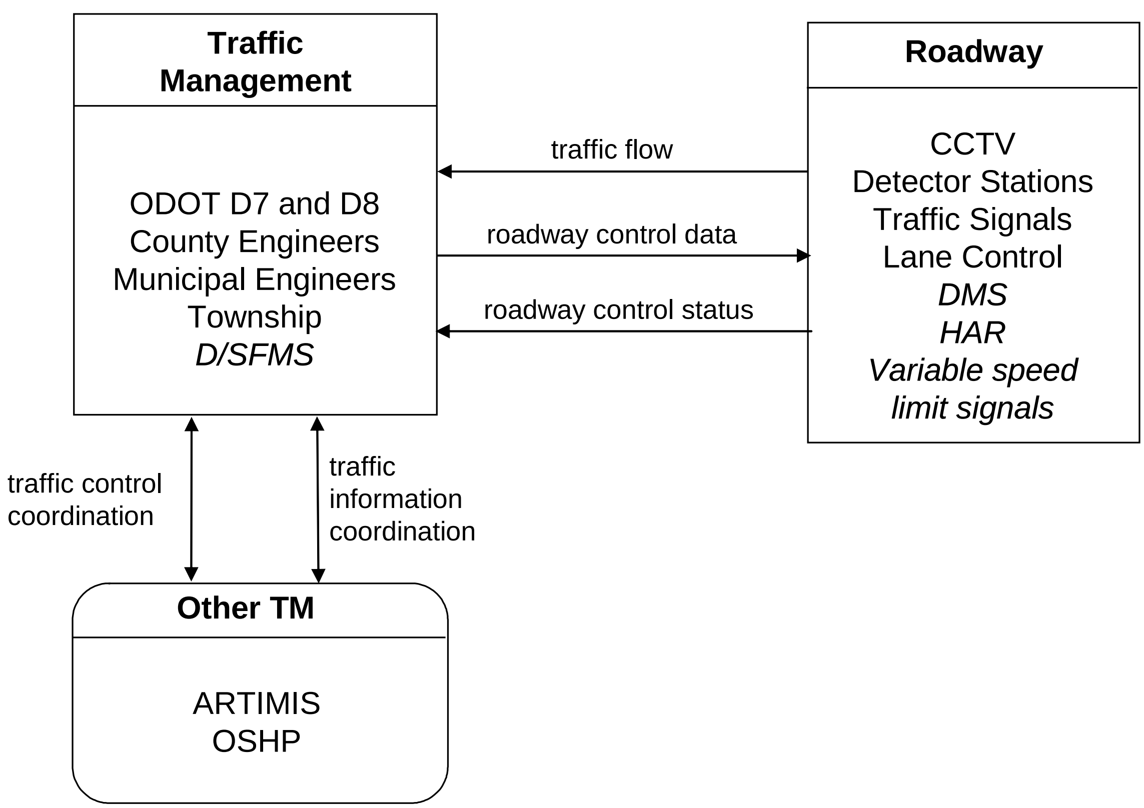

Figure 5.16 Regional Traffic Control Functional Flow Diagram

5.17 ATMS08: Incident Management System

This functional flow diagram manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The functional flow diagram includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) to aid in regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources are collected and correlated by this functional flow diagram to detect and verify incidents and implement an appropriate response. This functional flow diagram 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 center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination functional flow diagram and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information functional flow diagrams. 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 a CAD system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

