FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

TRACS No. 024 MA 001 H8915 01L/02L
Federal Project No. STP-024-A(200)T

PREPARED FOR:

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January 31, 2017

ADOT
Intermodal Transportation

PROJECT DETERMINATION FORM

Project Number	County and ADOT District	Project Name and Highway
024 MA 001 H8915 01L/02L	Maricopa/Pinal	SR-24, Ellsworth Road to Ironwood Rd–Interim Phase II
Fed No. STP-024-A(200)T	Central District	SR-24

Project Description:	Final Design Concept Report (DCR) – SR-24, Ellsworth Road to Ironwood Road – Interim Phase II

Existing Program	
Yes	No
	x

Program Year	Programmed Budget
N/A	N/A
	DCR Construction Cost Estimate
	$136,512,143

Operating Partnership Category					
S	F	T	D	Z	N/A
		X			

Public Hearing: In the Highway Development Process, at least one public hearing or the opportunity for a hearing will be offered for any project that:

	Requires a significant amount of new right-of-way:
	Substantially changes the layout or function of connecting roadway or the facility being improved;
	Has a significant adverse impact on abutting real property;

	Otherwise has a significant social, economic, environmental or other effect
	Is controversial on environmental grounds;
	Or has significant floodplain encroachment
X *	None of the above conditions apply

Recommends:

Yes:	No:		Environmental Category		
X *		Public Forum			
	x	Offer a combined Location / Design Hearing	Class I	Class II	Class III
	x	Offer Separate Location/Design Hearing			X
	x	Hold a Design Public Hearing			

Ron McCally 12/22/16
Ron McCally Project Manager Date
Project Management Group EM01

Paul O'Brien 12/23/16
Paul O'Brien Manager, Environmental Date
Planning Group EM02

Concur:

12-27-16
Reed Henry Manager, Roadway Date
Predesign Section 615E

01/17/17
Madhu Reddy District Engineer Date
Central Construction District E700

Approved:

1/6/17
Gregory Byres Deputy State Roadway Engineer Date
Roadway Engineering Group 615E

David L Eberhart 12/29/16
David Eberhart State Bridge Engineer Date
Bridge Group 613E

Comments:
*An EA was completed in May 2011 for the DCR for SR802/now SR 24 from Loop 202 Santan to Ironwood Rd. An EA re-evaluation will be completed for the SR 24 Interim Phase II DCR for Ellsworth Rd. to Ironwood Rd. The current EA re-evaluation included scoping letters to Agencies and adjacent/affected property owners. In the future, as final design progresses to the next stages of development with more details and Construction schedule information available, a Project Public information meeting will be held.

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EXECUTIVE SUMMARY

Introduction

In 2011, ADOT in conjunction with Federal Highway Administration (FHWA), completed a Design Concept Report (DCR) and an Environmental Assessment (EA) for the Gateway Freeway (SR-24) Corridor between the Santan Freeway (SR 202) and Ironwood Drive, formally known as SR 802.

In 2014, ADOT completed the construction and opened to traffic the first segment of this SR24 corridor from SR202 to Ellsworth Road.

Currently, ADOT in conjunction with FHWA, is in the process of developing a solution that includes construction of an interim roadway within the footprint of the future segment of SR-24 between Ellsworth Road and Ironwood Drive. ADOT and FHWA are also revisiting the vertical alignment for the ultimate SR-24 design in order to identify cost saving improvements.

The purpose of this study is to update the original Design Concept Report (DCR) and complete an Environmental Reevaluation of the original Environmental Assessment (EA) completed in 2011.

The purpose of the interim improvements is to provide a transportation corridor that supports existing and predicted traffic demands and improving connectivity in the region until 2027 when funding is anticipated to become available for the final SR 24 build-out.

This update is intended to preserve the access control plan for this corridor and does not change any access points or their locations from what was outlined in the 2011 DCR. Additionally, this update maintains the horizontal geometry of the original DCR, but modifies the vertical geometry/profile for SR24 from east of Williams Field Road to Ironwood Drive.

Finally, this update to the 2011 DCR is intended to follow the same document format; it references the original DCR throughout the report and provides updated information where relevant and required.

Regional Planning

No updates, see the ADOT 2011 SR-24 DCR

Programming

The Arizona Transportation Board has an approved Five-Year Transportation Facilities Construction Program in Fiscal Year (FY) 2017. However, no funding has been provided for the SR-24 corridor in the ADOT Five-Year Transportation Program.

Two projects are currently planned within or adjacent to the study corridor and are included in the Regional Transportation Plan Freeway Program (RTPFP) in Group 3 (2027 - 2035) as shown below.

Current Projects in the RTPFP Group 3

Route	Freeway Segment	Type of Work	RTPFP Budget ($000)	RTPFP Group	RTPFP Group (years)
SR 24	SR 202L, Santan - Ellsworth Rd, Ph2	Freeway Upgrade	46,900	3	2027 - 2035
SR 24	Ellsworth Rd - Meridian Rd	New Freeway	212,600	3	2027 - 2035

Additional funding would need to be provided by ADOT and/or FHWA for the segment of SR-24 from Meridian Road to Ironwood Drive, since that segment of the freeway is located outside of Maricopa County and is not eligible for RTP funds.

Transit

No updates, see the ADOT 2011 SR-24 DCR

Phoenix-Mesa Gateway Airport

No updates, see the ADOT 2011 SR-24 DCR

MITIGATION MEASURES

No updates at this time. As part of the Environmental Assessment Re-evaluation currently being prepared for this study, Mitigation Measures will be updated.

1.0 INTRODUCTION

1.1 PROJECT LOCATION

The limits of the original Design Concept Report (DCR) for the State Route 24 (SR-24) Freeway, completed in April 2011 by ADOT, began at the SR 202L freeway and extended to Ironwood Drive. The segment from SR 202L to Ellsworth Road (Phase I of the ADOT DCR 2011) was subsequently constructed and opened to traffic in 2014. The project limits for this DCR update begins west of the existing, interim at-grade intersection of SR-24 at Ellsworth Road and extend east to Ironwood Drive, a distance of approximately 4.6 miles.

This project is located in or adjacent to the cities of Mesa and Apache Junction and the towns of Gilbert and Queen Creek, in Maricopa and Pinal Counties in Arizona (Figure 1). The proposed project is within the Arizona Department of Transportation's (ADOT) Central District.

The study area limits consist of approximately 4.6 miles of the new SR-24 corridor from Ellsworth Road to Ironwood Drive. Figure 2 on page 1-3 shows the defined study area for the SR-24 corridor study that encompasses these project limits.

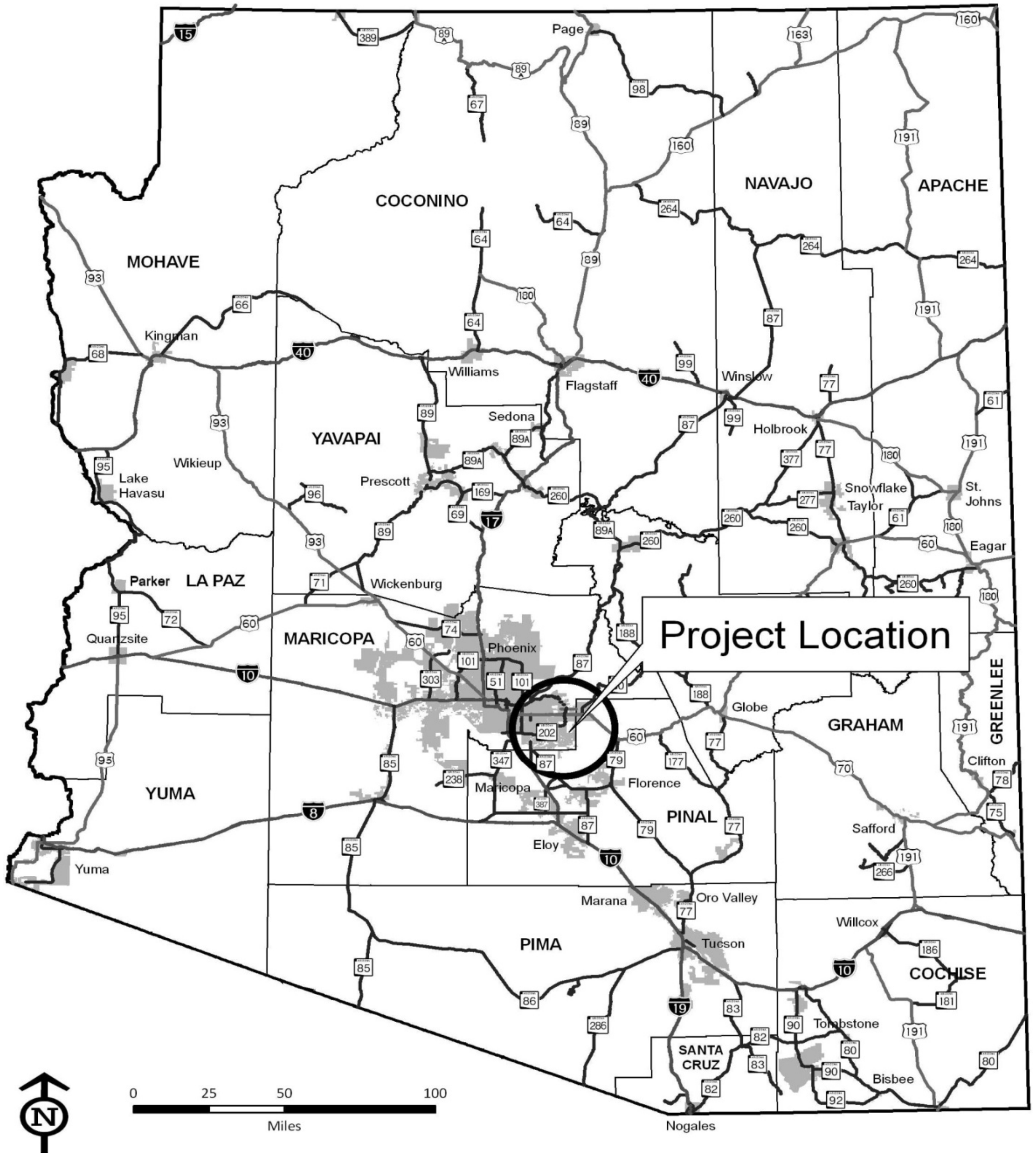
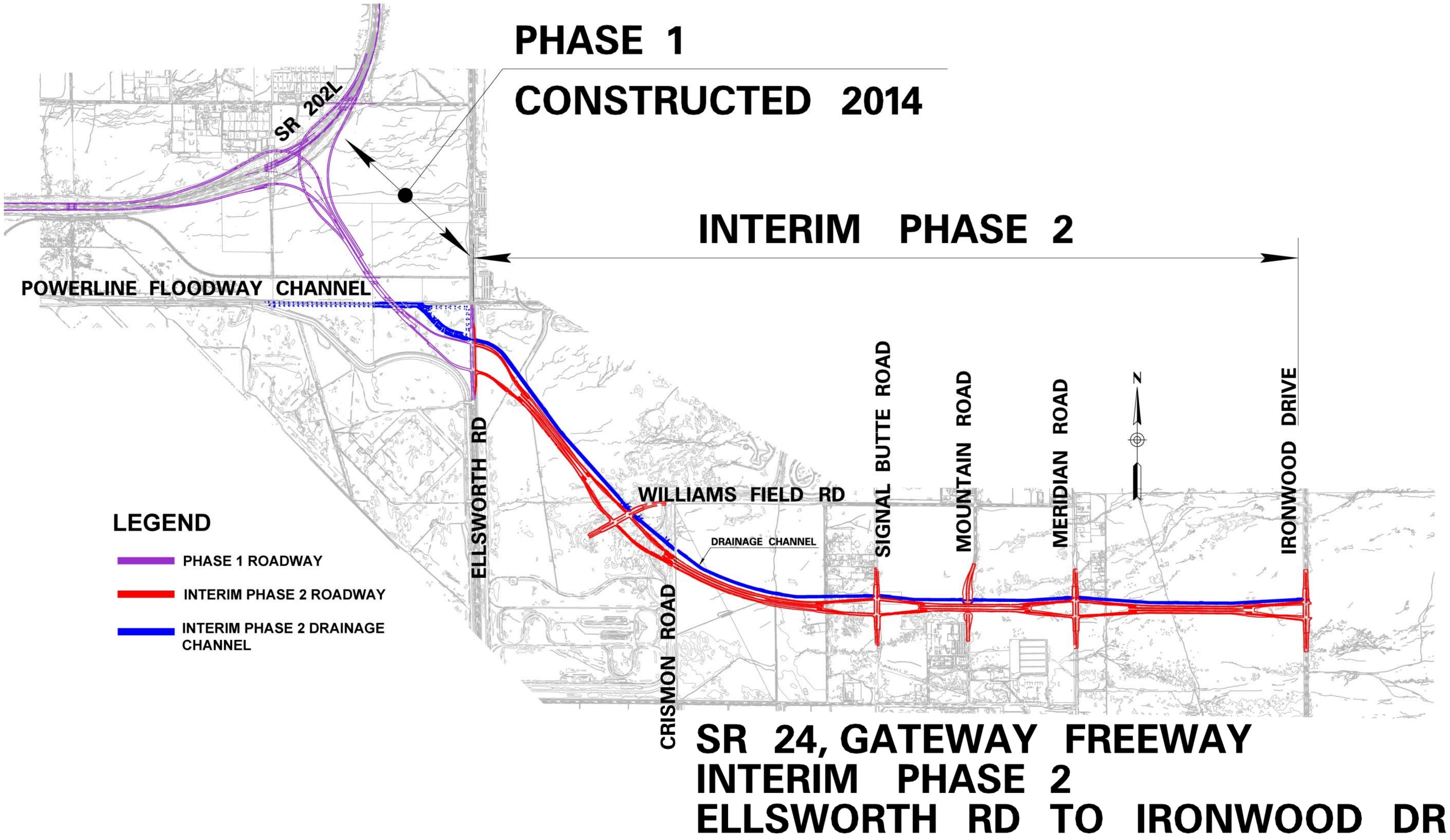


Figure 1 – Project Location Map

Figure 2 – Study Area for Interim SR-24 Phase 2



1.2 NEED FOR THE PROJECT

See ADOT DCR 2011 Section 1.2 for Need of the SR-24 project. The goals for developing an interim solution for the remaining 4.6 miles of the proposed SR-24 corridor between Ellsworth Road and Ironwood Drive are as follows:

- Promote economic development by linking future economic activity centers, supporting future population and employment growth sooner rather than later with an interim solution.
- Provide a corridor with the projected capacity to improve transportation options between the cities of Mesa and Apache Junction and the towns of Gilbert and Queen Creek, in Maricopa and Pinal Counties in the southeast Valley.

1.3 CHARACTERISTICS OF THE CORRIDOR

This segment of SR-24 will furnish a vital transportation artery in southeastern Maricopa County that will provide high capacity freeway access between the southeastern Maricopa and northern Pinal County communities to the Phoenix metropolitan area. This new freeway will also support the planned growth of Phoenix-Mesa Gateway Airport and the planned residential, commercial, industrial and warehouse/distribution center developments within the study area. SR-24 will also provide a vital link between the Regional Freeway System and the future State Highway System corridors that have been identified within Pinal County.

1.3.1 Roadway Characteristics

See ADOT DCR 2011 Section 1.3.1

Within the project limits, Ellsworth Road is classified as a six lane arterial street, with three lanes in the northbound and southbound directions of travel that are separated by a raised median. Phase I of the ADOT DCR 2011 was constructed and completed in 2014. In the vicinity of SR-24, Ellsworth Road was widened to five lanes, with two lanes in the northbound direction and three lanes in the southbound direction separated by a raised median.

Within the project limits, Williams Field Road is classified as a future six lane arterial street, with three lanes in the westbound and eastbound directions of travel separated by a raised median. Williams Field Road currently does not exist between Ellsworth and Signal Butte Roads, and is a two lane roadway between Signal Butte and Meridian Roads. Funding for Williams Field Road is not currently identified in the RTP Arterial Streets Program and would likely be constructed as adjacent development occurs in the area.

Within the project limits, Crismon Road is classified as a future four lane arterial street, with two lanes in the northbound and southbound directions of travel separated by a raised median. Crismon Road does not currently exist in the vicinity of SR-24. Funding for Crismon is not currently identified in the RTP Arterial Streets Program and would likely be constructed as adjacent development occurs in the area.

Within the project limits, Signal Butte Road is classified as a future six lane arterial street, with three lanes in the northbound and southbound directions of travel separated by a raised median. Signal Butte Road does not currently exist in the vicinity of SR-24. Funding for the construction of Signal Butte Road is identified in Group 2 (2019 - 2026) of the RTP Arterial Streets Program.

Within the project limits, Mountain Road is classified as a four lane major collector street, with two lanes in the northbound and southbound directions of travel separated by a striped median. Mountain Road is currently a two lane roadway at the SR-24 crossing.

Within the project limits, Meridian Road is classified as a future six lane arterial street, with three lanes in the northbound and southbound directions of travel separated by a raised median. Meridian Road does not currently exist in the vicinity of SR-24. Funding for Meridian Road is not currently identified in the RTP Arterial Streets Program and would likely be constructed as adjacent development occurs in the area.

Ironwood Drive is an existing four lane major arterial street with two lanes in the northbound and southbound directions of travel separated by an open median. Ironwood Drive is classified as a Regionally Significant Road with a six lane roadway section. The Pinal County Small Area Transportation Study (SATS) identified Ironwood Drive as a long-term priority for widening the existing roadway to a six lane facility.

1.3.2 Transit Facilities and Routes

See ADOT DCR 2011 Section 1.3.2

1.3.3 Land Use

See ADOT DCR 2011 Section 1.3.3

City of Mesa has requested that the new right-of-way accommodate a future multi-use path that may follow the SR-24 corridor. At this time the area north of the channel maintenance road, within the new right of way between Ellsworth Road and Ironwood Drive, has been set aside for a future trail.

1.3.4 Phoenix-Mesa Gateway Airport

See ADOT DCR 2011 Section 1.3.4

1.3.5 Utilities and Railroads

Existing utilities within the study area were identified based on information obtained from ADOT as-built drawings, as well as facility plans and quarter-section maps obtained from each local jurisdiction and utility company. These utilities are presented in Table 1 on the following page

Table 1 – Existing Utility Crossings

Cross Street	Utility Description
Ellsworth	Soutwest Gas 10" gas line; Mesa 16" & 20" DIP water lines, 13-2" Conduits; Century Link telephone lines; SRP underground 12KV power line
222nd St	SRP 12kV overhead power line
Signal Butte Road	SRP 12kV overhead power line
Mountain Road	Southwest Gas 4" PE gas line; Mesa 12" PVC sanitary sewer and 16" ACP water line
Meridian Road	SRP 12kV overhead power line
Approx Sta 273+00	WAPA 230kV overhead power line on lattice towers.
Ironwood Drive	MediaCom CATV fiber optic line

1.3.6 Drainage

See detailed drainage report in Appendix D for additional information.

1.3.7 Right-of-Way

Right of Way was acquired for Phase 1 of the ADOT 2011 DCR. All new improvements east of Ellsworth Road will require new right-of-way. Any improvements west of Ellsworth Road will fit within the existing right-of-way that was acquired as part of Phase 1 of the ADOT DCR 2011.

1.3.8 Structures

There are no existing bridge or retaining wall structures between Ellsworth Road and Ironwood Drive.

1.3.9 Signing and Lighting

There is no existing Signing and Lighting within this study area between Ellsworth and Ironwood Drive.

1.3.10 Freeway Management Systems

There is no existing Freeway Management System (FMS) within the study area between Ellsworth and Ironwood Drive

1.3.11 Geotechnical Conditions

There are no updates see section 1.3.11 from the ADOT DCR 2011.

1.3.12 Previous Projects

The ADOT Milepost Strip Map Shows the project listed in Table 2 below:

Table 2 – Previous Projects

Freeway Corridor	Project Number and/or TRACS Number	Milepost	As-Built Date	Description
SR 24	024 MA 000 H6867 01C	0.00 - 1.00	2015	SR 202L to Ellsworth Road

2.0 TRAFFIC AND CRASH DATA

Supporting Traffic and Crash Data analysis and mitigation measures for the Interim Phase 2 preferred alternative has been provided in Appendix E to this report.

3.0 EVALUATION OF ALTERNATIVES

3.1 BACKGROUND

In 2011 ADOT completed the DCR for SR-24, Gateway Freeway (SR 202L – Ironwood Drive). The DCR provided an implementation plan of three phases. In May of 2014 ADOT completed construction of Phase 1 based on the DCR. Phase 2 of the DCR is to complete the remaining elements of the ultimate SR202L/SR-24 TI, widen SR 202L between Recker Road and the east Power Road ramps, widen SR 202L between the SR202L/SR-24 TI and Guadalupe Road, and extend the SR-24 mainline improvements east to Meridian Road as depicted in Figure 27 from ADOT 2011 DCR

The Phase 3 of the DCR is to extend the ultimate freeway improvements from Meridian Road to Ironwood Drive as depicted in Figure 28 from ADOT 2011 DCR

In March 2015 MAG completed a feasibility study for interim Phase 2, between Ellsworth and Ironwood, which looked at interim concepts that would:

- Promote economic development by linking future economic activity centers, supporting future population and employment growth sooner rather than later with an interim solution
- Provide a corridor with the projected capacity to improve transportation options between the cities of Mesa and Apache Junction and the towns of Gilbert and Queen Creek, in Maricopa and Pinal Counties in the southeast Valley.

The MAG 2015 Feasibility study developed 4 interim SR-24 Options; A1, A2, B and C.

3.2 ALTERNATIVES EVALUATION PROCESS – TIER 1

The Tier 1 process was used in the original ADOT 2011 DCR to evaluate the location of SR-24 corridor.

3.3 ALTERNATIVES EVALUATION PROCESS – TIER 2

3.3.1 Introduction

The alternatives from the MAG feasibility study were evaluated with the Tier 2 analysis. The Tier 2 evaluation process quantitatively examined how well each alignment alternative would address the primary objectives of the evaluation criteria.

3.3.2 Description of Alternatives

Alternative A1: Undivided, Two Lanes in Each Direction

The strategy behind Alternative A1 would be to provide a simple four-lane typical section using the SR-24 mainline horizontal geometry as proposed in the ADOT DCR 2011. See Figure 3 on page 3-3. This alternative includes the following:

- 8-foot paved outside shoulders.
- 12-foot travel lanes.
- At-Grade intersections at crossroads.
- Mainline Profile at-grade, future cross roads above grade

Alternative A2: Divided, Two Lanes in Each Direction

The strategy behind Alternative A2 would be to provide a simple four-lane typical section using the SR-24 mainline horizontal geometry as proposed in the ADOT DCR 2011. Opposing lanes of traffic would be separated by the 26 foot graded median planned for the ultimate freeway typical section. This alternative would make use of the interim pavement surface in the ultimate condition. See Figure 3 on page 3-3. This alternative further included the following:

- 4-foot paved inside shoulders and 10-foot paved outside shoulders.
- Roadway pavement placed in the ultimate location.
- Ultimate Median grading.
- At-Grade intersections at crossroads.
- Mainline Profile at-grade, future ultimate crossroads above grade over Mainline

With this alternative, the interim outside edge of pavement would be 8ft into the future 12ft lane.

Alternative B: Undivided, One Lane in Each Direction

Alternative B would implement the horizontal geometry of the future ramps from the crossroad to the mainline. From the mainline and between ramp terminals, a temporary alignment could be incorporated that largely uses the mainline offset to the outside lane(s) and auxiliary lanes. This alternative could be implemented using the eastbound or westbound ramp alignments from the crossroad to crossroad because it is intended to be a two-lane roadway separated by a double yellow stripe. See Figure 4 on page 3-4. This alternative further included the following:

- 8-foot paved outside shoulders.
- Roadway pavement placed in the ultimate location.

- At-grade intersections at interchange crossroads.
- Mainline Profile at-grade between successive interchange entrance ramps to exit ramps. Ultimate profile is above grade over future interchange cross roads.

Alternative B was removed from consideration because the traffic operation analysis would not be feasible as well as compatibility with the ultimate buildout.

Alternative C: Divided, Two Lanes in Each Direction

Alternative C also would implement the horizontal geometry of the future ramps from the crossroad to the mainline. From the mainline and between ramp terminals, a temporary alignment could be incorporated that largely uses the mainline offset to the outside lane(s) and auxiliary lanes. See Figure 4 on page 3-4. This alternative further included the following:

- 6-foot paved inside shoulders and 12-foot outside paved shoulders.
- Roadway pavement placed in the ultimate location.
- At-grade intersections.
- Ultimate Outside Grading
- Mainline Profile at-grade between successive interchange entrance ramps to exit ramps. Ultimate profile is above grade over future interchange cross roads.

In all alternatives the Mainline Ultimate profile was reevaluated to coordinate with the interim alternatives. In all options the horizontal geometry of SR-24, Ramps, and Crossroads were not reevaluated from the ADOT DCR 2011 recommended alternative. No Changes to access points from the ADOT DCR 2011. SR-24 must not cutoff connectivity of Mountain Road between Williams Field Road and Pecos Road and must be a grade separated crossing the SR-24 alignment.

3.3.3 Evaluation Criteria

- Right-of-Way
- Traffic Analysis
- Compatibility with the planned Ultimate Cross Section
- Local Access
- Pump Station
- Estimated Construction Cost

A description of each of the evaluation criteria was developed for use of the Project Team in conducting the alternative evaluations.

Right-of-Way

The interim SR-24 and its impacts to the ultimate configuration should minimize right-of-way acquisition impacts. Right-of-way that is established should fit the footprint of the interim configuration as well as the ultimate configuration. This performance measure was quantified by reviewing the ultimate grading footprint based on the alternative options being at or above grade.

Traffic Analysis

The interim SR-24 should operate at an acceptable level for the interim buildout in the year 2025 while still providing capability with the ultimate buildout and providing mobility throughout the corridor.

Compatibility with Ultimate

The interim SR-24 alternative should be compatible with the ultimate SR-24 and minimize “Throw-away” by constructing the interim roadway that can be used in the ultimate SR-24 roadway. The location of the interim lane lines relative to the ultimate lane lines, having lanes fall in the same location could result in less restripe in the ultimate configuration.

Development Impacts

The interim SR-24 should seek to minimize impacts to the opportunity for future development.

The interim SR-24 should minimize the amount of earthwork needed with the goal to achieve a balanced earthwork project.

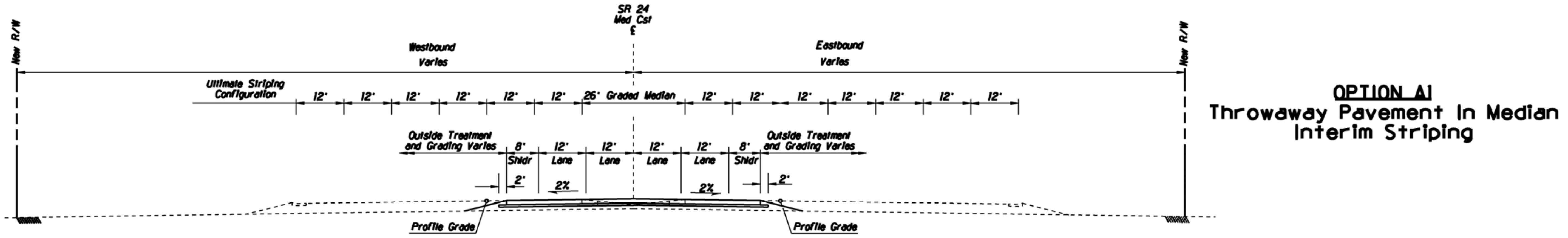
Pump Station

The interim SR-24 vertical profile reevaluation goal should be to eliminate the need for a Pump Station for the interim as well as for the ultimate configuration

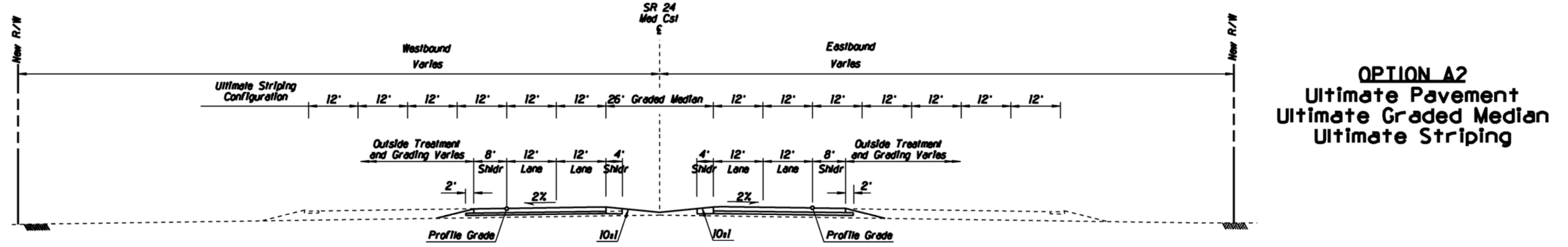
Estimated Construction Cost

The interim SR-24 should be a cost-effective solution. Impacts to the ultimate configuration construction costs should also be considered.

