



Maricopa County
Department of Transportation

ITS Communication Master Plan Urban-Rural & In-Between

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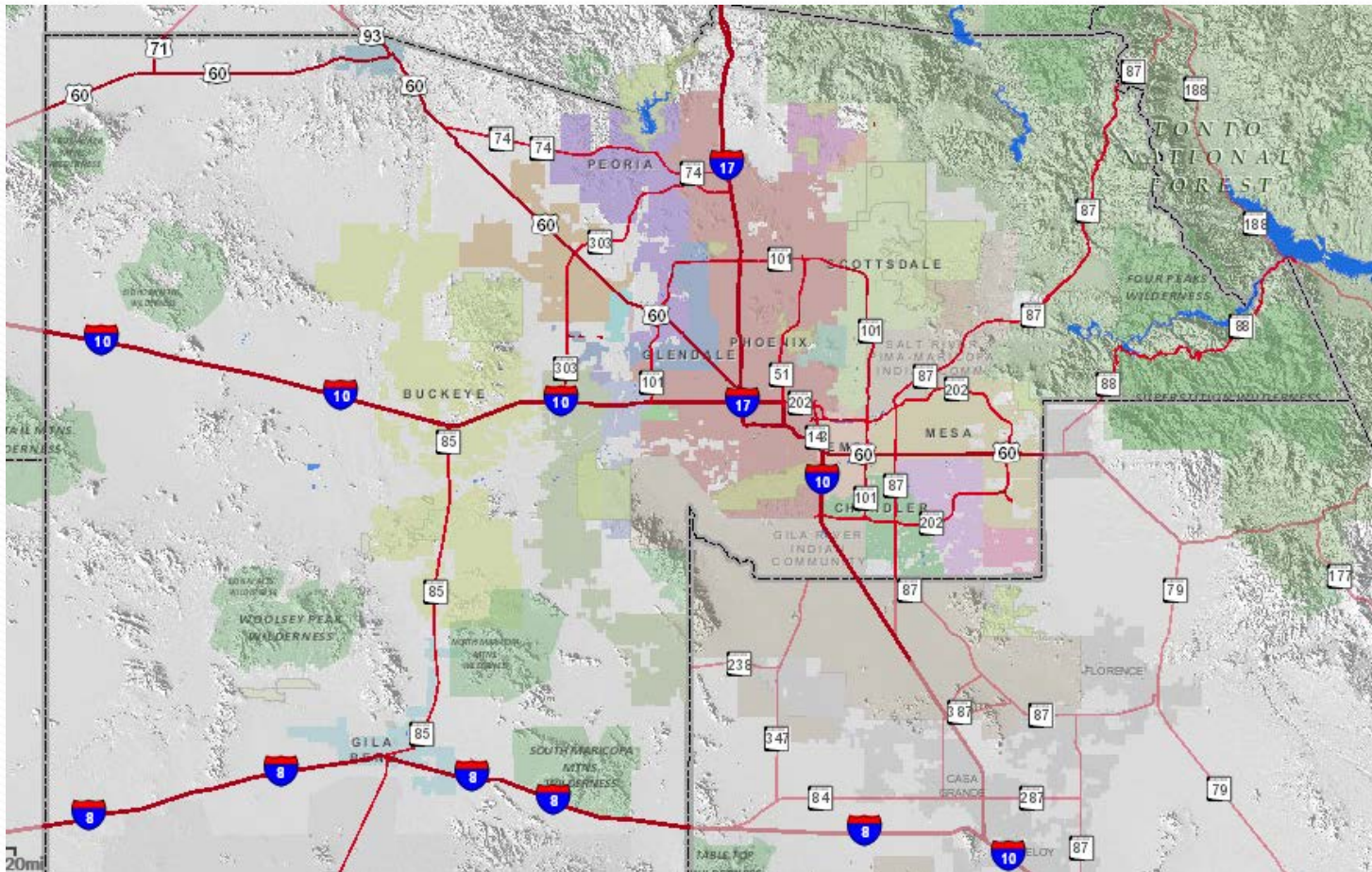
October 22, 2018