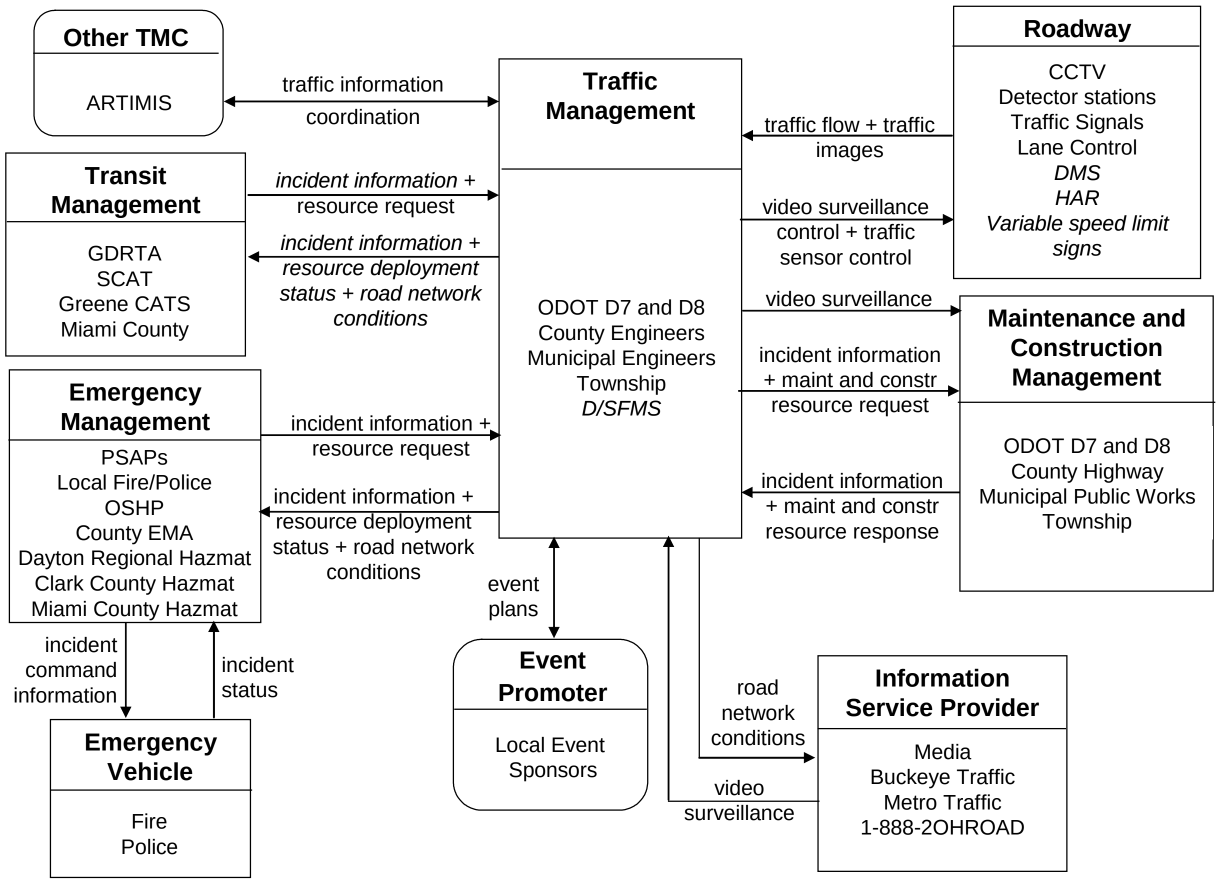

Figure 5.17 Incident Management System Functional Flow Diagram

5.18 ATMS09: Traffic Forecast and Demand Management

This functional flow diagram includes advanced algorithms, processing, and mass storage capabilities that support historical evaluation, real-time assessment, and forecast of the roadway network performance. This includes the prediction of travel demand patterns to support better link travel time forecasts. The source data would come from the D/SFMS Traffic Management Subsystem itself as well as other traffic management centers and forecasted traffic loads derived from route plans supplied by the Information Service Provider Subsystem. This functional flow diagram provides data that supports the implementation of Transportation Demand Management (TDM) programs, and policies managing both traffic and the environment. The package collects information on vehicle pollution levels, parking availability, usage levels, and vehicle occupancy to support these functions. Demand management requests can also be made to Transit Management and Parking Management Subsystems.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

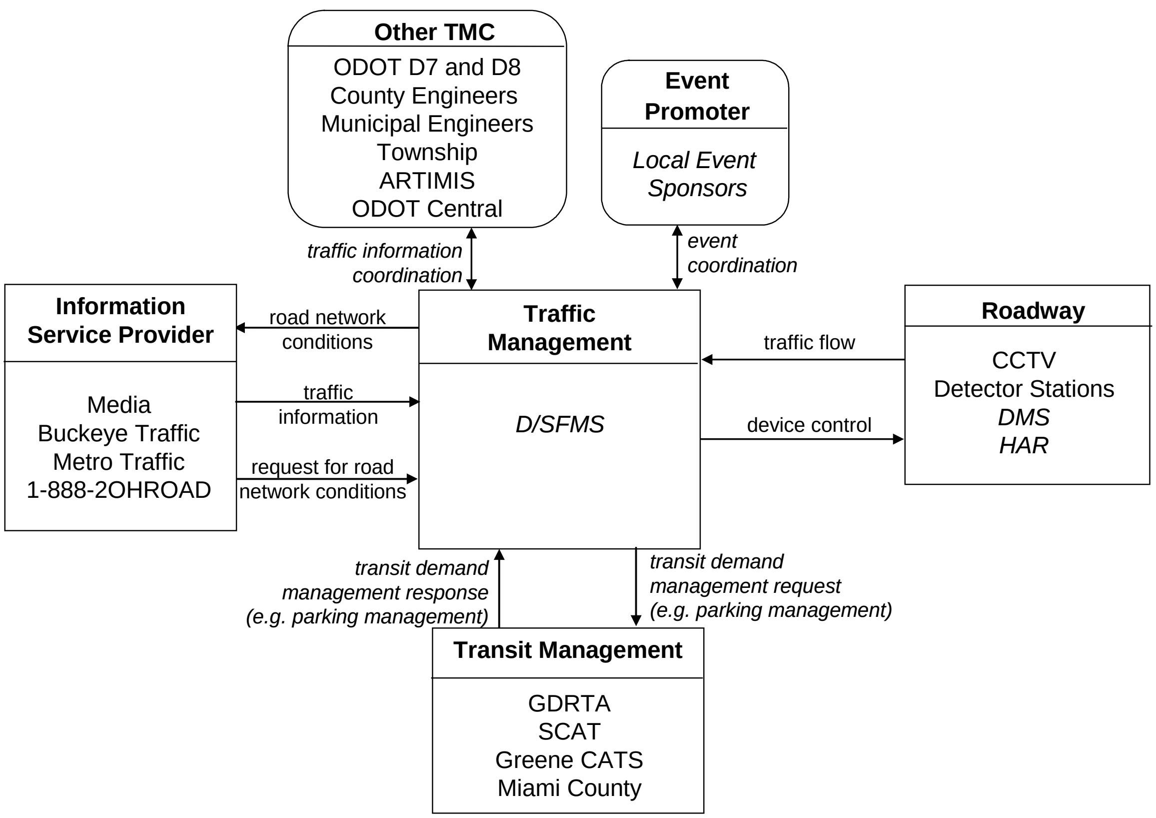

Figure 5.18 Traffic Forecast and Demand Management Functional Flow Diagram

5.19 ATMS13: Rail Grade Crossing

This market package manages highway traffic at highway-rail intersections (HRIs). It is especially significant in the city of Springfield where numerous HRI bisect the downtown. Issues with safety as well as noise surround this issue for the city and region. For this market package both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) These traditional HRI warning systems may also be augmented with other standard traffic management devices such as The Automated Horn System (AHS). AHS is a stationary horn system activated by the railroad-highway at-grade crossing warning system. (very needed in downtown Springfield).

All of the warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. The active warning systems supported by this market package include positive barrier systems that preclude entrance into the intersection when the barriers are activated (Four-Quadrant Gate Systems). In this market package, the wayside equipment provides information about the arriving train so that the train's direction of travel, estimated time of arrival, and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This is important in the city of Springfield region with the transit agency straddling the CSX rail line and the potential for a new consolidated hospital abutting the right-of-way creating issues for both transit and EMS vehicles.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