Figure 3 - Typical Sections Options A1 & A2

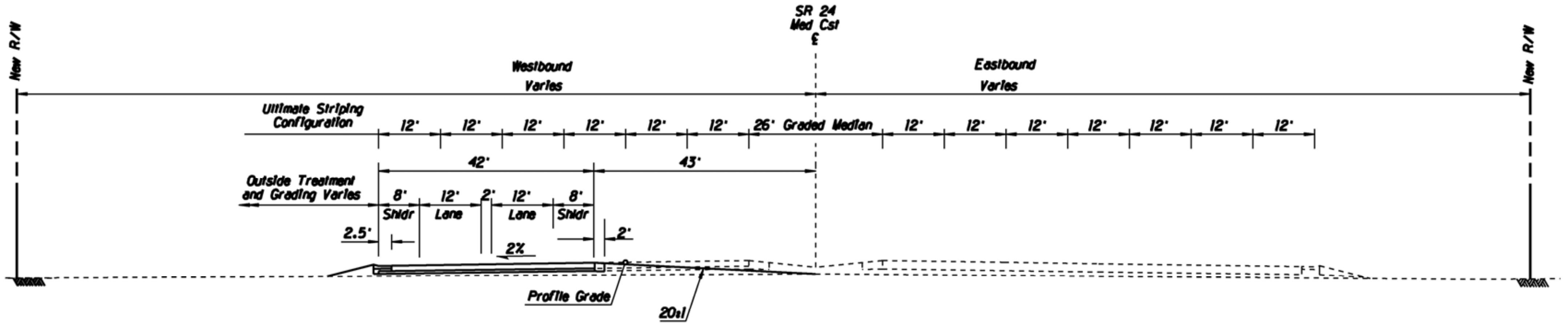


TYPICAL SECTION (OPTION A1)
Interim SR 24



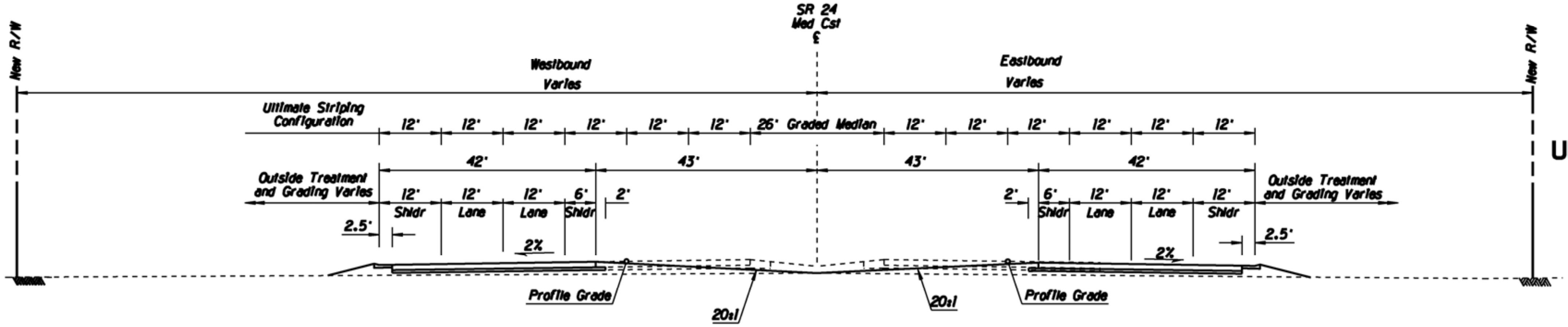
TYPICAL SECTION (OPTION A2)
Interim SR 24

Figure 4 - Typical Sections Options B & C



TYPICAL SECTION (OPTION B)
Interim SR 24

OPTION B
Ultimate Pavement
Ultimate C&G
Interim Striping



TYPICAL SECTION (OPTION C)
Interim SR 24

OPTION C
Ultimate Pavement
Ultimate C&G in both directions
Ultimate Striping

3.3.4 Evaluation of Alternatives

Right-of-Way

Alternatives A1 and A2 would require the future interchange cross roads at Williams Field, Signal Butte and Meridian to be above grade to cross over the at Grade SR-24. This would require additional Right-of-Way at the interchanges because the ramps would tie into the cross roads approx 23ft above grade which would require additional grading footprints on the outside of the ultimate ramps and cross roads. Right-of-way outside of the interchange areas could be reduced from the ADOT DCR 2011 foot print since the outside grading slopes would be at or near grade.

Alternatives C would keep the approx same footprint as the ADOT DCR 2011 footprint at the interchanges as the crossroads would be at approx existing grade, however the ultimate grading footprint would be reduced in the areas between interchanges as the ultimate profile would be at-grade or slightly above grade, reducing the footprint of the ultimate grading.

Traffic Analysis

All alternatives would operate at a similar Level of Service. Each alternative has the same number of lanes. The difference between alternatives is the location of the lanes in relation to the ultimate buildout.

Compatibility with Ultimate

Alternative A1 would be the least compatible with the ultimate configuration. 40% of the roadway width would be throwaway because it is located within the ultimate open median area. Additionally, areas with superelevation would be completely incompatible because the Axis of Rotation in the Ultimate configuration is not located on the centerline of SR-24, which would be the required location of superelevation for the interim condition.

Alternative A2 and Alternative C would be completely compatible with the ultimate configuration. The location of the lane lines in both alternatives would both fall on future lane lines in the ultimate configuration. However, Alternative C allows for a simpler construction operation for the ultimate as all construction will happen in the median between EB and WB interim traffic lanes.

Development Impacts

Alternatives A1 and A2 require the interchange crossroads to be built above grade and over an at-grade SR-24 in the ultimate condition. This increases the amount of area needed for Right-of-Way to fit the footprint of the slopes and impacts how parcels can access the crossroad near the interchange area because of the elevated footprint.

Alternative C keeps the interchange crossroads near existing ground similar to the ADOT DCR 2011 preferred alternative and therefore keeping the same opportunity for future development in those areas.

Pump Station

All alternatives eliminate the need for a pump station based on modifying the profile of SR-24 to be at-grade or above grade.

Estimated Construction Cost

Alternatives A1 and A2 have similar interim construction costs, however in the ultimate configuration the A1 will cost more because of the amount of throw away in the future condition.

Alternative C would have a slightly higher interim construction costs than Alternatives A1 and A2 because it builds the most pavement. However, in the ultimate condition the structures at Williams Field, Signal Butte and Meridian would cost less than Alternatives A1 and A2 because the size of the required structures is reduced if the structures are on the mainline vs the structures being on the crossroads. Also the required box culverts crossing for the drainage channel would be shorter because the crossroads are at existing grade in alternative C and in Alternatives A1 and A2 the crossroads are above grade requiring the box culvert lengths to be longer due to the grading slope lengths.

3.3.5 Evaluation Matrix

The scoring for each evaluation criterion was based on a range from 1.0 to 5.0, with 1.0 representing the lowest and 5.0 representing the highest scores. The multi-discipline team reviewed each alternative based on the evaluation criteria. The resultant score of each criterion was determined by group discussion and overall consensus by the evaluation team. The composite alternative score is the sum of each individual evaluation criteria score. The final alternative scores are shown in the Table 3.

Table 3 - Alternative Screening Matrix

Evaluation Criteria	Alternative A1	Alternative A2	Alternative C
Right-of-Way	2	2	5
Traffic Analysis	4	4	4
Compatibility with Ultimate	2	5	5
Local Access	3	3	4
Pump Station	5	5	5
Estimated Construction Cost	5	5	4
Total Score:	**21**	**24**	**27**

3.3.6 Recommendation

Based on the alternatives evaluation and screening process results, the Project Team recommends the selection of the Alternative C as the Preferred Alternative for this study.

4.0 MAJOR DESIGN FEATURES OF THE PREFERRED ALTERNATIVE

4.1 INTRODUCTION

This section describes the design controls and design features for the Preferred Alternative for SR-24 and the service interchanges within the study limits. The interim facility controls will be the same as the ultimate facility controls. This will enable interim improvements to be compatible for ultimate design criteria.

4.2 DESIGN CRITERIA

SR-24 is classified as a controlled access Urban Principal – Freeway/Expressway. The interim facility will not operate as a Freeway/Expressway, however the criteria used for the interim design is the same as the ultimate facility design criteria. A summary of the design controls for Interim SR-24 is provided in Table 4.

Table 4 – Design Controls for Interim SR-24

Description of Criteria	Values for Design
Design Year:	2030
Design Speed:	65 mph
Superelevation:	0.06 ft/ft maximum
Cross Slope:	2.00%
Lane Width:	12 ft.
Shoulder Width:	
- Median:	6 FT.
- Outside:	12 ft.
Maximum Horizontal Curve:	3 degree, 27 minutes
Maximum Gradient:	3%
Taper rate:	65:1
Slope Standards:	
- Cut Slopes:	Varies, 3:1 maximum
- Fill slopes:	Varies, 3:1 maximum
Minimum Vertical Clearance:	
- Highway structure:	16.5 ft.
- Pedestrian overpass:	17.5 ft.

A summary of design controls for the service interchange ramps is provided in Table 5.

Table 5 – Design Controls for Service Interchange Ramps

Description of Criteria	Values for Design
Design Year:	2030
Design Speed:	
- Nose of gore (exit ramps):	60 mph
- Nose of gore (entrance ramp):	55mph
- Ramp body:	50 mph
- Ramp terminal:	35 mph
Superelevation:	0.06 ft/ft maximum
Cross Slope:	2.0%
Pavement Width:	
- Two lane exit ramp:	34 ft., plus 2 ft. offset to barrier
- Entrance ramp:	28 ft., plus 2 ft. offset to barrier
Lane Width:	12 ft.
Maximum Horizontal Curve:	6 degree, 53 minutes
Maximum Gradient:	+4%, -5%
Taper rate:	65:1
Slope Standards:	
- Cut Slopes:	Varies, 3:1 maximum
- Fill slopes:	Varies, 3:1 maximum
Minimum Vertical Clearance:	
- Highway structure:	16.5 ft.
- Pedestrian overpass:	17.5 ft.

The local arterial streets will be designed in accordance with the local jurisdiction functional classification requirements.

4.3 SR-24 INTERIM FREEWAY CONCEPT

Introduction

The Preferred Alternative was developed to provide an interim facility to extend SR-24 between Ellsworth Road and Ironwood Drive to provide additional regional connectivity while providing the capacity needed for the projected 2025 traffic demand. This preferred alternative was also developed with consideration to the ultimate SR-24 concept as described in the ADOT DCR 2011. The horizontal geometry developed in the ADOT DCR 2011 for SR-24 and associated ramps and roadways within project limits was not reevaluated as part of the scope of this DCR. However, the vertical geometry that was developed in the ADOT DCR 2011 for SR-24 and associated ramps and roadways within the project limits was part of the reevaluation process. The Preferred Interim Alternative plans are included in Appendix C.

The locations of the bridge structures, retaining walls, noise walls, drainage basins and other improvements included in this project account for the ultimate SR-24 facilities.

In coordination with the City of Mesa, the interim concept will accommodate a City of Mesa trail within the proposed Right-of-Way that the city may open prior to the ultimate construction of SR-24.

SR-24 Interim Eastbound Mainline

In the interim condition there will be two general-purpose lanes in the eastbound direction of travel on SR-24 between Ellsworth Road and Ironwood Drive. Between the interchanges the lanes would be located on same horizontal alignment as the two outside lines as shown in the ADOT DCR 2011. At the interchanges, the lanes would follow the entrance and exit ramps alignments in the interim condition. All ramps will be designed to accommodate a minimum of two lanes of traffic. This will require approximately 6ft of additional pavement width for a portion of the exit ramps that were designed as one lane exits in the ADOT DCR 2011. Mainline pavement would be constructed between the back of gore of the entrance ramps and exit ramps of successive interchanges.

The west half of the Ellsworth Road TI has been constructed as part of Phase 1 of the DCR. Currently there is an end of Freeway condition at the Eastbound exit ramp at Ellsworth Road. The interim SR-24 project would construct the Eastbound two lane entrance ramp per the ADOT DCR 2011 horizontal layout.

The Williams Field Road exit ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout. The Williams Field Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Signal Butte Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. The Signal Butte Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Meridian Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. The Meridian Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Ironwood Drive exit ramp will be designed per the ADOT DCR 2011 horizontal layout, and was already designed to accommodate 2 lanes of traffic for an end of freeway condition.

SR-24 will be an at-grade or elevated freeway between Ellsworth Road and Ironwood Drive.

Ultimately new overpasses will be provided at Ellsworth Road , Williams Field Road, Signal Butte Road, Meridian Road and Ironwood Drive. In the interim condition none of the overpasses will be constructed as all mainline traffic will be on the ramps. New freeway underpasses will be provided at Crismon Road and Mountain Road. Currently Crismon Road does not exist across the alignment of SR-24, it is recommended that Crismon Road is built with the ultimate construction of SR-24.

SR-24 Interim Westbound Mainline

In the interim condition there will be two general-purpose lanes in the westbound direction of travel on SR-24 between Ironwood Drive and Ellsworth Road. Between the interchanges the lanes would be located on same horizontal alignment as the two outside lines as shown in the ADOT DCR 2011. At the interchanges, the lanes would follow the entrance and exit ramps alignments in the interim condition. All ramps will be designed to accommodate a minimum of two lanes of traffic. This will require approximately 6ft of additional pavement width for a portion of the exit ramps that were designed as one lane exits in the ADOT DCR 2011. Mainline pavement would be constructed between the back of gore of the entrance ramps and exit ramps of successive interchanges. The Ironwood Drive entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Meridian Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. The Meridian Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Signal Butte Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. The Signal Butte Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Williams Field Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. The Williams Field Road entrance ramp (2 lanes) will be designed per the ADOT DCR 2011 horizontal layout.

The Ellsworth Road exit ramp will be designed per the ADOT DCR 2011 horizontal layout, but will be wider to accommodate the 2 lanes instead of 1 lane as depicted in the ADOT DCR 2011. Need to Determine if Traffic Dictates the need to have a grade separation at Ellsworth for the interim condition.

4.4 SERVICE TRAFFIC INTERCHANGES AND GRADE SEPARATIONS

4.4.1 Introduction

As with the ADOT DCR 2011, new traffic interchanges will be provided on SR-24 to facilitate access to the existing and planned roads at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road and Ironwood Drive. However, for the Interim Concept only a portion of the interchanges are built. The full grade separations will not be constructed in the interim condition, see Figure 5 on page 4-3. The SR-24 profile has been revised to allow the interim condition to be built at or near existing grade, see Figure 6 on page 4-4. This profile adjustment also eliminates the need for a drainage pump station as the profile is no longer depressed.

Figure 5 – Interim Construction at Interchange

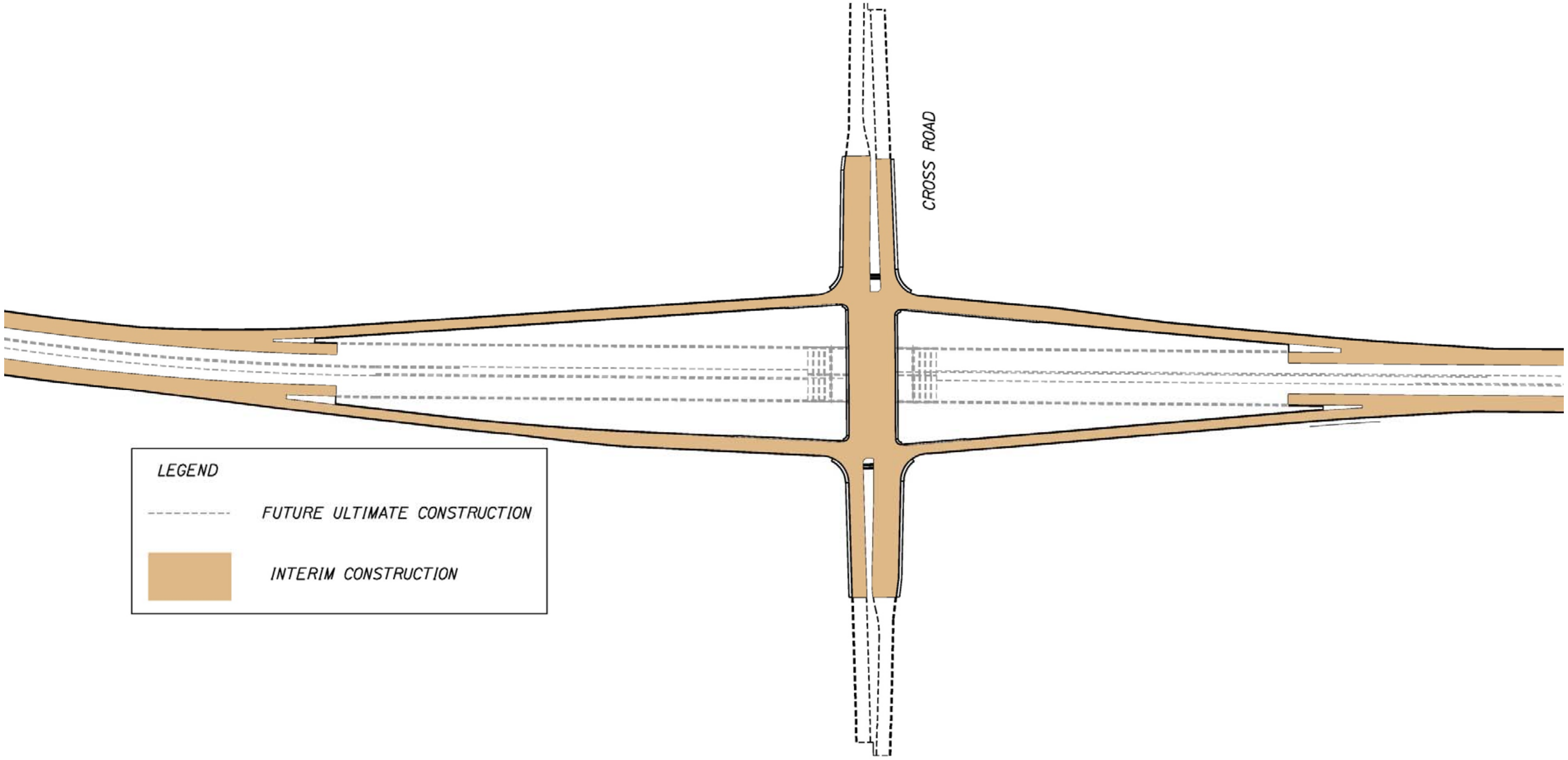
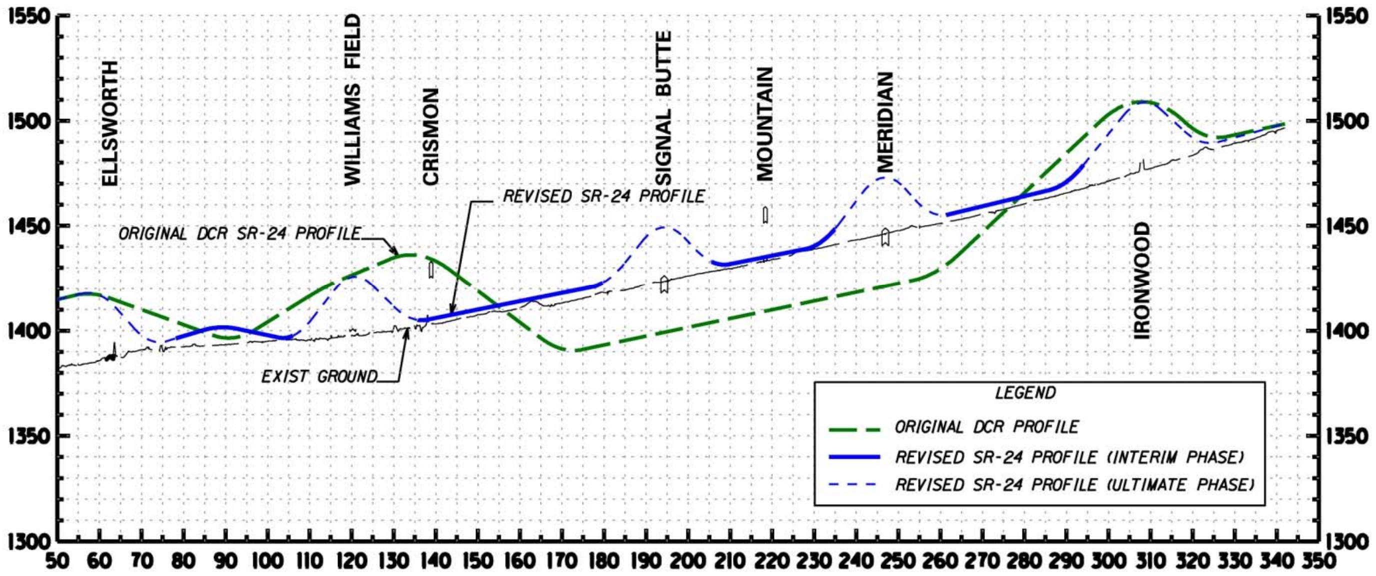


Figure 6 - Revised SR-24 Profile



4.4.2 Ellsworth Road Interim TI

See the ADOT DCR 2011 for a discussion on the ultimate Ellsworth Road Full Diamond TI. Phase I of the DCR construction was completed in May of 2014. Ellsworth Road was constructed as a 5 lane arterial street, with three through lanes in the southbound direction and two through lanes in the northbound direction. Ellsworth is planned as a six lane arterial street. Ellsworth Road was constructed and striped with 2 left turn lanes for the northbound to westbound left-turn movement. Ellsworth Road was constructed to accommodate 2 left turn lanes for the southbound to eastbound left turn movement; however it was striped out for future restripe when the eastbound entrance ramp is constructed. For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound. The southbound to eastbound dual left-turn lanes will be striped and the eastbound entrance and westbound exit ramps will be per the ADOT DCR 2011 design. The existing eastbound exit ramp will be restriped to accommodate the through movement for the eastbound SR-24 traffic.

Mainline Structures at Ellsworth will not be part of the interim project. The traffic operational analysis indicates the intersections will operate at adequate capacity for the interim Design Year 2025

Existing Catch basins and storm drains impacted along NB Ellsworth Road will be extended to accommodate the widened pavement. The existing box culvert that was constructed as part of Phase 1 in 2014 will be extended for the NB Ellsworth widening and headwalls will be added.

Existing and Planned utilities may be impacted.

4.4.3 Williams Field Road Full Diamond TI

See the ADOT DCR 2011 for a discussion on the ultimate Williams Field Road Full Diamond TI. For the interim condition the grade separation will not be constructed. In the interim condition it is assumed that Williams Field Road could be open during the interim condition.

4.4.4 Crismon Road Grade Separation

A grade separation was developed for Crismon Road in the ADOT DCR 2011 and the Horizontal alignment has not changed from the ADOT DCR 2011. However, the ultimate section for Crismon Road was updated to reflect the Mesa 2040 Transportation Plan, which has Crismon Road as a four lane arterial road instead of a six lane arterial road as described in the ADOT DCR 2011. With this interim design the DCR vertical alignment was reevaluated to help better provide a cost effective solution for the interim design SR-24. At Crismon Road the SR-24 profile was lowered to be near existing grade and Crismon Road has been designed to be above grade to cross over SR-24 with a structure. By having the Crismon Road vertical alignment go over SR-24 it greatly reduces the amount of embankment that is needed for SR-24. Since, Crismon Road does not currently exist within the project limits, it is recommended to not construct Crismon Road as part of the interim SR-24 project. The portion of Crismon Road within the ADOT Right of Way will be included as part of the ultimate SR-24 project.

4.4.5 Signal Butte Road Full Diamond TI

See the ADOT DCR 2011 for a discussion on the ultimate Signal Butte Road Full Diamond TI. In the interim condition the configuration of Signal Butte will remain the same as described in the ADOT DCR 2011. However, the ultimate vertical alignment for SR-24 has been adjusted to be above grade at Signal Butte Road with an overpass structure instead of SR-24 being depressed with an underpass structure at Signal Butte Road. All SR-24 traffic will use the entrance and exit ramps through the intersection with Signal Butte Road in the interim condition, the overpass structure will not be built in the interim condition.

If funding for the interim condition will not allow SR-24 to be built the full length of the project from Ellsworth Road to Ironwood Drive, then Signal Butte Road has been determined, in discussions with FHWA, ADOT and the City of Mesa, as the location for the logical terminus of SR-24. Ironwood Drive is the only improved road, east of Ellsworth Road, which currently provides regional connectivity to communities to the south of the project, in particular the Town of Queen Creek. The roadway network would need to provide connectivity that allows traffic on Ironwood Drive, south of the SR-24 Corridor, to be able to connect to Signal Butte Road. Once funding is determined for the SR-24 interim phase 2 then coordination between FHWA, ADOT, MAG, City of Mesa, Pinal County and Town of Queen Creek will need to occur to improve the roadway network to allow Signal Butte to be the logical terminus. If Signal Butte Road is the terminus the City of Mesa will need to include improvements in the STIP to the north and south of SR 24 to ensure Signal Butte can accommodate an end of roadway condition.

4.4.6 Mountain Road Grade Separation

A grade separation crossing has been developed for Mountain Road as depicted in Appendix C. The profile of the crossing has changed from the ADOT DCR 2011. The ultimate vertical alignment for SR-24 has been adjusted to be at existing grade at the Mountain Road crossing; In the ADOT DCR 2011 the SR-24 vertical alignment was below grade with a depressed section. With the change to the vertical alignment of

SR-24, the Mountain Road profile was adjusted to be above grade with an underpass structure. The horizontal alignment and layout of Mountain Road was not changed. By raising the grade of Mountain Road the connection to the existing roadway, at existing grade, will require additional Right-of-way impacts to the north and south of SR-24 to allow for the side slopes. Fuji Films has a developed parcel on the south west quadrant of Mountain Road and SR-24 which will be impacted by raising the grade of Mountain Road. The northern most driveway will be eliminated due to the grade difference between the existing driveway and the proposed Mountain Road grade, approx 10ft above existing. There are two additional existing driveways that provide access into the Fuji Property to the south that will not be impacted. A retaining wall will be required to maintain Fuji Films on site retention basins along the frontage of their property with Mountain Road.

4.4.7 Meridian Road Full Diamond TI

See the ADOT DCR 2011 for a discussion on the ultimate Meridian Road Full Diamond TI. For the interim condition the configuration of Meridian Road will remain the same as described in the ADOT DCR 2011. However, the ultimate vertical alignment for SR-24 has been adjusted to be above grade at Meridian Road with an overpass structure instead of SR-24 being depressed with an underpass structure at Meridian Road. All SR-24 traffic will use the entrance and exit ramps through the intersection with Meridian Road in the interim condition, the overpass structure will not be built in the interim condition. The ADOT DCR 2011 also determined Meridian Road TI would be the End of Freeway for Phase 2 of the implementation plan, however Meridian Road is not currently an improved road between Ray Road and Ocotillo Road. In discussions with ADOT, FHWA and City of Mesa Staff it was determined that Meridian Road TI would not support an end of freeway condition without improving Meridian Road between Ray Road and Ocotillo Rd. Based on the current development priorities of the City of Mesa, the city would not support improving Meridian Road for the interim end of freeway condition.

In the interim condition it is assumed that Meridian Road will not be in operation and all SR-24 traffic will continue through the future ramp intersections.

4.4.8 Ironwood Drive Full Diamond TI

See the ADOT DCR 2011 for a discussion on the ultimate Ironwood Drive Full Diamond TI. The Ironwood Drive Interim TI would have no changes to the end of freeway condition as depicted in the ADOT DCR 2011 appendix C.

4.5 ACCESS CONTROL

Access Control will be acquired for SR-24 in accordance with ADOT and FHWA Access Control Policy Requirements. Currently, the plans in appendix C have shown full access control and and Right-In Right-Out access control limits.

Since the ADOT 2011 DCR, ADOT has changed their access control policies in 2014, however additional development planning has occurred based on the previous policies which will require variances. Variances to ADOT’s access control policy are expected at the North East quadrant of the future Ellsworth Interchange and the South East quadrant of the future Meridian Interchange, based on discussions with ADOT Right-of-Way group.

4.6 RIGHT-OF-WAY

The proposed right-of-way requirements are shown on the Preferred Alternative Concept Plans in Appendix C. The right-of-way shown in the interim plans has been designed to accommodate the ultimate configuration. The footprint of SR-24 has been reduced by adjusting the profile grade to be at-grade grade between the interchanges. The total estimated right-of-way acquisition required for this alternative is 294 acres, with a total anticipated cost of $56 million. Compared to the ADOT 2011 DCR, the right-of-way acquisition required has been reduced by approx 90 acres.

Temporary Construction Easements (TCE’s) may be required for the construction of the Preferred Alternative. The TCE locations and limits will be determined during final design.

4.7 DRAINAGE

4.7.1 On-Site Drainage Systems

SR-24 is discussed in this section as an interim project between Ellsworth Road and Ironwood Drive, but provisions are made for the ultimate configurations and runoff flows. The pavement will be normal crowned at most locations to allow for continued drainage to the outside shoulder and to roadside ditches. The proposed interim two lanes of traffic would be located at the outside limit of the ultimate section. In super-elevated sections, catch basins would be placed along the median barrier rail to collect runoff.

On-Site Existing Conditions

The existing drainage improvements on the corridor are related to Segment I of the project finalized in May 2014 between SR 202L and Ellsworth Road, and the improved Ellsworth Road and Ironwood Drive. At Mountain Road the on-site drainage is limited to roadside ditches.

Currently, on-site freeway drainage is collected in catch basins and conveyed through lateral pipes into existing off-site drainage systems. Runoff is also collected by catch basin inlets within the limits of the Ellsworth Road improvements. Ironwood Drive is a median-separated facility and runoff sheet flows off the edge of the pavement to the outside ditches; median flows are intercepted at the culverts crossing the road.

The existing on-site drainage system would see minor modifications including:

- Several cross pipes that currently discharge into the Ellsworth Basin across the future SR-24 channel would be cut short and discharge into the SR-24 channel once that is built.
- Should the need for a grade-separated crossing at Ellsworth Road be justified by the traffic analysis, the footprint of the temporary basin between the existing on- and off-ramps at Ellsworth Road would be reduced to construct the mainline embankment.
- At Mountain Road a grade-separated crossing is proposed. Mountain Road would cross above SR-24 through a bridge and the roadway section would be improved. Existing roadway side ditches north of the project would be intercepted by the SR-24 channel.
- Ironwood Drive would be improved within the access control limits. Curb and gutter and catch basins would direct and intercept the on-site runoff on each side of the road. Storm drain pipes would convey the flow to the SR-24 channel or the RCBC crossing Ironwood Drive.

