Goodyear Intelligent Transportation Systems Strategic Plan

Executive Summary

Prepared for:

City of Goodyear

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I. INTRODUCTION

The City of Goodyear is a rapidly growing city in the southwest Phoenix metropolitan area. As a growing municipality, Goodyear faces a substantial challenge in building, maintaining, and also expanding its transportation infrastructure to serve increased travel demand within the constraints of limited resources. The City is looking at alternatives to traditional capacity enhancements, and Intelligent Transportation Systems (ITS) can address this challenge and help the existing transportation network function more efficiently. ITS services are a way by which Goodyear and other cities can improve efficiency of the transportation system and provide an acceptable level of service to the traveling public when additional roadway capacity cannot be quickly or affordably constructed.

The City developed an Intelligent Transportation System Strategic Plan to:

- Shape the vision for ITS in Goodyear;
- Identify needs that ITS technologies could help to address;
- Establish goals, objectives, and service area priorities for ITS;
- Identify the infrastructure, funding, and other resources necessary to support the City's ITS priorities;
- Identify roles and responsibilities for implementing these priorities; and
- Establish timeframes for implementing and integrating a transportation technology program.

The City of Goodyear ITS Strategic Plan defines advanced technology and communications solutions to transportation challenges within the City over the next decade and beyond. The Plan serves as a blueprint for development and integration of ITS strategies with consideration of cost-effective, high impact, priority focus areas within the City's transportation network. The Strategic Plan development focuses on near-term deployment opportunities in the next five years as well as identifies the long-term strategies for integrating ITS in the City over the course of the next 15 years. The pace of deployment planned in this strategic plan for the City of Goodyear is consistent with the pace that has been seen in the City over the past decade. Land development in the City over the next decade will determine the pace of infrastructure deployment as well as staffing requirements to support that infrastructure.

II. STAKEHOLDER COORDINATION

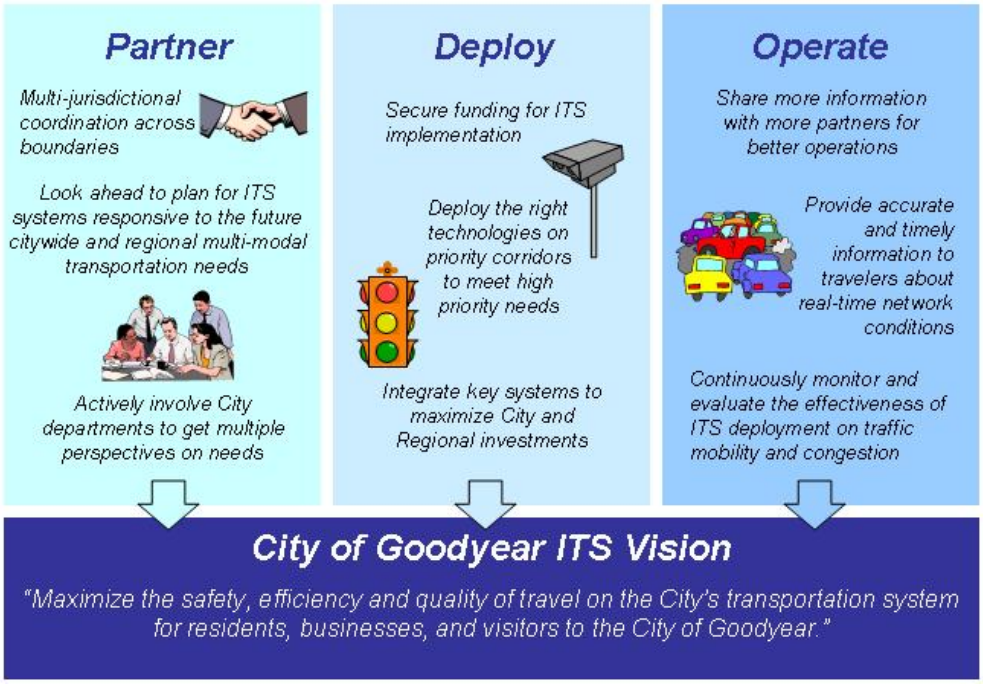
Stakeholder input to the City's transportation needs and challenges is the foundation of an ITS Strategic Plan. A broad cross-section of City staff from a variety of departments was involved to ensure that the existing operations and future needs lists are current and comprehensive. Partner agencies, including Arizona Department of Transportation (ADOT), Maricopa County Department of Transportation (MCDOT), Maricopa Association of Governments (MAG), City of Avondale, and Town of Buckeye also participated in the planning process.