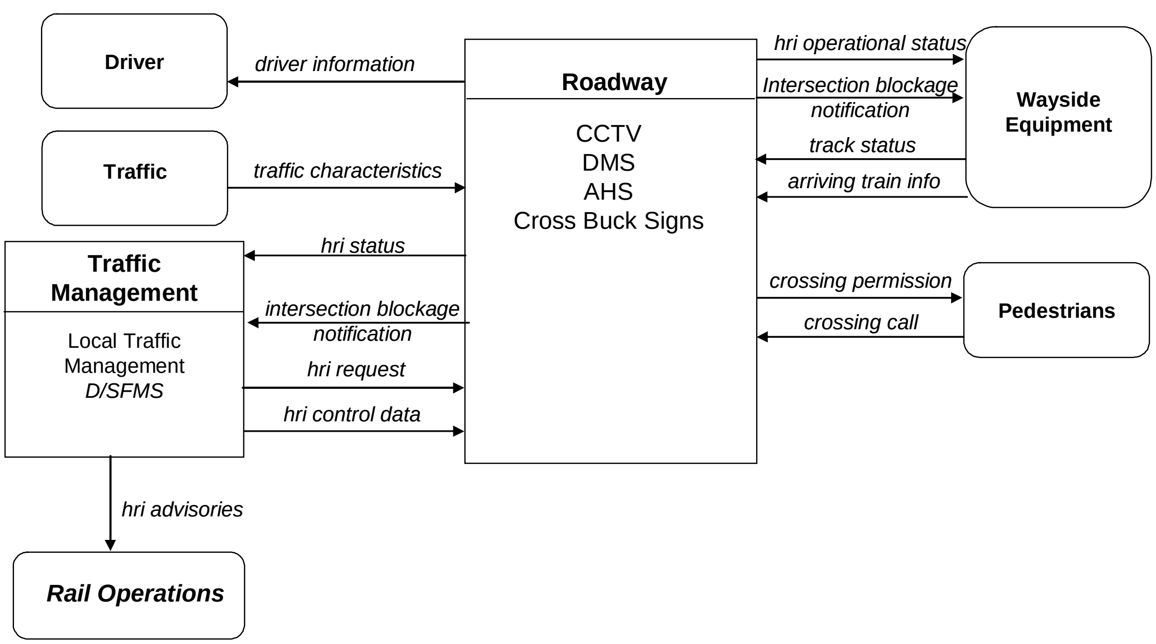

Figure 5.19 Rail Grade Crossing Functional Flow Diagram

5.193 ATMS14: Advanced Railroad Grade Crossing

This service package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where rail operational speeds are greater than 80 miles per hour). This service package includes all capabilities from the Standard Railroad Grade Crossing service package and augments these with additional safety features to mitigate the risks associated with higher rail speeds. The active warning systems supported by this service package include positive barrier systems that preclude entrance into the intersection when the barriers are activated. Like the Standard package, the HRI equipment is activated on notification by wayside interface equipment which detects, or communicates with the approaching train. In this service package, the wayside equipment provides additional information about the arriving train so that the train's direction of travel, estimated time of arrival, and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This service package also includes additional detection capabilities that enable it to detect an entrapped or otherwise immobilized vehicle within the HRI and provide an immediate notification to highway and railroad officials.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

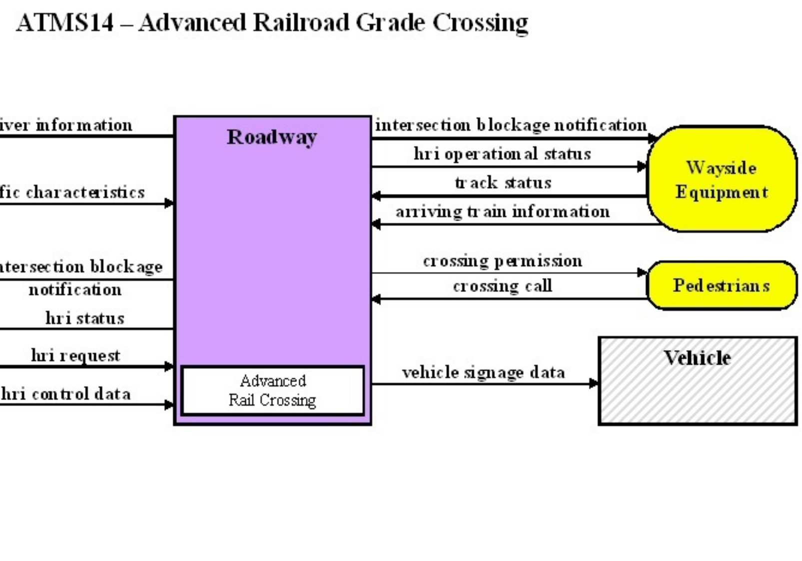

Figure 5.193: Advanced Railroad Grade Crossing Functional Flow Diagram

5.197 CVO10: HAZMAT Management

This functional flow diagram integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation. Hazmat information fed through the D/SFMS would be made available to PSAPs and local emergency management agencies to expedite the most appropriate response to an incident.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

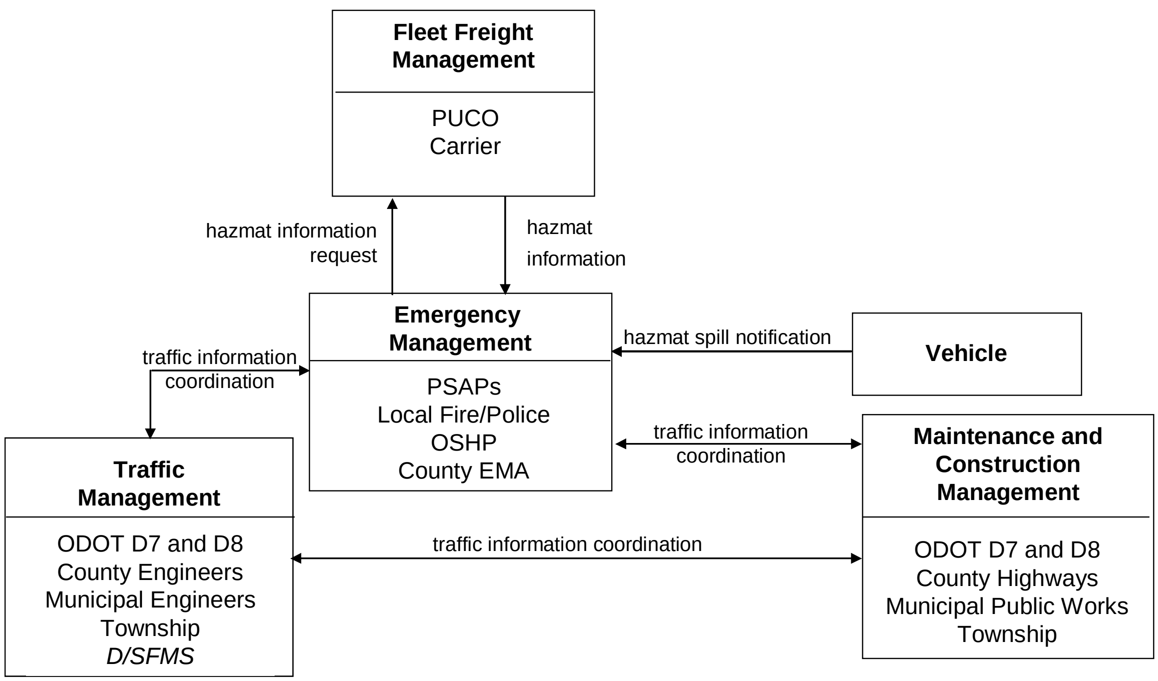

Figure 5.197 HAZMAT Management Functional Flow Diagram

5.20 EM01: Emergency Call-Taking and Dispatch

This functional flow diagram provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Subsystem and an Emergency Vehicle supports dispatch and provision of information to responding personnel.