In areas of super-elevation, catch basins along the concrete median half barrier are provided to intercept and remove drainage flows from the roadway.

Proposed On-Site Drainage Features

Due to the mix of developed (developing) urban, suburban and undeveloped landscape within the project area, the recommended alternative for pavement drainage is sheet flow over the edge of pavement to adjacent roadway ditches. Concrete half barrier or curb and gutter are recommended adjacent to the outside shoulder of the roadway for superelevated or grade-elevated roadway segments (approaches to grade-separated crossings).

The pavement will have a 2% cross grade draining to the outside for a majority of the project, except for the superelevated sections.

The proposed drainage system would include installation of shallow linear detention basins for water quality treatment, roadside ditches, catch basins and storm drain pipes. Such features are only loosely indicated on the plans and calculations were not done at this design stage; this work is deferred to a later design phase.

ADOT C-15.91 catch basins would be installed along curb and gutter sections to collect the pavement runoff. Similarly, ADOT C-15.92 catch basins would be installed in locations with concrete half barrier. Additional catch basins (flanking inlets) would be added at sag curves and superelevation transitions to reduce bypass flows. Flanking inlets could be supplemented by slotted drains.

Runoff collected in the catch basins will be conveyed to cut ditches or storm drains. New storm drain would be installed to convey flows to a discharge point, or a connection between the new catch basins and existing storm drain laterals is made, where possible.

The on- and off- ramps would not include catch basins unless curb and gutter is required.

The areas between on- and off- ramps at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road and Ironwood Drive would be used for water quality retention basins. These areas would be regraded to a more traditional infield configuration when the ultimate project is constructed.

Several existing pipes would be shortened to discharge into the SR-24 channel (between Powerline Floodway and Ellsworth Road). The remaining pipes not being used would be abandoned in place, capped and filled with sand/cement slurry.

In addition to the general approach described above, see Draft Initial Drainage Report for future on-site drainage features by segment.

Final Design Issues

Several issues will need to be considered with the final design of the drainage features. They include runoff spread, interception and conveyance of pavement runoff generated throughout the interim project, which was not evaluated. See Draft Initial Drainage Report for additional details.

4.7.2 Off-Site Drainage Systems

This section is intended as an update to the analysis performed by ADOT for the project area as part of the SR-24 Gateway Freeway FDCR and extensive references will be made to the FDCR report and its accompanying Initial Drainage Report. The update relies heavily on the extensive regional evaluation done by FCDMC for the East Mesa ADMPU using hydrologic models modified for the purpose of the SR-24 interim project.

Existing Conditions

Several existing or proposed regional drainage facilities in the project area will have an influence upon or be affected by the project. They are:

- Powerline Flood Retarding Structure (FRS) and Vineyard FRS in Pinal County, designed to provide flood protection to Central Arizona Project (CAP) Canal and to downstream areas in Pinal County and Maricopa County;
- Powerline Floodway, a concrete-lined channel that extends from the Powerline FRS to the East Maricopa Floodway; it is primarily designed to drain the FRS structures;
- Ellsworth Channel, which runs along the east and west sides of Ellsworth Road between Pecos Road and the Powerline Floodway;
- Former General Motors Proving Grounds perimeter channel, which will be improved by developers;
- East Maricopa Floodway, which serves as a regional outfall for eastern Maricopa County;
- Pecos Road Channel is one of the proposed drainage improvements in the East Mesa ADMPU, it is intended to run along Pecos Road and to discharge into Ellsworth Channel.

The SR 202L Santan drainage channel is not affected by this project.

Pertinent pre- and post-project hydrology was developed by ADOT for the SR-24 Gateway Freeway FDCR Initial Drainage Report. The most current hydrologic analysis in the project watershed was performed by FCDMC in the East Mesa ADMPU. The latter study updated the existing condition regional hydrology to reflect major infrastructure improvements in the area. See Draft Initial Drainage Report for additional details.

Proposed Options

The interim SR-24 project could be constructed in the next 3- to 10 years. The proposed off-site drainage system would be based on the default conceptual drainage design provided with the SR-24 Gateway Freeway DCR, but sized for a revised hydrology that accounts for development likely to occur in the watershed within this timeframe. This concept shows an off-site channel on the north side of SR-24 that is sized for the larger existing (pre-project) condition design flows. The SR-24 channel outfalls into the Powerline Floodway, which would be widened to the confluence with Ellsworth Channel. A detention/retention basin at Ellsworth Road (Ellsworth Basin) would regulate the SR-24 channel peak flow before the outfall into Powerline Floodway. This concept represents the baseline approach to off-site drainage design.

The interim SR-24 project would contribute additional flows to the existing off-site runoff due to the new pavement surface. Although on-site runoff will increase, the proposed off-site collection infrastructure would not be affected as the on-site and off-site peak flows are far apart. The peak flows approaching the SR-24 alignment would only be affected by the development in the upstream watershed.

With the projected reduction in flows as development occurs in the watershed, the off-site drainage would need to be reassessed for opportunities of peak flow and runoff volume reduction. For that purpose, three possible options for the proposed off-site drainage infrastructure were presented to the stakeholders, and examined. These options were In addition to the baseline design, and were all inspired by alternatives presented and discussed in East Mesa ADMPU, and in the City of Mesa SDMP: See Draft Initial Drainage Report for additional details.

The three options were discussed with ADOT, MAG, State Land Department, Pinal County, City of Mesa and FCDMC. All options were eventually eliminated from consideration in relation to the Interim SR-24 project because they would require facilities located outside of the current environmentally-cleared footprint.

Therefore, the baseline SR-24 off-site drainage configuration, amended with the relocation of Ellsworth Channel at the Airport, was selected to be applied for further hydrologic analysis and conceptual hydraulic design.

Proposed Conceptual Design

The channel design was optimized to maintain hydraulic conditions within the design parameters described above. In addition, several factors specific to the project were considered regarding existing basin at Ellsworth Road, the inflow from adjacent developments, sediment basins, widening of Powerline Floodway, existing and proposed cross culverts. See Draft Initial Drainage Report for additional details.

4.8 STRUCTURES

4.8.1 New Bridge Structures

See section 4.8.1 ADOT 2011 DCR

With the adjustment to the SR-24 profile to be above the cross roads at the interchanges, it changes structures at Signal Butte and Meridian Road. These will be future overpasses instead of underpasses.

Crismon Road will now become a future Underpass.

Mountain Road will remain an underpass but will be above grade over the at-grade SR-24. Details of these bridges are shown in table 6 below.

Table 6 – New Bridge Structure Concepts

Bridge Description	Bridge Length	Number of Spans	C_L-C_L Span Lengths	Deck Width	Max Superstructure Depth
Crismon Road Underpass (Future)	316'	2	155', 155'	107.33'	7.5'
Signal Butte Road TI Overpass (SR 24 WB) (Future)	227'	2	111', 111'	74.5'	8.5'*
Signal Butte Road TI Overpass (SR 24 EB) (Future)	227'	2	111', 111'	74.5'	8.5'*
Mountain Road Underpass	309'	2	151', 152'	81.33'	6.5'
Meridian Road TI Overpass (SR 24 WB) (Future)	227'	2	111', 111'	74.5'	8.5'*
Meridian Road TI Overpass (SR 24 EB) (Future)	227'	2	111', 111'	74.5'	8.5'*

4.8.2 Widening of Existing Bridge Structures

No Updates see section 4.8.3 ADOT 2011 DCR

4.8.3 Retaining Walls

No Updates see section 4.8.3 ADOT 2011 DCR

4.8.4 Noise Walls

Updates for the current study are in process. Depending on the outcome ADOT would prepare a Hot Spot or noise wall analysis if needed.

4.9 UTILITIES

See Section 4.9 ADOT 2011 DCR. The only update is the Ultimate pump station has been eliminated with the SR-24 vertical alignment changes. No electric or gas service will be required.

4.10 EARTHWORK

Approximately 282,000 cubic yards of excavation and 112,000 cubic yards of borrow are anticipated to be needed for the interim phase 2 project.

4.11 GEOTECHNICAL AND PAVEMENT DESIGN

4.11.1 Subsurface Conditions

No updates see section 4.11.1 ADOT 2011 DCR

4.11.2 Pavement Structural Sections

The pavement structural sections for the SR-24 mainline and the SR-24 service interchange ramps, have been reevaluated based on updated traffic volumes. A memo has been provided as Appendix F. The recommended pavement structural sections have been provided in Table 7.

Table 7 – Pavement Structural Sections for SR-24

Item	AB-2 (in)	Plain PCCP (in)	AR-ACFC[1] (in)	Total Thickness (in)
Mainline SR 24	4	11.0	1	16
Service Interchange Ramps	4	10.0	1	15
Ramp Gore Areas	4	11.0	1	16

1. It is assumed that the AR-ACFC will not be placed with the interim project and will be placed with the Ultimate.

4.11.3 Landscaping

It is recommended that landscaping should not be part of the interim SR-24 and be designed and constructed with the Ultimate build out. The slopes should be seeded to protect from erosion.

The area north of the drainage channel within the proposed right-of-way that accommodates a future City of Mesa trail will be seeded with the interim project.

4.12 FREEWAY SIGNING AND PAVEMENT MARKING

A signing concept plan was developed to ensure an effective signing plan could be developed for the Preferred Interim Alternative. The concept signing plan is provided in Appendix C.

The final sign locations will be determined during the development of the final design plans and will consider existing and new locations of utilities, bridge structures, retaining and noise walls, drainage features, lighting standards, FMS components, and other appurtenances.

A pavement marking concept was also developed to incorporate the existing and new lane configurations, service interchange ramps, and local arterial streets and is included with the concept signing plan. The pavement marking design would be developed in accordance with applicable provisions of the current version of the ADOT Signing and Marking Standard Drawings that reference the requirements for lane lines, edge lines and intersection pavement markings.

4.13 LIGHTING AND TRAFFIC SIGNALS

Interim lighting and traffic signal plans are included in Appendix C. See ADOT 2011 DCR for additional information.

4.14 CONSTRUCTION PHASING AND TRAFFIC CONTROL

Traffic will be managed through detailed traffic control plans and by procedures and guidelines specified in Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), 2009 Version, and by the Arizona Supplement to Part VI of the MUTCD. The final construction phasing and traffic control plans will be developed during final design.

Ellsworth Road, Mountain Road and Ironwood Drive are the only existing roadways that exist or remain in place through the interim SR-24 corridor, which will require the majority of the traffic control through the interim corridor.

Coordination will be required with the City of Mesa to determine the project phasing restrictions that will be used for this project. These restrictions could include limits to crossroad lane reductions due to City of Mesa concerns about arterial street capacity, freeway access, and emergency vehicle access.

It is expected that Mountain Road will require a detour to complete construction of the above grade roadway over SR-24.

Access to existing properties will be maintained at all times. The final construction phasing and traffic control plans will be prepared during final design.

An Emergency Management Plan in coordination with maintenance of traffic will be required during construction to inform emergency vehicles and personnel to access the construction area during an emergency. This Emergency Management Plan will be prepared as part of the final design.

4.15 FREEWAY MANAGEMENT SYSTEMS AND MULTIMODAL PLANNING DATA COLLECTION

4.15.1 **FMS Communications and Trunk Line**

See Section 4.15.1 ADOT 2011 DCR. Phase 1 of the DCR was completed in 2014. The FMS Trunkline was not installed as part of the SR-24 between Ray Road and Ellsworth Road. It is expected as part of this Interim Phase 2 project that the conduit for the FMS trunk line would be part of the interim project and would be installed. The City of Mesa would install fiber for traffic signal communication.

4.15.2 **FMS Devices**

See Section 4.15.2 ADOT 2011 DCR. FMS Devices are not expected to be installed as part of the interim project.

4.15.3 **MPD Devices**

See Section 4.15.3ADOT 2011 DCR. MPD Devices are not expected to be installed as part of the interim project.

4.16 PHOENIX-MESA GATEWAY AIRPORT COORDINATION

No updates see Section 4.16 ADOT 2011 DCR.

4.17 PEDESTRIAN FEATURES

If existing pedestrian features within the interim SR-24 project limits do not meet either Americans with Disabilities Act Accessibility Guidelines (ADAAG) or Public Rights-of-Way Accessibility Guidelines (PROWAG), they will be required to be upgraded. All new pedestrian features designed with the interim SR-24 project will be required to meet PROWAG.

5.0 ITEMIZED ESTIMATE OF PROBABLE COSTS

The order of magnitude of project cost for the Preferred Alternative is $136,512,142. which includes $4,592,734 for design, $55,641,000 for right-of-way, and $76,278,408 for construction. The total project estimate includes approximately $112,431,314 for the segment of SR-24 within Maricopa County and $24,080,828 for the segment within Pinal County.

The SR-24 Ultimate (Ellsworth to Meridian) freeway project has been moved to Phase V of the program which is unfunded. MAG is currently working on a re-balancing of the over-all RTP program. The re-balancing will result in Project Programming changes, bringing projects back into the program. The results of the re-balancing effort will appear in the (FY2018-2022) Tentative 5-Year Construction Program which will be released for public review and comment in spring 2017. Additional funding would need to be provided by Pinal County (or other sources) for the segment of SR-24 from Meridian Road to Ironwood Road, since that segment of the freeway is located outside of Maricopa County and is not eligible for RTP funds.

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	1,900	$ 6.00	$ 11,400.00
REMOVAL OF SIGNS	L.SUM	1	$ 4,000.00	$ 4,000.00
ROADWAY EXCAVATION	CU.YD.	25,795	$ 6.00	$ 154,770.00
CHANNEL EXCAVATION SR-24	CU.YD.	298,514	$ 3.00	$ 895,542.00
BORROW	CU.YD.	54,985	$ 15.00	$ 824,775.00
AGGREGATE BASE CLASS 2	CU.YD.	42,000	$ 45.00	$ 1,890,000.00
AGGREGATE SUBBASE, CLASS 6	CU.YD.	8,700	$ 18.00	$ 156,600.00
PORTLAND CEMENT CONCRETE PAVEMENT (10")	SQ.YD.	141,288	$ 32.00	$ 4,521,216.00
PORTLAND CEMENT CONCRETE PAVEMENT (11")	SQ.YD.	126,263	$ 35.00	$ 4,419,205.00
ASPHALTIC CONCRETE (7" AC OVER 10" AB)	SQ.YD.	12,857	$ 30.00	$ 385,710.00
PIPE, CORRUGATED METAL, SLOTTED, 18"	L.FT.	724	$ 110.00	$ 79,640.00
STORM DRAIN PIPE, 24"	L.FT.	25,621	$ 60.00	$ 1,537,260.00
STORM DRAIN PIPE, 30"	L.FT.	1,756	$ 80.00	$ 140,480.00
STORM DRAIN PIPE, 36"	L.FT.	665	$ 100.00	$ 66,500.00
RCP CULVERT (3-36") (ELLSWORTH BASIN)	L.SUM	1	$ 30,000.00	$ 30,000.00
CONCRETE CATCH BASIN (C-15.80)(H=8' OR LESS)	EACH	37	$ 2,800.00	$ 103,600.00
CONCRETE CATCH BASIN (C-15.91)(H=8' OR LESS)	EACH	142	$ 3,200.00	$ 454,400.00
CONCRETE CATCH BASIN (C-15.92)(H=8' OR LESS)	EACH	16	$ 3,500.00	$ 56,000.00
MANHOLE (C-18.10)(NO.3)(FOR PIPES 6" TO 36")	EACH	47	$ 3,500.00	$ 164,500.00
FOUNDATION FOR SIGN POST (CONCRETE)	EACH	82	$ 180.00	$ 14,760.00
BRIDGE SIGN STRUCTURE (TAPERED TUBE,SINGLE BEAM)	EACH	8	$ 16,000.00	$ 128,000.00
FOUNDATION FOR BRIDGE SIGN STRUCTURE (TAPERED TUBE)	EACH	16	$ 7,000.00	$ 112,000.00
CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 3C)	EACH	7	$ 40,000.00	$ 280,000.00
CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 4C)	EACH	8	$ 41,000.00	$ 328,000.00
FOUNDATION FOR CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 3C)	EACH	7	$ 7,500.00	$ 52,500.00
FOUNDATION FOR CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 4C)	EACH	8	$ 7,500.00	$ 60,000.00
BREAKAWAY SIGN POST S4X7.7	L.FT.	495	$ 25.00	$ 12,375.00
FOUNDATION FOR BREAKAWAY SIGN POST S4X7.7	EACH	39	$ 280.00	$ 10,920.00
SLIP BASE	EACH	79	$ 150.00	$ 11,850.00
SIGN POST (PERFORATED) (2 1/2 T)	L.FT.	1,007	$ 12.00	$ 12,084.00
REGULATORY, WARN, OR MARKER, SIGN PANEL W/TYP VIII/IX/X SHE	SQ.FT.	958	$ 14.00	$ 13,412.00
EXTRUDED ALUMINUM SIGN PANEL	SQ.FT.	4,000	$ 22.00	$ 88,000.00
OBLITERATE PAINTED MARKING (STRIPE)	L.FT.	42,000	$ 0.20	$ 8,400.00
IMPACT ATTENUATION DEVICE (SAND BARREL CRASH CUSHION)	EACH	28	$ 8,000.00	$ 224,000.00
MILEPOST MARKER (S-10)	EACH	9	$ 220.00	$ 1,980.00
PAVEMENT MARKING (WHITE THERMOPLASTIC) (0.090")	L.FT.	144,000	$ 0.30	$ 43,200.00
PAVEMENT MARKING (YELLOW THERMOPLASTIC) (0.090")	L.FT.	120,000	$ 0.30	$ 36,000.00
PAVEMENT MARKING (TRANSVERSE) (THERMOPLASTIC) (ALKYD) (0.0	L.FT.	6,000	$ 0.50	$ 3,000.00
PAVEMENT LEGEND (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	29	$ 110.00	$ 3,190.00
PAVEMENT MARKING, PREFORMED, TYPE I, WHITE STRIPE	L.FT.	37,500	$ 3.45	$ 129,375.00
PAVEMENT MARKING, PREFORMED, TYPE I, FREEWAY ARROW	EACH	118	$ 250.00	$ 29,500.00
PAVEMENT MARKER, RAISED, TYPE C	EACH	2,500	$ 3.25	$ 8,125.00
PAVEMENT MARKER, RAISED, TYPE D	EACH	160	$ 2.75	$ 440.00
POLE (TYPE H) (STANDARD BASE)	EACH	86	$ 1,900.00	$ 163,400.00
POLE (TYPE T) (50 FT.)	EACH	75	$ 3,000.00	$ 225,000.00
BREAKAWAY BASE FOR LIGHTING POLE OR SIGNAL FLASHER	EACH	86	$ 800.00	$ 68,800.00
POLE FOUNDATION (TYPE H) (STANDARD BASE)	EACH	86	$ 900.00	$ 77,400.00
POLE FOUNDATION (TYPE T)(40 FT. THRU 55 FT.)	EACH	75	$ 3,000.00	$ 225,000.00
MAST ARM (20 FT.)(ALUMINUM TRUSS)	EACH	86	$ 1,100.00	$ 94,600.00
ELECTRICAL CONDUIT (2") (PVC)	L.FT.	55,000	$ 15.00	$ 825,000.00
ELECTRICAL CONDUIT (3") (PVC)	L.FT.	5,000	$ 18.00	$ 90,000.00
ELECTRICAL CONDUIT (3-3") (PVC)	L.FT.	54,000	$ 22.00	$ 1,188,000.00

Continued on Next Page

Continued from Previous Page

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
PULL BOX (NO. 7) (WITH EXTENSION)	EACH	20	$ 600.00	$ 12,000.00
PULL BOX (NO. 4)	EACH	190	$ 700.00	$ 133,000.00
PULL BOX (NO. 6)	EACH	60	$ 900.00	$ 54,000.00
PULL BOX (NO. 9)	EACH	10	$ 2,600.00	$ 26,000.00
CONDUCTOR (NO. 8)	L.FT.	220,000	$ 0.75	$ 165,000.00
CONDUCTOR (INSULATED BOND) (NO. 8)	L.FT.	55,000	$ 0.50	$ 27,500.00
TRAFFIC SIGNAL (ELLSWORTH RD TI)	L.SUM	1	$ 175,000.00	$ 175,000.00
TRAFFIC SIGNAL (WILLIAMS FIELD RD TI)	L.SUM	1	$ 275,000.00	$ 275,000.00
TRAFFIC SIGNAL (SIGNAL BUTTE RD TI)	L.SUM	1	$ 275,000.00	$ 275,000.00
TRAFFIC SIGNAL (MERIDIAN RD TI)	L.SUM	1	$ 275,000.00	$ 275,000.00
TRAFFIC SIGNAL (IRONWOOD RD TI)	L.SUM	1	$ 250,000.00	$ 250,000.00
LUMINAIRE (HORIZONTAL MOUNT) (267 WATT LED)	EACH	86	$ 850.00	$ 73,100.00
LUMINAIRE (VERTICAL MOUNT) (267 WATT LED)	EACH	75	$ 850.00	$ 63,750.00
LOAD CENTER CABINET (TYPE IV) (240/480 VOLT)	EACH	5	$ 10,000.00	$ 50,000.00
SEEDING (CLASS II)	ACRE	179	$ 3,250.00	$ 581,750.00
CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	66,140	$ 18.00	$ 1,190,520.00
CONCRETE CURB AND GUTTER (TYPE B, C OR C-1)	L.FT.	66,595	$ 15.00	$ 998,925.00
CONCRETE CURB AND GUTTER (TYPE D, STD C-05.10)	L.FT.	15,097	$ 18.00	$ 271,746.00
CONCRETE CURB (C-05.10) (TYPE A)	L.FT.	8,665	$ 15.00	$ 129,975.00
CONCRETE CURB AND GUTTER, TYPE A (MAG DET. 220)	L.FT.	2,330	$ 15.00	$ 34,950.00
CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	1,680	$ 15.00	$ 25,200.00
CONCRETE SIDEWALK (C-05.20)	SQ.FT.	79,556	$ 3.50	$ 278,446.00
CONCRETE SIDEWALK RAMP (TYPE B C-05.30)	EACH	32	$ 2,000.00	$ 64,000.00
CONCRETE SIDEWALK RAMP (TYPE F C-05.30)	EACH	8	$ 1,500.00	$ 12,000.00
CONCRETE BARRIER (SINGLE FACE WITH 2.5' GUTTER)	L.FT.	1,525	$ 60.00	$ 91,500.00
CONCRETE BARRIER (SINGLE FACE WITH 4.5' GUTTER)	L.FT.	1,659	$ 65.00	$ 107,835.00
RIGHT-OF-WAY MARKER	EACH	172	$ 1,000.00	$ 172,000.00
RETAINING WALL (REGULAR)	SQ.FT.	6,700	$ 55.00	$ 368,500.00
CONCRETE CHANNEL LINING (6")	SQ.YD.	164,015	$ 50.00	$ 8,200,750.00
WEIR SPILLWAY FROM ELLSWORH BASIN	L.SUM	1	$ 350,000.00	$ 350,000.00
RCB CULVERT (4-10' X 4' X 35') (ELLSWORTH RD)	L.SUM	1	$ 50,000.00	$ 50,000.00
RCB CULVERT (3-12' X 8' X 200') (WILLIAMS FIELD RD)	L.SUM	1	$ 450,000.00	$ 450,000.00
RCB CULVERT (3-8' X 8' X 200') (CRISMON RD)	L.SUM	1	$ 300,000.00	$ 300,000.00
RCB CULVERT (3-8' X 8' X202') (SIGNAL BUTTE RD)	L.SUM	1	$ 300,000.00	$ 300,000.00
RCB CULVERT (3-8' X 8' X 295') (MOUNTAIN RD)	L.SUM	1	$ 550,000.00	$ 550,000.00
RCB CULVERT (3-8' X 8' X 190') (MERIDIAN RD)	L.SUM	1	$ 300,000.00	$ 300,000.00
RCB CULVERT (3-8' X 8' X 173') (IRONWOOD RD)	L.SUM	1	$ 180,000.00	$ 180,000.00
MOUNTAIN ROAD UNDERPASS	L.SUM	1	$ 2,876,150.00	$ 2,876,150.00
ITEM TOTAL:				**$ 40,202,506.00**
PROJECT WIDE				
MAINTENANCE AND PROTECTION OF TRAFFIC (2%)		2.0%		$ 804,050.12
DUST AND WATER PALLIATIVE (2%)		2.0%		$ 804,050.12
CONSTRUCTION SURVYING (4%)		4.0%		$ 1,608,100.24
EROSION CONTROL (1%)		1.0%		$ 402,025.06
MOBILIZATION (8% OF ALL CONSTRUCTION ITEMS)		8.0%		$ 3,216,200.48
CONTRACTOR QUALITY CONTROL (2%)		2.0%		$ 804,050.12
PROJECT WIDE SUBTOTAL:				**$ 7,638,476.14**
NIDENTIFIED ITEMS (20% OF ITEM TOTAL AND PROJECT WIDE SUBTOTAL)				**$ 9,568,196.43**
PROJECT WIDE TOTAL:				**$ 17,206,672.57**

OTHER COST		
ENGINEERING DESIGN (INCLUDES SURVEYING AND GEOTECHNICAL) (8% OF ALL ITEMS):	**8.00%**	**$ 4,592,734.29**
ENVIRONMENTAL MITIGATION (UNKNOWN AT THIS TIME):	**0.00%**	**$ -**
CONSTRUCTION ENGINEERING:	**9.00%**	**$ 5,166,826.07**
CONSTRUCTION CONTINGENCIES:	**5.00%**	**$ 2,870,458.93**
UTILITY RELOCATION:		**$ 300,000.00**
RIGHT-OF-WAY:		**$ 55,641,000.00**
OTHER COST TOTAL:		**$ 68,571,019.28**
SUMMARY		
ITEM TOTAL		**$ 40,202,506.00**
PROJECT WIDE		**$ 17,206,672.57**
OTHER COST		**$ 68,571,019.28**
ICAP (8.36%)	**8.36%**	**$ 10,531,944.54**
TOTAL PROJECT COST:		**$ 136,512,142.39**

6.0 IMPLEMENTATION PLAN

6.1 INTRODUCTION

The ADOT 2011 DCR recommended a three phase implementation plan to systematically build the Preferred Alternative over time as funding becomes available. Phase 1 – SR 202L to Ellsworth Road was subsequently constructed and open to traffic in 2014. This DCR update proposes an additional Interim phase into the implementation plan, Interim Phase 2.

6.2 INTERIM PHASE 2 – ELLSWORTH ROAD TO IRONWOOD DRIVE

The phase 2 project will build the outside lanes and ramps of the ultimate SR-24 between Ellsworth Road and Ironwood Drive.

Ellsworth Road will be widened for the future third northbound lane and right turn lane to eastbound SR-24.

Williams Field Road will be constructed to the ultimate roadway width within ADOT maintained PCCP pavement limits.

Signal Butte Road will be constructed to the ultimate roadway width within ADOT maintained PCCP pavement limits

Mountain Road will be constructed as an above grade overpass to cross over SR-24.

Meridian Road will be constructed to the ultimate roadway width within ADOT maintained PCCP pavement limits

Ironwood Drive will be constructed to the ultimate roadway width within ADOT maintained PCCP pavement limits

The ultimate offsite drainage channel will be constructed north of SR-24 between Powerline floodway and Ironwood Drive. The Ellsworth Road basin will be modified to function as an off-line retention and water quality basin. The need for a pump station has been eliminated by raising the grade of the SR-24 profile and has been eliminated. The Powerline Floodway will be widened to its ultimate configuration.

The estimated construction cost for Interim Phase 2 is approximately $139,016,495. The order of magnitude cost estimate is provided in section 5 of this DCR update.

7.0 AASHTO CONTROLLING DESIGN CRITERIA

No updates see Section 7 ADOT 2011 DCR.

8.0 SOCIAL, ECONOMIC AND ENVIRONMENTAL CONCERNS

ADOT, in coordination with FHWA, completed an EA for the SR 24 Gateway Freeway (formerly known as SR 802) in April 2011. The 2011 EA evaluated the selected alternative for SR 24 that included construction of a controlled-access high-speed transportation facility from SR 202L MP 34.50 to Ironwood Road. On May 6, 2011, FHWA issued a Finding of No Significant Impact (FONSI) for the SR 24 project (NH-802-A[AUG], 802 MA 999 H6867 01L). An EA Reevaluation is currently being prepared to evaluate the proposed Phase II Interim Improvements and proposed modifications to the selected alternative that was evaluated in the 2011 EA. However, the reevaluation cannot be completed and approved by FHWA until after the project is fiscally constrained.

FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

APPENDIX A – SUMMARY OF COMMENTS

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

TRACS No. H8915 01L/02L
Federal Project No. 024 A (200)

Draft IDCR Comment Response Document

ADOT Project Manager: Ronald McCally
Consultant: PARSONS

INDEX OF COMMENTS RECEIVED

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
			JOHN WENNES, ADOT ENVIRONMENTAL			
1	1	Pg. 1-1 Draft IDCR	*MITIGATION MEASURES* – Replace paragraph with the following text: “No updates at this time. As part of the Environmental Assessment Re-evaluation currently being prepared for this study, Mitigation Measures will be updated.”.	A	A	Will revise
2	2	Pg. 1-4 Draft IDCR	*Section 1.3.3, Second paragraph, second row* – include “of” after “the area north”	A	A	Will revise
3	3	Pg. 4-2 Draft IDCR	*Section 4.4.1,First paragraph, second row* – include “roads” after “planned”.	A	A	Will revise
4	4	Pg. 8-1 Draft IDCR	*Section 8, First paragraph* – replace all text with “Updates for the current study are in process.”	A	A	Will revise
			TED LEHMAN, JE FULLER - HYDROLOGY			
5	1	App. D, Draft Initial Drain. Report	Sub-basin E6A appears to have been left developed, while the report suggests it should have been reverted to undeveloped conditions	A	A	Will revise. The basin unit hydrograph was revised to reflect undeveloped conditions, but tests indicate further revisions are needed to simulate that condition appropriately

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OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
6	2	App. D, Draft Initial Drain. Report	Sub-basins GM16-GM20 are combined downstream of the SR24 channel and detention basin. Review of the development plans, topography, and discussions between the Premier (working on the Ellsworth Channel realignment) and Parsons team members suggest that any outflow from these sub-basins is more likely to be collected by the new SR24 channel, probably near its intersection with Crismon Road.	A	A	Model has been revised
			TAMMY MIVSHEK, ADOT TRAFFIC ENGINEERING			
7	1	IDCR 4-4	4.4.2 Ellsworth Road Interim TI, it states "The traffic operational analysis indicates the intersections will operate at adequate capacity for the Interim Design Year 2025." In the Traffic Analysis Report on page 17, Table 5 It shows that the overall operation of the NB and WB approach the overall LOS for AM and PM Peak hours are at F(E) for NB and F(F) for WB for the SR 24/Ellsworth WB Ramp under Option A. Under Option B, the LOS during AM and PM Peak Hours is F(F) for the NB approach and F(F) for the WB approach at the WB Ramp per Table 7 on Page 19 of the Traffic Analysis Report. At present the intersection is operating under acceptable conditions with some delays in the turning movement.	B	A	The overall level of service is acceptable with the mitigated lane configurations shown in figures 6 and 7 of the report.

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
8	2	IDCR 4-8	4.12 Freeway Signing and Pavement Marking, it states "A signing concept plan was developed to ensure an effective signing plan should be developed for the Preferred Interim Alternative." The Interim concept appears to be directed at the Ultimate condition and not the Interim. It doesn't make sense to sign for roads that don't exist yet. Also, would we want to have sign structures sitting out there without signs on them and to be sitting there for however long in between the interim and ultimate? What if during the Ultimate Design the structures are in the way of future sound walls, etc.	B	D	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian.
9	3	IDCR 4-8	4.12 Freeway Signing and Pavement Marking. These are going to be at-grade intersections but I don't see any signing pertaining to the x-roads at the TIs. Only Ellsworth, Mountain and Ironwood are open but there is nothing showing what will be used in order to guide or control traffic on these roadways. The other roads for the x-roads may be used as turn around points for the Interim condition but again there is no traffic control or guide signing. For the roads that lead to nowhere it would also be a good idea for barricades to be placed at the end of the roadway.	B	D	We are updating the original DCR. The traffic plans were at the same level of detail. Intersections to be signalized except Meridian Road

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

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10	4	IDCR 4-8	4.13 Lighting and Traffic Signals. There were no comments made pertaining to the Interim condition. Is there lighting going to be placed on the Interim condition. It appears that the mainline will be divided without barrier put in place but lighting is not going to be placed on the ramps? Also, no mention of any signals in the Interim. The Ellsworth signal would need to be updated because of the new ramps. The end of roadway, whether it be Signal Butte, if that option is selected and the roadway built, or Ironwood, will lead into a roadway that will have traffic on it. Will traffic control be set up utilizing a signal light at that location? What about Mountain Road. What type of traffic control will be used on this roadway, a stop condition or a signal light. SR 24 will not be able to move freely through these locations.	A	A	We are adding Signals and Lighting. All cross roads will have signals with the ramps for the interim condition except for Meridian.
11	5	IDCR 4-8	4.14 Construction Phasing and Traffic Control. It may be advisable that an Emergency Management Plan be put into effect as well with the traffic control in order for emergency vehicles and personnel to enter into the construction area since there will be limited points in which to enter in case of an emergency. It probably would be helpful for emergency personnel to know where the access points would be to the project if something were to happen during construction of SR 24.	D	A	This appears to be a final design issue. Text will be included indicating an Emergency Management Plan needs to be prepared during final design.

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SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
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OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
12	6	IDCR, App. C T-1.01	The raised pavement markers should all be Type C since there are median islands separating the traffic lanes on the x-roads. Type C should be used on all the lane lines. The spacing for the RPM's on the broken white should be at 40 ft. spacing and not 20 ft. spacing and on the turn lane lines they should be spaced at 20 ft. Also, Type D RPMs should also be used on the median island noses as per Std. Dwg. M-1 as well as the yellow paint.	A	A	Will revise.
13	7	IDCR, App. C T-1.01 - T-1.10	Ellsworth Rd Ramp "A" Connector is listed as "Future" per C-3.01. As far as the DCR is concerned all of the work will be done on the East of Ellsworth Rd. Why is there new sign panels and sign structure being placed for Ramp A depicting two lanes for WB L202 and one lane for NB L202. There is nothing in the DCR that states that this ramp will be widened to two lanes for WB direction during the Interim.	A	D	The connector ramp will not be constructed with interim project
14	8	IDCR, App. C T-1.01	Per the 1st paragraph under 4.4.2 Ellsworth Road Interim TI on Page 4-4 of the DCR it states, "For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound." This 3rd lane in the NB direction was also depicted in Appendix C on sheet C-4.01 but is not shown on the pavement marking sheet T-1.01.	B	A	Discussion needed based on Traffic Operations at Ellsworth Road. The project team will meet with the City of Mesa to discuss the third left turn lane. The results of this meeting will impact the report. Meeting resulted in 2 Lt turn lanes at this location based on operations and maintenance preferred by the City of Mesa. Updates will reflect this.

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15	9	IDCR, App. C T-1.01 - T-1.10	Again many of the signs on here are more representative of the Ultimate condition and not of the Interim condition. We shouldn't be signing for roadways that do not exist at this time nor should we have signing such as "Right Lane Exit Only" signs in the interim. Some of the signs on these pages do not comply with the 2009 MUTCD or the current MOAS as shown.	A	A	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian
16	10	IDCR, App. C T-1.01 - T-1.10	On the x-roads there is no signing shown or barriers for end of roadway conditions on the non-existent roads. On all of the x-roads, with the exception of Meridian Rd, it shows that the striping will match existing striping regardless of whether the road exists or not. At Meridian no striping is shown on T-1.08 even though on C-4.06 it shows a portion of the x-road will be built. In the interim the only roads in existence will be Ellsworth, Mountain, and Ironwood. The x-road sheets should be more representative of the conditions that will exist when the Interim project is completed. If the Interim conditions do include x-roads around SR 24 even though the roadways are not in place is beneficial to traffic who can use them to make turn around. It does not show on the x-roads if it will be free flow through them, stop condition, or signal light.	B	A	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian. At the time of final design it will be determined which cross roads will be developed. We will add a discussion to the DCR.
17	11	IDCR, App. C T-1.01 - T-1.10	Why isn't there a W10-2 Expressway Ends XX Miles located on EB SR 24 before Ironwood?	B	A	Warning and regulatory signs will be freeway size and not expressway size.

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18	12	Traffic Analysis Report	On Page 6, 1st Paragraph under Existing Intersection Configuration it states that the NB approach on Ellsworth consists of four through lanes at the EB off-ramp. Technically there are four lanes going through this intersection but in reality there are only two through lanes. The other two lanes are actually two left turn storage lanes for the WB on-ramp.	A	A	The text of the report will be updated to clarify that two left turn lanes are queue storage for the northbound left turn lanes at the intersection of Ellsworth Road and SR 24 EB Ramps.
19	13	Traffic Analysis Report	On Page 8 the left turn arrow in Figure 1A is missing.	A	A	The figure will be corrected.
20	14	Traffic Analysis Report	On Page 9, it appears that the data in Table 2 is backwards for 1A and 1B.	A	A	The figure will be corrected.
21	15	Traffic Analysis Report	On Page 9 in the first sentence of the 2nd paragraph under Crash Analysis it states, " identified a one-year total of 24 crashes (without any fatalities) on 24 from Loop 202 . . .” Should it not say " identified a one-year total of 24 crashes (without any fatalities on SR 24 from Loop 202. . ."	A	A	The table will be corrected.
22	16	Traffic Analysis Report	On Page 11 under Projected Segment Traffic Volumes, it states an "end of freeway" condition. Ellsworth is the "end of freeway" condition and Signal Butte in Option B or Ironwood in Option A would be an "end of expressway" condition. Per the ADOT Roadway Design Guide (2012), "Full access control gives preference to through traffic by providing access only through selected public roads and by prohibiting at-grade crossings or direct access from abutting property. Partial access control still gives preference to through traffic but permits some crossings at grade	B	A	The report will be updated to state that Ellsworth Road is an end of expressway condition in Option A.

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OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
			and some private driveway connections." The 2009 MUTCD defines a Freeway as a divided highway with full access control and an Expressway as a divided highway with partial control of access. "End of freeway" exists at Ellsworth Rd with the at-grade signalized intersection. In the Interim SR 24 could only be labeled as an Expressway with the at-grade intersections with partial controlled access from Ellsworth Rd to Signal Butte Rd/Ironwood Rd, depending on the Option selected.			
23	17	Traffic Analysis Report	On Page 4-4 of the DCR, 1st paragraph under 4.4.2 Ellsworth Road Interim TI it states, "For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound." The DCR does not state that the third lane would be opened to traffic but is shown as a possibility in Appendix C C-4.01. The projected traffic volumes do not show any projections with the possibility of this third NB through lane	B	A	The project team will evaluate the recommended intersection geometry at the intersection of Ellsworth Road and SR 24 WB Ramp due to the impact to the SR 24 EB on ramps and Ellsworth Road. Pavement widening on Ellsworth Road is to accommodate the 12-foot lane shift of the existing NB through lanes. The additional pavement width will be used for the third northbound left turn lane.
24	18	Traffic Analysis Report	Currently Signal Butte Rd does not exist in the area of SR 24. From what I understand in the DCR under Option A that this road will not be built by 2025. Under Option B it would become the logical terminus but would still have to be built. Why is it under Option A that you are showing through movements NB and SB through the intersections to a nonexistent road?	B	D	Signal Butte Road is expected to be built at time of construction or soon after. We are showing the ultimate striping, Final Designer will provide appropriate striping at time of construction. City of Mesa is planning to construct Signal Butte Road from Ray Road to Pecos Road.
25	19	Traffic Analysis Report	In Figure 4 and Figure 5, on the diagram you are showing Meridian Rd as Moeur Rd.	A	A	Will change

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
26	20	Traffic Analysis Report	On Page 18, 20, Figure 6, and Figure 7 for the Mitigated intersections, adding a third left turn lane for the WB on ramp at Ellsworth would improve the level of service for Option A and Option B but there are other factors that also need to be considered. By adding the third left turn lane this would mean widening Ellsworth Rd with another lane on top of the third NB through lane. Also, the WB on-ramp would need to be widened to three lanes from the existing two in order to accommodate the third left turn lane. By adding the third lane on the ramp there would need to be enough room in order to merge that third lane prior to Ramp A or leaving the third lane as the Ramp A lane from the Ellsworth intersection.	B	A	The project team will evaluate the recommended intersection geometry at the intersection of Ellsworth Road and SR 24 WB Ramp due to the impact to the SR 24 EB on ramps and Ellsworth Road. Pavement widening on Ellsworth Road is to accommodate the 12-foot lane shift of the existing NB through lanes. The additional pavement width will be used for the third northbound left turn lane. Ellsworth Road will not be widened to three through lanes. The WB on ramp would need to be widened to add an additional lane.
27	21	Traffic Analysis Report	Figure 7, the proposed lane configuration diagrams label 3A and 3B as Ironwood Dr when they should be Signal Butte Rd.	A	A	The figure will be corrected.
28	22	Traffic Analysis Report	Page 26 under 2025 Option A Scenario, 1st paragraph Ironwood Rd would not be an "end of freeway" but an "end of expressway" condition. Also it states that Mountain Rd would be "grade separated" over SR 24 but in the next paragraph it states, "Grade separation of interchanges is not recommended in the 2025 Option A scenario." Maybe it should be re-stated that all other interchanges besides Mountain Rd will not be grade separated.	D	A	Mountain Road will not be an interchange. It will just be a grade separated crossing. It will not have direct access to SR-24 The text will be clarified to better explain why Mountain Road isn’t a TI.
29	23	Traffic Analysis Report	Page 27, third paragraph under 2025 Option A Mitigated Analysis, third line states, . . ."ramp through movement During AM both peak hour." Please clarify.	A	A	The report will be updated to state that the northbound left turn turning movement conflicts with the westbound ramp movements. The word “through” will be deleted.

A-Will Comply
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30	24	Traffic Analysis Report	Page 27 under 2025 Option B Scenario, 1st paragraph, Signal Butte would be "end of expressway" condition and not "end of freeway."	B/C	A	The report will be updated to designate that Signal Butte Road will be an "end of expressway" condition.
			EUNICE CHAN, FHWA			
31	1	Pg 3, Traffic Analysis Report	2025 Opt A Mitigated Analysis references expected delays for the NB left turn movement at the intersection of Ellsworth Rd and WB SR24 Ramps and no further mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. Appendix H seems to indicate that even with the mitigation measures, there will be a 76.8 s/veh delay for the NBL movement on Ellsworth and SR 24 WB Ramps, and a 102.9 s/veh delay for the EBT movement on Ellsworth Rd and SR 24 EB Ramps.	B	A	The predicted overall level of service for the 2025 Option A mitigated condition is level of service D or better. The predicted delay for northbound left turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.
32	2	Pg 4, Traffic Analysis Report	2035 Horizon Year – mentions that vehicles are expected to queue on the westbound on ramp and northbound left turn lane at the intersection of Meridian Rd and SR 24 WB Ramps and no mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. For example, Appendix K indicates LOS F during peak hours for the NBL in 2035, but the delay is only 58.1 s/veh.	B	A	The predicted overall level of service for the 2035 horizon yea s level of service D or better. The predicted delay for northbound and westbound turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.

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33	3	Pg 6, Traffic Analysis Report	Existing Roadway Network – Include sentence on posted speed limit for Meridian Road.	A	A	The report will be updated.
34	4	Pg 11, Traffic Analysis Report	Design Concept Report Alternatives and Projected Segment Traffic Volumes discussions appear to be the same?	A	A	The report will be updated.
35	5	Pg 17, Traffic Analysis Report	Table 5: a. Clarify "recommended lane configurations" in the first sentence. Figure 6 only labels the "Mitigated" configurations. Are the recommended lane configurations the ones that are unlabeled? b. Include discussion of the severity of unmitigated peak hour delays (Appendix G). For example, not incorporating the recommended mitigation would result in LOS F with a delay of 1373.2 s/veh for the NBL and 564.1 veh/s for WBT at the intersection of Ellsworth Rd and SR 24 WB Ramps.	A B	A A	a. Table 5 refers to the unmitigated lane configurations. The text and figures will be updated. b. Table 5 refers to the unmitigated lane configurations. An alternative analysis is shown in Table 6 with the mitigated levels of service. Discussion referring to Table 6 and the mitigated analysis will be added to this section.
36	6	Pg 18, Traffic Analysis Report	Table 6 – See comment 1. Table shows LOS C for EB through movements at Ellsworth Rd and EB SR 24 Ramps. But Appendix H shows LOS F?	A	A	Table will be updated.
37	7	Pg 19, Traffic Analysis Report	Table 7 – See comment 5.a.	A	A	Table 7 refers to the unmitigated lane configurations. The text and figures will be updated.

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Client Project Manager: Ronald McCally
Consultant: PARSONS

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38	8	Pg 21, Traffic Analysis Report	Table 9 – See comment 2.a.	A	A	Table 9 refers to the unmitigated lane configurations. The text and figures will be updated.
39	9	Traffic Analysis Report	Figure 6 - Didn't see a difference between the original and the mitigated configuration for 3A or 3B? What was the mitigation?	A	A	The mitigated lane configuration at Signal Butte Road and SR 24 WB off ramps is three (3) northbound left turn lanes. The figure will be updated.
40	10	Traffic Analysis Report	Figure 8 – Reason for calling out the lane configurations on Meridian Rd and not for the other crossroads?	D	D	The lane configuration was shown on Meridian Road to clarify a six lane cross section north of SR 24 and a four lane cross section south of SR 24.
41	11	Pg. 3-1, Draft IDCR	a. Provide description of Tier 1 analysis and background on why it was not used for evaluating the four alternatives. b. Section 3.3.2 Description of Alternatives should reference or include typical sections of each alternative.	D A	D A	a. Tier 1 analysis was used for determining the SR 24 Corridor Alignment in the original DCR. b. Will include typical sections of each
42	12	Pg. 3-2, Draft IDCR	a. Was Alternative B removed from consideration for reasons other than the feasibility of the traffic operation analysis? b. Clarify last sentence under subheading, "Compatibility with Ultimate."	D A	D A	a. That and the compatibility with the ultimate. b. Will clarify

A-Will Comply
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OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
43	13	Pg 3-3, Draft IDCR	a. Traffic Analysis – All alternatives would operate at a similar Level of Service, which is -? Provide additional discussion. b. Suggest including a table that shows how each of the four alternatives quantitatively addresses the primary objectives of the evaluation criteria as part of the Tier 2 evaluation process. While this is generally discussed per alternative, it is not presented in a way that allows comparison of similarities and differences between the alternatives and the extent to which they meet (or don't meet) the primary objectives. c. Second sentence under "Development Impacts" should include "of" between "amount" and "area" d. Under "Estimated Construction Cost" subheading, the Alternatives in the second paragraph should be capitalized for uniformity (see also para 4.5 on pg 4-5). • What were the costs for each alternative? It appears that only the estimated cost for the preferred alternative is given (pg. 5-1).	D A A A B	D A A A D	a. Our scope was to update the existing DCR therefore was structured to provide a traffic analysis on the selected alternative. b. Will add table c. Will revise d. Will revise • Our scope was to update the existing DCR therefore was structured to provide a traffic analysis on the selected alternative.
44	14	Pg 4-2, Draft IDCR	Include discussion of number of GP lanes in the WB direction under subheading, "SR 24 Interim Westbound Mainline."	A	A	Will add two GP lanes

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45	15	Pg. 4-4, Draft IDCR	4.4.5 Signal Butte Road Full Diamond TI 1. General note: in order for Signal Butte to be the logical terminus, City of Mesa needs to include improvements in the STIP (to the north and south) to ensure Signal Butte can handle the end of freeway traffic	A	A	Text will be added to denote the City of Mesa needs to include inprovements.
46	16	Pg. 4-7, Draft IDCR	Section 4.8.4 Noise Walls notes no updates. Verify if any updates/additional mitigation measures are needed to reflect the change from a depressed freeway to an at grade or above grade freeway between Williams Field Rd and Ironwood and the change from at grade to above grade bridges at Crimson and Mountain.	B	C	Decision from FHWA pending. Depending on outcome ADOT would prepare a Hot Spot or noise wall Analysis if needed.
47	17	Pg. 5-2, Draft IDCR	a. Does the project wide erosion control (1%) cover permanent erosion control measures or just BMPs during construction? Verify whether permanent seeding for all disturbed areas is included within this 1% or include a line item in the cost estimate as there will be no landscaping under the interim condition. b. Ensure all existing pedestrian features within the interim scope of work/project limits are upgraded, if needed, and any new features designed to meet ADA/PROWAG.	B A	A A	a. Will add seeding item b. Will add a statement regarding upgrading existing facilities to meet ADA/Prowag

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Client Project Manager: Ronald McCally
Consultant: PARSONS

			KEN AKOH-ARREY, ADOT DRAINAGE			
48	1	App. D, Draft Initial Drain. Report	Existing condition HEC-1 Schematic is not matching the input in HEC-1 output. Sub-basin labels such as P1, P2, etc., are not on the schematic. Is there another schematic which should have been included? In fact, the labels on this schematic map are only of the E-series.	A	A	The ADMPU schematic will be included for reference. The project Schematic represents only the watershed pertaining to SR 24, which was revised for the project (see Section 4.4, Draft Initial Drainage Report). The Hydrologic model includes the entire East Mesa ADMPU area, incorporating E, P and R sub-basin groups. The ADMPU model was maintained intact in its coverage to ensure that the revised information is available to FCDMC and City of Mesa for further updates as a comprehensive regional tool.
49	2	Pgs 21-22, Draft Initial Drain. Report	The Interim option – the Baseline option, modeled with existing condition will convey more flow than any of the three ultimate condition options that were eliminated from consideration. However, Figure 6 is not showing a pump station as shown for those three options. Will this option get by without a pump station? How so? What is different?	A	A	The interim and revised ultimate roadway profiles are fully above ground and the pump station is not needed in any of the options that were analyzed. The reference to a pump station in the exhibits is incorrect and it was removed.
50	3	Pg 27, Draft Initial Drain. Report	Section 4.6 - This section should include discussion on the pump station as a conceptual design appurtenant that supplements the performance of the channel, if there is going to be one.	D	D	The pump station is not needed.
51	4	Pg 27, Draft Initial Drain. Report	Section 4.6 - The second bullet states that flow from PPGN (Wood Patel, 2014) in excess of the 100-year, 24-hr storm would flow across Ellsworth Rd. to the Ellsworth Retention Basin and fill it up limiting the flow that can be clipped from the channel's hydrograph for attenuation. Is this a potential problem? What is the recommended solution so that more discharge is not sent downstream than is being intended?	D	D	Note that the statement refers to "flows in excess of the 100-year, 24-hour event", which is a condition in excess of the design and is applicable for extreme events only. At the moment this is an assumption, as the PPGN development is in very early stages of planning and a detailed grading plan is not available to indicate the location where emergency flows would leave the development.

			MIKE DUNCAN, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
52	1	App. D - Draft Initial Drain. Report	HEC-1 model output, for run of 01DEC15 14:28 The flows from the SR24 channel and the Ellsworth Basin area are: "802ELS", "G19E26", and "G17E26", which are 1,876 cfs + 182 cfs + 0 cfs = 2,058 cfs, which exceeds the 1,650 cfs criteria of Section 4.6, page 27 of the report.	A	A	The analysis in the Draft Initial Drainage Report was done for a detention volume of 96 ac-ft. Approximately 109 ac-ft of detention volume is needed to attenuate the peak flow to 1,650 cfs. An area suitable for detention has been identified at Ellsworth Rd, Ramp C, which could provide the additional volume.
53	2	App. D - Draft Initial Drain. Report	Line 1242, page 29, of the HEC-1 output has: DT 1650UP 96.0 0.0 Which means that the diversion is limited to 96 acre-feet, but section 4.6 of the report mentions 100 acre-feet.	A	A	See response to Comment 52/1
54	3	Draft Initial Drain. Report	The report does not address or show that the Powerline Floodway (and downstream East Maricopa Floodway) is not negatively impacted by the drainage system that encompasses the SR24 channel and the Ellsworth Basin.	B	A	The impact is being assessed based on the hydrology and the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 hydrology.
55	4	App. D - Draft Initial Drain. Report	HEC-1 Schematic - At the upper left there are two concentration points shown with the same label CPE26A	A	A	Duplicate label was deleted
56	5	Sht. D-1.03, Plans	The bottom width for the proposed, modified Powerline Floodway channel is 55 feet. What is the design basis for this?	B	A	The impact is being assessed based on the hydrology and the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 hydrology.

A-Will Comply
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57	6	Sht. C-4.07, Plans	The box culvert under Ironwood Dr is shown as 2 @ 8' x 6'. This should be 3 @ 8' x 8' to match the same culvert shown on sht. C-3.35.	A	A	Will adjust
58	7	Sht. D-1.01, Plans	Are there any supporting analyses to show that the approx. 750 ft. long lateral weir and 4 barrel box culvert will function as expected to meet the overall peak outflow criteria?	B	A	Analysis is in progress and will be made available with the Initial Drainage Report. Analysis included in drainage report.
59	8	Sht. D-1.02, Plans	The typical section uses B for top width while the table below uses T.	A	A	Will adjust
60	9	All sheets, Plans	Refer to Ironwood Road but it should be Ironwood Drive.	A	A	Will adjust
61	10	Sht. D-1.03	The channel side slopes are shown as 1.5:1. For the subject major re-construction of the Powerline Floodway, side slopes of 2:1 would be the steepest allowed by FCDMC.	A	A	Will adjust

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Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			JEFF SHELTON, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
62	1	App. D, Draft Initial Drain. Report	HEC-1 model 24INT100C.dat. Comparison of EMADMPU hydrology to SR-24 hydrology and the effect on the EMF. The hydrograph at CPEMF1 from model 24INT100C.dat was added to a hydrograph from PVR with peak of 600 cfs. This was then input into an unsteady EMF HEC-RAS model that was developed by the FCD to evaluate the levee status of the channel. The hydrographs for CPEMF1 and PVR were added together for the existing and future EMADMPU models and input into the unsteady EMF model for comparison to 24INT100C.dat. The results indicate that your current plan would produce water surfaces 1.37 feet higher than the future EMADMPU model in the EMF at the Powerline Floodway. Average increases of approximately 0.5 feet occur for miles up and down stream of the confluence. The results also indicate that your current plan would produce water surfaces 0.16 feet higher than the existing EMADMPU model in the EMF at the Powerline Floodway. Your model also produces reductions in the water surface for miles downstream of the confluence (see attached spreadsheets). The EMF HEC-RAS model and other supporting calculations will be provided upon request.	A	A	FCDMC provided the regional model. The material will be referenced and the effects of the added SR 24 flows described in the Initial Drainage Report.
63	2	App. D, Draft Initial Drain. Report	HEC-1 model 24INT100C.dat. Function of basin at Ellsworth Road and SR-24. The calculations in HEC-1 (802ELS) that represent the offline basin at Ellsworth are so basic that they might not adequately give a rough estimation of the effect the SR-24 drainage system has on the Powerline Floodway and EMF.	B	A	The level of hydraulic modeling involved is complex and is dependent of an advanced design stage that was not scoped for the IDCR phase of the project. The detention basin operation is being refined, but at a simplified level.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			MARIA DEEB, CITY OF MESA			
64	1	Pg. 1-1 Draft IDCR	*Programming, Paragraph two* - Define acronym: Regional Transportation Plan Freeway Program	A	A	Will define
65	2	Pg. 1-1 Draft IDCR	*Mitigation Measures, Paragraph one* – I will suggest not using the words: "no updates" The mitigation language currently used by ADOT has changed since 2010. Also, the concept includes updated locations for drainage structures, therefore related mitigations be required? these might affect level of impact and impact locations. And have the noise and air quality conformity runs been completed? HPT completed? Will updates only occur during design and not at this DCR stage? Suggest text with clarification if not updates are to be done at this time but will during the design phase.	A	A	Will provide updates if available at time of final DCR submittal or provide statement regarding the update to the Environmental Evaluation and mitigations
66	3	Pg. 1-3 Draft IDCR	Provide a color label that explains the pink vs. blue colors.	A	A	Will add
67	4	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph one* - Within Mesa: per the Mesa 2040 Transportation Master Plan (page 81) it is a 6L arterial separated by raised medians from Southern Avenue to Pecos Road, then a 4L with raised medians to Germann Road (medians page 77)	A	A	Will update to further extents
68	5	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph two* - Within Mesa: per the Mesa 2040 Transportation Master Plan (page 81) it is a 6L arterial separated by raised medians from Ellsworth Road to Crismon, then a 4L with raised medians to Meridian Road (medians page 77)	A	A	Will update to further extents

A-Will Comply
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69	6	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph three* - 4 lane per the 2040 plan	A	A	Will adjust Crismon Rd to 4 lanes with raised median
70	7	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph four* - medians are required on all legs of arterials to arterials, raised medians are proposed for SB from north of Williams Field to Pecos Roads	A	A	Will update to further extents (Comment 67)
71	8	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph six* - classified as 6L except in segment from south of Guadalupe Road to Williams Field Road where it is a 4L	A	A	Will update to further extents (Comment 67)
72	9	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph six* - medians are required on all legs of arterials to arterials, raised medians are proposed for Meridian from north of Williams Field to Pecos Roads	A	A	Will update to further extents (Comment 67)
73	10	Pg. 1-5 Draft IDCR	*Section 1.3.6, Drainage* - suggest including comment: "see detailed drainage report".	A	A	Will add
74	11	Pg. 4-1 Draft IDCR	*Section 4.2, Table 1* - typo	A	A	Will fix spelling of Clearance
75	12	Pg. 4-1 Draft IDCR	*Section 4.2, Table 2* - typo	A	A	Will fix spelling of Clearance
76	13	Pg. 4-2 Draft IDCR	*Section 4.3, SR 24 Interim Freeway Concept* - Can we add language in the introduction section that references: The interim concept will include accommodation for a trail; the City may open it prior to the freeway's ultimate construction.	A	A	Will add

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77	14	Pg. 4-8 Draft IDCR	*Section 4.11.3, Landscaping* - The interim landscape should support the construction of a shared use pathway.	B/C	A	We will reference seeding on the trail
78	15	Pg. 4-9 Draft IDCR	*Section 4.15.1, FMS Communications and Trunk Line* - Should the foundation/infrastructure be constructed with interim and at ultimate pull wire, etc. as desired/needed?	D	A	DISCUSSION NEEDED We received comment from ADOT Central Phoenix Construction District during our CRA meeting to not include FMS infrastructure as it gets damaged prior to fiber being pulled. Text to be added to DCR Update to reflect that conduit should be included along the corridor for signal use.
79	16	Pg. 4-9 Draft IDCR	*Section 4.15.1, FMS Communications and Trunk Line* - Per Avery R. If signals are to be operated by COM we desire to get fiber to them sooner rather than later. I would recommend that conduit be added to any bridge structures; If the freeway crosses any canals, drainage areas, etc. it would be a good idea to get a conduit crossing in those structures if they are built now. COM wants to know which traffic signals we were going to have in this interim condition so we recommend some conduit that could help us right away	B/C	A	DISCUSSION NEEDED Text to be added to DCR Update to reflect that conduit should be included along the corridor for signal use.
			ERIK GUDERIAN, CITY OF MESA			
80	1	Pg. 4-4 Draft IDCR	*Section 4.4.3, Paragraph one* - It should be assumed that Williams Field could be open during the interim condition. Most likely not at opening day, but at some point.	A	A	Will assume it is open.

