Des Moines Area Metropolitan Planning Organization

Report 2010 - 3

Sponsored by

Altoona
Ankeny
Bondurant
Carlisle
Clive
Dallas County
Des Moines
Grimes
Johnston
Mitchellville
Norwalk
Pleasant Hill
Polk City
Polk County
Urbandale
Warren County
Waukee
West Des Moines
Windsor Heights
Iowa Department of Transportation
Federal Highway Administration
Federal Transit Administration

Des Moines Area Regional Intelligent Transportation Systems (ITS) Architecture Update

August 2009

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1.0 Introduction

The U.S. Department of Transportation (USDOT) defines Intelligent Transportation Systems (ITS) as "the electronics, communications or information processing used singly or integrated to improve the efficiency or safety of surface transportation."[1] ITS encompasses a broad array of systems and information processing and communications technologies, which help improve surface transportation safety and mobility and contribute to economic growth.

Demands on our transportation systems continue to increase. Integrating ITS technologies into our transportation systems enable people and goods to move more efficiently and safely. In addition, a deployed ITS network can archive traffic data that can assist and enhance the congestion management process.

ITS includes a broad range of diverse technologies that focus on both the transportation infrastructure and vehicle, as well as integrated applications between the two. These technologies include information processing, communications, electronics, and traffic control. Examples include electronic toll collection, in-vehicle navigation systems, and dynamic message signs.

1.1 PURPOSE

The *Transportation Equity Act for the 21st Century* (TEA-21) legislation includes reference to the need to work toward regionally integrated transportation systems. TEA-21 states that all ITS projects funded with highway trust funds should be consistent with the National ITS Architecture and appropriate ITS standards. In January 2001, the Federal Highway Administration (FHWA) published Rule 940 (23 CFR Part 940), and the Federal Transit Administration (FTA) published a companion policy, to implement TEA-21's Section 5206(e). In order to conform to this rule/policy, a regional ITS architecture is developed using the National ITS Architecture, but tailored to meet local needs. Future ITS projects, then, must adhere to the developed regional ITS architecture. Additionally, Section 1201.c of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) legislation requires State and local governments to address information needs and data exchanges associated with highway and transit information and monitoring systems when developing or updating their regional ITS architectures.

A regional ITS architecture is a beneficial tool for planning the regional integration of transportation systems. Specifically, a regional ITS architecture can enhance regional planning by bringing together a diverse array of agencies and governments to discuss future transportation needs and how ITS can help meet those needs.

1.2 ITS ARCHITECTURE

An ITS architecture defines a framework within which ITS can be built. The architecture functionally defines what the ITS pieces are, what the interconnections among the ITS pieces are, and what the information is to be exchanged among those ITS pieces. A regional ITS architecture is a specific framework for ensuring institutional agreement and technical integration for the implementation of ITS projects in a particular region.

National ITS Architecture – The USDOT developed a National ITS Architecture to provide a common framework for planning, defining, and integrating ITS. The National ITS Architecture is available as a resource for any region and is maintained by the USDOT independently of any specific system design or region in the nation. The up-to-date National ITS Architecture (Version 6.1) is available on the National ITS Architecture website.[2]

Turbo Architecture™ – The USDOT developed the Turbo Architecture™ software application that uses the National ITS Architecture as a starting point to help regions develop their regional and project ITS architectures. The up-to-date Turbo

1 Federal Highway Administration. 2006. Regional ITS Architecture Guidance Document.

2 http://www.iteris.com/itsarch/

Architecture™ (Version 4.1), which supports National ITS Architecture Version 6.1, is available for free download from the National ITS Architecture website.[3]

The Des Moines Area Metropolitan Planning Organization (MPO) recognizes the need to develop a Des Moines area regional ITS architecture to guide the development of ITS projects and programs, as well as to be consistent with ITS strategies and projects contained in transportation plans. The MPO coordinates the development of the *Des Moines Area Regional ITS Architecture* (Regional ITS Architecture) on behalf of its many regional stakeholders, including cities, counties, highway agencies, public safety agencies, transit operators, and other operating agencies, to ensure compatibility with National ITS Architecture Standards among local ITS technologies as well as to fully address regional ITS integration. The purpose of this report is to illustrate and to document regional integration of the Regional ITS Architecture.

3 http://www.iteris.com/itsarch/html/turbo/turbomain.htm

2.0 Background

The MPO recognizes that ITS architecture is important to all MPO member governments and participating agencies anticipating using federal funds to implement an ITS-related project. In December 1997, the Center for Transportation Research and Education (CTRE) at Iowa State University conducted and prepared the *Des Moines Metropolitan Area ITS Strategic Plan.* This ITS Strategic Plan, including deployment recommendations, has provided guidelines for developing ITS in the Des Moines metropolitan area.

Beginning in 2001, the MPO began the process of developing its Regional ITS Architecture. Using the National ITS Architecture (Version 5.0) as a resource, the MPO built its Regional ITS Architecture using the Turbo Architecture™ software (Version 3.0). The MPO adopted the Regional ITS Architecture in July 2004, and is available on the MPO's website.[4]

During the reconstruction of Interstate 235 through the Des Moines metropolitan area, Iowa DOT consultant developed a Project-Level ITS Architecture for the Interstate 235 Reconstruction. The Iowa DOT consultant's report, published in April 2002, is available on the MPO's website.[5]

METHODOLOGY

The MPO began the process of updating the adopted *Regional ITS Architecture* in September 2008, with assistance of the MPO member governments and participating agencies. The MPO staff sent each stakeholder an ITS survey form (Appendix A) to complete, and requested each stakeholder to submit their completed survey to the MPO. After completing the initial data entry of the survey responses into Turbo Architecture™ 4.0, the MPO staff compiled the updated data and information from the survey results, and presented the preliminary results to the Traffic Management Advisory Committee and other stakeholders (Section 3.4) for their review.

As the National ITS Architecture is continuously being maintained and updated, the Regional ITS Architecture needs to be continuously maintained and updated to be in compliance with the National ITS Architecture and to keep current with what is happening in the region.

4 http://www.dmampo.org/Publications/DMAITS/Index.html

5 http://www.dmampo.org/Publications/DMAITS/reports/I235ITSArch.PDF

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3.0 Regional ITS Architecture

As a result of collaboration from participating governments and agencies, as well as input and comments from other stakeholders, the Regional ITS Architecture was developed.

3.1 REGION AND TIME

The MPO's Planning Area Boundary serves to define the 'region' for this Regional ITS Architecture. Currently, there are 19 member governments, two (2) associate member, and six (6) advisory members of the MPO, including cities, counties, and other transportation agencies. Figure 1 illustrates the MPO's current Planning Area. Several ITS elements included in the Regional ITS Architecture have services both inside and outside the MPO's Planning Area. The Regional ITS Architecture included these elements because these elements have service within the region that could include ITS elements.

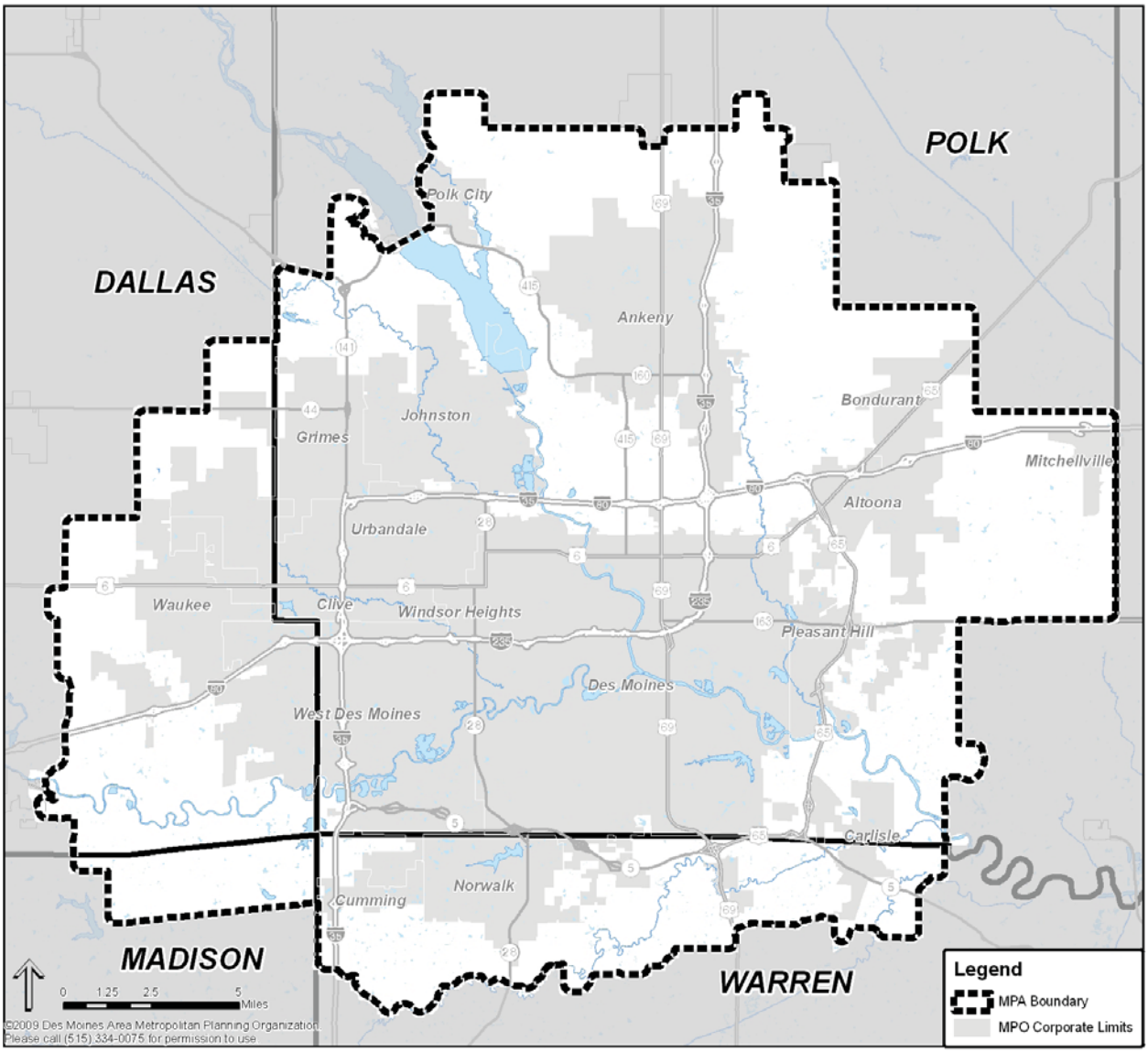

FIGURE 1. Horizon Year 2035 Des Moines Area MPO Planning Area.

The Regional ITS Architecture's time line has a horizon of ten (10) years, or 2019. All projects contained in the Regional ITS Architecture have implementation/completion dates within this timeframe. This horizon year is included in the MPO's Horizon Year 2035 Long Range Transportation Plan and in the MPO's Transportation Improvement Plan.

3.2 ITS DEVICE LOCATIONS

The Iowa DOT and its Traffic Management Center (TMC) provided the MPO with a map (Appendix B) indentifying locations of ITS devices in the MPO's Planning Area. The ITS devices include Dynamic Message Signs (DMS), Closed Circuit Television (CCTV), and traffic detectors (cameras and sensors).

3.3 SUBSYSTEMS

There are 22 subsystems in the National ITS Architecture that are grouped into four classes: Centers, Field, Vehicles, and Travelers. Various communications methods are involved when these subsystems are connected together. Figure 2 illustrates high-level interconnects among 12 subsystems in the Regional ITS Architecture.

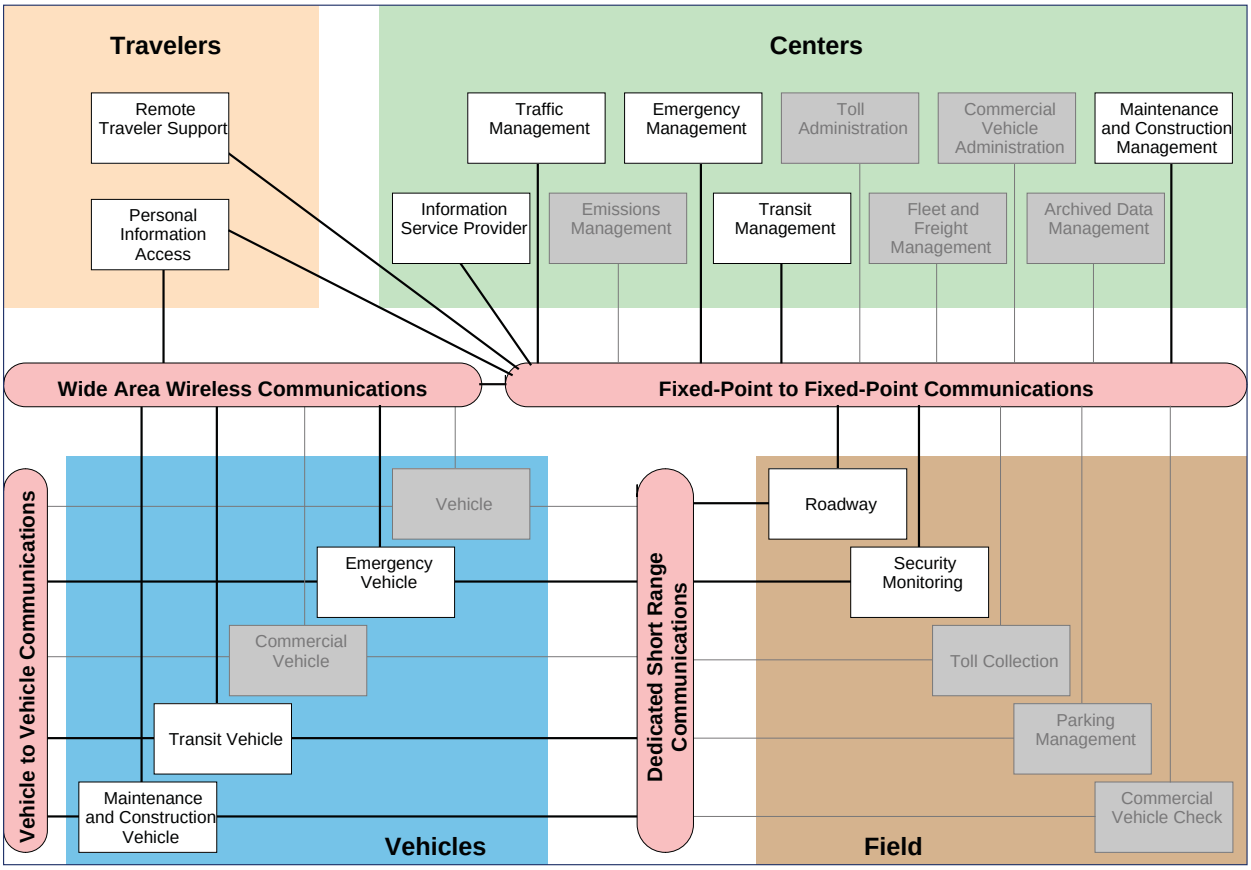

FIGURE 2. Regional ITS Architecture Subsystems.

This subsystem diagram (Figure 2) depicts all subsystems within the Regional ITS Architecture and the basic communication channels among these subsystems. The following sections will provide more detail about these subsystems and their communications. Subsequent sections of this report contain detailed information about Stakeholders, Inventory, Market Packages, Interfaces, Agreements, and Standards used in the Regional ITS Architecture. A brief description of the included subsystems can be found in Table 1.

TABLE 1. Description of Subsystems in the Regional ITS Architecture.

Class	Subsystem	Brief Description
Centers	Traffic Management (TMS)	Monitors and controls traffic and the road network.
	Emergency Management (EM)	Represents public safety, emergency management, and other allied agency systems that support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented ITS applications.
	Maintenance and Construction Management (MCMS)	Monitors and manages roadway infrastructure construction and maintenance activities.
	Information Service Provider (ISP)	Collects, processes, stores, and disseminates transportation information to system operators and the traveling public.
	Transit Management (TRMS)	Manages transit vehicle fleets and coordinates with other modes and transportation services.
Field	Roadway Subsystem (RS)	Includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself.
	Security Monitoring Subsystem (SMS)	Includes surveillance and sensor equipment used to provide enhanced security and safety for transportation facilities or infrastructure.
Vehicles	Emergency Vehicle Subsystem (EVS)	Resides in an emergency vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient incident response.
	Transit Vehicle Subsystem (TRVS)	Resides in a transit vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient movement of passengers.
	Maintenance and Construction Vehicle (MCVS)	Resides in a maintenance, construction, or other specialized service vehicle or equipment and provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.
Travelers	Remote Traveler Support (RTS)	Provides access to traveler information and supports security and safety monitoring of public areas.
	Personal Information Access (PIAS)	Provides the capability for travelers to receive formatted traffic advisories from their homes, place of work, major trip generation sites, personal portable devices, over multiple types of electronic media.

3.4 STAKEHOLDERS

A stakeholder is an organization that owns and/or operates ITS system within the region. Stakeholders serve as key participants in developing and maintaining the Regional ITS Architecture. For the Regional ITS Architecture, the MPO staff identified all the member governments and several other agencies as the regional stakeholders. The following pages (Report 1) contain a list of the stakeholders included in the Regional ITS Architecture, accompanied with a stakeholder description and the associated elements for that stakeholder.

Report 1. Stakeholders

City of Altoona
Description: City of Altoona, Iowa
Altoona refers to Polk County Emergency Management Agency.

City of Ankeny
Description: City of Ankeny, Iowa
Associated Element: City of Ankeny Fire Department
Associated Element: City of Ankeny Public Works
Associated Element: City of Ankeny Public Works-MCO Vehicles

City of Bondurant
Description: City of Bondurant, Iowa
Associated Element: City of Bondurant EOC

City of Carlisle
Description: City of Carlisle, Iowa
Associated Element: City of Carlisle Public Works
Associated Element: City of Carlisle Public Works-MCO Vehicles

City of Clive
Description: City of Clive, Iowa
Associated Element: City of Clive EOC
Associated Element: City of Clive Public Works
Associated Element: City of Clive Public Works-MCO Vehicles

City of Des Moines
Description: City of Des Moines, Iowa
Associated Element: City of Des Moines 911 Dispatch Center
Associated Element: City of Des Moines Public Works Dispatch Center
Associated Element: City of Des Moines Traffic Operations Center
Associated Element: City of Des Moines 911 Dispatch Center-Emergency Vehicles
Associated Element: City of Des Moines Public Works-MCO Vehicles
Associated Element: City of Des Moines Public Works-MCO Field Devices
Associated Element: City of Des Moines Public Works-Roadside Equipment

City of Grimes
Description: City of Grimes, Iowa
Associated Element: City of Grimes Fire Department
Associated Element: City of Grimes Maintenance Shop
Associated Element: City of Grimes Fire Department-Emergency Vehicles
Associated Element: City of Grimes-MCO Vehicles

City of Johnston
Description: City of Johnston, Iowa
Associated Element: City of Johnston Public Works
Associated Element: City of Johnston Public Works-MCO Vehicles

City of Norwalk
Description: City of Norwalk, Iowa
Associated Element: City of Norwalk Public Safety
Associated Element: City of Norwalk Public Works
Associated Element: City of Norwalk Public Safety-Emergency Vehicles
Associated Element: City of Norwalk Public Works-MCO Vehicles

City of Pleasant Hill

Description: City of Pleasant Hill, Iowa Pleasant Hill Fire Department refers to Polk County Emergency Management Agency.

City of Polk City

Description: City of Polk City, Iowa City of Polk City refers to Polk County Emergency Management Agency.

City of Urbandale

Description: City of Urbandale, Iowa Urbandale Emergency Management Center refers to Westcom Dispatch Center.
Associated Element: City of Urbandale Engineering
Associated Element: City of Urbandale Public Works
Associated Element: City of Urbandale Public Works-MCO Vehicles

City of West Des Moines

Description: City of West Des Moines, Iowa West Des Moines Emergency Management Center refers to Westcom Dispatch Center.
Associated Element: City of West Des Moines Public Works
Associated Element: City of West Des Moines Public Works-MCO Vehicles
Associated Element: City of West Des Moines Public Works-MCO Field Devices

City of Windsor Heights

Description: City of Windsor Heights, Iowa
Associated Element: City of Windsor Heights Public Works
Associated Element: City of Windsor Heights Public Works-MCO Vehicles
Associated Element: City of Windsor Heights Public Safety

Dallas County

Description: Dallas County, Iowa
Associated Element: Dallas County Central Maintenance Facility
Associated Element: Dallas County Emergency Management
Associated Element: Dallas County Homecare Services
Associated Element: Dallas County Homecare Services-Transit Vehicles
Associated Element: Dallas County Central Maintenance Facility-MCO Vehicles

Des Moines Area Regional Tranist Authority

Description: Des Moines Area Regional Tranist Authority (DART) provides public transportation services for Polk County, Iowa.
Associated Element: Des Moines Area Regional Transit Authority
Associated Element: Des Moines Area Regional Transit Authority-Transit Vehicles

Iowa Department of Transportation

Description: Iowa Department of Transportation (DOT)
Associated Element: Des Moines Area Traffic Management Center
Associated Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Associated Element: Iowa DOT Statewide Operations Support Center
Associated Element: Iowa DOT Statewide Operations Support Center-Roadside Equipment
Associated Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Associated Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Associated Element: Iowa DOT Statewide Operations Support Center-Security Monitoring Field Equipment

Media

Description: Local media for travel and construction information distribution.

Associated Element: Media

Polk County

Description: Polk County, Iowa

Associated Element: Polk County Emergency Management Agency

Associated Element: Polk County Dispatch-Emergency Vehicles

Public

Description: General public.

Associated Element: User Personal Computing Devices

Transportation Management Association

Description: The Transportation Management Association (TMA) is a non-profit organization that focuses on transportation issues from the perspective of the commuter, the parker, the rider, the biker, the shopper, etc. Funding for the TMA comes from partnerships with the Des Moines Area Metropolitan Planning Organization (MPO), Downtown Community Alliance, City of Des Moines, and Des Moines Area Regional Transit Authority (DART).

Associated Element: Transportation Management Association

Warren County

Description: Warren County, Iowa

Associated Element: Warren County Emergency Management

Westcom Dispatch Center

Description: Westcom is made up designated members of the City of Clive, Urbandale and West Des Moines by a 28E Agreement.

Stakeholders in this group:

City of West Des Moines City of Clive City of Urbandale

Associated Element: Westcom Dispatched Police/Fire/EMS Emergency Vehicles-Security Monitoring Field Equipment

Associated Element: Westcom Dispatched Police/Fire/EMS Emergency Vehicles

Associated Element: Westcom Dispatch Center

3.5 INVENTORY

Based on the ITS survey results, and with assistance from the stakeholders, the MPO staff documented existing and planned ITS elements in the region, as well as their associated stakeholder(s), and a brief description for each element. The following pages (Report 2) contain a list of the ITS elements included in the inventory, with each element's status, associated stakeholder(s), and entities the element is 'mapped to' in the Regional ITS Architecture.

Report 2. Inventory

Element: Remote Traveler Support
Status: Existing
Description: Remote traveler support provides access to traveler information at transit stations, transit stops, other fixed sites along travel routes (e.g., rest stops), and major trip generation locations.

Element: Surface Transportation Weather Service
Status: Existing
Description: Providers of value-added sector specific meteorological services. These providers utilize National Weather Service data and predictions, road condition information and local environmental data to provide weather observations and forecasts.

Element: Weather Services
Status: Existing
Description: Weather Services include the National Weather Service as well as private disseminators of weather data.

City of Ankeny - National Weather Service (NWS), Roadway Weather Information System (RWIS), D.T.N. WeatherCentury, Accu-Weather Intellicast.

City of Clive - Metropolitan Incident Command Radio Network (MICRN) radio system, RWIS.

City of Grimes - National Oceanic and Atmospheric Administration (NOAA).

City of Windsor Heights - MICRN.

Iowa DOT - Meridian Environmental Technology Inc., DTN/Meteorlogix.

City of Ankeny
Element: City of Ankeny Fire Department
Status: Existing
Description: Ankeny Fire Department partners with Polk County Emergency Management Agency.
Ankeny Emergency Management Center partners with Polk County Sheriff Dispatch and Polk County Emergency Management Agency.
Notes from survey:
Emergency vehicles: Polk County Dispatch.

Element: City of Ankeny Public Works
Status: Existing
Description: Ankeny Maintenance Facility
Notes from survey:
The Arterial/Traffic Management Center control signalized intersections - Closed Loop and Opticom Preemption.
Uses plow trucks for de-icing.
Utilizes mobile changeable message boards for construction traffic control.

Element: City of Ankeny Public Works-MCO Vehicles
Status: Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

City of Bondurant
Element: City of Bondurant EOC
Status: Existing
Description: Bondurant refers to Polk County Emergency Managment Agency.

City of Carlisle
Element: City of Carlisle Public Works
Status: Existing
Description: No description provided.

Element: City of Carlisle Public Works-MCO Vehicles *Status:* Existing
Description: City of Carlisle has ITS devices in their Public Works vehicles for processing and communication functions necessary to the support of highway maintenance and construction.

City of Clive

Element: City of Clive EOC
Status: Existing
Description: Clive EOC refers to Westcom Dispatch Center.
Notes from survey:

Uses a CodeRed phone notification system for Clive residents as needed.

Element: City of Clive Public Works
Status: Existing
Notes from survey:

All signals maintained by Clive are interconnected. Preemption system is used by public safety sectors and some public works operations. Railroad preemption ties in with signals.

Real-time traffic data collection technologies used on arterials managed by the Arterial/ Traffic Management Center - Loop Detectors (counting loops), CCTV Cameras, and Video Detection (Planned).

Arterial/Traffic Managment Center control signalized intersections - Closed Loop, Signal Preemption for public safety sectors and some public works operations, and railroad preemption.

Arterial/Traffic Management Center distribute information to travelers directly using roadside media infrastruction on the arterial - Dynamic Message Signs on mainline streets, Media Fax, Code Red (reverse 911), and other.

Element: City of Clive Public Works-MCO Vehicles
Status: Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

City of Des Moines

Element: City of Des Moines 911 Dispatch Center
Status: Existing
Notes from survey:

Direct access to incident data from TMC via I-235 cameras. Send incident data to TMC and Highway Helpers via telephone and radio communication. Preemption lights for some fire and rescue vehicles.

Element: City of Des Moines 911 Dispatch Center-Emergency Vehicles
Status: Existing
Description: Police, Fire, Rescue vehicles. Emergency vehicles include ITS equipment that provides the sensory, processing, storage, and communications functions necessary to support safe and efficient emergency response.

Element: City of Des Moines Public Works Dispatch Center *Status:* Existing
Description: Des Moines Public Works

Element: City of Des Moines Public Works-MCO Field Devices
Status: Existing
Description: MCO Field Devices include sensors, displays, and cameras for operational purposes of maintenance and construction.

Element: City of Des Moines Public Works-MCO Vehicles
Status: Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

Element: City of Des Moines Public Works-Roadside Equipment
Status: Existing
Description: No description provided.

Element: City of Des Moines Traffic Operations Center *Status:* Existing
Description: Des Moines Traffic and Transportation
Notes from survey:

Real-time traffic data collection technologies used on arterials managed by the Arterial/ Traffic Management Center - Loop Detectors, CCTV Cameras.

Arterial/Traffic Management Center control signalized intersections - Closed Loop (integrated with central system) and Centralized Control, Signal Preemption for emergency vehicles (generally limited to downtown area), Signal Priority for Transit Vehicle (limited-University Ave. corridor).

Arterial/Traffic Management Center distribute information to travelers directly using roadside media infrastructure on the arterials - Dynamic Message Signs controlling parking access, Dynamic Message Signs on mainline streets (Planned), currently use trailers.

Arterial Management Center detect and verify incidents - no direct detection, but CCTV cameras to verify.

City of Grimes

Element: City of Grimes Fire Department
Status: Existing
Description: No description provided.

Element: City of Grimes Fire Department-Emergency Vehicles
Status: Planned
Description: Emergency vehicles include ITS equipment that provides the sensory, processing, storage, and communications functions necessary to support safe and efficient emergency response.

Element: City of Grimes Maintenance Shop
Status: Existing
Description: No description provided.

Element: City of Grimes-MCO Vehicles
Status: Existing
Description: City vehicles.

City of Johnston

Element: City of Johnston Public Works
Status: Existing
Description: No description provided.

Element: City of Johnston Public Works-MCO Vehicles *Status:* Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

City of Norwalk

Element: City of Norwalk Public Safety
Status: Existing
Description: Norwalk Public Safety partners with Warren County Emergency Management.

Element: City of Norwalk Public Safety-Emergency Vehicles
Status: Existing
Description: Norwalk Fire, Police, and Rescue vehicles.

Element: City of Norwalk Public Works
Status: Existing
Description: No description provided.

Element: City of Norwalk Public Works-MCO Vehicles
Status: Existing
Description: No description provided.

City of Urbandale

Element: City of Urbandale Engineering
Status: Existing
Notes from survey:

Real-time traffic data collection technologies used on arterials managed by the Arterial/Traffic Management Center - Loop Detectors, CCTV Cameras (Planned).

Arterial/Traffic Managment Center control signalized intersections - Closed Loop.

Signalized intersections operated by the Arterial Management Center within 200 feet of a highway-rail intersection that currently adjust signal timing in response to train crossing to avoid vehicle entrapment, or interconnected with active crossing devices - 100th and Douglas.

Element: City of Urbandale Public Works
Status: Existing
Description: No description provided.

Element: City of Urbandale Public Works-MCO Vehicles
Status: Planned
Description: For maintenance only.

City of West Des Moines

Element: City of West Des Moines Public Works
Status: Existing
Notes from survey:

Real-time traffic data collection technologies used on arterials managed by the Arterial/Traffic Management Center - Loop Detectors, CCTV Cameras.

Arterial/Traffic Managment Center control

signalized intersections - Closed Loop or Centralized Control, Signal Preemption for emergency vehicles.

Element: City of West Des Moines Public Works-MCO Field Devices
Status: Existing
Description: MCO Field Devices include sensors, displays, and cameras for operational purposes of maintenance and construction.

Element: City of West Des Moines Public Works-MCO Vehicles
Status: Planned
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

City of Windsor Heights
Element: City of Windsor Heights Public Safety
Status: Existing
Description: Windsor Heights refers to Polk County Emergency Management Agency.

Element: City of Windsor Heights Public Works
Status: Existing
Description: No description provided.

Element: City of Windsor Heights Public Works-MCO Vehicles
Status: Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

Dallas County
Element: Dallas County Central Maintenance Facility *Status:* Existing
Notes from survey:

Central Maintenance Facility: 23380 250th Street, Dallas Center, Iowa. Dallas County Road Department.

Dispatch maintenance or construction vehicles by radio.

Request sheriff to monitor vehicle speeds in work zones.

Share maintenance and construction information with the Sheriff Department.

Element: Dallas County Central Maintenance Facility-MCO Vehicles
Status: Existing
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

Element: Dallas County Emergency Management
Status: Existing
Description: No description provided.

Element: Dallas County Homecare Services
Status: Existing
Description: HomeCare Services Inc.
Notes from survey:

In person or telephone transit trip planning.

Element: Dallas County Homecare Services-Transit Vehicles *Status:* Existing
Description: Transit vehicles include ITS devices that support the safe and efficient movement of passengers. These systems collect, manage, and disseminate transit-related information to the driver, operations and maintenance personnel, and transit system patrons.
Notes from survey:

Public Transportation Center directly or indirectly (i.e., thru another agency/ organization) disseminate info to the public -Display in Transit Vehicles.

Public Transportation Center provide transit trip planning - In person or telephone.

Des Moines Area Regional Tranist Authority
Element: Des Moines Area Regional Transit Authority
Status: Existing
Notes from survey:

DART disseminate info to the public - www.ridedart.com, SmartCard (planned), automatic passenger counters (planned), radio upgrade (planned), work order management systerm (planned).

DART provides transit trip planning - Internet Web Page (Google Transit+Trapeze Tnp

Planner) (Planned), e-mail or other direct PC communications (+mobile devices).

Electronic fare payment system - GFI Cents-A-Bill (mag-strip).

Automated Vehicle Locator (AVL) (planned).

Element: Des Moines Area Regional Transit Authority-Transit Vehicles
Status: Existing
Description: Transit vehicles include ITS devices that support the safe and efficient movement of passengers. These systems collect, manage, and disseminate transit-related information to the driver, operations and maintenance personnel, and transit system patrons.

Iowa Department of Transportation
Element: Des Moines Area Traffic Management Center
Status: Existing
Description: Primary Stakeholder: Iowa DOT/ District 1.
Notes from survey:

Real-time traffic data collection technologies used on freeways managed by the Freeway Management Center - Closed Circuit Television, Side-Fire Radar.

Freeway Management Center currently distribute information to travelers directly using roadside infrastruction on the freeways - Dynamic Message Signs, Highway Advisory Radio, TV, Radio, 511.

Freeway Management Center disseminate freeway travel times, speeds, and conditions information to the public - Internet Web Page, Pagers or Personal Data Assistants (Planned), Kiosks, e-mail or other direct PC communications, TV.

Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Status: Existing
Description: Center Name: 4 Maintenance Garages include North Shop, Grimes, Altoona, and Carlisle. Primary Stakeholder: Iowa DOT/District 1 & Construction.

Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Status: Existing
Description: MCO Field Devices include sensors, displays, and cameras for operational purposes of maintenance and construction.

Element: Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Status: Planned
Description: MCO vehicles include ITS devices that provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction.

Element: Iowa DOT Statewide Operations Support Center
Status: Existing
Description: Primary Stakeholder: Iowa DOT/ Office of Maintenance.

Element: Iowa DOT Statewide Operations Support Center-Roadside Equip
Status: Planned
Description: Roadside Equipment includes any and all equipment distributed on and along the roadway which monitors and controls traffic. This can include equipment for tolling.

Element: Iowa DOT Statewide Operations Support Center-Security Monito
Status: Planned
Description: Security monitoring field equipment includes sensors and surveillance devices that monitor transportation infrastructure and public areas.

Media
Element: Media
Status: Existing
Description: The Media element represents the information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media.

Polk County
Element: Polk County Dispatch-Emergency Vehicles
Status: Existing
Description: Center Name: Polk County Dispatch.

Element: Polk County Emergency Management Agency
Status: Existing
Description: No description provided.

Public
Element: User Personal Computing Devices
Status: Existing
Description: User Personal Computing Devices refers to equipment an individual owns and can personalize with their choices for information about transportation networks. An Internet-connected PC is an example.

Transportation Management Association
Element: Transportation Management Association
Status: Existing
Notes from survey:
www.DriveTimeDesMoines.org

Warren County
Element: Warren County Emergency Management
Status: Existing
Description: No description provided.

Westcom Dispatch Center
Stakeholders in this group:
City of West Des Moines
City of Clive
City of Urbandale
Element: Westcom Dispatch Center
Status: Existing
Description: Notes from survey: Can monitor intersections via camera.

Element: Westcom Dispatched Police/Fire/EMS Emergency Vehicles
Status: Existing
Description: These emergency vehicles are dispatched by Westcom but the Stakeholder is the City of Clive. Emergency vehicles include ITS equipment that provides the sensory, processing, storage, and communications functions necessary to support safe and efficient emergency response.

Element: Westcom Dispatched Police/Fire/EMS Emergency Vehicles-Sec
Status: Existing
Description: Security monitoring field equipment includes sensors and surveillance devices that monitor transportation infrastructure and public areas.

3.6 NEEDS AND SERVICES

Needs

Following the collection of the inventory, the MPO staff, with assistance from the stakeholders, compiled a list of needs for the region that could be supported with ITS. The needs identified for the region are listed below.

Traffic Management Needs

- Improve coordination of traffic management between agencies; and,
- Improve signal coordination within the metro area.

Traveler Information Needs

- Provide traveler with up-to-date travel conditions; and,
- Provide multiple forms of access to travel conditions.

Data Needs

- Improved data collection; and,
- Easy access to data.

Transit Needs

- Enhance transit vehicle tracking system;
- Provide alternate payment methods for riders; and,
- Transit vehicle priority at selected signals.

Emergency Management Needs

- Improve coordination and communication between emergency response organizations; and,
- Provide accurate and timely information to emergency responders.

Maintenance and Construction Operations Needs

- Improve construction zone safety; and,
- Maintenance vehicle tracking system.

Market Packages

Market Packages are service-oriented perspectives of the National ITS Architecture. A Market Package collects several different subsystems, equipment packages, terminators, and architecture flows that provide the desired service. Market Packages are tailored to fit, separately or in a combination, real world transportation problems and needs. Market Packages represent assembled pieces of the regional architecture, contain the flows that connect those pieces of regional architecture, and note the other important external systems connected to those assembled regional architecture pieces.

Listed in Table 2 are the Market Packages included in the Regional ITS Architecture with their current status. More detailed information about each Market Package, including underlying graphics and definitions, can be found at the National ITS Architecture website.[6] These Market Packages contain all possible connections. The MPO staff, in consultation with the stakeholders, may not have included all possible Market Package connections when developing the Regional ITS Architecture. Appendix C (Report 3) is a complete listing of Market Packages included in the Regional ITS Architecture, with description and associated elements for each one.

6 Market Packages, http://www.iteris.com/itsarch/html/mp/mpindex.htm.

TABLE 2. Market Packages in the Regional ITS Architecture.

Service Area	Market Package	Market Package Name	Status
Public Transportation	APTS01	Transit Vehicle Tracking	Planned
	APTS02	Transit Fixed-Route Operations	Existing
	APTS03	Demand Response Transit Operations	Existing
	APTS04	Transit Fare Collection Management	Existing
	APTS05	Transit Security	Existing
	APTS06	Transit Fleet Management	Existing
	APTS07	Multi-modal Coordination	Planned
	APTS08	Transit Traveler Information	Existing
	APTS09	Transit Signal Priority	Existing
	APTS10	Transit Passenger Counting	Planned
Travel Information	ATIS01	Broadcast Traveler Information	Existing
Traffic Management	ATMS01	Network Surveillance	Existing
	ATMS03	Surface Street Control	Existing
	ATMS04	Freeway Control	Existing
	ATMS06	Traffic Information Dissemination	Existing
	ATMS07	Regional Traffic Management	Existing
	ATMS08	Traffic Incident Management System	Existing
	ATMS13	Standard Railroad Grade Crossing	Existing
Emergency Management	EM01	Emergency Call-Taking and Dispatch	Existing
	EM02	Emergency Routing	Existing
	EM05	Transportation Infrastructure Protection	Existing
	EM06	Wide-Area Alert	Existing
	EM07	Early Warning System	Existing
	EM08	Disaster Response and Recovery	Existing
	EM09	Evacuation and Reentry Management	Existing
	EM10	Disaster Traveler Information	Existing
Maintenance & Construction Management	MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing
	MC02	Maintenance and Construction Vehicle Maintenance	Existing
	MC03	Road Weather Data Collection	Existing
	MC04	Weather Information Processing and Distribution	Existing
	MC06	Winter Maintenance	Existing
	MC07	Roadway Maintenance and Construction	Existing
	MC08	Work Zone Management	Existing
	MC10	Maintenance and Construction Activity Coordination	Existing

3.7 INTERFACES

After the ITS systems in the Des Moines metropolitan area have been identified and defined in terms of the functions that those ITS systems perform, the existing and planned interfaces between these systems are defined. First, the connections (or 'Interconnects') among systems are identified, and then the information that will be exchanged on each of the interfaces (or 'Information Flows') is defined.

Interconnects

Interconnects are existing and planned communication paths among ITS elements in the region. There are four different types of communications: Fixed Point - Fixed Point, Wide Area Wireless (Mobile), Field - Vehicle, and Vehicle - Vehicle. In addition, several other specialized interconnects also are defined, including human interface and physical/environmental. The diagram in Appendix D illustrates interconnects among all ITS elements in the inventory.

Information Flows

Information flows are the information exchanged between ITS elements in the region. Diagrams in Appendix E illustrate each ITS element's information flows.

3.8 AGREEMENTS

A Regional ITS Architecture contains many connections among agencies that need to share information. Stakeholders that are going to share information need to enter into agreements. The agreements will need to specify what information is to be shared, what access or control each organization has in that information sharing, and how the information is to be shared among the participating organizations. As the stakeholders share more information, those stakeholders having agreements to clarify responsibilities will become increasingly important. Creating information-sharing agreements is important to a Regional ITS Architecture's success.

The Regional ITS Architecture's stakeholders indicated throughout the development of the Regional ITS Architecture that there currently is cooperation among agencies, but there has not been a need to create formal agreements. With the implementation and improvement of ITS in the region it is likely that more formal agreements will be needed in the future.

There are six types of agreements: Handshake Agreement; Memorandum of Understanding; Interagency Agreement, Intergovernmental Agreement; Operational Agreement; Funding Agreement; and Master Agreement. It is important to evaluate what kind of agreement is needed and to build consensus with each of the stakeholders involved. Some examples of agreements that would support the Regional ITS Architecture include:

- Data usage and sharing agreements between public agencies;
- Data usage and sharing agreements between public agencies and private media and information service providers;
- Shared video monitoring agreements; and
- Mutual aid agreements.

3.9 STANDARDS

Standards support ITS and support a regional architecture. Standards specify exactly how systems should communicate and share information. Standards also are crucial in developing an open ITS where all systems will be able to communicate with each of the other systems. USDOT's ITS Joint Program Office (JPO) is supporting Standard Development Organizations (SDO) to develop standards for successful ITS deployments. More information regarding ITS standards and the status of standards is available at the USDOT's ITS JPO's Standards Site.[7] Appendix F (Report 4) is a listing of Standards that are relevant to the Regional ITS Architecture.