A project web page for this project is hosted within the City's website and provides a centralized project information resource for an overview of the ITS Strategic Plan, contact information, project newsletters, schedule, deliverable and presentation downloads, meeting materials and the Final Reports and Executive Summary.

Focus Group meetings were held in mid-September 2007 and late January 2008 for stakeholders to provide their input to the project. Project newsletters were also developed throughout the project to provide a snapshot of the project progress and key issues and recommendations developed during the project.

To provide direction and focus in developing the ITS Strategic Plan, the City of Goodyear identified a clear vision and mission for the future of ITS in the City, which is shown on the next page. The mission statement has been developed to align with the City's vision and describe the active process by which a successful ITS program will be implemented in the City.

These missions are ongoing—there will need to be active partnering, deployment, and operations throughout the life of the City's ITS Program.



III. CITY OVERVIEW AND IMPACTS TO PLANNING

CITY OF GOODYEAR

Goodyear was the fifth fastest growing city in Maricopa County from 2000 to 2005. In 2007, the population of Goodyear was approximately 47,000 and was projected to be approximately 174,000 in 2020; and 300,000 in 2030, showing a growth rate of approximately 10% per year as reported by the MAG Socioeconomic Projections (May, 2007). Goodyear shares planning boundaries with the City of Avondale to the east, Town of Buckeye to the west, City of Litchfield Park to the north, and Gila River Indian Community and City of Maricopa to the southeast, and Maricopa County.

NEIGHBORING JURISDICTIONS

The decisions that Goodyear makes regarding ITS deployments will impact neighboring jurisdictions and regional ITS initiatives when coordinating corridor operations across boundaries. Traffic demand along the nearby highways of I-10 traveling east/west and Loop 303 traveling north/south will increase substantially as the west valley develops. Coordination between the Cities of Goodyear and Avondale is very important because they share east-west travel corridors. Avondale currently has a traffic signal system with wireless connections to the traffic signal controllers, closed-circuit television (CCTV) cameras for traffic monitoring, some camera detection at signalized intersections, and plans to implement a Traffic Management Center (TMC) in the next two to three years. The newly annexed communities that border the Maricopa/Pinal County line at the western edge of the City of Maricopa will impact transportation planning in Goodyear through the development of new roadways and communities.

IV. EXISTING INVENTORY

Goodyear existing inventory as well as ITS inventory in neighboring jurisdictions affects the planning for future deployments of ITS infrastructure in Goodyear.

GOODYEAR

Arterial ITS infrastructure includes video detection, CCTV cameras, and communication to traffic signal controllers. The City currently operates 67 existing traffic signals, some with video detection. The City has synchronized its traffic signal system and utilizes lagging left turns for its traffic operations. New traffic signals continue to be designed and constructed, and additional expansion of the signal system will occur every year following. Projects to provide a fiber optic backbone and communication to some City of Goodyear intersections are have been completed along Litchfield Road and are planned for McDowell Road.

The MAG ITS Committee has recommended approval for the following Goodyear ITS projects:

- Portable dynamic message signs (DMS) to have before the spring training facility is in place; Goodyear currently has four portable DMS (applied for 2009 funding);
- Joint project with the City of Avondale and MCDOT to install eight DMS on MC-85 and on McDowell Road; and
- Fifteen miles of fiber in existing conduit (applied for 2013 funding).

NEIGHBORING JURISDICTIONS

ITS devices and infrastructure for the neighboring jurisdictions of Avondale and Maricopa County complement the ITS devices in Goodyear along corridors that cross into multiple jurisdictions. Coordination of deployment of these devices will provide traffic monitoring and communications opportunities along the corridors that the jurisdictions share. Future planned ITS infrastructure in Goodyear should continue to coordinate with its neighbors' planned deployments to foster the greatest coverage and cooperation capabilities between the cities and the county.

V. NEEDS AND ISSUES

KEY NEEDS AND ISSUES

Based on the identified concerns, issues, and needs that stakeholders have provided, general needs for the City have been developed. This list of topics encompasses the needs of the City from various contributors including stakeholders, existing documentation, future planned projects, and neighboring jurisdiction plans.

- Corridor improvement through integration of ITS tools and infrastructure along jurisdictional boundaries.
- Enhance safety and support incident management.
- Develop center-to-center communications with departments within Goodyear and between Goodyear and neighboring jurisdictions.
- Provide more traveler information on primary arterial corridors of concern throughout the City.
- Support emergency management operations during congestion and incidents.
- Maintenance and construction management coordination with other agencies.