A-Will Comply
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81	2	Pg. 4-4 Draft IDCR	*Section 4.4.6, Paragraph one* - Has this been proposed to Fuji in previous meetings with them? There is a new development plan for the north section of their property.	D	D	Yes, we have provided our design and have met with Fuji Film on 3/3/16. There are benefits to Fuji Film as well by reducing the R/W impacts along SR-24

A-Will Comply
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			MARC AHLSTROM, CITY OF MESA			
82	1	Pg. 1-5 Draft IDCR	*Table 1, Ellsworth Cross Street* - There is also a 20" water line in Ellsworth. Both water lines are DIP.	A	A	Will add
83	2	Pg. 4-4 Draft IDCR	*Section 4.4.4, Crismon Road Grade Separation* - This should be included in the cost of the freeway.	A	A	Portion inside ADOT R/W to be included in the ultimate SR 24 project.
			AL ZUBI, CITY OF MESA			
84	1	Pg. 4-4 Draft IDCR	*Section 4.4.4, Crismon Road Grade Separation* - Same comment on the economic impact on adjacent properties as Mountain Rd.	A	A	Portion inside ADOT R/W to be included in the ultimate SR 24 project.
85	2	Pg. 4-4 Draft IDCR	*Section 4.4.4, Paragraph one* - How will that be funded if not by the SR24 project?	A	A	It will be funded by SR-24 just not the interim project.
86	3	Pg. 4-4 Draft IDCR	*Section 4.4.6, Mountain Road Grade Separation* - Raising Mountain Rd will also have an economic impact on the other three corners/properties, by limiting access. Would ADOT take that in consideration, and not just discuss the impact with just Fuji, but the other property owners?	A	A	A statement will be added to the document about ADOT R/W acquisition process and Final Design.
87	4	Pg. 4-4 Draft IDCR	*Section 4.4.6, Paragraph one* – Remove reference to 2011 DCR as the nature of the grade separation changed *(Parsons interpretation of the highlighted text)*	A	A	It will be removed.

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			CHAUN HILL, MARICOPA ASSOCIATION OF GOVERNMENTS			
88	1	General, Draft IDCR	Please correct references to read "SR-24"	A	A	Will update
89	2	Pg. 1-1 Draft IDCR	*Executive Summary* - When referencing "Group 3" of the RTPFP, should this be "Phase 3"?	D	D	Latest RTPFP describes "Groups" rather than "Phases"
90	3	Pg. 1-1 Draft IDCR	*Section 1.3.3, Paragraph two* – "City of Mesa has requested that the new right-of-way accommodate a future multi-use path that may follow the SR-24 alignment." Is this request accommodated within the currently identified right-of-way footprint, or will additional right-of way be necessary?	A	A	The proposed R/W accommodates the trail.
91	4	Pg. 3-1 Draft IDCR	*Section 3.3, Paragraph one* – "Connectivity of Mountain Road between Williams Field Road and Pecos Road must not be removed in the interim alternatives." This again brings up the concern of interim and ultimate access. If interim access is provided at Mountain Road, does this provide the expectation that access will be provided in the ultimate condition? Is this the intent of the ultimate project?	A	A	Will clarify, Mountain Road is only a Grade Separated Crossing; it is not an interchange and will not have direct access to SR-24. Intent was to not cut off Mountain road with SR 24 (ie a grade separation is needed)
			QUINN CASTRO, MARICOPA ASSOCIATION OF GOVERNMENTS			
92	5	Pg. 5-1 Draft IDCR	*Section 5.0,* – Present this section as the total corridor costs only, with a breakout of a combined segment 1 and 2 together (all within Maricopa County) and only one separate segment from Meridian to Ironwood (because it's within Pinal County). This seems to continuously provide data that leads the reader to believe this is a multiple choice project. The distinction (if really relevant) between the counties truly only represents the difference in funding sources. It's good to have the segment data BUT, this document should clearly show a continuous recommended interim roadway from Ellsworth to Ironwood. This estimate should align with the Interim Phase 2 Ellsworth Road to Ironwood Road implementation plan on page 6-1.	A	A	The reason for the breakout into 3 segments was if the project was only constructed to Signal Butte (based on funding) then the costs are broken out. If funding allows project to be constructed to Ironwood, then the Signal Butte to Meridian Road estimate was the remaining portion within Maricopa County. We can combine the estimates.
93	6	Pg. 6-1 Draft IDCR	*Section 6.2,* – The last paragraph needs to be revised to reflect the changes above related to the estimate.	A	A	It will be revised.
			CHUCK CHRISTIANSEN, PREMIER ENGINEERING CORP FOR PHX-MESA GATEWAY AIRPORT			
94	1	General	The PMGAA led Ellsworth Channel Relocation project recently completed a coordinated effort to obtain existing condition (without future SR-24 extension) hydrology and future condition (with future SR-24 extension) hydrology models. The results show an increase of approximately 1200 cfs in the Powerline Floodway in the future conditions model with the future SR-24 extension constructed. The increased flows affect the channel relocation. Please provide a coordinated solution to the increase with project stakeholders and/or mitigate the increase.	C	D	The interim condition will collect flows only to Ironwood Road. However, the peak flow will be in excess of the 1,200 cfs. Attenuation can not happen without an additional detention basin. The original DCR regulated the outflow to the Powerline Floodway to 1,650 cfs. The current project follows the same conditions.

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			LANCE WEBB, CITY OF MESA			
95	1	App. E - Draft Initial Drain. Report	For the offsite channel options, Parsons has only provided adequate freeboard for the Powerline Floodway for the dirt lined, not concrete lined. The concrete lined channel will require a greater freeboard since the hydraulics of the channel at this location is supercritical and 1-ft of freeboard is not adequate. This alternative needs to be modified to meet hydraulics requirements for channel design.	B	A	Powerline Floodway widening was not tabulated in Appendix E of the Draft Initial Drainage Report, but only the SR-24 offsite channel. Powerline Floodway was not included in the Draft document because the cross section and profile are being assessed and coordinated with the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 submittal. The analysis will be included with the Initial Drainage Report.
96	2	App. F - Draft Initial Drain. Report	Should the concrete lined option be pursued, more volume will be required to attenuate flows within the outfall basin prior to passing under the existing (already constructed)crossing under the SR 24	B	A	That is correct The concrete lined option is the most likely to be pursued for the channel. Hence, the additional detention volume was evaluated, a new location for the extra volume was identified and a practical diversion solution is being devised.
97	3	App. D - Draft Initial Drain. Report	(PARSONS Note - Repeat of Comment 93/1 by Chuck Christiansen): The PMGAA project for the relocation of the Ellsworth Channel project has been coordinating with ADOT as far as the flows to expect. The results from this report for the future conditions (with future SR-24 extension) show an increase of ~1200 CFS in the Powerline Floodway for future conditions with future SR -24 extension constructed. The increased flows for the model affect how the channel can and will be relocated. Please provide a coordinated solution to mitigate this increase in flows by likely upsizing the outfall basin to accommodate this additional flow	C	D	The interim condition will collect flows only to Ironwood Road. However, the peak flow will be in excess of the 1,200 cfs. Attenuation can not happen without an additional detention basin. The original DCR regulated the outflow to the Powerline Floodway to 1,650 cfs. The current project follows the same conditions.

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			GLENN GAELICK, ADOT ROADWAY DESIGN SUPPORT			
98	1	G-2.06	Why is there 17.5 outside lane widths here vs 17' on previous crossroads?	B	D	This was from the Original DCR, no change was made to the section widths.
99	2	G-2.07	Please clarify the need for 18.5' outside lane width vs previous 17' dimension for same on other crossroads.	B	D	This was from the Original DCR, no change was made to the section widths.
100	3	C-1.01	1) Tangent Length for Curve Ref No. 800 seems excessive. Please check. 2) POT's 49 & 50 for Exst Ellsworth Cst CL do not show up on Geometric layout sheets although they seem to be called out as Pt. No's 20899 & 20909. Please clarify. 3) L & T shown for curve Ref No. 813 do not substantiate data shown on Geo Layout sheet C-2.01. Please check.	A A A	A A A	1) Will Revise to 1396.32' 2) Will revise Point numbers to match the layout sheets. 3) Will revise the Geo layout sheets
101	4	C-1.03	POT 2094 (Signal Butte) seems to be shown as 20943 of Sht C-2.06. Please clarify.	A	A	Number should be 20943
102	5	C-2.03	Suggest value in showing SR24 Med. Cst CL Sta where Section 27's south section line crosses.	A	A	Will Add

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

103	6	C-3.01	1) Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Ellsworth. 2) Suggest some investigation as to feasibility of either false work or soffit fill for construction of the SR24 overpass structure. Downside of soffit fill could be differential settlement of the exst. PCCP. False work construction would need to be accommodated in proposed clearance over Ellsworth. 3) Proximity of proposed retaining wall adjacent to Ellsworth Ramp D Lt could pose construction problems. Please investigate.	C B B	A D D	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We are showing the “Full Access Control” limits in the plans per ADOT R/W request. Ellsworth Rd will require a variance at the NE Quadrant, based on approved Development Plat Plans for Cadence Parkway. 2) Soffit Fill will probably not be feasible here because the interim interchange will need to remain open. False work should work, but will confirm clearances 3) Retaining wall is approx 15’ at its closest point.
104	7	C-3.05	Based on plans data there may be an excessive grade difference across the gore nose at Ellsworth Ramp D. Please check.	B	A	Profile to be revised.
105	8	C-3.07	Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Williams Field.	B	A	Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A
106	9	C-3.09 & C-03.10	Beginning profile grade seems to be missing for Ramps A & B.	A	A	Will add
107	10	C-3.11	Ramp terminus station seems to be at odds with callouts on Sht C-3.13. Please check.	A	A	Will revise

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

108	11	C-3.13	Would there be value in extending access control north and south of Crismon per RDG due to the likelihood that the approach embankments would limit access anyway?	B/C	A	Will show access control
109	12	C-3.19	1) Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Signal Butte. 2) Based on plans data there may be an excessive grade difference across the gore nose at Signal Butte Ramp C. Please check.	C B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A 2) Profile to be revised.
110	13	C-3.23	Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Mountain to encompass embankment prism and to limit access to points far enough away from the crest VC to provide reasonable decision sight distance.	B/C	A	Will show access control
111	14	C-3.24	Mainline VC data is obscured on Rt end.	A	A	Will revise
112	15	C-3.27	1) Recommend extending access ctrl to comply with ADOT RDG Fig 506A on both ends of Meridian. 2) Do proposed clearances over Meridian provided by mainline profile accommodate false work construction for the SR24 overpass structure?	C B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A. 2) Will confirm
113	16	C-3.31	Graphic location of Ironwood Ramp B Gore is at odds with Gore Ctrl Point callout. Please check.	A	A	Will update the plan call out.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

114	17	C-4.07	1) Recommend extending access ctrl to comply with ADOT RDG Fig 506A. 2) Do proposed clearances over Ironwood provided by mainline profile accommodate false work construction for the SR24 overpass structure?	A B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A. 2) Will revise.
115	18	General	Juxtaposition of interim ramps and mainline with future mainline and/or crossroad structures raises questions about construction compatibility. Cross sections would be of value in determining any serious conflicts.	B/C	D	The interim design will allow for the future ultimate construction to be compatible.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

ARIZONA DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING GROUP
MD 615E

DESIGN REVIEW COMMENTS

SUBMITTAL:	**08-22-16 SR 24 Ellsworth Rd-Ironwood Rd Final Draft DCR Submittal**	*PROJECT NAME:*	**H8915**
RETURN DATE:	**08-26-16**	*PROJECT NO:*	
REVIEWED BY:	**R. Glenn Gaelick**	*TRACS NO. ROUTE NO. MILE POST NO.*	
DISCIPLINE/ OFFICE:	**Roadway Design Support Section Phone No. 602-712-7039**	*DESIGNER/ CONSULTANT:*	**Parsons**
ADOT FAX NUMBER:	**602-712-3335**	*ADOT PROJECT MANAGER*	**McCally**

ACTION CODES:
A= WILL COMPLY ***B= CONSULTANT/DESIGNER TO EVALUATE**
***C= ADOT TEAM TO EVALUATE** ***D= DESIGN TEAM RECOMMENDS NO FURTHER ACTION**

**** REQUIRES A WRITTEN EXPLANATION AND FINAL DISPOSITION BY CONSULTANT/DESIGNER***

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION INIT.	DISPOSITION FINAL
		DCR		
	3-1 – 3-2 & 3-4 – 3.5	3-1 & 3-2 talk about alternatives. 3-4 & 3-5 discuss options. Suggest uniformity.	A	A
		PLANS		
	C-1.01	**Repeat from IDCR Comment -** L & T shown for curve Ref No. 813 do not substantiate data shown on Geo Layout sheet C-2.01. Please check.	A	A
	C-2.06	PC & PT Sta's shown for curve 823 are not substantiated by data on C-1.03.	A	A
	C-2.07	Curve 861 PT Value is unclear.	A	A
	C-3.03	Recommend a VC at Sta 8+00.	A	A
	C-3.08	Vertical data at lower left of sheet is muddled.	A	A
	C-3.23 & 3.27	Rt side ramp width for Meridian A is shown as 16'. This is not reflected in the typical. Please clarify.	A	A
	C-3.28	Tangent grade at Rt end of sheet is muddled.	A	A

MAG

DESIGN REVIEW COMMENTS

SUBMITTAL:	**08-22-16 SR 24 Ellsworth Rd-Ironwood Rd Final Draft DCR Submittal**	*PROJECT NAME:*	**H8915**
RETURN DATE:	**10-14-2016**	*PROJECT NO:*	
REVIEWED BY:	**Chaun Hill**	*TRACS NO. ROUTE NO. MILE POST NO.*	
DISCIPLINE/ OFFICE:	**MAG Phone No. 602-254-6300**	*DESIGNER/ CONSULTANT:*	**Parsons**
FAX NUMBER:		*ADOT PROJECT MANAGER*	**McCally**

ACTION CODES:
A= WILL COMPLY ***B= CONSULTANT/DESIGNER TO EVALUATE**
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**** REQUIRES A WRITTEN EXPLANATION AND FINAL DISPOSITION BY CONSULTANT/DESIGNER***

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION INIT.	FINAL
		DCR		
	general	Appendix A contains a full set of the Summary of Comments and there resolution as expected. The Drainage Report contains another full set of the Summary of Comments in Appendix D and there resolution NOT so expected. The Traffic Report contains a set of the Summary of Comments in Appendix E and, while they are specifically the Traffic Analysis comments they still represent some repetition.	A. Drainage report sealed separately. To provide record if/when the documents are separated the comments are included.	A
		The Traffic Report contains good mitigation measures that should be considered for implementation.	A Included a reference to the measures in section 2.0	A
		In the overall report on page 5-1 there is a sentence that says the SR-24 Ultimate Project was moved out of the RTPFP and it was actually moved to Phase V of the program which is unfunded. I recognize this is a minor distinction but should be clarified please. (An unfunded phase was added to Proposition 400 for the same reason.)	A updated text.	A

City of Mesa

DESIGN REVIEW COMMENTS

SUBMITTAL:	**08-22-16 SR 24 Ellsworth Rd-Ironwood Rd Final Draft DCR Submittal**	*PROJECT NAME:*	**H8915**
RETURN DATE:	**08-23-16**	*PROJECT NO:*	
REVIEWED BY:	**Maria Deeb**	*TRACS NO. ROUTE NO. MILE POST NO.*	
DISCIPLINE/ OFFICE:	**City of Mesa Phone No. 480-644-2845**	*DESIGNER/ CONSULTANT:*	**Parsons**
FAX NUMBER:		*ADOT PROJECT MANAGER*	**McCally**

ACTION CODES:
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**** REQUIRES A WRITTEN EXPLANATION AND FINAL DISPOSITION BY CONSULTANT/DESIGNER***

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION INIT.	FINAL
		DCR		
1	general	When discussing programming in the executive summary you reference a five-year Transportation Facilities Construction Program in FY 2016. Are you referencing a document starting the programming timeline in FY2015/2016? Or FY2016/2017? We at the City reference FY 2016/2017 as FY2017. Group 3 (2027-2025) should be consistent with how you are referencing the FY above.	A. Updated the paragraph to reflect ADOT input where program stands.	A

FHWA

DESIGN REVIEW COMMENTS

SUBMITTAL:	**SR 24 Ellsworth Rd-Ironwood Rd Phase II DCR Submittal**	*PROJECT NAME:*	**H8915 01L & 02L**
RETURN DATE:	**9/26/2016**	*PROJECT NO:*	
REVIEWED BY:	**Eunice Chan**	*TRACS NO. ROUTE NO. MILE POST NO.*	
DISCIPLINE/ OFFICE:	**FHWA** **Phone No. (602) 382-8965**	*DESIGNER/ CONSULTANT:*	**Parsons**
FAX NUMBER:		*ADOT PROJECT MANAGER*	**McCally**

ACTION CODES:
A= WILL COMPLY
***B= CONSULTANT/DESIGNER TO EVALUATE**
***C= ADOT TEAM TO EVALUATE**
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**** REQUIRES A WRITTEN EXPLANATION AND FINAL DISPOSITION BY CONSULTANT/DESIGNER***

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION		RESPONSE
			INIT.	FINAL	
		DCR			
1	Previous Comment #31	Referring to response on comment 31: Check text on bullet three- last sentence appears to be cut off.	A	A	Text has been updated.
2	Previous Comment #33	Referring to response on comment 33: Has not been updated.	A	A	Speed limit was added.
3	Previous Comment #34	Referring to response on comment 34: The second half of both paragraphs are still identical (Opt A and B). Clarify purpose of repeating this information under two separate headings on the same page?	A	A	The intent was that it was different section of the report and the description was added to each one separately. The sections ended up being on the same page.

DESIGN REVIEW COMMENTS
(CONTINUED)
ROADWAY ENGINEERING GROUP

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION		RESPONSE
			INIT.	FINAL	
4	Previous Comment #35	Referring to response “b.” on comment 35: Did not see this additional discussion in either the Table 5 or Table 6 section.	A	A	Text was added.
5	Previous Comment #38	Referring to response on comment 38: I don't think this was updated?	A	A	Text was added.
6	Previous Comment #41	Referring to response “a.” on comment 41: Include this explanation under paragraph 3.2.	A	A	Updated comment response text to section.
7	Previous Comment #42	Referring to response “a.” on comment 42: Include this explanation in the IDCR	A	A	Added comment response text to section.
8	Previous Comment #43	Referring to response “a.” on comment 43: How is this statement (highlighted) supported then? Traffic analysis section pg 3-2 clarify "event horizon"	A	A	Additional text included in DCR. Also added text to 3.3.4 Traffic analysis to discuss lanes.

ADOT

DESIGN REVIEW COMMENTS

SUBMITTAL:	**SR 24 Ellsworth Rd-Ironwood Rd Phase II DCR Submittal**	*PROJECT NAME:*	**H8915 01L & 02L**
RETURN DATE:	**9/8/2016**	*PROJECT NO:*	
REVIEWED BY:	**Tammy R. Mivshek**	*TRACS NO. ROUTE NO. MILE POST NO.*	
DISCIPLINE/ OFFICE:	**ADOT Infrastructure Delivery and Operations Division Phone No. 602-712-7220**	*DESIGNER/ CONSULTANT:*	**Parsons**
FAX NUMBER:		*ADOT PROJECT MANAGER*	**McCally**

ACTION CODES:
A= WILL COMPLY ***B= CONSULTANT/DESIGNER TO EVALUATE**
***C= ADOT TEAM TO EVALUATE** ***D= DESIGN TEAM RECOMMENDS NO FURTHER ACTION**

**** REQUIRES A WRITTEN EXPLANATION AND FINAL DISPOSITION BY CONSULTANT/DESIGNER***

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION		RESPONSE
			INIT.	FINAL	
		DCR			
1	Signing & Striping	On the signing and striping sheets, why are there “exit only” panels on the overhead signs considering the fact that all traffic must essentially exit at each TI. I don’t want traffic thinking that there is a through situation when they all have to exit along the ramps and be placed into a stop situation at the intersections	A	A	We will leave sign as shown and modify to show two down green arrows.

DESIGN REVIEW COMMENTS
(CONTINUED)
ROADWAY ENGINEERING GROUP

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION		RESPONSE
			INIT.	FINAL	
2	Signing & Striping	The required wrong way signing is not showing on the plans set. Wrong way signing must be incorporated into the project. Replace the lane assignment signs at the intersections (the only ones I saw are at Ellsworth) with the Wrong Way signing on the off ramps. This should not be depicted by a note on the plans.	A	A	We are at the DCR phase. During final design the note would come off and intersection wrong way signing would be shown. Quantities reflect the higher sign square footage, posts, and foundations.
3	Signing & Striping	The wrong way signing that is supposed to be placed on the overhead structures on the ramps is not being shown. This should not be depicted by a note on the plans.	A	A	We are at the DCR phase. During final design the note would come off and intersection wrong way signing would be shown. Quantities reflect the higher sign square footage, posts, and foundations.
4	Signing & Striping	All one way signing (R6-1) on roadways that have multiple lanes, the size of the sign shall be 54” x 18” per the MUTCD, per the plans these are shown as 36” x 12”.	A	A	Will revise
5	Signing & Striping	The exit gore ground mounted signs are not depicted correctly per ADOT standards. They should be using the E5-1c narrow exit gore signs.	A	A	Will revise
6	Signing & Striping	The W3-3 panels are placed at 1000 ft. before the intersection. Why is Table 2C-4 of the Arizona Supplement to the MUTCD or the MUTCD distances not followed regarding the placement of warning signs?	A	A	Will review and revise accordingly.
7	Signal Plan	On Dwg. No. T-3.05, why is there a need for a mast arm and pole crossing over the on-ramp in the westbound direction since SR 24 ends at Ironwood?	A	A	The callout denotes that it is for the future. Shown to denote that it will fit for the future.

DESIGN REVIEW COMMENTS
(CONTINUED)
ROADWAY ENGINEERING GROUP

ITEM NO.	DWG, SHT, PAGE NO.	COMMENT	DISPOSITION		RESPONSE
			INIT.	FINAL	
8	DCR	On Page 4-8, it states that "Interim lighting and traffic signal plans are included in Appendix C."	A	A	We will add "area" as noted.
9	DCR	It states on Page 4-9, second line Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), 2003 Version. . ., we go by the 2009 version. This needs to be updated to 2009.	A	A	We will update.

FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

APPENDIX B

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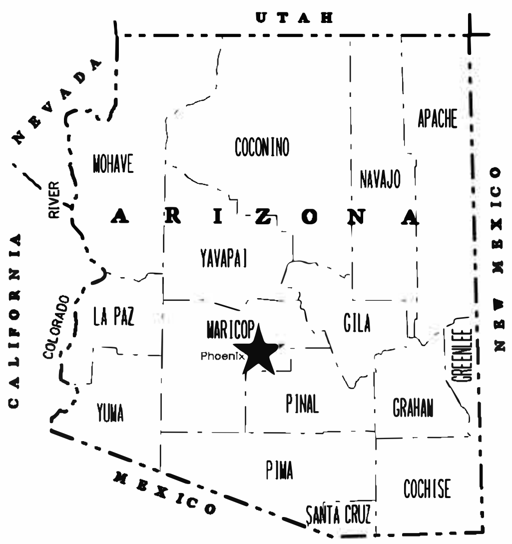


STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

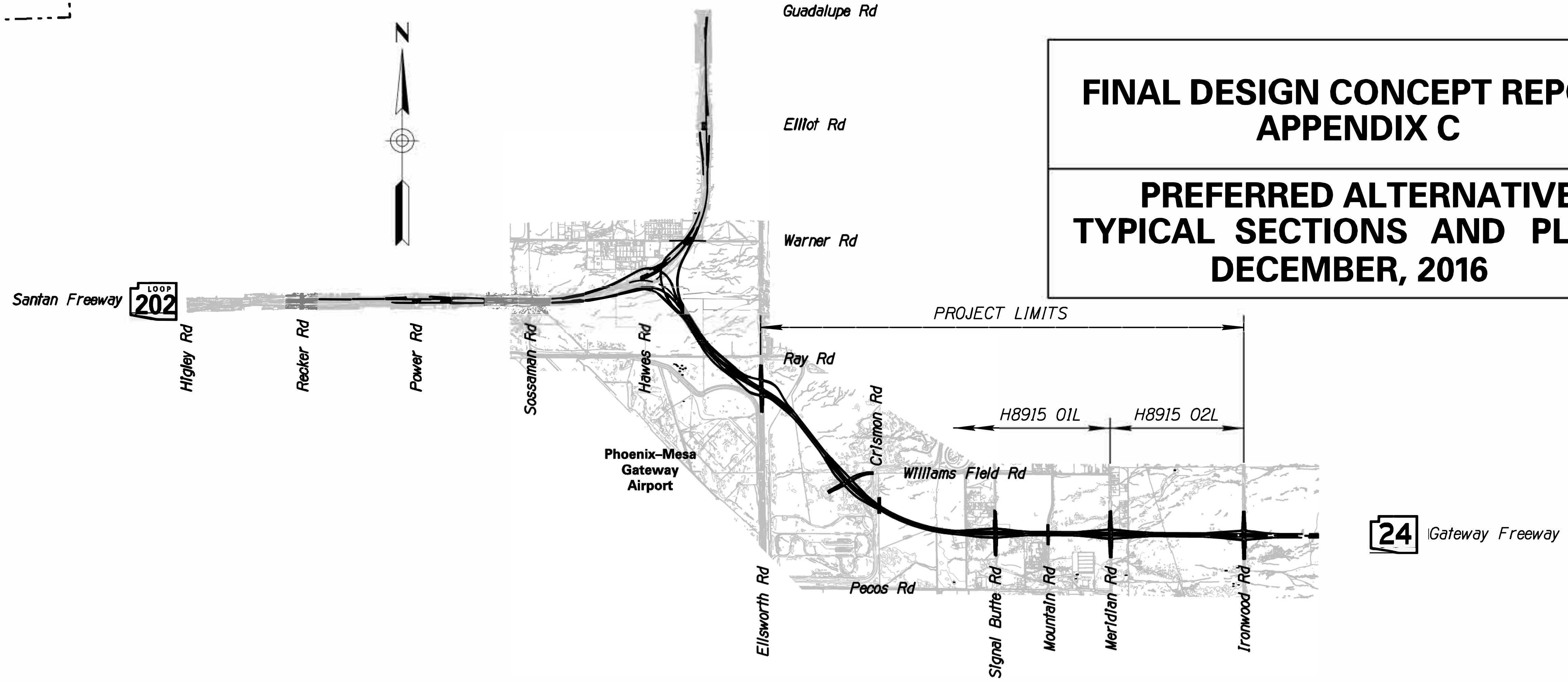
PROJECT PLANS

STATE HIGHWAY
SR 24, GATEWAY FREEWAY
024 MA 001

ADOT

FINAL DESIGN CONCEPT REPORT
APPENDIX C

PREFERRED ALTERNATIVE
TYPICAL SECTIONS AND PLANS
DECEMBER, 2016



SR 24, GATEWAY FREEWAY
INTERIM PHASE 2
ELLSWORTH ROAD TO IRONWOOD ROAD
PROJECT NO. 024 MA 001 H8915 01L/02L
CONTRACT NO. 2014-006.14

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
DALLAS HAMMIT, P.E., STATE ENGINEER

AS BUILT DATA	AS BUILT DATE	______ OF ______

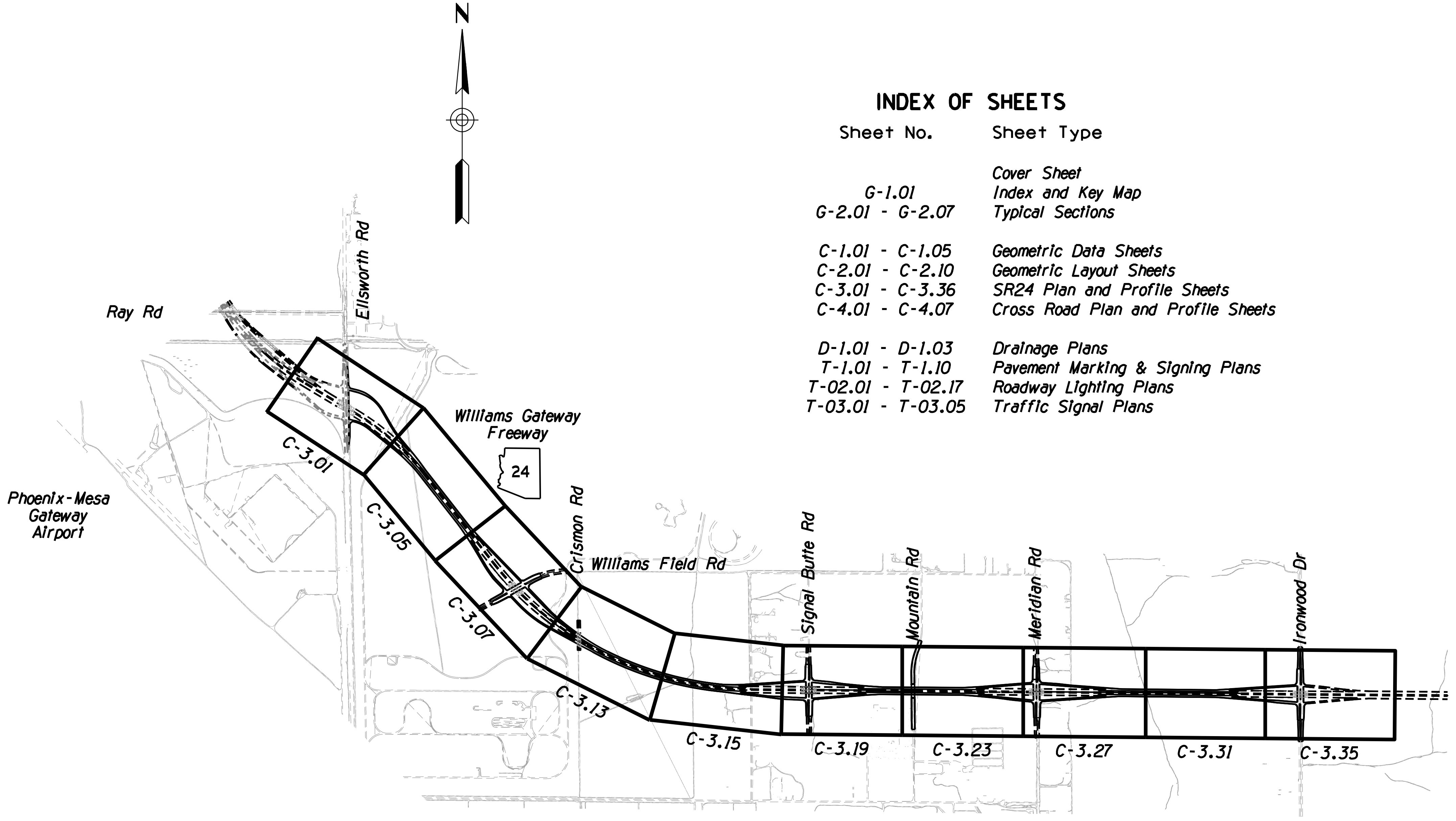
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