The OSHP, Dayton Police and Montgomery County Sheriff's departments are installing AVL and mobile data terminals in all police vehicles. The systems will provide an enhanced communications between officers and dispatch.

Public safety, traffic management, and many other allied agencies may each participate in the coordinated response managed by this package. It is also important to note that the public information officers for the regional emergency management agencies provide information to the media as a secondary priority. The first priority of these officers is to assist in the management of incidents.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

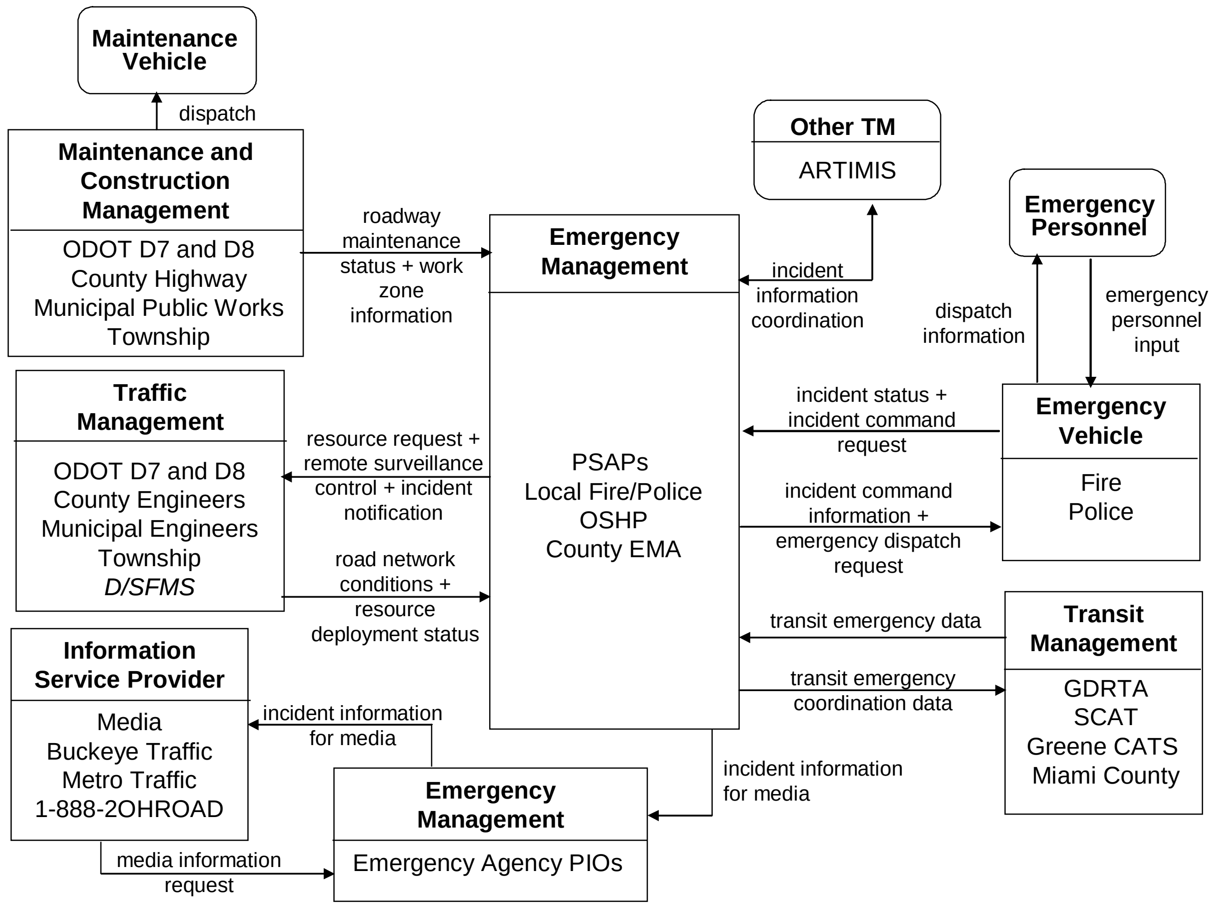

Figure 5.21 Emergency Response Functional Flow Diagram

5.21 EM04: Roadway Service Patrols

This functional flow diagram supports roadway service patrol vehicles that monitor roads that typically have incidents, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The Miami Valley region will continue to monitor state policies and practices for implementing roadway service patrols.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

