

APPENDICES

Appendix A: Previous Studies and Recommendations

STUDY	SUMMARY	RECOMMENDATIONS
Framework and Statewide Studies		
Arizona Statewide Dynamic Message Master Plan, November 2011 (Final)	This plan provides specific justification warrants, criteria, and consideration of permanent DMS design requirements for the Arizona highway system.	Proposed Dynamic Message Signs: SB SR 87 at MP 201
ADOT Intelligent Transportation System Design Guide (2015)	This design guide provides direction on ITS for both rural and urban applications. https://www.azdot.gov/docs/default-source/rural-public-transportation-program/adot-its-design-guide-052315.pdf?sfvrsn=4	Provides design guidance for rural dynamic message signs, Remote Weather Information Systems (RWIS), and truck escape ramp detection and warning systems
ADOT Bicycle Safety Action Plan (2018)	The 2018 BSAP Update uses a data-driven approach to assess bicycle crashes on the State Highway System (SHS), and identify specific steps, actions, and potential countermeasures that, upon implementation and over time, will measurably reduce bicycle crashes, injuries, and fatalities on the SHS. http://www.azbikeped.org/downloads/ADOT-Bicyclist-Safety-Action-Plan.pdf	The northern terminus of this study (MP 250) is the start of a 2018 BSAP Priority Location 19, which is located between MP 250 (Green Valley Parkway) and MP 253.2 (Forest Drive). Engineering countermeasures suggested included: - Access Management Study - Conduct an access management study. Recommendations may include driveway consolidation and constructing a raised median. - Striped Paved Shoulder - Assess feasibility of striped paved shoulder on SR 87. Per record drawings, SR 87 typical width is 68'. A 4' striped shoulder (as measured from gutter seam to the center of the white stripe) could be installed on SR 87 in both directions. Striped shoulder may require one or more travel lanes to be reduced to 11'. A striped or paved shoulder should also be considered for remainder of SR 87 north through the Town of Payson. - Roadway Signing Improvements - Consider installing R4-11 BMUFL sign with R4-11aP Change Lanes to Pass plaque Education countermeasures suggested partnering with Central Arizona Governments (CAG) and local agencies to provide education, outreach, and training to increase bicyclist and motorist awareness and improved behaviors. Increasing level of traffic bicycling skills can help to make bicyclists more comfortable when riding in traffic, improve relations between bicyclists and motorists, and facilitate the smooth and orderly flow of traffic.
Regional Planning Studies		
SR 87/SR 260/SR 377 Corridor Profile Study, March 2017 (Final)	The SR 87/SR 260/SR 377 CPS defines solutions and improvements for the corridor that are evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance. https://azdot.gov/docs/default-source/planning/Corridor-Studies/sr-87-final-report-noappendix-031717.pdf?sfvrsn=2	<u>Bush Highway Area Safety and Freight Improvements (SR 87 MP 191-213) – Priority Rank 4</u> - Rehabilitate shoulders (NB/SB MP 194-205) - Install speed feedback signs (NB MP 206.5 and 207.7, NB/SB before curves and intersection with FR 68 [MP 209.6]) - Widen inside shoulders (SB MP 211-209) <u>Sunflower Area Safety Improvements (SR 87 MP 213-235) – Priority Rank 5</u> - Install speed feedback signs and speed advisory warning signs with flashing beacons at curves (NB MP 213.2, 214.0, 217.8, 220.5, 224.5, 232.5; SB MP 231.0, 229.3, 221.0, 219.6, 216.0, 214.3) - Rehabilitate shoulders - Widen inside shoulders (SB MP 228.5-226.0)