INDEX OF SHEETS

Sheet No.	Sheet Type
	Cover Sheet
G-1.01	*Index and Key Map*
G-2.01 - G-2.07	*Typical Sections*
C-1.01 - C-1.05	*Geometric Data Sheets*
C-2.01 - C-2.10	*Geometric Layout Sheets*
C-3.01 - C-3.36	*SR24 Plan and Profile Sheets*
C-4.01 - C-4.07	*Cross Road Plan and Profile Sheets*
D-1.01 - D-1.03	*Drainage Plans*
T-1.01 - T-1.10	*Pavement Marking & Signing Plans*
T-02.01 - T-02.17	*Roadway Lighting Plans*
T-03.01 - T-03.05	*Traffic Signal Plans*



Access Control Legend (See Roadway Plans for Location)

Right-In-Right-out Access Control only

Full Access Control

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

SR 24
SHEET INDEX AND KEY MAP

DCR

NOT FOR CONSTRUCTION OR RECORDING

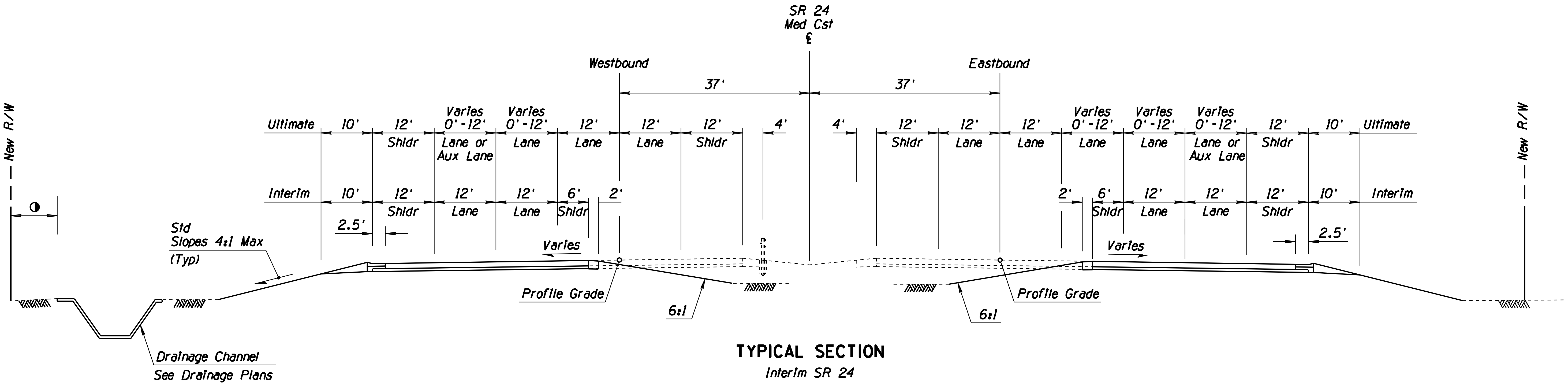
ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. G-1.01

TRACS NO. H8915 01L/02L

___ OF ___

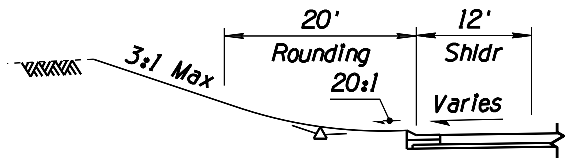
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

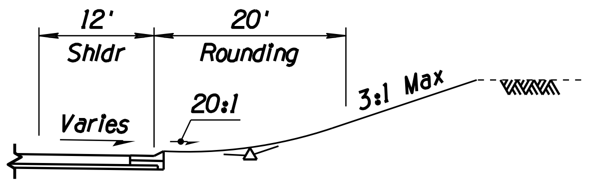
024 MA 001

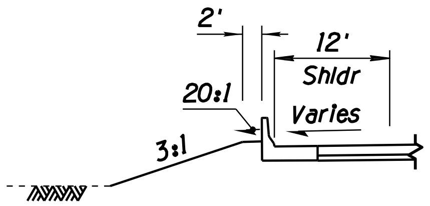


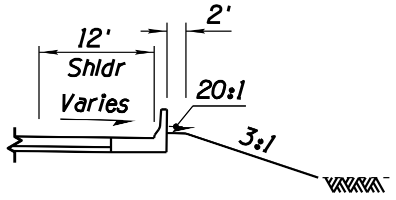
TYPICAL SECTION

Interim SR 24









◑ *Area for Future City of Mesa Shared use Pathway*

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24 MAINLINE
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 24
LOCATION: ELLSWORTH RD TO IRONWOOD DR
DWG NO. G-2.01

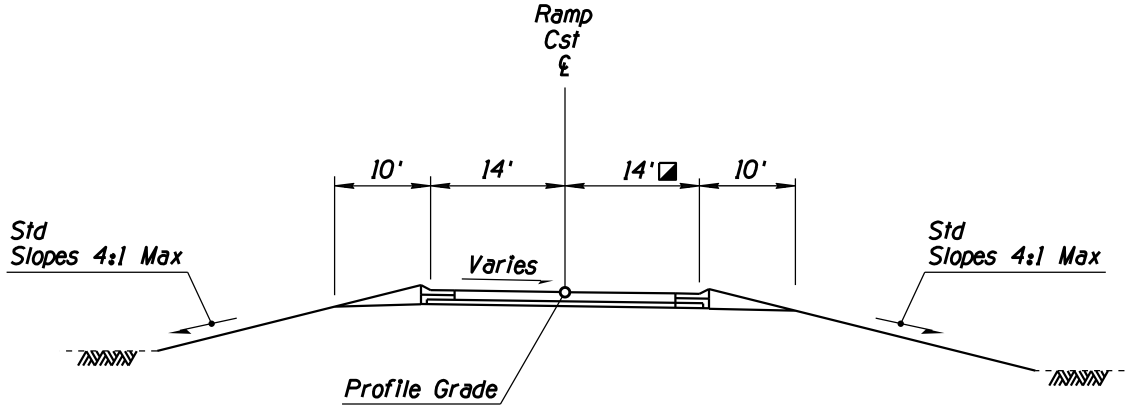
TRACS NO. H8915 01L/02L

___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.
DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



TYPICAL EMBANKMENT SECTION

2-Lane Entrance & Exit Ramp
With Direction of Travel

◪ *20' at Williams Field Ramp B*

Note: *In the interim condition, Exit Ramps will be striped as 2 lane exits. In the future ultimate condition, Exit Ramps will be re-striped as 1 lane exit ramps, except at Williams Field Ramp B and at any End of Freeway Exit Ramps.*

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SERVICE INTERCHANGE RAMPS
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. G-2.02

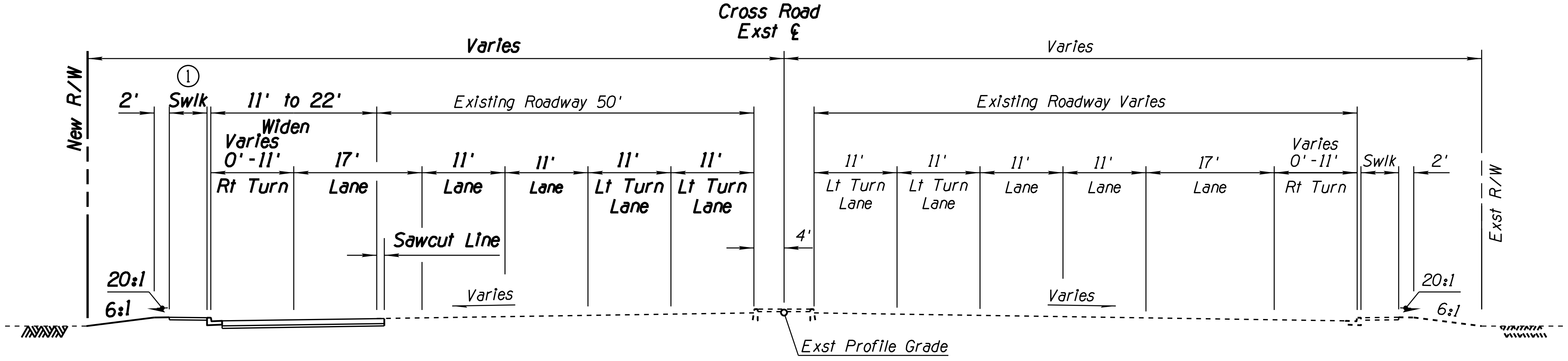
TRACS NO. H8915 01L/02L

___ OF ___

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

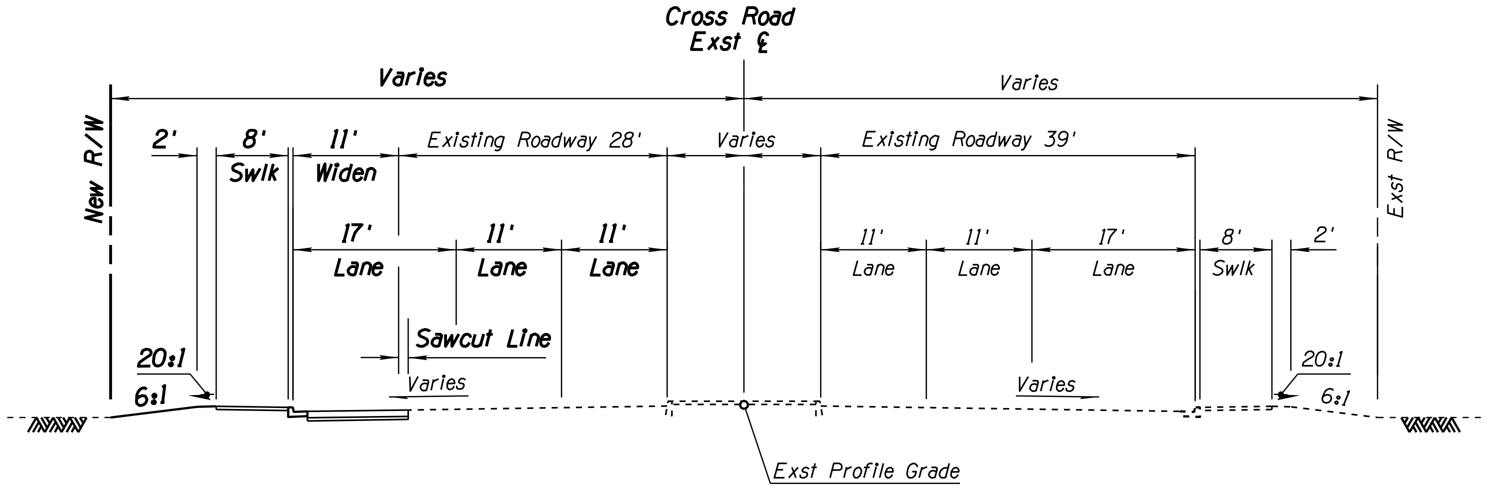


TYPICAL SECTION

At Full Diamond Traffic Interchange

Ellsworth Road

①Sidewalk Width 6' Between Ramp Intersections
Sidewalk Width 8' Outside of Ramp Intersections



TYPICAL SECTION

Away From Traffic Interchange

Ellsworth Road

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

CROSSROADS
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

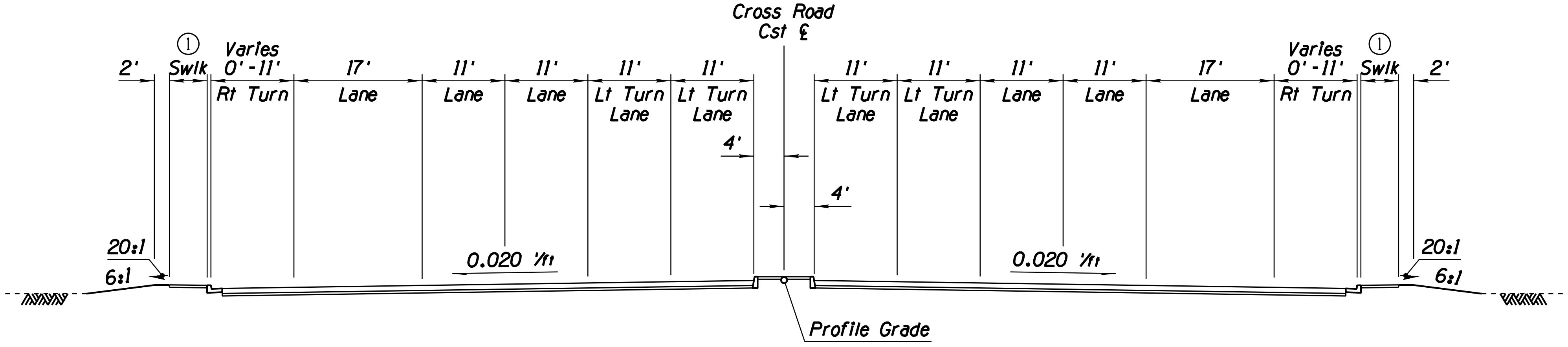
ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. G-2.03

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

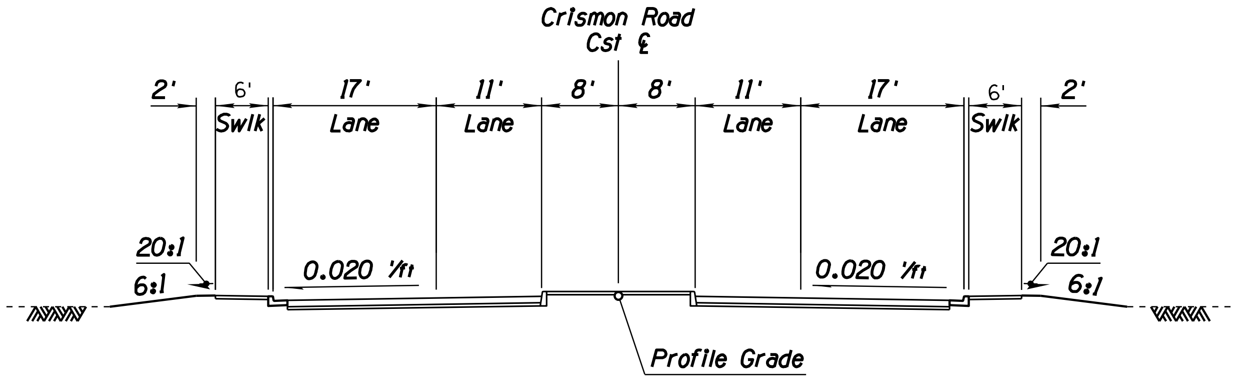


TYPICAL SECTION

At Full Diamond Traffic Interchange

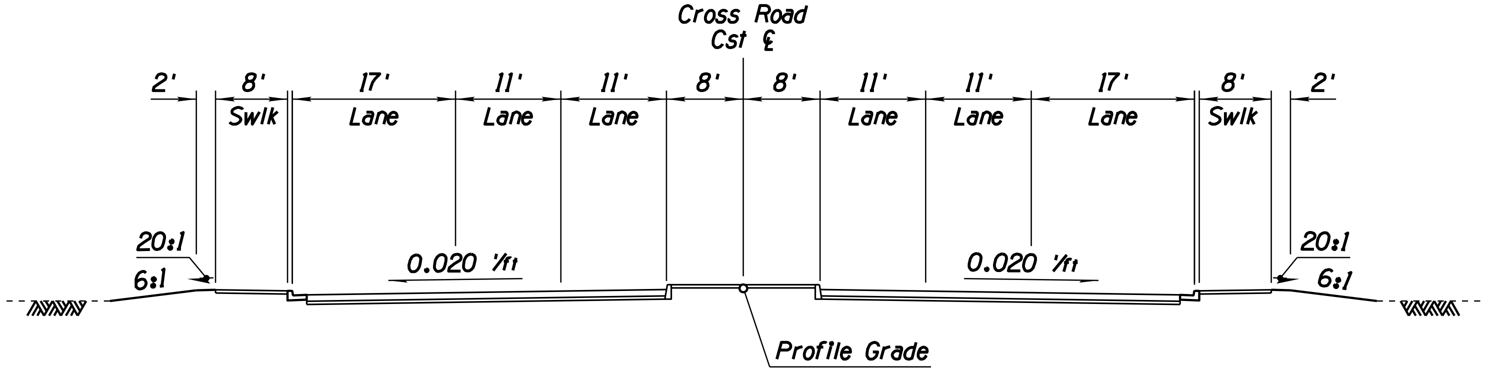
Williams Field Road

①*Sidewalk Width 5' Between Ramp Intersections*
Sidewalk Width 8' Outside of Ramp Intersections



TYPICAL SECTION

Future Crismon Road



TYPICAL SECTION

Away From Traffic Interchange
Williams Field Road

NOTE: Ultimate Striping Shown
See Pavement Marking and Signing
Plans for Interim Condition.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

CROSSROADS
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. G-2.04

TRACS NO. H8915 01L/02L

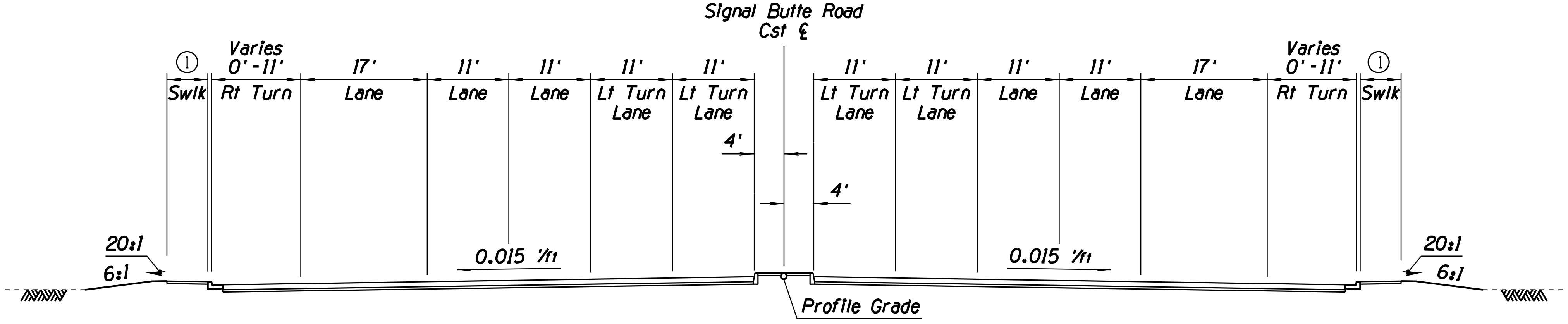
___ OF ___

SURVEY NO.- FINISHED PLANS- REVISIONS- LOCATION- DATE-

SURVEY NO.- FINISHED PLANS- REVISIONS- LOCATION- DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

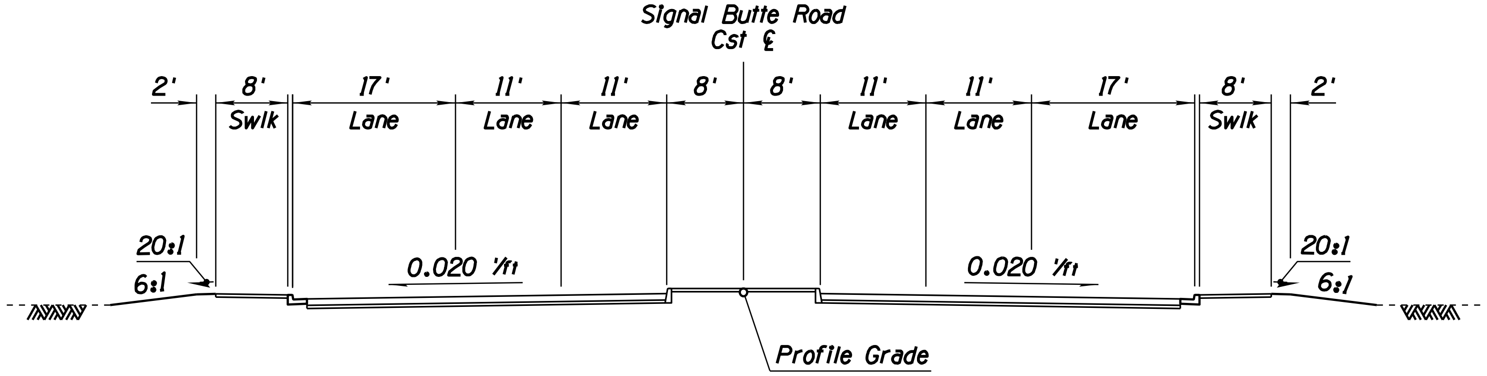


TYPICAL SECTION

At Full Diamond Traffic Interchange

Signal Butte Road

① *Sidewalk Width 6' Between Ramp Intersections*
Sidewalk Width 8' Outside of Ramp Intersections



TYPICAL SECTION

Away From Traffic Interchange

Signal Butte Road

NOTE: Ultimate Striping Shown
See Pavement Marking and Signing
Plans for Interim Condition.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

CROSSROADS
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. G-2.05

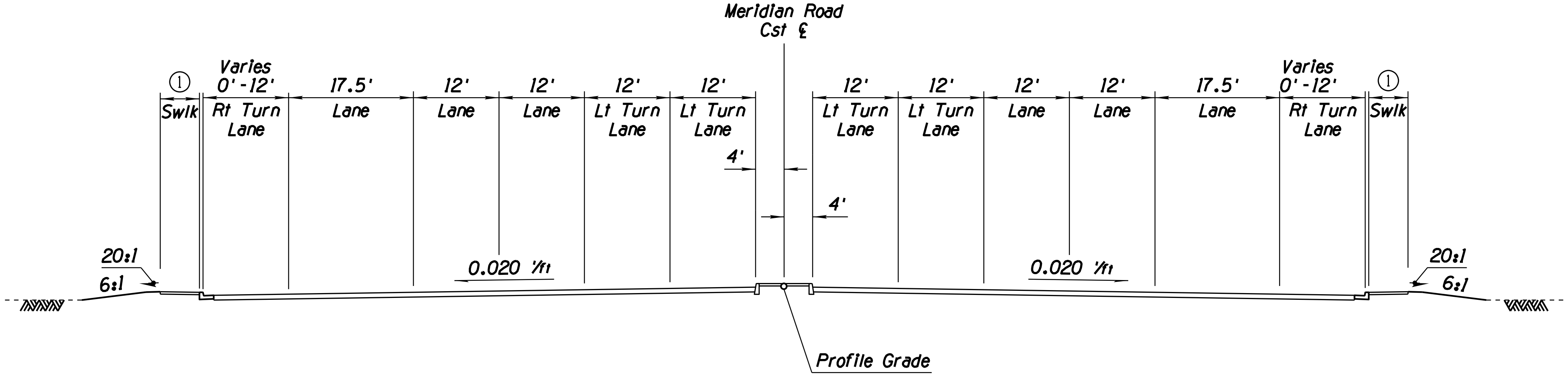
TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

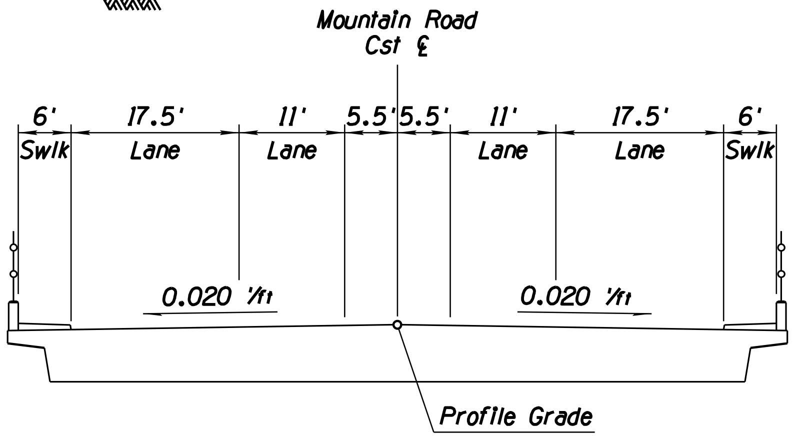


TYPICAL SECTION

At Full Diamond Traffic Interchange

Meridian Road

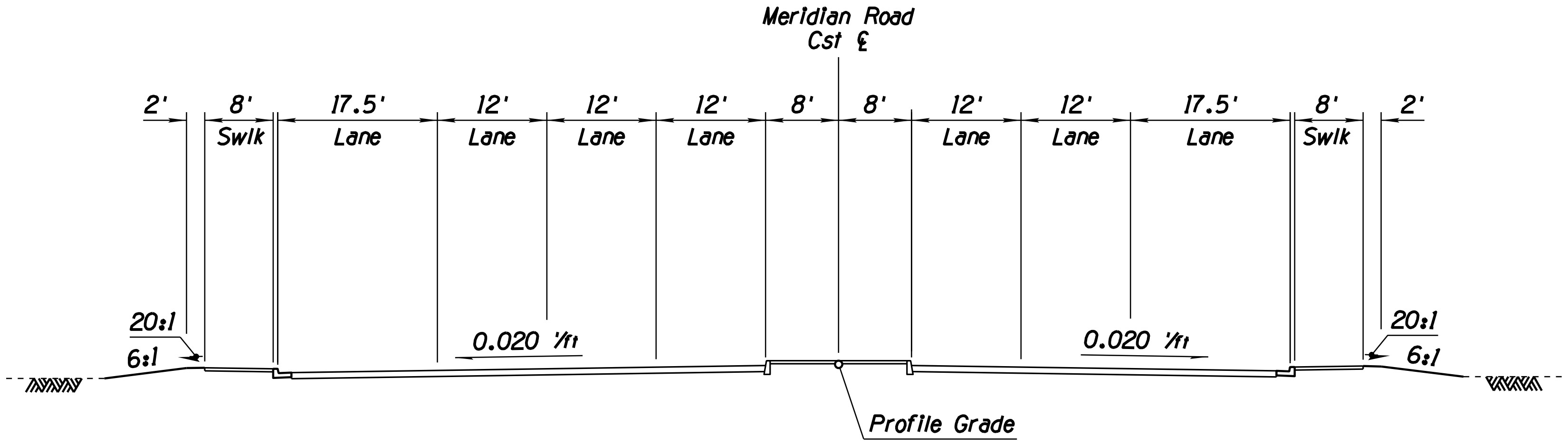
① *Sidewalk Width 6' Between Ramp Intersections*
Sidewalk Width 8' Outside of Ramp Intersections



TYPICAL SECTION

At Freeway Crossing

Mountain Road



TYPICAL SECTION

Away From Traffic Interchange

Meridian Road

NOTE: Ultimate Striping Shown
See Pavement Marking and Signing
Plans for Interim Condition.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

CROSSROADS
DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. G-2.06

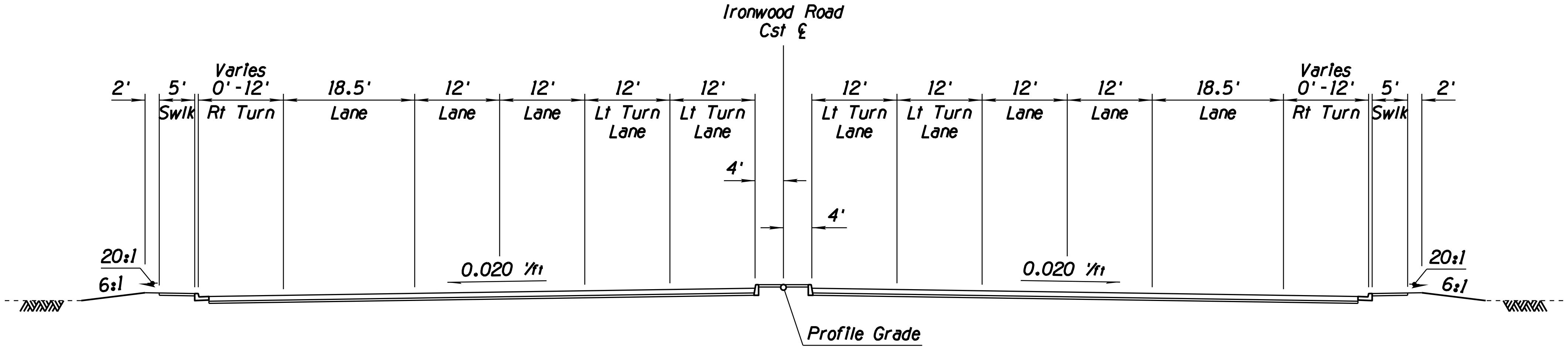
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

