



MOSON ROAD CROSS-SECTION LANE LAYOUT STUDY: FINAL SUMMARY REPORT

**SUBMITTED TO
SIERRA VISTA METROPOLITAN
PLANNING ORGANIZATION**



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MOSON ROAD CROSS-SECTION LANE LAYOUT STUDY: HEREFORD ROAD TO STATE HIGHWAY 90

MAY 1, 2023

PREPARED FOR:

SIERRA VISTA METROPOLITAN PLANNING ORGANIZATION
&
COCHISE COUNTY



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ABSTRACT

Michael Baker International, Inc. (MBI) partnered with the Sierra Vista Metropolitan Planning Organization (SVMPO) and Cochise County to develop a conceptual Cross-Section Lane Layout Study for the Moson Road Corridor from Hereford Road to State Highway 90 (approximately 7.75-mile roadway section). The intent of this effort was to recommend a cross-section lane layout and identify critical locations where left turn lanes, acceleration or deceleration lanes, or drainage constraints created a need for infrastructure improvements.

The conceptual recommendation is that the Moson Road Corridor be improved to accommodate two 12' lanes with 10' shoulders. Eight left turn lanes are recommended at three intersections (Hereford Road, Ramsey Road, Barataria Road) and two right turn lanes added at one intersection (Hereford Road). Twenty-two drainage crossings were analyzed, and recommendations made for addressing stormwater flows at those locations. These include raising the roadway surface, adding swales, placing metal pipes, adding concrete box culverts, or considering the inclusion of a simple-span bridge structure.

No improvements to the intersection at State Highway 90 are anticipated to be needed at this time. The Highway 90 intersection with Moson Road has been previously improved and includes exclusive turn lanes that are adequate for projected traffic volumes.

This Final Summary Report describes the referenced design standards, infrastructure changes recommended along the study corridor, and proposes potential construction phasing of identified improvements. The conceptual cost estimate for the recommended improvements and drainage alternatives is \$21,105,288 (April 2023). The Design Phase for this project was initiated, using regional and local agency funds, in February of 2023. Construction, if funding is awarded and/or identified, could potentially begin in the Winter of 2024.

Moson Road Corridor	
Miles	7.75
Lanes	12'
Shoulders	10'
New Left Turn Lanes	8
New Right Turn Lanes	3
Drainage Crossings	27

The Moson Road Corridor Study focused on THREE areas

- 1 Improve operations and safety for all roadway users.
- 2 Address drainage issues and overtopping during storm events.
- 3 Evaluate roadway alternatives to meet projected growth in the area.





INTRODUCTION

MBI was selected as the consultant team to assist the SVMPO and Cochise County develop a conceptual Cross-Section Lane Layout Scoping Study for the Moson Road Corridor from Hereford Road to State Highway 90 (approximately 7.75-mile segment). The intent of the Study was to identify a recommended cross-section lane layout. An assessment was made of locations that needed left or right turn lanes, acceleration, or deceleration lanes, or where drainage constraints created a need for infrastructure improvements.

This report describes the design elements used to develop these conceptual recommendations based on the Traffic Memorandum, dated January 2023; the Drainage Memorandum, dated February 2023; and referenced Design Standards; as well as consideration of existing slopes and grades. This study identifies proposed changes in lane layout configuration; locations and layouts of improved intersections, and drainage crossing solutions for addressing stormwater flows at each location.

CORRIDOR DESCRIPTION

The Moson Road study corridor is in southwest Cochise County, Arizona, with a small portion of the corridor located within the jurisdiction of the City of Sierra Vista (Horsethief Draw Road north to Highway 90). Moson Road is a regionally important north/south connection providing access to a variety of land uses that include local businesses, schools, places of worship and recreational sites. Residential uses vary from smaller sites with mobile homes to larger ranch style properties with horse corrals, orchards, and gardens. This route also provides a critical detour and evacuation route when there are travel constraints on State Highways 90 and 92.

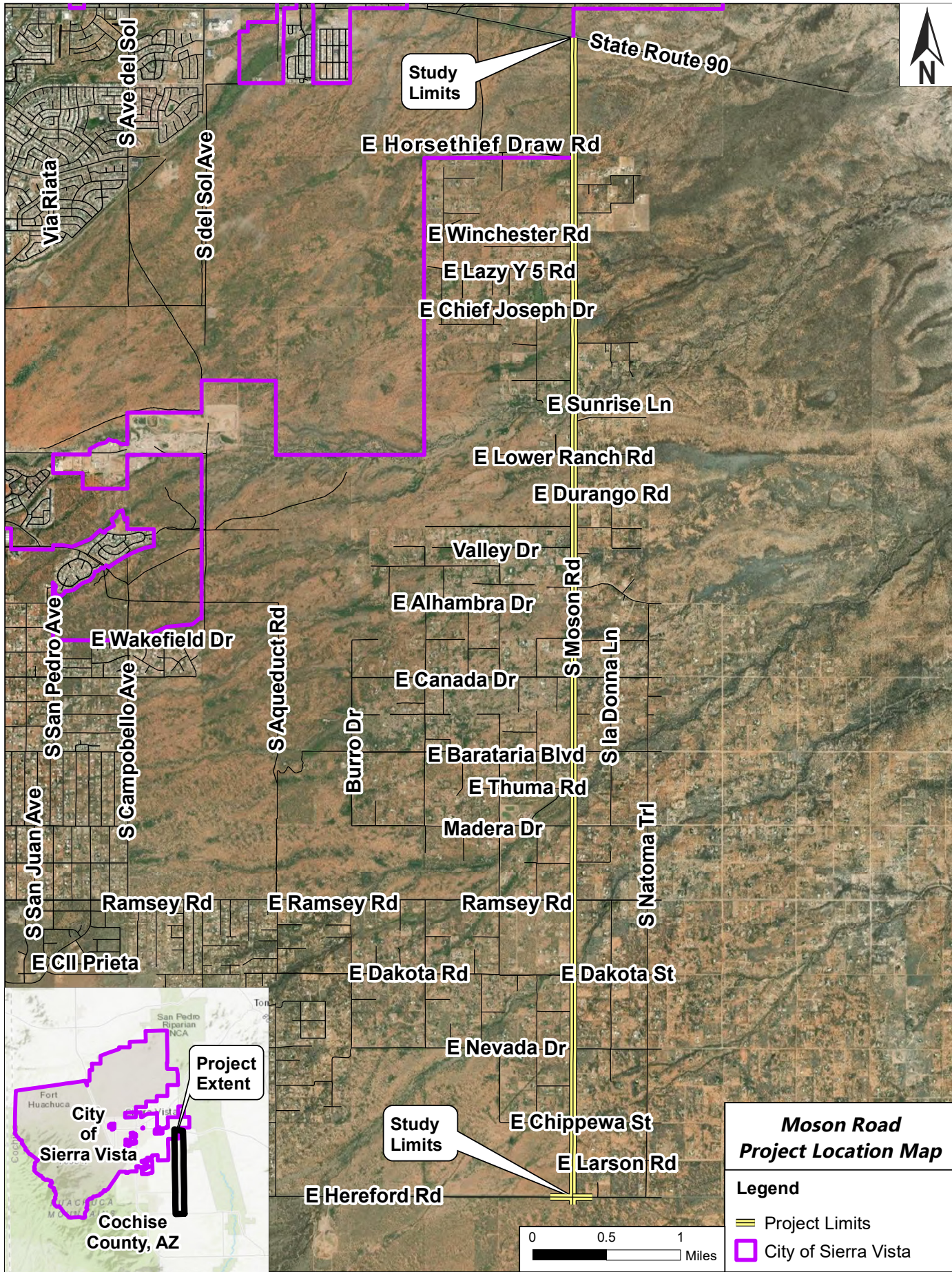
The roadway is currently configured with one lane in each direction, with a posted speed limit of 45 mph. There is no curb, gutter or sidewalk along this corridor. There is no existing roadway lighting along the corridor. There are numerous driveways and public cross-streets on both sides of the corridor. Roadside drainage ditches/swales currently collect and carry stormwater runoff. Twenty-two drainage crossings impact the roadway corridor.

ROADWAY CLASSIFICATION

Moson Road is a Federal Functionally Classified (FFC) Major Collector. This roadway corridor is designated as a FFC Urban Major Collector from Horsethief Draw Road to Highway 90. The remainder of the corridor is designated as an FFC Rural Major Collector from Hereford Road to Horsethief Draw Road.

Based on the Cochise County Road Design & Construction Standards, a Major Collector Road can accommodate an Average Daily Traffic (ADT) between 2,600 to 6,300 vehicles with a desired Level of Service (LOS). As shown in Figure 2, the Year 2022 ADT on Moson Road meets the traffic volume capacity of a Major Collector roadway between Ramsey Road and Highway 90.

The segment of Moson Road, Hereford Road to Ramsey Road, carries an existing traffic volume with the typical ADT of a County Collector Road, as described in the Cochise County Road Design & Construction Standards, between 1,100 to 2,600 vehicles, with a desired LOS B. Although currently carrying a lower traffic volume, the Hereford Road intersection, and this roadway segment, are critical links providing routes to both Highway 92 and Highway 90. In addition, out-year traffic volumes begin to exceed the threshold of the lower design standard and take on more characteristics of its FFC classification as a Major Collector.





CORRIDOR RECOMMENDED LANE LAYOUT

The Moson Road study corridor is recommended to be improved to accommodate two 12' lanes with 10' shoulders, 8' of which would be paved, with left turn lanes at the following locations:

- Eastbound Hereford Road at Moson Road
- Southbound Moson Road at Hereford Road
- Northbound and Southbound Moson Road at Ramsey Road
- Northbound and Southbound Moson Road at Barataria Road
- Eastbound and Westbound Ramsey Road at Moson Road

Right turn lanes are also recommended at the following locations:

- Westbound Hereford Road at Moson Road
- Southbound Moson Road at Hereford Road

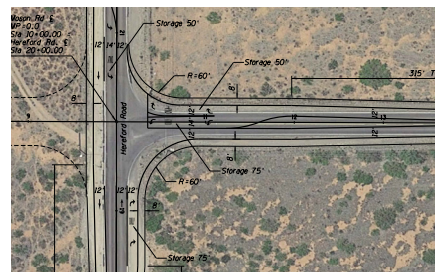
No improvements to the intersection at State Highway 90 are anticipated to be needed at this time. The Highway 90 intersection with Moson Road has been previously improved and includes exclusive turn lanes that are adequate for projected traffic volumes.

INTERSECTION CONFIGURATIONS

Traffic analysis of the corridor intersections led to a recommendation of the following intersection configurations along the Moson Road corridor:

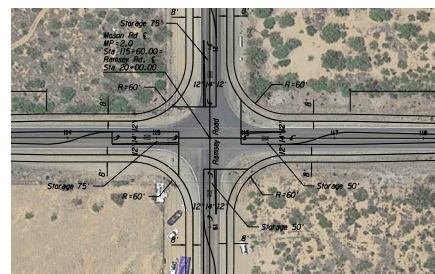
Moson Road/Hereford Road

- Construction modifications may consider adding a south leg of the intersection to accommodate a future southern extension of Moson Road to Highway 92. The limits of construction under this phase could include a paved two-lane spur within the existing Hereford Road right-of-way.
- Reconfigure the intersection to accommodate:
 - » Eastbound: Provide a single left-turn lane, a through lane, and 8' paved shoulders within the limits of the turn lane improvements
 - » Westbound: Provide a single right-turn lane, a through lane, and 8' paved shoulders within the limits of the improvements
 - » Southbound: Provide a single left-turn lane, and a dedicated right-turn lane



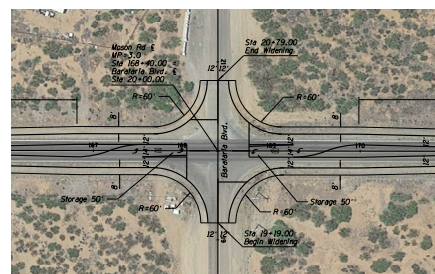
Moson Road/Ramsey Road

- Reconfigure the intersection to accommodate:
 - » Northbound: Widen to provide a single left-turn lane and one through lane
 - » Southbound: Widen to provide a single left-turn lane and one through lane
 - » Eastbound: Widen to provide a single left-turn lane
 - » Westbound: Widen to provide a single left-turn lane
- Add 8' paved shoulders along Ramsey Road within the limits of the proposed turn-lanes



Moson Road/Barataria Road

- Reconfigure the intersection to accommodate:
 - » Northbound: Widen to provide a single left-turn lane and one through lane
 - » Southbound: Widen to provide a single left-turn lane and one through lane
- Extend the proposed improvements to the end of the paved returns along the east and west legs of the intersection, including 8' paved shoulders





RIGHT-OF-WAY

The existing and intended right-of-way along this segment of Moson Road is expected to total a minimum of 100' and be adequate to accommodate the proposed typical section. However, there may be locations along the alignment that may require temporary construction easements for the construction of the proposed improvements. Permanent drainage easements may also be needed at culvert locations to accommodate parallel side ditches and/or erosion protection.