OPPORTUNITIES FOR ITS IN GOODYEAR

The opportunities that Goodyear has for integrating ITS into the City growth plans provided below have the potential for addressing the needs of the stakeholders and identify the position that the City can take to benefit ITS implementation for the future. The key opportunities for the City are to:

- Coordinate with new developments for retail/commercial and residential areas.
- Connect to Regional Community Network to share information with MCDOT and Avondale.
- Plan for key ITS infrastructure to help with special event management.
- Share real-time information with other City departments.
- Coordinate with Avondale and MCDOT on east-west signal coordination.
- Provide a greater density of traffic count stations along major corridors.
- Integrate ITS with planned arterial capital roadway improvements including future Loop 303 corridor and SR-801 development activities.
- Provide traffic monitoring capability at I-10 intersections with major arterials.
- Coordinate transportation telecommunications needs with City's plans for building out its own network.

VI. ITS ARCHITECTURE

SELECTED MARKET PACKAGES FOR GOODYEAR

Early activities in the transportation planning process include the identification of problems, inventory of regional transportation system assets, and coordination with other agencies to define additional needs. These activities are followed by the identification of alternative strategies to address the problems identified. Market packages are used as a mechanism for linking common transportation problems, challenges, goals, and policies with potential ITS solutions.

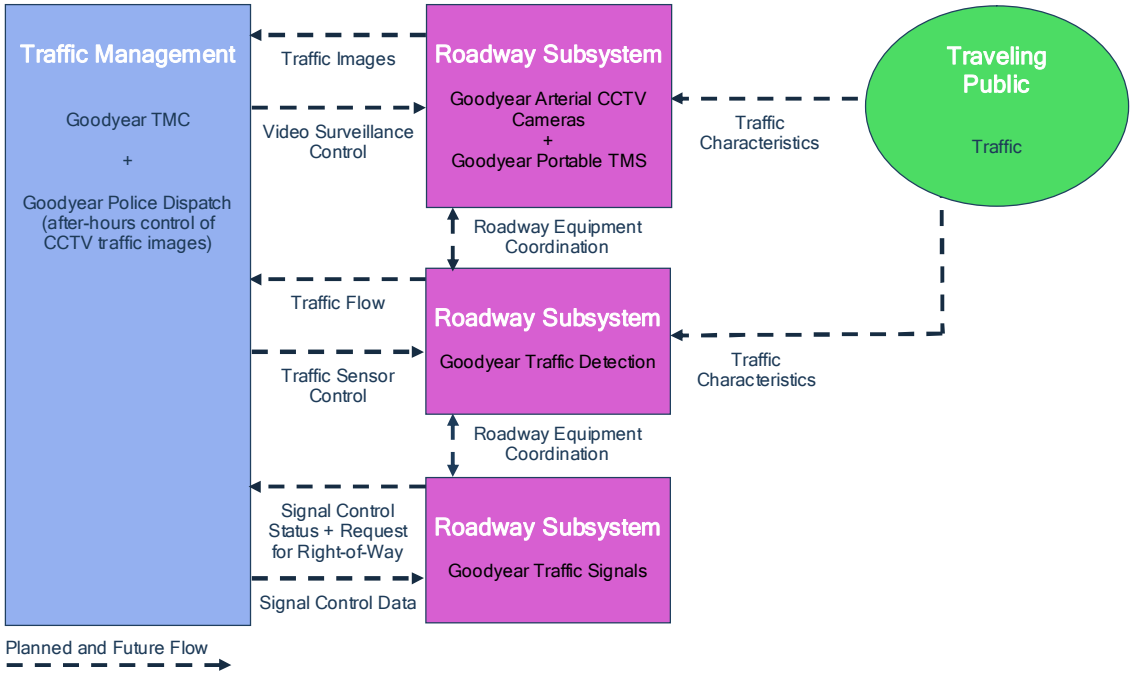
Sixteen specific market packages were chosen for Goodyear out of the 91 total market packages available in the National ITS Architecture. Market packages were chosen based on the needs and issues identified by stakeholders and operational systems that would provide the desired functionality. These market packages were customized with Goodyear and partner agencies and field equipment, and the interfaces between agencies and infrastructure were established. Interfaces have been identified for each element in the Goodyear ITS Architecture and each element has been mapped to those other elements with which it must interface.