7 http://www.standards.its.dot.gov/

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APPENDIX A
ITS Inventory Survey Form

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Questions for Regional ITS Architecture in the Des Moines Area MPO Area (New Version)

Stakeholder :

Contact :

Address :

Phone :

Categories			Questions	Elements	Status of System (ciecle)	Description
1	Commercial Vehicle Operations	1.1	What is your Commercial Vehicle Operation Center name?			
			What is the primary Stakeholder?			
		1.2	Does your State/Regional CV Administrative Center perform (or plan) electronic credential administrative services?		Existing, Planned, or Not Planned	
		1.3	Does your project/region have (or plan to have) roadside inspection facilities?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Inspection Facility		
					Existing, Planned, or Not Planned	
				b. Commercial Vehicles		
					Existing, Planned, or Not Planned	
		1.4	Does your inspection facility perform (or plan to perform) electronic screening?		Existing, Planned, or Not Planned	
		1.5	Does your inspection facility exchange (or plan to exchange) safety and/or security information?		Existing, Planned, or Not Planned	
		1.6	Does your inspection facility involve (or plan to involve) an international border?		Existing, Planned, or Not Planned	
		1.7	Do you perform (or plan to perform) a high speed Weigh-In-Motion service?		Existing, Planned, or Not Planned	
		1.8	Does your inspection facility perform (or plan to perform) HAZMAT detection?		Existing, Planned, or Not Planned	
2	Emergency Management	2.1	What is your Emergency Management Center name?			
			What is the primary Stakeholder?			
		2.2	Does the center currently perform (or plan to perform) computer aided dispatch of emergency vehicles?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Emergency Vehicles		
					Existing, Planned, or Not Planned	
		2.3	Does the center receive (or plan to receive) incident data from an arterial, freeway, or transit center?		Existing, Planned, or Not Planned	
		2.4	Does the center send (or plan to send) incident data to an arterial, freeway, or transit center?		Existing, Planned, or Not Planned	
		2.5	Does the center have (or plan to have) preemption lights for signalized intersections or ramp meters?		Existing, Planned, or Not Planned	

		2.6	Does the center monitor (or plan to monitor) the transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Security Monitoring Field Equipment	Existing, Planned, or Not Planned	
		2.7	Does the center remotely control (or plan to remotely control) barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate the impact of an incident?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Roadside Equipment	Existing, Planned, or Not Planned	
		2.8	Does the center monitor (or plan to monitor) public travel-related areas such as transit stations, transit stops, rest stops, and kiosk locations for potential threats using sensors and surveillance equipment?		Existing, Planned, or Not Planned	
		2.9	Does the center use (or plan to use) 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?		Existing, Planned, or Not Planned	
		2.10	Does the center monitor (or plan to monitor) and detect potential, looming, and actual disasters including natural disasters and technological and man-made disasters (hazardous materials incidents, nuclear, chemical, biological, and radiological attacks) and notify all responding agencies of detected emergencies?		Existing, Planned, or Not Planned	
		2.11	Does the center support (or plan to support) disaster response and recovery, including coordination of emergency response plans and resources, damage assessment, service restoration, and transition back to normal operation?		Existing, Planned, or Not Planned	
		2.12	Does the center support (or plan to support) evacuation of the general public from a disaster area and manage subsequent reentry to the disaster area using transportation resources?		Existing, Planned, or Not Planned	
		2.13	Does the center provide (or plan to provide) disaster-related traveler information to the general public, regarding evacuation and reentry information and other information concerning the operation and availability of the transportation system during a disaster?		Existing, Planned, or Not Planned	

3	Freeway Management	3.1	What is your Freeway Management Center name?			
			What is the primary Stakeholder?			
		3.2	Are real-time traffic data collection technologies used (or planned to be used) on any of your freeways managed by the Freeway Management Center?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Loop Detectors		
					Existing, Planned, or Not Planned	
				b. Closed Circuit Television		
					Existing, Planned, or Not Planned	
				c. Vehicle Probe Readers		
					Existing, Planned, or Not Planned	
				d. Other (e.g., radar)		
					Existing, Planned, or Not Planned	
		3.3	Does your Freeway Management Center have (or plan to add) environmental sensor stations to monitor the environmental conditions?			
		3.4	Does your Freeway Management Center currently distribute (or are there plans to distribute) information to travelers directly using roadside infrastructure on the freeways?			
			If Existing or Planned?	Elements' Name a. Dynamic Message Signs (DMS)		
					Existing, Planned, or Not Planned	
				b. Highway Advisory Radio (HAR)		
					Existing, Planned, or Not Planned	
				c. In-Vehicle Signing		
					Existing, Planned, or Not Planned	
				d. Other		
					Existing, Planned, or Not Planned	
		3.5	Does your Freeway Management Center operate (or plan to add) ramp meters on freeway entrances?			
			If Existing or Planned?	Elements' Name		
				a. Preemption for Emergency Vehicle's Name		
					Existing, Planned, or Not Planned	
				b. Priority for Transit Vehicle's Name		
					Existing, Planned, or Not Planned	
		3.6	Does your Freeway Management Center operate (or plan to add) lane control devices (e.g., changeable overhead directional arrows) on the freeways?		Existing, Planned, or Not Planned	

		3.7	Does your Freeway Management Center disseminate (or plan to disseminate) freeway travel times, speeds, and conditions information to the public?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Elements' Name a. Internet Web Page		
					Existing, Planned, or Not Planned	
				b. Pagers or Personal Data Assistants		
					Existing, Planned, or Not Planned	
				c. Kiosks		
					Existing, Planned, or Not Planned	
				d. E-mail or Other Direct PC Communications		
					Existing, Planned, or Not Planned	
				e. In-Vehicle Navigation Systems		
					Existing, Planned, or Not Planned	
				f. TV (Interactive or Dedicated Cable)		
					Existing, Planned, or Not Planned	
				g. Other		
					Existing, Planned, or Not Planned	
		3.8	Does your Freeway Management Center detect and verify (or plan to detect and verify) incidents?		Existing, Planned, or Not Planned	
		3.9	Does your Freeway Management Center share (or plan to share) traffic data with another Freeway Management Center or Arterial Management Center?		Existing, Planned, or Not Planned	
		3.10	Does your Freeway Management Center manage (or plan to manage) HOV lanes?		Existing, Planned, or Not Planned	
		3.11	Does your Freeway Management Center manage (or plan to manage) automatic or remotely controlled gates or barriers that control access to roadway segments including ramps and traffic lanes?		Existing, Planned, or Not Planned	
4	Public Transportation	4.1	What is your Public Transportation Center name? What is the primary Stakeholder?			
		4.2	Does your Public Transportation Center manage (or plan to manage) transit vehicles?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Fixed Route (including Bus Rapid Transit)		
					Existing, Planned, or Not Planned	
				b. Rail		
					Existing, Planned, or Not Planned	
				c. Demand Response		
					Existing, Planned, or Not Planned	
				d. Flexible Route		
					Existing, Planned, or Not Planned	
				e. Ferries		
					Existing, Planned, or Not Planned	

4.3	Does your transit element provide (or plan to provide) maintenance of the transit vehicles?		Existing, Planned, or Not Planned	
4.4	Do you have (or plan to have) an Automated Vehicle Location (AVL) System?		Existing, Planned, or Not Planned	
4.5	Does your agency have (or plan to have) on board security monitoring systems?		Existing, Planned, or Not Planned	
4.6	Does your agency monitor (or plan to monitor) public areas (e.g., stops, park & ride lots, stations)?		Existing, Planned, or Not Planned	
4.7	Does your agency perform security monitoring (or plan to monitor) non- public areas (e.g. transit yards or other infrastructure)?		Existing, Planned, or Not Planned	
4.8	Does your Public Transportation Center directly or indirectly (i.e., thru another agency/organization) disseminate (or plan to disseminate) info to the public?		Existing, Planned, or Not Planned	
	If Existing or Planned?	Element's name a. Internet Web Page		
			Existing, Planned, or Not Planned	
		b. Pagers or Personal Data Assistants		
			Existing, Planned, or Not Planned	
		c. Kiosks		
			Existing, Planned, or Not Planned	
		d. E-mail or Other Direct PC Communications		
			Existing, Planned, or Not Planned	
		e. Display/Audio in Transit Vehicles		
			Existing, Planned, or Not Planned	
		f. Electronic Displays/ Audio Announcements at Transit Stops and Stations (Includes Video Monitors)		
			Existing, Planned, or Not Planned	
		g. TV (Interactive or Dedicated Cable)		
			Existing, Planned, or Not Planned	
		h. Other		
			Existing, Planned, or Not Planned	
4.9	Does your Public Transportation Center provide transit trip planning?			
	If Existing or Planned?	Element's name a. Internet Web Page		
			Existing, Planned, or Not Planned	
		b. Kiosks		
			Existing, Planned, or Not Planned	
		c. e-mail or other direct PC communications		
			Existing, Planned, or Not Planned	
		d. Other		
			Existing, Planned, or Not Planned	

		4.10	Does your transit element have (or plan to have) an Electronic Fare Payment System (smart card, swipe card, credit card, etc.)?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Travel Card's Name		
					Existing, Planned, or Not Planned	
		4.11	Does your transit element share (or plan to share) transit data with a Freeway Management Center, Arterial Management Center, or other Transit Management Center?		Existing, Planned, or Not Planned	
5	Regional Traveler Information	5.1	What is your Regional Travel Information Center name? what is the primary Stakeholder?			
		5.2	Does your Regional Traveler Information Center use (or plan to use) different technologies to distribute traveler information to the public?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Internet Web Page		
					Existing, Planned, or Not Planned	
				b. Pagers or Personal Data Assistants		
					Existing, Planned, or Not Planned	
				c. Kiosks		
					Existing, Planned, or Not Planned	
				d. E-mail or Other Direct PC Communications		
					Existing, Planned, or Not Planned	
				e. In-Vehicle Navigation Systems		
					Existing, Planned, or Not Planned	
				f. TV (Interactive or Dedicated Cable)		
					Existing, Planned, or Not Planned	
				g. Other		
					Existing, Planned, or Not Planned	
		5.3	Does your Regional Traveler Information Center have (or plan to have) the capability to provide any of the following information: broadcast data, personalized data, route guidance, or yellow pages information?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Broadcast of Static		
					Existing, Planned, or Not Planned	
				b. Personalized Provision of Traffic, Transit, or Maintenance and Construction Information to Users		
					Existing, Planned, or Not Planned	

				c. Route Guidance (Either Pre-Trip or Enroute)		
					Existing, Planned, or Not Planned	
				d. Yellow Pages Information or Reservation		
					Existing, Planned, or Not Planned	
6	Arterial /Traffic Managemnet	6.1	What is your Arterial/Traffic Management Center name?			
			What is the Primary Stakeholder?			
		6.2	Does your Arterial or Traffic Management Center control (or plan to control) signalized intersections?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Closed Loop or Centralized Control		
					Existing, Planned, or Not Planned	
				b. Real-Time Traffic Adaptive Control, such as SCOOT /SCATS or Similar		
					Existing, Planned, or Not Planned	
				c. Signal Preemption for Emergency Vehicles		
					Existing, Planned, or Not Planned	
				d. Signal Priority for Transit Vehicles		
					Existing, Planned, or Not Planned	
		6.3	Do you have signalized intersections operated by the Arterial Management Center within 200 feet of a highway-rail intersection that currently (or are planned to) adjust signal timing in response to train crossing to avoid vehicle entrapment, or are interconnected with active crossing devices?		Existing, Planned, or Not Planned	
		6.4	Are real-time traffic data collection technologies used (or planned to be used) on any of your arterials managed by the Arterial or Traffic Management Center?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Loop Detectors		
					Existing, Planned, or Not Planned	
				b. CCTV Cameras		
					Existing, Planned, or Not Planned	
				c. Probe Readers		
					Existing, Planned, or Not Planned	
				d. Other		
					Existing, Planned, or Not Planned	

6.5	Does your Arterial or Traffic Management Center distribute (or plan to distribute) information to travelers directly using roadside media infrastructure on the arterials?		Existing, Planned, or Not Planned	
	If Existing or Planned?	Element's name a. Dynamic Message Signs on Mainline Streets		
			Existing, Planned, or Not Planned	
		b. Highway Advisory Radio		
			Existing, Planned, or Not Planned	
		c. Dynamic Message Signs Controlling Parking Access		
			Existing, Planned, or Not Planned	
		d. In-Vehicle Signing Transmitter Locations		
			Existing, Planned, or Not Planned	
		e. Other		
			Existing, Planned, or Not Planned	
6.6	Does your agency deploy (or plan to deploy) technologies associated with highway-rail intersections?		Existing, Planned, or Not Planned	
	If Existing or Planned?	Element's name a. Video Surveillance		
			Existing, Planned, or Not Planned	
		b. Electronic Surveillance Other Than Video		
			Existing, Planned, or Not Planned	
		c. Ability to Predict Train Arrivals Electronically		
			Existing, Planned, or Not Planned	
		d. Electronic Traffic Violator Devices		
			Existing, Planned, or Not Planned	
		e. Other		
			Existing, Planned, or Not Planned	
6.7	Does your Arterial or Traffic Management Center have (or plan to add) environmental sensor stations to monitor the environmental conditions?		Existing, Planned, or Not Planned	
6.8	Does your Arterial or Traffic Management Center provide (or plan to provide) surface street travel times, speeds, and conditions information to the public?		Existing, Planned, or Not Planned	
	If Existing or Planned?	Element's name a. Internet Web Page		
			Existing, Planned, or Not Planned	
		b. Pagers or Personal Data Assistants		
			Existing, Planned, or Not Planned	

				c. Kiosks	Existing, Planned, or Not Planned				
				d. E-mail or Other Direct PC Communications	Existing, Planned, or Not Planned				
				e. In-Vehicle Navigation Systems	Existing, Planned, or Not Planned				
				f. TV (Interactive or Dedicated Cable)	Existing, Planned, or Not Planned				
				g. Other	Existing, Planned, or Not Planned				
		6.9	Does your Arterial Management Center detect and verify (or plan to detect and verify) incidents?		Existing, Planned, or Not Planned				
		6.10	Does your Arterial Management Center share (or plan to share) traffic data with another Freeway Management Center or Arterial Management Center?		Existing, Planned, or Not Planned				
		6.11	Does your Arterial or Traffic Management Center manage automatic or remotely controlled gates or barriers that control access to roadway segments?		Existing, Planned, or Not Planned				
7	Electronic Tolling	7.1	What is your Electronic Tolling Center name?						
			What is the primary Stakeholder?						
			If Existing or Planned?	Element's name a. Roadside Equipment	Existing, Planned, or Not Planned				
				b. Vehicles	Existing, Planned, or Not Planned				
8	Maintenance and Construction Operations	8.1	What is your Maintenance and Construction Operations (MCO) Center?						
			What is the primary Stakeholder?						
		8.2	Does your center manage or dispatch maintenance or construction vehicles?		Existing, Planned, or Not Planned				
			If Existing or Planned?	Element's name a. MCO Vehicles	Existing, Planned, or Not Planned				
		8.3	Does your MCO center have (or plan to have) the capability to track MCO vehicles and other MCO equipment to ascertain their location?		Existing, Planned, or Not Planned				
		8.4	Does your MCO center have (or plan to have) the capability to automate vehicle maintenance scheduling and manage both routine and corrective maintenance activities on vehicles and other MCO equipment?		Existing, Planned, or Not Planned				
		8.5	Does your MCO center currently collect (or plan to collect) road and weather conditions data from environmental sensors located on or near the roadway?		Existing, Planned, or Not Planned				
			If Existing or Planned?	Element's name a. MCO Field Devices	Existing, Planned, or Not Planned				

		8.6	Does your MCO center receive (or plan to receive) weather information from the National Weather Service?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a. Weather Services	 Existing, Planned, or Not Planned	
		8.7	Does your MCO center receive (or plan to receive) surface transportation specific weather information from a Value Added Meteorological Service Provider?		Existing, Planned, or Not Planned	
			If Existing or Planned?	Element's name a.Value Added Meteorological Service Provider	 Existing, Planned, or Not Planned	
		8.8	Does your MCO center use (or plan to use) environmental data or information to detect environmental hazards such as icy road conditions, high winds, or dense fog?		Existing, Planned, or Not Planned	
		8.9	Do you have (or plan to have) automated roadway treatment systems (de-icing, anti-icing, etc.)?		Existing, Planned, or Not Planned	
		8.10	Does your MCO center perform (or plan to perform) winter road maintenance activities?			
		8.11	Does your MCO center currently provide (or plan to provide) maintenance services such as landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), or repair and maintenance of equipment (both ITS and non-ITS) on the roadway?		Existing, Planned, or Not Planned	
		8.12	Does your MCO center manage (or plan to manage) work zones activities?		Existing, Planned, or Not Planned	
		8.13	Do you control (or plan to control) traffic in work zones through the use of roadside devices such as dynamic message signs (DMS) or do you monitor (or plan to monitor) traffic in work zones through the use of devices such as closed circuit television?			
		8.14	Do you currently monitor (or plan to monitor) intrusions into work zones or provide alerts to field personnel when work zone intrusions occur?		Existing, Planned, or Not Planned	
		8.15	Does your MCO center monitor (or plan to monitor) vehicle speeds in work zones?		Existing, Planned, or Not Planned	
		8.16	Does your MCO center currently share (or plan to share) maintenance and construction information with other transportation organizations or with organizations that provide traveler information?		Existing, Planned, or Not Planned	

APPENDIX B
ITS Device Location Map

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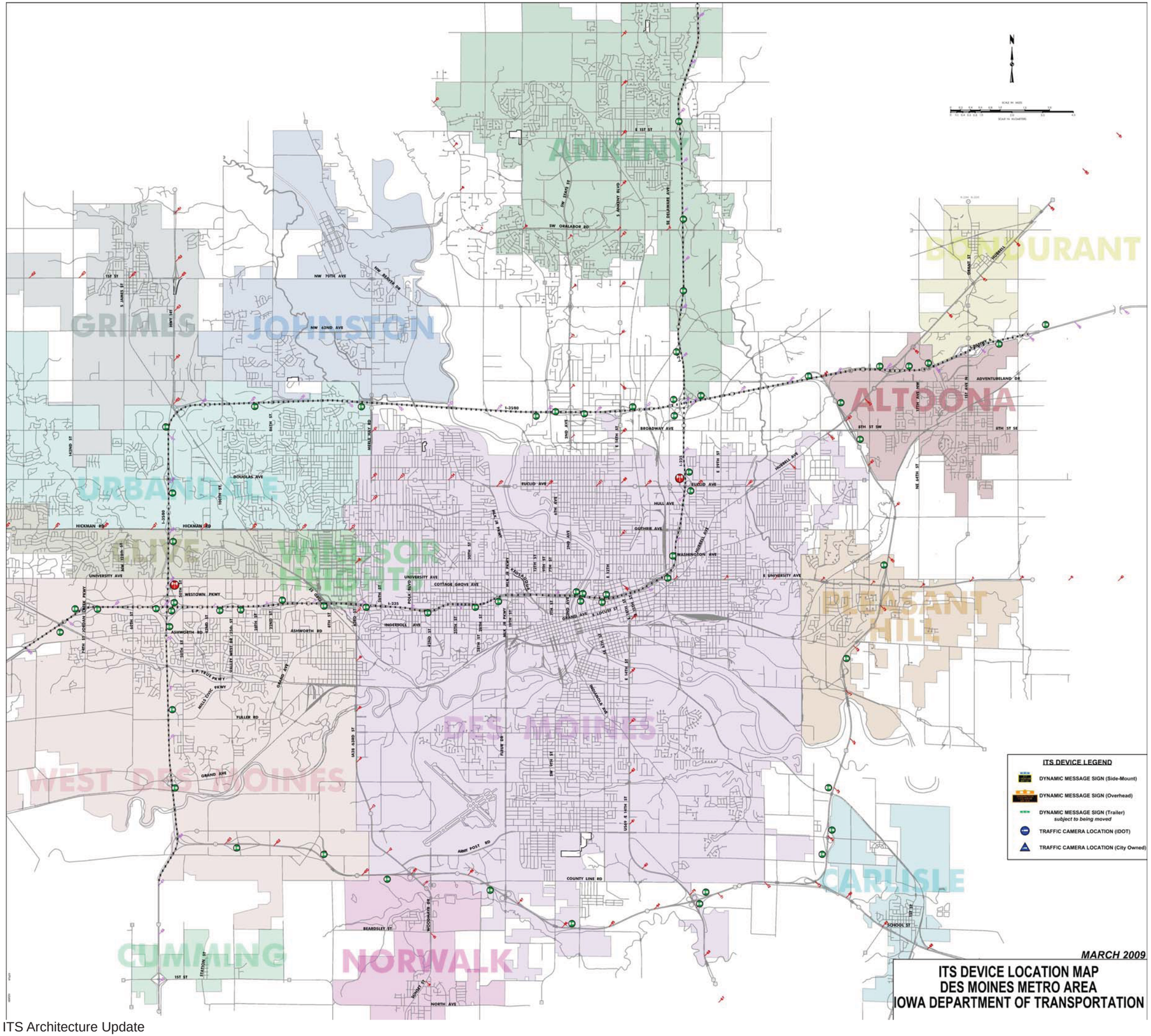
ANKENY
GRIMES
JOHNSTON
BONDURANT
ALTOONA
URBANDALE
WINDSOR HEIGHTS
PLEASANT HILL
DES MOINES
WEST DES MOINES
CARLISLE
CUMMING
NORWALK
ITS DEVICE LEGEND
DYNAMIC MESSAGE SIGN (Side-Mount)
DYNAMIC MESSAGE SIGN (Overhead)
DYNAMIC MESSAGE SIGN (Trailer)
subject to being moved
TRAFFIC CAMERA LOCATION (IDOT)
TRAFFIC CAMERA LOCATION (City Owned)
MARCH 2009
ITS DEVICE LOCATION MAP
DES MOINES METRO AREA
IOWA DEPARTMENT OF TRANSPORTATION

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APPENDIX C
Market Packages

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Report 3. Market Packages (Transportation Services)

Transit Vehicle Tracking (APTS01) --Planned

This market package monitors current transit vehicle location using an Automated Vehicle Location System. 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.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Transit Fixed-Route Operations (APTS02) --Existing

This market package performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service performs scheduling activities including the creation of schedules, blocks and runs, as well as operator assignment. This service determines the transit vehicle trip performance against the schedule 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, ferry, air) to provide the public with integrated and personalized dynamic schedules.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Demand Response Transit Operations (APTS03) --Existing

This market package performs automated dispatch and system monitoring for demand responsive transit services. This service performs scheduling activities as well as operator assignment. In addition, this market package 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 paratransit service. In the second scenario, a third party service provider determines that the paratransit service is a viable means of satisfying a traveler request and makes a reservation for the traveler.

Dallas County Homecare Services
Dallas County Homecare Services-Transit Vehicles
Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Transit Fare Collection Management (APTS04) --Existing

This market package manages transit fare collection on-board transit vehicles and at transit stops using electronic means. It allows transit users to use a traveler card or other electronic payment device. Readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem. Two other market packages, ATMS10: Electronic Toll Collection and ATMS16: Parking Facility Management also provide electronic payment services. These three market packages in combination provide an integrated electronic payment system for transportation services.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Transit Security (APTS05) --Existing

This market package 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. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). 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 market package provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure such as bridges, tunnels, and transit railways or bus rapid transit (BRT) guideways. 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 (e.g., rail track continuity checking or bridge structural integrity monitoring).

The surveillance and sensor information is transmitted to the Emergency Management Subsystem, as are transit user activated alarms in public secure areas. On-board alarms, activated by transit users or transit vehicle operators are transmitted to both the Emergency Management Subsystem and the Transit Management Subsystem, indicating two possible approaches to implementing this market package.

In addition the market package supports remote transit vehicle disabling by the Transit Management Subsystem and transit vehicle operator authentication.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Transit Fleet Management (APTS06) --Existing

This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance. The market package also supports the day to day management of the transit fleet inventory, including the assignment of specific transit vehicles to blocks.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Multi-modal Coordination (APTS07) --Planned

This market package 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. Transit transfer information is shared between Multimodal Transportation Service Providers and Transit Agencies.

Dallas County Homecare Services
Des Moines Area Regional Transit Authority

Transit Traveler Information (APTS08) --Existing

This market package 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. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.

Dallas County Homecare Services
Dallas County Homecare Services-Transit Vehicles
Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles
Media
User Personal Computing Devices

Transit Signal Priority (APTS09) --Existing

This market 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.

City of Des Moines Traffic Operations Center

Transit Passenger Counting (APTS10) --Planned

This market package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center. The collected data can be used to calculate reliable ridership figures and measure passenger load information at particular stops.

Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles

Broadcast Traveler Information (ATIS01) --Existing

This market package collects traffic conditions, advisories, general 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 web casts. 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 market package ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS

information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.

Des Moines Area Traffic Management Center
Media
Transportation Management Association
User Personal Computing Devices

Network Surveillance (ATMS01) --Existing

This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.

City of Clive Public Works
City of Des Moines Traffic Operations Center
City of Urbandale Engineering
City of West Des Moines Public Works
Des Moines Area Traffic Management Center

Surface Street Control (ATMS03) --Existing

This market package 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 market 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 market package 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 market package is consistent with typical urban traffic signal control systems.

City of Ankeny Public Works
City of Clive Public Works
City of Des Moines Traffic Operations Center
City of Urbandale Engineering
City of West Des Moines Public Works

Freeway Control (ATMS04)--Existing

This market package provides central monitoring and control, communications, and field equipment that support freeway management. It supports a range of freeway management control strategies including ramp metering, interchange metering, mainline lane controls, mainline metering, and other strategies including variable speed controls. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option.

This market package also includes the capability to utilize surveillance information for detection of incidents. Typically, the processing would be performed at a traffic management center; however, developments might allow for point detection with roadway equipment. For example, a CCTV might include the capability to detect an incident based upon image changes. Additionally, this market

package allows general advisory and traffic control information to be provided to the driver while en route.

Des Moines Area Traffic Management Center

Traffic Information Dissemination (ATMS06) --Existing

This market package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers 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 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 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.

City of Clive Public Works
City of Des Moines Traffic Operations Center
Des Moines Area Traffic Management Center
Media

Regional Traffic Management (ATMS07) --Existing

This market package provides for the sharing of traffic information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include coordinated signal control in a metropolitan area and coordination between freeway operations and arterial signal control within a corridor. This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications 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 Surface Street Control and Freeway Control Market Packages and adds hardware, software, and fixed-point to fixed-point 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.

City of Ankeny Public Works
City of Clive Public Works
City of Des Moines Traffic Operations Center
City of West Des Moines Public Works
Des Moines Area Traffic Management Center
Iowa DOT Statewide Operations Support Center

Traffic Incident Management System (ATMS08) --Existing

This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance 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 market

package to detect and verify incidents and implement an appropriate response. This market 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 center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination market package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information market 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 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.

City of Des Moines 911 Dispatch Center
City of Des Moines Traffic Operations Center
City of Urbandale Engineering
City of West Des Moines Public Works
Des Moines Area Traffic Management Center
Iowa DOT Statewide Operations Support Center
Media
Warren County Emergency Management

Standard Railroad Grade Crossing (ATMS13) --Existing

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). 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. 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. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.

City of Des Moines Traffic Operations Center
City of Urbandale Engineering
City of West Des Moines Public Works

Emergency Call-Taking and Dispatch (EM01) --Existing

This market package 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.

City of Des Moines 911 Dispatch Center
City of Des Moines 911 Dispatch Center-Emergency Vehicles
City of Grimes Fire Department

City of Grimes Fire Department-Emergency Vehicles
City of Norwalk Public Safety
City of Norwalk Public Safety-Emergency Vehicles
Polk County Dispatch-Emergency Vehicles
Polk County Emergency Management Agency
Warren County Emergency Management
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles

Emergency Routing (EM02) --Existing

This market package supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions, and suggested routing information are provided to enhance emergency vehicle routing. Special priority or other specific emergency traffic control strategies can be coordinated to improve the safety and time-efficiency of responding vehicle travel on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time conditions and has the option of requesting a route from the Traffic Management subsystem. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption and the transmission of alerts to surrounding vehicles. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.

City of Ankeny Fire Department
City of Clive EOC
City of Clive Public Works
City of Des Moines 911 Dispatch Center
City of Des Moines Traffic Operations Center
City of Grimes Fire Department
City of West Des Moines Public Works
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles

Transportation Infrastructure Protection (EM05) --Existing

This market package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated by Traffic Management Subsystems to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.

Iowa DOT Statewide Operations Support Center
Iowa DOT Statewide Operations Support Center-Roadside Equipment
Iowa DOT Statewide Operations Support Center-Security

Monitoring Field Equipment
Westcom Dispatch Center
Westcom Dispatched Police/ Fire/EMS Emergency Vehicles
Westcom Dispatched Police/ Fire/EMS Emergency Vehicles-Security Monitoring Field Equipment

Wide-Area Alert (EM06) --Existing

This market package 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. 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.

City of Ankeny Fire Department
City of Bondurant EOC
City of Clive EOC
City of Des Moines 911 Dispatch Center
Iowa DOT Statewide Operations Support Center
Polk County Emergency Management Agency
Warren County Emergency Management

Early Warning System (EM07) --Existing

This market package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The market package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.

City of Ankeny Fire Department
City of Bondurant EOC
City of Clive EOC
City of Des Moines 911 Dispatch Center
City of Grimes Fire Department
Dallas County Emergency Management
Polk County Emergency Management Agency
Warren County Emergency Management
Westcom Dispatch Center
Westcom Dispatched Police/ Fire/EMS Emergency Vehicles-Security Monitoring Field Equipment

Disaster Response and Recovery (EM08) --Existing

This market package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national

security emergencies such as nuclear, chemical, biological, and radiological weapons attacks).

The market package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The market package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this market package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response.

The market package identifies the key points of integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response. In this market package, the Emergency Management subsystem represents the federal, regional, state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Subsystem and the other center subsystems provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this market package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities.

This market package builds on the basic traffic incident response service that is provided by ATMS08, the Traffic Incident Management market package. This market package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of the National ITS Architecture will want to consider both ATMS08 and this market package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response.

Disaster Response and Recovery is also supported by EM10, the "Disaster Traveler Information" market package that keeps the public informed during a disaster response. See that market package for more information.

City of Ankeny Fire Department
City of Bondurant EOC
City of Clive EOC
City of Des Moines 911 Dispatch Center
City of Grimes Fire Department
Dallas County Emergency Management
Iowa DOT Statewide Operations Support Center
Polk County Emergency Management Agency
Warren County Emergency Management
Westcom Dispatch Center

Evacuation and Reentry Management (EM09) --Existing

This market package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The market package addresses evacuations for all types of disasters, including disasters like

hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.

This market package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times.

Evacuations are also supported by EM10, the "Disaster Traveler Information" market package, which keeps the public informed during evacuations. See that market package for more information.

City of Ankeny Fire Department
City of Bondurant EOC
City of Clive EOC
City of Des Moines 911 Dispatch Center
Dallas County Emergency Management
Iowa DOT Statewide Operations Support Center
Polk County Emergency Management Agency
Warren County Emergency Management
Westcom Dispatch Center

Disaster Traveler Information (EM10) --Existing

This market package uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster. This market package collects information from multiple sources including traffic, transit, public safety, emergency management, shelter provider, and travel service provider organizations. The collected information is processed and the public is provided with real-time disaster and evacuation information using ITS traveler information systems.

A disaster will stress the surface transportation system since it may damage transportation facilities at the same time that it places unique demands on these facilities to support public evacuation and provide access for emergency responders. Similarly, a disaster may interrupt or degrade the operation of many traveler information systems at the same time that safety-critical information must be provided to the traveling public. This market package keeps the public informed in these scenarios, using all available means to provide information about the disaster area including damage to the transportation system, detours and closures in effect, special traffic restrictions and allowances, special transit schedules, and real-time information on traffic conditions and transit system performance in and around the disaster.

This market package also provides emergency information to assist the public with evacuations when necessary. Information on mandatory and voluntary evacuation zones, evacuation times, and instructions are provided. Available evacuation routes and destinations and current and anticipated travel conditions along those routes are provided so

evacuees are prepared and know their destination and preferred evacuation route. Information on available transit services and traveler services (shelters, medical services, hotels, restaurants, gas stations, etc.) is also provided. In addition to general evacuation information, this market package provides specific evacuation trip planning information that is tailored for the evacuee based on origin, selected destination, and evacuee-specified evacuation requirements and route parameters.

This market package augments the ATIS market packages that provide traveler information on a day-to-day basis for the surface transportation system. This market package provides focus on the special requirements for traveler information dissemination in disaster situations.

City of Ankeny Fire Department
City of Bondurant EOC
City of Clive EOC
City of Des Moines 911 Dispatch Center
Dallas County Emergency Management
Iowa DOT Statewide Operations Support Center
Polk County Emergency Management Agency
Warren County Emergency Management
Westcom Dispatch Center

Maintenance and Construction Vehicle and Equipment Tracking (MC01) --Existing

This market package 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.

City of Ankeny Public Works
City of Ankeny Public Works-MCO Vehicles
City of Clive Public Works
City of Clive Public Works-MCO Vehicles
City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Vehicles
City of West Des Moines Public Works
City of West Des Moines Public Works-MCO Vehicles
Dallas County Central Maintenance Facility
Dallas County Central Maintenance Facility-MCO Vehicles
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles

Maintenance and Construction Vehicle Maintenance (MC02) --Existing

This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.

City of Ankeny Public Works
City of Ankeny Public Works-MCO Vehicles
City of Clive Public Works-MCO Vehicles
City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Vehicles
City of West Des Moines Public Works
City of West Des Moines Public Works-MCO Vehicles
Dallas County Central Maintenance Facility
Dallas County Central Maintenance Facility-MCO Vehicles

Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles

Road Weather Data Collection (MC03) --Existing

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

City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Field Devices
City of West Des Moines Public Works
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices

Weather Information Processing and Distribution (MC04) --Existing

This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package 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 decision 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 market package, and aid operators in scheduling work activity.

City of Ankeny Public Works
City of Carlisle Public Works
City of Clive Public Works
City of Des Moines Public Works Dispatch Center
City of Grimes Maintenance Shop
City of Johnston Public Works
City of Urbandale Public Works
City of West Des Moines Public Works
City of Windsor Heights Public Works
Dallas County Central Maintenance Facility
Des Moines Area Traffic Management Center
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Statewide Operations Support Center
Surface Transportation Weather Service
Weather Services

Winter Maintenance (MC06) --Existing

This market package 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.

City of Ankeny Public Works
City of Ankeny Public Works-MCO Vehicles
City of Carlisle Public Works
City of Carlisle Public Works-MCO Vehicles
City of Clive Public Works
City of Clive Public Works-MCO Vehicles
City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Vehicles
City of Grimes Maintenance Shop
City of Johnston Public Works
City of Norwalk Public Works
City of Norwalk Public Works-MCO Vehicles
City of Urbandale Public Works
City of West Des Moines Public Works
City of Windsor Heights Public Works
Dallas County Central Maintenance Facility
Dallas County Central Maintenance Facility-MCO Vehicles
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles

Roadway Maintenance and Construction (MC07) --Existing

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.

City of Ankeny Public Works
City of Ankeny Public Works-MCO Vehicles
City of Carlisle Public Works
City of Carlisle Public Works-MCO Vehicles
City of Clive Public Works
City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Vehicles
City of Johnston Public Works
City of Urbandale Public Works
City of West Des Moines Public Works
City of Windsor Heights Public Works
Dallas County Central Maintenance Facility
Dallas County Central Maintenance Facility-MCO Vehicles
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles

Work Zone Management (MC08) --Existing

This market 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., ISP, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This market 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.

City of Ankeny Public Works
City of Ankeny Public Works-MCO Vehicles
City of Clive Public Works
City of Des Moines Public Works Dispatch Center
City of Des Moines Public Works-MCO Vehicles
City of Johnston Public Works
City of West Des Moines Public Works
Dallas County Central Maintenance Facility
Dallas County Central Maintenance Facility-MCO Vehicles
Dallas County Emergency Management
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles

Maintenance and Construction Activity Coordination (MC10) --Existing

This market package 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.

City of Ankeny Public Works
City of Carlisle Public Works
City of Clive Public Works
City of Des Moines Public Works Dispatch Center
City of Johnston Public Works
City of Urbandale Public Works
City of West Des Moines Public Works
City of Windsor Heights Public Works
Dallas County Central Maintenance Facility
Dallas County Emergency Management
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages

APPENDIX D
Interconnect Diagram

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City of West Des Moines
City of West Des Moines Public Works
Dallas County
Dallas County Central Maintenance Facility
Media
Media
City of Norwalk
City of Norwalk Public Works-MCO Vehicles
Des Moines Area Regional Transit A...
Des Moines Area Regional Transit Authority
City of Urbandale
City of Urbandale Public Works
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
City of Urbandale
City of Urbandale Engineering
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Transportation Management Associat...
Transportation Management Association
Weather Services
City of Bondurant
City of Bondurant EOC
City of Des Moines
City of Des Moines 911 Dispatch Center
Dallas County
Dallas County Homecare Services
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles
City of Windsor Heights
City of Windsor Heights Public Works
City of Clive
City of Clive Public Works
Westcom Dispatch Center
Westcom Dispatch Center
Polk County
Polk County Emergency Management Agency
City of Grimes
City of Grimes-MCO Vehicles
City of Des Moines
City of Des Moines Public Works Dispatch Center
City of Des Moines
City of Des Moines Traffic Operations Center
City of Ankeny
City of Ankeny Public Works
Dallas County
Dallas County Emergency Management
City of Clive
City of Clive EOC
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Surface Transportation Weather Service
Iowa Department of Transportation
Des Moines Area Traffic Management Center
City of Grimes
City of Grimes Maintenance Shop
Remote Traveler Support
Warren County
Warren County Emergency Management
City of Windsor Heights
City of Windsor Heights Public Safety
City of Grimes
City of Grimes Fire Department
City of Ankeny
City of Ankeny Fire Department
City of Des Moines
City of Des Moines Public Works-MCO Vehicles
City of Carlisle
City of Carlisle Public Works-MCO Vehicles
City of Johnston
City of Johnston Public Works-MCO Vehicles
Polk County
Polk County Dispatch-Emergency Vehicles
City of Carlisle
City of Carlisle Public Works
City of Norwalk
City of Norwalk Public Works
City of Johnston
City of Johnston Public Works
City of Norwalk
City of Norwalk Public Safety
City of Des Moines
City of Des Moines Public Works-MCO Field Devices
City of Norwalk
City of Norwalk Public Safety-Emergency Vehicles
City of Clive
City of Clive Public Works-MCO Vehicles
City of Ankeny
City of Ankeny Public Works-MCO Vehicles
City of West Des Moines
City of West Des Moines Public Works-MCO Vehicles
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Roadside Equipment
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles-Security Monitoring Field Equipment
Des Moines Area Regional Transit Authority
Des Moines Area Regional Transit Authority-Transit Vehicles
City of Urbandale
City of Urbandale Public Works-MCO Vehicles
City of Des Moines
City of Des Moines 911 Dispatch Center-Emergency Vehicles
Dallas County
Dallas County Homecare Services-Transit Vehicles
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Security Monitoring Field Equipment
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Public
User Personal Computing Devices
City of Des Moines
City of Des Moines Public Works-Roadside Equipment
City of Windsor Heights
City of Windsor Heights Public Works-MCO Vehicles
City of Grimes
City of Grimes Fire Department-Emergency Vehicles
Dallas County
Dallas County Central Maintenance Facility-MCO Vehicles
City of West Des Moines
City of West Des Moines Public Works-MCO Field Devices
Existing
Planned

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APPENDIX E
Information Flows

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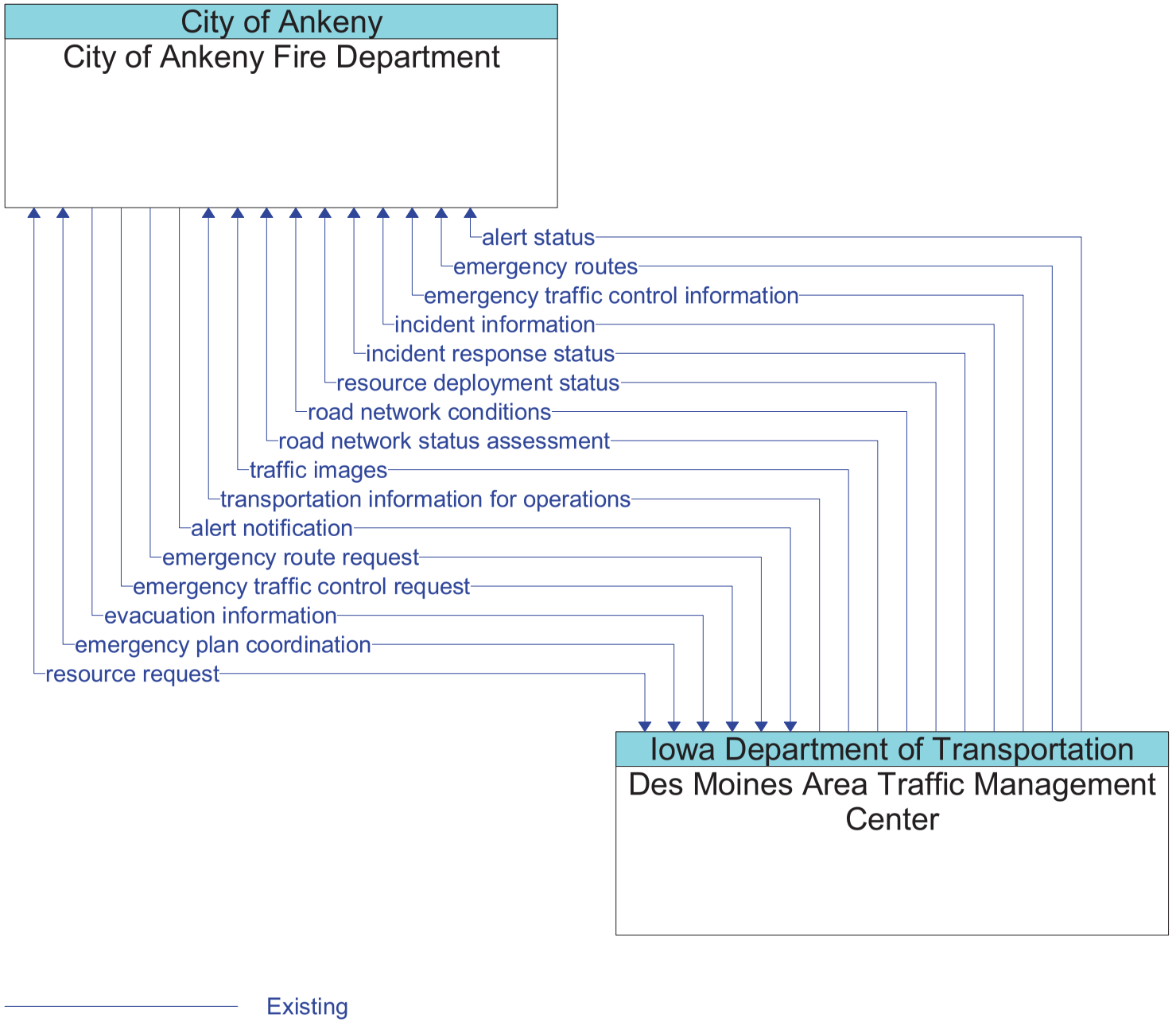
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City of Ankeny Fire Department
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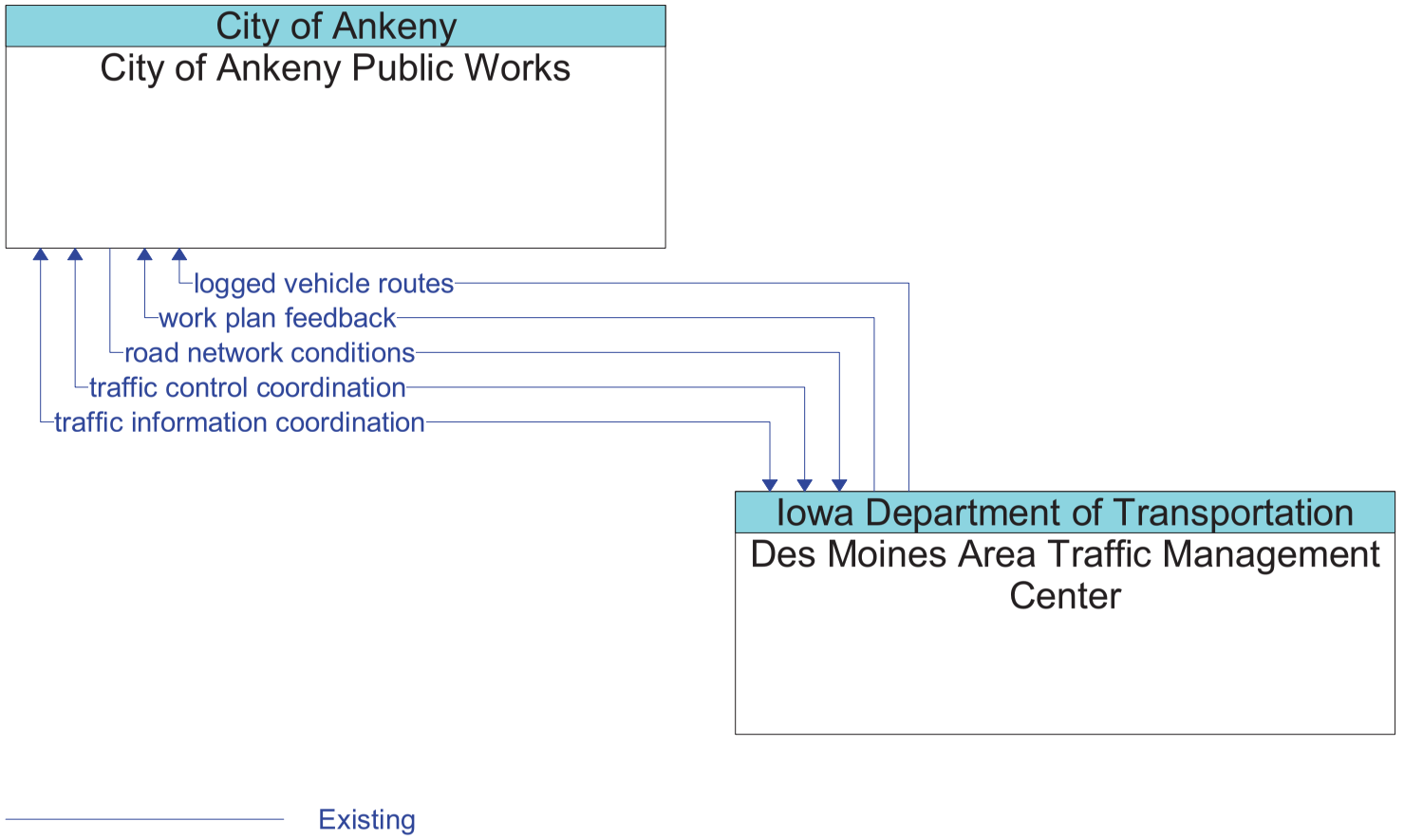
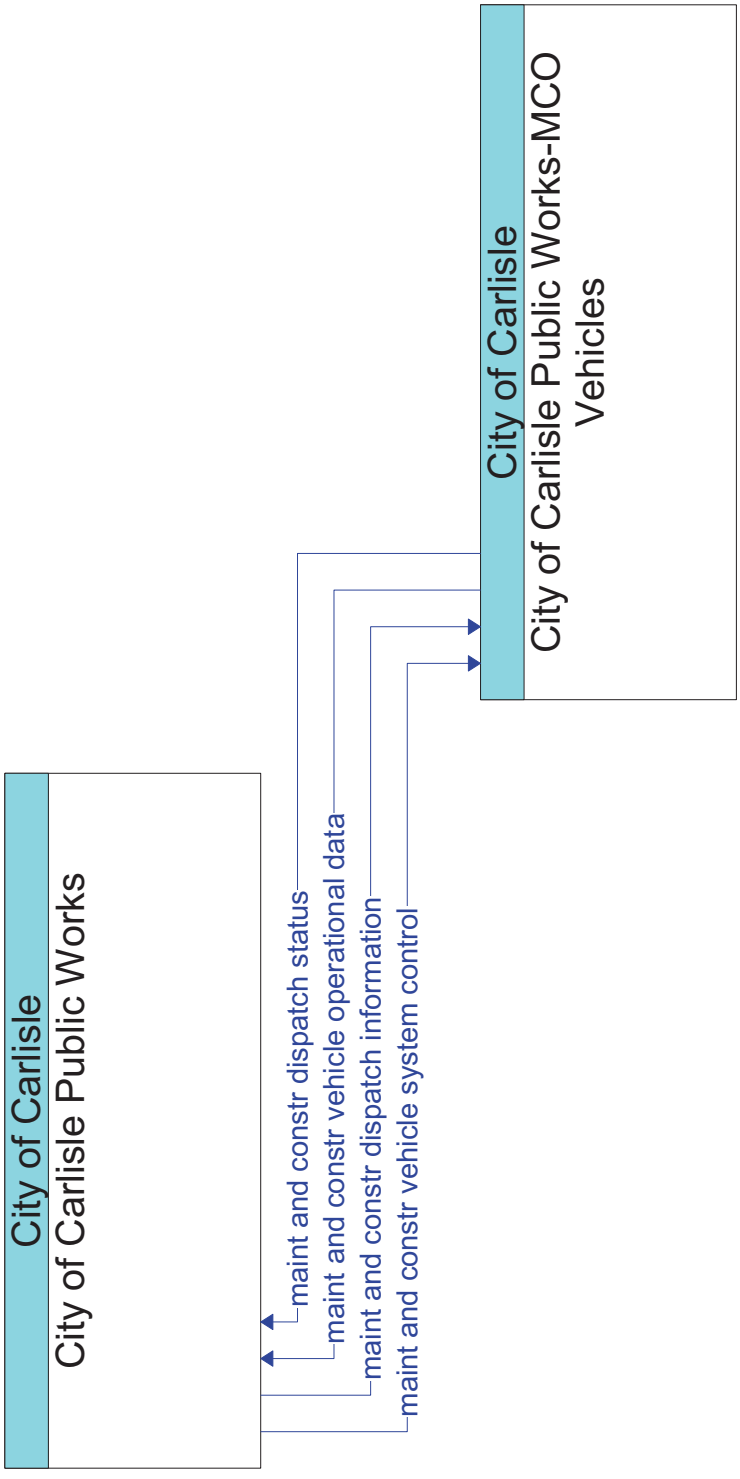
emergency routes
emergency traffic control information
incident information
incident response status
resource deployment status
road network conditions
road network status assessment
traffic images
transportation information for operations
alert notification
emergency route request
emergency traffic control request
evacuation information
emergency plan coordination
resource request
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing


City of Ankeny
City of Ankeny Public Works
logged vehicle routes
work plan feedback
road network conditions
traffic control coordination
traffic information coordination
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing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City of Carlisle Public Works
City of Carlisle
City of Carlisle Public Works-MCO Vehicles
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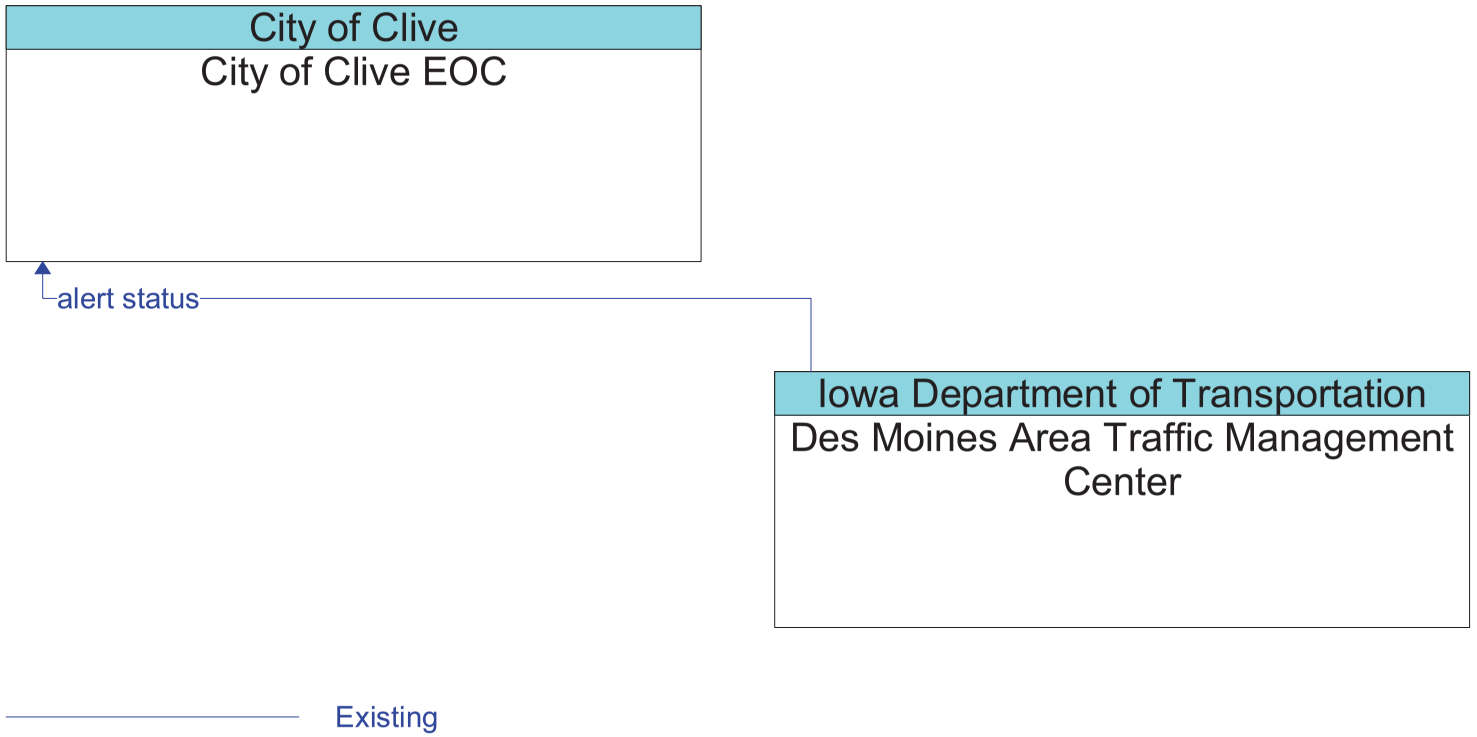
maint and constr vehicle operational data
maint and constr dispatch information
maint and constr vehicle system control
Existing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City of Clive EOC
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Des Moines Area Traffic Management Center
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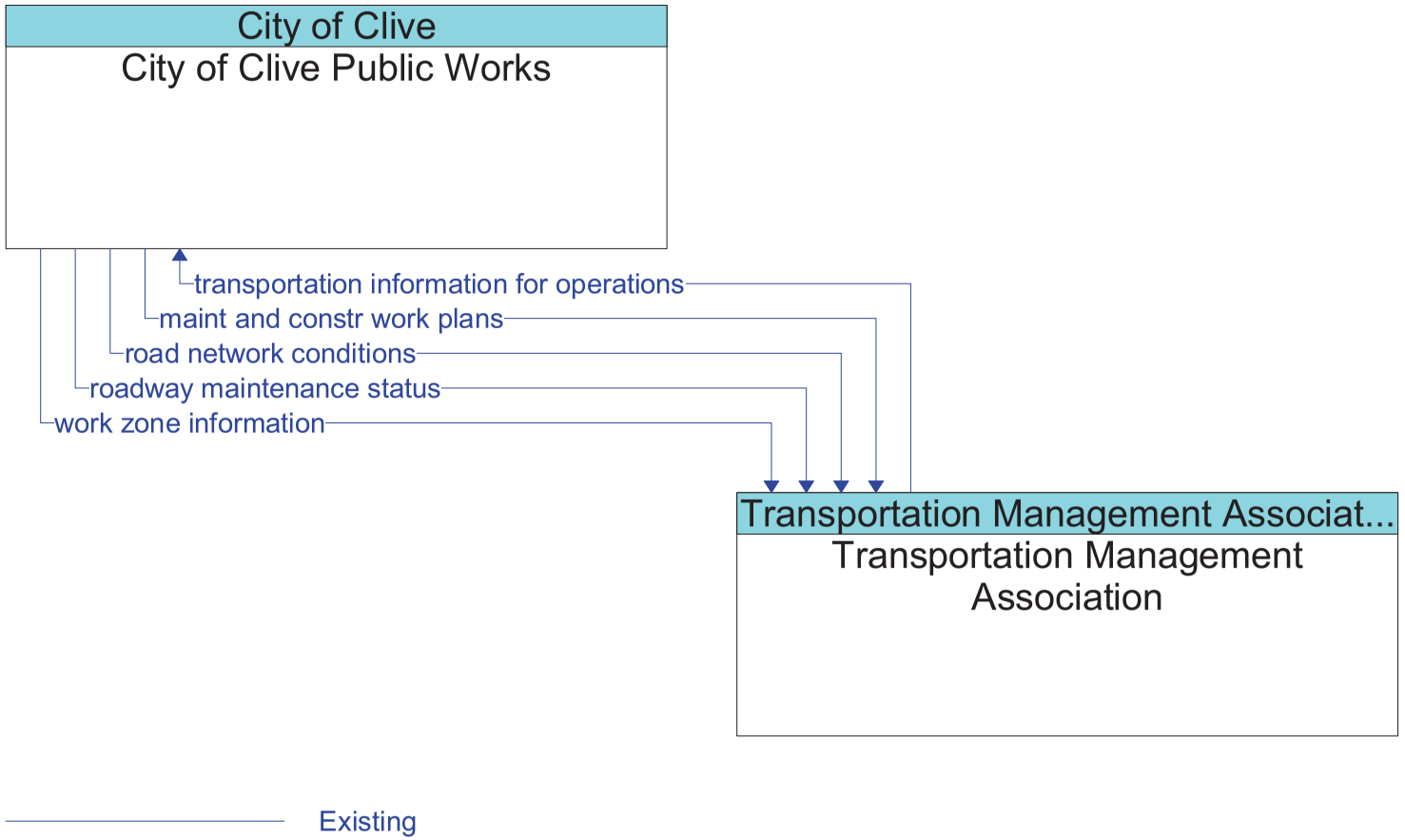
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City of Clive Public Works
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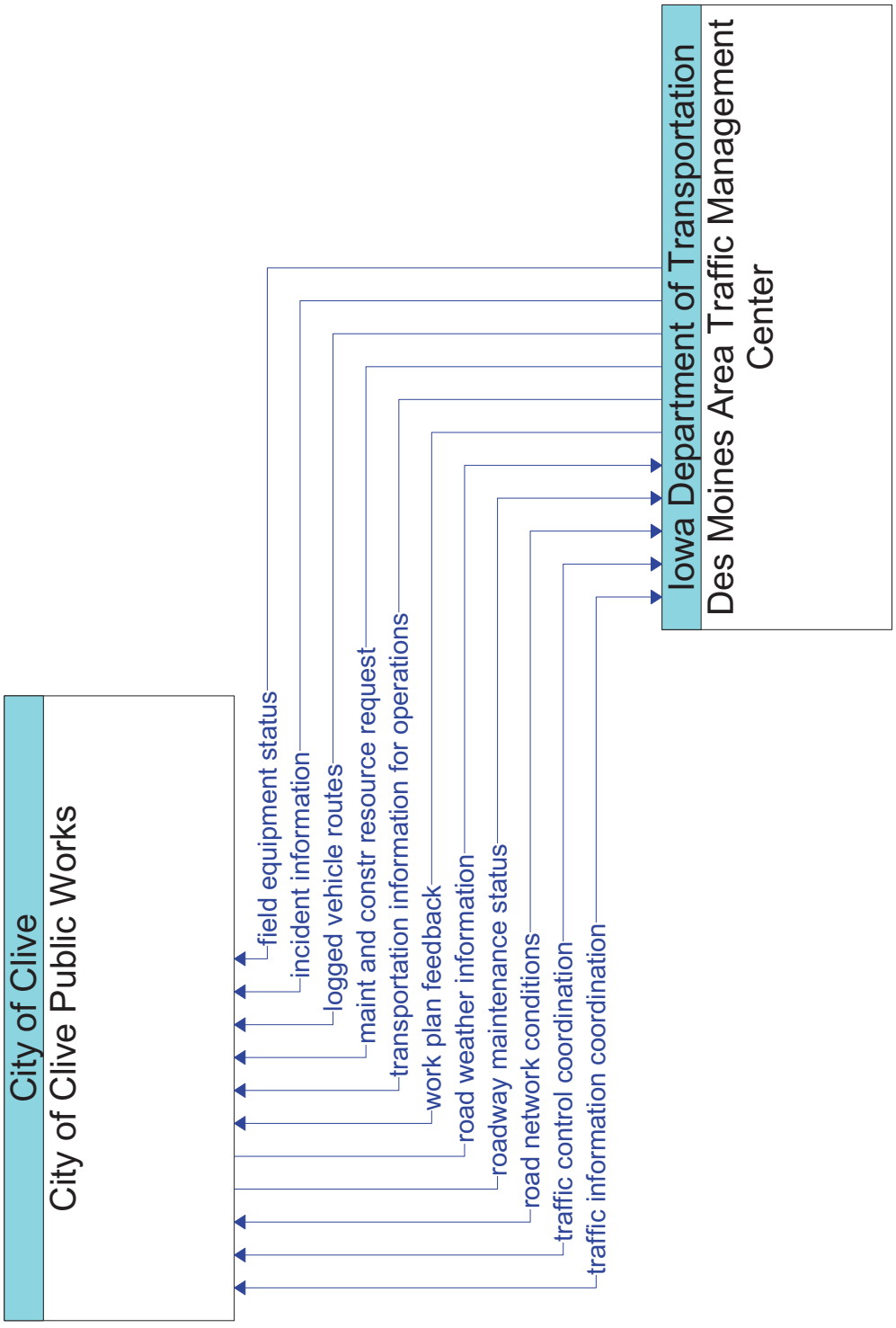
maint and constr work plans
road network conditions
roadway maintenance status
work zone information
Transportation Management Associat...
Transportation Management Association
Existing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City of Clive Public Works
Iowa Department of Transportation
Des Moines Area Traffic Management Center
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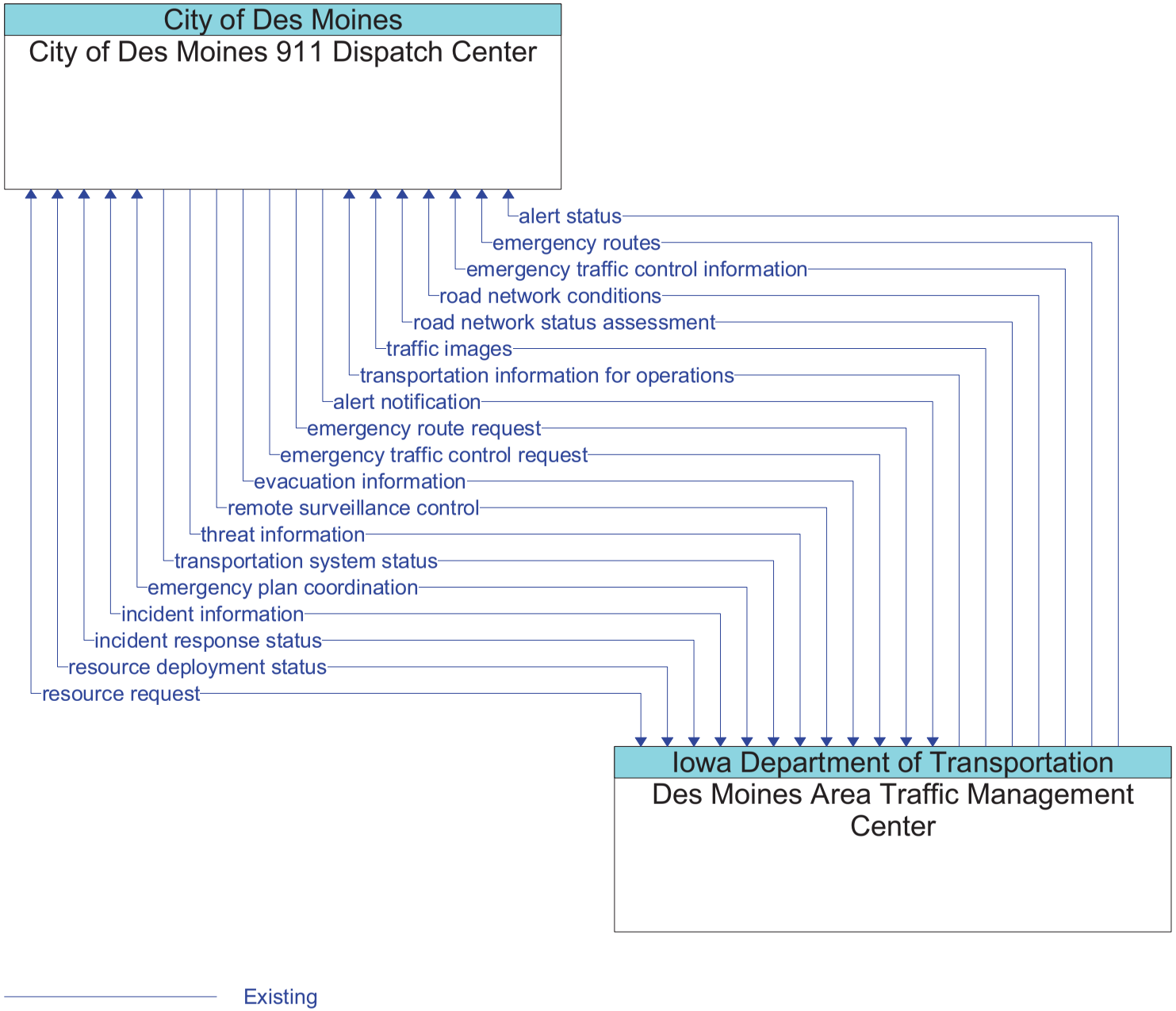
transportation information for operations
work plan feedback
road weather information
roadway maintenance status
road network conditions
traffic control coordination
traffic information coordination
Existing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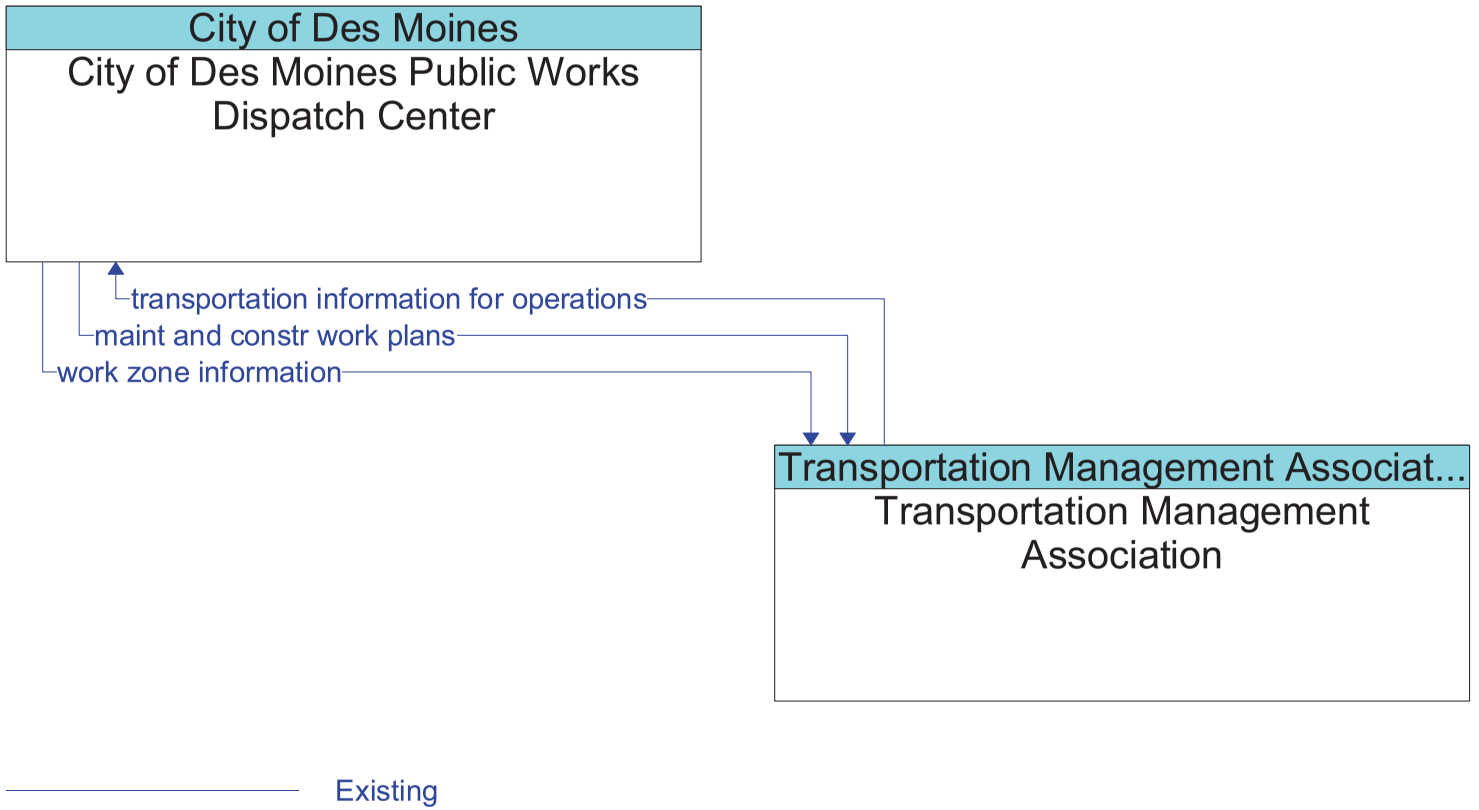
City of Des Moines 911 Dispatch Center
alert status
emergency routes
emergency traffic control information
road network conditions
road network status assessment
traffic images
transportation information for operations
alert notification
emergency route request
emergency traffic control request
evacuation information
remote surveillance control
threat information
transportation system status
emergency plan coordination
incident information
incident response status
resource deployment status
resource request
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing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City of Des Moines Public Works Dispatch Center
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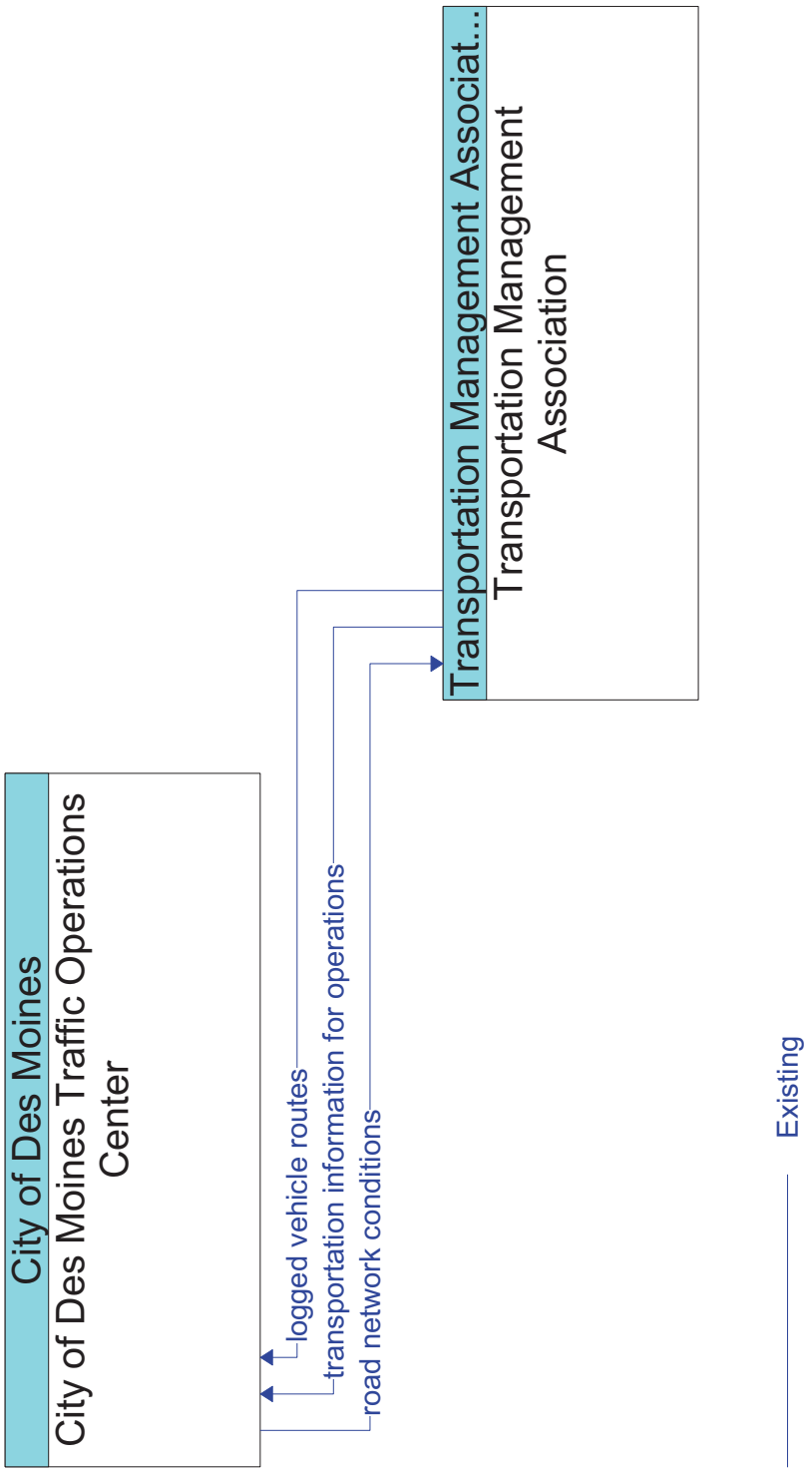
maint and constr work plans
work zone information
Transportation Management Associat...
Transportation Management Association
Existing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City of Des Moines Traffic Operations Center
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Transportation Management Association
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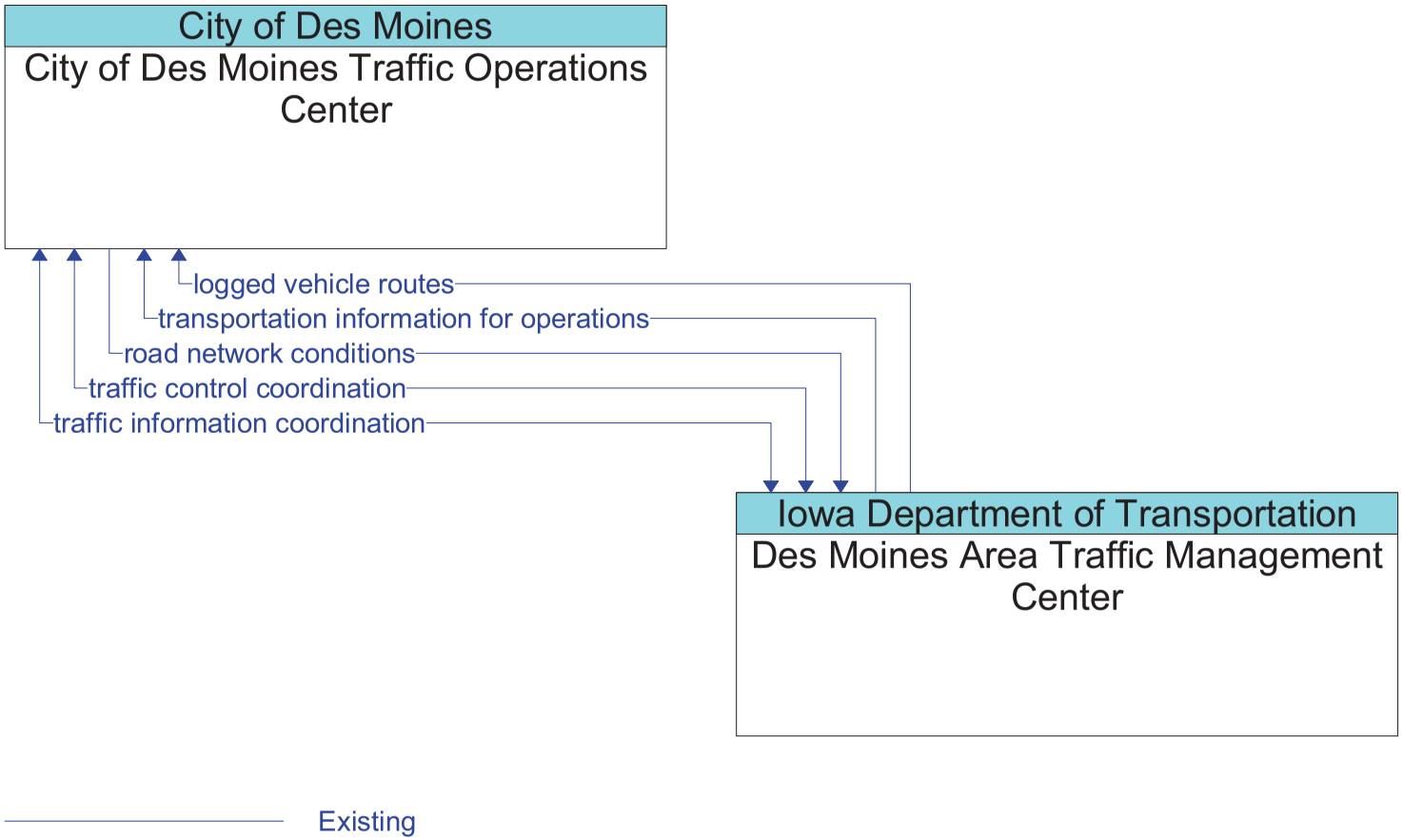
transportation information for operations
road network conditions
Existing