A small segment of the Moson Road Corridor, the western half of the roadway from Horsethief Draw Road to Highway 90, is under the ownership and jurisdiction of the City of Sierra Vista. Agreements, and possible funding support, between the City of Sierra Vista and Cochise County, will be needed in advance of completing the recommended improvements.

DESIGN STANDARDS

Design Standards and Guidelines of Cochise County, Arizona Department of Transportation (ADOT), Maricopa County Department of Transportation (MCDOT), American Association of State Highway and Transportation Officials (AASHTO), and Manual of Uniform Traffic Control Devices (MUTCD), as appropriate, were referenced for this study.

The following standards and criteria were used in drafting the recommended intersection designs.

Project Design Element	Recommended Criteria
<ul style="list-style-type: none"> Lanes 	<ul style="list-style-type: none"> 12' travel lanes, 14' left-turn lanes, right turn lane width- 12' minimum CC017-1 and CC017-2
<ul style="list-style-type: none"> Design Speed / Posted Speed 	<ul style="list-style-type: none"> 55 mph / 45 mph
<ul style="list-style-type: none"> Design Vehicle 	<ul style="list-style-type: none"> WB-50
<ul style="list-style-type: none"> Alignment 	<ul style="list-style-type: none"> No adjustments to construction centerline or monument centerline alignment anticipated.
<ul style="list-style-type: none"> Clearance 	<ul style="list-style-type: none"> Per the AASHTO Roadside Design Guide
<ul style="list-style-type: none"> Dedicated Turn-Lane 	<ul style="list-style-type: none"> Storage length should be determined by an intersection traffic analysis based on the number of turning vehicles likely to arrive in an average two-minute period within the peak hour. Reference Table 4 (Page 12) of the Traffic Memorandum, dated January 18, 2023
<ul style="list-style-type: none"> Intersection Radii 	<ul style="list-style-type: none"> 60' curvature of edge of pavement
<ul style="list-style-type: none"> Driveway Detail 	<ul style="list-style-type: none"> Cochise County Details CC205-1, CC205-2 and CC205-3
<ul style="list-style-type: none"> Intersection Sight Triangles 	<ul style="list-style-type: none"> Cochise County Detail CC300
<ul style="list-style-type: none"> Stopping Sight Distance 	<ul style="list-style-type: none"> AASHTO A Policy on Geometric Design of Highways and Streets, 6th Edition
<ul style="list-style-type: none"> Cross Slope 	<ul style="list-style-type: none"> 2%
<ul style="list-style-type: none"> Longitudinal Slope 	<ul style="list-style-type: none"> AASHTO A Policy on Geometric Design of Highways and Streets, 6th Edition, Section 3.4.6.
<ul style="list-style-type: none"> Pedestrian Facilities 	<ul style="list-style-type: none"> N/A
<ul style="list-style-type: none"> Pavement Marking Signage Intersection Lighting Traffic Control 	<ul style="list-style-type: none"> Manual of Uniform Traffic Control Devices, 9th Edition ADOT Manual of Approved Signs (MOAS) AASHTO Roadway Lighting Design Guide ADOT Traffic Signing and Marking Standard Drawings ADOT Traffic Control Design Guidelines (TCDG), 2011 Illuminating Engineering Society (IES) RP-08-14
<ul style="list-style-type: none"> Pavement Structural Section (Preliminary*) 	<ul style="list-style-type: none"> Pavement Section No. 1 - 3" AC overlay with Stress Absorbing Membrane Interlayer Pavement Section No. 2 - 5-1/2" AC over 6" ABC *Pavement Design to be determined during final design
<ul style="list-style-type: none"> Construction Methods & Materials Technical Specifications 	<ul style="list-style-type: none"> Cochise County Specifications for Public Improvements, 2017 Edition



UTILITIES

The following utility companies are identified to be affected by the construction of this project.

<p>Arizona Department of Transportation - Safford CULVERT, ELECTRIC BLUE/RED David A. Velasquez (520) 720-4751</p>	<p>City of Tombstone SEWER, WATER GREEN, BLUE Elke Remeikis-Hanna (520) 457-3415</p>
<p>Arizona Department of Transportation - Tucson ELECTRIC/TRAFFIC SIGNALS RED Gustavo Ruiz (520) 262-5909</p>	<p>Cox Communications - Sierra Vista CATV, FIBER OPTICS ORANGE, ORANGE W/F USIC Dispatch Center (800) 778-9140</p>
<p>Arizona Electric Power Co-Op ELECTRIC RED Ben Turner (520) 686-3798</p>	<p>CTLQL - CenturyLink COAXIAL, FIBER OPTICS ORANGE, ORANGE W/F USIC Dispatch Center (800) 778 -9140</p>
<p>City of Sierra Vista Public Works and Parks SEWER, TRAFFIC SIGNALS, WATER GREEN, RED, BLUE Brandon Pascual (520) 515-8557</p>	<p>Sulphur Springs Valley Electric Co-Op - Willcox ELECTRIC RED Mike Cook (520) 508-0324</p>



DRAINAGE

The Moson Road Corridor drainage evaluation was based on the Cochise County Road Design & Construction Standards Manual, 2017 Edition. Applicable drainage design criteria for Major Collector Roads is shown in Table 1.

Table 1 – Design Criteria and Reference Manuals

Drainage Component	Design Criteria	Reference Manuals
At-Grade Low Water Crossing for Major Collector Road	<ul style="list-style-type: none"> ■ Minimum 6" x 18" cut-off wall shall be provided outside the edges of the roadway pavement. ■ Cut-off walls shall be placed at least 3" from the upstream and downstream edge of pavement and shall extend to the developed 100-year flow width. ■ Velocity: Minimum 3' for self-cleaning. ■ 100-year Design Storm: Convey within Right-of-Way. 	Cochise County Road Design Manual (Section C.6.F)
Open Channel/ Roadside Ditch for Major Collector Road	<ul style="list-style-type: none"> ■ 25-year Design Storm: Convey runoff with a maximum water surface no greater than the lowest adjacent road subgrade or alternative design approved by regulatory agency. ■ 100-year Design Storm: Convey within Right-of-Way. ■ Velocity: 4 ft/s or more requires bank protection. 	Cochise County Road Design Manual (Section C.6.F)
	<ul style="list-style-type: none"> ■ Roadside Ditches: The preferred foreslope shall be 4:1 H:V and the preferred backslope shall be 6:1 H:V. 	AASHTO Roadside Design Manual (Table 3-1 & Figure 3.6)
Bridge for Major Collector Road	<ul style="list-style-type: none"> ■ Bridge Freeboard: Minimum 1' below bridge low chord, with pier clogging factored into analysis. 	ADOT Roadway Design Guidelines (Chapter 600)
Culvert for Major Collector Road	<ul style="list-style-type: none"> ■ 25-year Design Storm: Convey runoff under road with no overtopping of the roadway (Requires design variance for using 10-year Design Storm). ■ 100-year Design Storm: Convey excess runoff through an overflow/dip section without adversely impacting adjacent properties. ■ Minimum pipe culvert diameter for roadway crossings shall be 24" and 18" for driveways. ■ Culverts 48" and greater shall have concrete headwalls. ■ Minimum inside height of box culverts shall be 4' above the natural streambed elevation. ■ Minimum inside height of arch culverts shall be 4.5' above the natural streambed elevation. ■ Velocity: Minimum 3' for self-cleaning. Maximum 10' at outlet unless special conditions exist. 	Cochise County Road Design Manual (Section C.6.F)
	<ul style="list-style-type: none"> ■ Design flood high water elevation shall be no higher than 3" below pavement. ■ Headwater: For the design flood, the headwater level should be no higher than 3" below the pavement. Generally, the headwater depth to culvert height ratio should not exceed 1.5. ■ Cover: Pipe culverts should have at least 1' of embedment below the pavement structural section. In no case should culverts have less than 1' of cover within the pavement width (edge to edge) without special protective measures. ■ End treatment: End sections or headwalls should be provided on all culverts. ■ No erosion protection is generally required if the outlet velocity is less than 1.5 times natural stream velocity 	ADOT Roadway Design Guidelines (Chapter 600)



The following is a list of the data used in the evaluation:

- Cochise County provided 2' interval topography, flown in 2020, for the study corridor.
- Effective FEMA Flood Insurance Rate Map (FIRM) panels (ref. Drainage Memorandum).
- The Draft Flood Insurance Study (FIS) data (ref. Drainage Memorandum) was obtained from Cochise County. The peak discharges developed for the Draft FIS uses detailed topography and refined hydrologic methodology. FEMA is still in the process of reviewing this data.
- The Moson Road Concept Drainage Study (ref. Drainage Memorandum) was submitted to Cochise County by Stantec in June 2002. The study identified the various existing crossings for the study corridor and identified possible alternatives to mitigate drainage impacts. Those solutions were considered during the assessment of this study. The Concept Drainage study also developed hydrology and peak discharges using the old regression equations.
- United States Geological Survey (USGS) has developed a web-based program called StreamStats (ref. Drainage Memorandum) to calculate peak discharges based on gage data and regression equations. The peak discharge for the crossings were also developed using USGS StreamStats to compare peak discharges with the previous Drainage Study.

Hydraulic Alternatives Analysis

Moson Road is classified as a Major Collector Road requiring the proposed drainage crossings to be designed for a 25-year storm event, as noted in the Design Criteria section above. However, after consultation with the Technical Advisory Group, which included Cochise County staff, direction was given to analyze design criteria for stormwater structures to address the 10-year storm event. A design waiver would be obtained for those crossings that would be designed and constructed for a 10-year, instead of the 25-year storm event. Cost to fully build-out all crossings on Moson Road was one significant consideration for using the 10-year storm event as a threshold.

The alternatives analysis for each crossing was based on the Moson Road Concept Drainage Report (ref. Drainage Memorandum) for most of the locations. All other data available including contours, Draft Flood Insurance Study (FIS) data, current field conditions, engineering judgement, etc. were considered when building on the basis that the Concept Drainage Report provided. For all alternatives, it is assumed that there will be no curb and gutter constructed along Moson Road.

Culverts were recommended for crossings with a 10-year storm peak discharge of 200 cubic feet per second (cfs) or more and/or had an existing culvert. All culverts were assumed to be 100' long, for the purposes of calculating culvert capacity, based on AASHTO Roadside Design Guide "Clear Zone" requirements. All roadway widths at culvert crossings were assumed to be 50', slightly wider than the two-lane road on Cochise County Standard Detail No. CC011. All culvert tailwater conditions assumed normal depth as the culvert outlet condition.

The culvert alternatives were modeled in HY-8 Version 7.50. HY-8 is a computerized implementation of FHWA-endorsed culvert hydraulic analysis approaches and protocols. HY-8 is the full name of the software and is not an abbreviation. The modeled alternatives are accounted for with two separate models and output reports including "Draft FIS Crossings" and "Concept Drainage Study & StreamStats Crossings" (ref. Drainage Memorandum).

Low water crossing and drainage swale/roadside ditch alternatives were recommended for crossings with a 10-year storm peak discharge of 200 cfs or less without existing culverts, but unlike culvert alternatives, they do not have the support of detailed calculations. It is anticipated that these alternatives would be modeled in FlowMaster or Hydrologic Engineering Center – River Analysis System (HEC-RAS) as part of the Final Design Phase.

Bridges were recommended for crossings with a 10-year storm peak discharge of 2,500 cfs or more. A bridge is defined according to the HEC-RAS User's Manual. It is a structure carrying traffic over a flooding source that is abutment-supported rather than earthen fill-supported. It may or may not require piers depending on bridge span and deck type. It is anticipated that the bridge alternatives would also be modeled in HEC-RAS as part of the Final Design Phase.



A list of design alternatives for each crossing was developed based on a design for a 10-year storm event (Ref. Drainage Memorandum). An abridged version of these findings are shown in Table 2.

Color shading within Table 2 corresponds to the hydrologic source used for each crossing. Structural solution abbreviations are identified below.