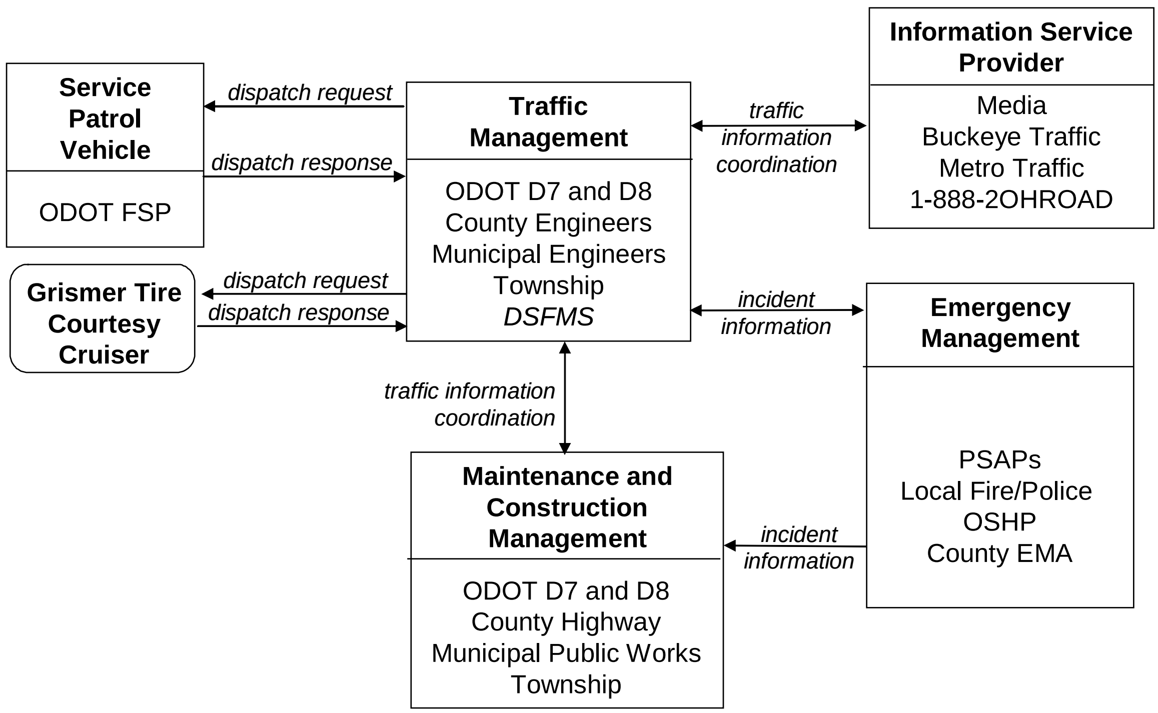

Figure 5.22 Roadway Service Patrols Functional Flow Diagram

5.22 EM06: Wide Area Alert

This functional flow diagram uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. In the Miami Valley, the county Emergency Management Agencies (EMA) coordinate this alert system. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information web sites.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

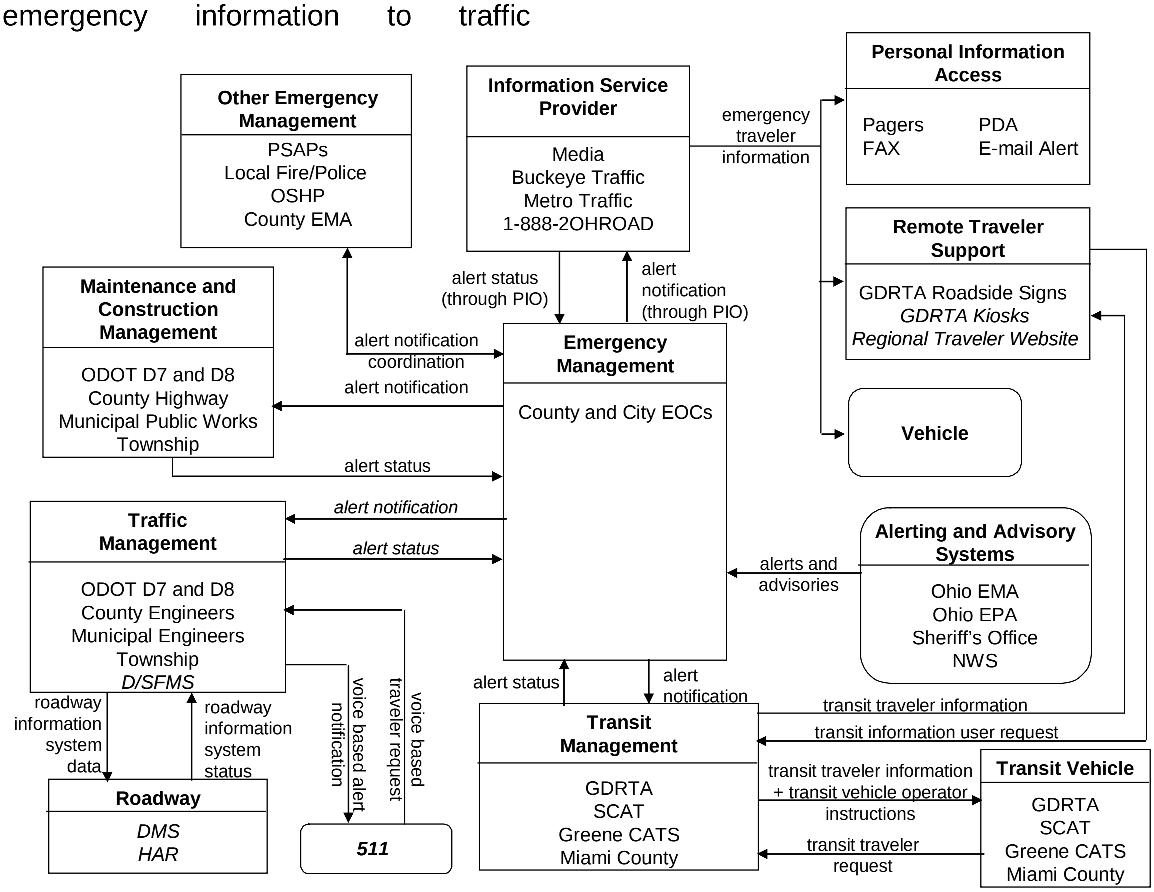

Figure 5.23 Wide Area Alert Functional Flow Diagram

5.23 MC01: Maintenance and Construction Vehicle and Equipment Tracking

This functional flow diagram will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.

Miami Valley stakeholders are planning to install AVL on the winter and regular maintenance fleets.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