Maricopa County
Department of Transportation



Project Area Map

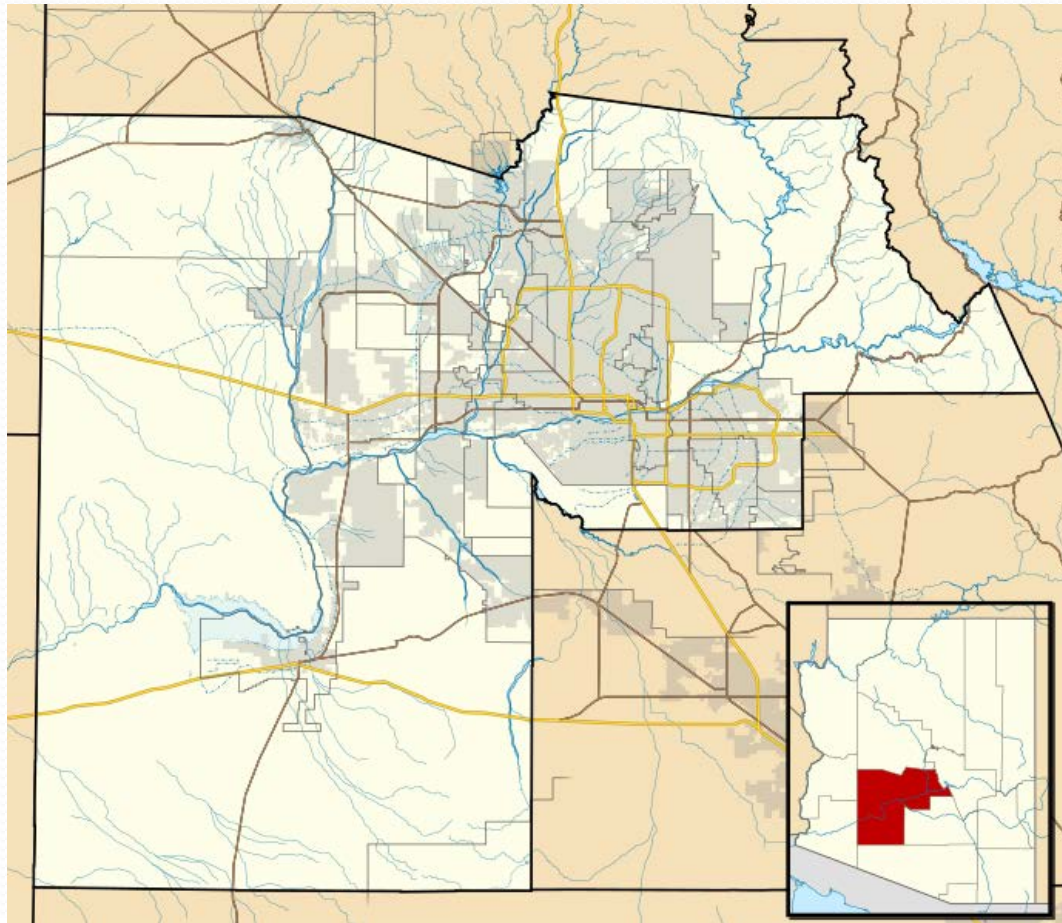


About Maricopa County

- **Population:** 4 Million People
- **Land Area:** 9,200 Square Miles
- **Incorporated Cities & Towns:** 23
- **5,000 +/- Traffic Signals**
 - **Unincorporated Areas:** 158
 - **In Cities & Towns:** 4,800 +/-



Unincorporated Areas

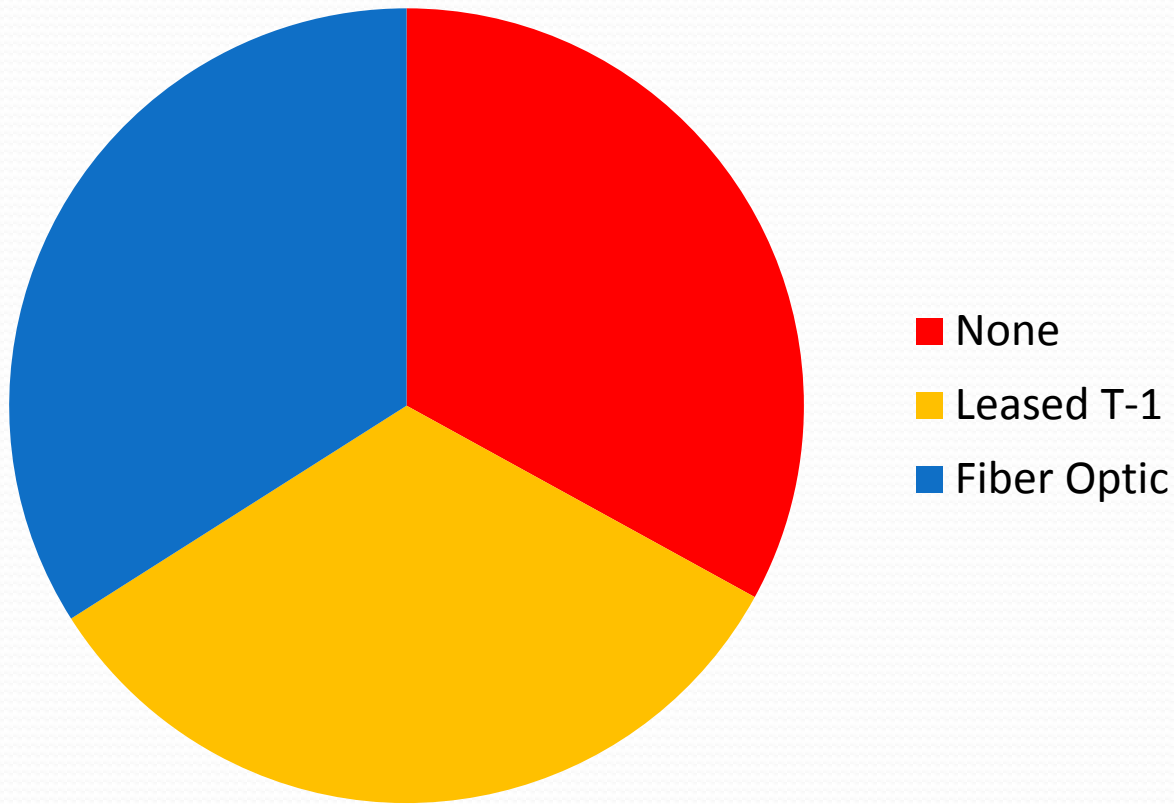


Urban, Rural & In-Between

- **Unincorporated Geographic Regions: 17**
- **Distance to MCDOT TMC_{Minimum}: 3 Miles**
- **Distance to MCDOT TMC_{Maximum}: 60 Miles**
- **158 Traffic Signals**



Existing Traffic Signal Communications



Benefits of Real-Time Traffic Signal Communications

- Better Traffic Signal Synchronization
- Real Time Integrated Corridor/Incident Management
- CCTV Observations
- Fewer Maintenance Vehicle Dispatches
- ARID Travel Time Monitoring
- Connected Vehicle Support



Plan History

- **ITS Business Plan Developed in 2005**
- **Plan 95% Implemented**
 - **Modern TMC Constructed**
 - **Fiber Trunks on Key MCDOT**
 - Bell Road
 - Olive Ave
 - Wireless Extension to Fiber Trunk
 - Leased T-1 Communications



- **Regional Community Network Built to Link Transportation Agencies**
- **ADOT Fiber Deployed on Most Urban Freeways**



Technical Objectives

- Reliably Communicate with 100% of MCDOT Signals
- Use Improved Communications to Reduce Maintenance Vehicle Dispatches
- Provide Bandwidth to Take Advantage of Recent Technology
 - High quality CCTV/Detection
 - ARID
 - Connected Vehicles
 - Battery Backups
 - EVP
 - MMU
- 95% to 99.9% Network Availability



Policy Objectives

- Participate and lead in regional partnerships to keep traffic moving efficiently and safely in a multi jurisdictional environment.
- Maintain a skilled and highly trained staff to effectively maintain and operate the system.
- Develop a fault tolerant communications network where economically feasible.