City of Des Moines
City of Des Moines Traffic Operations Center
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transportation information for operations
road network conditions
traffic control coordination
traffic information coordination
Iowa Department of Transportation
Des Moines Area Traffic Management Center
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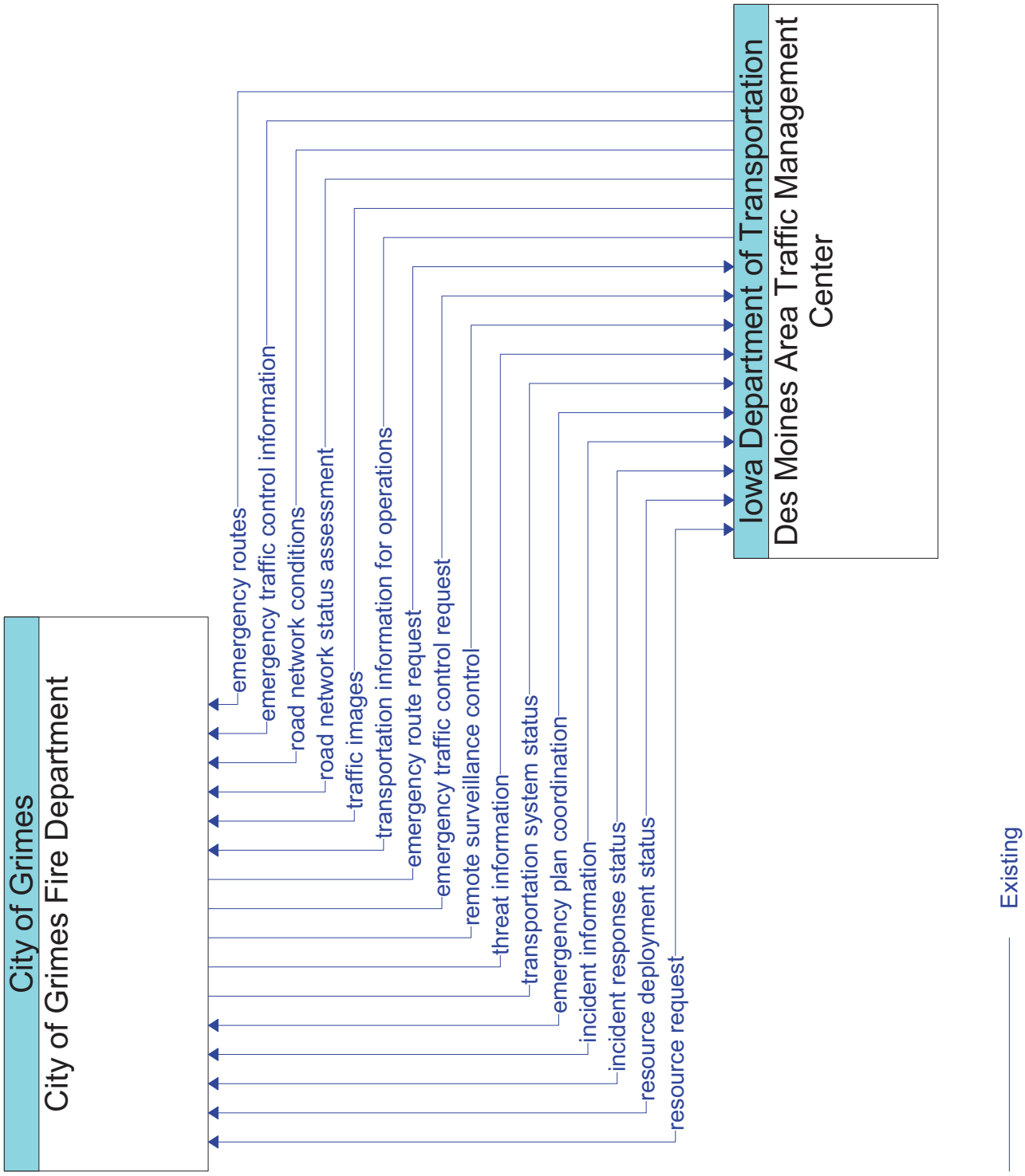
City of Grimes
City of Grimes Fire Department
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emergency traffic control information
road network conditions
road network status assessment
traffic images
transportation information for operations
emergency route request
emergency traffic control request
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threat information
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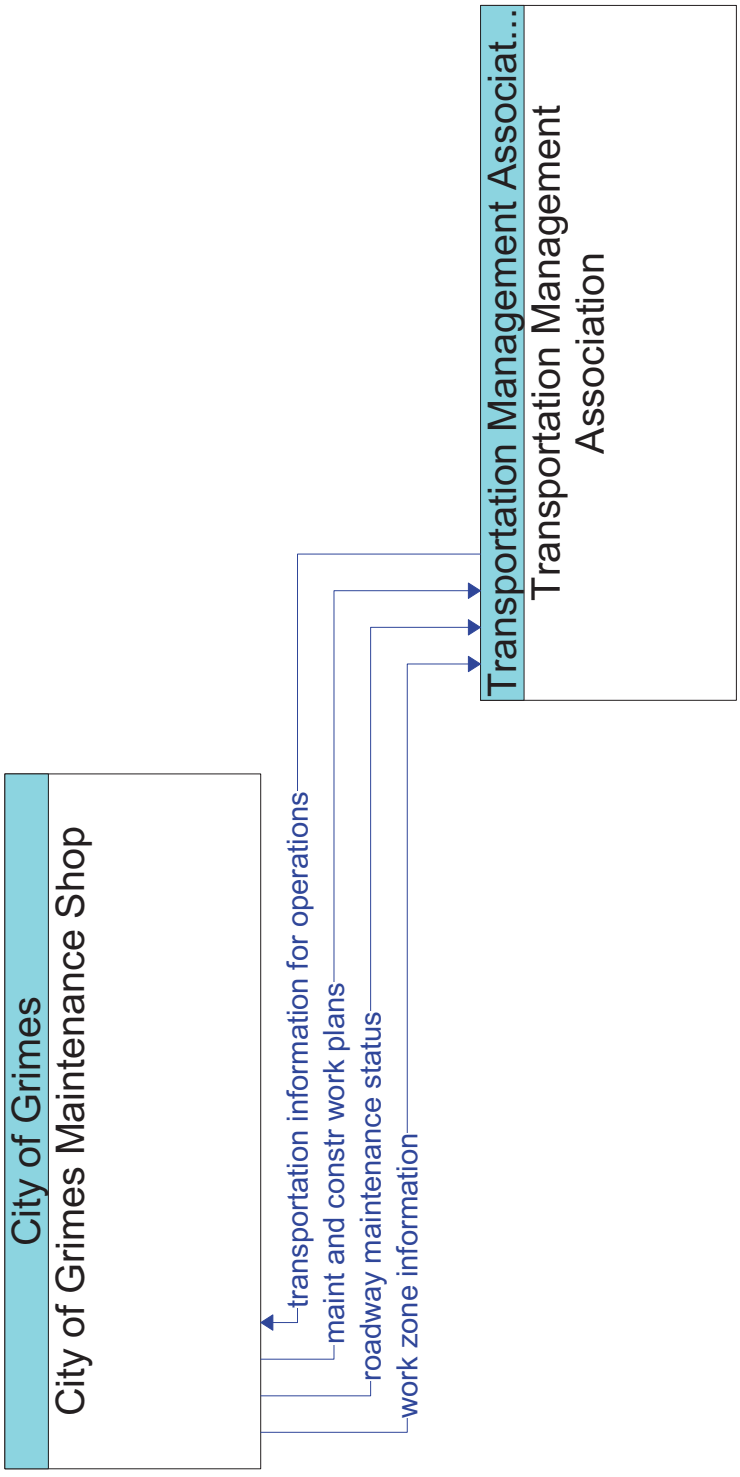
emergency plan coordination
incident information
incident response status
resource deployment status
resource request
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing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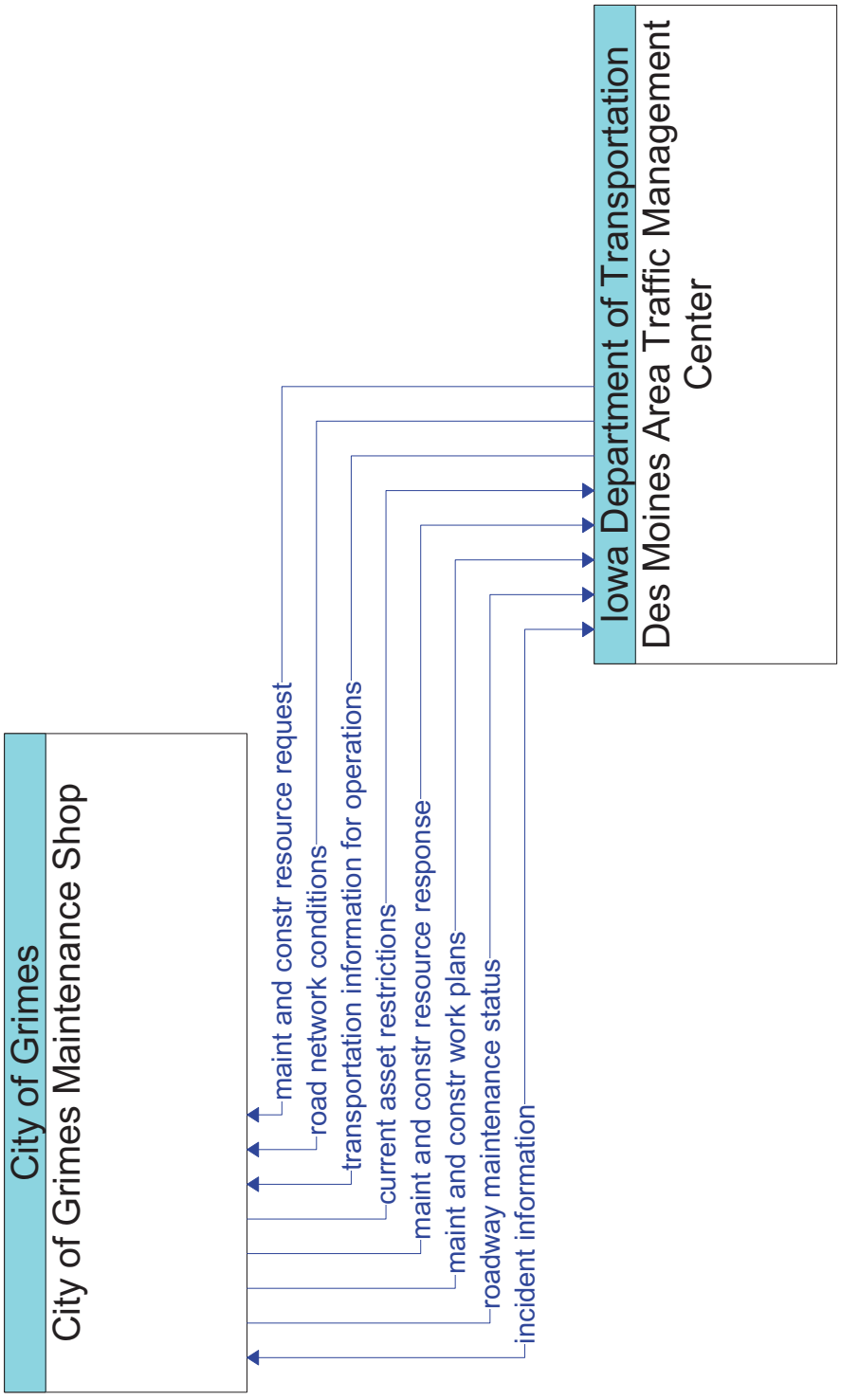
work zone information
Transportation Management Associat...
Transportation Management Association
Existing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City of Grimes Maintenance Shop
Iowa Department of Transportation
Des Moines Area Traffic Management Center
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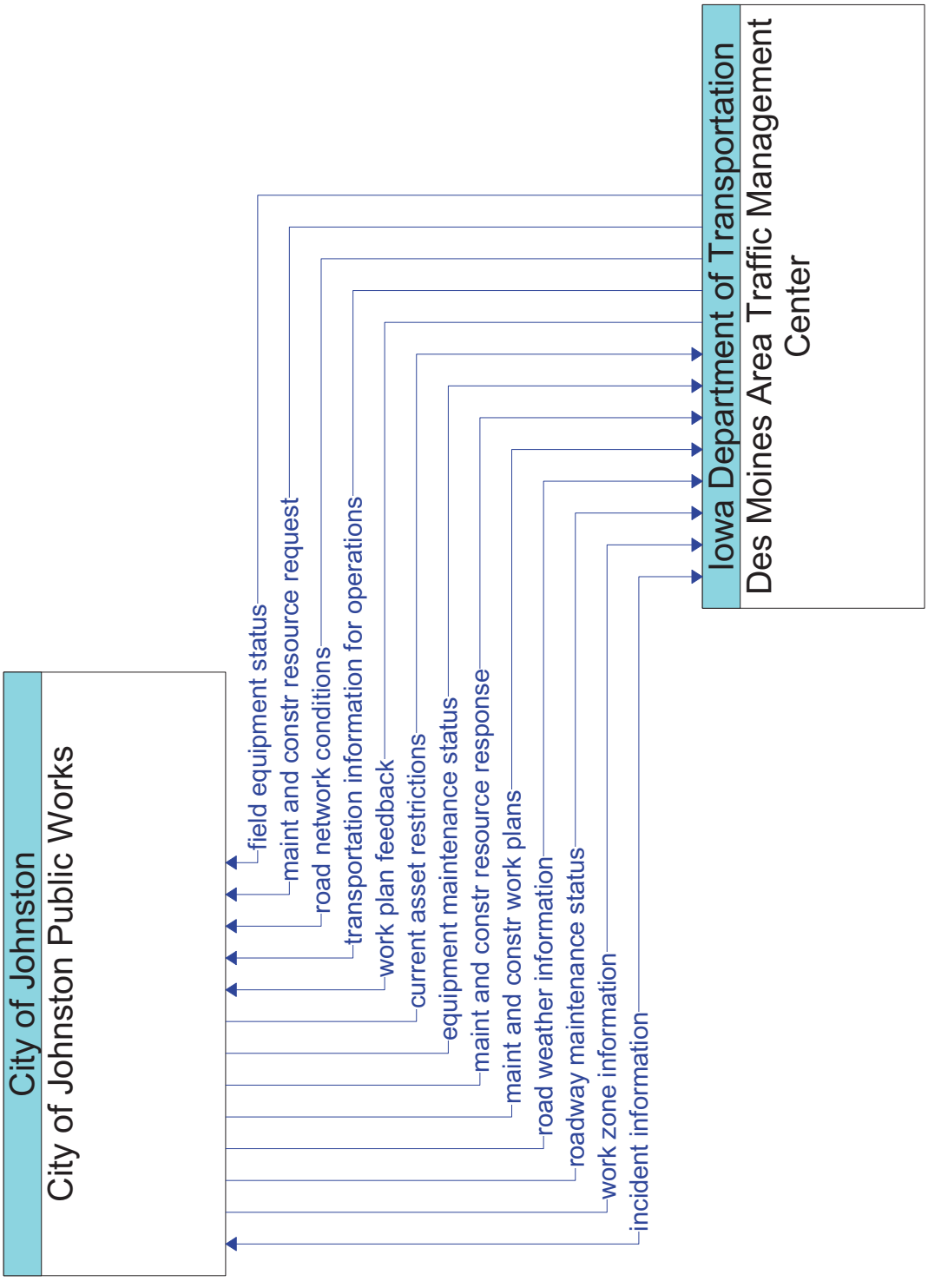
road network conditions
transportation information for operations
current asset restrictions
maint and constr resource response
maint and constr work plans
roadway maintenance status
incident information
Existing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City of Johnston Public Works
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road network conditions
transportation information for operations
work plan feedback
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
road weather information
roadway maintenance status
work zone information
incident information
Iowa Department of Transportation
Des Moines Area Traffic Management Center
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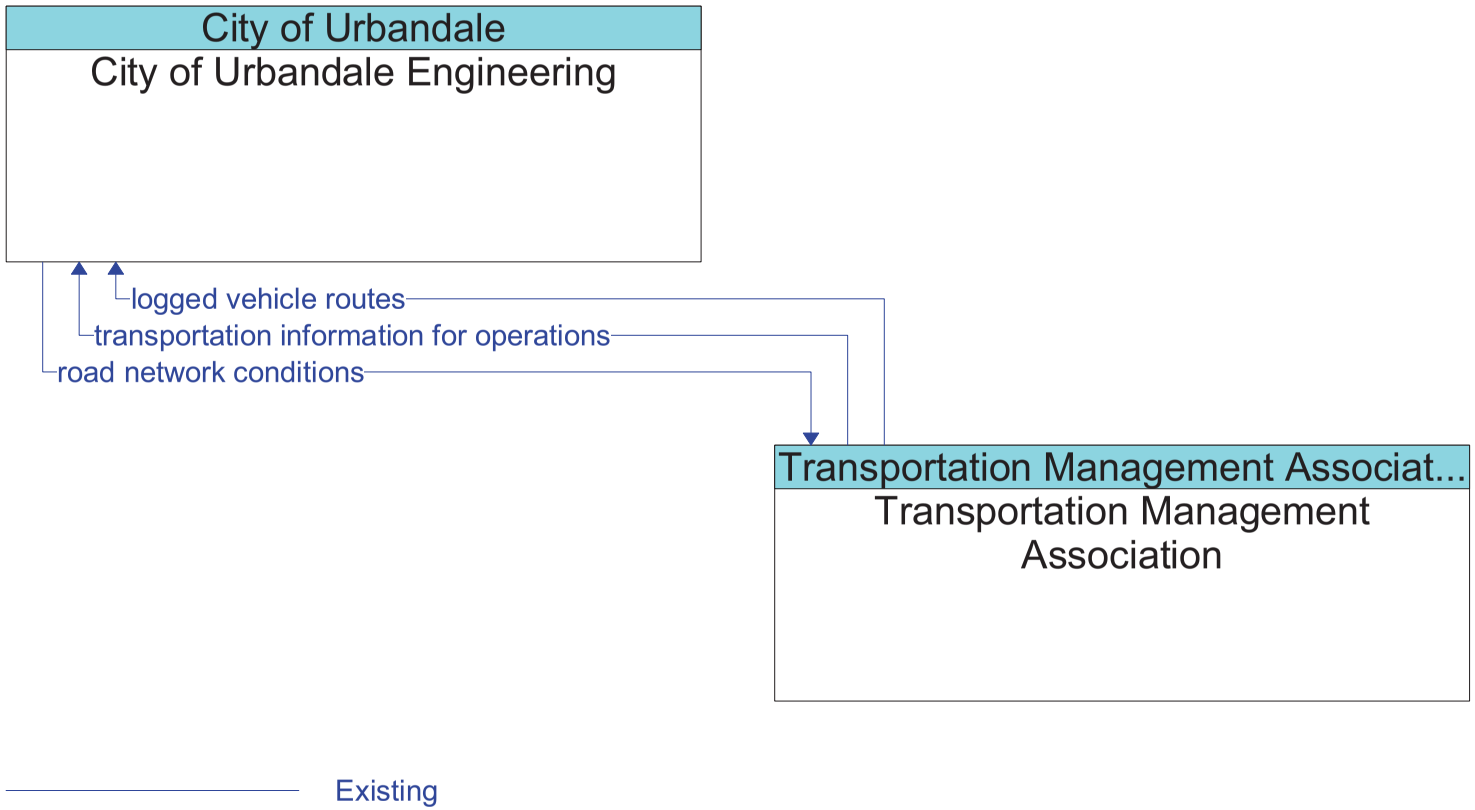
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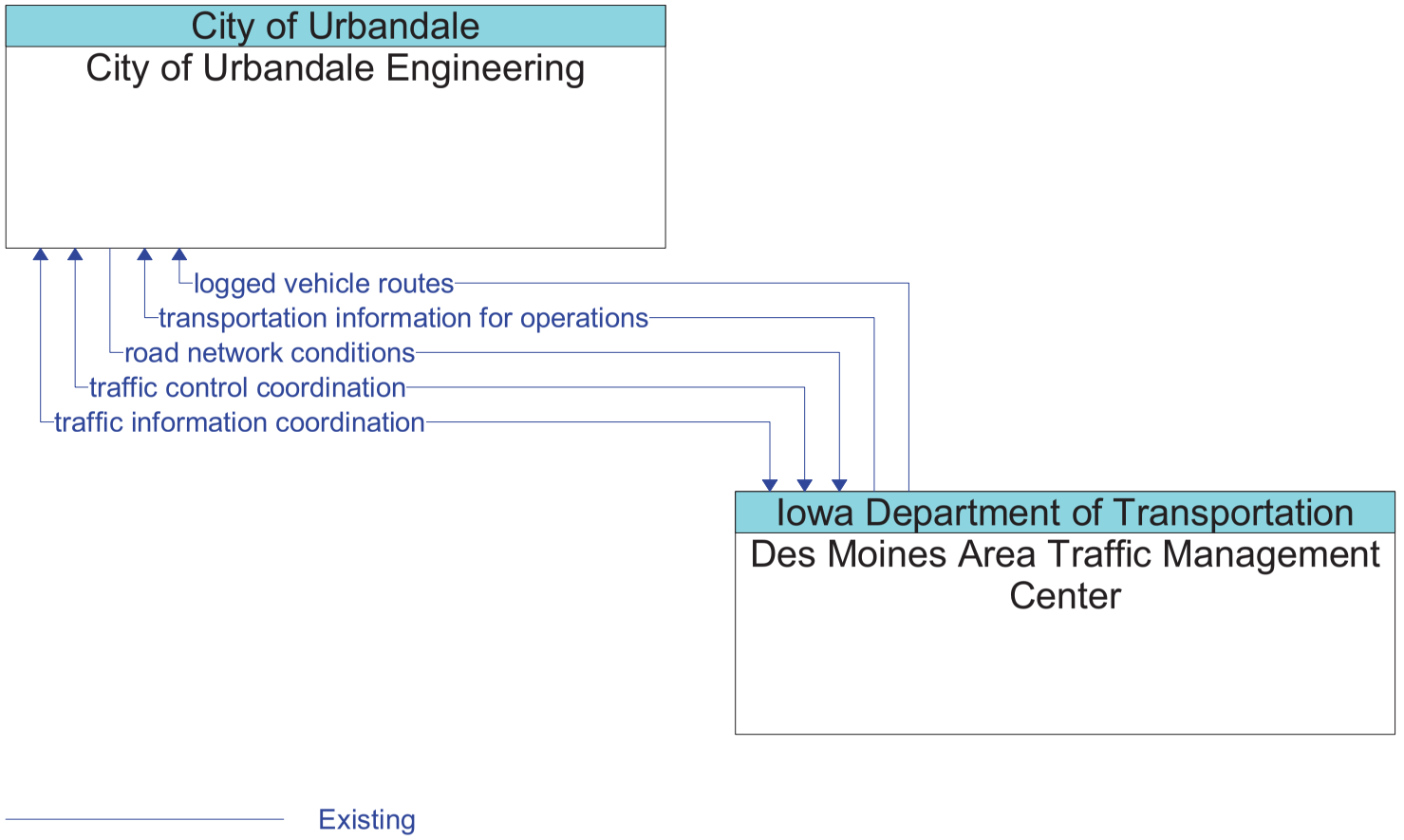
transportation information for operations
road network conditions
Transportation Management Associat...
Transportation Management Association
Existing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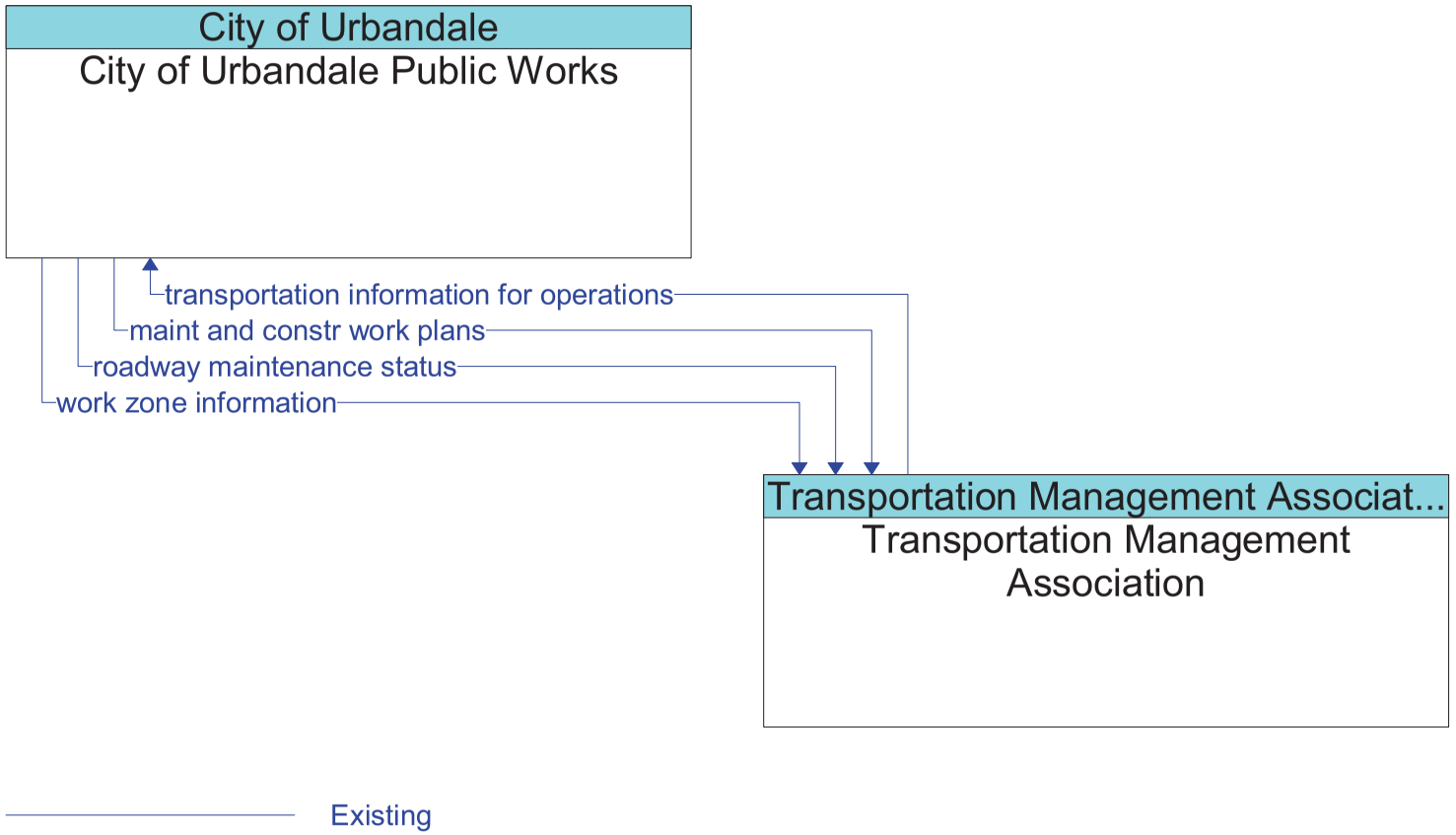
City of Urbandale Engineering
logged vehicle routes
transportation information for operations
road network conditions
traffic control coordination
traffic information coordination
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing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City of Urbandale Public Works
transportation information for operations
maint and constr work plans
roadway maintenance status
work zone information
Transportation Management Associat...
Transportation Management Association
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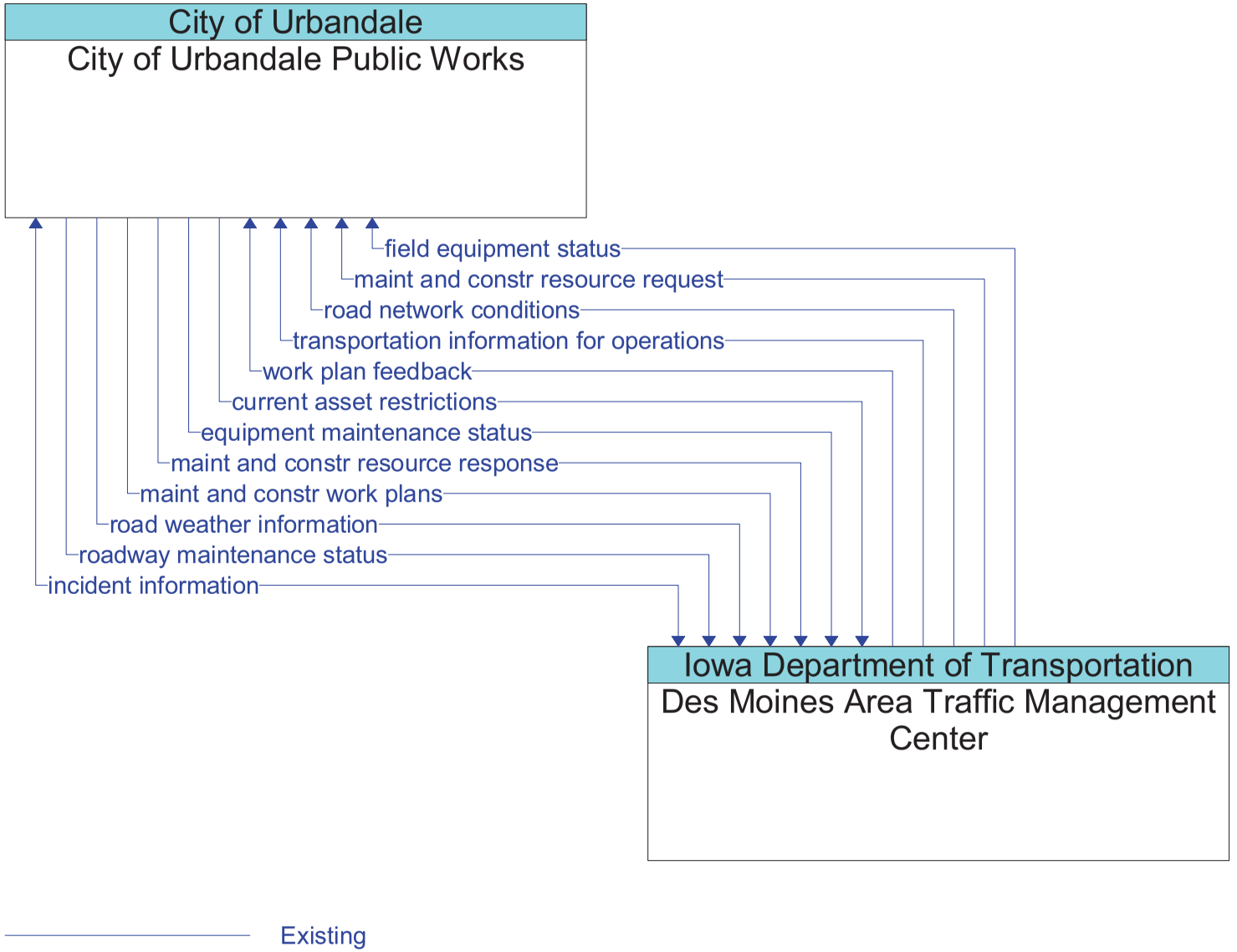
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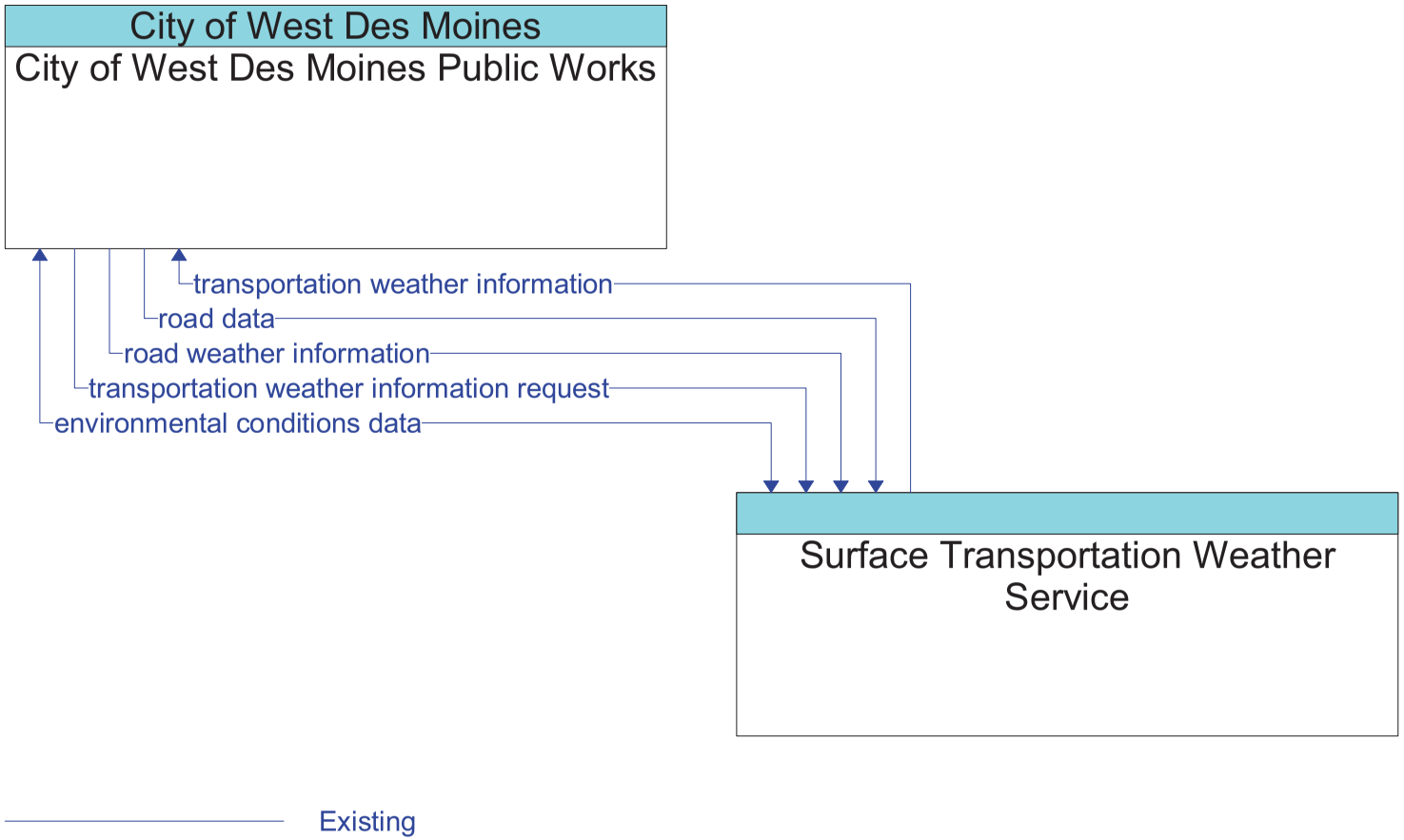
City of Urbandale Public Works
field equipment status
maint and constr resource request
road network conditions
transportation information for operations
work plan feedback
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
road weather information
roadway maintenance status
incident information
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing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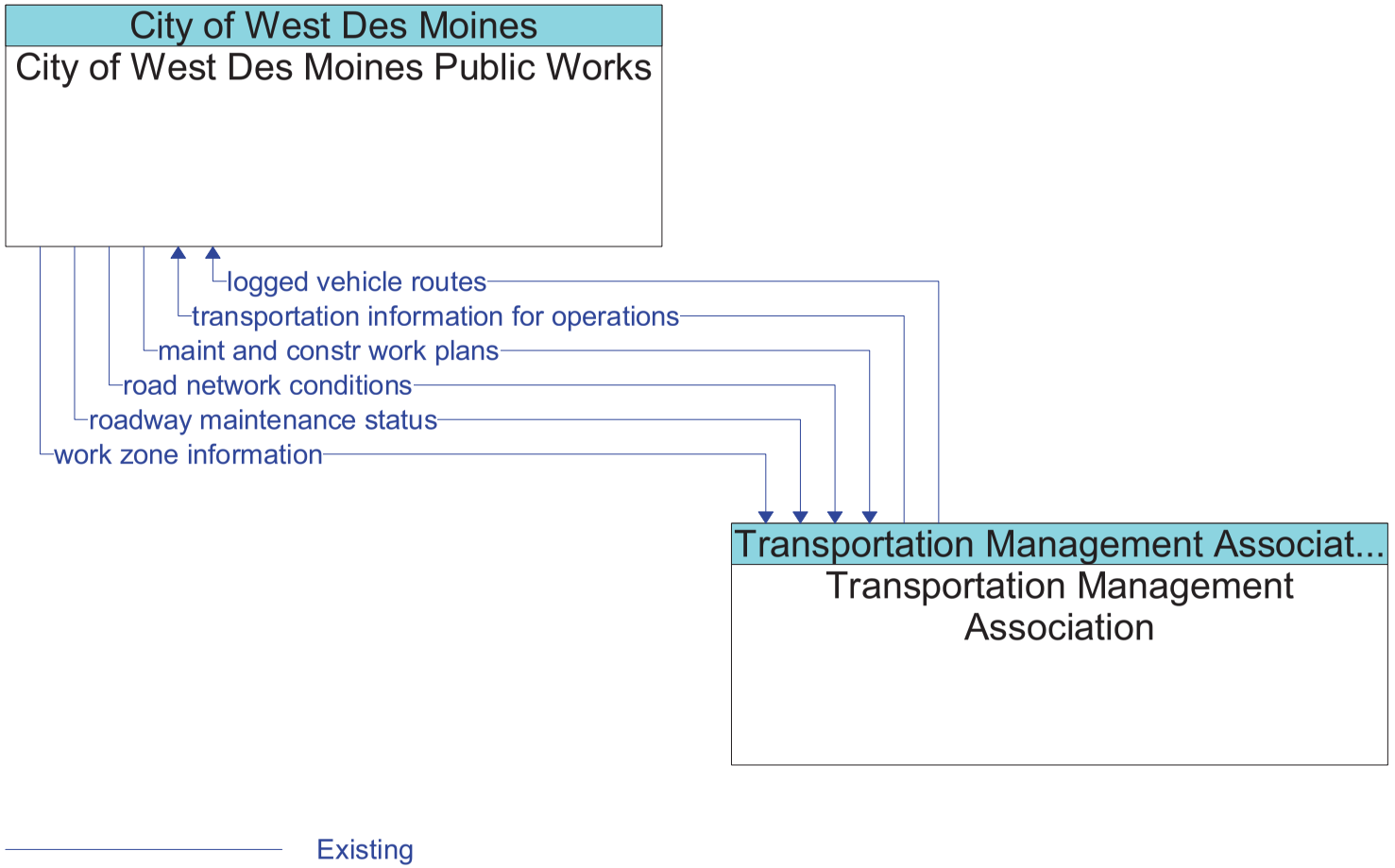
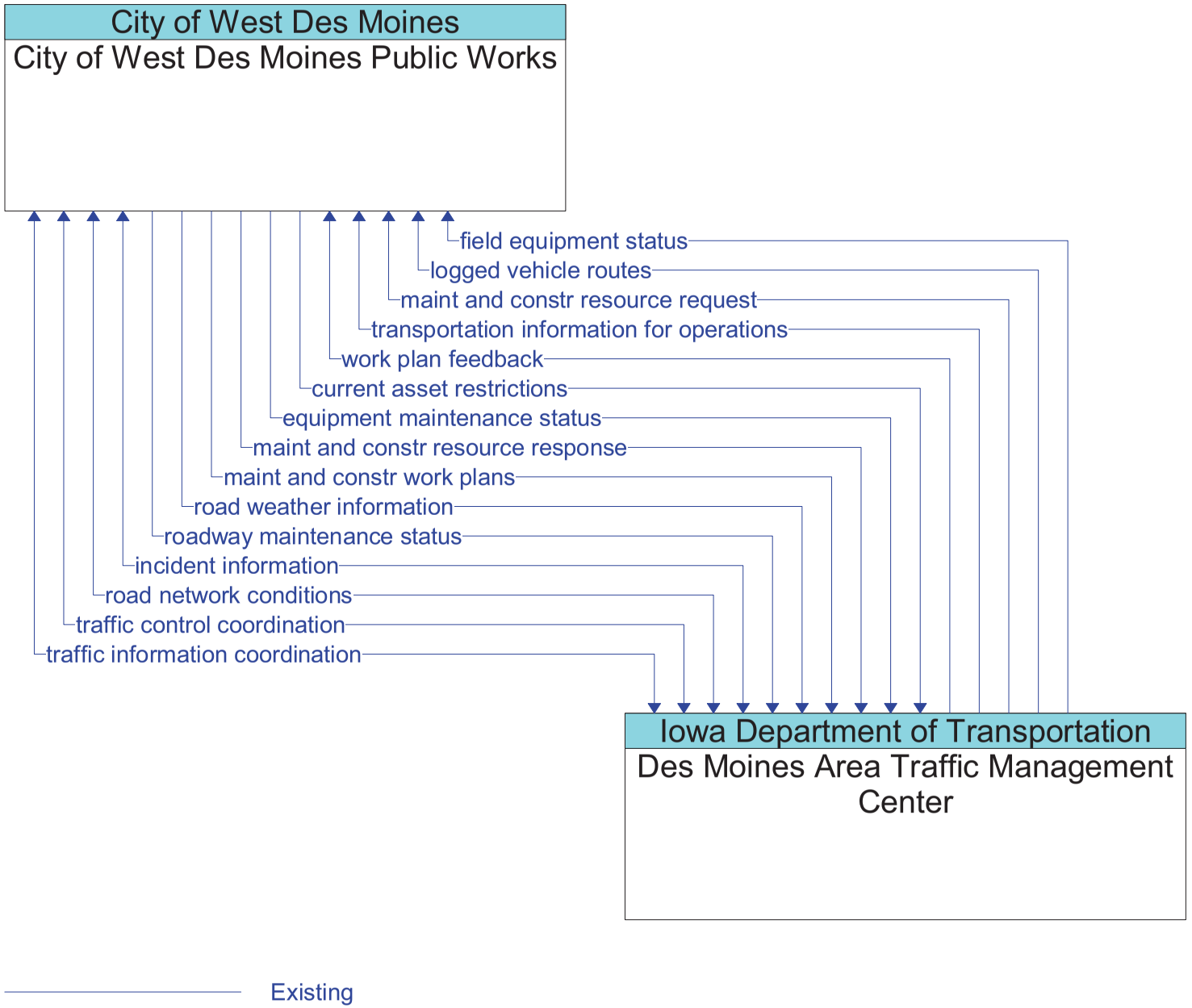
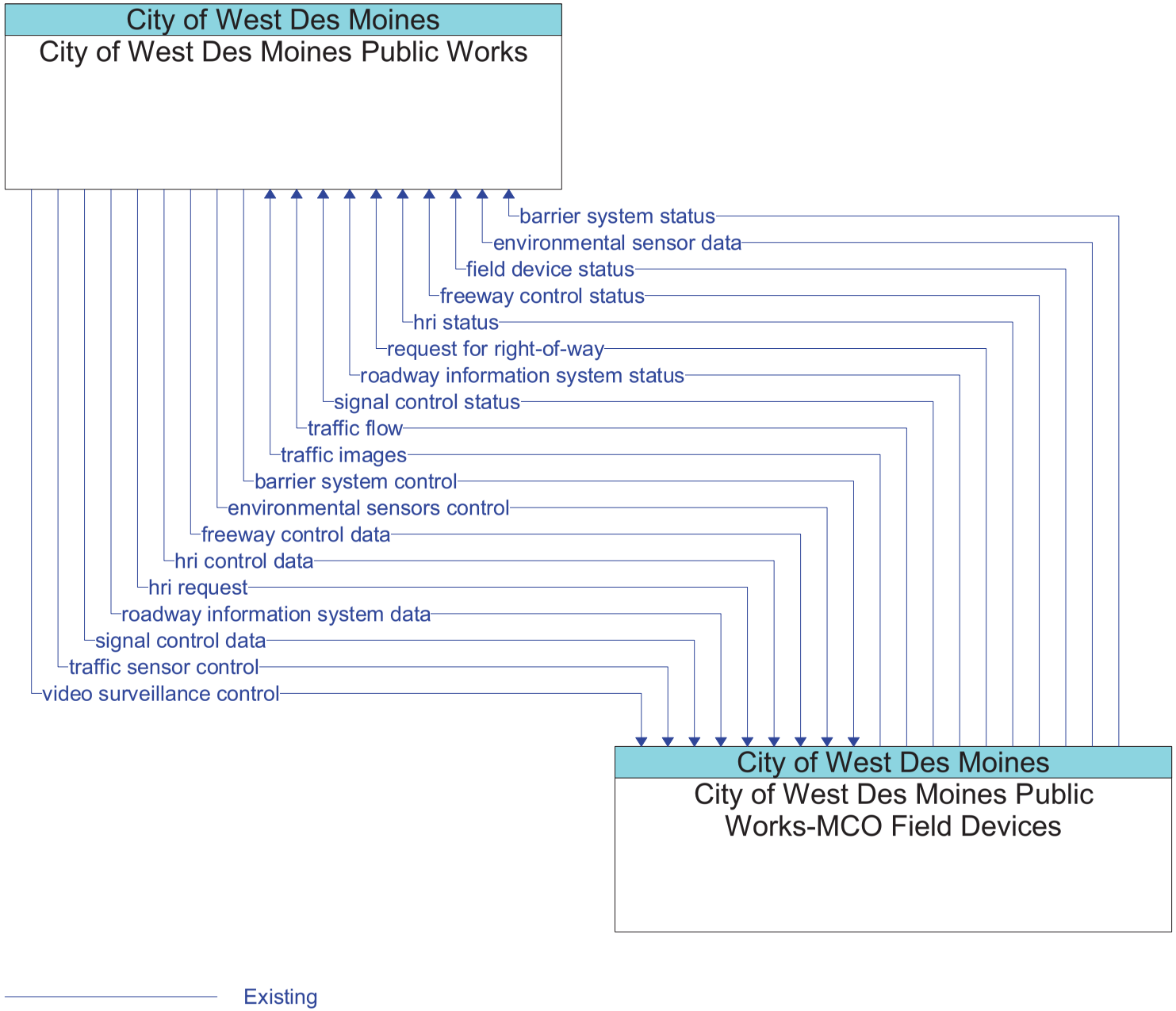
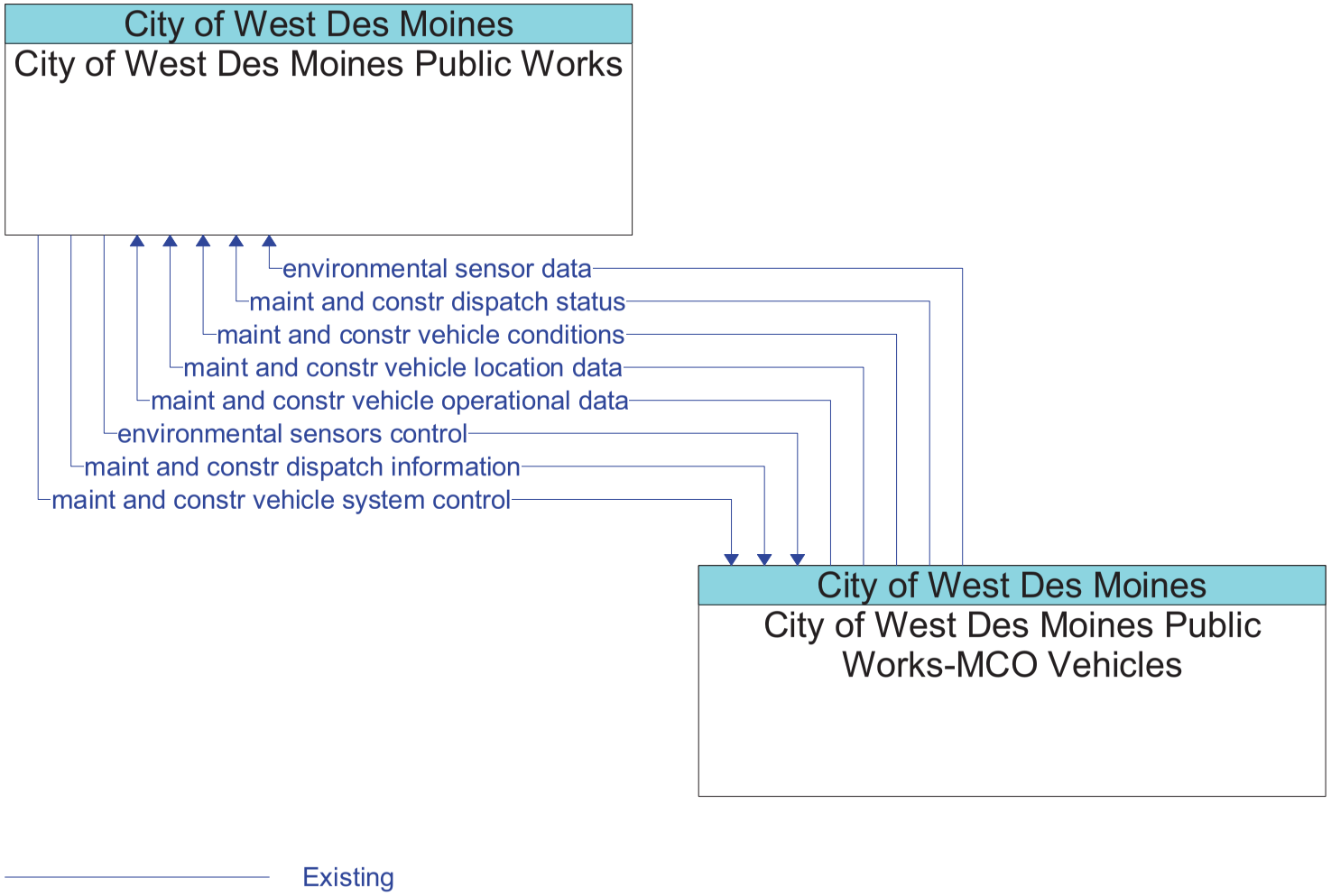
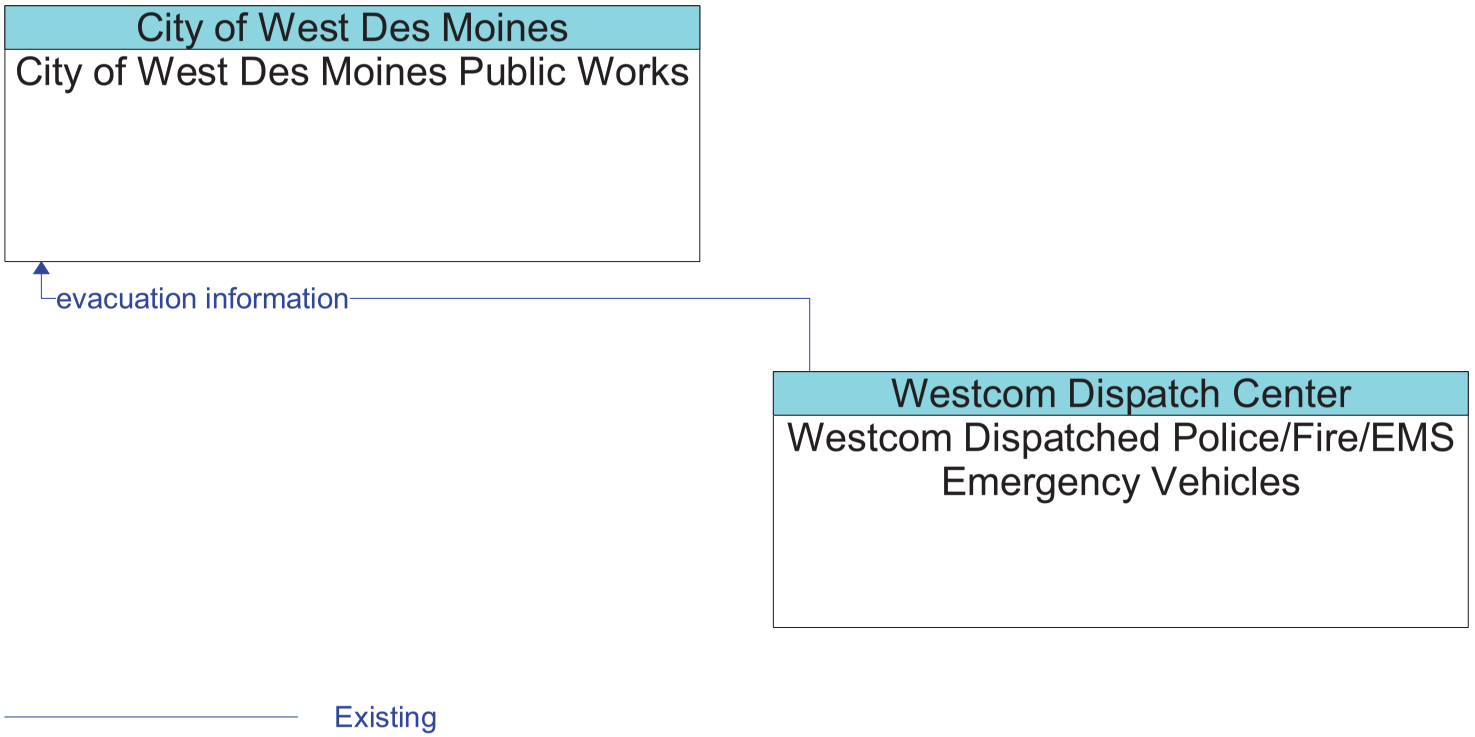
City of West Des Moines Public Works
transportation weather information
road data
road weather information
transportation weather information request
environmental conditions data
Surface Transportation Weather Service
Existing


City of West Des Moines
City of West Des Moines Public Works
logged vehicle routes
transportation information for operations
maint and constr work plans
road network conditions
roadway maintenance status
work zone information
Transportation Management Associat...
Transportation Management Association
Existing


City of West Des Moines
City of West Des Moines Public Works
field equipment status
logged vehicle routes
maint and constr resource request
transportation information for operations
work plan feedback
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
road weather information
roadway maintenance status
incident information
road network conditions
traffic control coordination
traffic information coordination
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing


City of West Des Moines
City of West Des Moines Public Works
barrier system status
environmental sensor data
field device status
freeway control status
hri status
request for right-of-way
roadway information system status
signal control status
traffic flow
traffic images
barrier system control
environmental sensors control
freeway control data
hri control data
hri request
roadway information system data
signal control data
traffic sensor control
video surveillance control
City of West Des Moines
City of West Des Moines Public Works-MCO Field Devices
Existing


City of West Des Moines
City of West Des Moines Public Works
environmental sensor data
maint and constr dispatch status
maint and constr vehicle conditions
maint and constr vehicle location data
maint and constr vehicle operational data
environmental sensors control
maint and constr dispatch information
maint and constr vehicle system control
City of West Des Moines
City of West Des Moines Public Works-MCO Vehicles
Existing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City of West Des Moines Public Works
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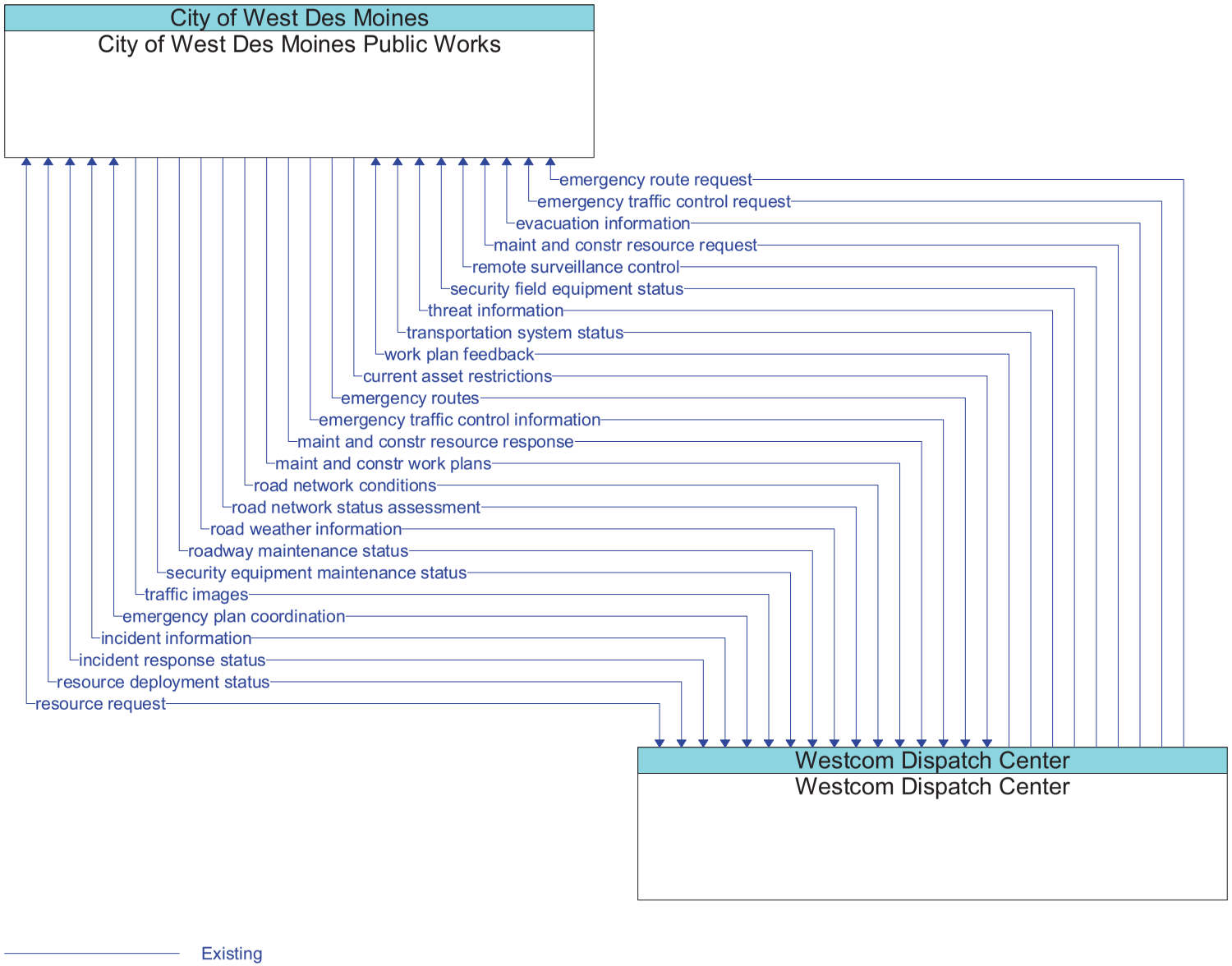
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles
Existing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City of West Des Moines Public Works
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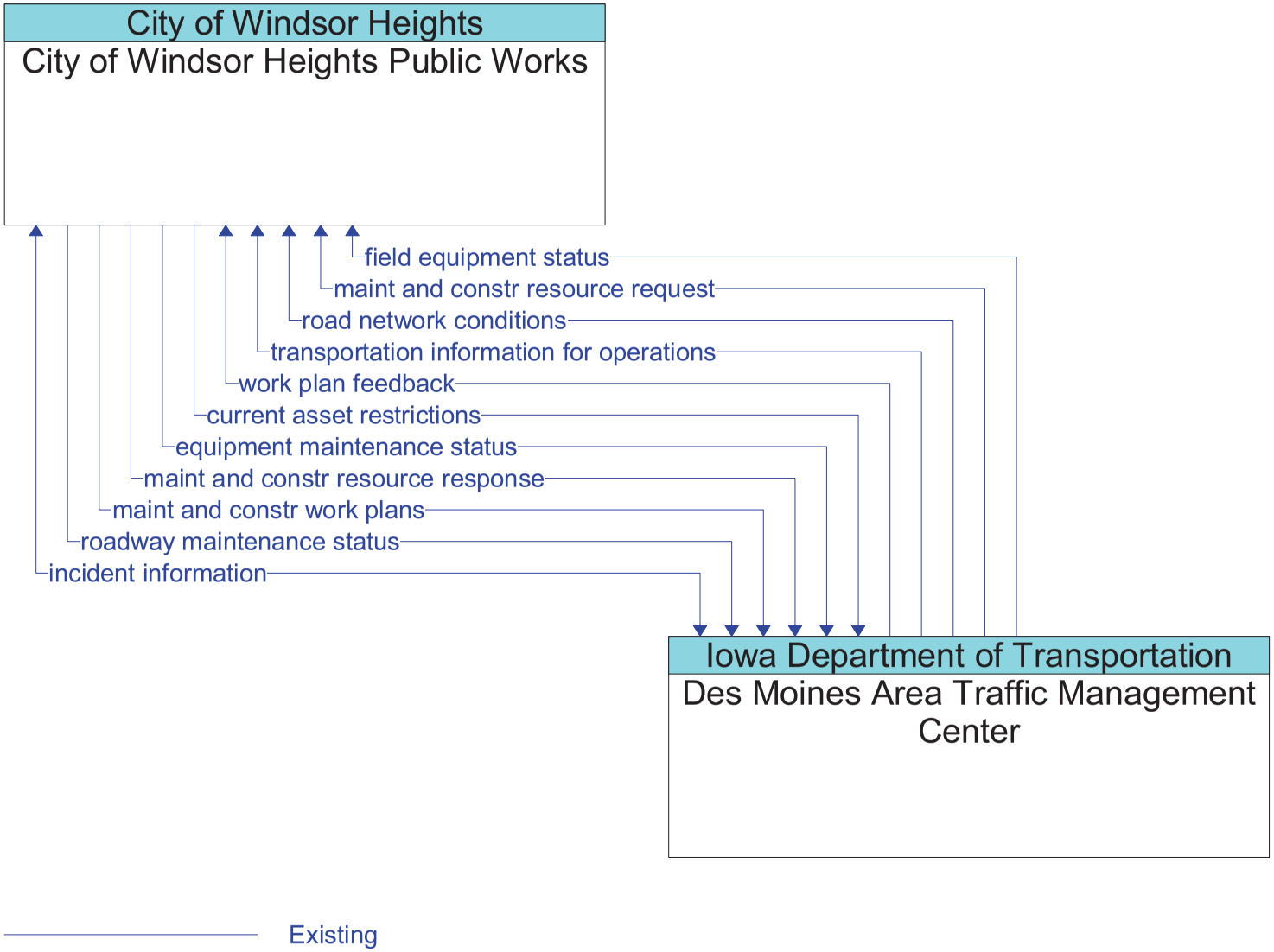
emergency traffic control request
evacuation information
maint and constr resource request
remote surveillance control
security field equipment status
threat information
transportation system status
work plan feedback
current asset restrictions
emergency routes
emergency traffic control information
maint and constr resource response
maint and constr work plans
road network conditions
road network status assessment
road weather information
roadway maintenance status
security equipment maintenance status
traffic images
emergency plan coordination
incident information
incident response status
resource deployment status
resource request
Westcom Dispatch Center
Westcom Dispatch Center
Existing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work plan feedback
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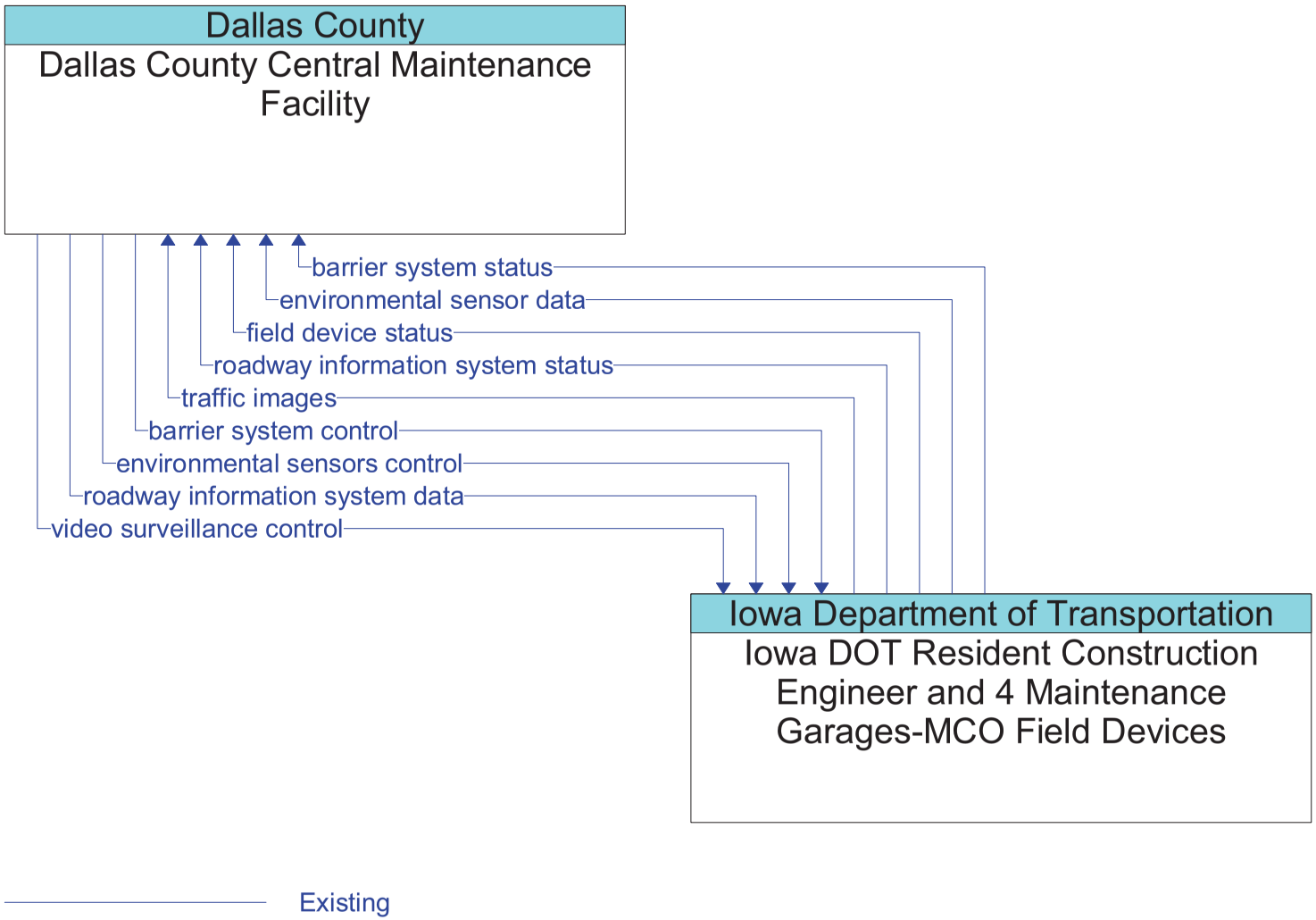
maint and constr resource response
maint and constr work plans
roadway maintenance status
incident information
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing


Dallas County
Dallas County Central Maintenance Facility
barrier system status
environmental sensor data
field device status
roadway information system status
traffic images
barrier system control
environmental sensors control
roadway information system data
video surveillance control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
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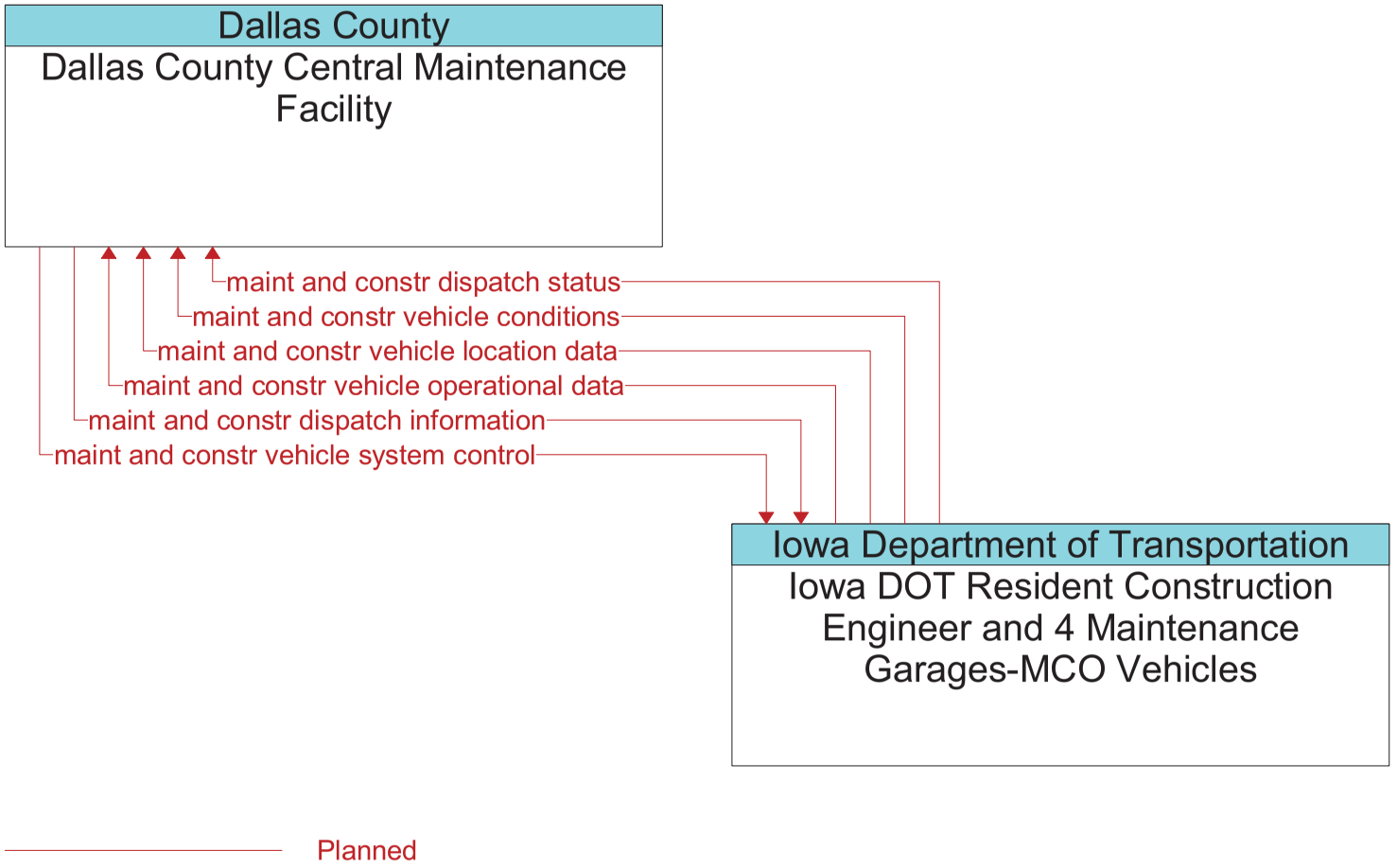
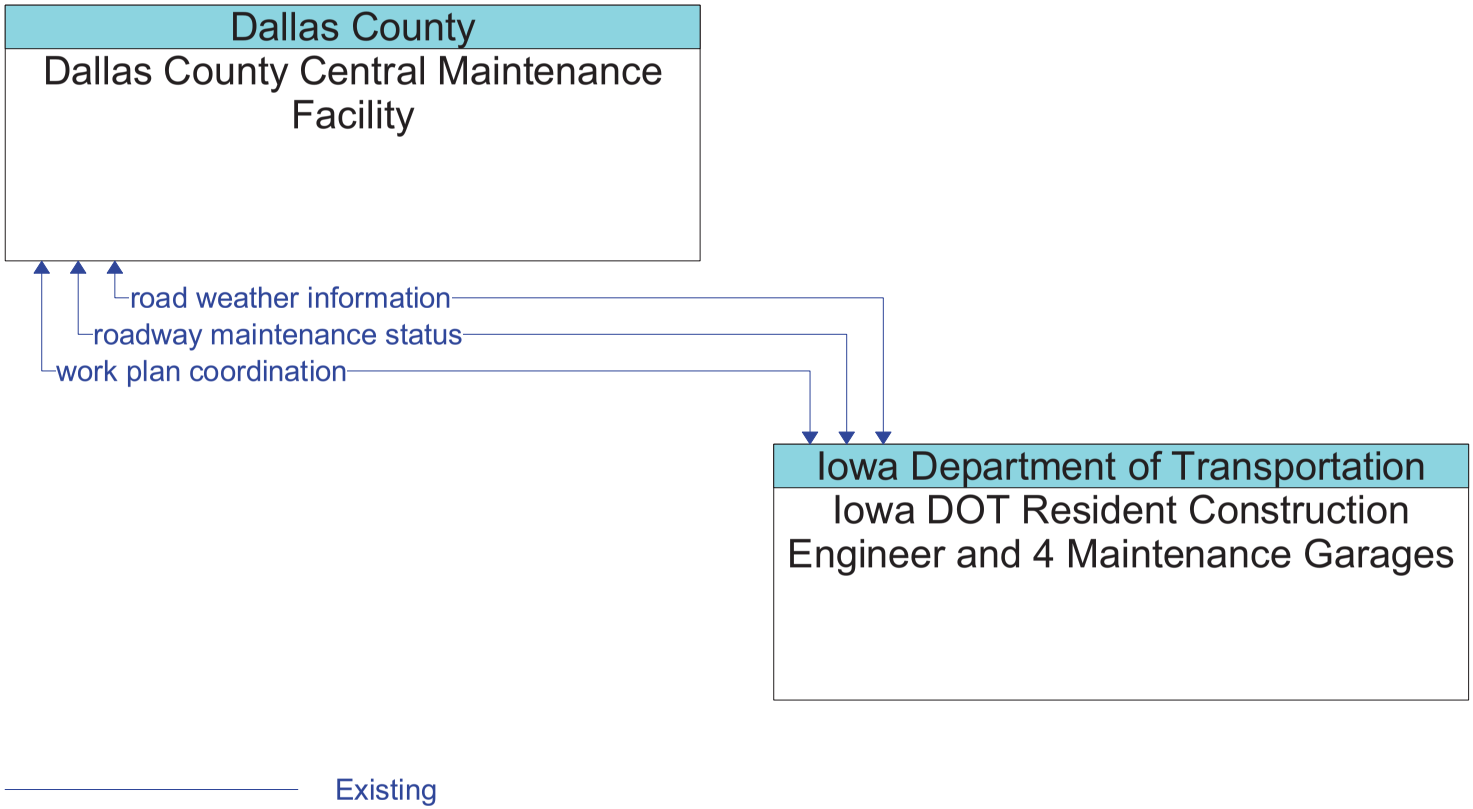

Dallas County
Dallas County Central Maintenance Facility
maint and constr dispatch status
maint and constr vehicle conditions
maint and constr vehicle location data
maint and constr vehicle operational data
maint and constr dispatch information
maint and constr vehicle system control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Planned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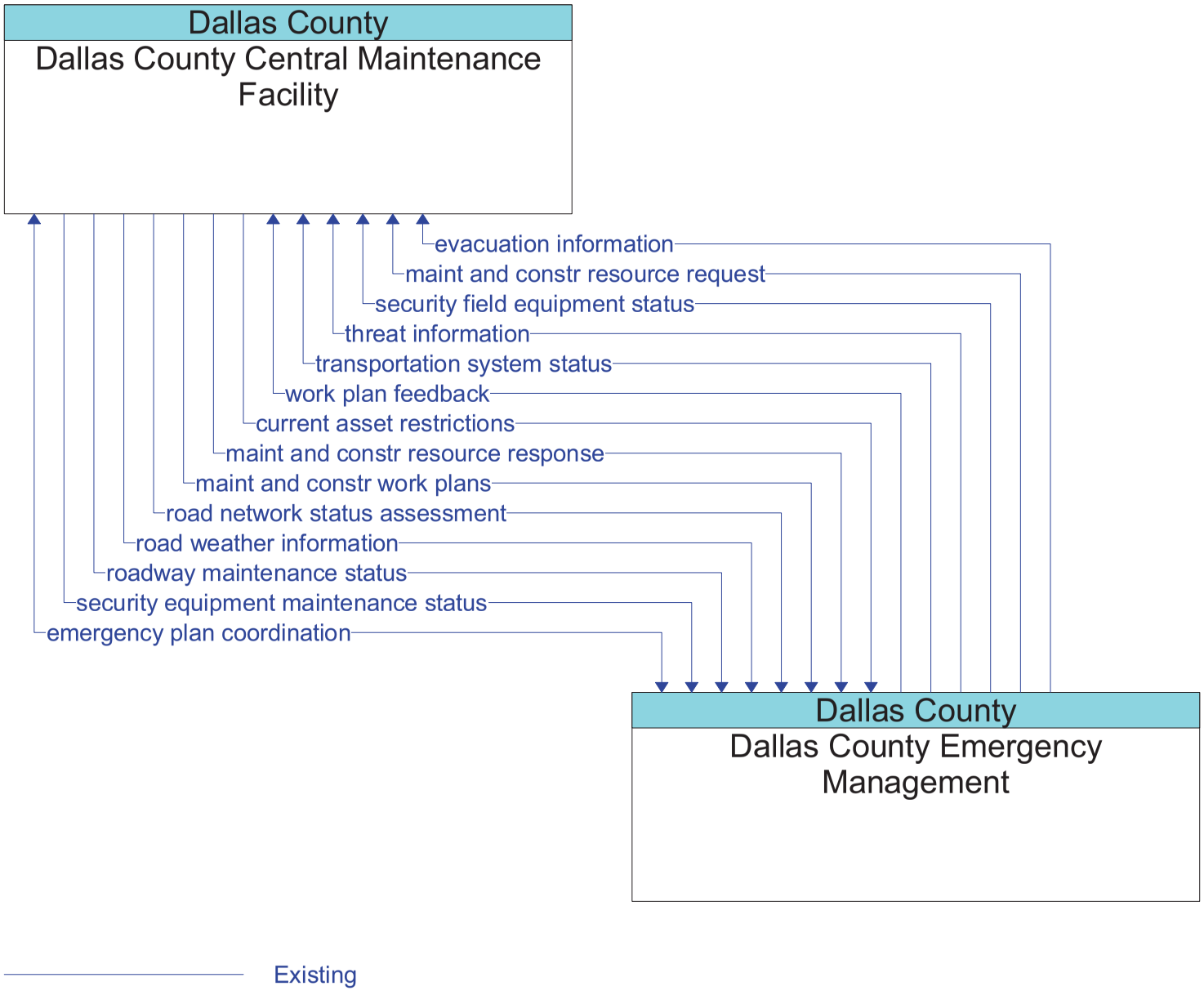
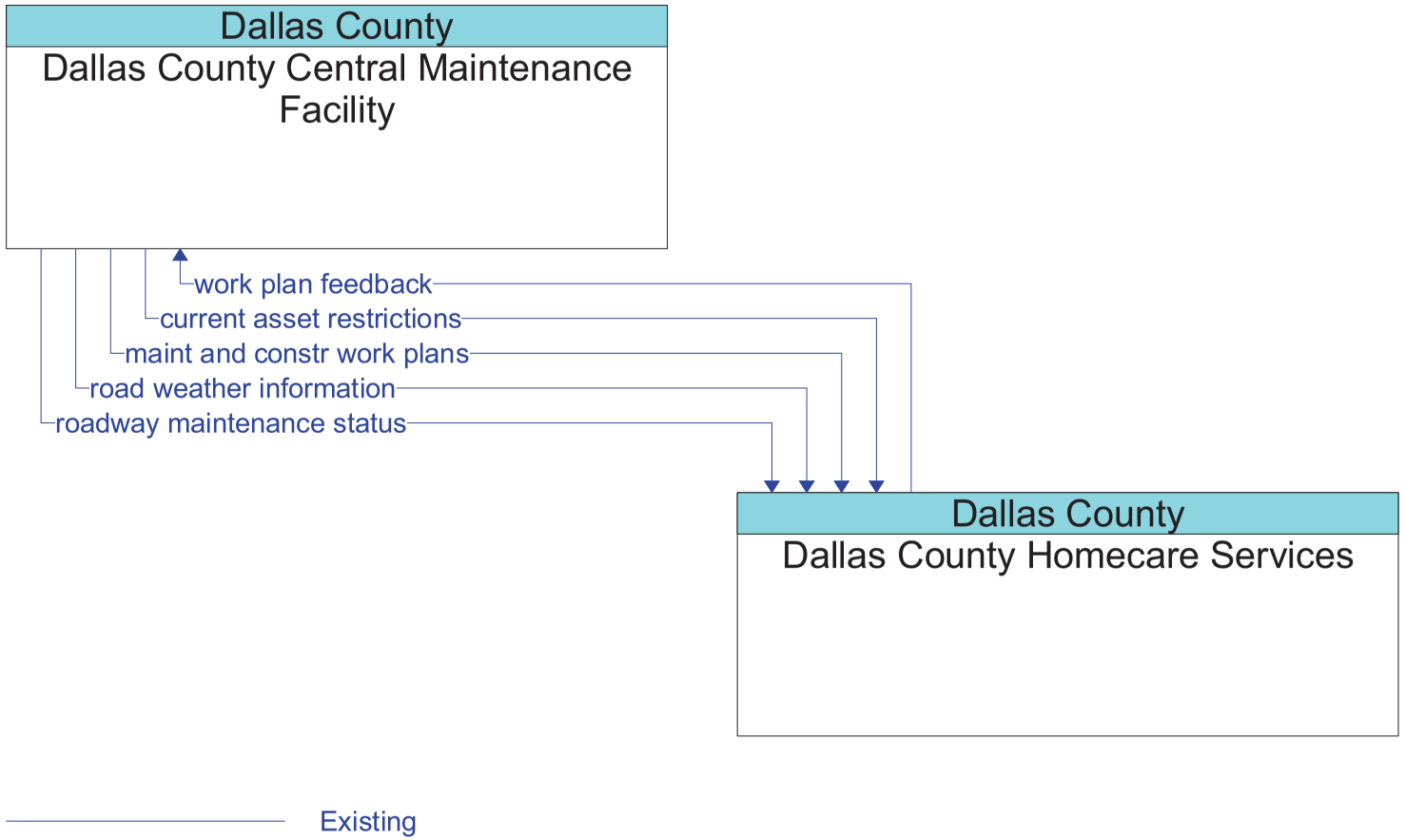
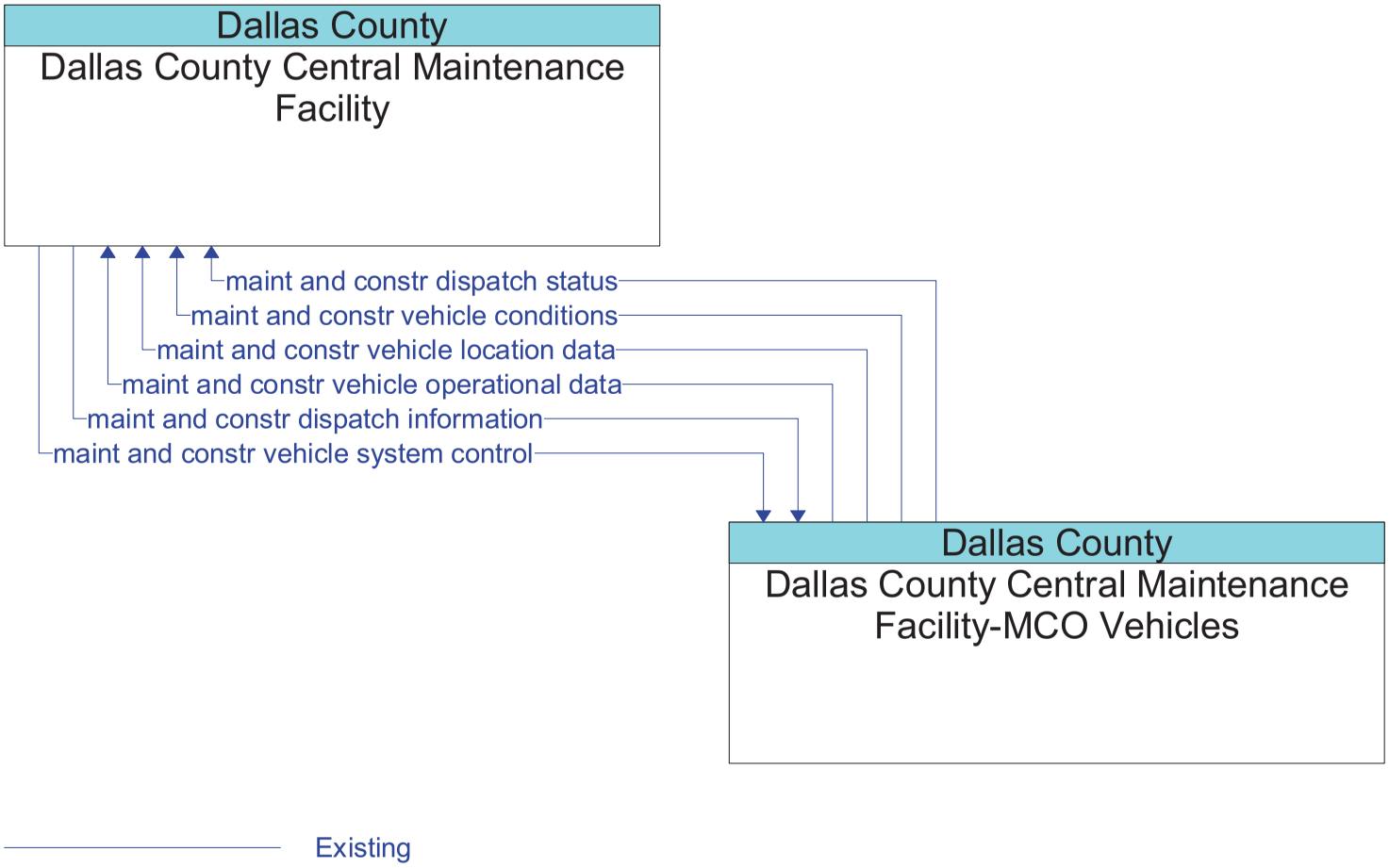
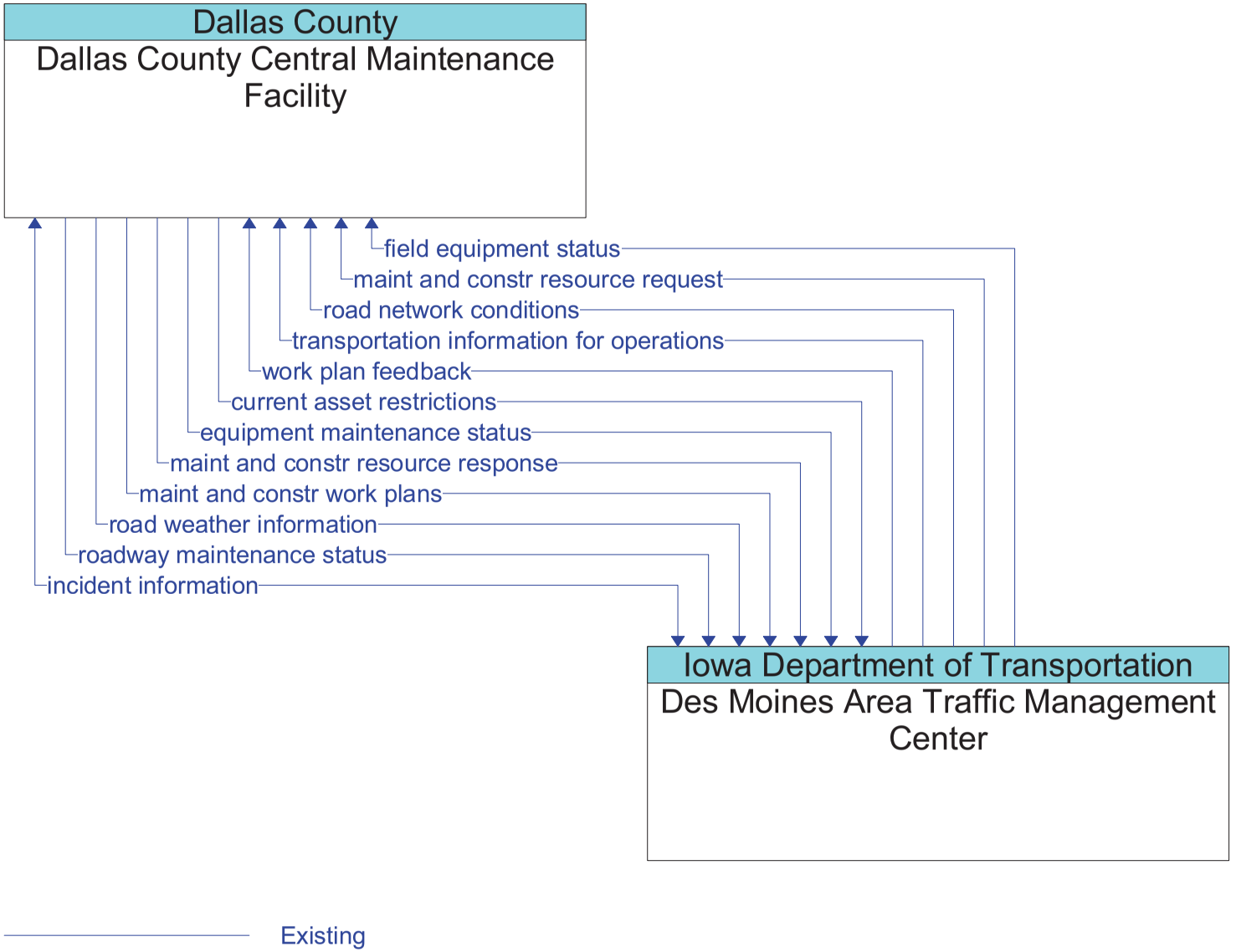
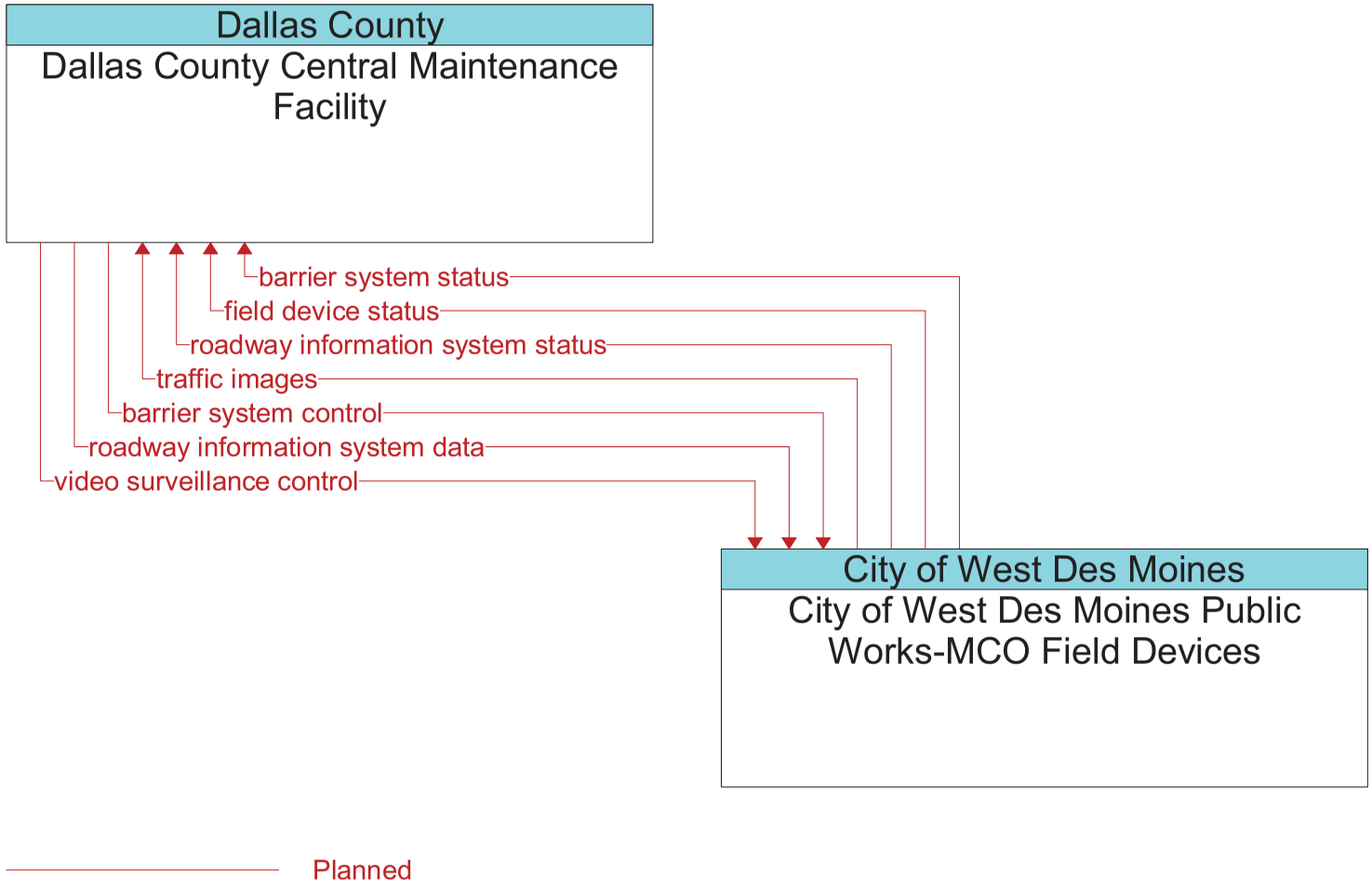
Dallas County Central Maintenance Facility
road weather information
roadway maintenance status
work plan coordination
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Existing

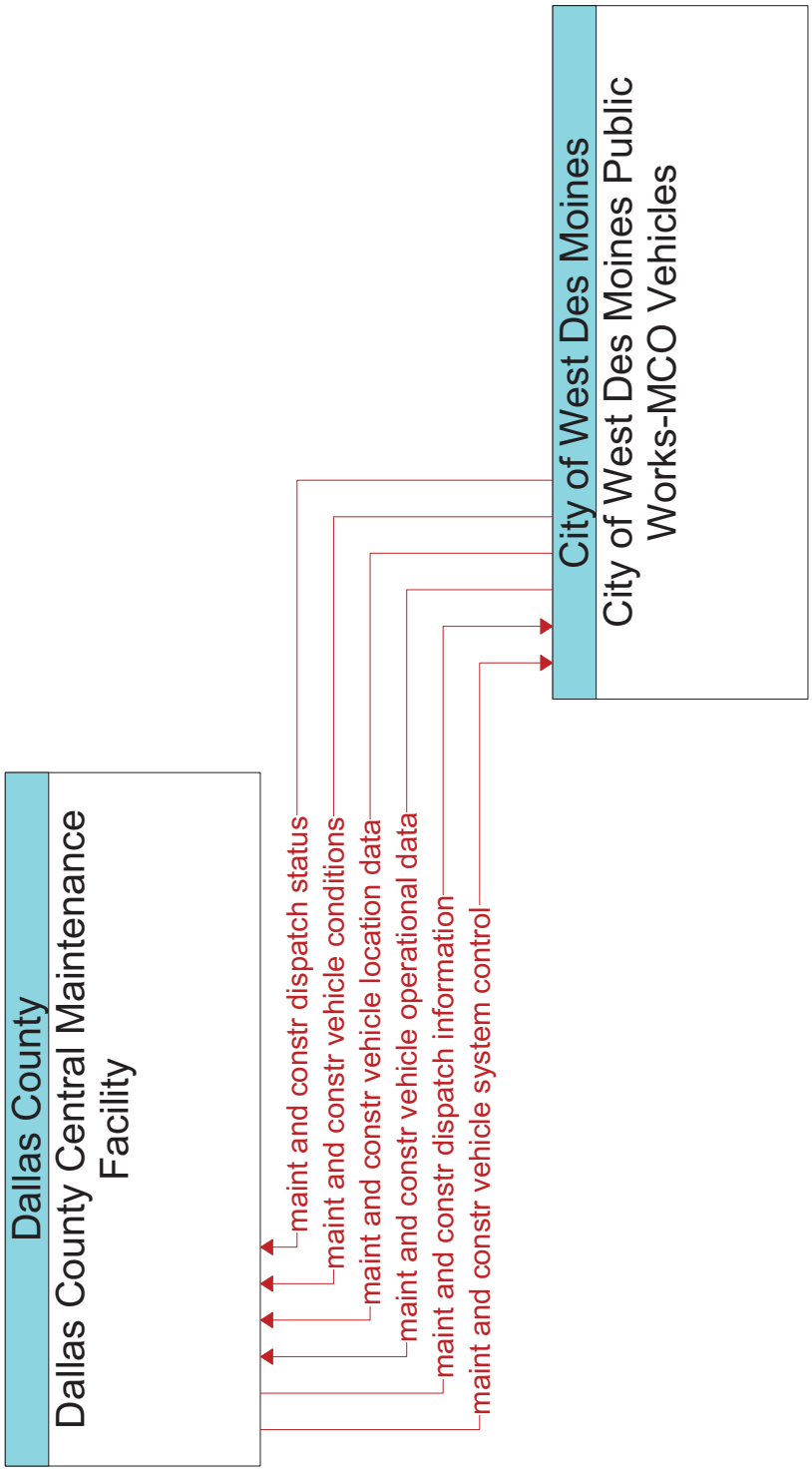

Dallas County
Dallas County Central Maintenance Facility
evacuation information
maint and constr resource request
security field equipment status
threat information
transportation system status
work plan feedback
current asset restrictions
maint and constr resource response
maint and constr work plans
road network status assessment
road weather information
roadway maintenance status
security equipment maintenance status
emergency plan coordination
Dallas County
Dallas County Emergency Management
Existing

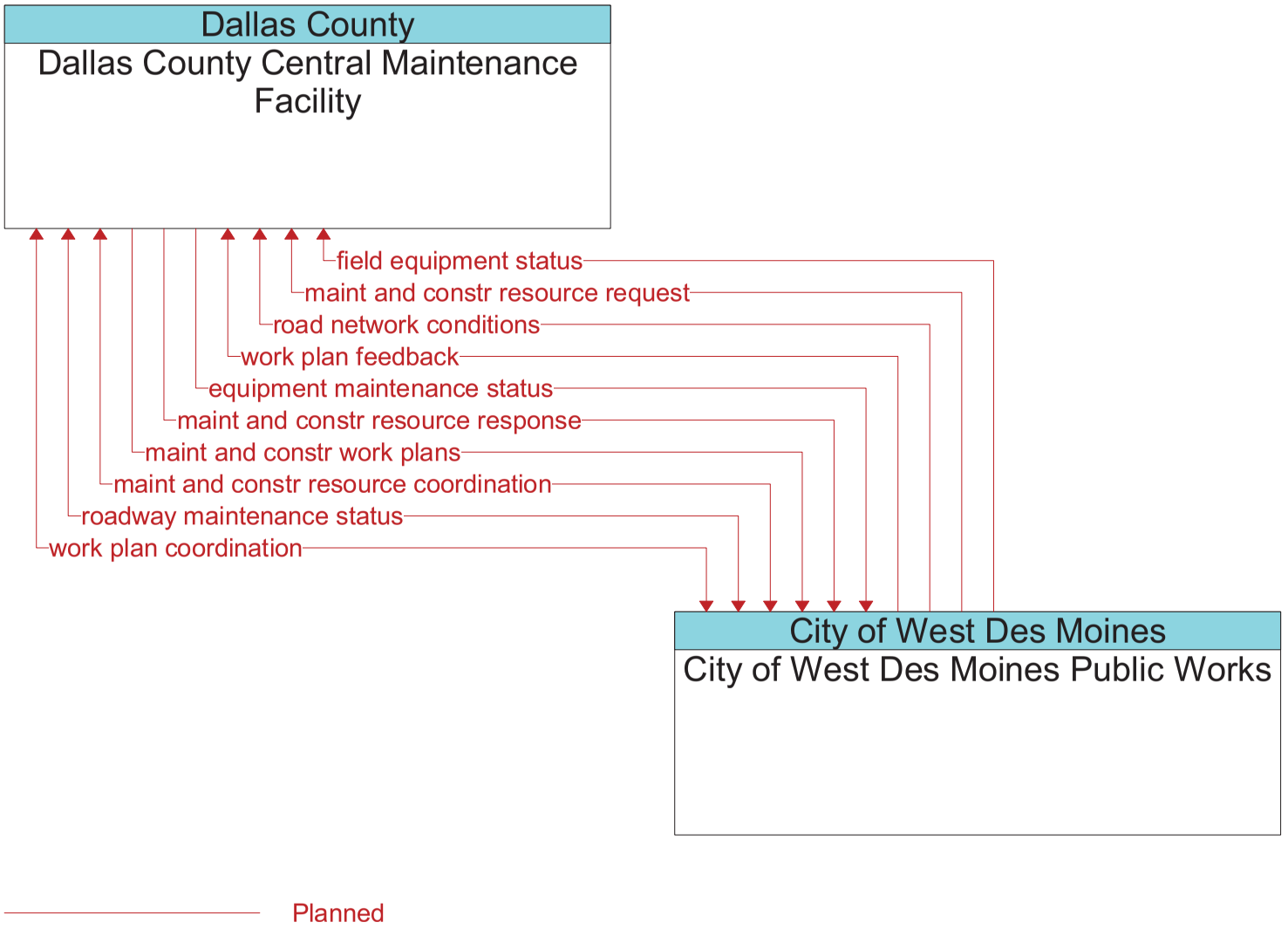

Dallas County
Dallas County Central Maintenance Facility
work plan feedback
current asset restrictions
maint and constr work plans
road weather information
roadway maintenance status
Dallas County
Dallas County Homecare Services
Existing

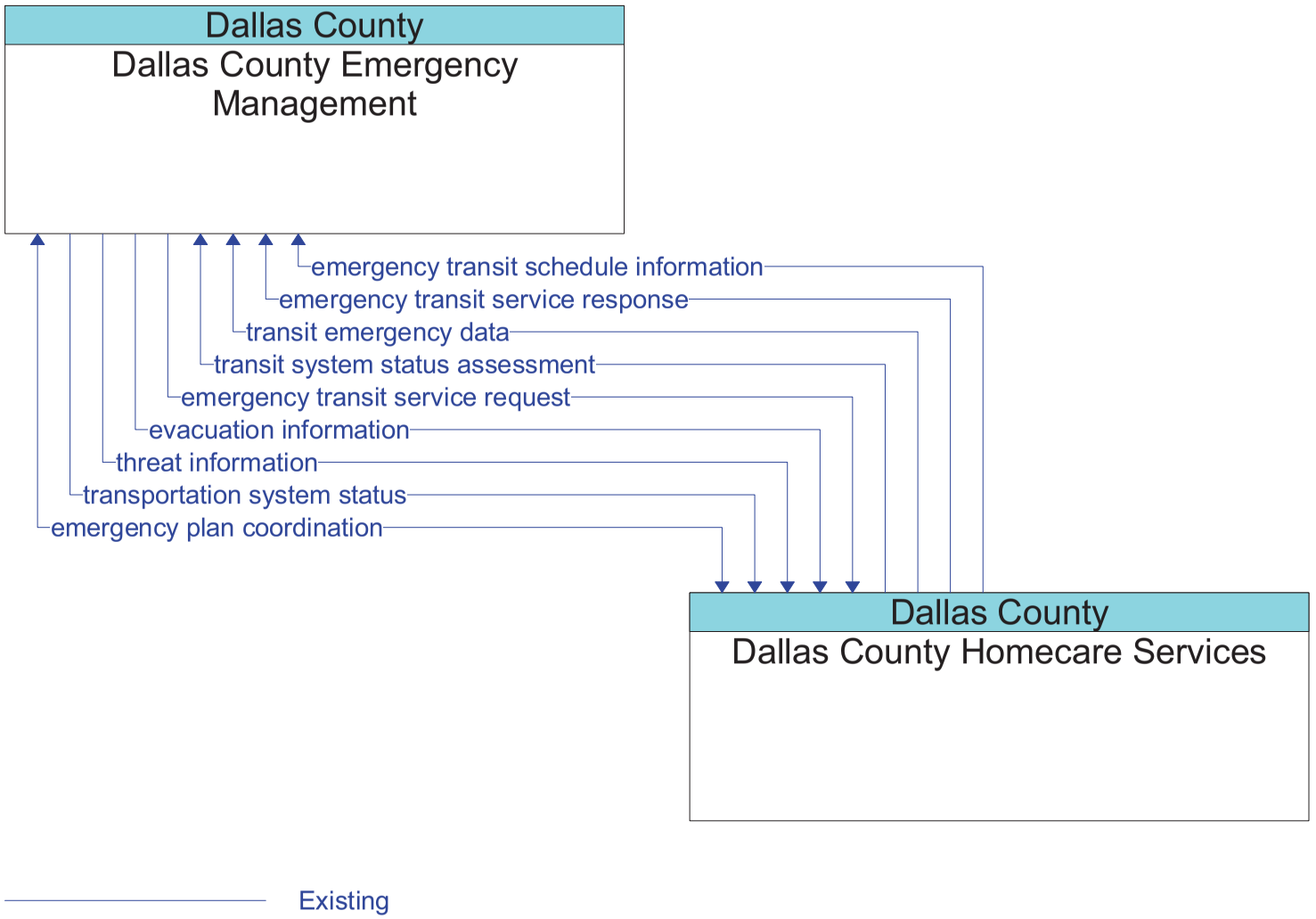

Dallas County
Dallas County Central Maintenance Facility
maint and constr dispatch status
maint and constr vehicle conditions
maint and constr vehicle location data
maint and constr vehicle operational data
maint and constr dispatch information
maint and constr vehicle system control
Dallas County
Dallas County Central Maintenance Facility-MCO Vehicles
Existing

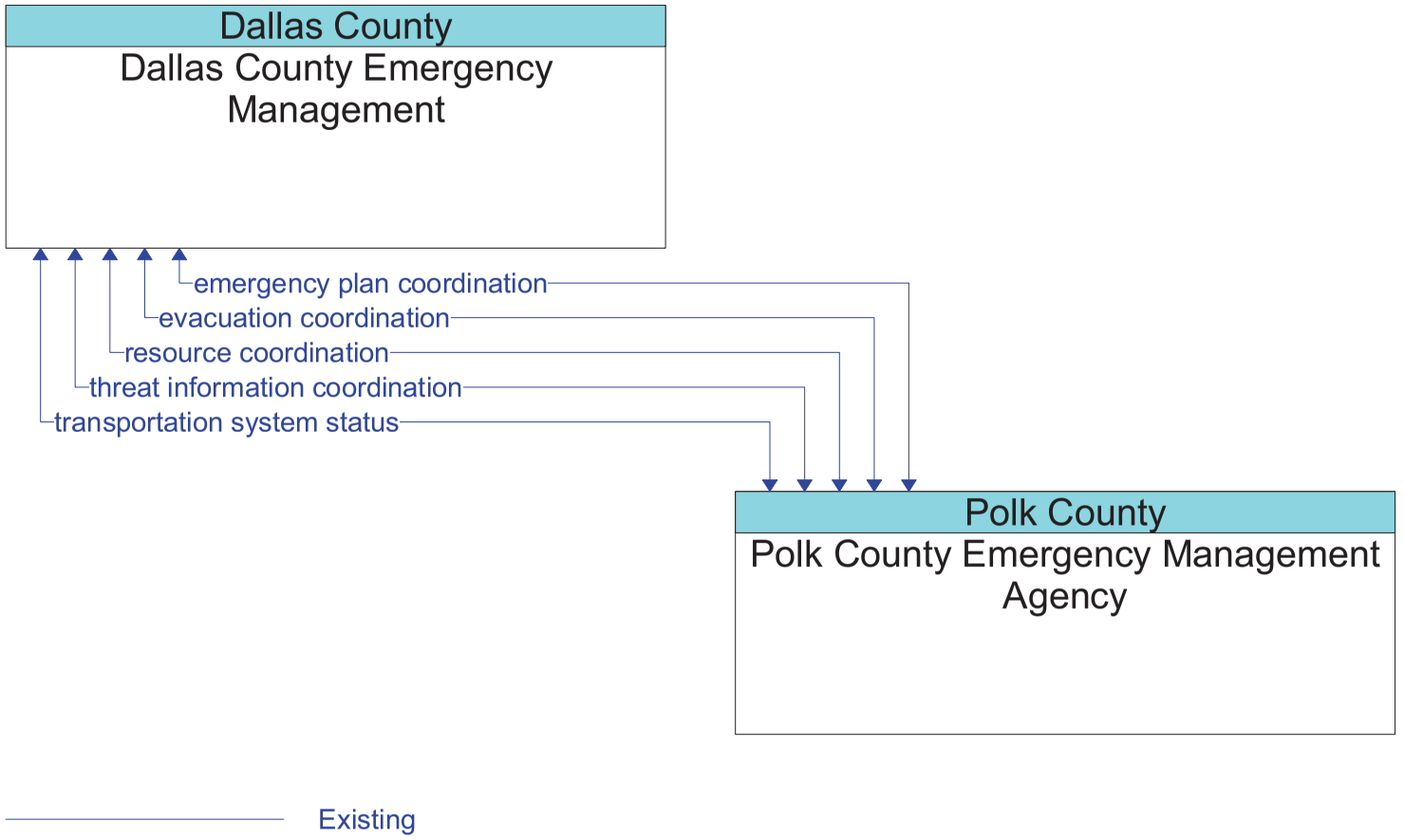

Dallas County
Dallas County Central Maintenance Facility
field equipment status
maint and constr resource request
road network conditions
transportation information for operations
work plan feedback
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
road weather information
roadway maintenance status
incident information
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing

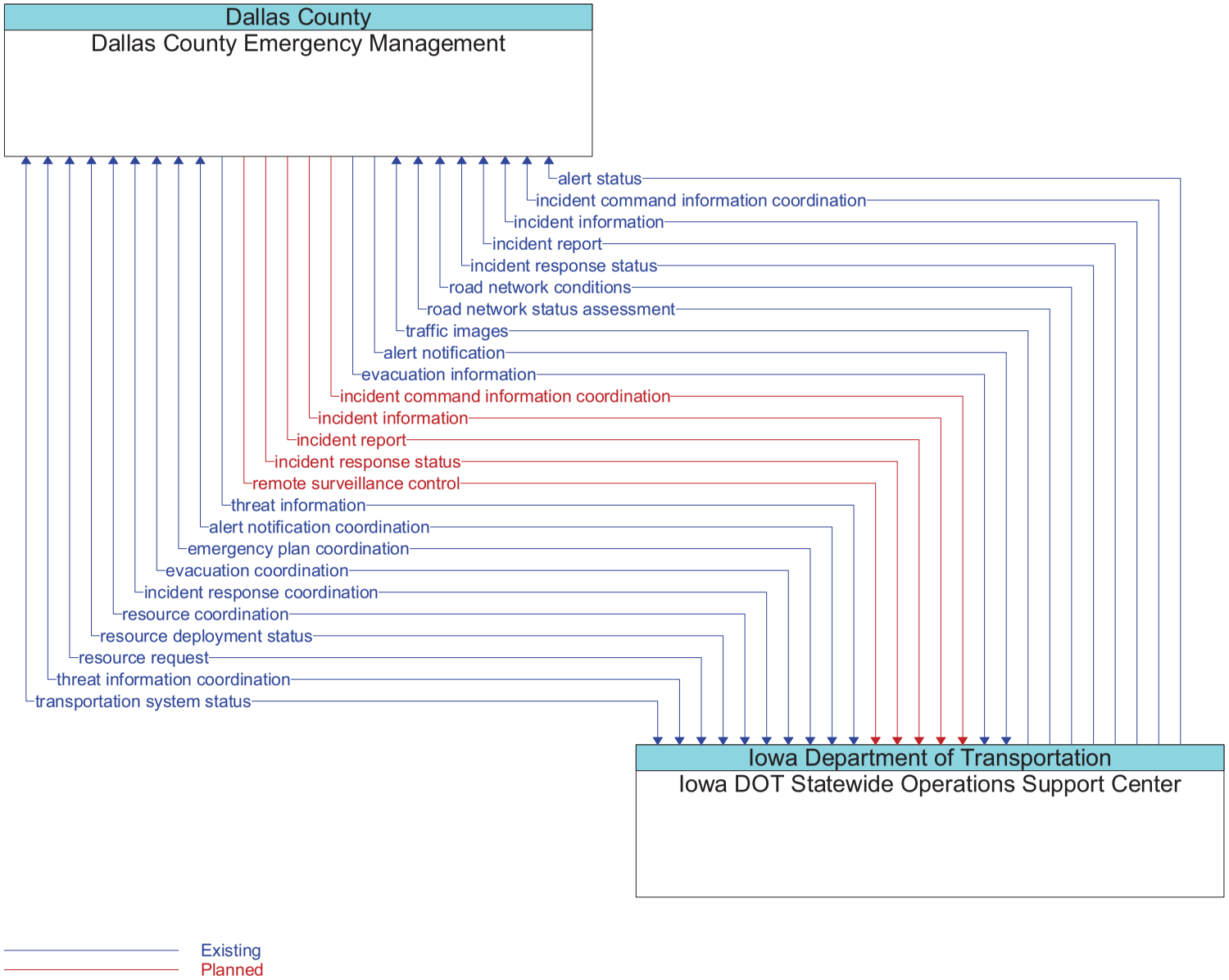

Dallas County
Dallas County Central Maintenance Facility
barrier system status
field device status
roadway information system status
traffic images
barrier system control
roadway information system data
video surveillance control
City of West Des Moines
City of West Des Moines Public Works-MCO Field Devices
Planned