Selected Market Packages for Goodyear	
Archived Data Management Service Area	
AD1	ITS Data Mart
Traveler Information Service Area	
ATIS01	Broadcast Traveler Information
ATIS02	Interactive Traveler Information
Traffic Management Service Area	
ATMS01	Network Surveillance
ATMS03	Surface Street Control
ATMS06	Traffic Information Dissemination
ATMS07	Regional Traffic Management
ATMS08	Traffic Incident Management System
ATMS19	Speed Monitoring
Emergency Management Service Area	
EM01	Emergency Call-Taking and Dispatch
EM02	Emergency Routing
EM04	Roadway Service Patrols
EM06	Wide-Area Alert
Maintenance and Construction Management Service Area	
MC01	Maintenance and Construction Vehicle and Equipment Tracking
MC08	Work Zone Management
MC10	Maintenance and Construction Activity Coordination

CUSTOMIZED MARKET PACKAGES

Customized market packages give a real-world perspective on the roles and responsibilities that the stakeholder agencies have in providing a particular service to the region. To provide a conceptual perspective of how the market packages work together to support Goodyear goals for ITS deployment, high-level conceptual diagrams have been developed for each selected market package for Goodyear from the National ITS Architecture. These customized market packages represent an overview of the functional areas that summarize the ITS deployments and systems that are included in the architecture. 16 customized market packages were developed for this project and depict specific city information flows and coordination between departments, devices, and travelers.

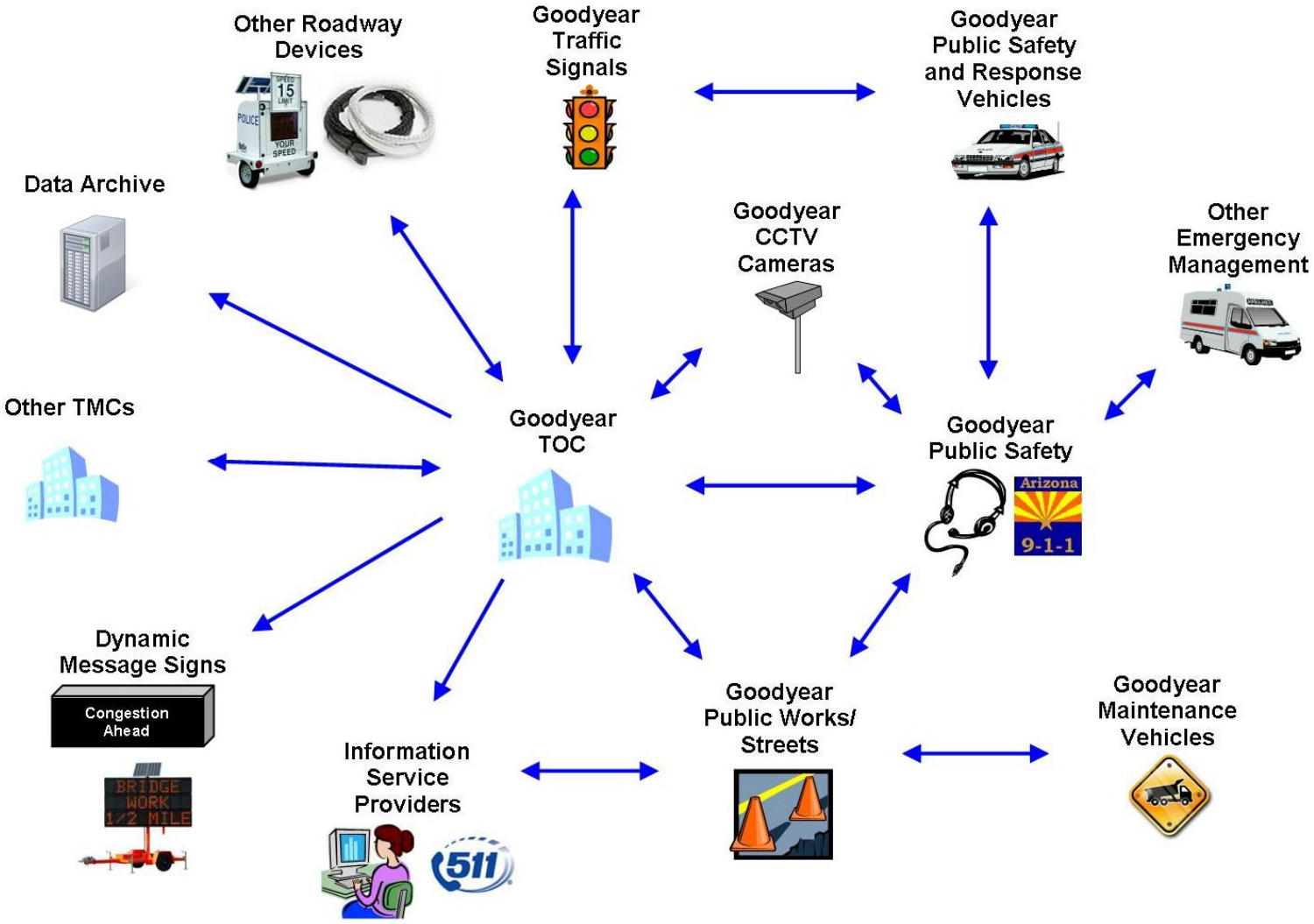
The customized market package shown below is one of several diagrams developed for the ITS Strategic Plan. The figure describes that day-to-day, the Goodyear TMC will monitor the many traffic management and control devices implemented throughout the city. Also, because the TMC will not be staffed on a 24/7/365 basis, the Goodyear Police Department will monitor and control the camera system after-hours to continue the monitoring capability throughout the City which is shown in the figure. This market package shows the daily operating functions that will occur in Goodyear by the TMC and then after-hours by the Goodyear Police.