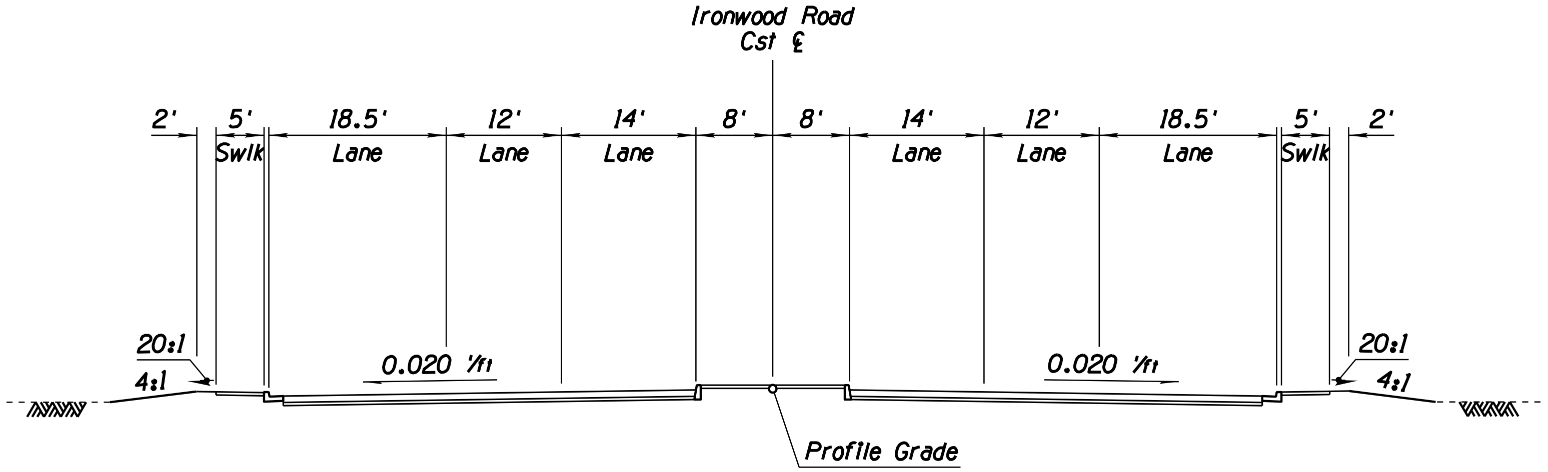
024 MA 001



TYPICAL SECTION

At Full Diamond Traffic Interchange

Ironwood Road



TYPICAL SECTION

Away From Traffic Interchange

Ironwood Road

*NOTE: Ultimate Striping Shown
See Pavement Marking and Signing
Plans for Interim Condition.*

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

DESIGN SHEET
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE: SR 24

LOCATION: ELLSWORTH RD TO IRONWOOD DR

DWG NO. G-2.07

TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
		024 MA 001			

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES		All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings								G.A.F. = 1.00016
	SR24 Med Cst ℄												
50020	POT	10+00.00	N=846791.245	E=782407.226									
800	PI	38+01.00	N=844408.657	E=783879.937	SIMPLE	Δ=27°23'33"	D=1°00'00"	R=5729.58'	T=1396.32'	L=2739.25'	Ext=167.69'	e=0.030'/ft	SEE SUPERELEVATION DIAGRAM
801	PI	75+62.62	N=842450.250	E=787153.924	SIMPLE	Δ=21°06'47"	D=1°00'00"	R=5729.58'	T=1067.77'	L=2111.32'	Ext=98.65'	e=0.030'/ft	SEE SUPERELEVATION DIAGRAM
802	PI	149+05.58	N=836644.843	E=791689.628	SIMPLE	Δ=51°30'12"	D=0°45'00"	R=7639.44'	T=3685.10'	L=6867.10'	Ext=842.36'	e=0.023'/ft	SEE SUPERELEVATION DIAGRAM
50031	POT	341+91.40	N=836473.327	E=811477.788									
	Existing Ellsworth Rd Cst ℄												
20899	POT	4+73.67	N=844651.332	E=785995.755									
50101	POT	20+00.00	N=843125.295	E=786025.412									
20909	POT	31+02.00	N=842023.502	E=786046.823									
	Existing Ellsworth Rd Ramp 'A' Cst ℄												
60100	PC	0+00.00	N=844928.799	E=783707.902									
810	PI	4+62.85	N=844576.753	E=784008.388	SIMPLE	Δ=12°40'35"	D=1°22'30"	R=4166.97'	T=462.85'	L=921.92'	Ext=25.63'	e=0.030'/ft	
811	PI	17+16.18	N=843822.987	E=785014.446	SIMPLE	Δ=22°57'17"	D=5°00'00"	R=1145.92'	T=232.67'	L=459.10'	Ext=23.38'	e=0.056'/ft	
60110	POT	27+42.33	N=843575.210	E=786016.668									
	Existing Ellsworth Rd Ramp 'B' Cst ℄												
60201	PC	0+00.00	N=844457.873	E=783964.982									
812	PI	2+77.31	N=844250.738	E=784149.364	SIMPLE	Δ=5°28'20"	D=0°59'15"	R=5802.58'	T=277.31'	L=554.20'	Ext=6.62'	e=0.030'/ft	
813	PI	21+31.64	N=842989.273	E=785509.065	SIMPLE	Δ=28°58'01"	D=6°00'00"	R=954.93'	T=246.67'	L=482.78'	Ext=31.34'	e=0.055'/ft	
60207	POT	26+58.27	N=842860.345	E=786030.561									
	Ellsworth Rd Ramp 'C' Cst ℄												
60300	POT	0+00.00	N=843575.210	E=786016.668									
814	PI	6+56.34	N=843417.687	E=786653.824	SIMPLE	Δ=46°06'04"	D=6°00'00"	R=954.93'	T=406.34'	L=768.35'	Ext=82.86'	e=0.059'/ft	SEE SUPERELEVATION DIAGRAM
815	PI	16+42.69	N=842525.206	E=787169.350	SIMPLE	Δ=9°59'12"	D=2°00'00"	R=2864.79'	T=250.30'	L=499.34'	Ext=10.91'	e=0.035'/ft	SEE SUPERELEVATION DIAGRAM
816	PI	24+01.88	N=841942.652	E=787658.153	SIMPLE	Δ=4°56'14"	D=0°59'15"	R=5802.58'	T=250.16'	L=500.00'	Ext=5.39'	e=0.030'/ft	SEE SUPERELEVATION DIAGRAM
60309	PT	26+51.72	N=841737.892	E=787801.857									
	Ellsworth Rd Ramp 'D' Cst ℄												
60400	POT	0+00.00	N=842860.345	E=786030.561									
817	PI	3+84.81	N=842767.989	E=786404.125	SIMPLE	Δ=25°07'28"	D=6°30'00"	R=881.47'	T=196.42'	L=386.53'	Ext=21.62'	e=0.060'/ft	SEE SUPERELEVATION DIAGRAM
818	PI	17+58.76	N=841899.151	E=787476.626	SIMPLE	Δ=12°59'20"	D=1°30'00"	R=3819.72'	T=434.82'	L=865.92'	Ext=24.67'	e=0.032'/ft	SEE SUPERELEVATION DIAGRAM
60406	PT	21+89.86	N=841556.506	E=787744.330									

CURVE DATA TABLE

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GEOMETRIC DATA SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-1.01

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
		024 MA 001			

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES		All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings								G.A.F. = 1.00016
	Williams Field Rd Cst ℄												
61000	PC	7+33.80	N=839352.449	E=791126.718									
820	PI	11+65.52	N=839356.323	E=790695.010	SIMPLE	Δ=29°32'53"	D=3°30'00"	R=1637.02'	T=431.73'	L=844.23'	Ext=55.97'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
50061	POT	20+00.00	N=838941.998	E=789948.593									
821	PI	35+61.58	N=838184.121	E=788583.256	SIMPLE	Δ=39°02'02"	D=3°30'00"	R=1637.02'	T=580.25'	L=1115.26'	Ext=99.79'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
61005	PT	40+96.59	N=838284.880	E=788011.825									
	Williams Field Rd Ramp 'A' Cst ℄												
61100	PC	0+00.00	N=840552.854	E=788728.979									
822	PI	3+62.36	N=840267.307	E=788952.073	SIMPLE	Δ=6°02'02"	D=0°50'00"	R=6875.49'	T=362.36'	L=724.06'	Ext=9.54'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
61110	POT	20+62.03	N=839044.887	E=790133.951									
	Williams Field Rd Ramp 'B' Cst ℄												
61201	PC	0+00.00	N=840654.668	E=788464.155									
823	PI	5+16.96	N=840247.297	E=788782.430	SIMPLE	Δ=7°23'58"	D=0°43'00"	R=7994.76'	T=516.96'	L=1032.49'	Ext=16.70'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
824	PI	16+43.71	N=839276.231	E=789356.731	SIMPLE	Δ=13°26'00"	D=3°00'00"	R=1909.86'	T=224.92'	L=447.78'	Ext=13.20'	e=0.044'/ft	SEE SUPERELEVATION DIAGRAM
61210	POT	22+41.56	N=838844.932	E=789773.726									
	Williams Field Rd Ramp 'C' Cst ℄												
61300	POT	0+00.00	N=839039.064	E=790123.459									
825	PI	16+55.45	N=837848.912	E=791274.139	SIMPLE	Δ=20°50'28"	D=1°00'00"	R=5729.58'	T=1053.70'	L=2084.12'	Ext=96.09'	e=0.027'/ft	SEE SUPERELEVATION DIAGRAM
61303	PT	26+85.87	N=837401.518	E=792228.145									
	Williams Field Rd Ramp 'D' Cst ℄												
61400	POT	0+00.00	N=838839.108	E=789763.234									
826	PI	8+18.09	N=838250.963	E=790331.874	SIMPLE	Δ=17°26'15"	D=2°00'00"	R=2864.79'	T=439.33'	L=871.88'	Ext=33.49'	e=0.035'/ft	SEE SUPERELEVATION DIAGRAM
61404	POT	24+33.79	N=837476.065	E=791757.366									
	Crismon Rd Cst ℄												
20921	POT	4+16.35	N=839350.140	E=791384.176									
50062	PI	20+00.00	N=837766.605	E=791403.477									
20930	POT	30+48.10	N=836718.583	E=791416.250									
	Signal Butte Rd Cst ℄												
20923	POT	-7+11.87	N=839312.901	E=796683.786									

CURVE DATA TABLE

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GEOMETRIC DATA SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-1.02

TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
		024 MA 001			

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES		All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings								G.A.F. = 1.00016
20931	PI	19+25.00	N=836676.256	E=796717.965									
50006	POT	20+00.00	N=836601.256	E=796718.270									
20943	POT	45+76.79	N=834024.492	E=796728.777									
	Signal Butte Rd Ramp 'A' Cst ℄												
63100	PC	0+00.00	N=836734.938	E=794578.268									
830	PI	3+43.87	N=836695.739	E=794919.894	SIMPLE	Δ=10°17'18"	D=1°30'00"	R=3819.72'	T=343.87'	L=685.89'	Ext=15.45'	e=0.032'/ft	SEE SUPERELEVATION DIAGRAM
63110	POT	21+42.15	N=836813.244	E=796716.189									
	Signal Butte Rd Ramp 'B' Cst ℄												
63201	POT	0+00.00	N=836591.755	E=794545.524									
831	PI	14+31.73	N=836425.557	E=795967.572	SIMPLE	Δ=3°53'59"	D=0°45'00"	R=7639.44'	T=260.08'	L=519.95'	Ext=4.43'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
63210	POT	21+83.34	N=836389.272	E=796718.507									
	Signal Butte Rd Ramp 'C' Cst ℄												
63300	POT	0+00.00	N=836813.244	E=796716.189									
832	PI	15+10.46	N=836661.252	E=798218.983	SIMPLE	Δ=5°16'43"	D=0°43'00"	R=7994.76'	T=368.54'	L=736.56'	Ext=8.49'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
63303	PT	18+78.48	N=836658.057	E=798587.508									
	Signal Butte Rd Ramp 'D' Cst ℄												
63400	POT	0+00.00	N=836389.258	E=796719.135									
833	PI	15+04.06	N=836515.255	E=798217.911	SIMPLE	Δ=5°18'07"	D=0°50'00"	R=6875.49'	T=318.35'	L=636.24'	Ext=7.37'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
63403	PT	18+21.95	N=836512.496	E=798536.245									
	Exst Mountain Rd Cst ℄												
63500	PC	4+61.79	N=838092.016	E=799329.444									
850	PI	7+21.40	N=837832.415	E=799331.876	SIMPLE	Δ=20°32'46"	D=4°00'00"	R=1432.39'	T=259.61'	L=513.65'	Ext=23.34'	e=0.036'/ft	SEE SUPERELEVATION DIAGRAM
851	PI	13+40.53	N=837245.418	E=799118.118	SIMPLE	Δ=20°32'36"	D=4°00'00"	R=1432.39'	T=259.61'	L=513.65'	Ext=23.34'	e=0.036'/ft	SEE SUPERELEVATION DIAGRAM
63550	POT	20+00.00	N=836580.402	E=799124.348									
63506	POT	45+72.81	N=834007.704	E=799148.451									
	Mountain Rd Cst ℄												
63510	POC	8+12.11	N=837744.794	E=799290.069									
850	PI	7+21.40	N=837832.415	E=799331.876	SIMPLE	Δ=20°32'46"	D=4°00'00"	R=1432.39'	T=259.61'	L=513.65'	Ext=23.34'	e=0.036'/ft	SEE SUPERELEVATION DIAGRAM
851	PI	13+40.53	N=837245.418	E=799118.118	SIMPLE	Δ=20°32'36"	D=4°00'00"	R=1432.39'	T=259.61'	L=513.65'	Ext=23.34'	e=0.036'/ft	SEE SUPERELEVATION DIAGRAM
63550	PI	20+00.00	N=836580.402	E=799124.348									

CURVE DATA TABLE

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GEOMETRIC DATA SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-1.03

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
		024 MA 001			

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES		All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings								G.A.F. = 1.00016
63511	POT	28+87.90	N=835692.541	E=799132.666									
	Meridian Rd Cst ℄												
20925	POT	-7+19.05	N=839274.553	E=801948.175									
22579	PI	15+61.92	N=836993.715	E=801973.312									
20932	PI	19+25.00	N=836630.662	E=801977.313									
50007	POT	20+00.00	N=836555.666	E=801978.145									
22580	PI	41+99.39	N=834356.413	E=802002.538									
	Meridian Rd Ramp 'A' Cst ℄												
64100	PC	0+00.00	N=836645.057	E=800087.452									
860	PI	3+00.49	N=836642.452	E=800387.928	SIMPLE	Δ=5°00'18"	D=0°50'00"	R=6875.49'	T=300.49'	L=600.59'	Ext=6.56'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
64110	POT	18+92.91	N=836767.653	E=801975.803									
	Meridian Rd Ramp 'B' Cst ℄												
64200	PC	0+00.00	N=836499.495	E=800036.188									
861	PI	3+46.77	N=836496.490	E=800382.949	SIMPLE	Δ=4°58'02"	D=0°43'00"	R=7994.76'	T=346.77'	L=693.11'	Ext=7.52'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
64210	POT	19+51.18	N=836343.679	E=801980.496									
	Meridian Rd Ramp 'C' Cst ℄												
64300	POT	0+00.00	N=836755.654	E=801975.935									
862	PI	19+57.07	N=836611.771	E=803927.708	SIMPLE	Δ=3°43'10"	D=0°43'00"	R=7994.76'	T=259.60'	L=519.01'	Ext=4.21'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
64303	PT	22+16.48	N=836609.521	E=804187.294									
	Meridian Rd Ramp 'D' Cst ℄												
64400	POT	0+00.00	N=836343.679	E=801980.496									
863	PI	18+51.22	N=836466.633	E=803827.630	SIMPLE	Δ=4°18'17"	D=0°50'00"	R=6875.49'	T=258.41'	L=516.58'	Ext=4.85'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
6440	PT	21+09.39	N=83464.393	E=804086.033									
	Ironwood Dr Cst ℄												
22582	POT	-11+54.59	N=839657.350	E=808065.089									
22583	PI	14+86.06	N=837016.726	E=808076.388									
65003	PI	20+00.00	N=836502.790	E=808078.587									
22584	POT	41+26.71	N=834376.102	E=808087.687									
	Ironwood Dr Ramp 'A' Cst ℄												

CURVE DATA TABLE

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GEOMETRIC DATA SHEET

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-1.04

TRACS NO. H8915 01L/02L

___ OF ___

DATE-

LOCATION-

REVISIONS-

FINISHED PLANS-

SURVEY NO.

DATE-

LOCATION-

REVISIONS-

FINISHED PLANS-

SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
		024 MA 001			

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES		All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings								G.A.F. = 1.00016
65100	PC	0+00.00	N=836594.353	E=805937.233									
870	PI	2+52.94	N=836592.161	E=806190.162	SIMPLE	Δ=4°12'49"	D=0°50'00"	R=6875.49'	T=252.94'	L=505.65'	Ext=4.65'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
65110	POT	21+44.21	N=836714.788	E=808077.680									
	Ironwood Dr Ramp 'B' Cst ℄												
65200	PC	0+00.00	N=836448.792	E=805885.969									
871	PI	2+91.51	N=836446.265	E=806177.465	SIMPLE	Δ=4°10'35"	D=0°43'00"	R=7994.76'	T=291.51'	L=582.76'	Ext=5.31'	e=0.020'/ft	SEE SUPERELEVATION DIAGRAM
65210	POT	21+99.62	N=86290.792	E=808079.494									

CURVE DATA TABLE

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

GEOMETRIC DATA SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

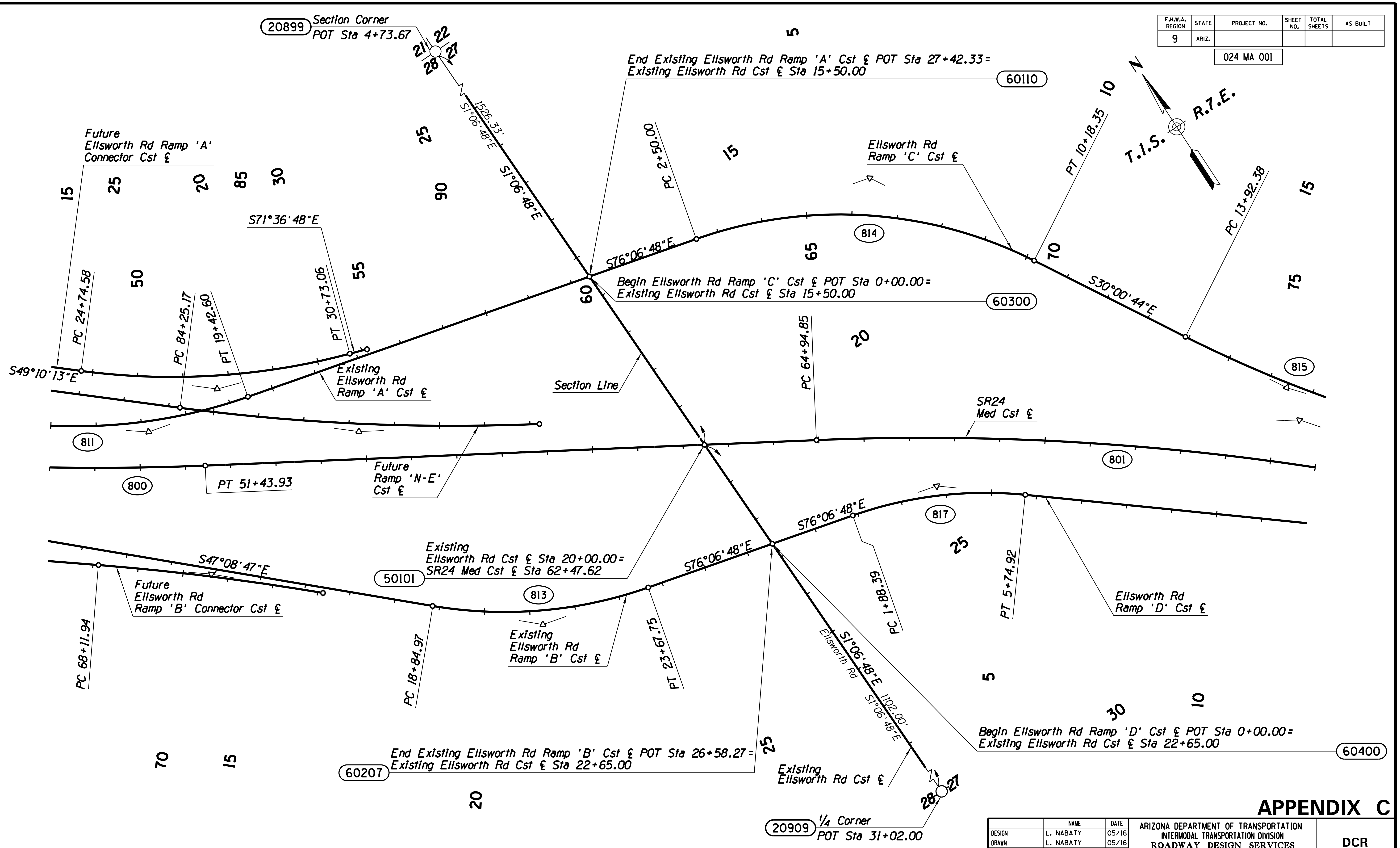
DWG NO. C-1.05

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 48+00 TO STA 76+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-2.01

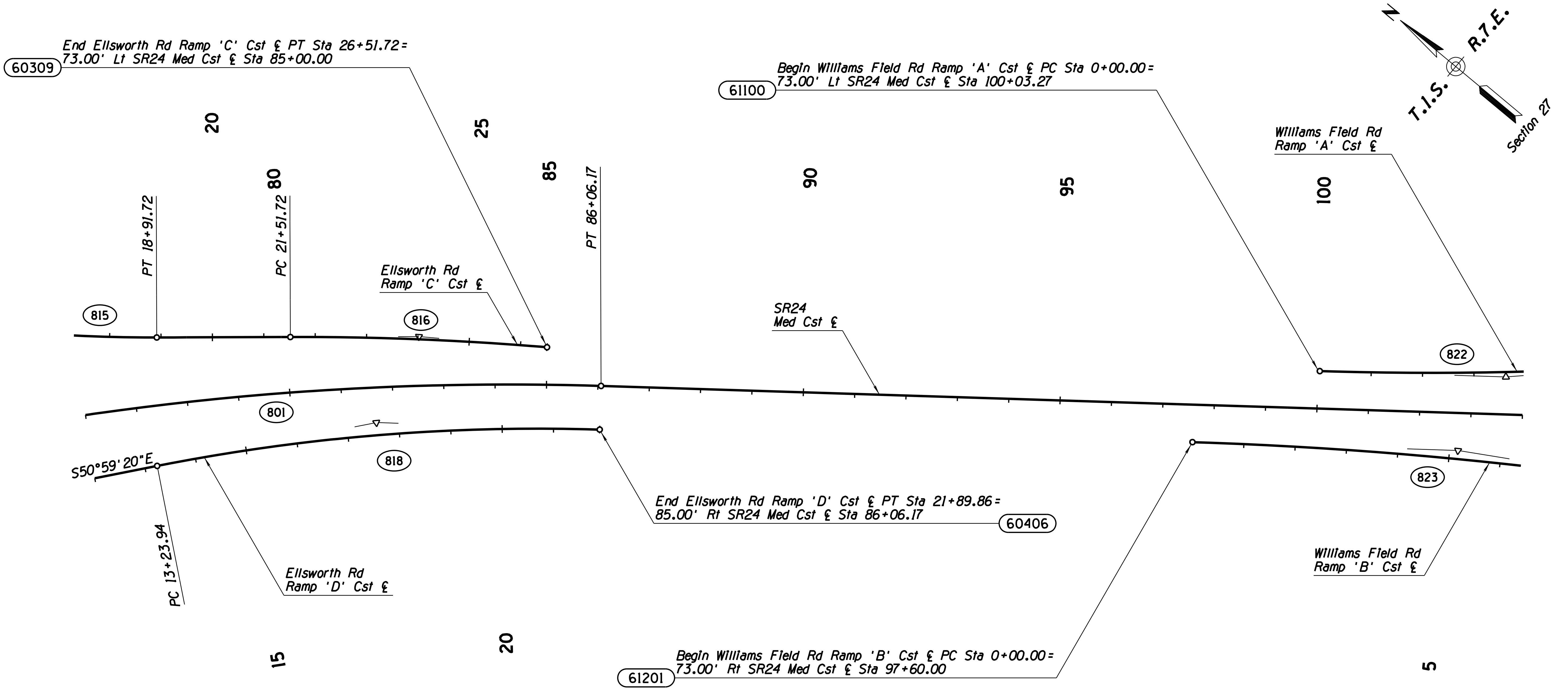
TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 76+00 TO STA 104+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-2.02

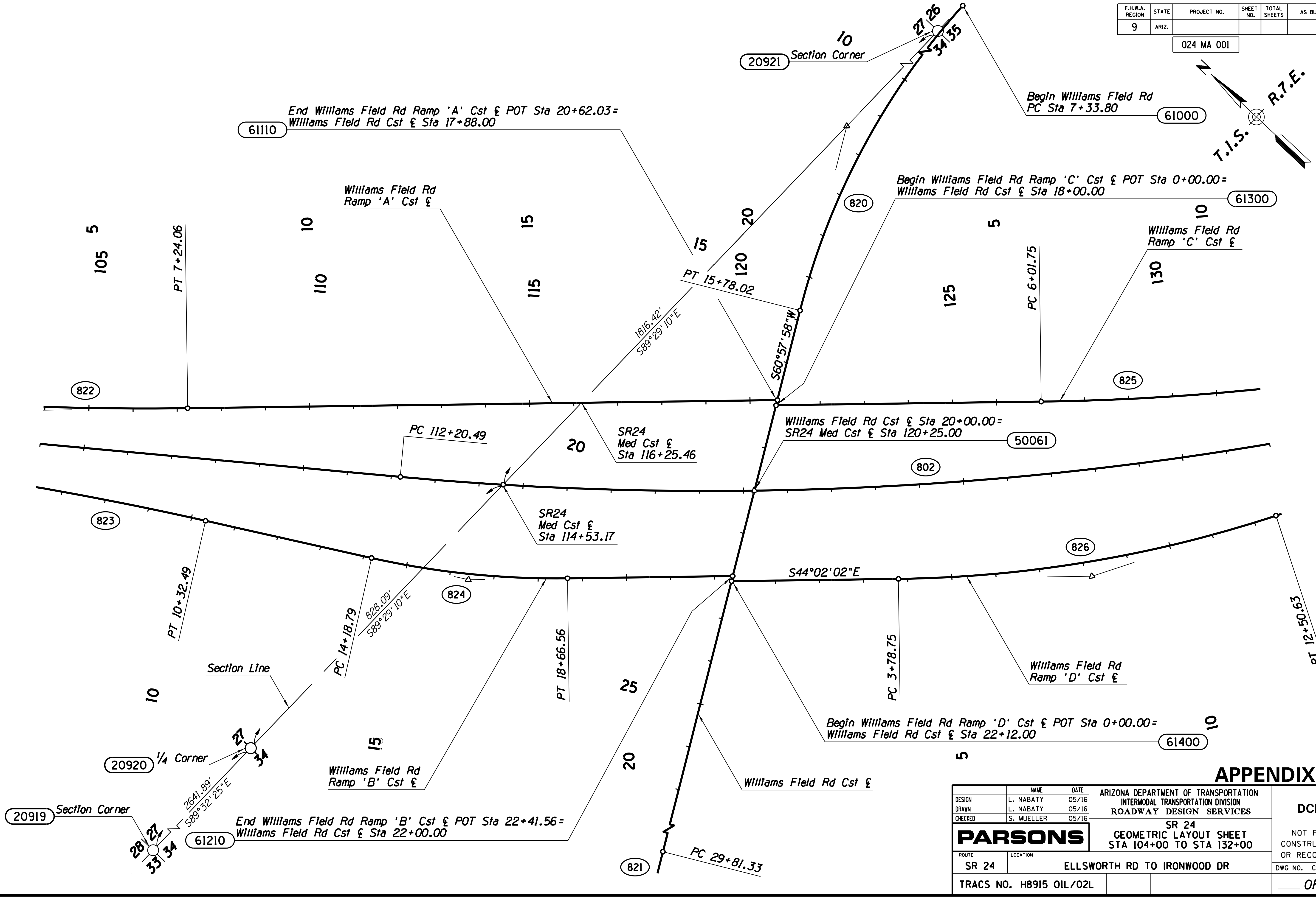
TRACS NO. H8915 01L/02L

____ OF____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 104+00 TO STA 132+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-2.03