Plan Phases

- **Short-Term**

- Wireless Connectivity
- Low Cost



- **Mid-Term**

- Focus on Efficiency
- Focus on Remote Diagnostics
- Cabinet Hardware Upgrades and Connectivity Investment

- **Long-Term**

- Work with Partner Agencies
- Fiber to Intersections with < One-Mile Spacing



Short Term Plan Goals (2-3 Years)

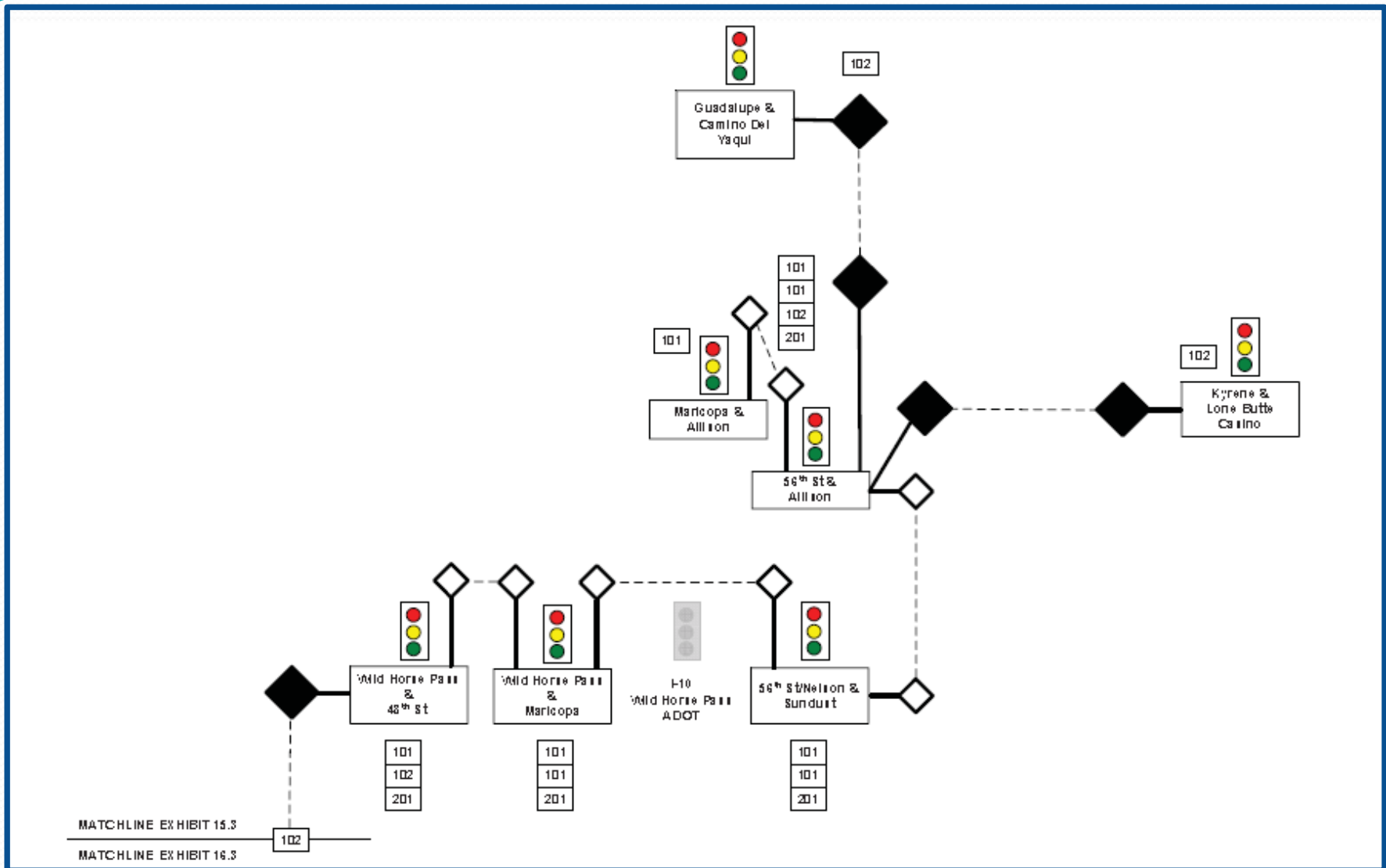
- Establish Real-Time Communications to Every MCDOT Intersection
- De-commission Leased T-1 Circuits to Reduce On-Going Costs
- Take Advantage of Regional Investments in Fiber Optics
 - ADOT Freeway Management System Fiber Optics
 - Regional Community Network



Wild Horse Pass Area Example

- No Existing Connectivity
- Rapidly Urbanizing Area in South-East Area of the County
- Low Cost Wireless Solution
- Backhaul via RCN Connection in Chandler Short-Term
- Last Mile Fiber Connection Long Term to I-10