ATMS03 – Surface Street Control

VII. OPERATIONAL CONCEPT

Operational Concepts build on the ITS architecture market packages to show how various components, devices, and systems will work together to perform specific functions. Specific functional concepts summarize the types of activities and events that could occur within Goodyear's city limits. In order to provide the various functions as outlined below, specific agencies will need to share specific information with one another and work together during critical times that require more than one agency to participate in the management of incidents, events, and evacuations. The general concept diagram, as shown in the figure on the next page, serves as a summary of coordination efforts that will be performed in Goodyear and provides a structure for important connections between agencies.



Goodyear Operational Concept Overview Diagram

VIII. TELECOMMUNICATIONS

The Telecommunication Plan identifies recommendations and requirements for the communications component of the City of Goodyear Intelligent Transportation System program. Infrastructure deployed in Goodyear (CCTV, portable and permanent DMS, traffic signals, and detection) requires a designated communications link to the Goodyear TMC. That communications link could be through the use of a fiber backbone cable or through wireless equipment connecting to a fiber backbone ring. The Telecommunications Plan describes the priority corridors as well as a phased approach to building out the telecommunications network. Goodyear has projects already programmed in the MAG Transportation Improvement Plan (TIP) that will build out the majority of fiber telecommunications infrastructure.

PHASING PLAN

The network topology follows a fiber ring scenario that includes three fiber rings to connect devices and traffic signals throughout the City to a backbone network to be able to pull those communications back to the Goodyear TMC. The arterial path of these fiber rings are focused on the priority corridors in Goodyear. Priority corridors that support the fiber ring backbone concept include:

Fiber Ring #1 –
- Litchfield Road
- Yuma Road and Bullard Avenue (Ball Park Area)
- Estrella Parkway – North of MC-85
- Indian School Road