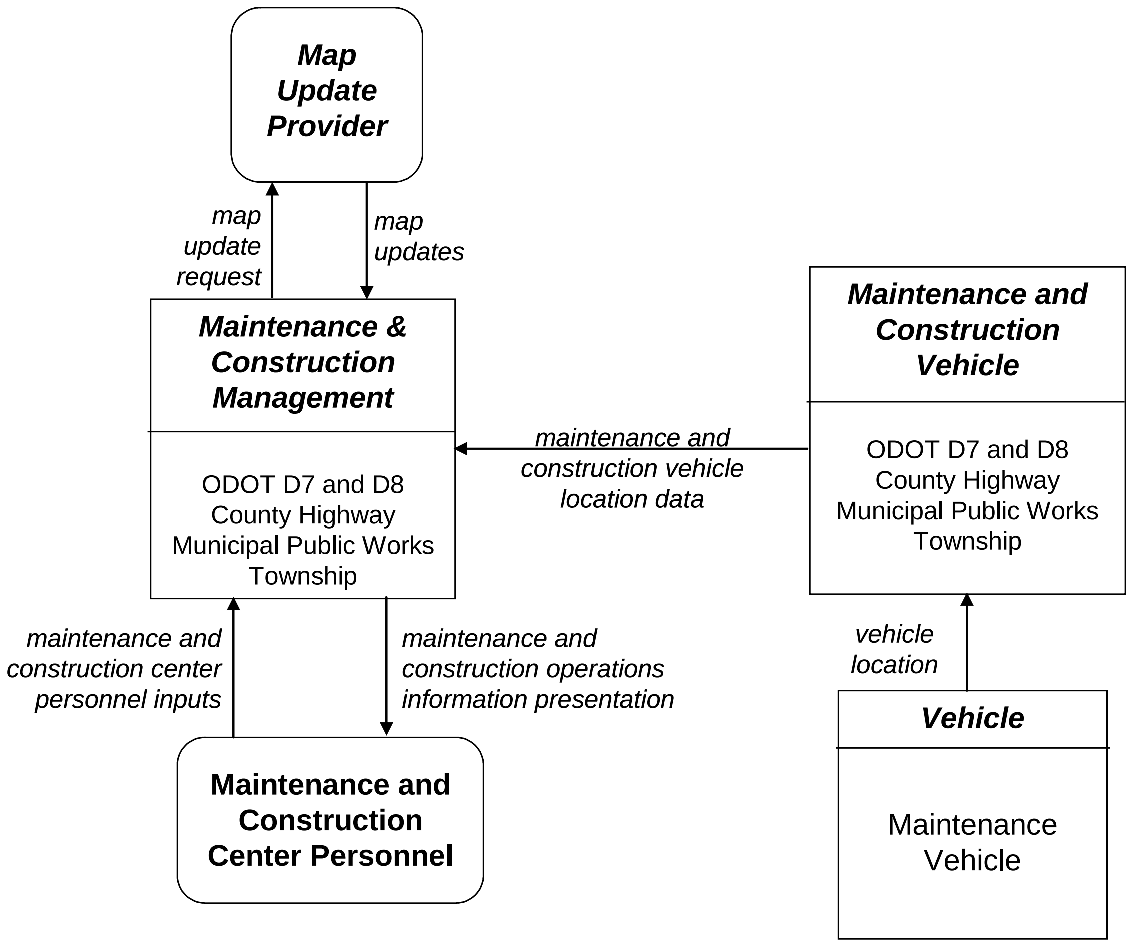

Figure 5.24 Maintenance and Construction Vehicle and Equipment Tracking Functional Flow Diagram

5.24 MC03: Road Weather Data Collection

This functional flow diagram collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles and on-board sensors provided by auto manufacturers. The collected environmental data is used by the Weather Information Processing and Distribution Functional flow diagram to process the information and make decisions on operations.

ODOT vehicles have sensors that detect road surface temperature; this aids primarily during winter maintenance.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

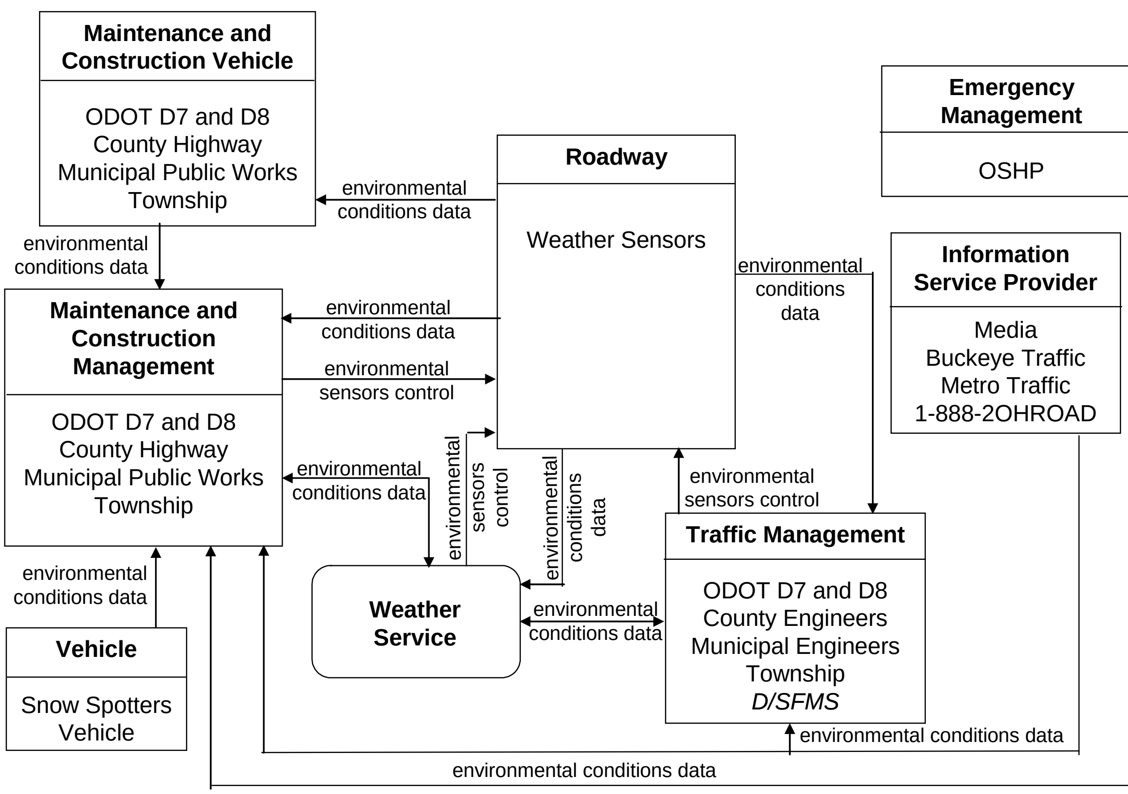

Figure 5.25 Road Weather Data Collection Functional Flow Diagram

5.25 MC04: Weather Information Processing and Distribution

This functional flow diagram processes and distributes the environmental information collected from the Road Weather Data Collection functional flow diagram. This functional flow diagram uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decisions on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination functional flow diagram, and aid operators in scheduling work activity.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