- = Draft FIS Flooding Source flows used
- = Concept Drainage Study Area flows used
- = StreamStats Drainage Area flows used

- LWC = Low Water Crossing (Dip Crossing)
- CMP = Corrugated Metal Pipe
- CMPA = Corrugated Metal Pipe Arch
- RCP = Reinforced Concrete Pipe
- RCBC = Reinforced Concrete Box Culvert

Table 2 – Drainage Alternatives Summary

Crossing ID	Location Descriptions	Proposed Alternatives (10-year Design Storm)
1	Larson Road at Moson Road	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point ▪ Raise road 1' above existing, 5 - 36" CMP (3" embedment depth)
2	Chippewa Street at Moson Road	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point
3	Larkspur Lane at Moson Road	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point ▪ Raise road 2' above existing, 4 - 34" x 53" Elliptical RCP (3" embedment depth)
4	Nevada Drive at Moson Road & Hunter Canyon Creek at Junction-10	<ul style="list-style-type: none"> ▪ Raise road 1.5' above existing, 2 - 4'-7.5" x 14' CMPA (3" embedment depth), LWC at Nevada Drive ▪ Raise road 1.75' above existing, 2 - 4'-7.5" x 15' CMPA (3" embedment depth), Swale along Moson ▪ Raise road 1.75' above existing, 2 - 4' x 10' RCBC (6" embedment depth), LWC at Nevada Drive ▪ Raise road 1.5' above existing, 3 - 4' x 8' RCBC (6" embedment depth), Swale along Moson Road
5		
6	Approx. 400' south of Dakota Road	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point
7	Miller Canyon Wash at J562	<ul style="list-style-type: none"> ▪ Raise road 1.5' above existing, 8 - 5'-2" x 16' CMPA (3" embedment depth) ▪ Raise road 1.5' above existing, 6 - 5' x 14' RCBC (6" embedment depth) ▪ Simple-span bridge
8	Ramsey Road at Moson Road	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point ▪ Raise road 1.5' above existing, 4 - 36" CMP (3" embedment depth)
9	Hansford Lane at Moson Road	<ul style="list-style-type: none"> ▪ Refer to Concept Drainage Study Area 4 alternative ▪ Swale on west side of Moson, LWC at Madera, and outfall to Carr Canyon Creek ▪ No road raise, 4 - 34" x 53" Elliptical RCP (3" embedment depth)
10	Approx. 500' north of Hansford Lane	<ul style="list-style-type: none"> ▪ Improve swale on west side of Moson and LWC at road low point
11	Carr Canyon Creek at Junction-12	<ul style="list-style-type: none"> ▪ Raise road 1' above existing, 6 - 5'-2" x 16' CMPA (3" embedment depth) ▪ Raise road 1' above existing, 6 - 5' x 12' RCBC (6" embedment depth) ▪ Simple-span bridge



Crossing ID	Location Descriptions	Proposed Alternatives (10-year Design Storm)
12	Barataria Blvd at Moson Road	<ul style="list-style-type: none"> Refer to Concept Drainage Study Area 6 alternative and LWC at road low point Raise road 0.25' above existing, 4 - 36" CMP (3" embedment depth)
13	Ramsey Canyon Wash at RCW_J_7C	<ul style="list-style-type: none"> Raise road 3' above existing, 9 - 5'-2.5" x 17' CMPA (3" embedment depth) Raise road 3' above existing, 7 - 5' x 14' RCBC (6" embedment depth) Simple-span bridge
14	Approx. 700' north of Canada Drive	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 2' above existing, 4 - 34" x 53" Elliptical RCP (3" embedment depth)
15	Palo Alto Road at Moson Road	<ul style="list-style-type: none"> Provide LWC at road low point above existing CMP
16	Approx. 800' north of Alhambra Drive	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 1' above existing, 4 - 36" CMP (3" embedment depth)
17	Carr Canyon Creek Tributary 1 at RCW_J_4_10	<ul style="list-style-type: none"> Raise road 0.25' above existing, 1 - 5'-2.5" x 17' CMPA (3" embedment depth) on each side of Valley Drive No road raise, 1 - 5' x 12' RCBC (6" embedment depth) on each side of Valley Drive
18	Approx. 250' south of Lower Ranch Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 2' above existing, 4 - 38" x 60" Elliptical RCP (3" embedment depth)
19	Garden Canyon Wash at Junction-31	<ul style="list-style-type: none"> No structural solution; only downstream erosion control Raise road 3.5' above existing, 7 - 5'-9" x 18' CMPA (3" embedment depth) Raise road 3.5' above existing, 6 - 6' x 16' RCBC (6" embedment depth) Simple-span bridge
20	Garden Creek Trail at Moson Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point
21	Thompson Lane at Moson Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 2.5' above existing, 4 - 34" x 53" Elliptical RCP (3" embedment depth)
22	Approx. 800' north of Thompson Lane	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point
23	Approx. 600' south of Lazy Y-5 Ranch Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 2' above existing, 4 - 43" x 68" Elliptical RCP (3" embedment depth)
24	Lazy Y-5 Ranch Road at Moson Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 1.25' above existing, 3 - 36" CMP (3" embedment depth)
25	Horse Thief Draw Road at Moson Road	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 2' above existing, 2 - 4'-7.5" x 15' CMPA (3" embedment depth) Raise road 2' above existing, 2 - 4' x 10' RCBC (6" embedment depth)
26	Approx. 1,700' south of State Route 90	<ul style="list-style-type: none"> Improve swale on west side of Moson and LWC at road low point Raise road 3.75' above existing, 2 - 4'-7.5" x 14' CMPA (3" embedment depth) Raise road 3.25' above existing, 2 - 4' x 10' RCBC (6" embedment depth)



Recommended drainage crossing solutions will be selected from the alternatives in the Final Design Phase, in consultation with drainage and roadway engineers. Final alternative selections should be completed when headwater impacts on the upstream side of crossings, erosion/scour, and property damage potential, as well as the costs of the alternatives are better known. Given the significant number of drainage crossings on this corridor, and their impact on all-weather travel in the Corridor, phasing of improvements may be needed due to funding constraints for preferred full build-out conditions.

FUTURE CONSIDERATIONS

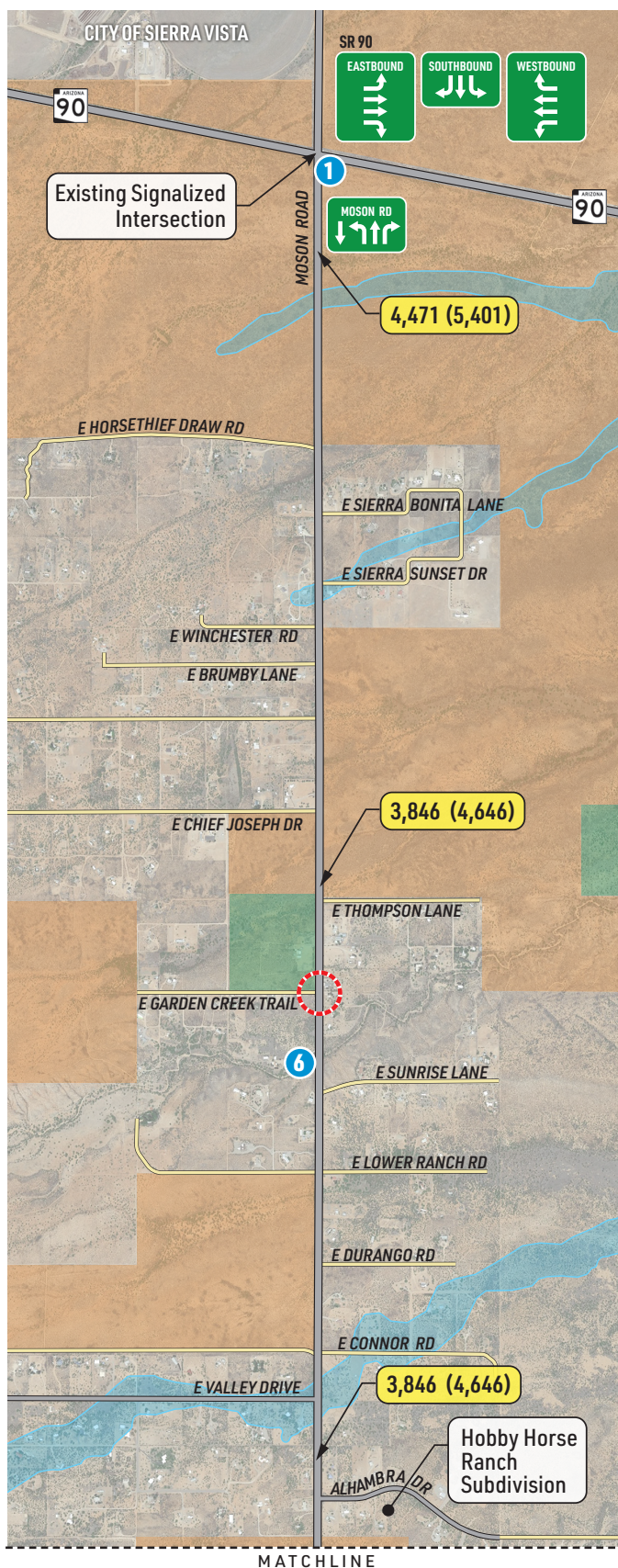
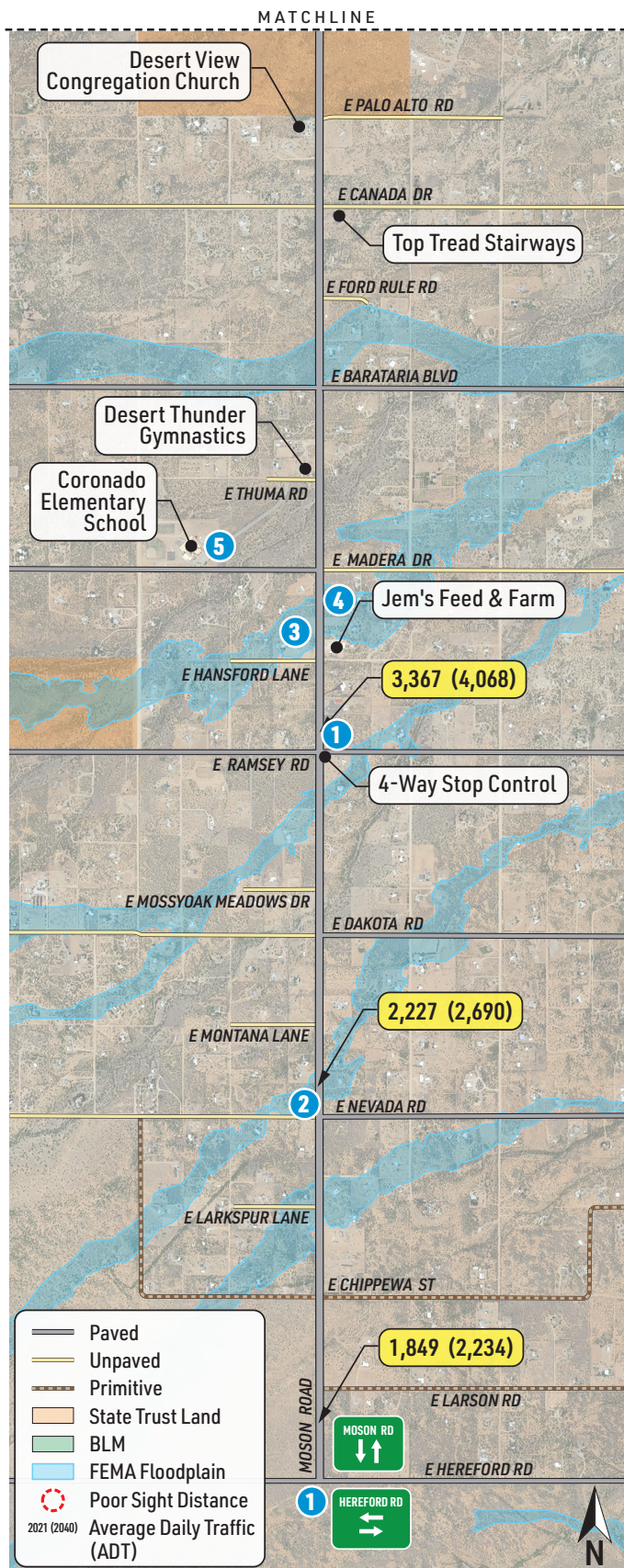
The following considerations regarding the final drainage crossing solutions are recommended to be considered during the Design Phase:

- Additional hydrologic analysis accounting for future land use conditions should be done in coordination with Cochise County, SVMPO, and other stakeholders.
- Recommended drainage crossing alternatives should be selected in coordination with Cochise County, SVMPO, and other stakeholders. The roadway classification and roadway width should be finalized prior to selecting among the drainage crossing alternatives.
- Hydraulic analysis of the low water crossings should be done to determine if the depth on roadway meets the Cochise County Road Design Manual criteria after finalizing the roadway elevations.
- There are potential right-of-way limitations impacting roadside ditch hydraulics, and depth criteria, for the typical cross-section. Variances from the Design Standards, as per A-3 3, may need to be determined, approved by the County Engineer, and documented.
- Drainage easements for the recommended alternatives should be determined and consideration given if there are any potential right-of-way limitations that might impact the constructability or future maintenance accessibility prior to selection of the final design choice.
- The hydraulic analysis should be refined once the recommended alternatives are selected for the crossings. This would require obtaining FEMA hydraulic models for the Draft FIS study, performing additional hydraulic models for crossings not part of the FEMA FIS study, and developing erosion and sediment control measures for erosion/scour and sediment deposition at the crossings.
- Given the number of drainage crossings on this corridor, phasing of improvements may be needed due to funding constraints for preferred full build-out conditions.