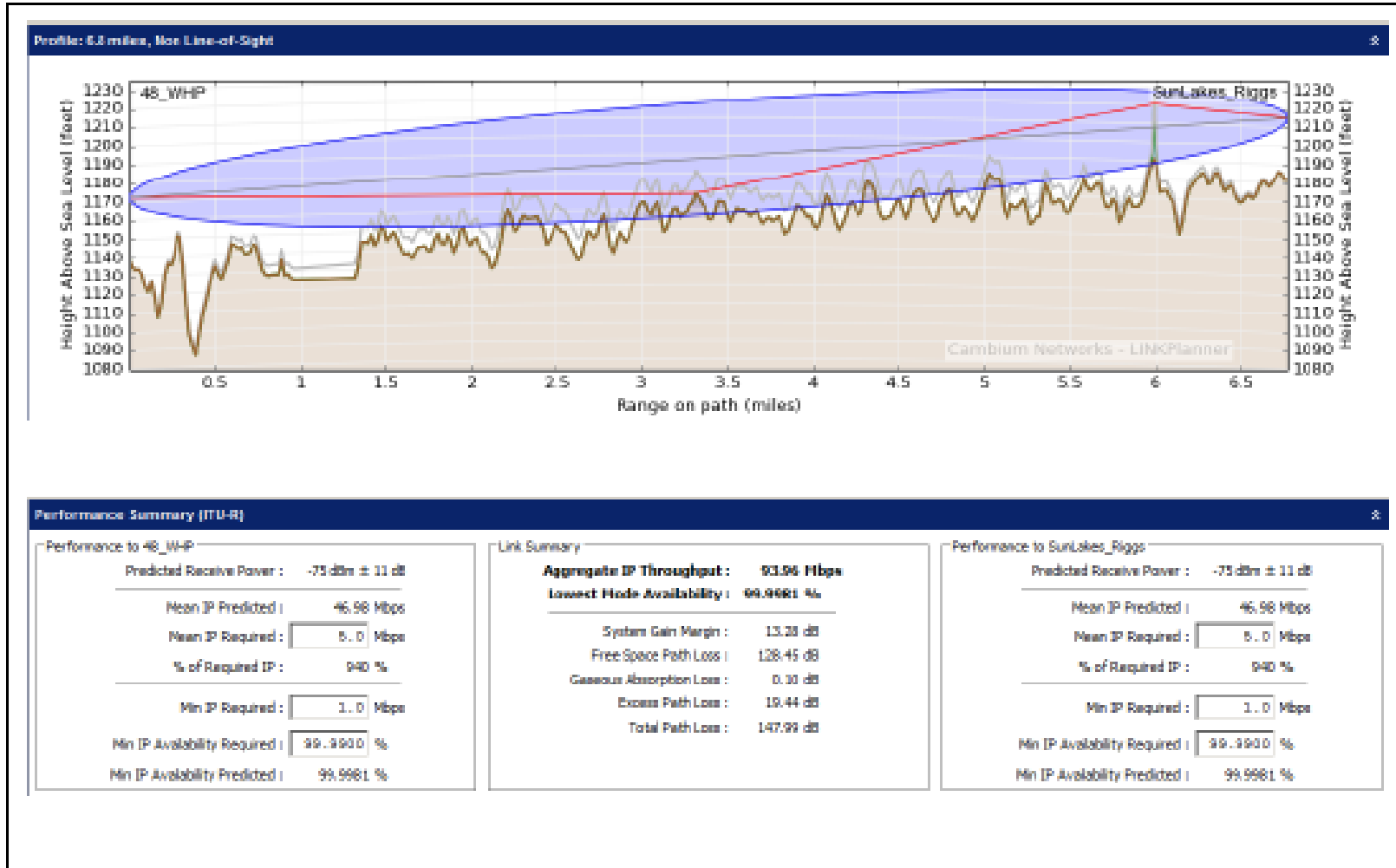
Line of Sight Radios



Non-Line of Sight Radios

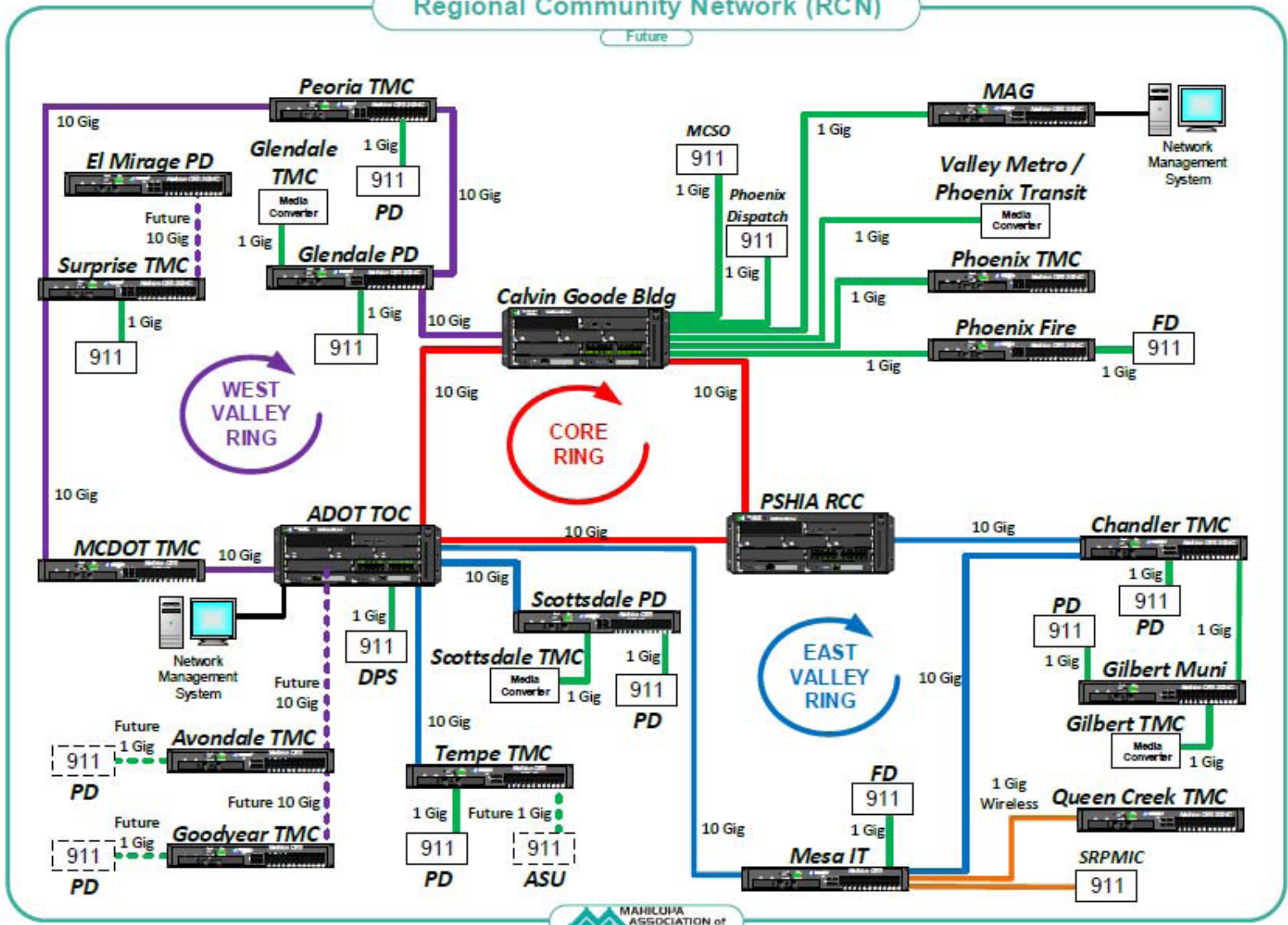