Fiber Ring #2 –
- Estrella Parkway – South of MC-85
- Cotton Lane
- Yuma Road

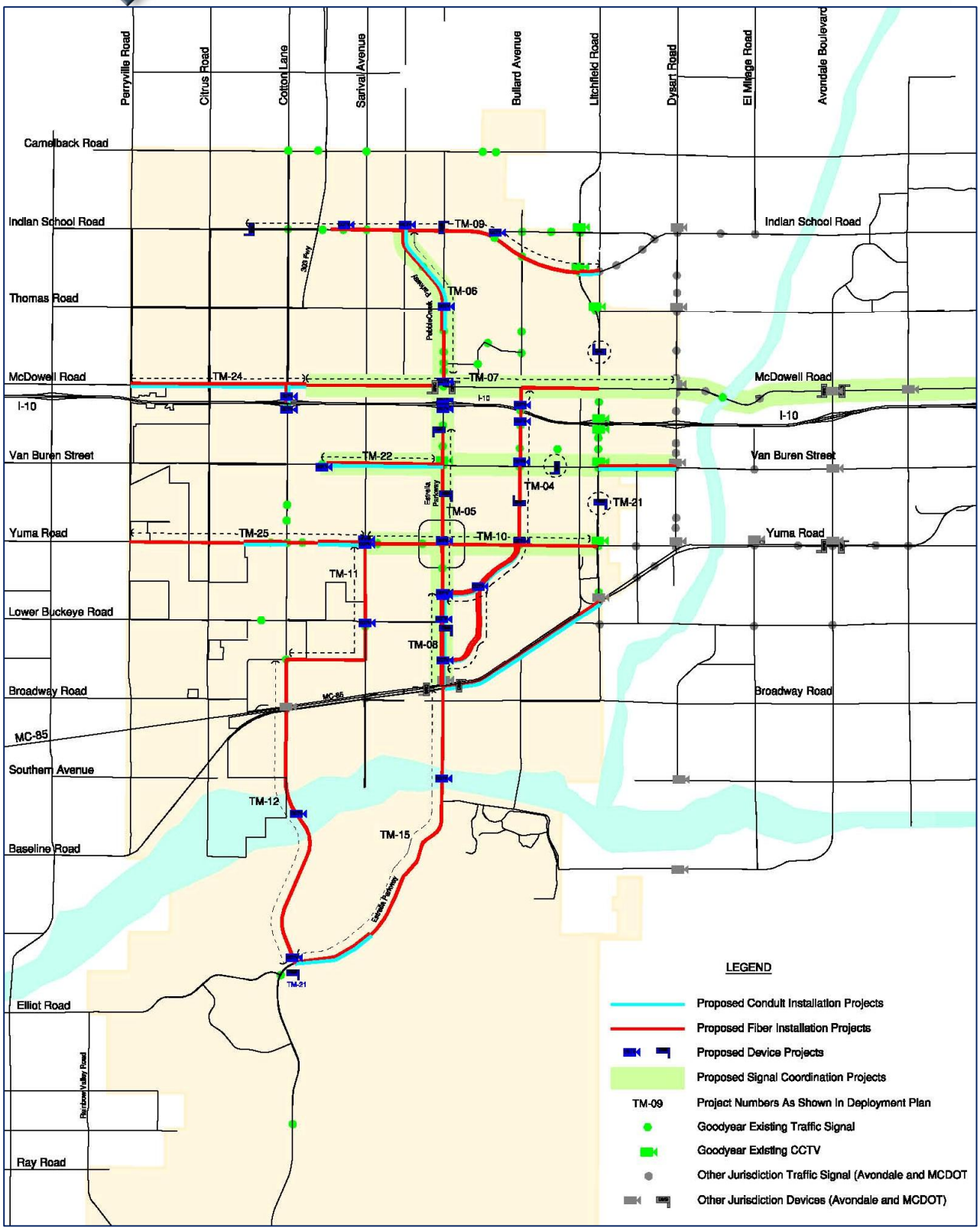
Fiber Ring #3 –
- Estrella Parkway
- Indian School Road
- Yuma Road
- Loop 303 – future