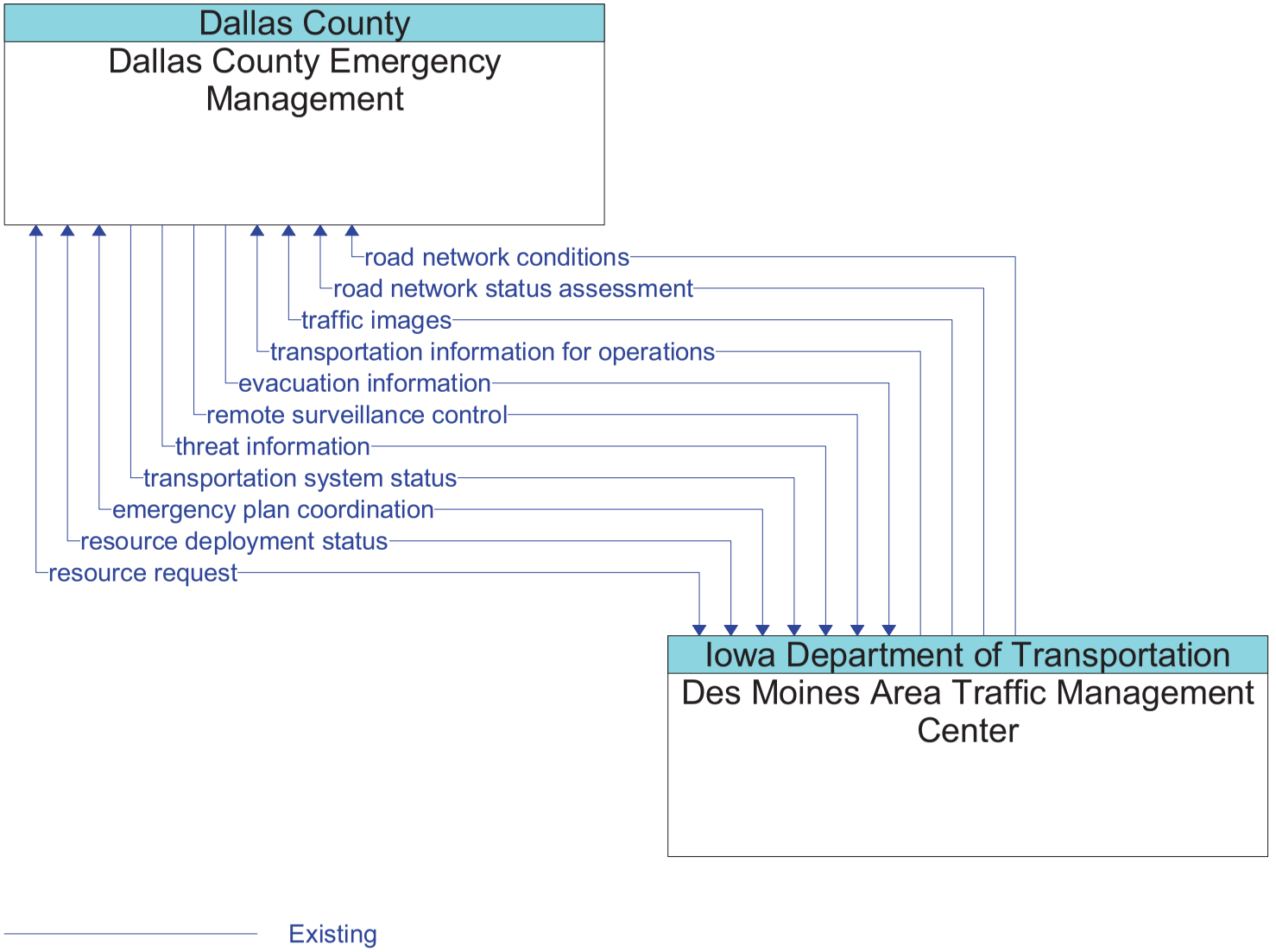

Dallas County
Dallas County Central Maintenance Facility
City of West Des Moines
City of West Des Moines Public Works-MCO Vehicles
maint and constr dispatch status
maint and constr vehicle conditions
maint and constr vehicle location data
maint and constr vehicle operational data
maint and constr dispatch information
maint and constr vehicle system control
Planned

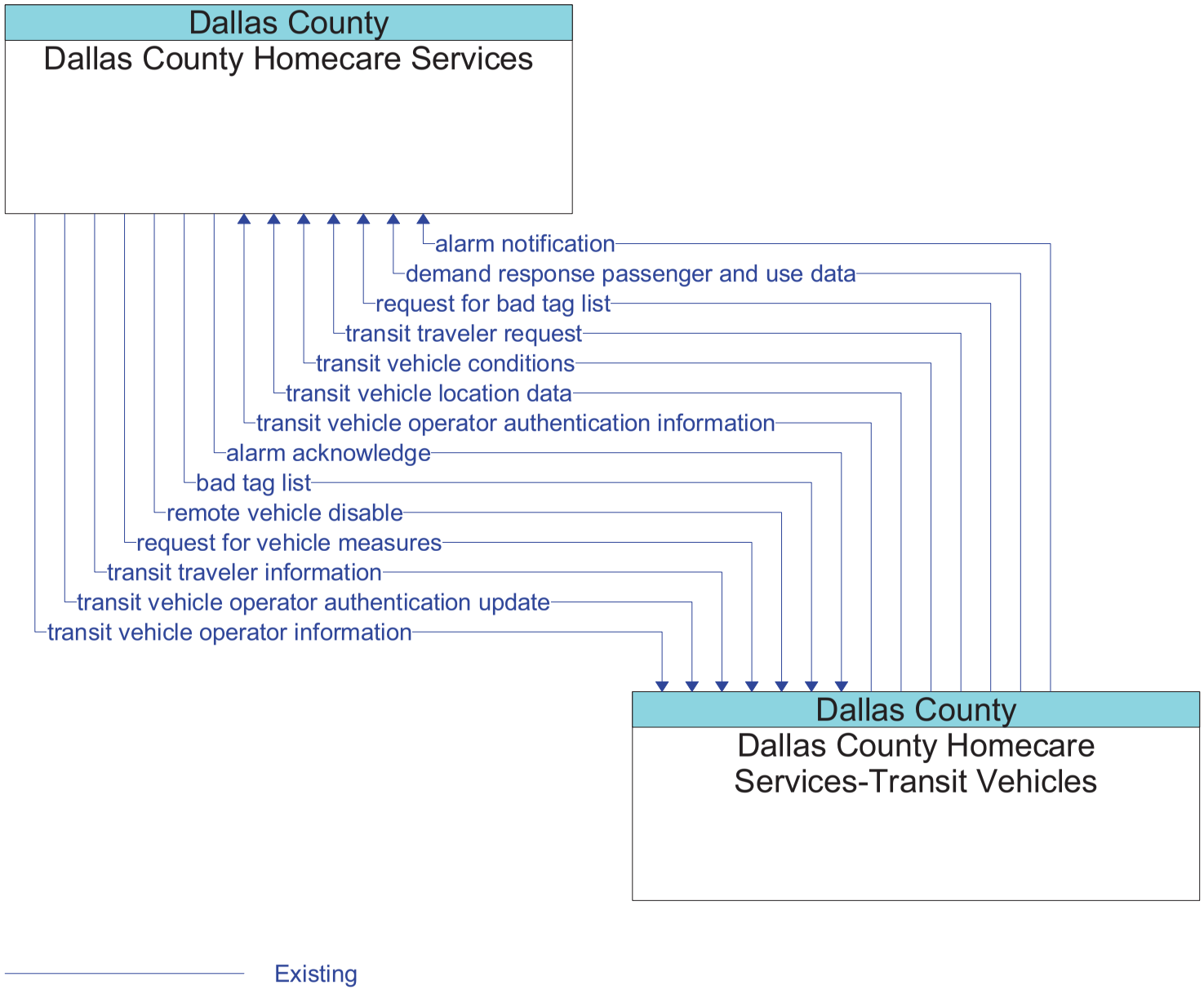

Dallas County
Dallas County Central Maintenance Facility
field equipment status
maint and constr resource request
road network conditions
work plan feedback
equipment maintenance status
maint and constr resource response
maint and constr work plans
maint and constr resource coordination
roadway maintenance status
work plan coordination
City of West Des Moines
City of West Des Moines Public Works
Planned

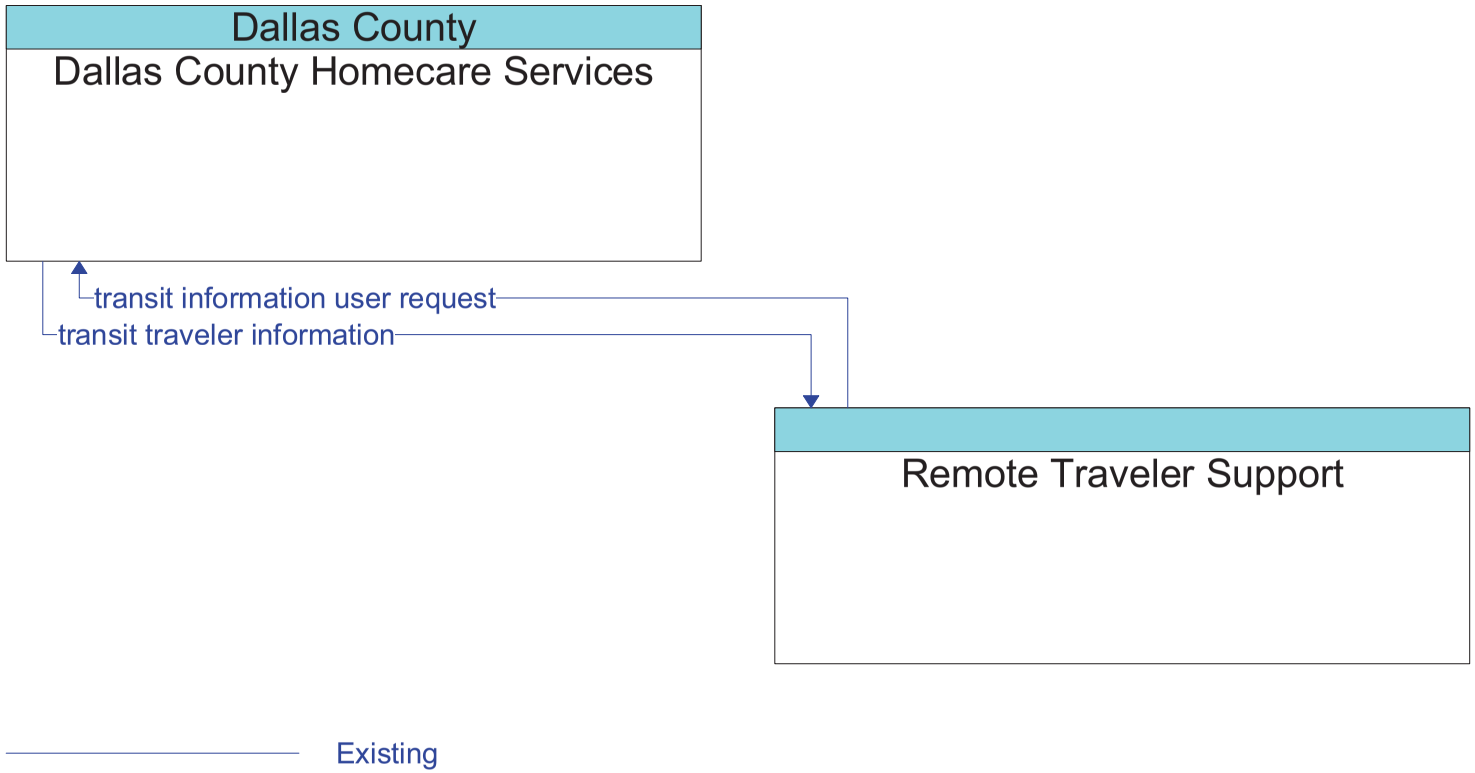

Dallas County
Dallas County Emergency Management
emergency transit schedule information
emergency transit service response
transit emergency data
transit system status assessment
emergency transit service request
evacuation information
threat information
transportation system status
emergency plan coordination
Dallas County
Dallas County Homecare Services
Existing

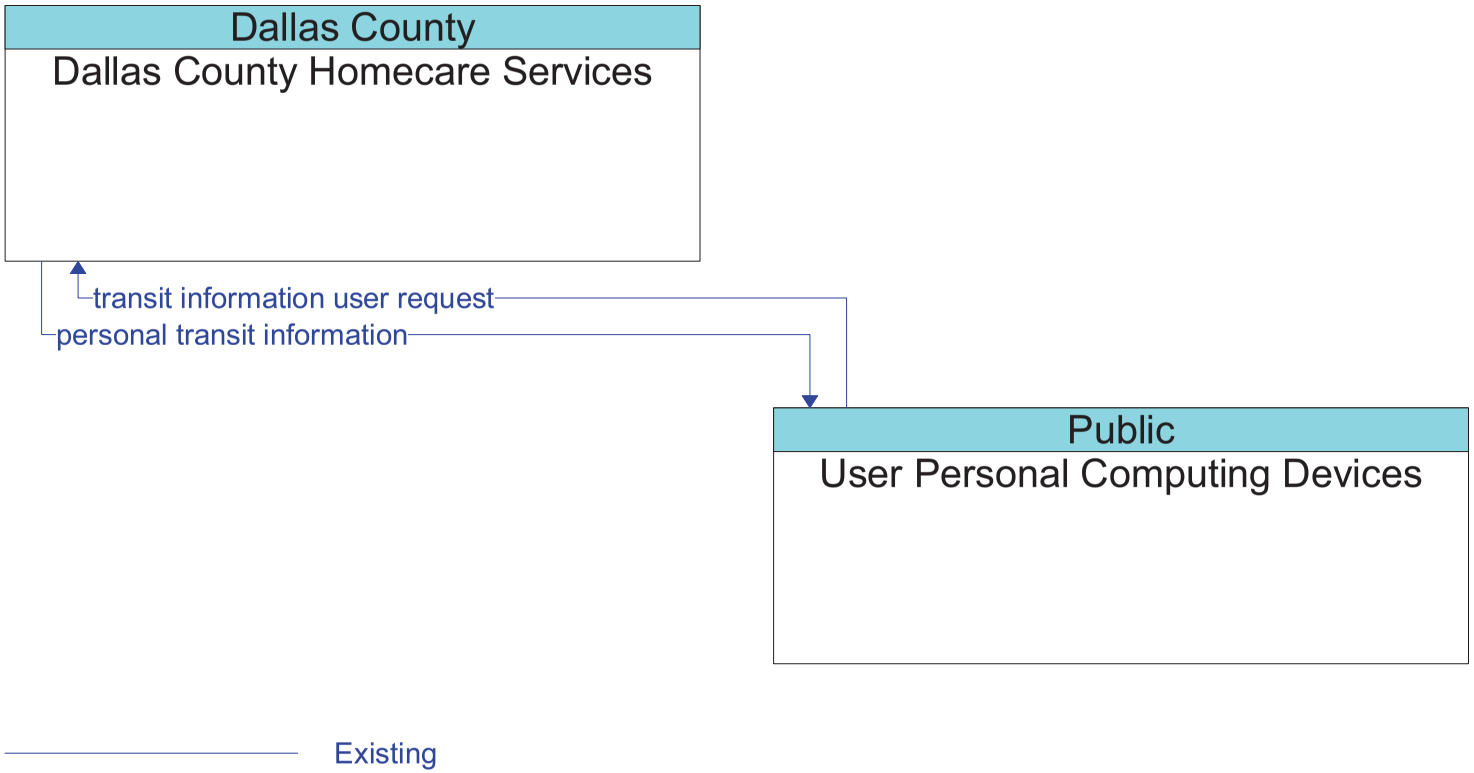

Dallas County
Dallas County Emergency Management
emergency plan coordination
evacuation coordination
resource coordination
threat information coordination
transportation system status
Polk County
Polk County Emergency Management Agency
Existing

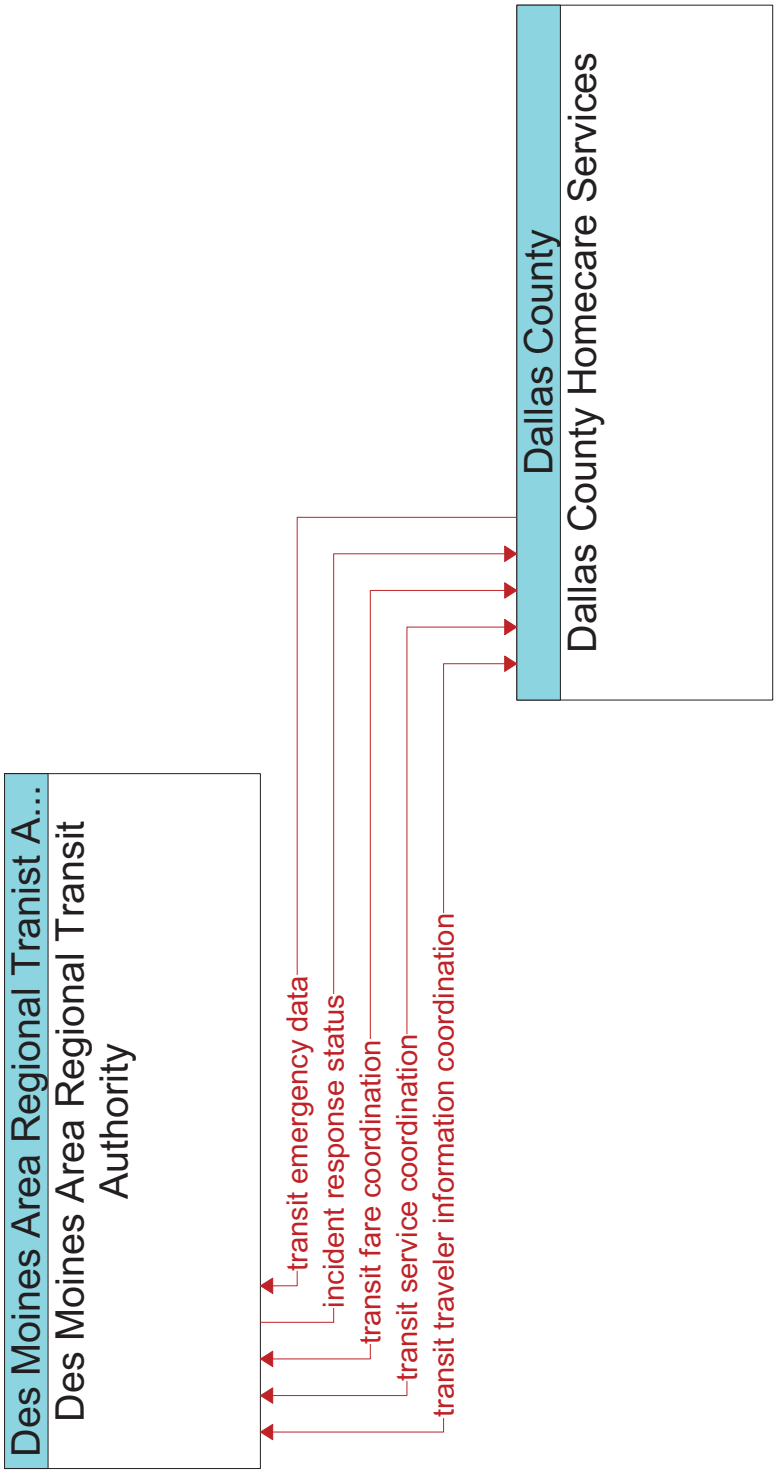

Dallas County
Dallas County Emergency Management
alert status
incident command information coordination
incident information
incident report
incident response status
road network conditions
road network status assessment
traffic images
alert notification
evacuation information
incident command information coordination
incident information
incident report
incident response status
remote surveillance control
threat information
alert notification coordination
emergency plan coordination
evacuation coordination
incident response coordination
resource coordination
resource deployment status
resource request
threat information coordination
transportation system status
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Existing
Planned

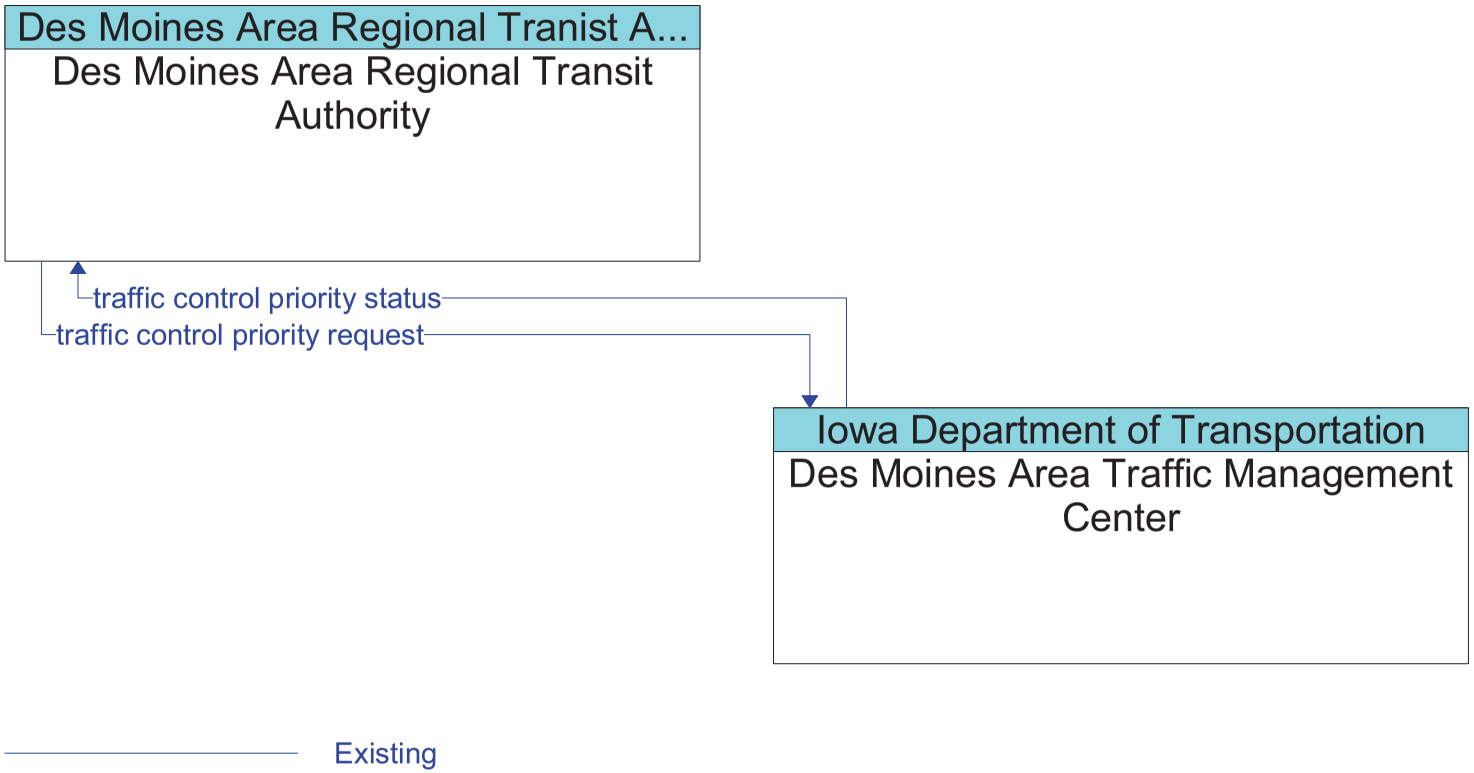

Dallas County
Dallas County Emergency Management
road network conditions
road network status assessment
traffic images
transportation information for operations
evacuation information
remote surveillance control
threat information
transportation system status
emergency plan coordination
resource deployment status
resource request
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing


Dallas County
Dallas County Homecare Services
alarm notification
demand response passenger and use data
request for bad tag list
transit traveler request
transit vehicle conditions
transit vehicle location data
transit vehicle operator authentication information
alarm acknowledge
bad tag list
remote vehicle disable
request for vehicle measures
transit traveler information
transit vehicle operator authentication update
transit vehicle operator information
Dallas County
Dallas County Homecare Services-Transit Vehicles
Existing


Dallas County
Dallas County Homecare Services
transit information user request
transit traveler information
Remote Traveler Support
Existing


Dallas County
Dallas County Homecare Services
transit information user request
personal transit information
Public
User Personal Computing Devices
Existing


Des Moines Area Regional Tranist A...
Des Moines Area Regional Transit Authority
transit emergency data
incident response status
transit fare coordination
transit service coordination
transit traveler information coordination
Dallas County
Dallas County Homecare Services
Planned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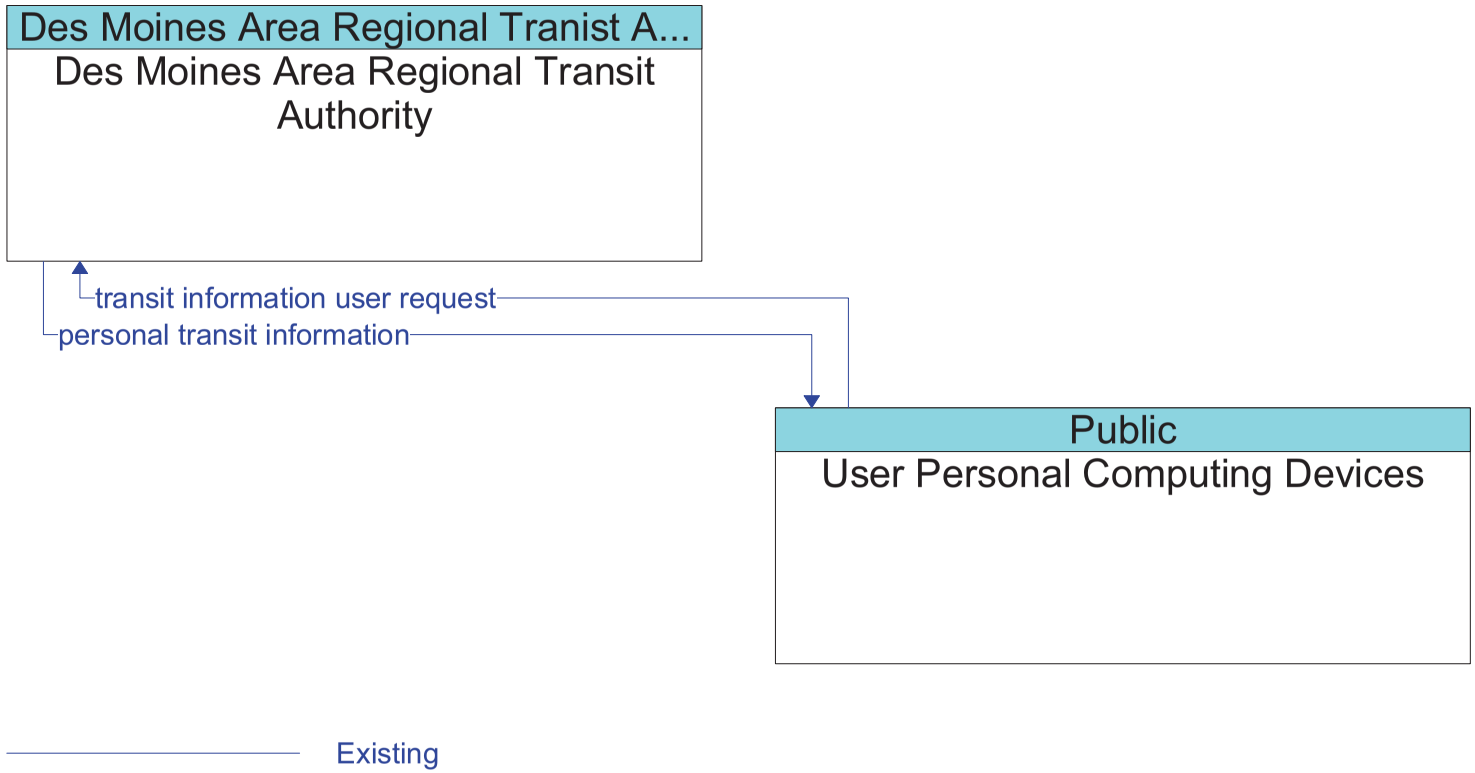
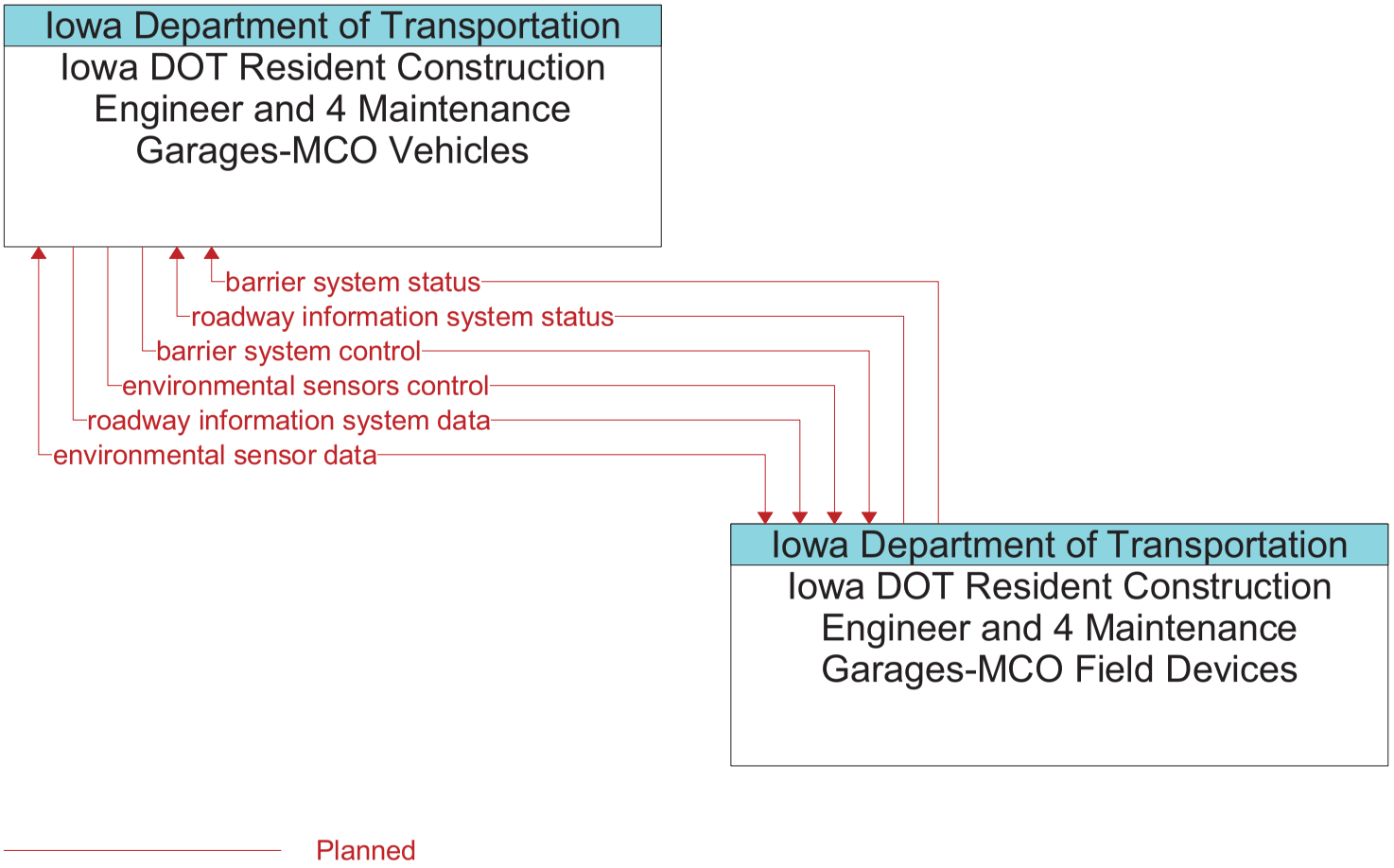
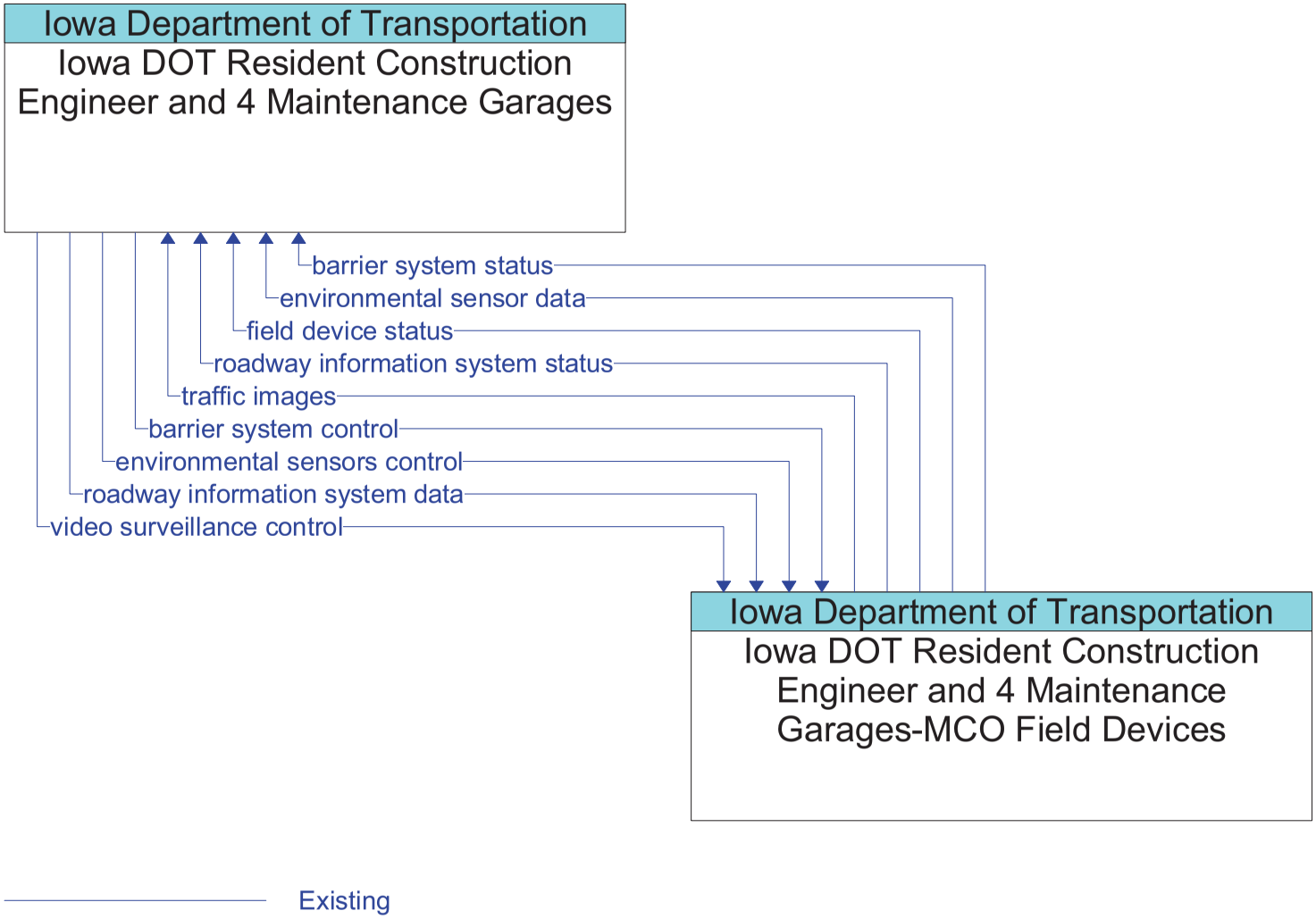
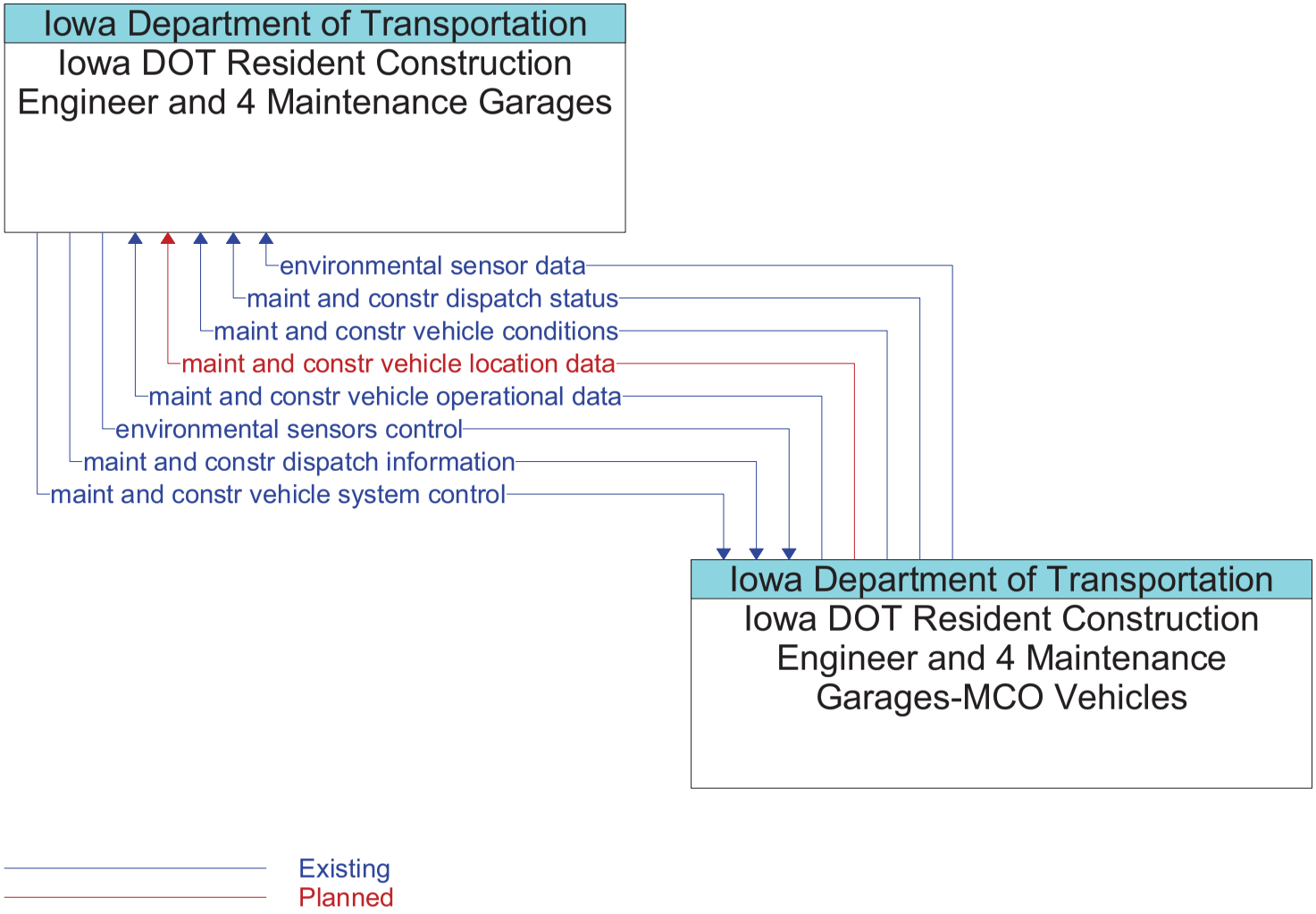
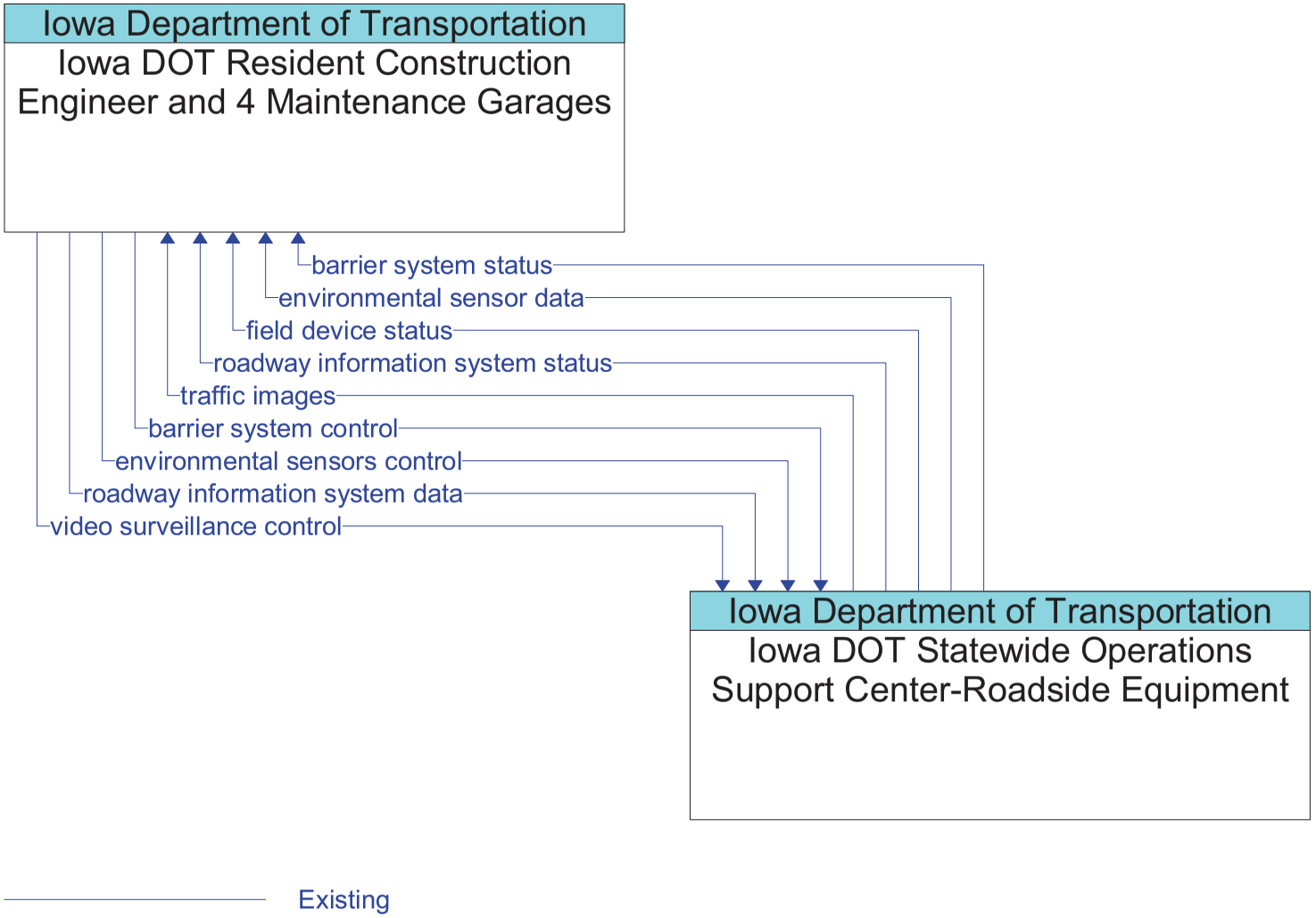
Des Moines Area Regional Transit Authority
traffic control priority status
traffic control priority request
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Existing

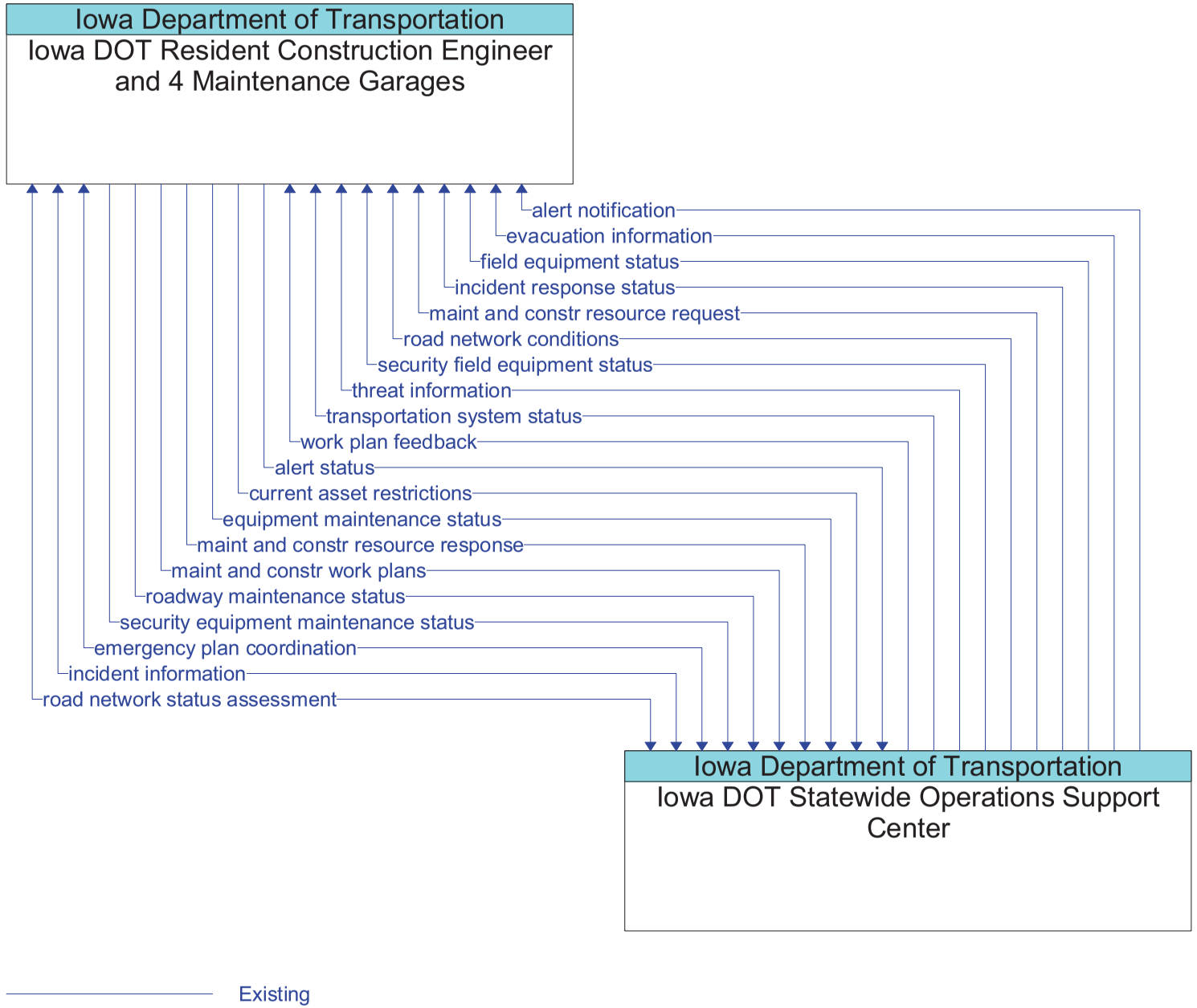

Des Moines Area Regional Tranist A...
Des Moines Area Regional Transit Authority
transit information user request
personal transit information
Public
User Personal Computing Devices
Existing