Wireless Path Study

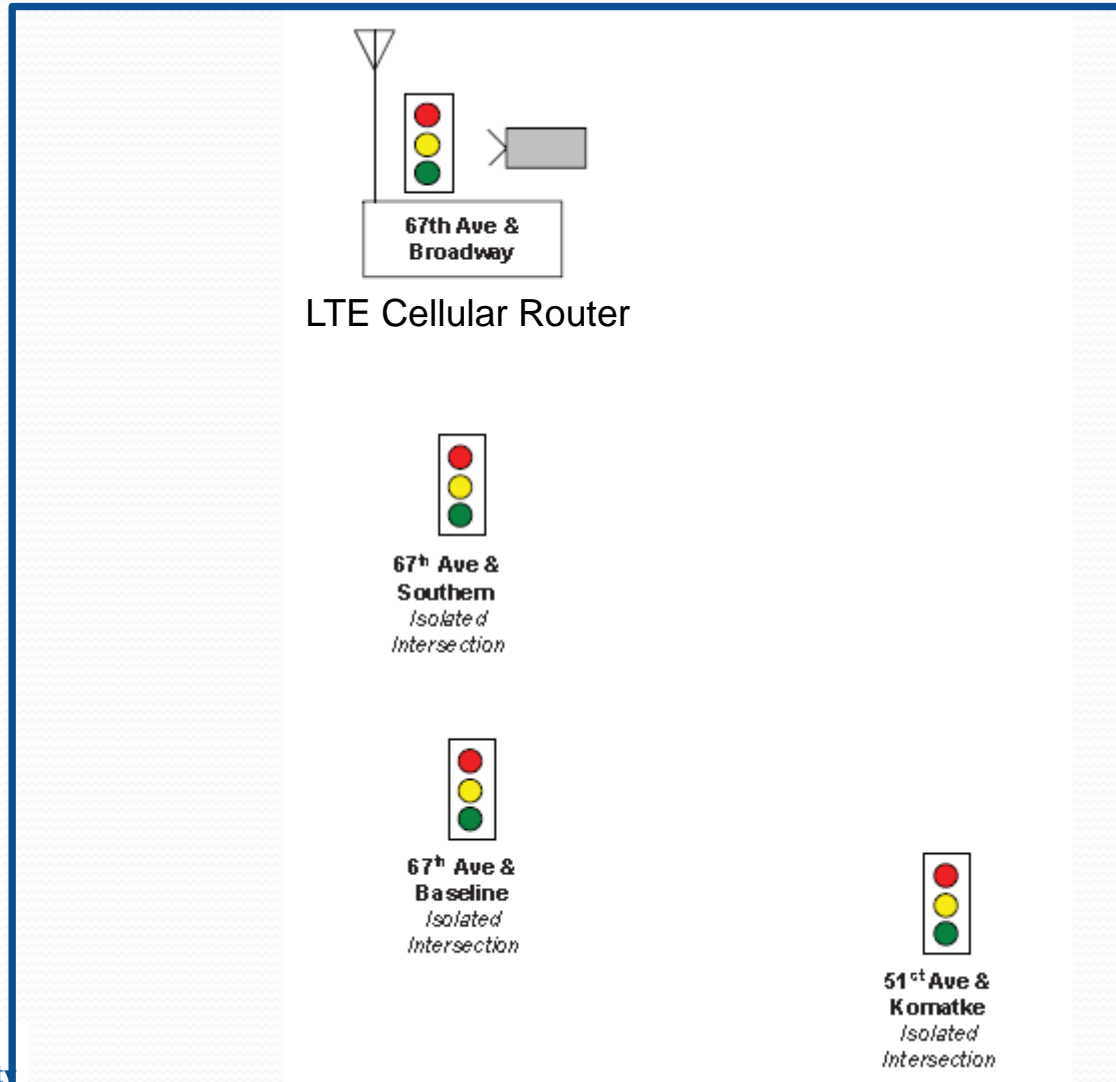


Regional Community Network (RCN)