CONNECTING GOODYEAR TO RCN

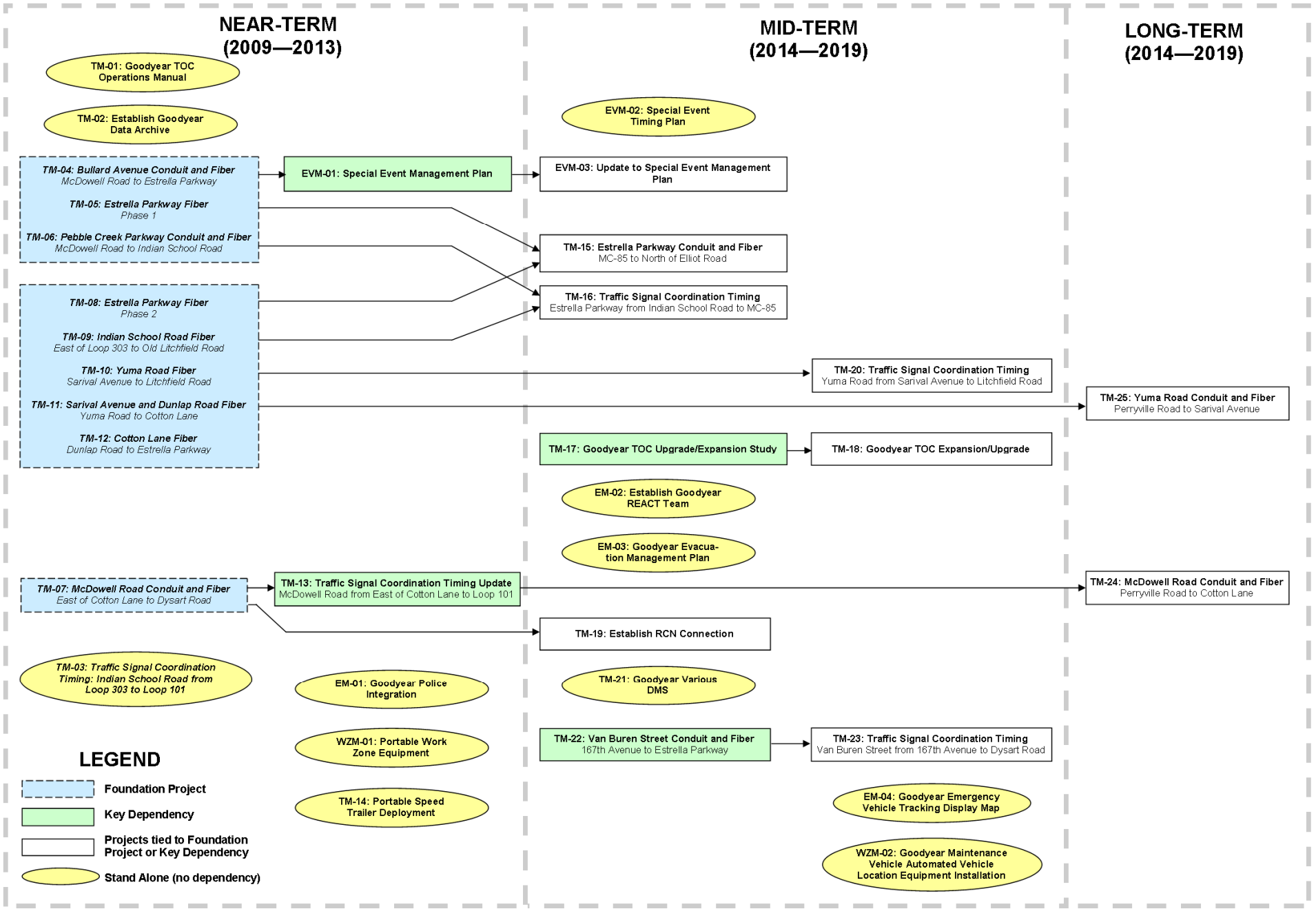
The City of Goodyear has been identified as a regional hub facility in the RCN West Valley Sub Ring. As a regional hub facility, the City would provide interagency connectivity needed for managing and integrating devices across jurisdictional boundaries. This connectivity would facilitate sharing traffic related information between Goodyear and adjacent jurisdictions. The RCN phase planned to connect the West Valley regional hubs of Goodyear and Avondale to the main RCN network is not currently funded. There is existing Goodyear fiber along Litchfield Road that could be used for RCN purposes, but this is pending ADOT installation of fiber along I-10 that is currently not planned or programmed for funding. A Goodyear/Avondale fiber connection could establish an interim RCN communications path at least between Avondale and Goodyear until the RCN West Valley Sub Ring can be funded and established.

IX. DEPLOYMENT PROJECTS

This section contains project recommendations to address stakeholder needs and goals for ITS implementation in Goodyear. Projects have been assigned a relative timeframe, which may shift depending on available funding, opportunities to advance projects within the City's capital improvement program, as well as opportunities to combine projects. The figures in this section summarize the projects developed as part of the deployment plan for Goodyear and map the physical deployment projects in Goodyear. There are projects that are related to planning and communication links that may not require physical implementation of infrastructure – these projects are not represented in the deployment map. The figure on the next page shows a schematic depiction of Goodyear projects in relation to one another. Projects that are shown as stand-alone (projects or studies/plans) can be implemented as funding opportunities arise, as institutional priorities dictate or as opportunities to mainstream. Projects that are italicized are already programmed in the MAG TIP for funding. This sequencing is intended to show a progression of projects, with the foundation projects being critical in the near term, and a phased approach to subsequent projects.



Goodyear Deployment Projects Map Build Out Through 2020



Sequencing of Deployment Projects

X. POTENTIAL AGREEMENTS

The Goodyear ITS Architecture has identified several agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders. Interfaces and data flows between public departments, between the City's TMC and other public agencies (such as MCDOT or Avondale), and with private entities for Goodyear will require agreements that establish parameters for sharing agency information. These agreements will support traffic management, incident management, provide traveler information, and other functions identified in the Goodyear ITS Architecture. Currently, while there are strong working relationships between Goodyear and other agencies, there are no formal agreements in place in Goodyear with regards to operating ITS infrastructure or exchanging information. The table below provides a list of agreements that the City is recommended to pursue in the near term. A full list of recommended agreements is included in the Implementation Plan.