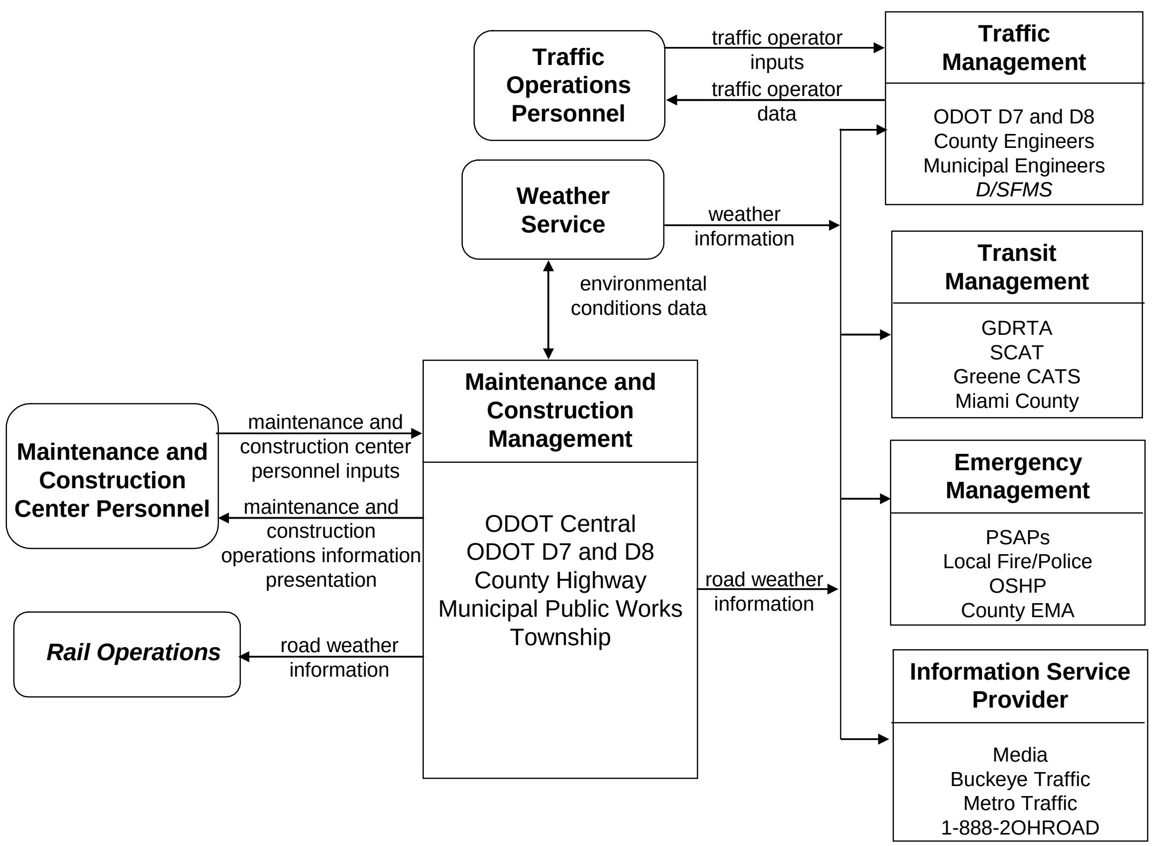

Figure 5.26 Weather Information Processing and Distribution Functional Flow Diagram

5.26 MC06: Winter Maintenance

This functional flow diagram supports winter road maintenance including snow plow 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. ODOT District 7 and 8, municipal public works, and county highway departments would be tied together through the D/SFMS.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

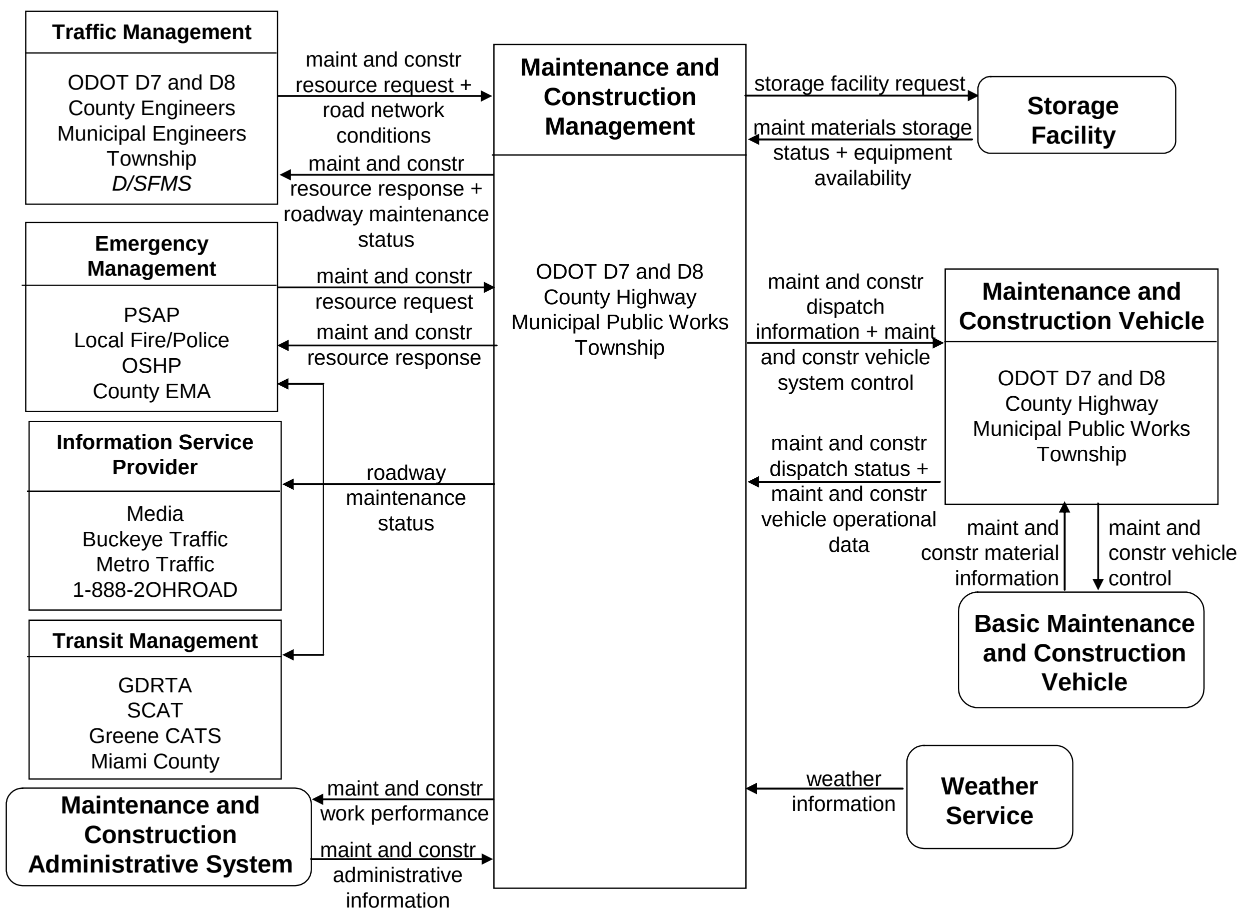

Figure 5.27 Winter Maintenance Functional Flow Diagram

5.27 MC08: Work Zone Management

This functional flow diagram directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, Traffic Management, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones. Once the D/SFMS is operational, work zone coordination among ODOT Districts 7 and 8, municipal public works, and county highway departments could be centralized to aid in information sharing among the various agencies.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