Issues Map

Existing Issues Map



- 1 Reviewed intersection turning movement counts to determine the exclusive turn lane needs
- 2 Culvert headwall in clear zone
- 3 Constructing in FEMA Zone A Floodplain may require a floodplain use permit or a no-rise certificate
- 4 NEPA and 404 issues
- 5 Reviewed pedestrian activity to determine the need for pedestrian facilities
- 6 Sediment issues in culvert crossings



ENVIRONMENTAL CONSIDERATIONS

An environmental assessment was specifically excluded from the scope of this study. It is important, and may be required, to address environmental concerns and impacts during the final design phase, including:

- Biological Resources
- Hazardous Materials
- Noise
- Wildlife Crossings
- Air Quality
- Cultural Resources

PHASING RECOMMENDATIONS

The proposed improvements are recommended to be constructed in two phases: Phase I includes the proposed improvements from Ramsey Road to State Highway 90, including the Ramsey Road intersection improvements, and Phase 2 includes the proposed improvements from Hereford Road to Ramsey Road.

Other phasing considerations may include staging intersection improvements, selecting lower cost drainage alternatives with future projects to construct the best alternative at a later date, constructing the most critically needed drainage improvements first, using pavement preservation strategies to build the base for the recommended construction phase and/or blading and building up the base for planned paved shoulders. Availability of funding, and the type of funding sources, are a critical path items for determining what action items to undertake first.

PROJECT COST SUMMARY

The following is a summary of the estimated project costs based on the conceptual pre-scoping lane layout (as of April 2023).

Project Summary	Project Cost
Design Phase	\$1,460,000
Moson Road Phase 1 (Ramsey Road to State Highway 90)	\$15,152,790
Moson Road Phase 2 (Hereford Road to Ramsey Road)	\$3,032,498
Construction Administration	\$1,460,000
Total Project Cost Estimate:	\$21,105,288

NEXT STEP ACTIONS

This conceptual corridor study provides the SVMPO and Cochise County with a thoroughly researched foundation to move recommendations forward to implementation. Given the funding constraints the full build-out of both roadway and drainage improvements is likely to take some time. However, advance action steps are recommended to be undertaken.

1. Initiation of the Design Phase with Arizona Department of Transportation. \$1,000,000 in funding towards the Design Phase has been programmed for Fiscal Year 2023 by the SVMPO. This phase was initiated in February of 2023.
2. Proactively complete Right-of-Way acquisitions for the full corridor width as well as obtain drainage and construction easements.
3. Finalize and complete the full bid-ready Design for the Corridor.
4. Develop and prioritize construction phases. Smaller pieces may be able to be completed in advance of resurfacing the entire corridor e.g. selected drainage crossing improvements or the installation of one or more turning, deceleration or acceleration lanes.
5. Apply for available federal, state, and regional funds to partner with County and City local agency funding for prioritized, phased construction phases. Budget for match and staff resources in future years to fully fund, program and implement the desired corridor improvements on Moson Road.
6. Plan and construct, over time, the corridor, intersection, and drainage improvements recommended by this study as subsequently refined during the Design Phase, as funding becomes available.

ACTION!

- Design Phase
- Right-of-Way
- Bid-Ready Design Plans
- Prioritize Construction
- Apply for Funding
- Construct Improvements

APPENDIX A
MOSON ROAD COST ESTIMATE - HEREFORD ROAD TO STATE HIGHWAY 90



APPENDIX A: TOTAL COSTS

MOSON ROAD: TOTAL COSTS					
Preliminary Construction Cost Estimate					
Item #	Description	QTY	Unit	Unit Price	Total
D	Design - Hereford Road to SR 90 (at 10 % of Construction Cost)	1	LS	\$1,460,000	\$1,460,000
1	REMOVE EXISTING BITUMINOUS SURFACING	81,254	SY	\$1.00	\$81,254
2	ROADWAY EMBANKMENT, INCL. HAUL FROM LOCAL PIT	49,500	CY	\$10.00	\$495,000
3	SUBGRADE PREPARATION	141,613	SY	\$3.00	\$424,839
4	SAWCUT EXISTING PAVEMENT	22,020	LF	\$1.50	\$33,030
5	CONSTRUCT ASPHALT PAVEMENT, 5-1/2" ACC	44,759	TN	\$140.00	\$6,266,260
6	CONSTRUCT AGGREGATE BASE, 6" ABC	25,837	CY	\$60.00	\$1,550,220
7	CONSTRUCT ASPHALT OVERLAY, 3" ACC	4,832	TN	\$140.00	\$676,480
8	PLACE STRESS ABSORBING MEMBRANE INTERLAYER	30,675	SY	\$12.00	\$368,100
9	CONSTRUCT RIPRAP EROSION CONTROL PAD ON GEOTEXTILE FABRIC	23,490	SF	\$11.50	\$270,135
10	RELOCATE/RESET EXISTING MAILBOX	68	EA	\$120.00	\$8,160
11	FURNISH & INSTALL NEW TRAFFIC SIGN ASSEMBLY	223	EA	\$500.00	\$111,500
12	FURNISH & INSTALL CMP PIPE CULVERT, 36"	1,500	LF	\$115.00	\$172,500
13	FURNISH & INSTALL HERCP PIPE CULVERT, 34" x 53"	1,200	LF	\$300.00	\$360,000
14	FURNISH & INSTALL HERCP PIPE CULVERT, 38" x 60"	300	LF	\$375.00	\$112,500
15	FURNISH & INSTALL HERCP PIPE CULVERT, 43" X 68"	300	LF	\$425.00	\$127,500
16	FURNISH & INSTALL CONCRETE BOX CULVERT, 4' X 10'	150	LF	\$600.00	\$90,000
17	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 14'	300	LF	\$875.00	\$262,500
18	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 15'	150	LF	\$925.00	\$138,750
19	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2" X 16'	1,050	LF	\$1,050.00	\$1,102,500
20	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2.5" X 17'	750	LF	\$1,200.00	\$900,000
21	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-9" X 18'	525	LF	\$1,300.00	\$682,500
22	FURNISH & INSTALL HEADWALL, MAG 501	20	EA	\$15,000.00	\$300,000
23	STRIPING, 6" YELLOW THERMOPLASTIC	69,950	LF	\$0.40	\$27,980
24	STRIPING, 6" WHITE THERMOPLASTIC	83,950	LF	\$0.40	33,580
	<i>SUB-TOTAL Items 1 thru 24 (Construction Costs)</i>				\$14,595,288
25	TRAFFIC CONTROL (8%)	1	LS	\$1,168,000	\$1,168,000
26	MOBILIZATION (10%)	1	LS	\$1,460,000	\$1,460,000
27	CONSTRUCTION CONTINGENCY (8%)	1	LS	\$1,168,000	\$1,168,000
28	CONSTRUCTION ADMINISTRATION (10%)	1	LS	\$1,460,000	\$1,460,000
	<i>SUB-TOTAL Items 25 thru 28</i>				\$5,050,000
MOSON ROAD: TOTAL COSTS					\$21,105,288

Assumptions

- Pipe culvert lengths are estimated at 75 feet
- Paved shoulder pavement structure matches the roadway lane sections
- Each identified cost item includes material, labor and equipment for complete in-place construction
- Cost Estimates are in 2023 dollars



APPENDIX A: PHASE I

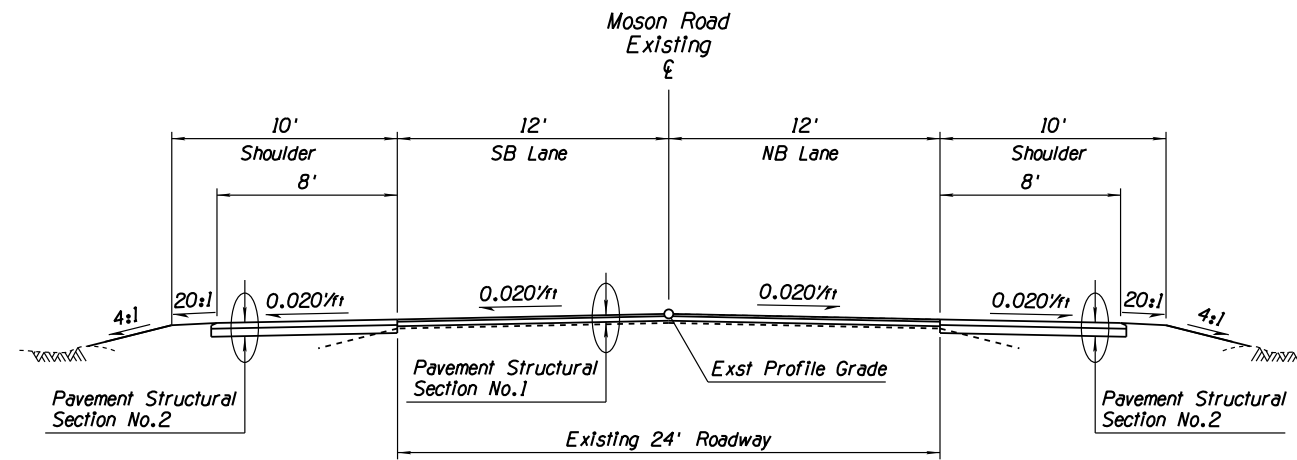
MOSON ROAD: PHASE I - RAMSEY ROAD TO HIGHWAY 90					
Preliminary Construction Cost Estimate					
Item #	Description	QTY	Unit	Unit Price	Total
D	Design - Hereford Road to SR 90 (at 10 % of Construction Cost)	1	LS	\$1,203,000	\$1,203,000
1	REMOVE EXISTING BITUMINOUS SURFACING	81,254	SY	\$1.00	\$81,254
2	ROADWAY EMBANKMENT, INCL. HAUL FROM LOCAL PIT	37,240	CY	\$10.00	\$372,400
3	SUBGRADE PREPARATION	137,225	SY	\$3.00	\$411,675
4	SAWCUT EXISTING PAVEMENT	-	LF	\$1.50	-
5	CONSTRUCT ASPHALT PAVEMENT, 5-1/2" ACC	43,492	TN	\$140.00	\$6,088,880
6	CONSTRUCT AGGREGATE BASE, 6" ABC	25,105	CY	\$60.00	\$1,506,300
7	CONSTRUCT ASPHALT OVERLAY, 3" ACC	-	TN	\$140.00	-
8	PLACE STRESS ABSORBING MEMBRANE INTERLAYER	-	SY	\$12.00	-
9	CONSTRUCT RIPRAP EROSION CONTROL PAD ON GEOTEXTILE FABRIC	19,438	SF	\$11.50	\$223,537
10	RELOCATE/RESET EXISTING MAILBOX	60	EA	\$120.00	\$7,200
11	FURNISH & INSTALL NEW TRAFFIC SIGN ASSEMBLY	201	EA	\$500.00	\$100,500
12	FURNISH & INSTALL CMP PIPE CULVERT, 36"	1,125	LF	\$115.00	\$129,375
13	FURNISH & INSTALL HERCP PIPE CULVERT, 34" x 53"	900	LF	\$300.00	\$270,000
14	FURNISH & INSTALL HERCP PIPE CULVERT, 38" x 60"	300	LF	\$375.00	\$112,500
15	FURNISH & INSTALL HERCP PIPE CULVERT, 43" X 68"	300	LF	\$425.00	\$127,500
16	FURNISH & INSTALL CONCRETE BOX CULVERT, 4' X 10'	-	LF	\$600.00	-
17	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 14'	150	LF	\$875.00	\$131,250
18	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 15'	150	LF	\$925.00	\$138,750
19	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2" X 16'	450	LF	\$1,050.00	\$472,500
20	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2.5" X 17'	750	LF	\$1,200.00	\$900,000
21	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-9" X 18'	525	LF	\$1,300.00	\$682,500
22	FURNISH & INSTALL HEADWALL, MAG 501	15	EA	\$15,000.00	\$225,000
23	STRIPING, 6" YELLOW THERMOPLASTIC	50,733	LF	\$0.40	\$20,293
24	STRIPING, 6" WHITE THERMOPLASTIC	60,940	LF	\$0.40	\$24,376
	<i>SUB-TOTAL Items 1 thru 24 (Construction Costs)</i>				\$12,025,790
25	TRAFFIC CONTROL (8%)	1	LS	\$962,000	\$962,000
26	MOBILIZATION (10%)	1	LS	\$1,203,000	\$1,203,000
27	CONSTRUCTION CONTINGENCY (8%)	1	LS	\$962,000	\$962,000
28	CONSTRUCTION ADMINISTRATION (10%)	1	LS	\$1,203,000	\$1,203,000
	<i>SUB-TOTAL Items 25 thru 28</i>				\$4,330,000
MOSON ROAD: PHASE I - TOTAL COSTS					\$17,558,790