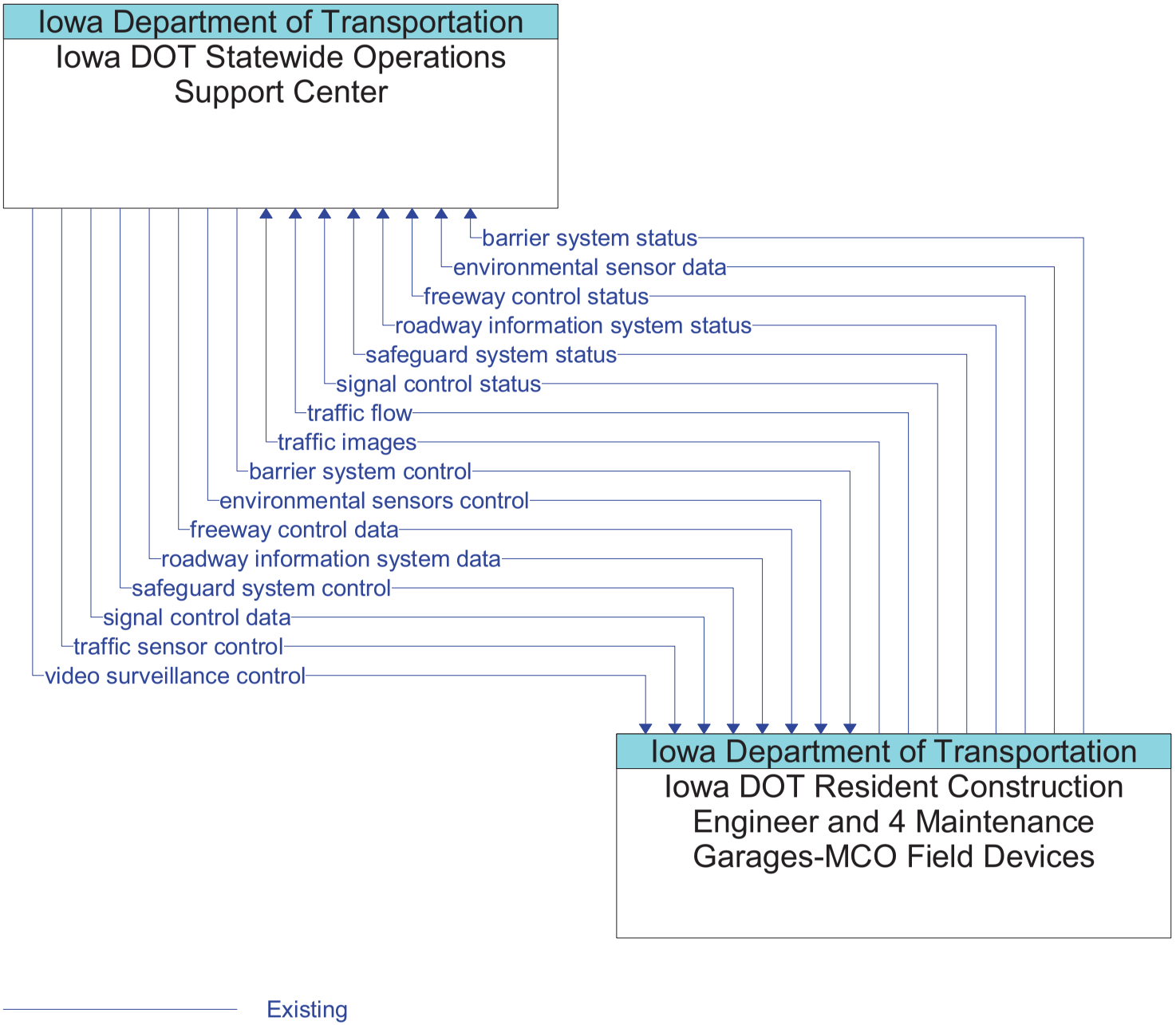

Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
barrier system status
roadway information system status
barrier system control
environmental sensors control
roadway information system data
environmental sensor data
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Planned

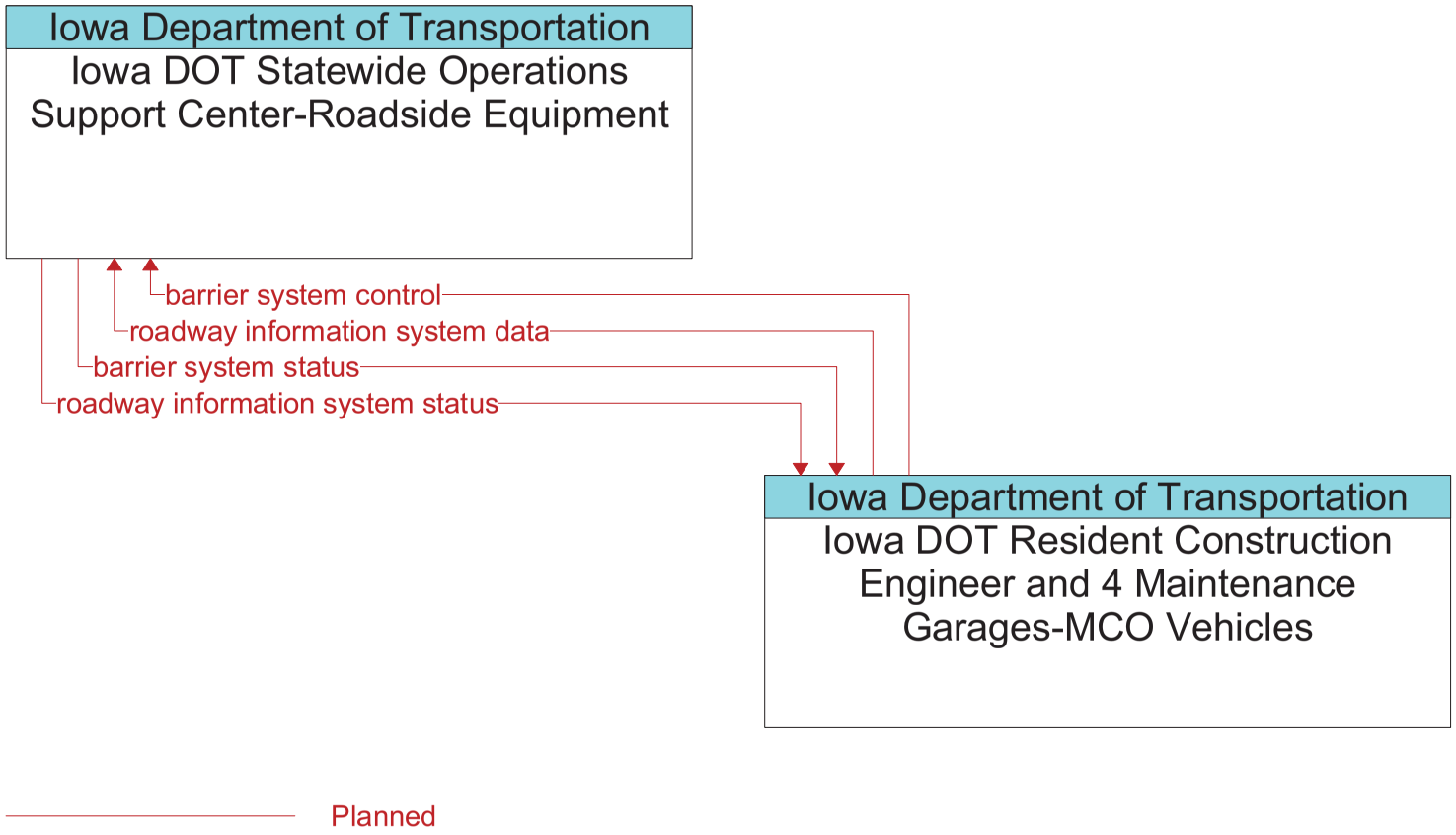

Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
barrier system status
environmental sensor data
field device status
roadway information system status
traffic images
barrier system control
environmental sensors control
roadway information system data
video surveillance control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Existing


Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
environmental sensor data
maint and constr dispatch status
maint and constr vehicle conditions
maint and constr vehicle location data
maint and constr vehicle operational data
environmental sensors control
maint and constr dispatch information
maint and constr vehicle system control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Existing
Planned


Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
barrier system status
environmental sensor data
field device status
roadway information system status
traffic images
barrier system control
environmental sensors control
roadway information system data
video surveillance control
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Roadside Equipment
Existing


Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
alert notification
evacuation information
field equipment status
incident response status
maint and constr resource request
road network conditions
security field equipment status
threat information
transportation system status
work plan feedback
alert status
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
roadway maintenance status
security equipment maintenance status
emergency plan coordination
incident information
road network status assessment
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Existing


Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
barrier system status
environmental sensor data
freeway control status
roadway information system status
safeguard system status
signal control status
traffic flow
traffic images
barrier system control
environmental sensors control
freeway control data
roadway information system data
safeguard system control
signal control data
traffic sensor control
video surveillance control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Existing


Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Roadside Equipment
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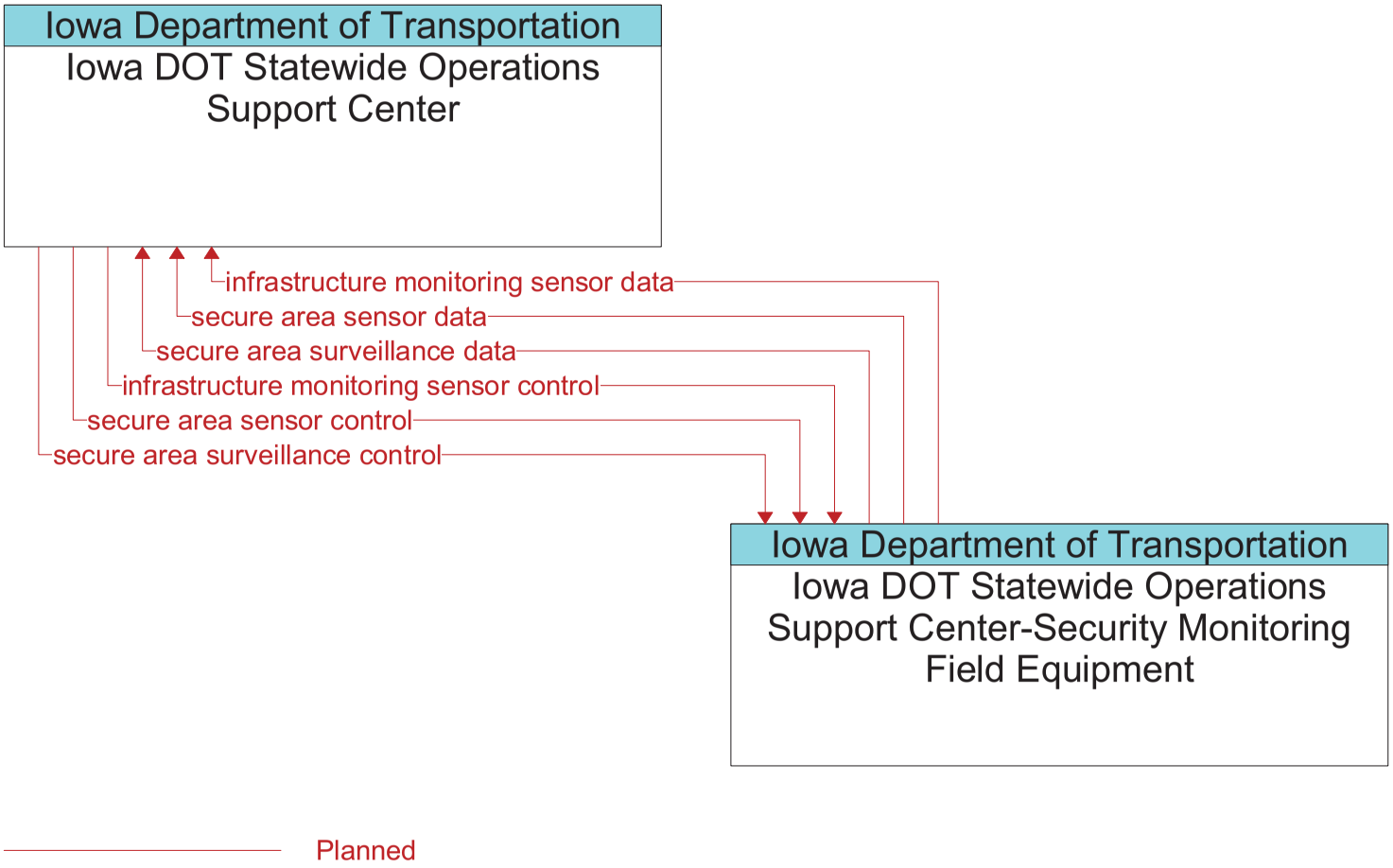
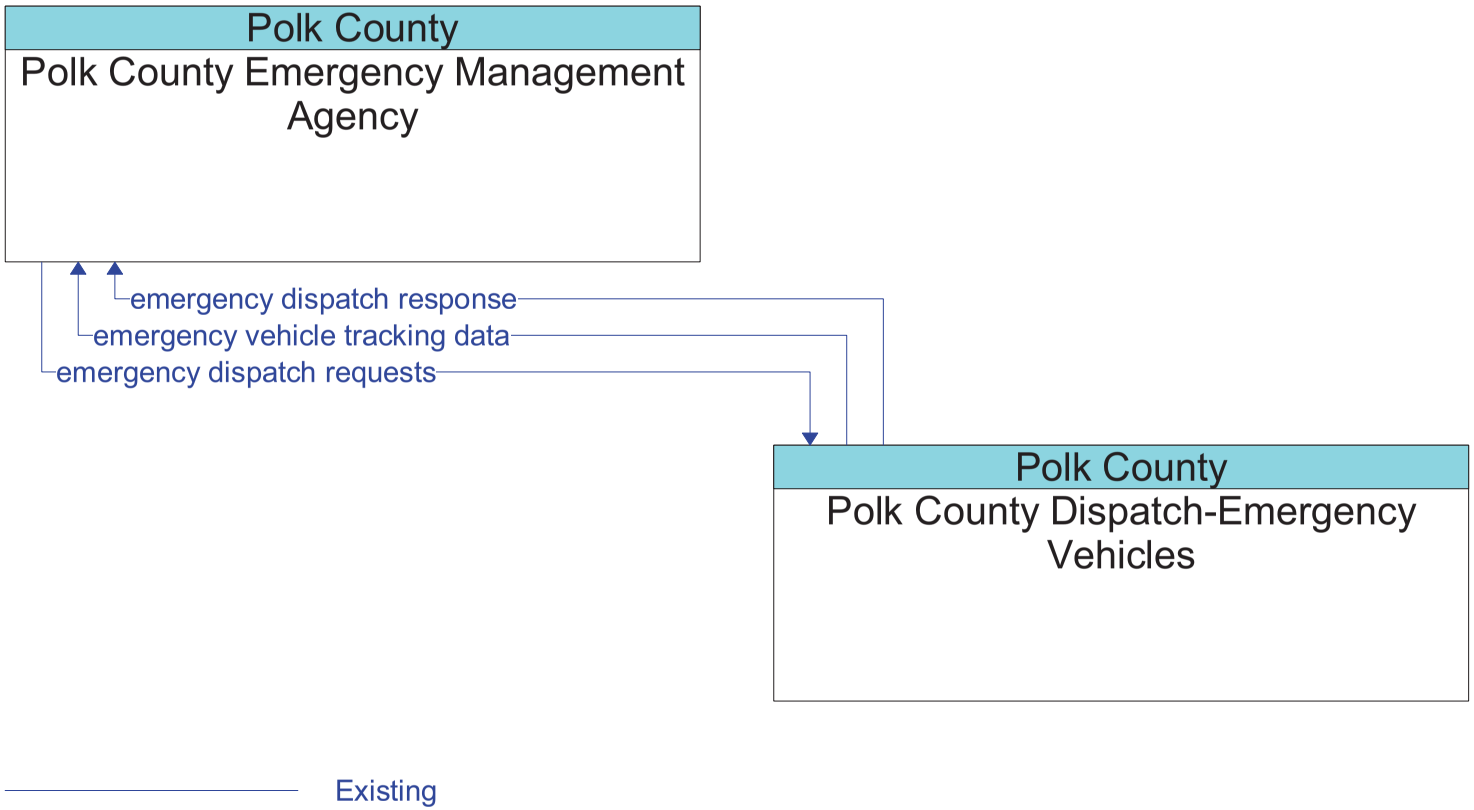
roadway information system data
barrier system status
roadway information system status
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Vehicles
Planned


Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
infrastructure monitoring sensor data
secure area sensor data
secure area surveillance data
infrastructure monitoring sensor control
secure area sensor control
secure area surveillance control
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Security Monitoring Field Equipment
Planned


Polk County
Polk County Emergency Management Agency
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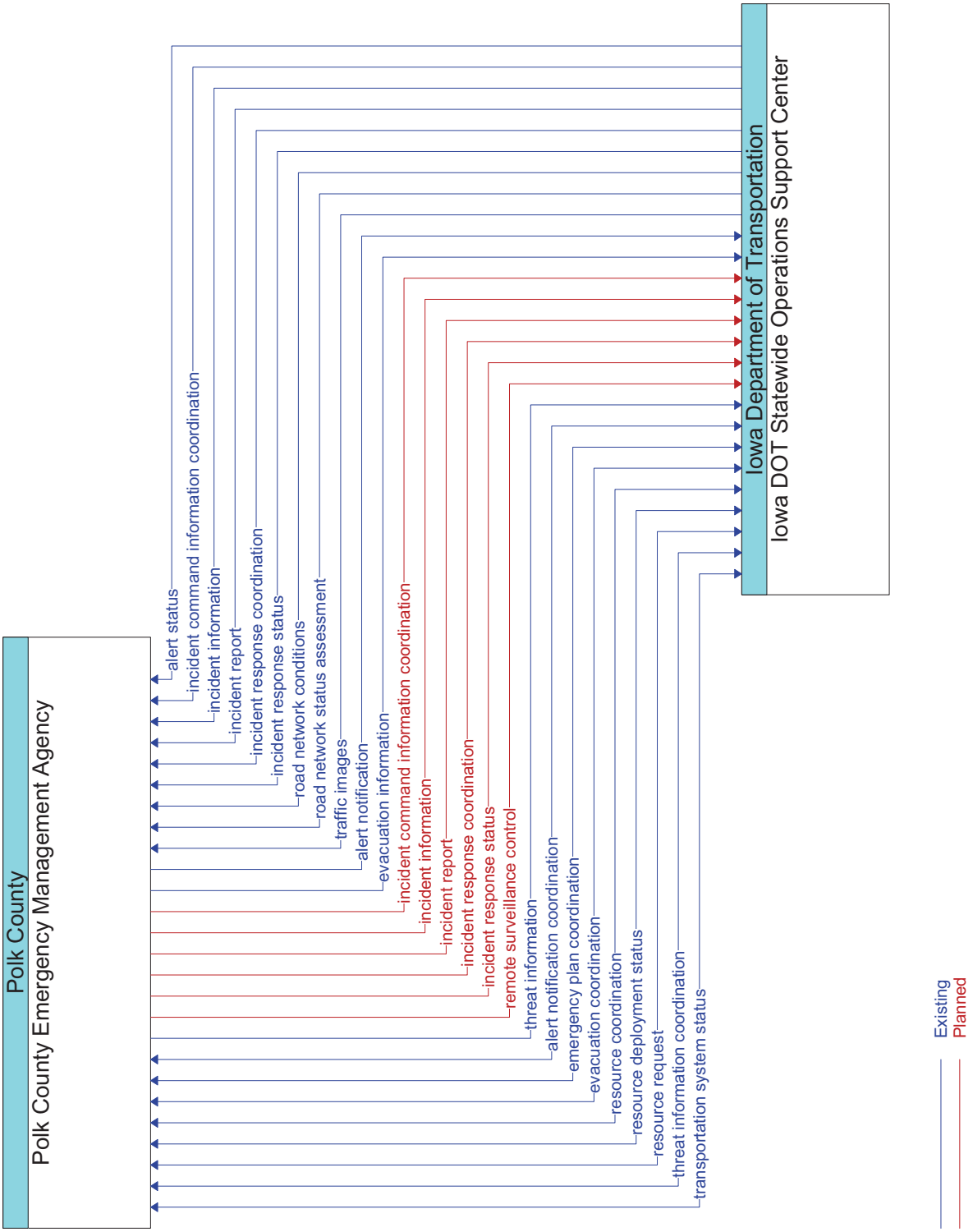
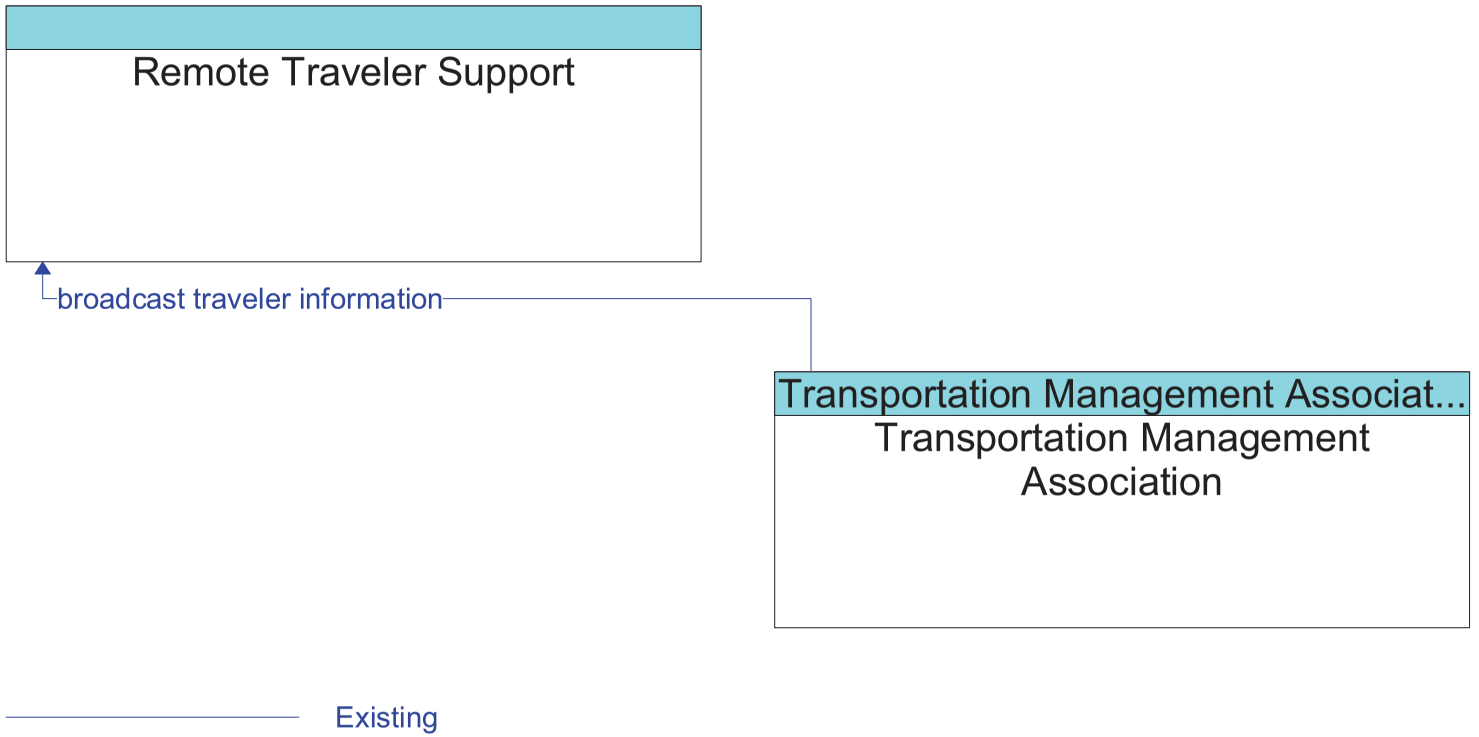
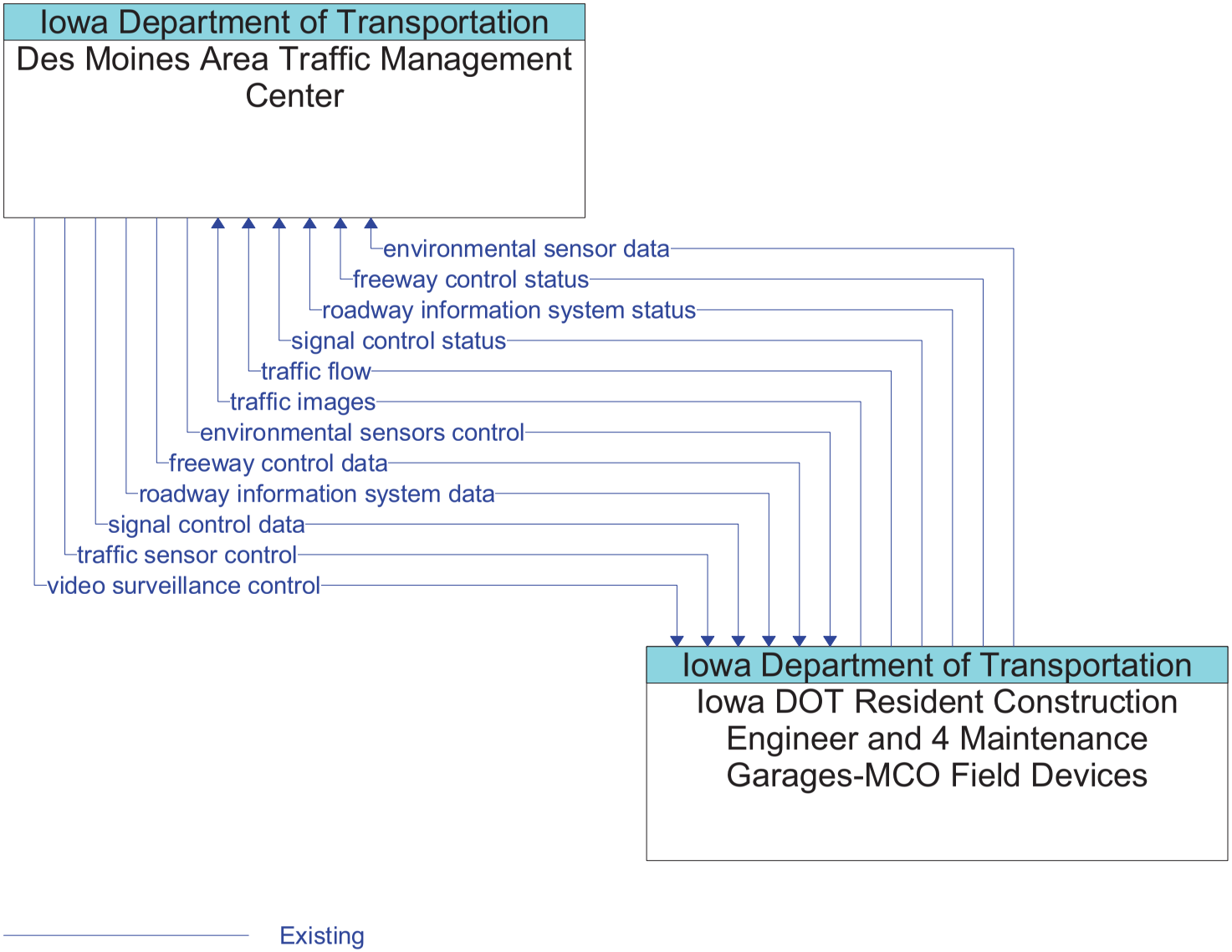
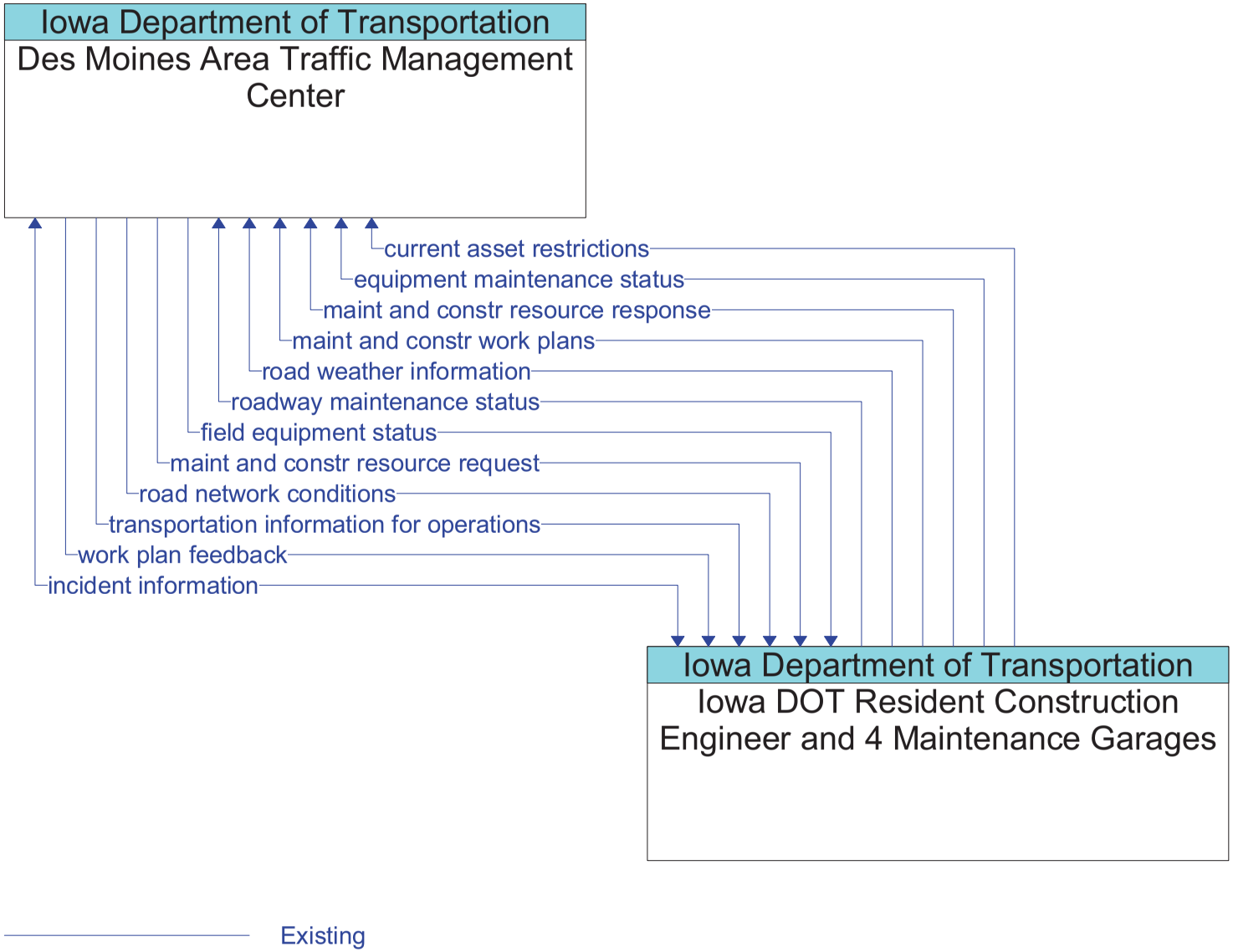
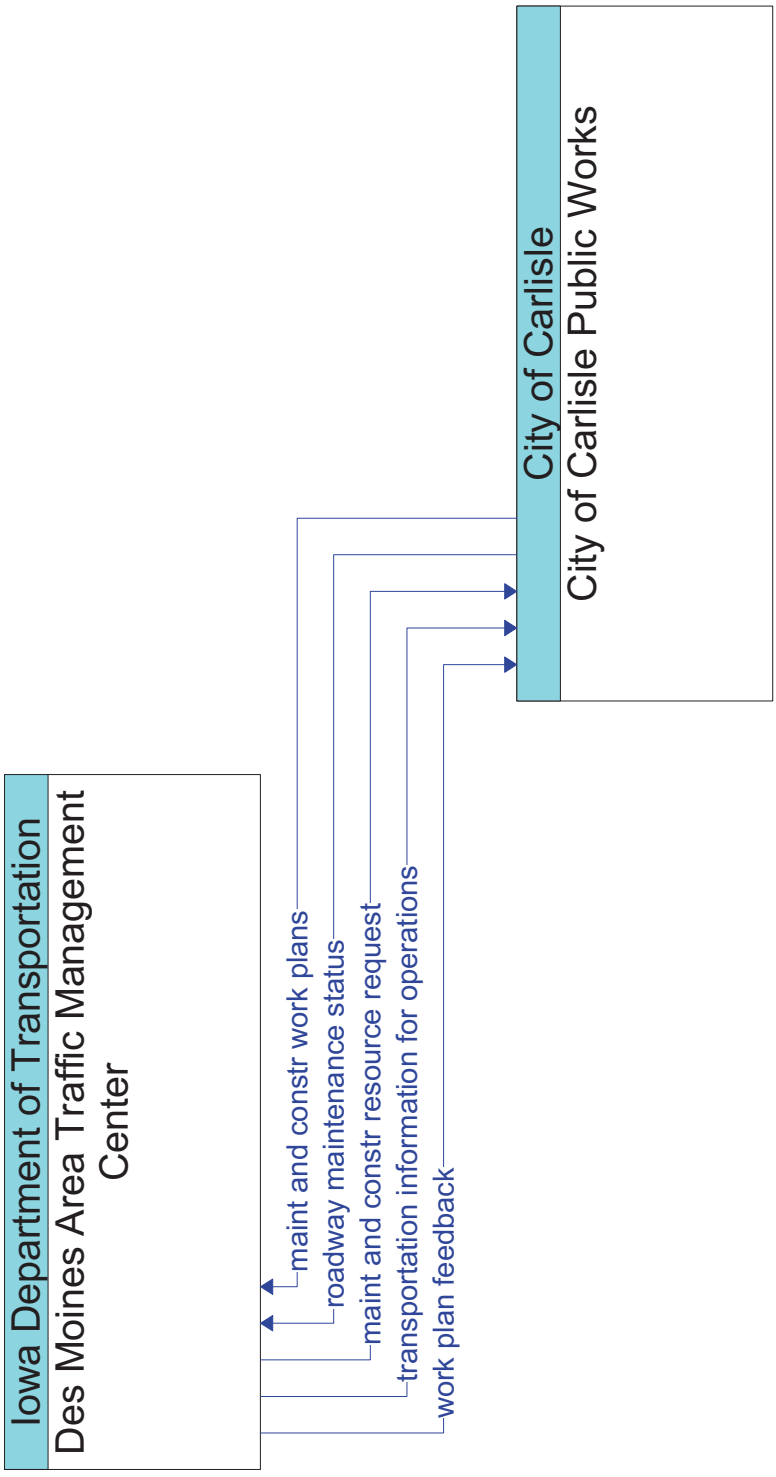
emergency vehicle tracking data
emergency dispatch requests
Polk County
Polk County Dispatch-Emergency Vehicles
Existing

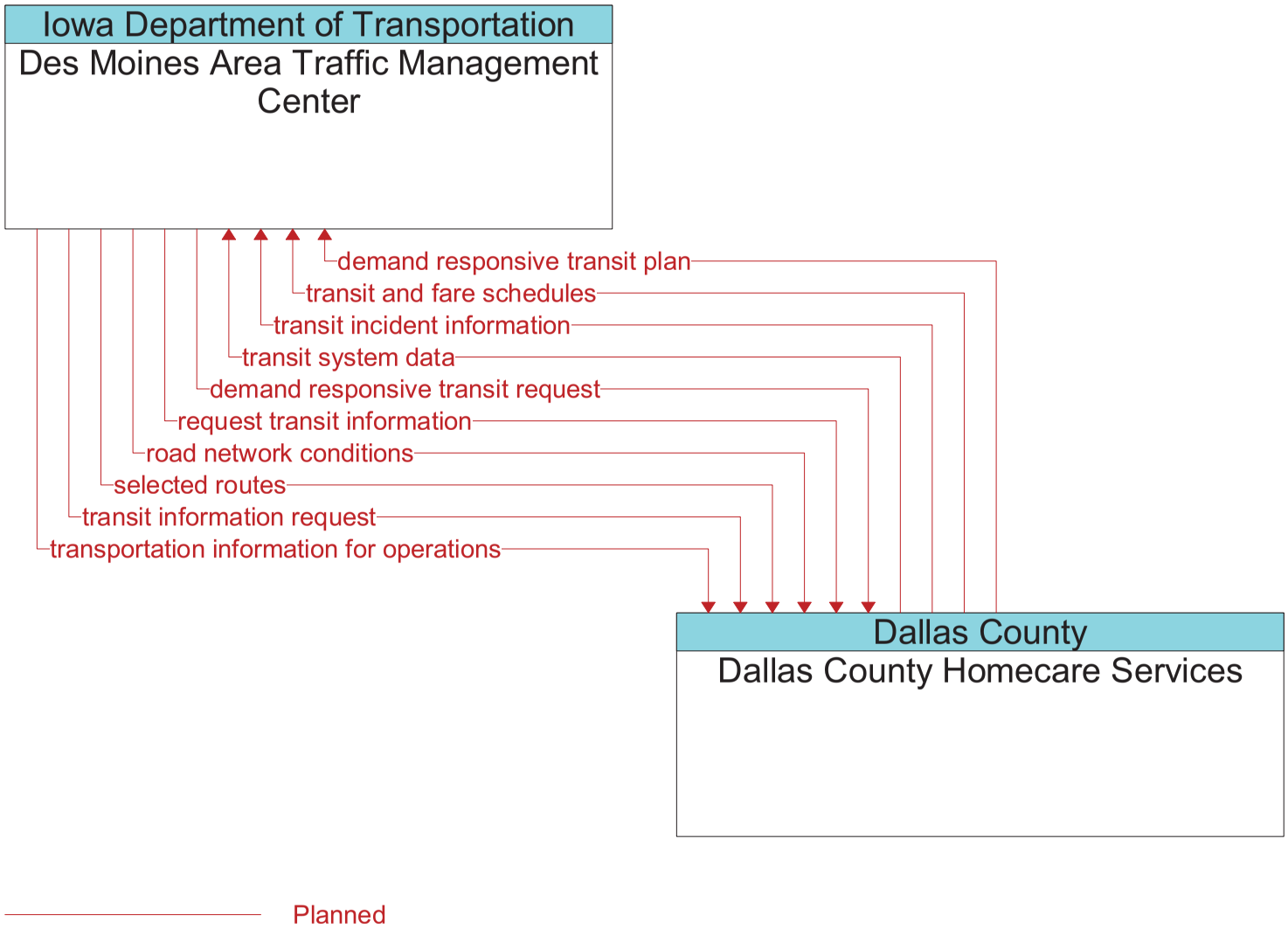

Polk County
Polk County Emergency Management Agency
alert status
incident command information coordination
incident information
incident report
incident response coordination
incident response status
road network conditions
road network status assessment
traffic images
alert notification
evacuation information
incident command information coordination
incident information
incident report
incident response coordination
incident response status
remote surveillance control
threat information
alert notification coordination
emergency plan coordination
evacuation coordination
resource coordination
resource deployment status
resource request
threat information coordination
transportation system status
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Existing
Planned

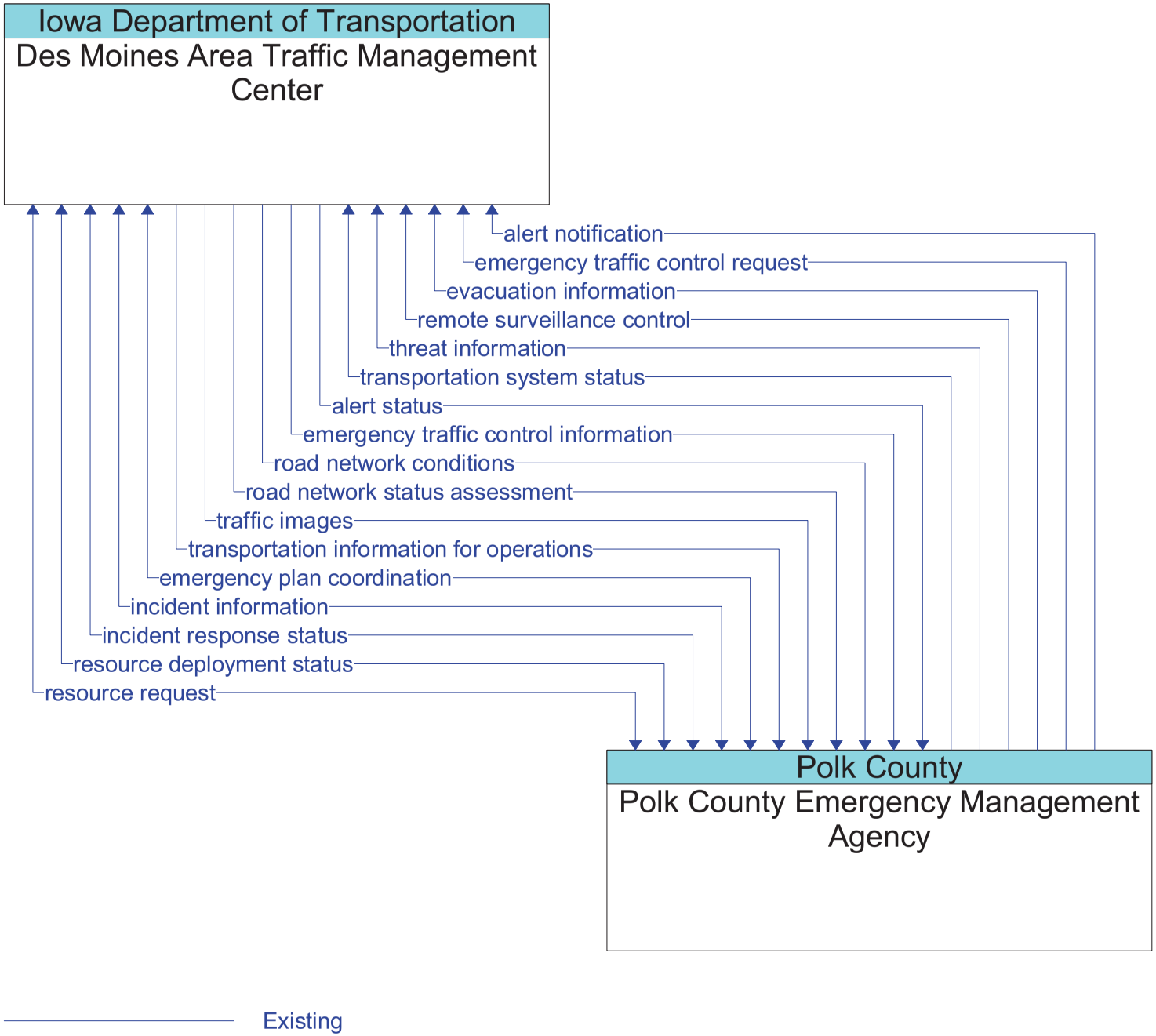

Remote Traveler Support
broadcast traveler information
Transportation Management Associat...
Transportation Management Association
Existing

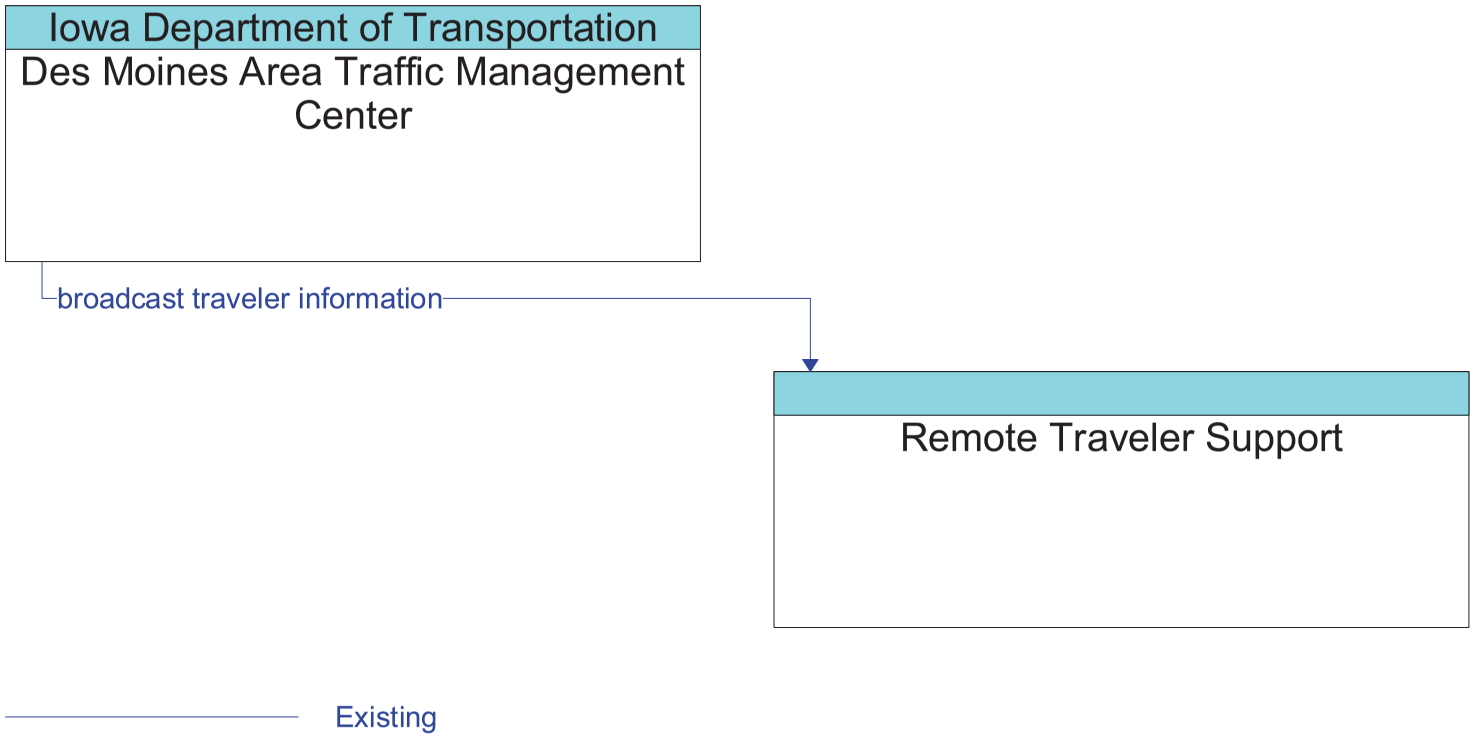

Iowa Department of Transportation
Des Moines Area Traffic Management Center
environmental sensor data
freeway control status
roadway information system status
signal control status
traffic flow
traffic images
environmental sensors control
freeway control data
roadway information system data
signal control data
traffic sensor control
video surveillance control
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
Existing