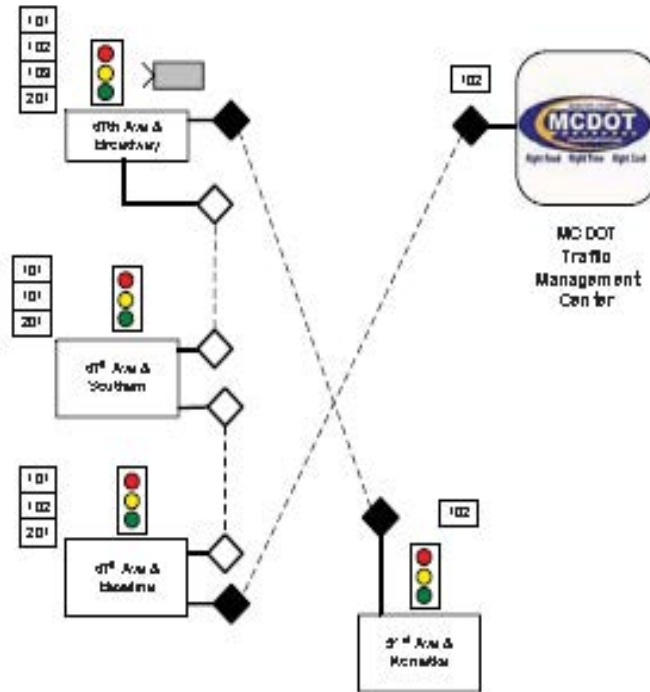
Future



La Veen Area



La Veen Area

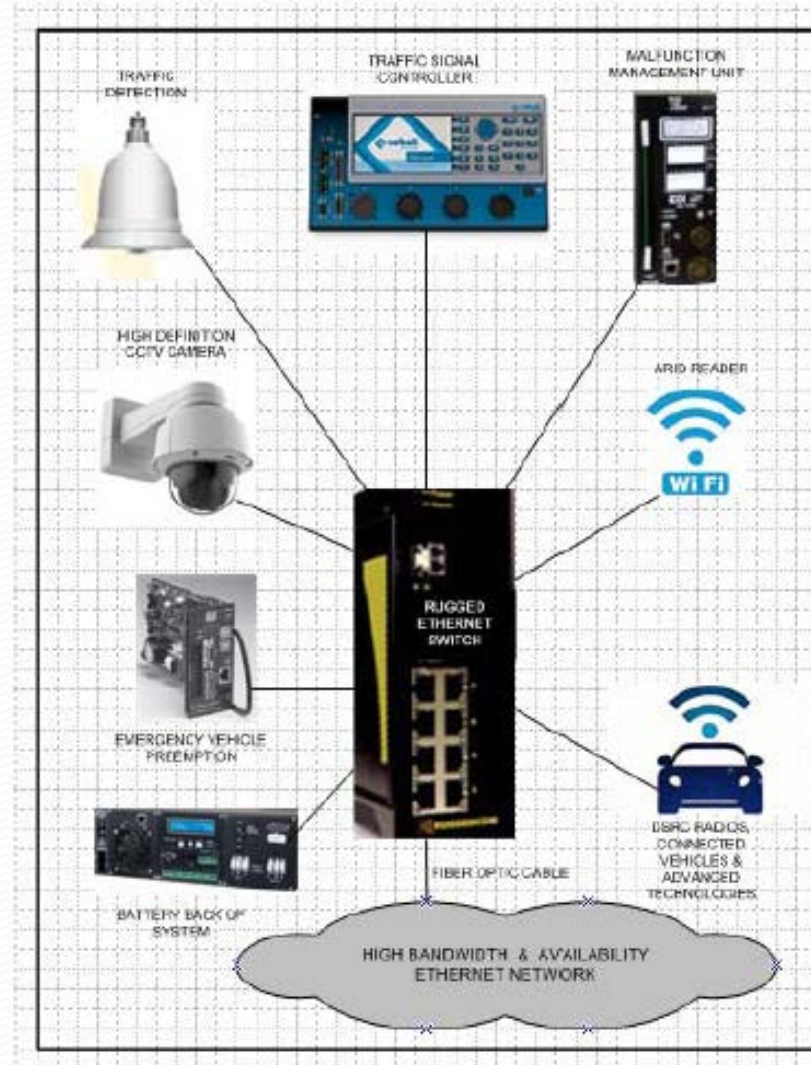


Mid-Term Plan Goals (3+ Years)

- Make the intersection as operationally efficient and easy to maintain as possible.
- Connect video detection, Smart Monitor, High Definition CCTV, Battery Back-up, ARID readers and all Ethernet capable cabinet technology for remote diagnostics and monitoring. Establish Real-Time Communications to Every MCDOT Intersection.
- Change business practices to performing remote diagnostics before sending a tech.



Mid-Term Plan



Short Term Plan Goals (2-3 Years)

- Establish Real-Time Communications to Every MCDOT Intersection
- De-commission Leased T-1 Circuits to Reduce On-Going Costs
- Take Advantage of Regional Investments in Fiber Optics
 - ADOT Freeway Management System Fiber Optics
 - Regional Community Network



Long Term Plan Goals

- Establish last mile connections between MCDOT fiber and partner agency fiber to complete connections and rings.
Recent Examples:
 - Anthem
 - Indian School Road
 - Mc Dowell
- Connect all intersections within one mile spacing via a fiber optic network.
- Potential to re-assess needs when 5G networks become widely available and reliable.
- Increase network availability to 99.99% or 99.999%



Long Term Plan

- 70 Miles of MCDOT arterials Fiber
- 100 New Fiber Drops
- 15 New Connection Points to ADOT FMS Fiber
- 119 Wireless Nodes Replaced with Fiber Increase network availability to 99.99% or 99.999%
- \$20,000,000 Investment Required



Plan Implementations

- **ITS Business Plan Developed in 2005**
 - Federally funded projects from the original plan
- **MC85 - El Mirage to 83rd Ave.**
 - 5 Miles, 9 County Maintained Intersections
 - Pre-Existing Communications: Radios, 3 Leased Line T1's
 - Post-Existing Communications: 144-count SMFO Backbone, 9-12 strand SMFO drop cables from back bone. 1 PTP cambium radio
 - TMC Connectivity Via ADOT FMS fiber
- **RH Johnson Bell to Granite Valley/Meeker – Rh Johnson to Granite Valley**
 - 5 Miles, 16 County Maintained Intersections
 - Pre-Existing communications: Radios, 5 Leased line T1's
 - Post-Existing communications: 144-count SMFO Backbone, 13-12 strand SMFO drop cables from Backbone.
 - TMC Connectivity Via Regional Community Network (RCN)