APPENDIX A: PHASE II

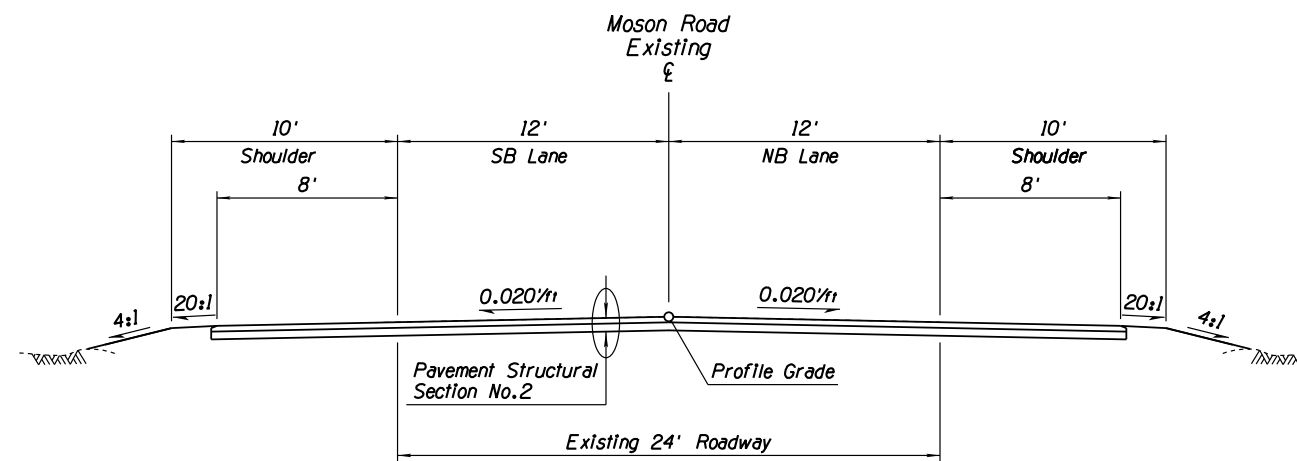
MOSON ROAD: PHASE II - HEREFORD ROAD TO RAMSEY ROAD					
Preliminary Construction Cost Estimate					
Item #	Description	QTY	Unit	Unit Price	Total
D	Design - Hereford Road to SR 90 (at 10 % of Construction Cost)	1	LS	\$257,000	\$257,000
1	REMOVE EXISTING BITUMINOUS SURFACING	-	SY	\$1.00	-
2	ROADWAY EMBANKMENT, INCL. HAUL FROM LOCAL PIT	12,260	CY	\$10.00	\$122,600
3	SUBGRADE PREPARATION	4,388	SY	\$3.00	\$13,164
4	SAWCUT EXISTING PAVEMENT	22,020	LF	\$1.50	\$33,030
5	CONSTRUCT ASPHALT PAVEMENT, 5-1/2" ACC	1,267	TN	\$140.00	\$177,380
6	CONSTRUCT AGGREGATE BASE, 6" ABC	732	CY	\$60.00	\$43,920
7	CONSTRUCT ASPHALT OVERLAY, 3" ACC	4,832	TN	\$140.00	\$676,480
8	PLACE STRESS ABSORBING MEMBRANE INTERLAYER	30,675	SY	\$12.00	\$368,100
9	CONSTRUCT RIPRAP EROSION CONTROL PAD ON GEOTEXTILE FABRIC	4,052	SF	\$11.50	\$46,598
10	RELOCATE/RESET EXISTING MAILBOX	8	EA	\$120.00	\$960
11	FURNISH & INSTALL NEW TRAFFIC SIGN ASSEMBLY	22	EA	\$500.00	\$11,000
12	FURNISH & INSTALL CMP PIPE CULVERT, 36"	375	LF	\$115.00	\$43,125
13	FURNISH & INSTALL HERCP PIPE CULVERT, 34" x 53"	300	LF	\$300.00	\$90,000
14	FURNISH & INSTALL HERCP PIPE CULVERT, 38" x 60"	-	LF	\$375.00	-
15	FURNISH & INSTALL HERCP PIPE CULVERT, 43" X 68"	-	LF	\$425.00	-
16	FURNISH & INSTALL CONCRETE BOX CULVERT, 4' X 10'	150	LF	\$600.00	\$90,000
17	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 14'	150	LF	\$875.00	\$131,250
18	FURNISH & INSTALL CMPA PIPE CULVERT, 4'-7.5" X 15'	-	LF	\$925.00	-
19	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2" X 16'	600	LF	\$1,050.00	\$630,000
20	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-2.5" X 17'	-	LF	\$1,200.00	-
21	FURNISH & INSTALL CMPA PIPE CULVERT, 5'-9" X 18'	-	LF	\$1,300.00	-
22	FURNISH & INSTALL HEADWALL, MAG 501	5	EA	\$15,000.00	\$75,000
23	STRIPING, 6" YELLOW THERMOPLASTIC	19,217	LF	\$0.40	\$7,687
24	STRIPING, 6" WHITE THERMOPLASTIC	23,010	LF	\$0.40	\$9,204
	<i>SUB-TOTAL Items 1 thru 24 (Construction Costs)</i>				\$2,569,498
25	TRAFFIC CONTROL (8%)	1	LS	\$206,000	\$206,000
26	MOBILIZATION (10%)	1	LS	\$257,000	\$257,000
27	CONSTRUCTION CONTINGENCY (8%)	1	LS	\$206,000	\$206,000
28	CONSTRUCTION ADMINISTRATION (10%)	1	LS	\$257,000	\$257,000
	<i>SUB-TOTAL Items 25 thru 28</i>				\$720,000
MOSON ROAD: PHASE II - TOTAL COSTS					\$3,546,498

APPENDIX B
MOSON ROAD TYPICAL SECTION SHEETS



TYPICAL SECTION Overlay

Moson Road
MP 0.0 to MP 1.91 - Sta 10+00 to 110+62



TYPICAL SECTION Reconstruction

Moson Road
MP 1.91 to MP 7.67 - Sta 110+62 to 414+80

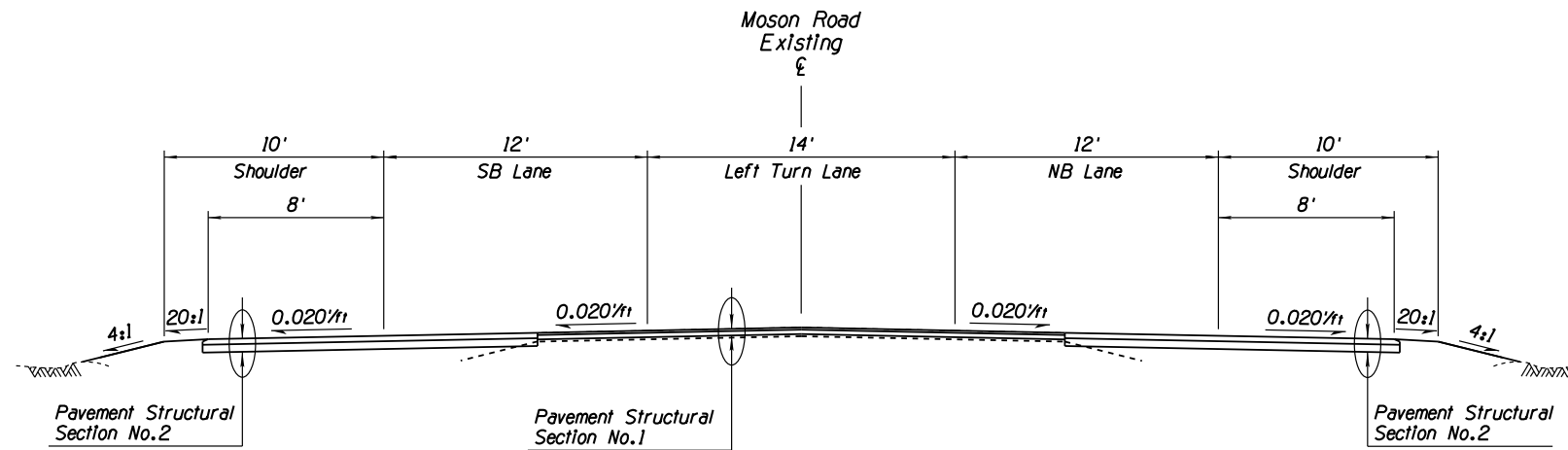
PAVEMENT STRUCTURAL SECTIONS

Pavement Structural Section No. 1
Place a 3" AC overlay with Stress Absorbing Membrane Interlayer (SAMI)

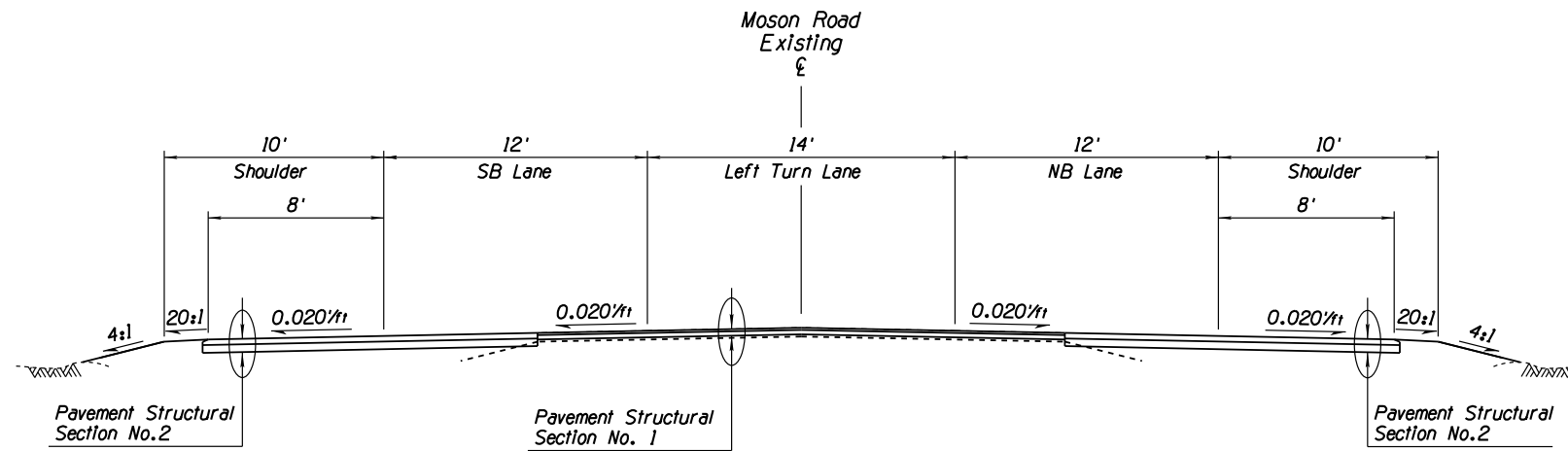
Pavement Structural Section No. 2
Remove and reconstruct existing pavement with 5-1/2" AC over 6" ABC