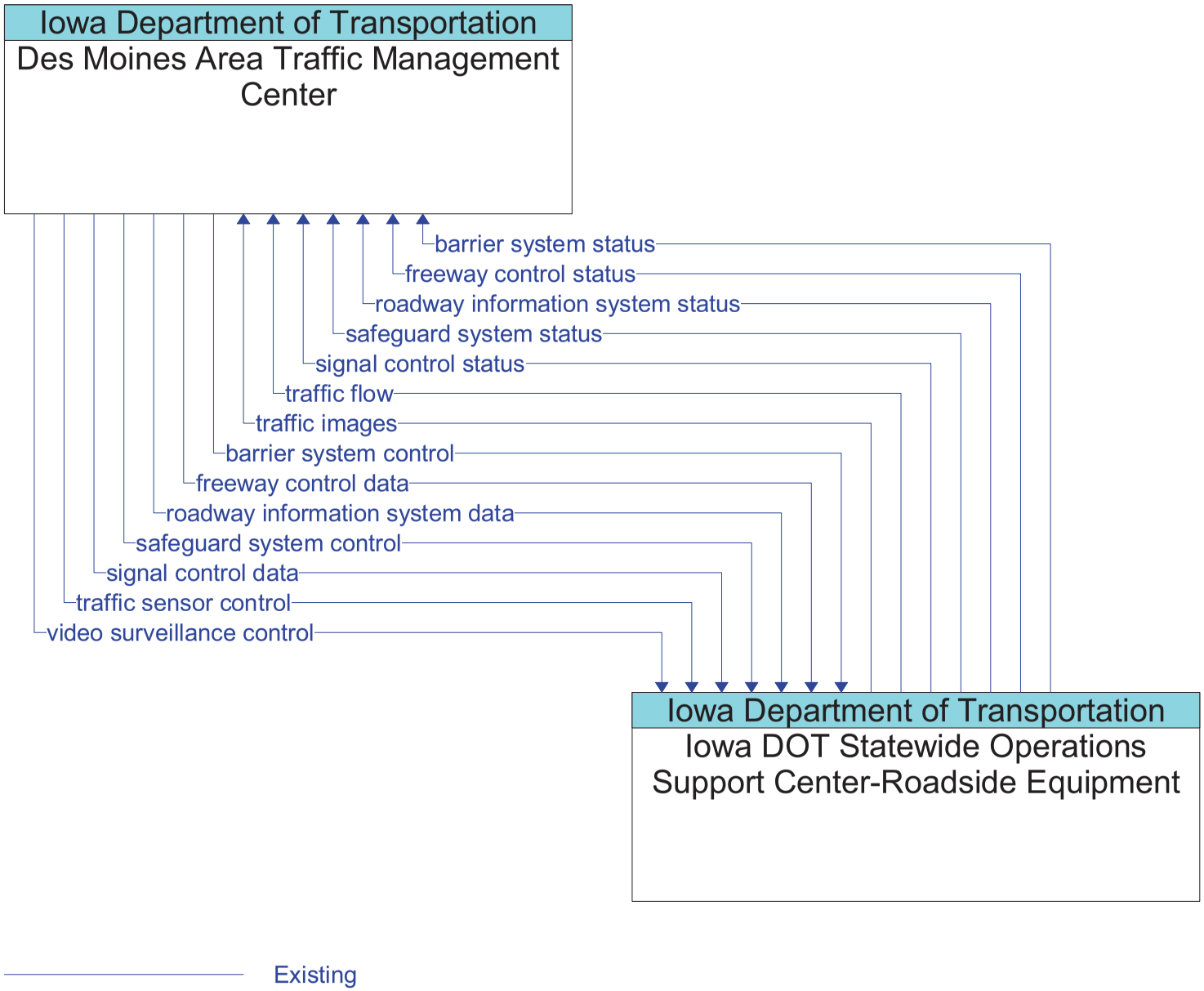

Iowa Department of Transportation
Des Moines Area Traffic Management Center
current asset restrictions
equipment maintenance status
maint and constr resource response
maint and constr work plans
road weather information
roadway maintenance status
field equipment status
maint and constr resource request
road network conditions
transportation information for operations
work plan feedback
incident information
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
Existing

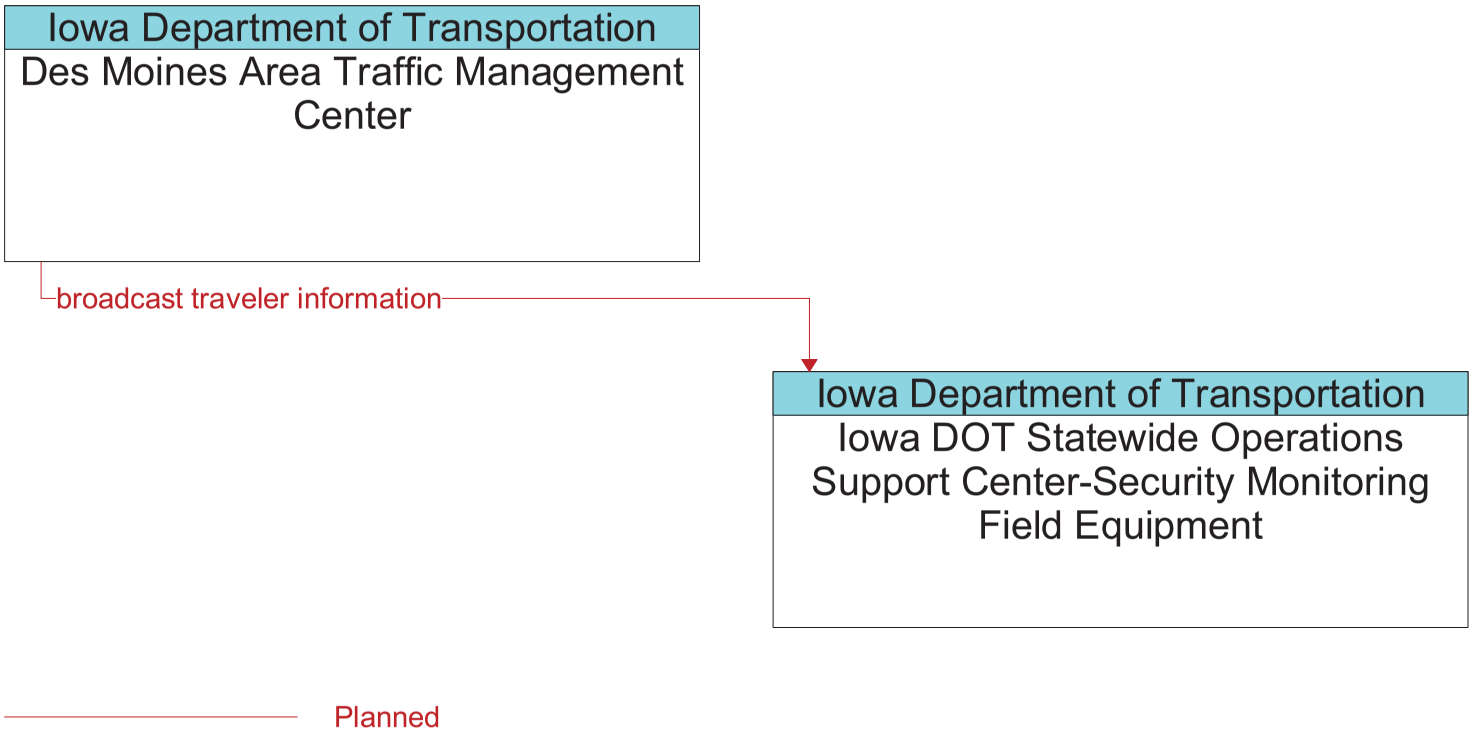

Iowa Department of Transportation
Des Moines Area Traffic Management Center
City of Carlisle
City of Carlisle Public Works
maint and constr work plans
roadway maintenance status
maint and constr resource request
transportation information for operations
work plan feedback
Existing

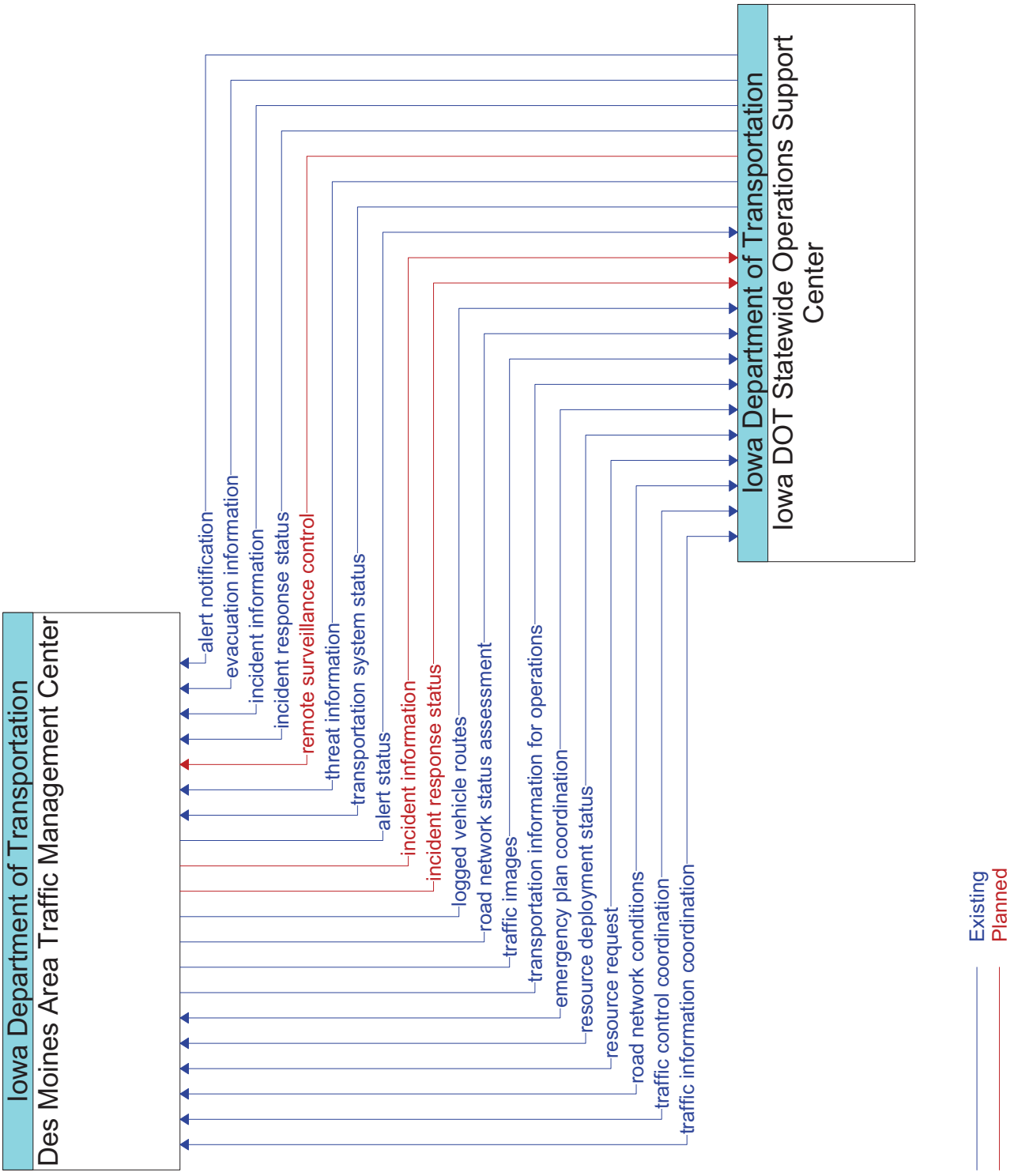

Iowa Department of Transportation
Des Moines Area Traffic Management Center
demand responsive transit plan
transit and fare schedules
transit incident information
transit system data
demand responsive transit request
request transit information
road network conditions
selected routes
transit information request
transportation information for operations
Dallas County
Dallas County Homecare Services
Planned

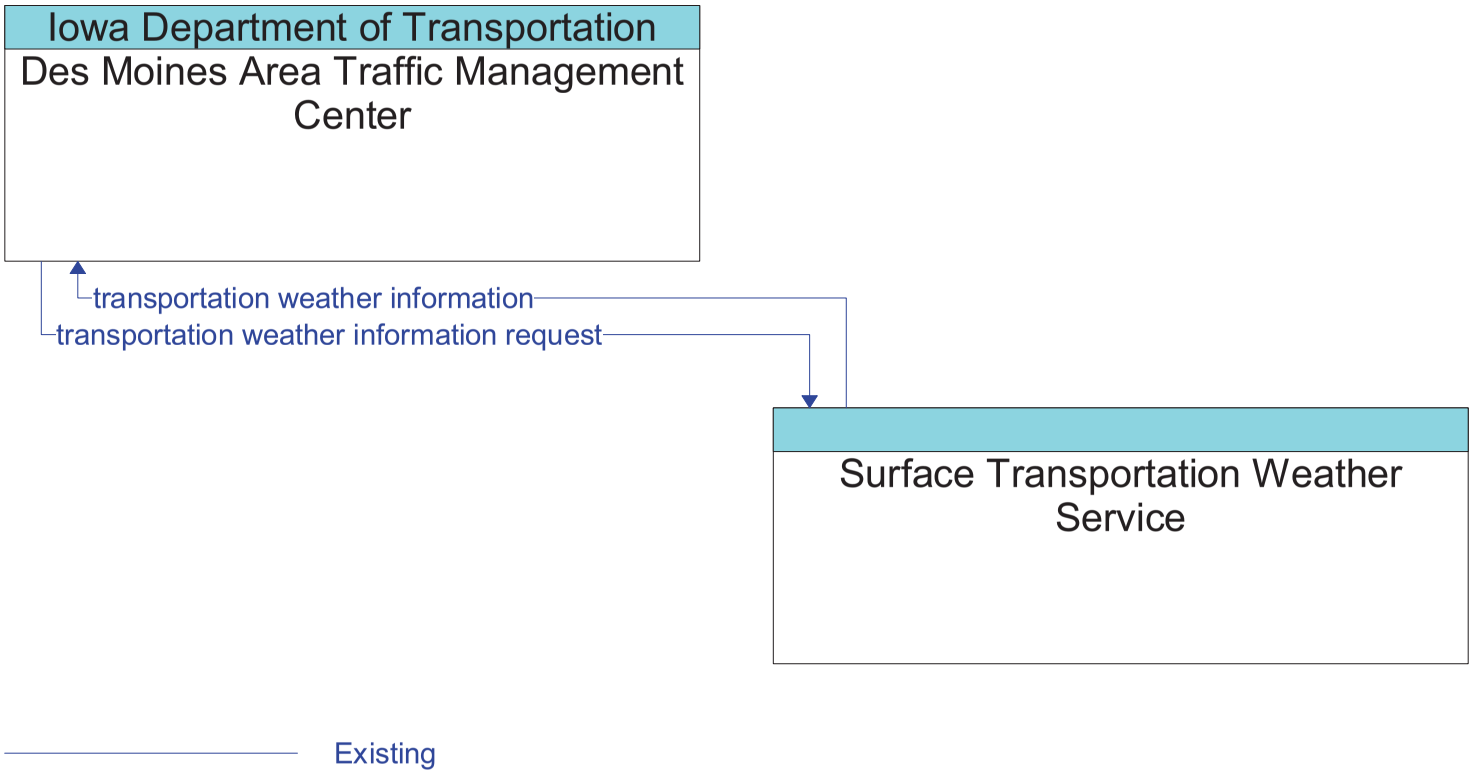

Iowa Department of Transportation
Des Moines Area Traffic Management Center
alert notification
emergency traffic control request
evacuation information
remote surveillance control
threat information
transportation system status
alert status
emergency traffic control information
road network conditions
road network status assessment
traffic images
transportation information for operations
emergency plan coordination
incident information
incident response status
resource deployment status
resource request
Polk County
Polk County Emergency Management Agency
Existing


Iowa Department of Transportation
Des Moines Area Traffic Management Center
broadcast traveler information
Remote Traveler Support
Existing


Iowa Department of Transportation
Des Moines Area Traffic Management Center
barrier system status
freeway control status
roadway information system status
safeguard system status
signal control status
traffic flow
traffic images
barrier system control
freeway control data
roadway information system data
safeguard system control
signal control data
traffic sensor control
video surveillance control
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Roadside Equipment
Existing


Iowa Department of Transportation
Des Moines Area Traffic Management Center
broadcast traveler information
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center-Security Monitoring Field Equipment
Planned


Iowa Department of Transportation
Des Moines Area Traffic Management Center
alert notification
evacuation information
incident information
incident response status
remote surveillance control
threat information
transportation system status
alert status
incident information
incident response status
logged vehicle routes
road network status assessment
traffic images
transportation information for operations
emergency plan coordination
resource deployment status
resource request
road network conditions
traffic control coordination
traffic information coordination
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Existing
Planned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Des Moines Area Traffic Management Center
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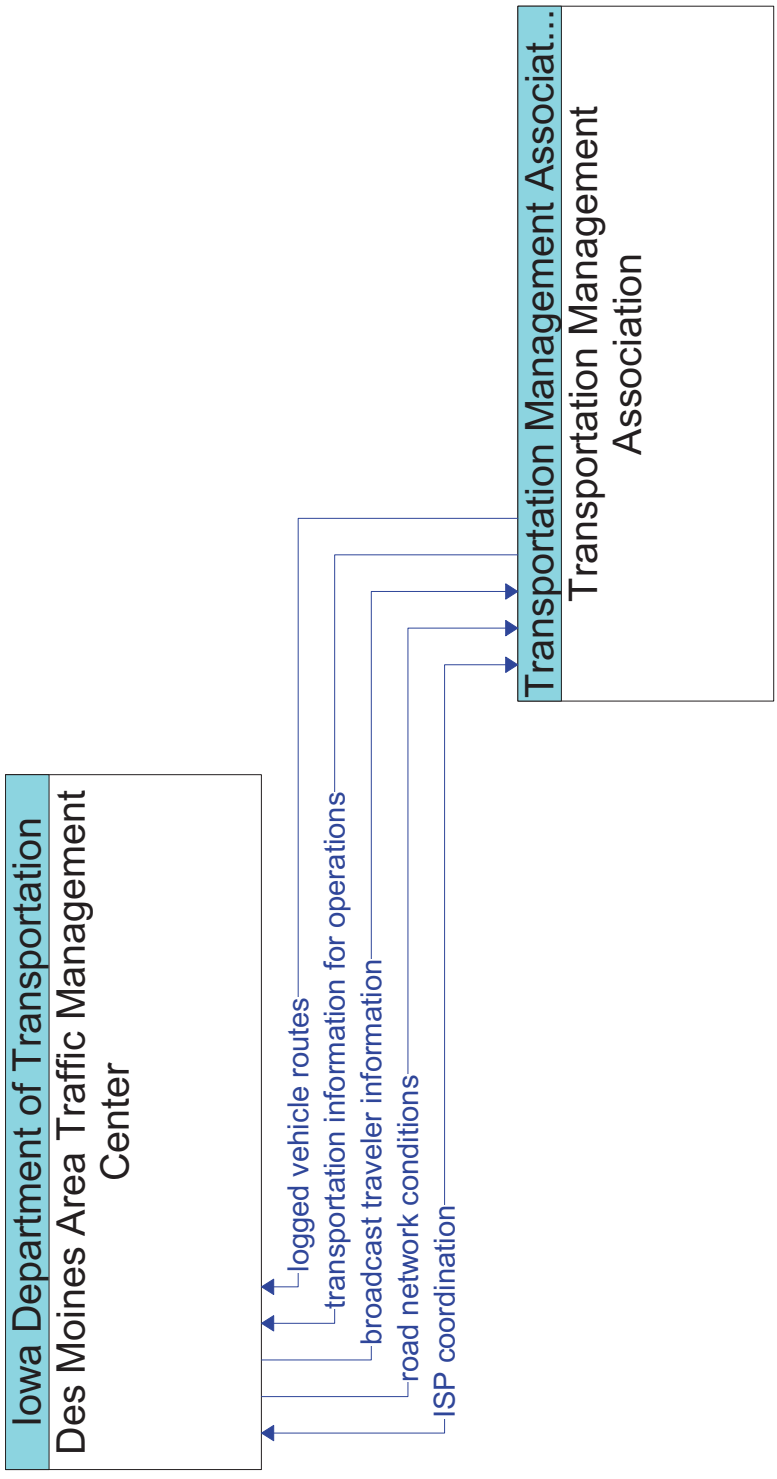
Surface Transportation Weather Service
Existing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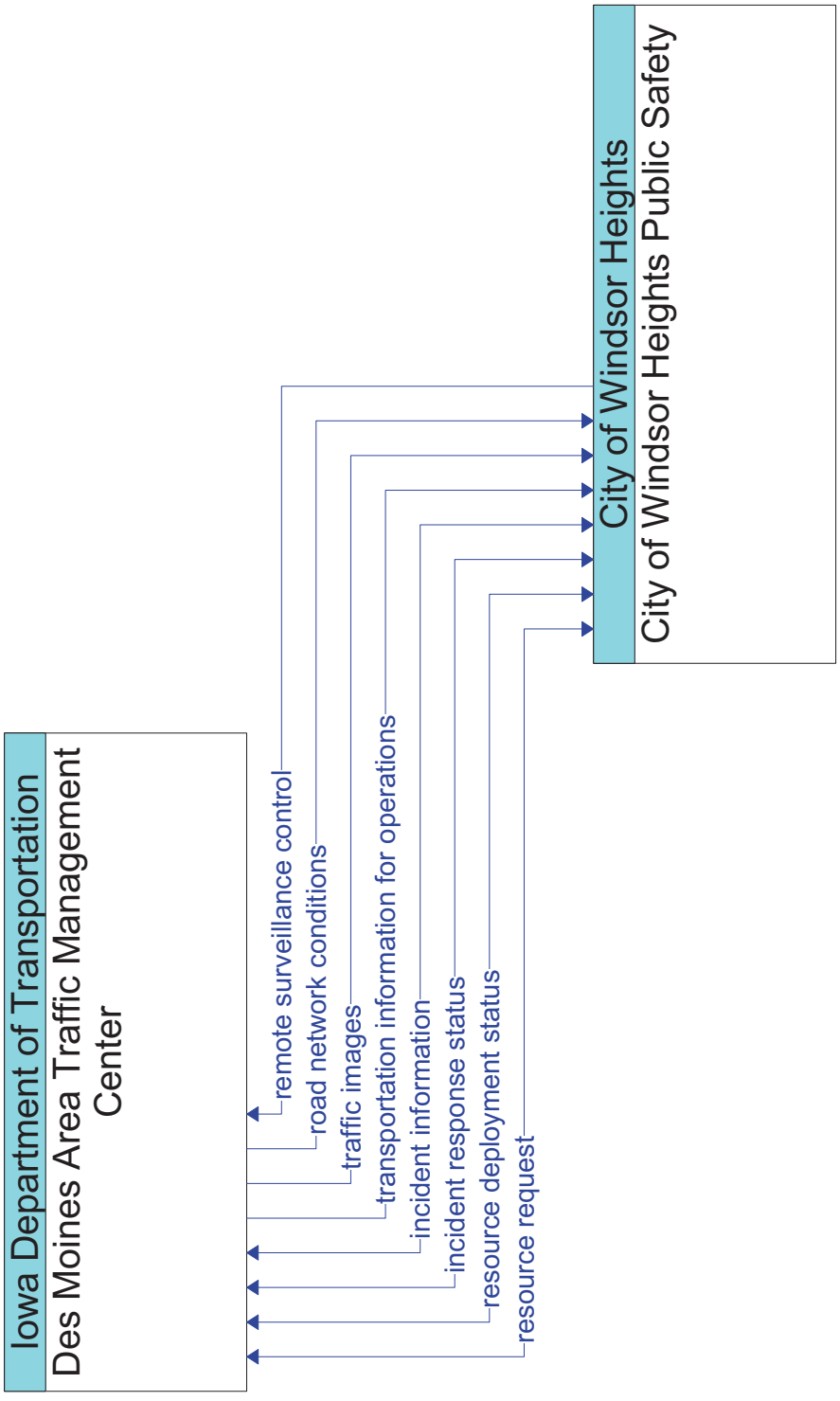
Des Moines Area Traffic Management Center
Transportation Management Associat...
Transportation Management Association
logged vehicle routes
transportation information for operations
broadcast traveler information
road network conditions
ISP coordination
Existing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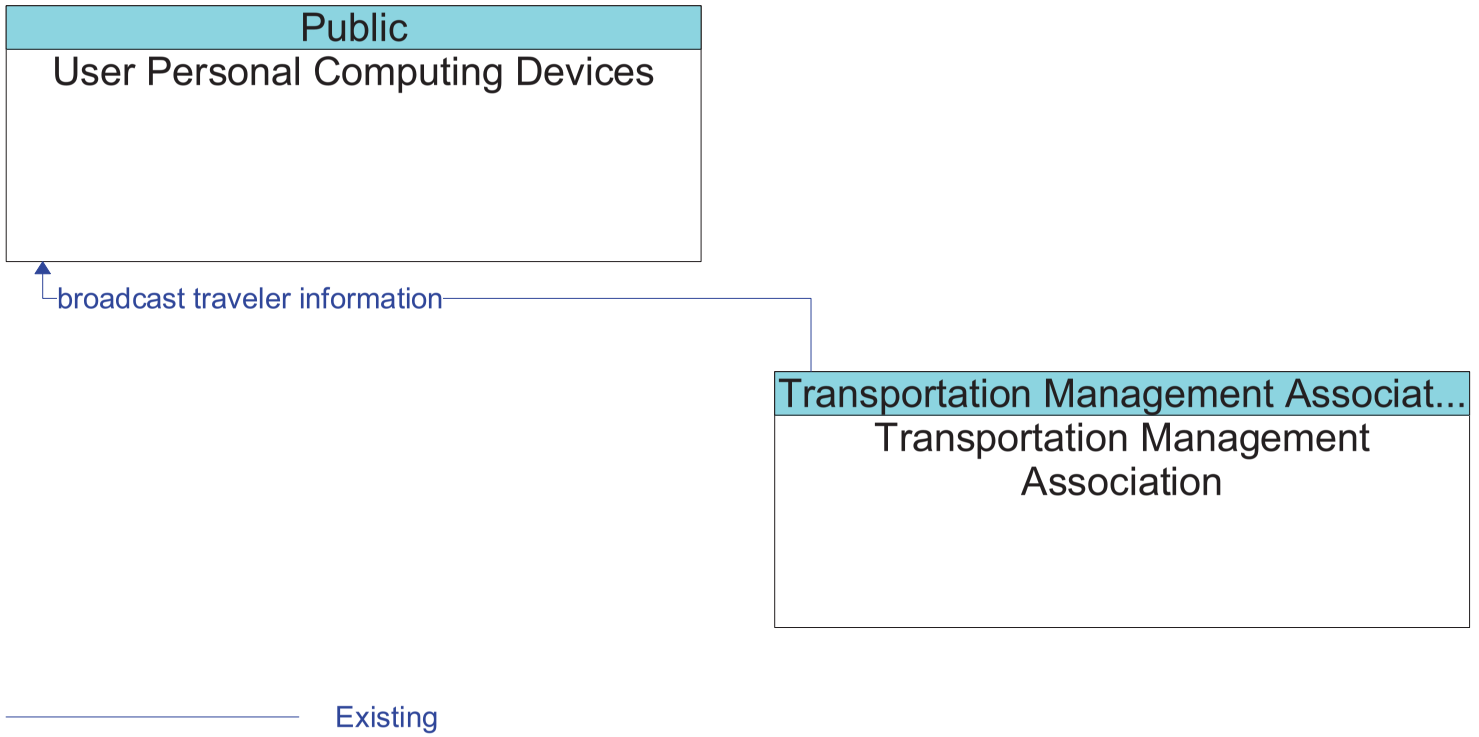
Des Moines Area Traffic Management Center
City of Windsor Heights
City of Windsor Heights Public Safety
remote surveillance control
road network conditions
traffic images
transportation information for operations
incident information
incident response status
resource deployment status
resource request
Existing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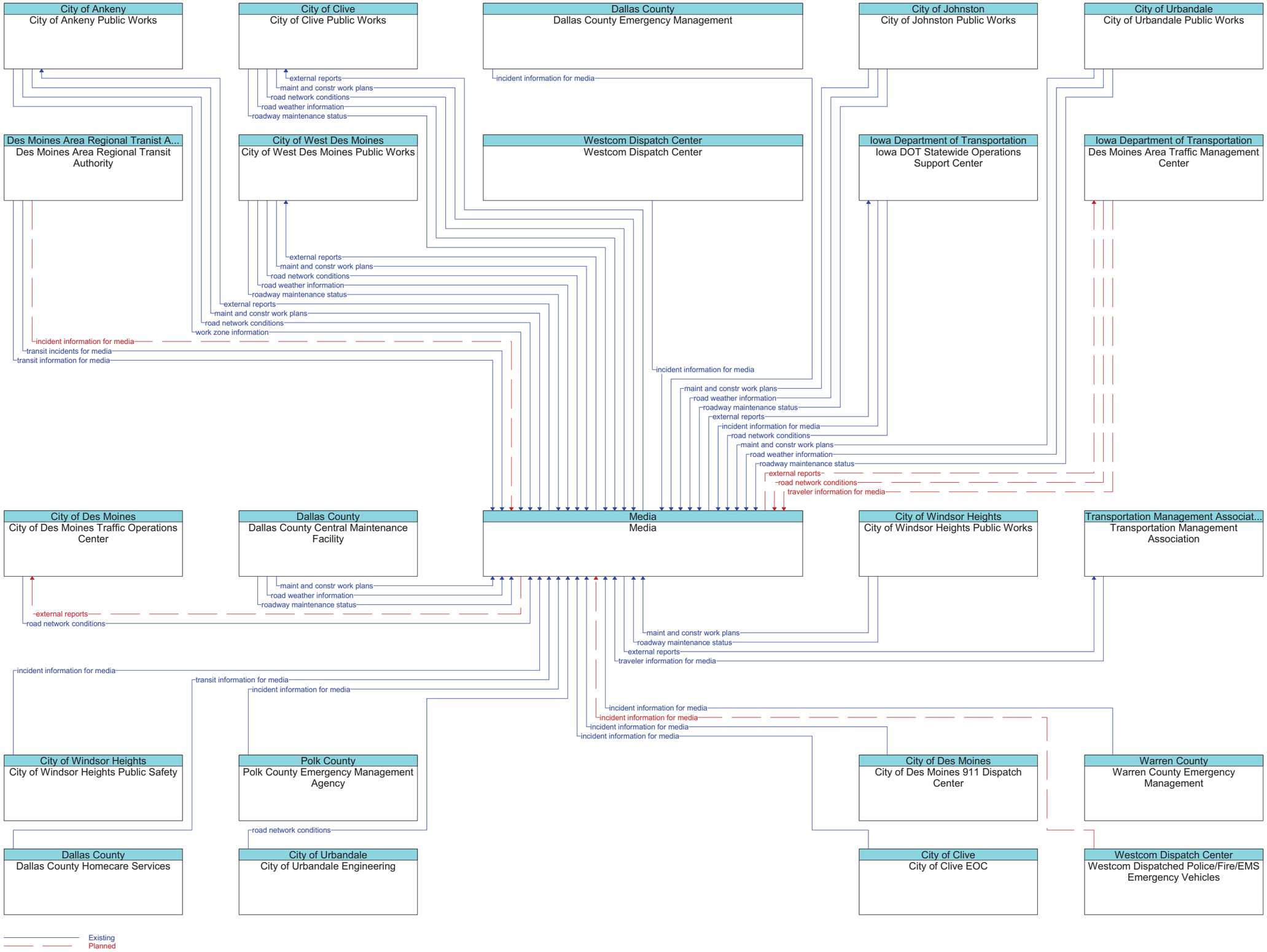
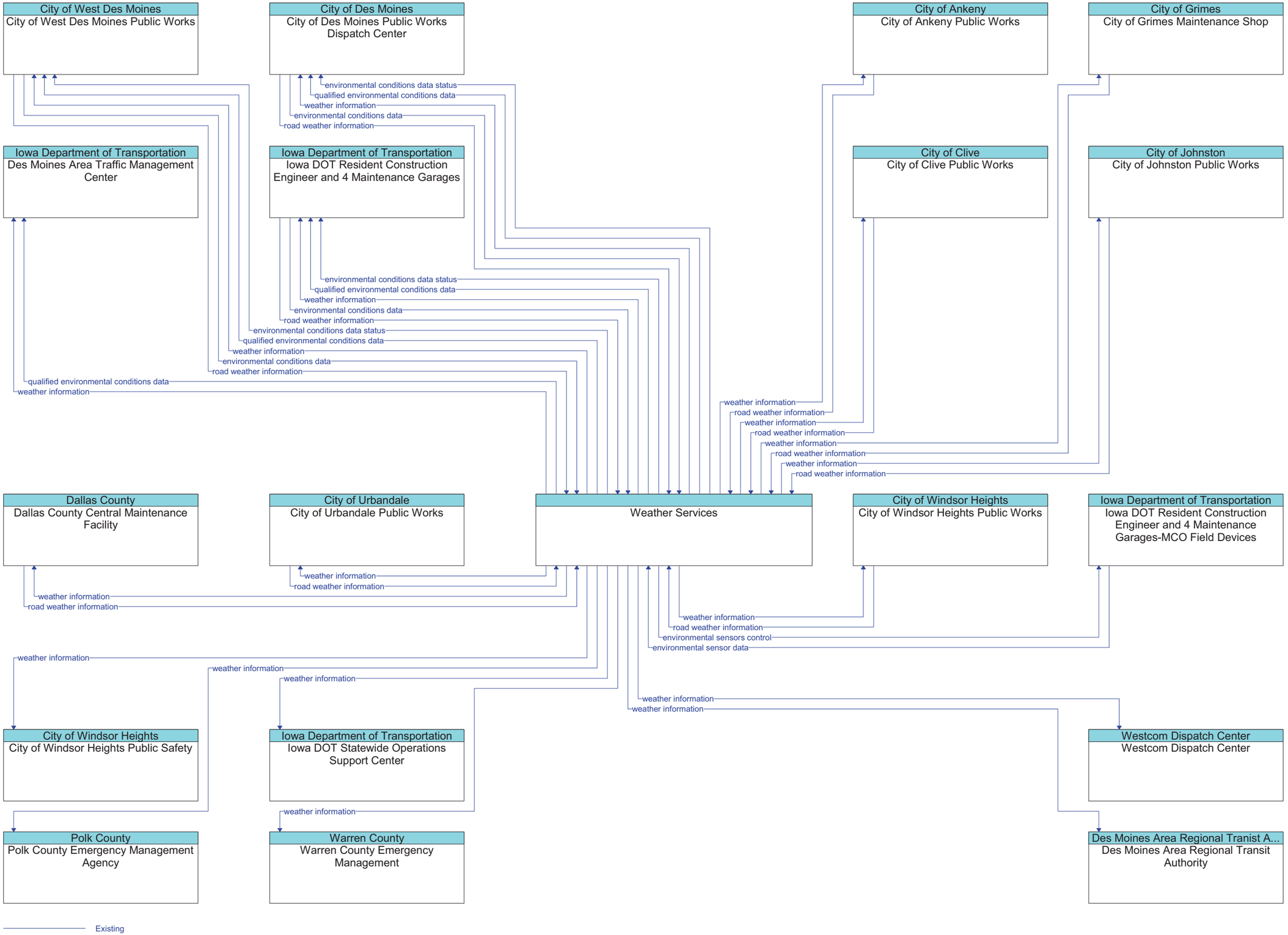
User Personal Computing Devices
broadcast traveler information
Transportation Management Associat...
Transportation Management Association
Existing


City of Ankeny
City of Ankeny Public Works
City of Clive
City of Clive Public Works
Dallas County
Dallas County Emergency Management
City of Johnston
City of Johnston Public Works
City of Urbandale
City of Urbandale Public Works
Des Moines Area Regional Tranist A...
Des Moines Area Regional Transit Authority
City of West Des Moines
City of West Des Moines Public Works
Westcom Dispatch Center
Westcom Dispatch Center
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Iowa Department of Transportation
Des Moines Area Traffic Management Center
City of Des Moines
City of Des Moines Traffic Operations Center
Dallas County
Dallas County Central Maintenance Facility
Media
Media
City of Windsor Heights
City of Windsor Heights Public Works
Transportation Management Associat...
Transportation Management Association
City of Windsor Heights
City of Windsor Heights Public Safety
Polk County
Polk County Emergency Management Agency
City of Des Moines
City of Des Moines 911 Dispatch Center
Warren County
Warren County Emergency Management
Dallas County
Dallas County Homecare Services
City of Urbandale
City of Urbandale Engineering
City of Clive
City of Clive EOC
Westcom Dispatch Center
Westcom Dispatched Police/Fire/EMS Emergency Vehicles
external reports
maint and constr work plans
road network conditions
road weather information
roadway maintenance status
incident information for media
work zone information
transit incidents for media
transit information for media
traveler information for media
Existing
Planned


City of West Des Moines
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City of Des Moines
City of Des Moines Public Works Dispatch Center
City of Ankeny
City of Ankeny Public Works
City of Grimes
City of Grimes Maintenance Shop
environmental conditions data status
qualified environmental conditions data
weather information
environmental conditions data
road weather information
Iowa Department of Transportation
Des Moines Area Traffic Management Center
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages
City of Clive
City of Clive Public Works
City of Johnston
City of Johnston Public Works
qualified environmental conditions data
weather information
road weather information
Dallas County
Dallas County Central Maintenance Facility
City of Urbandale
City of Urbandale Public Works
Weather Services
City of Windsor Heights
City of Windsor Heights Public Works
Iowa Department of Transportation
Iowa DOT Resident Construction Engineer and 4 Maintenance Garages-MCO Field Devices
environmental sensors control
environmental sensor data
City of Windsor Heights
City of Windsor Heights Public Safety
Iowa Department of Transportation
Iowa DOT Statewide Operations Support Center
Westcom Dispatch Center
Westcom Dispatch Center
Polk County
Polk County Emergency Management Agency
Warren County
Warren County Emergency Management
Des Moines Area Regional Tranist A...
Des Moines Area Regional Transit Authority
Existing

APPENDIX F
Standards

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Report 4. Relevant Standards Activities

Standards for Greater Des Moines Metropolitan Area, Iowa

> ⚠ NOTE: The ITS standards presented in this report may represent a superset of options, and in some cases, provide redundant capabilities. In addition, these ITS standards are at different maturity levels. Care should be taken to select the standards that best meet the needs of the region or project.

Lead SDO	Standard Name	Version	Document ID
AASHTO/ITE	Traffic Management Data Dictionary and Message Sets for External TMC Communication (TMDD and MS/ETMCC)		ITE TMDD 2.1
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group		(See Footnote)
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group		(See Footnote)
AASHTO/ITE/NEMA	Global Object Definitions		NTCIP 1201
AASHTO/ITE/NEMA	Object Definitions for Actuated Traffic Signal Controller (ASC) Units		NTCIP 1202
AASHTO/ITE/NEMA	Object Definitions for Dynamic Message Signs (DMS)		NTCIP 1203
AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations (ESS)		NTCIP 1204
AASHTO/ITE/NEMA	Object Definitions for Closed Circuit Television (CCTV) Camera Control		NTCIP 1205
AASHTO/ITE/NEMA	Object Definitions for Ramp Meter Control (RMC) Units		NTCIP 1207
AASHTO/ITE/NEMA	Object Definitions for Closed Circuit Television (CCTV) Switching		NTCIP 1208
AASHTO/ITE/NEMA	Data Element Definitions for Transportation Sensor Systems (TSS)		NTCIP 1209
AASHTO/ITE/NEMA	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters		NTCIP 1210
AASHTO/ITE/NEMA	Object Definitions for Signal Control and Prioritization (SCP)		NTCIP 1211
APTA	Standard for Transit Communications Interface Profiles		APTA TCIP-S-001 3.0.0
ASTM/IEEE/SAE	Dedicated Short Range Communication at 5.9 GHz Standards Group		(See Footnote)
IEEE	Incident Management Standards Group		(See Footnote)

Standards for Greater Des Moines Metropolitan Area, Iowa

Lead SDO	Standard Name	Version	Document ID
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group		(See Footnote)
SAE	Advanced Traveler Information Systems (ATIS) General Use Standards Group		(See Footnote)

Standards for Greater Des Moines Metropolitan Area, Iowa

Lead SDO	Standard Name	Version	Document ID

Footnotes:

Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group

SDO	Standard Name	Document ID
SAE	Location Referencing Message Specification (LRMS)	SAE J2266
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
SAE	Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media	SAE J2369
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540
SAE	RDS (Radio Data System) Phrase Lists	SAE J2540/1
SAE	ITIS (International Traveler Information Systems) Phrase Lists	SAE J2540/2
SAE	National Names Phrase List	SAE J2540/3

Advanced Traveler Information Systems (ATIS) General Use Standards Group

SDO	Standard Name	Document ID
SAE	Location Referencing Message Specification (LRMS)	SAE J2266
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540
SAE	RDS (Radio Data System) Phrase Lists	SAE J2540/1
SAE	ITIS (International Traveler Information Systems) Phrase Lists	SAE J2540/2
SAE	National Names Phrase List	SAE J2540/3

Dedicated Short Range Communication at 5.9 GHz Standards Group

SDO	Standard Name	Document ID
ASTM	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications	ASTM E2213-03
IEEE	Standard for Wireless Access in Vehicular Environments (WAVE) - Resource Manager	IEEE 1609.1-2006
IEEE	Standard for Wireless Access in Vehicular Environments (WAVE) - Security Services for Applications and Management Messages	IEEE 1609.2-2006
IEEE	Standard for Wireless Access in Vehicular Environments (WAVE) - Multi-Channel Operation	IEEE 1609.4-2006
IEEE	Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services	IEEE P1609.3
IEEE	Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications	IEEE P802.11p

Incident Management Standards Group

SDO	Standard Name	Document ID

Lead SDO	Standard Name	Version	Document ID

Incident Management Standards Group

SDO	Standard Name	Document ID
IEEE	Standard for Common Incident Management Message Sets for use by Emergency Management Centers	IEEE 1512 -2006
IEEE	Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.1-2006
IEEE	Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.2-2004
IEEE	Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.3-2006
IEEE	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers	IEEE P1512.4

NTCIP Center-to-Center Standards Group

SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Octet Encoding Rules (OER) Base Protocol	NTCIP 1102
AASHTO/ITE/NEMA	Center-to-Center Naming Convention Specification	NTCIP 1104
AASHTO/ITE/NEMA	Ethernet Subnetwork Profile	NTCIP 2104
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	File Transfer Protocol (FTP) Application Profile	NTCIP 2303
AASHTO/ITE/NEMA	Application Profile for DATEX-ASN (AP-DATEX)	NTCIP 2304
AASHTO/ITE/NEMA	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications (C2C XML)	NTCIP 2306

NTCIP Center-to-Field Standards Group

SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Octet Encoding Rules (OER) Base Protocol	NTCIP 1102
AASHTO/ITE/NEMA	Transportation Management Protocols (TMP)	NTCIP 1103
AASHTO/ITE/NEMA	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101
AASHTO/ITE/NEMA	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile	NTCIP 2102
AASHTO/ITE/NEMA	Point-to-Point Protocol Over RS-232 Subnetwork Profile	NTCIP 2103
AASHTO/ITE/NEMA	Ethernet Subnetwork Profile	NTCIP 2104
AASHTO/ITE/NEMA	Transportation Transport Profile	NTCIP 2201
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	Simple Transportation Management Framework (STMF) Application Profile	NTCIP 2301
AASHTO/ITE/NEMA	Trivial File Transfer Protocol (TFTP) Application Profile	NTCIP 2302
AASHTO/ITE/NEMA	File Transfer Protocol (FTP) Application Profile	NTCIP 2303

APPENDIX G
Acronyms

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Acronyms

AASHTO	American Association of State Highway and Transportation Officials
APTA	American Public Transportation Association
ASTM	American Society for Testing and Materials
AVL	Automated Vehicle Location
CCTV	Closed Circuit Television
CTRE	Center for Transportation Research and Education
DART	Des Moines Area Regional Transit Authority
DMS	Dynamic Message Signs
DOT	Department of Transportation
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
JPO	Joint Program Office
MCO	Maintenance and Construction Operations
MPO	Metropolitan Planning Organization
NEMA	National Electrical Manufacturers Association
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible Efficient Transportation Equity Act: A Legacy for Users
SDO	Standard Development Organization
TEA-21	Transportation Equity Act for the 21st Century
TMA	Transportation Management Association
TMC	Traffic Management Center

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