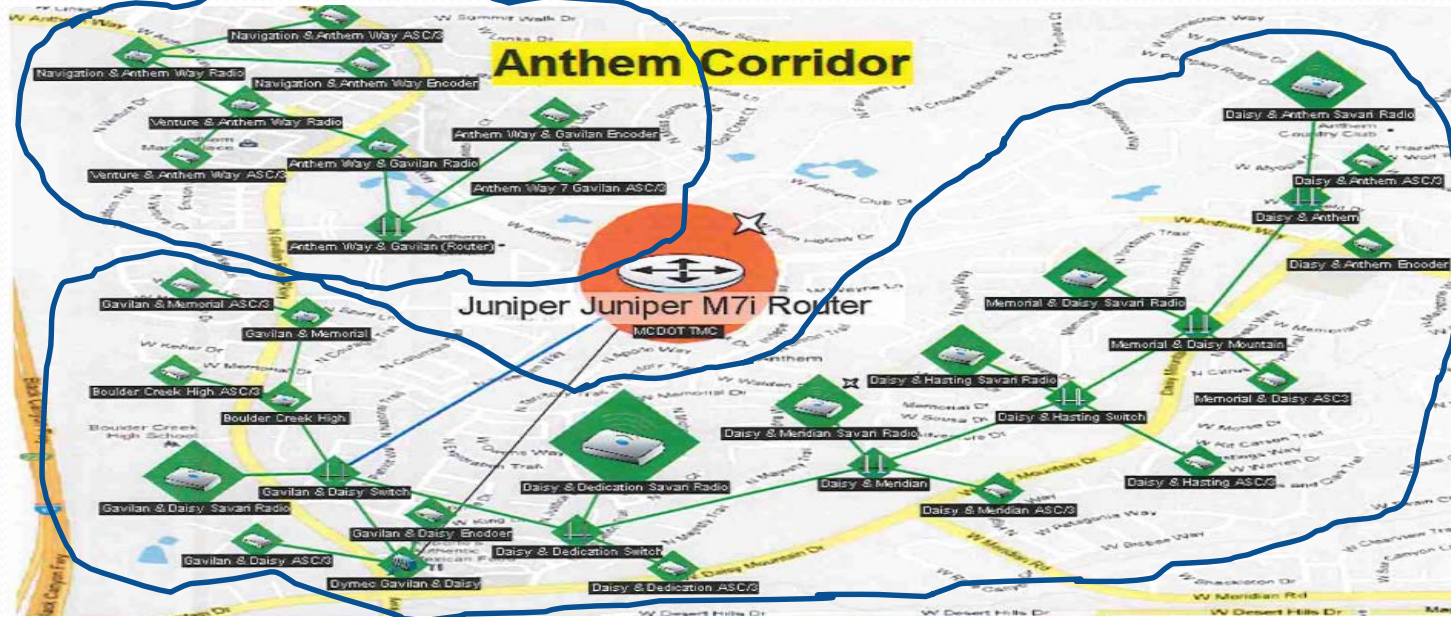
Plan Implementations

- **Riggs Rd Sun Lakes to Alma School, Alma School to Champagne**
 - 3 Miles, 7 County Maintained Intersections
 - Pre-Existing Communications: Radios, 1 Leased Line T₁
 - Post-Existing Communications: 96-count SMFO Backbone, (6) 12-count SMFO drop cables from Backbone.
 - TMC Connectivity Via City of Chandler Fiber to their TMC then to RCN
- **Last Mile Project – Indian School/99th, Anthem/I-17, McDowell/92nd St.**
 - 3 corridors 5.5 Miles, 12 County Maintained Intersections
 - Pre-Existing communications:
 - Indian School: 96-count SMFO Fiber, 1 Leased Line T₁
 - Anthem: 96-count SMFO Fiber, Radios, 1 Leased Line T₁
 - McDowell: 96-count SMFO Fiber, Radios, 2 Leased Line T₁'s
 - Post-Existing communications: 96-count SMFO Backbone, (12) 12-count SMFO drop cables from Backbone.
 - TMC Connectivity Via ADOT FMS fiber



Moving Forward

- **MCDOT ITS Communications Plan Developed in 2018**
 - Use updated Plan to fund and design Anthem Short Term plan
 - MCDOT Connected Vehicle Testbed
 - Currently split into to two different networks/areas
 - Goal: Merge Daisy Mountain side and The Anthem Side