February 9, 2023

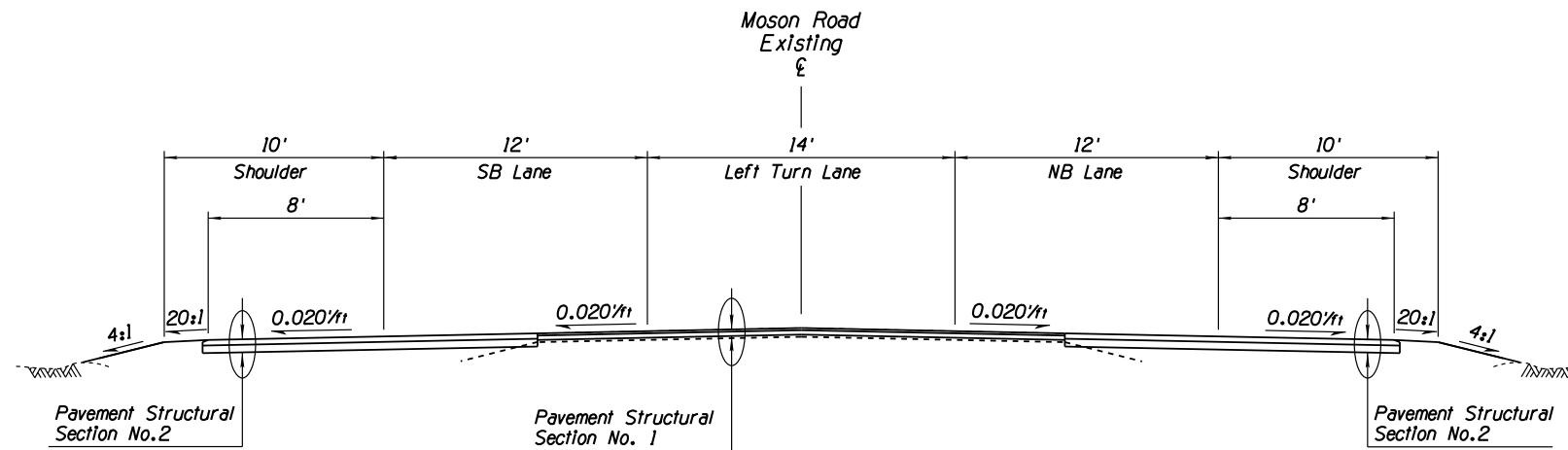
Sheet 1 of 3



**TYPICAL SECTION
Left Turn Lane**
Hereford Road MP 0.02 - Sta 11+00



**TYPICAL SECTION
Left Turn Lane**
Ramsey Road MP 2.0 - Sta 115+60

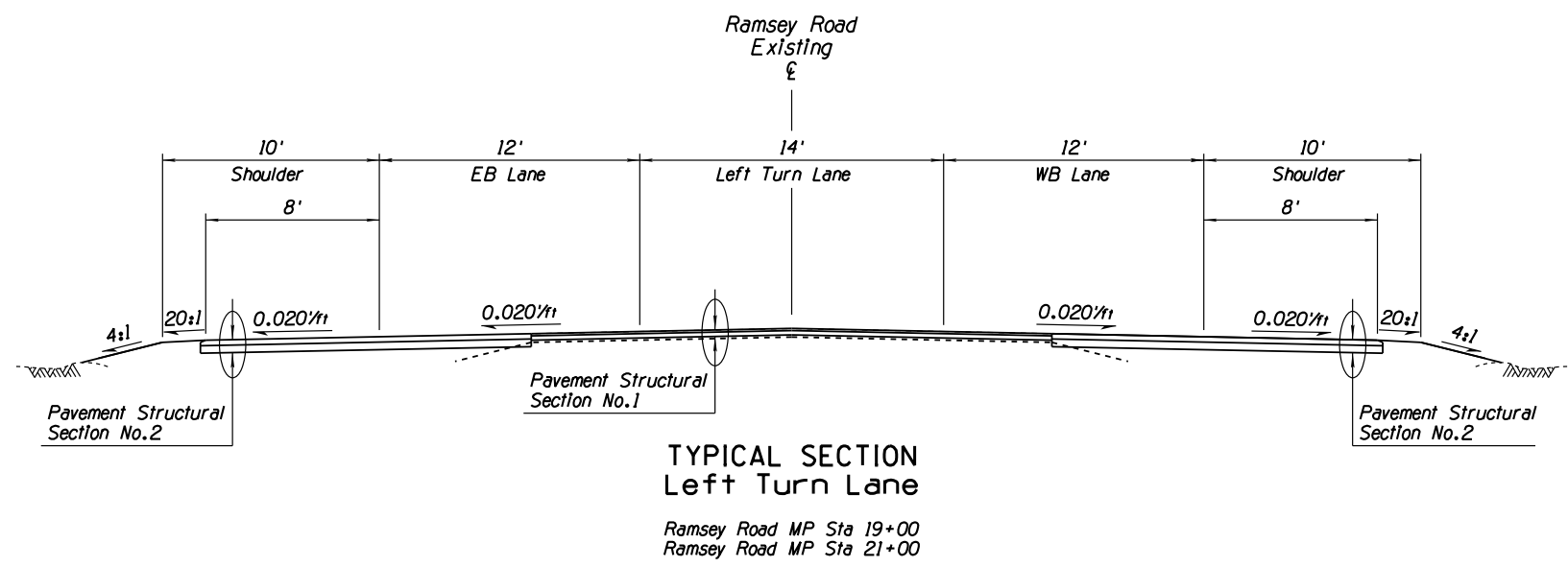
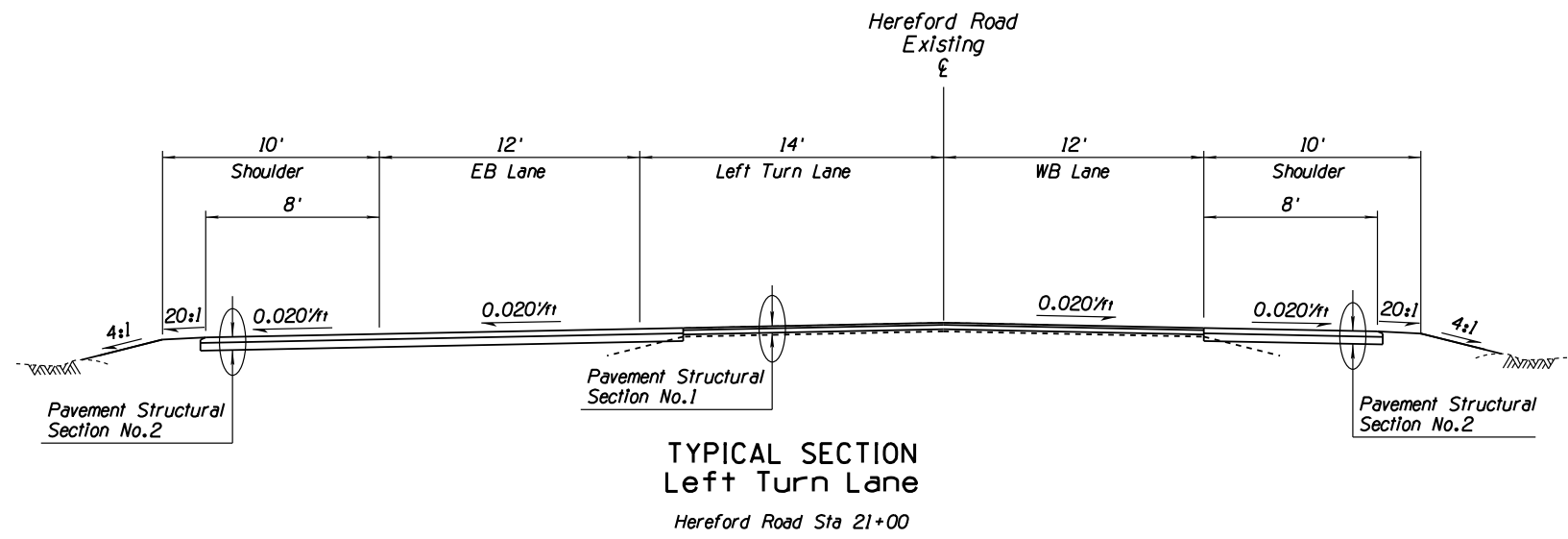


**TYPICAL SECTION
Left Turn Lane**
Barataria Blvd. MP 3.0 - Sta 168+40

PAVEMENT STRUCTURAL SECTIONS

Pavement Structural Section No. 1
Place a 3" AC overlay with Stress Absorbing Membrane Interlayer (SAMI)

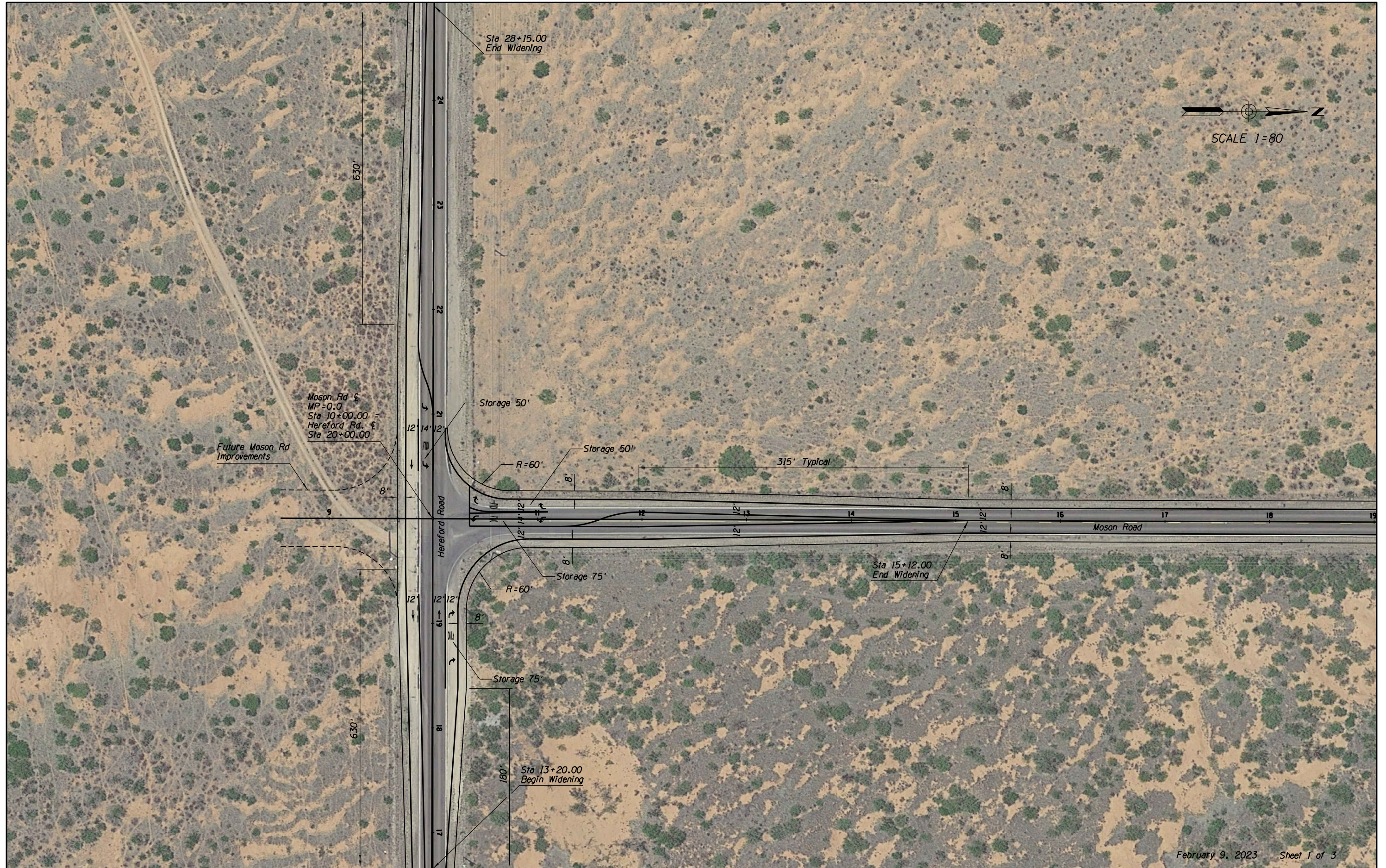
Pavement Structural Section No. 2
Remove and reconstruct existing pavement with 5-1/2" AC over 6" ABC



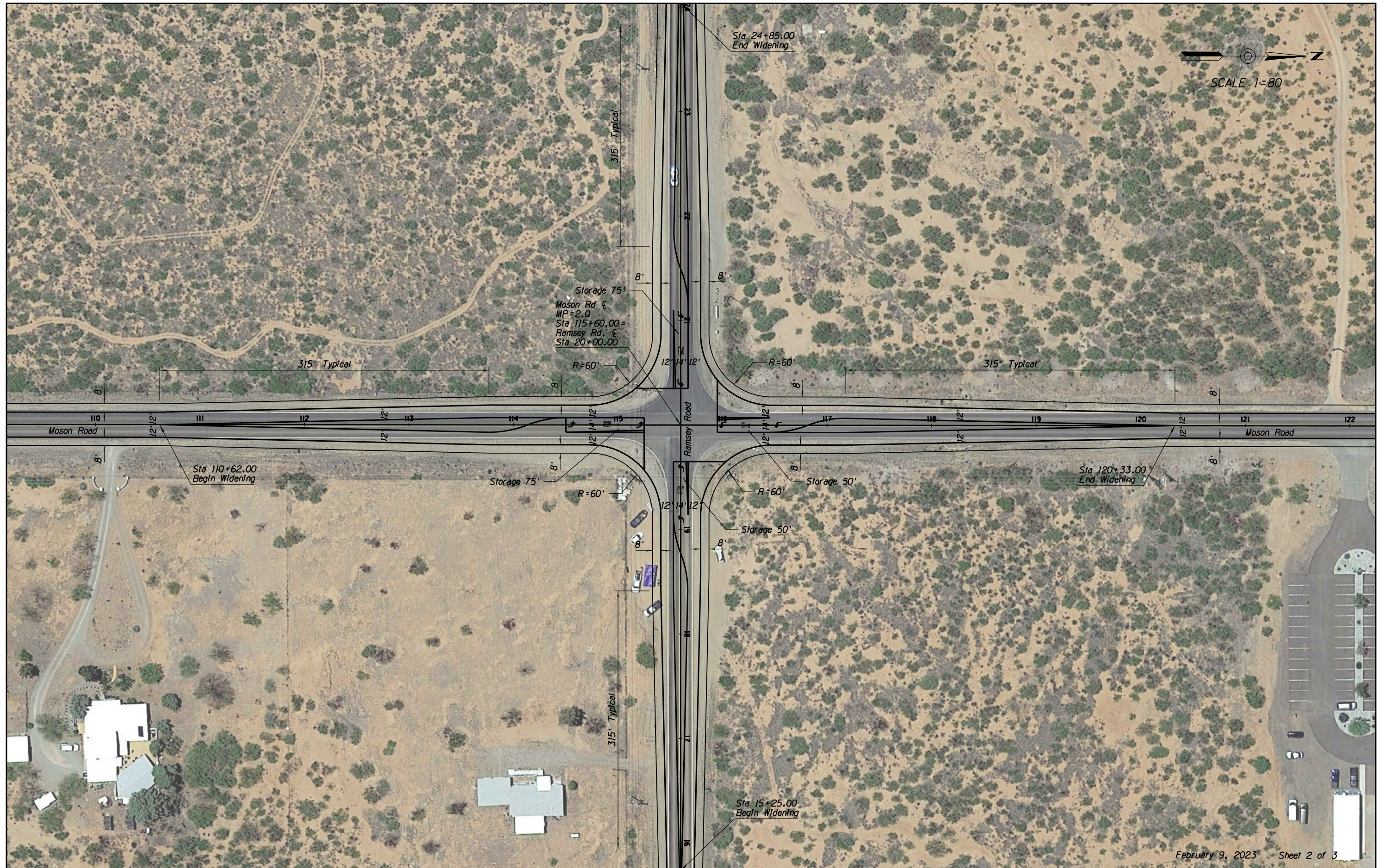
PAVEMENT STRUCTURAL SECTIONS

- Pavement Structural Section No. 1
Place a 3" AC overlay with Stress Absorbing Membrane Interlayer (SAMI)
- Pavement Structural Section No. 2
Remove and reconstruct existing pavement with 5-1/2" AC over 6" ABC