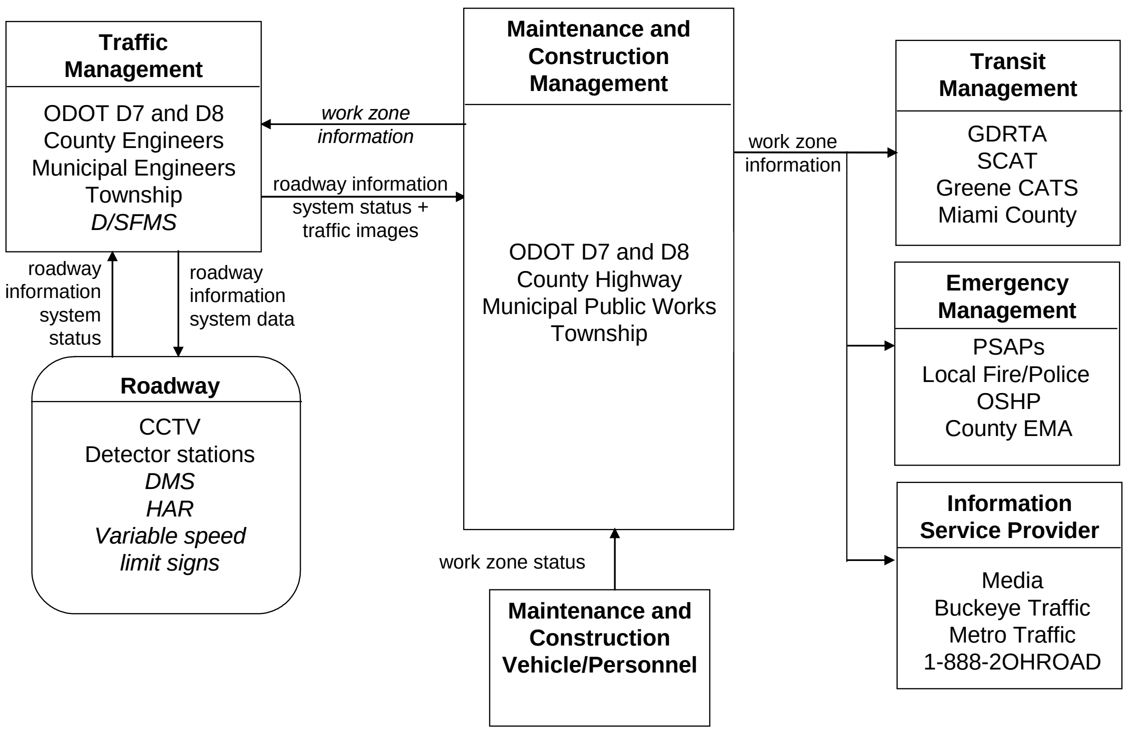

Figure 5.28 Work Zone Management Functional Flow Diagram

5.28 MC10: Maintenance and Construction Activity Coordination

This functional flow diagram supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

Currently, the coordination of construction and maintenance activity in the region is conducted on an informal basis. Coordination among the Miami Valley stakeholder agencies regarding this activity will lead to creating a formal, automated process where information can be accessed by agencies and the public.

When applied to the Regional ITS Architecture, the following functional flow diagram is produced:

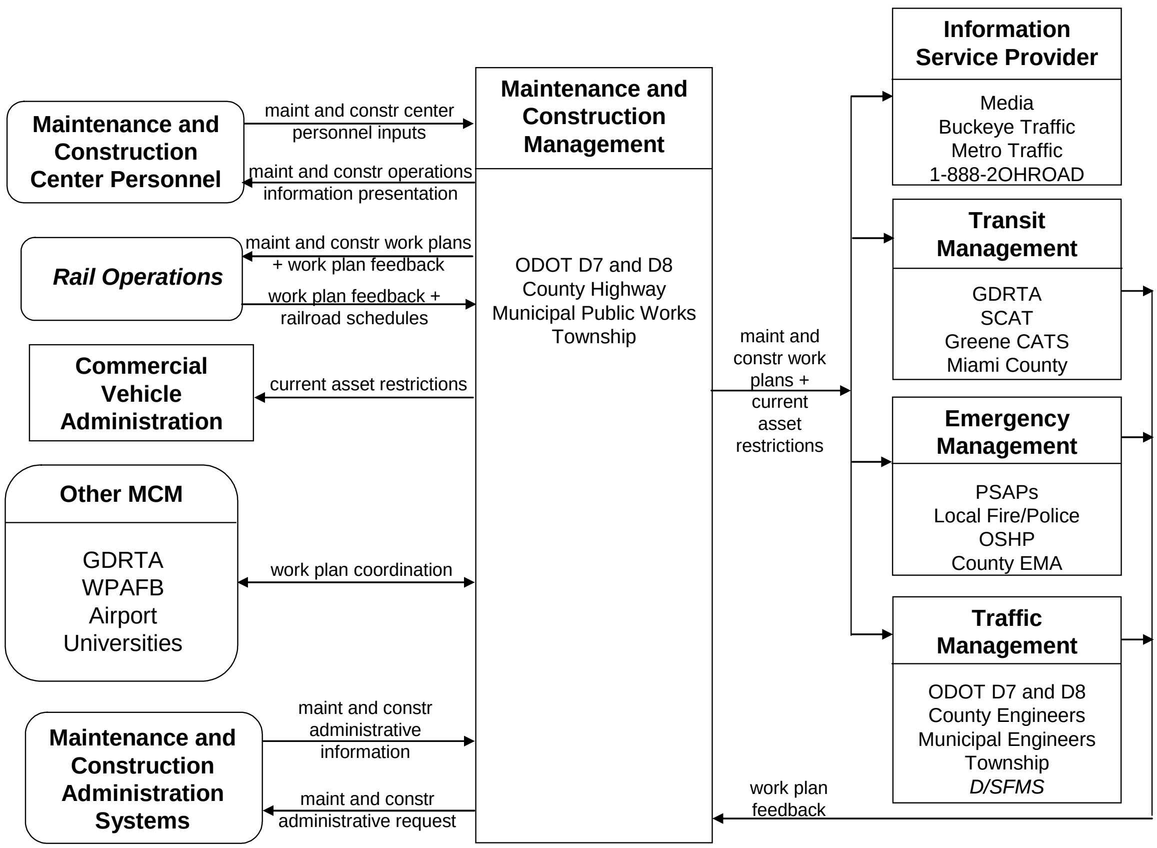

Figure 5.29 Maintenance and Construction Activity Coordination Functional Flow Diagram