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		• Install rock-fall mitigation (NB MP 214.2-214.6; SB MP 228.9-228.7, 228.5-228.0, 217.6-218.0) <u>Sunflower Area Freight Improvements (SR 87 MP 213-223) – Priority Rank 13</u> • Construct NB climbing lane, MP 213-215 and MP 219-223 • Widen Whiskey Springs Bridge, #2515 MP 220.32 • Widen Upper Kitty Joe Bridge, #2497 MP 221.39 <u>Slate Creek Pavement Improvements (SR 87 MP 224-226) – Priority Rank 14</u> • Replace Pavement <u>Rye Area Safety and Freight Improvements (SR 87 MP 235-241) – Priority Rank 1</u> • Install advisory sign about approaching area with intersections (Deer Creek Drive [MP 237.6], Gisela Road [MP239.5], two intersections in Rye [MP 240.5 and MP 240.9]) • Install reduced speed advisory sign on SR 87 (NB MP 240, SB MP 241) • Install speed feedback signs (NB MP 240, SB MP 241) • On SR 188 approaching SR 87 add flashing beacons to WB stop sign <u>Ox Bow Estates Area Safety Improvements (SR 87 MP 241-250) – Priority Rank 10</u> • Install speed feedback signs and speed advisory warning signs with flashing beacons at curves (SB MP 247, MP 245) • Implement variable speed limits MP 241-246 with new DMS and Closed Circuit Television (CCTV) SB at MP 247 and new DMS and CCTV NB at MP 240 • Install Road Weather Information System (RWIS) at MP 245 with dynamic weather warning beacons <u>Ox Bow Estates Area Freight Improvements (SR 87 MP 243-247) – Priority Rank 15</u> • Construct NB climbing lane • Install Intelligent Transportation System (ITS) conduit with all new infrastructure projects <u>Other Corridor Recommendations</u> • Implement a driving impaired and speeding safety education campaign along the corridor • Coordinate with Arizona Game and Fish Department (AGFD) to conduct a study on vehicle/wildlife conflicts on SR 87 between MP 233 and MP 241 <u>General Policy Recommendations</u> • Prepare strategic plans for CCTV camera and RWIS locations statewide • Leverage power and communication at existing weigh-in-motion (WIM), dynamic message signs (DMS), and call box locations to expand ITS applications across the state • Consider solar power for lighting and ITS where applicable • Investigate ice formation prediction technology where applicable • Conduct highway safety manual evaluation for all future programmed projects • Develop infrastructure maintenance and preservation plans (including schedule and funding) for all pavement and bridge infrastructure replacement or expansion projects • Develop standardized bridge maintenance procedures so districts can do routine maintenance work • Review historical ratings and level of previous investment during scoping of pavement and bridge projects. In pavement locations that warrant further investigation, conduct subsurface investigations during project scoping to determine if full replacement is warranted

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		- For pavement rehabilitation projects, enhance the amount/level of geotechnical investigations to address issues specific to the varying conditions along the project - Expand programmed and future pavement projects as necessary to include shoulders - Expand median cable barrier guidelines to account for safety performance - Install CCTV cameras with all DMS - In locations with limited communications, use CCTV cameras to provide still images rather than streaming video - Develop statewide program for pavement replacement - Install additional continuous permanent count stations along strategic corridors to enhance traffic count data - When reconstruction or rehabilitation activities will affect existing bridge vertical clearance, the dimension of the new bridge vertical clearance should be a minimum of 16.25 feet where feasible - All new or reconstructed roadway/shoulder edges adjacent to an unpaved surface should be constructed with a Safety Edge - Collision data on tribal lands may be incomplete or inconsistent; additional coordination for data on tribal lands is required to ensure adequate reflection of safety issues - Expand data collection devices statewide to measure freight delay - Evaluate and accommodate potential changes in freight and goods movement trends that may result from improvements and expansions to the state roadway network
BQAZ 2010 Statewide Transportation Planning Framework Final Report (2010)	This project developed a long-term transportation vision for 2050, with 2030 as an intermediate planning horizon.	Widen / upgrade SR 87 to 6 lanes (MP 177 to MP 253)
Design Concept Reports, Project Assessments, and Scoping Documents		
SR 87, MP 224 to MP 226, Final Project Assessment (2012)	The Project Assessment was for a landslide mitigation project. The goal of the project was to reduce maintenance costs and provide an acceptable factor of safety for a landslide that became destabilized during the original construction between 1998 and 2001.	Construct landslide mitigation measures on SR 87 (MP 224-226)
SR 87 Slate Creek Slope Mitigation, MP 224 to MP 226, Draft Scoping Document (2016)	This was a scoping report for a slope management project	- Initiate a geotechnical investigation and evaluation to determine embankment soil properties, slope stability, and fissure information - Remediate the 12-foot diameter multi-plate pipe - Develop surface runoff design to protect moisture sensitive embankment soils - Evaluate the need for reconstruction of the existing pavement and surface drainage system - Evaluate the need for improved drainage for soil nail walls near MP 224