**APPENDIX C:
MOSON ROAD INTERSECTION PLAN SHEETS**

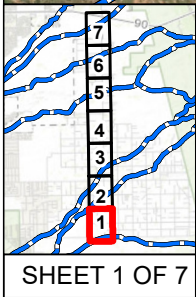
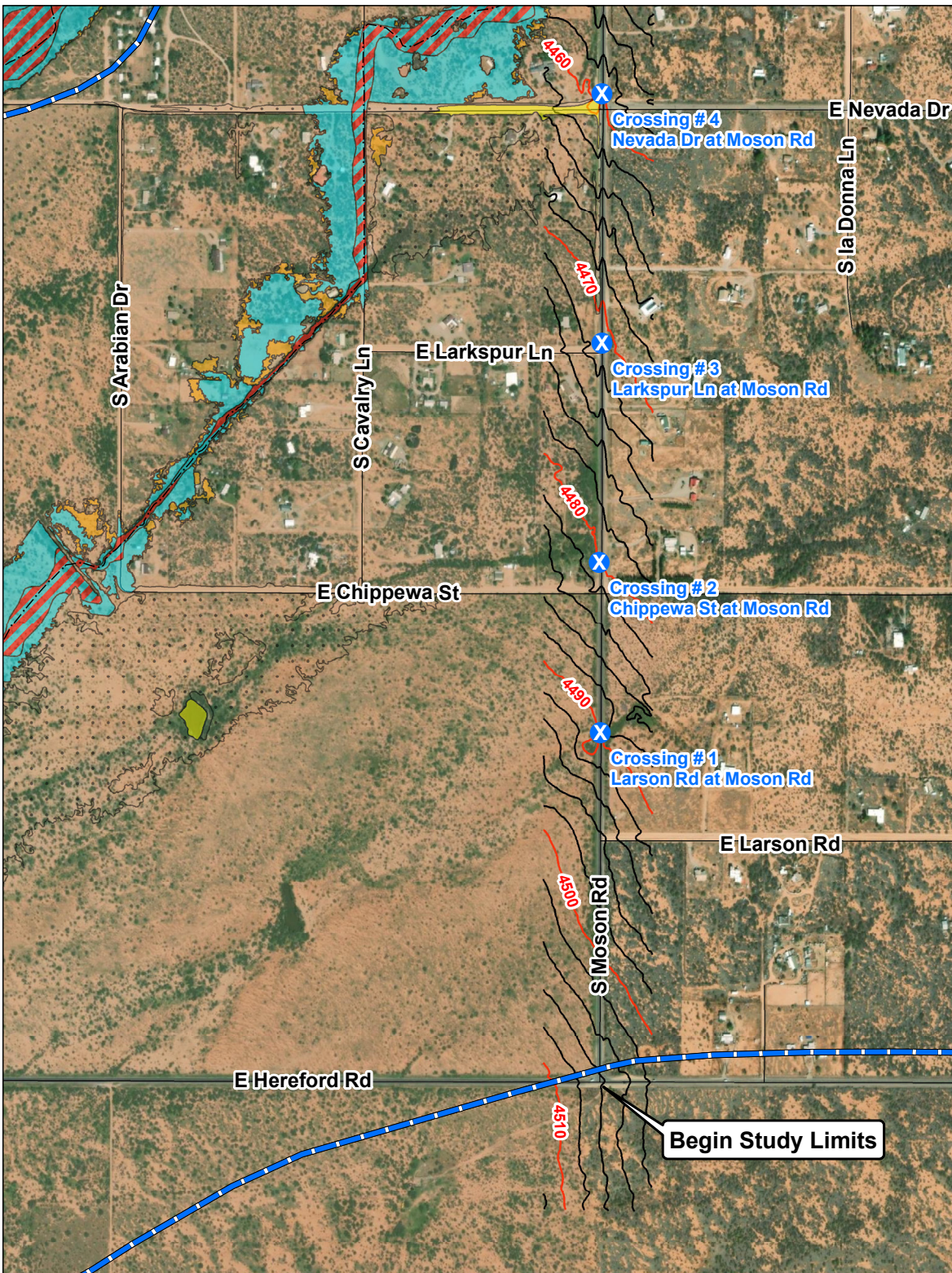


February 9, 2023 Sheet 1 of 3



February 9, 2023 Sheet 2 of 3

**APPENDIX D:
MOSON ROAD DRAINAGE CROSSINGS LOCATION MAP**



Moson Road Pre-Scoping Study Crossing Locations Map

Date: 1/18/2023

Michael Baker INTERNATIONAL
2929 N. Central Ave, Suite 800
Phoenix Plaza Tower II
Phoenix, AZ 85012

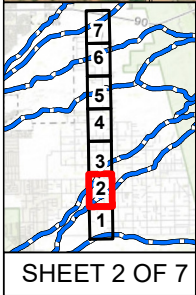
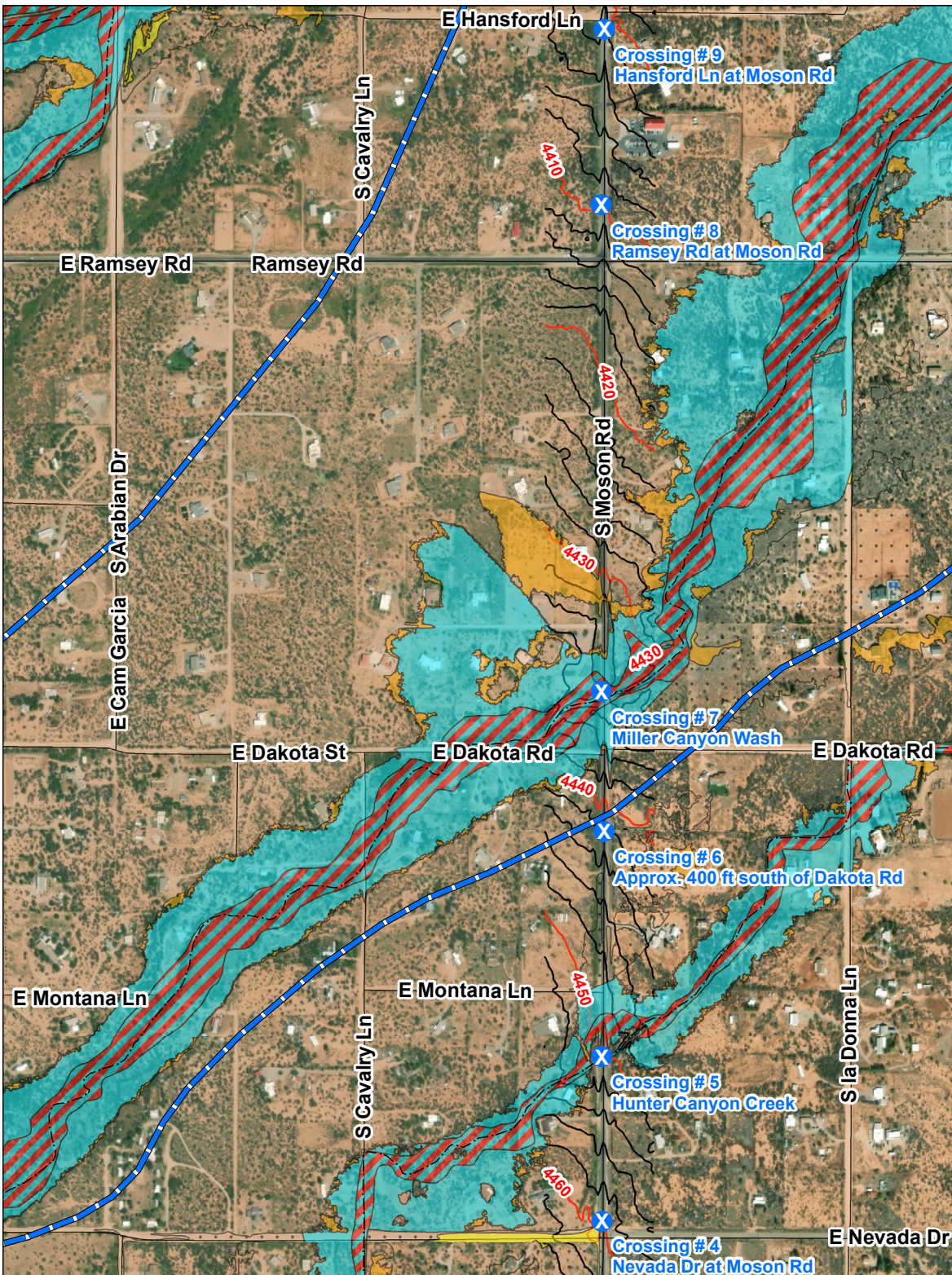
1 in = 500 ft

0 500 1,000 Feet

N

Legend

- Drainage Crossings (Blue X)
- HUC-12 Basins (Blue outline)
- Draft FIS Flowlines (Dashed line)
- Contours (2 ft)
 - Index (Red line)
 - Intermediate (Black line)
- Draft FIS SFHA
 - Zone A (Yellow)
 - Zone AE (Cyan)
 - Zone AE, Floodway (Red and Blue hatched)
 - Zone X, 500 YR (Orange)
 - Shaded X (White with black border)



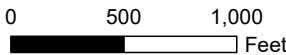
Moson Road Pre-Scoping Study Crossing Locations Map

Date: 1/18/2023

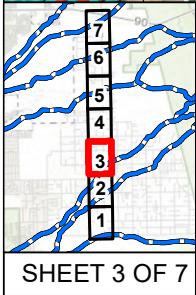
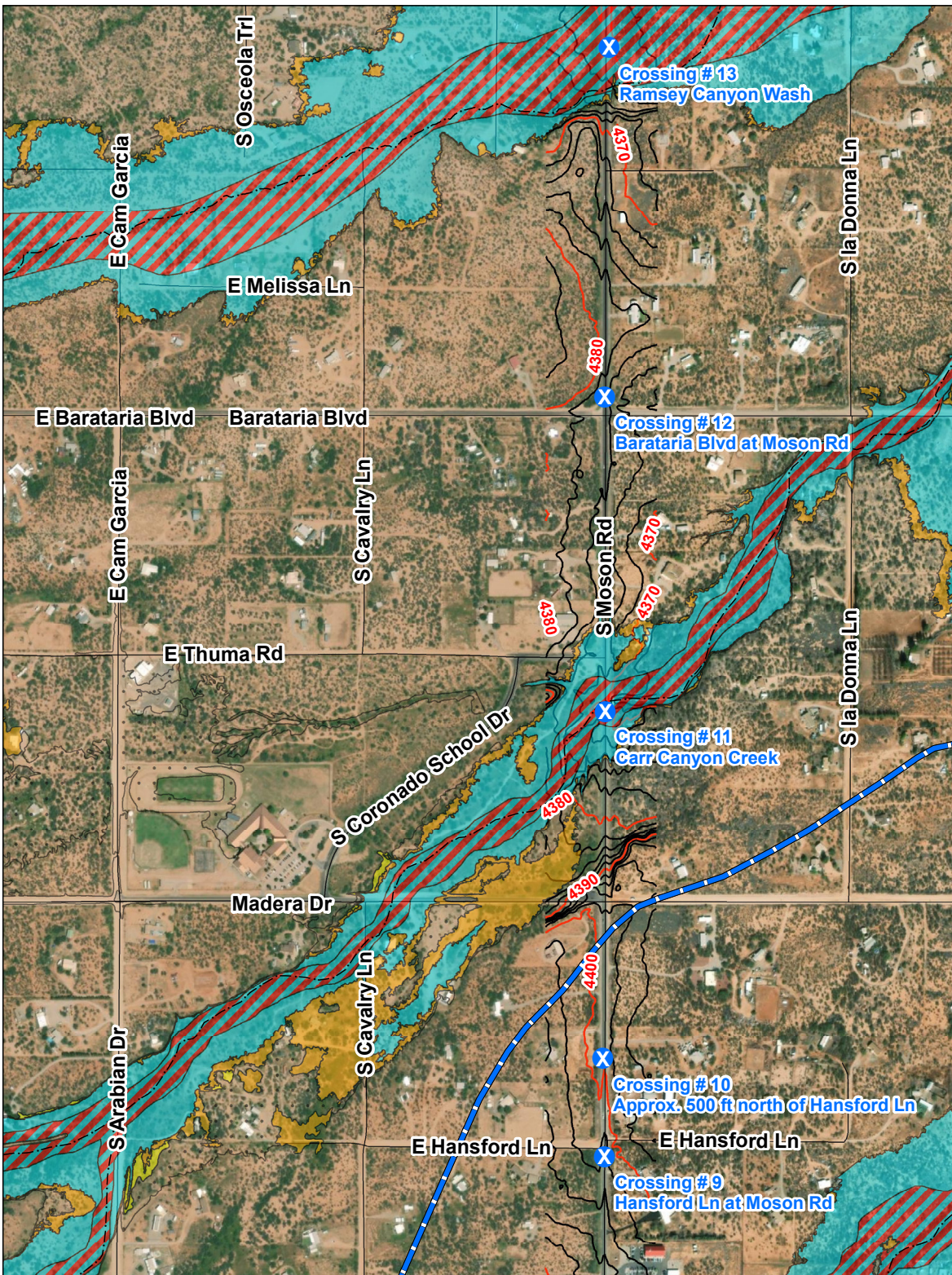
Michael Baker