Moving Forward

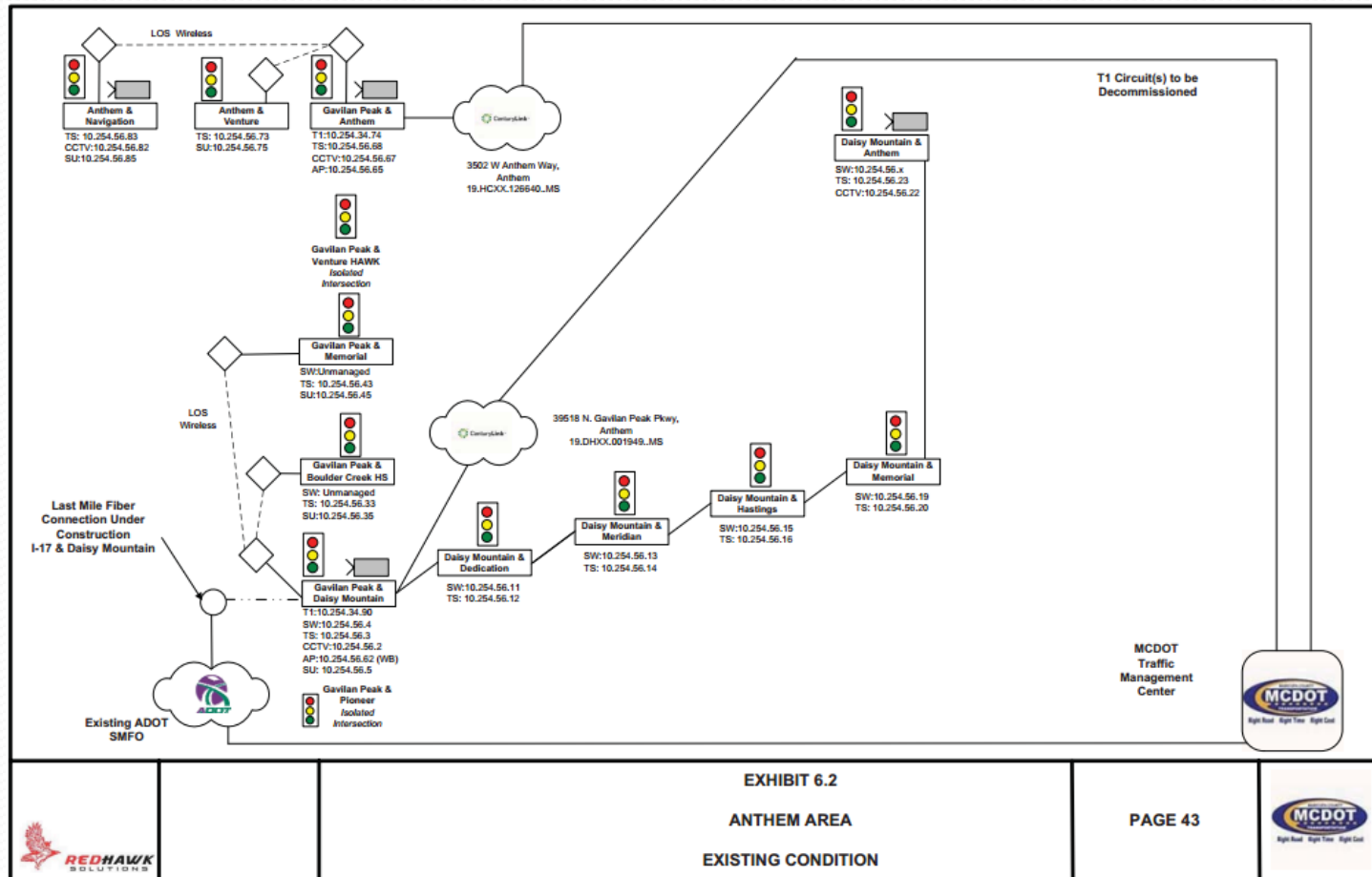
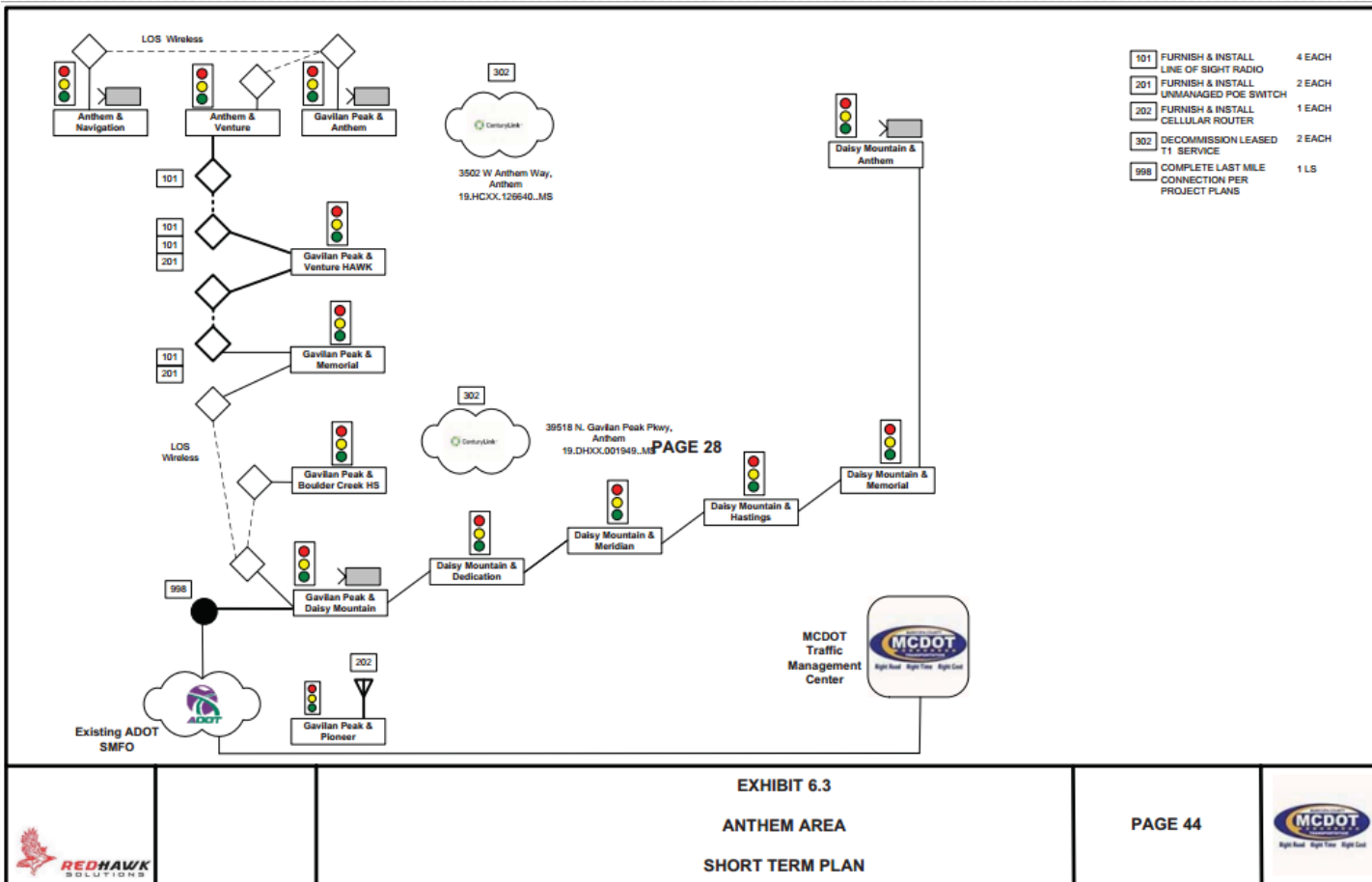


EXHIBIT 6.2
ANTHEM AREA
EXISTING CONDITION



Moving Forward



Questions



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Maricopa County

Department of Transportation

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