Potential Agreements for Goodyear	
Agreement and Agencies	**Description**
Data Sharing and Usage (Internal Public Divisions)	
Goodyear Police / Goodyear TMC – camera feeds, maintenance vehicle and work zone activity	This agreement would define the parameters, guidelines, and policies for inter- and intra-agency ITS data, maintenance vehicle activity and work zone activity sharing. The terms of this agreement should generally address such items as: ▪ Types of data and information to be shared – camera information, incident and special event information, maintenance activity ▪ How the information will be used – traffic incident management ▪ Parameters for data format, quality, security and frequency for sharing data
Data Sharing and Usage (Public Agency – Public Agency)	
Goodyear / Avondale, Buckeye (future) – traffic conditions, closures, restrictions, camera feeds, public safety coordination	This agreement would define the parameters, guidelines, and policies for data sharing and usage of citywide ITS-related information from Goodyear to Avondale. This type of agreement is recommended between Goodyear (data provider) and Avondale (data user) to define terms of use for distributing public-agency information regarding traffic conditions, closures, restrictions, as well as video images. Because this agreement is with external entities, it will likely be in the form of a Memorandum of Understanding or Inter-Governmental Agreement.
Telecommunications Infrastructure Agreements (Public)	
Goodyear TMC / Goodyear Information and Technology Services Department – Network and fiber maintenance	This agreement would establish the roles and responsibilities of Goodyear and the Goodyear Information and Technology Services Department to support maintenance requirements for the Goodyear C2C and C2F network and fiber infrastructure. This agreement should be developed to complement a "Goodyear Telecommunications Infrastructure Maintenance Plan" for the City.

XI. STAFFING PLAN

The table on the next page represents the recommended technician staffing needs for Goodyear's current and planned inventory of traffic signals and ITS devices. The table below also summarizes the recommended TMC operations staffing based on the current and planned ITS inventory for Goodyear. Recommendations are based on the existing infrastructure and forecasted values for infrastructure in the future. As general guidance, in order to represent the most likely technician and TMC staff needed to support ITS devices and traffic signal infrastructure, the number of technicians hired should exceed the calculated number of recommended technicians to ensure that no Goodyear personnel are managing a larger number of devices than their capability.

The level of ITS device deployment (CCTV cameras, traffic signal integration, and fiber optic installation) warrants an analysis of staff that should be dedicated to technician support of those devices as well as TMC operations of the ITS system in Goodyear. Timeframes that are shown represent the level of priority of adding personnel to the technician and TMC staff. These priorities in the implementation plan have years associated with them; however, these do not represent a requirement for additional staffing but rather a level of priority for when to add staffing based on when the deployment of infrastructure occurs in the city.

Recommended Technician and TMC Staffing Guidelines Summary

Description	Current Inventory	Near-Term	Mid-Term	Long-Term
Number of Traffic Signals (signalized intersection)	67	120	160	200
Number of CCTV Cameras	13	31	~40	~50
Number of Arterial DMS	0	6	9	9
Number of VID (approx. 2 per signalized intersection)	120	240	320	400
Total Number of ITS Devices	143	271	369	459
Number of Miles of Fiber Optic Infrastructure	9	29.5	35	40.5
Total Recommended Technicians	3.71	6.86	9.20	11.46
Recommended Additional Technicians to Hire in Each Timeframe	*0 (total 4 staff)*	*3 (totals 7 staff)*	*2 (totals 9 staff)*	*2 (totals 11 staff)*
Supervisor	0.5	1	1	1
System Operator	0.5	1	2	2
IT (City IT Group)	0	0.5	0.5	1
Public Safety Liaison	0	0.5	0.5	1
Total Recommended TMC Staff	1	3	4	5
Recommended Additional TMC Staff to Hire in Each Timeframe	*0 (total 1 staff)*	*2 (totals 3 staff)*	*1 (totals 4 staff)*	*1 (totals 5 staff)*

Near-Term Recommendation – Three additional technicians are recommended in the near-term timeframe with a majority of ITS devices are envisioned to be implemented over the next five years. Two additional TMC staff are recommended in this timeframe to support the additional device operations.

Mid-Term Recommendation – Two additional technicians should be hired in the mid-term timeframe to support further build out of the ITS system as well as one additional TMC staff.

Long-Term Recommendation – Two additional technicians and one additional TMC staff should be hired in the long-term to support further build out of the ITS system. As the long-term recommendations for devices is subject to build out in the near-term and mid-term timeframes, the number of staff needed is rounded down to the nearest person needed.

As ITS infrastructure is added and fiber cable communications are implemented around the city, the Goodyear TMC may need to increase personnel to be able to manage a larger network. Increased responsibilities warrant an increase in the IT position as well as coordination with the Goodyear Police. The System Operator staff into the long-term timeframe and beyond is addressed by the addition of the second System Operator position to TMC operations in the mid-term timeframe.