INTERNATIONAL
2929 N. Central Ave, Suite 800
Phoenix Plaza Tower II
Phoenix, AZ 85012

1 in = 500 ft



Legend	
	Drainage Crossings
	HUC-12 Basins
	Draft FIS Flowlines
	Contours (2 ft)
	Index
	Intermediate
Draft FIS SFHA	
	Zone A
	Zone AE
	Zone AE, Floodway
	Zone X, 500 YR
	Shaded X



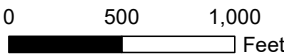
Moson Road Pre-Scoping Study Crossing Locations Map

Date: 1/18/2023

Michael Baker

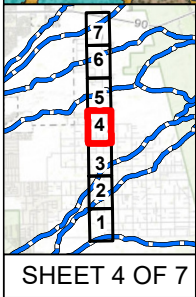
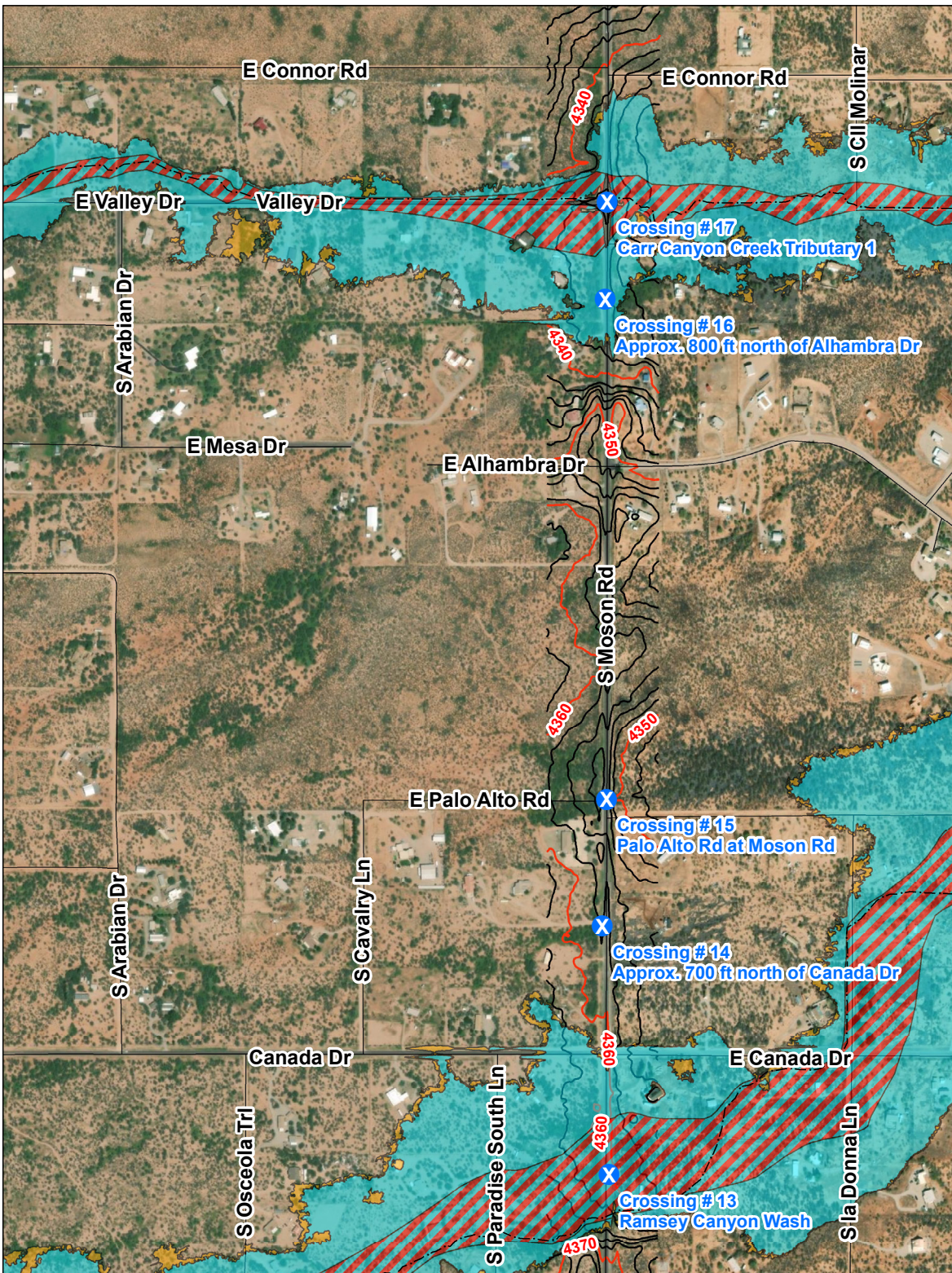
INTERNATIONAL
2929 N. Central Ave, Suite 800
Phoenix Plaza Tower II
Phoenix, AZ 85012

1 in = 500 ft



Legend

- Drainage Crossings
- HUC12 Basins
- Draft FIS Flowlines
- Contours (2 ft)**
- Index
- Intermediate
- Draft FIS SFHA**
- Zone A
- Zone AE
- Zone AE, Floodway
- Zone X, 500 YR
- Shaded X



Moson Road Pre-Scoping Study Crossing Locations Map

Date: 1/18/2023
Michael Baker
INTERNATIONAL
2929 N. Central Ave, Suite 800
Phoenix Plaza Tower II
Phoenix, AZ 85012

1 in = 500 ft

0 500 1,000 Feet

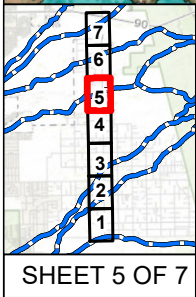
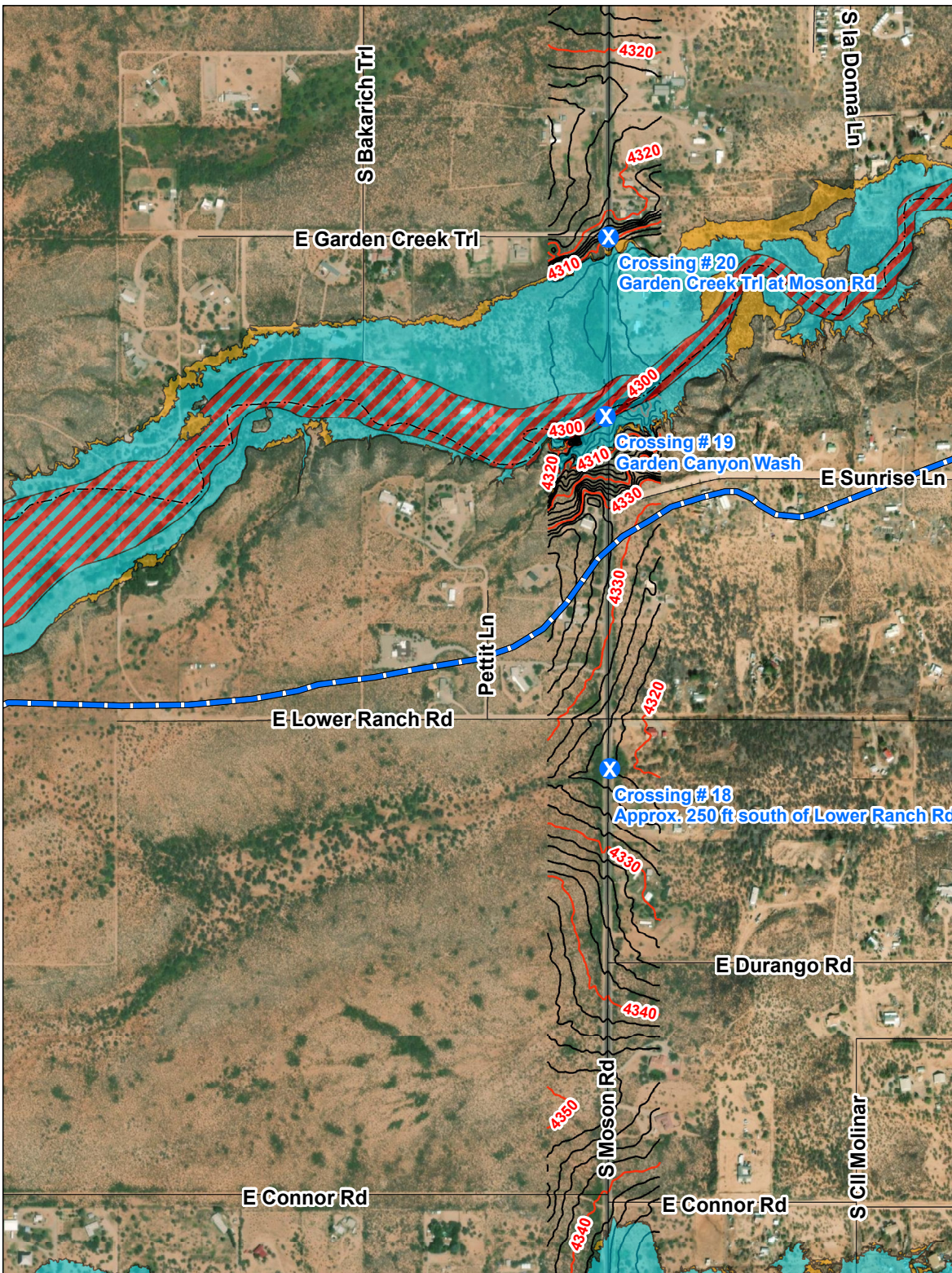
N

Legend

- Blue X: Drainage Crossings
- Blue square: HUC12 Basins
- Red dashed line: Draft FIS Flowlines
- Red line: Contours (2 ft)
- Red line: Index
- Black line: Intermediate

Draft FIS SFHA

- Yellow square: Zone A
- Light blue square: Zone AE
- Red and blue hatched square: Zone AE, Floodway
- Orange square: Zone X, 500 YR
- White square with black border: Shaded X



Moson Road Pre-Scoping Study Crossing Locations Map

Date: 1/18/2023
Michael Baker
INTERNATIONAL
2929 N. Central Ave, Suite 800
Phoenix Plaza Tower II
Phoenix, AZ 85012

1 in = 500 ft

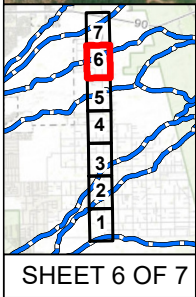
0 500 1,000 Feet

Legend

- Drainage Crossings
- HUC-12 Basins
- Draft FIS Flowlines
- Contours (2 ft)**
- Index
- Intermediate

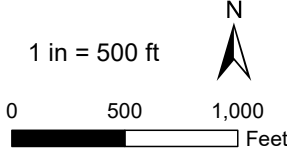
Draft FIS SFHA

- Zone A
- Zone AE
- Zone AE, Floodway
- Zone X, 500 YR
- Shaded X



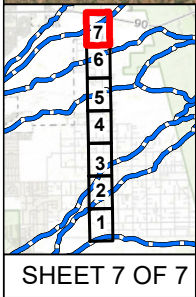
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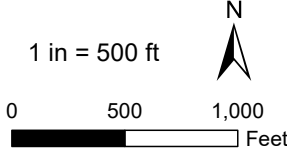
Legend

- Drainage Crossings
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- Zone A
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Legend	
Drainage Crossings	Draft FIS SFHA
HUC-12 Basins	Zone A
Draft FIS Flowlines	Zone AE
Contours (2 ft)	Zone AE, Floodway
Index	Zone X, 500 YR
Intermediate	Shaded X



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