TRACS NO. H8915 01L/02L

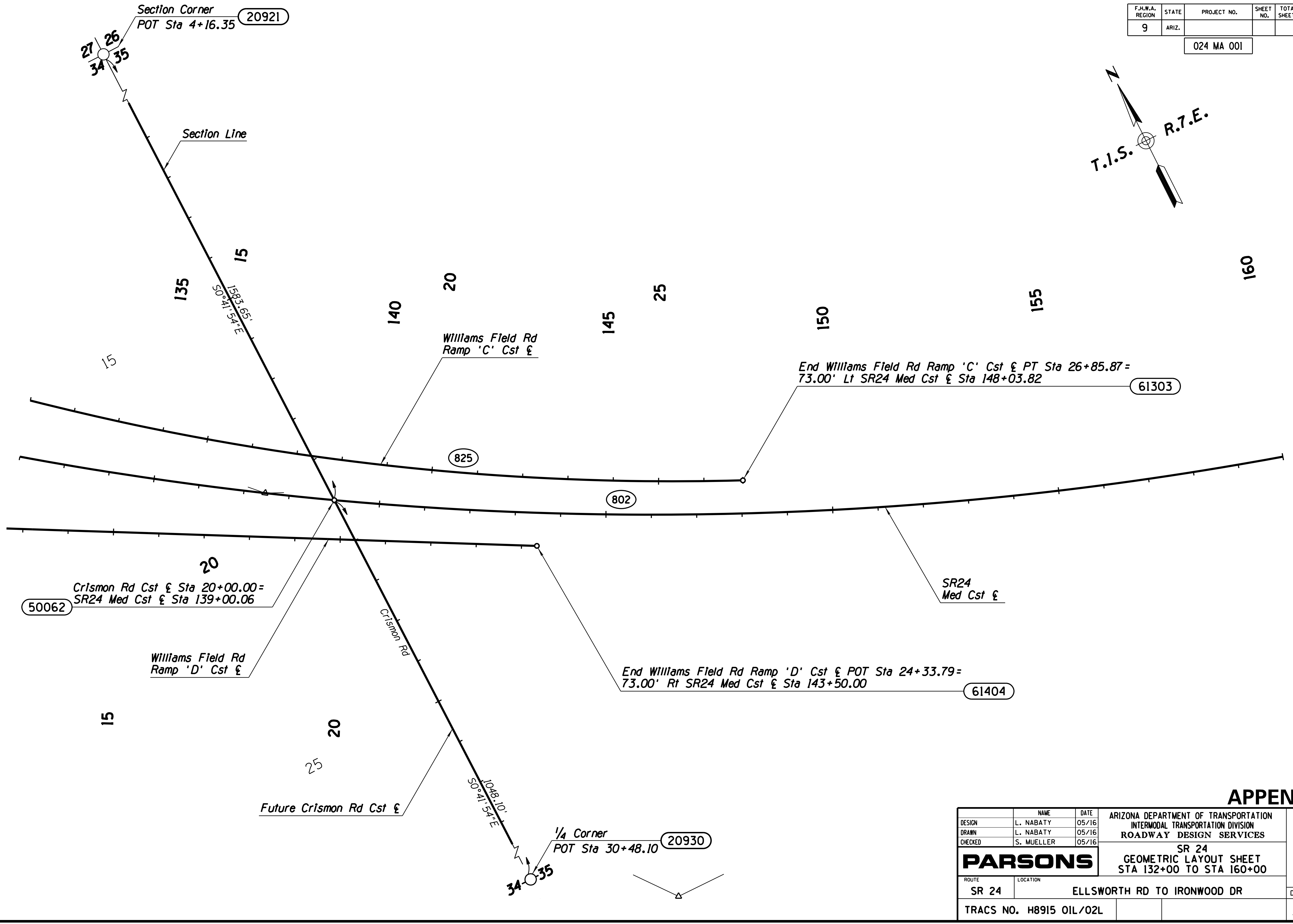
___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 132+00 TO STA 160+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-2.04

TRACS NO. H8915 01L/02L

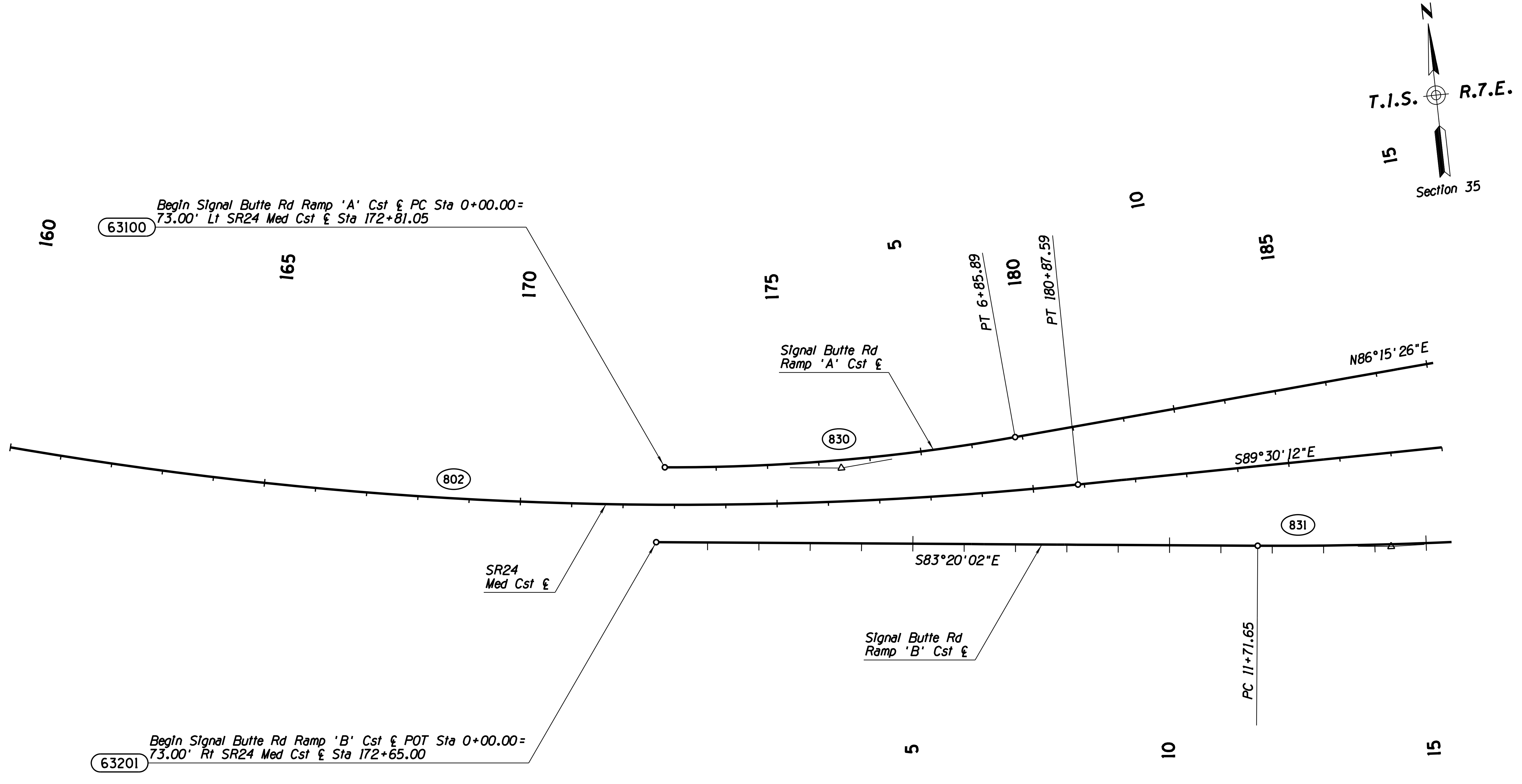
____ OF ____

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 160+00 TO STA 188+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

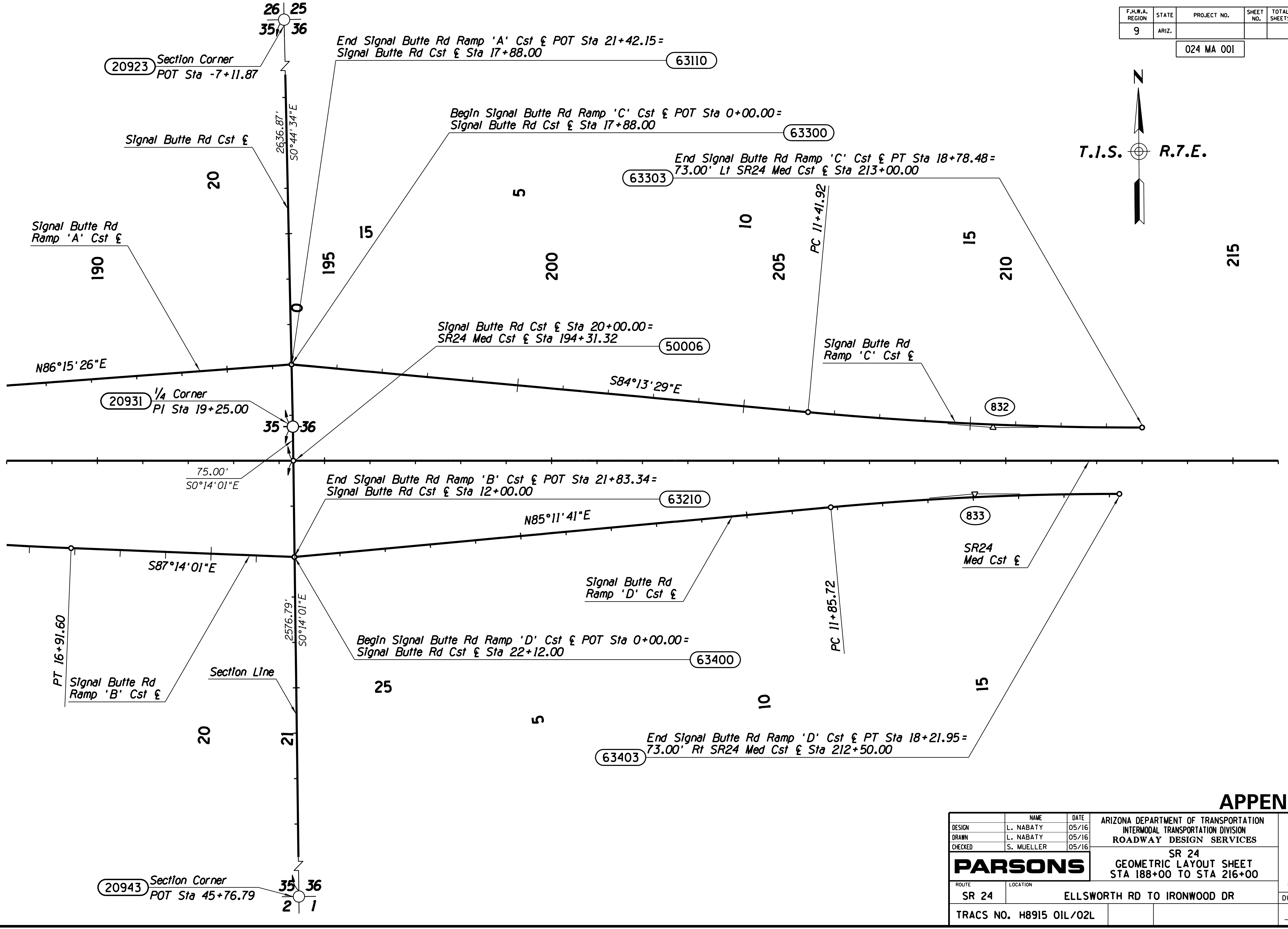
DWG NO. C-2.05

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

SR 24
GEOMETRIC LAYOUT SHEET
STA 188+00 TO STA 216+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-2.06

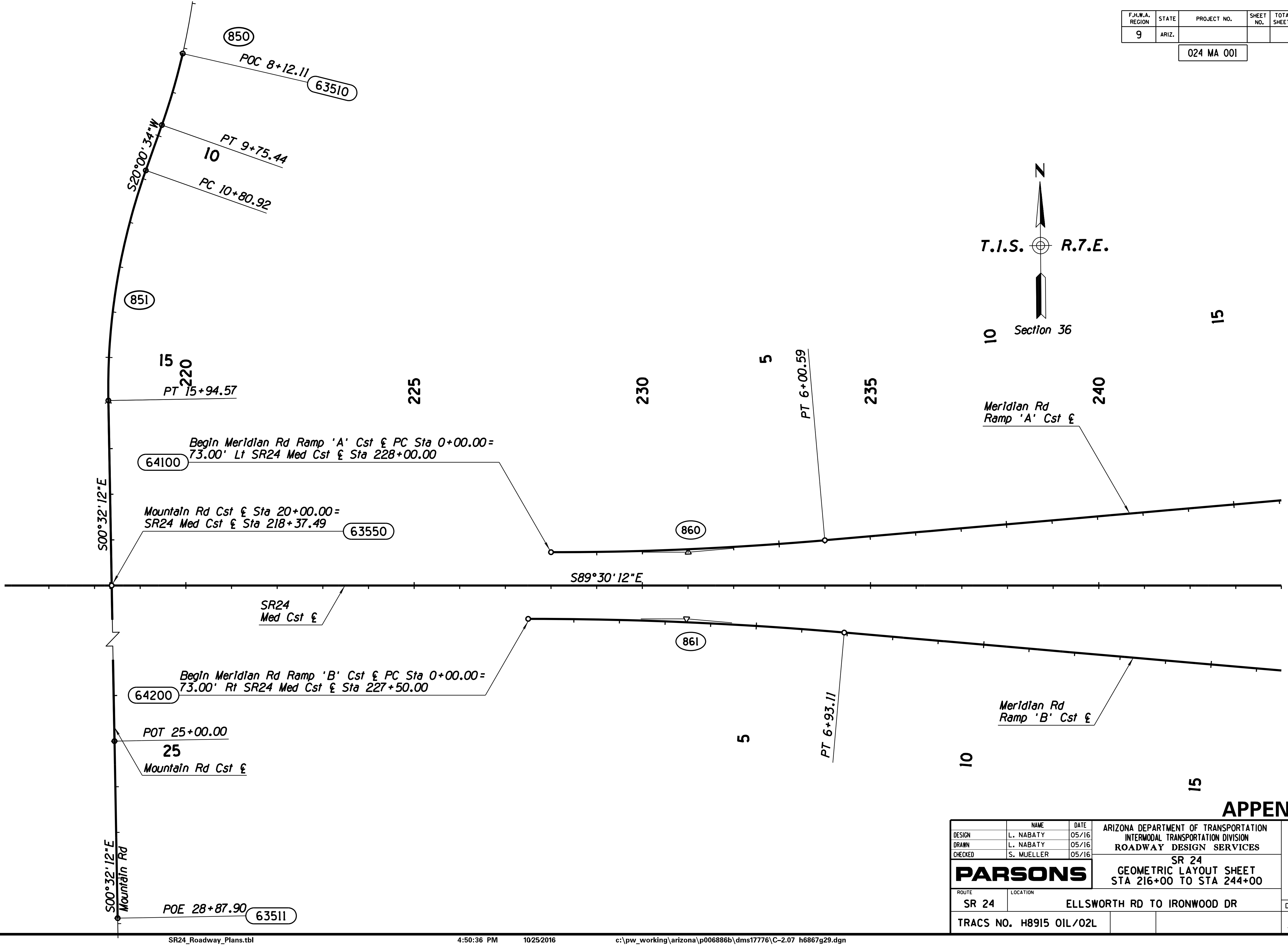
ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 216+00 TO STA 244+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-2.07

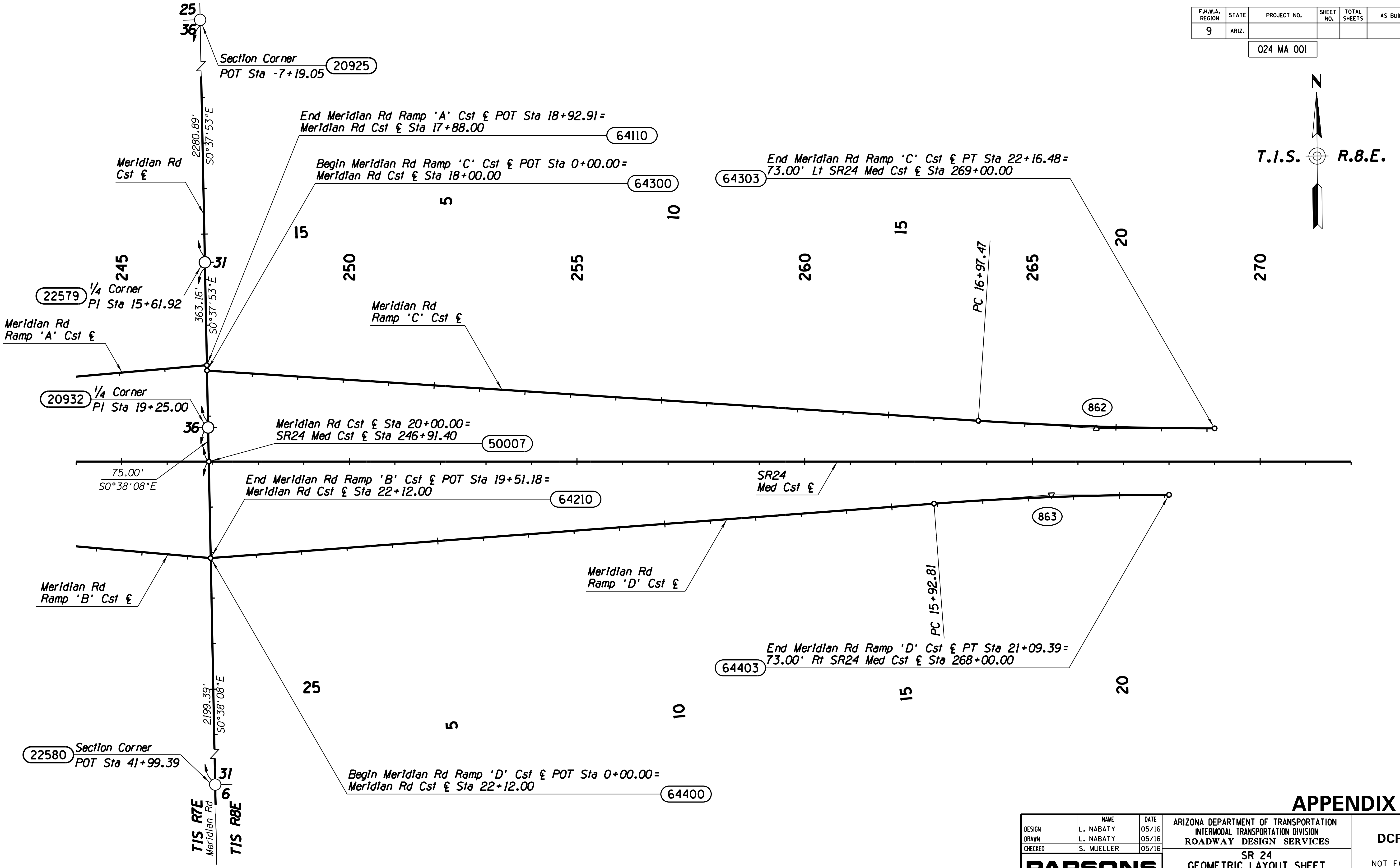
TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 244+00 TO STA 272+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-2.08

TRACS NO. H8915 01L/02L

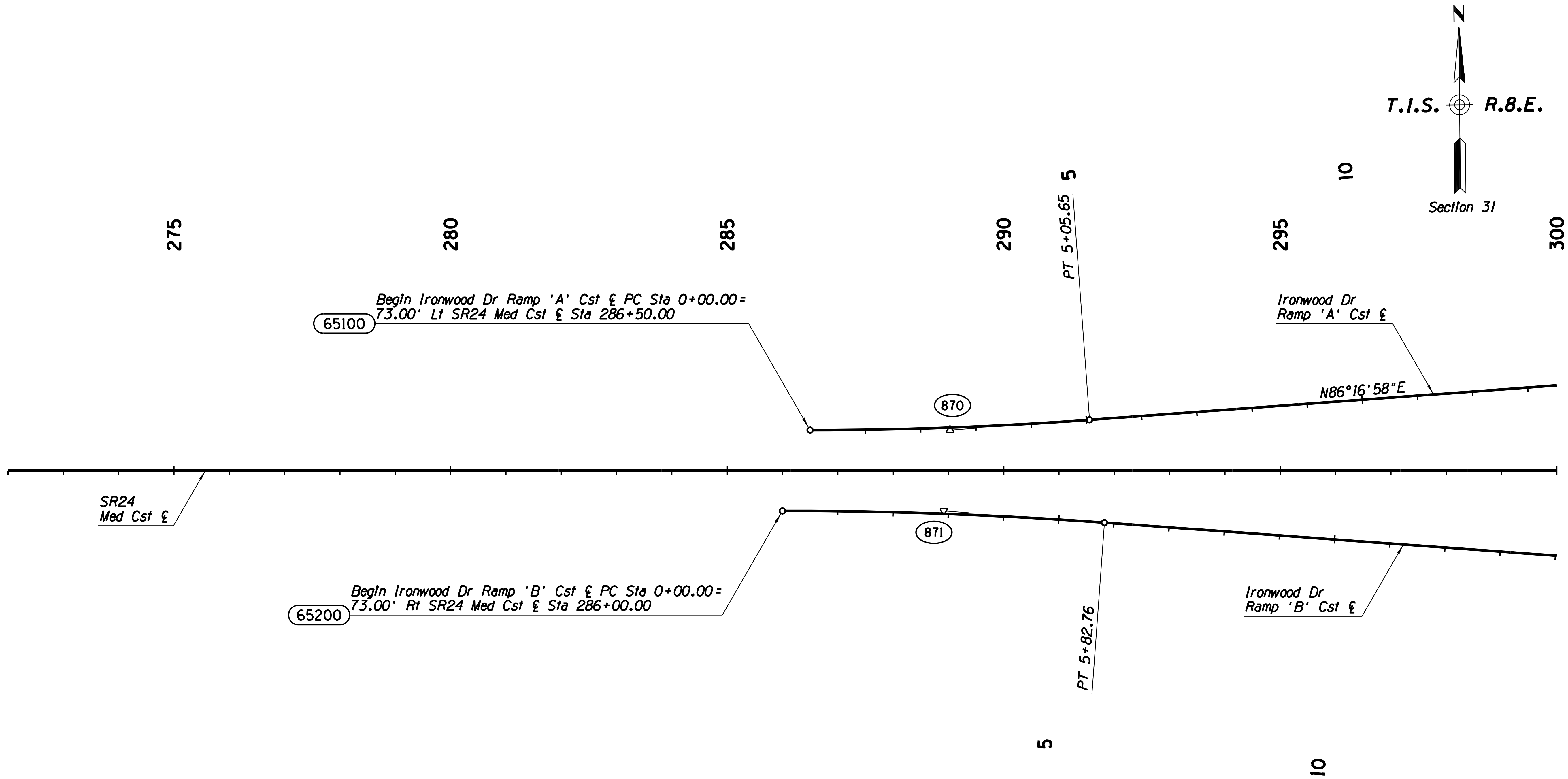
___ OF ___

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 272+00 TO STA 300+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

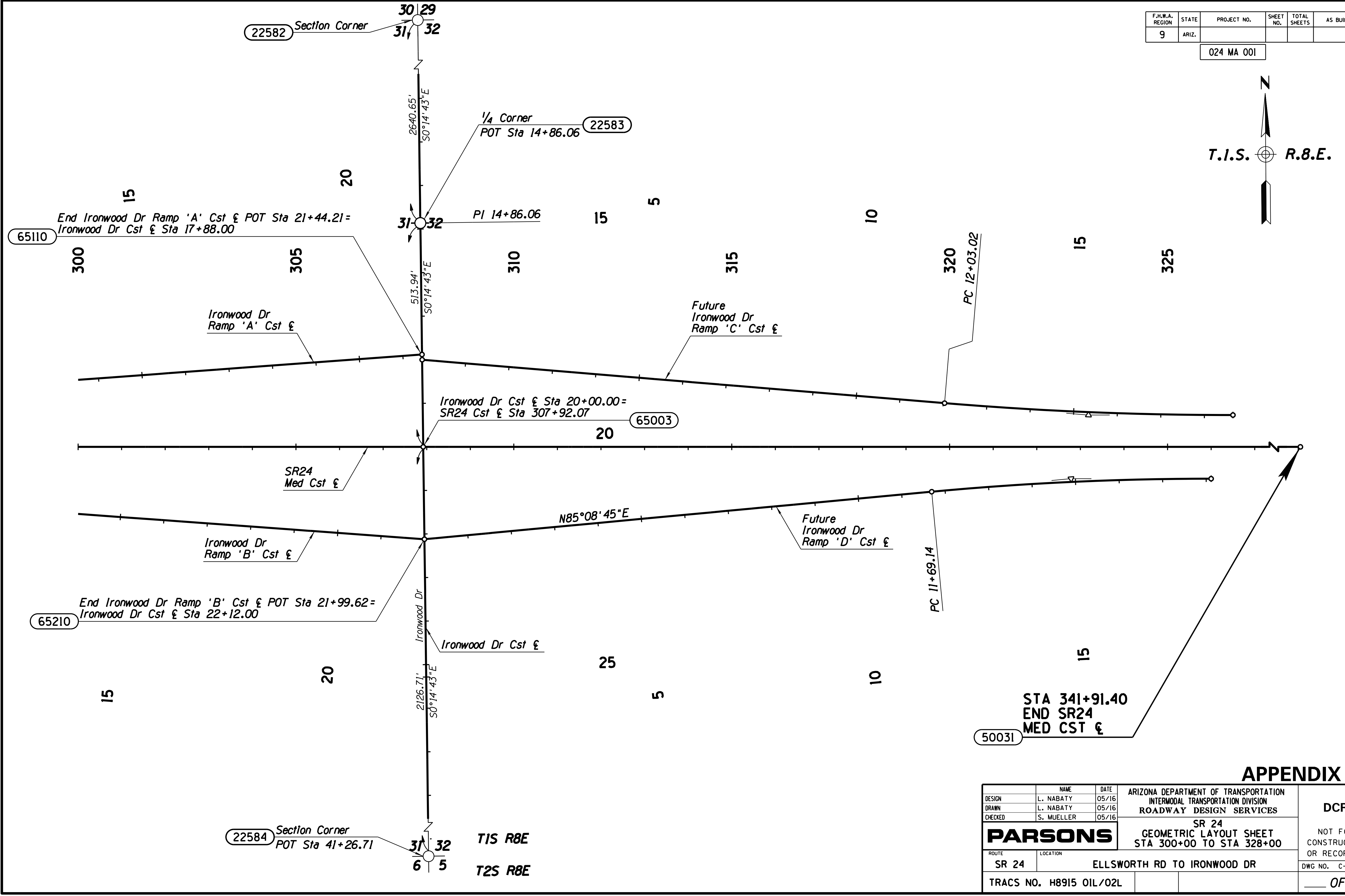
DWG NO. C-2.09

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
GEOMETRIC LAYOUT SHEET
STA 300+00 TO STA 328+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

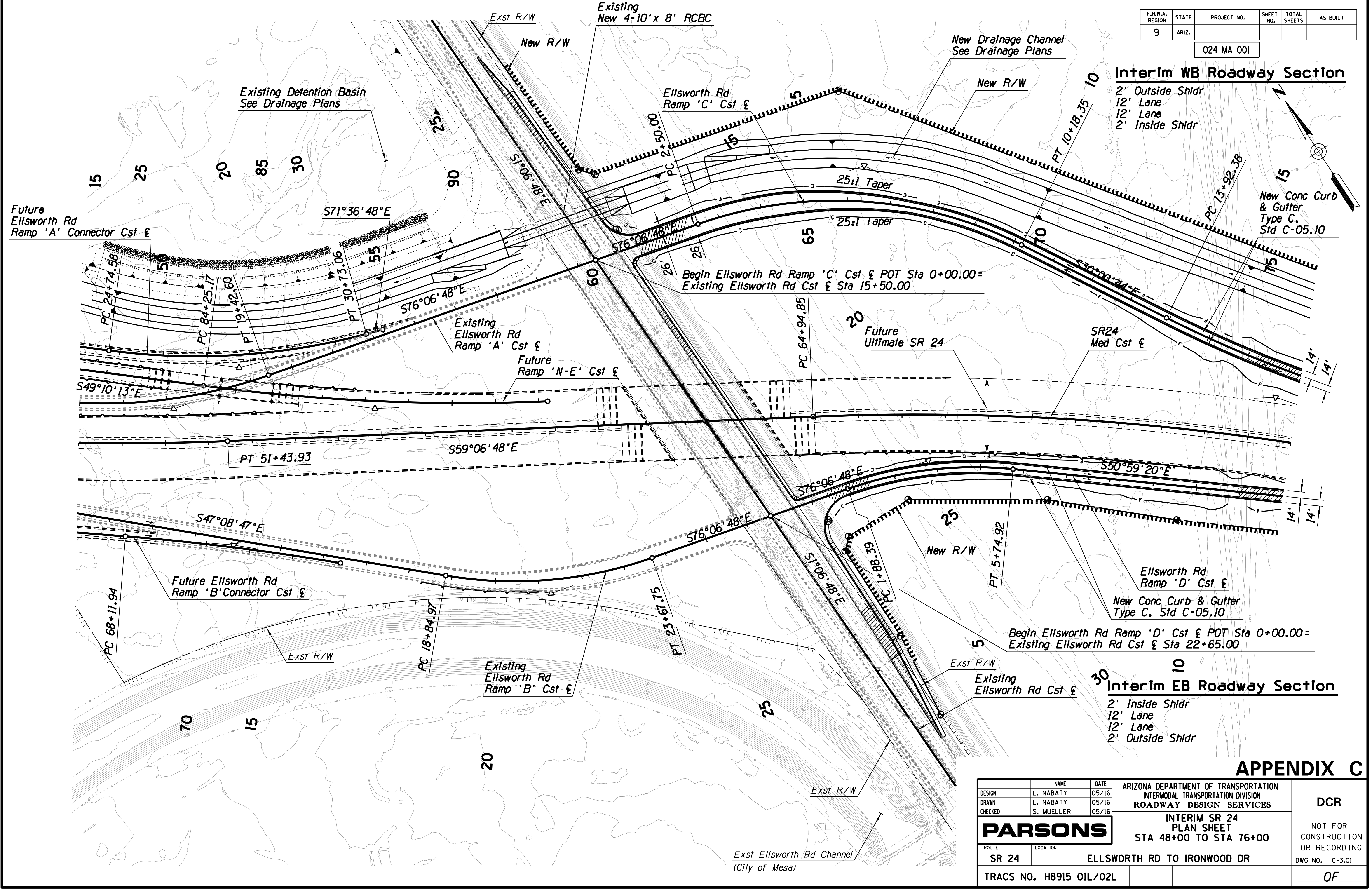
DWG NO. C-2.10

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



Interim WB Roadway Section

2' Outside Shldr
12' Lane
12' Lane
2' Inside Shldr

Interim EB Roadway Section

2' Inside Shldr
12' Lane
12' Lane
2' Outside Shldr

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 48+00 TO STA 76+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.01

TRACS NO. H8915 01L/02L

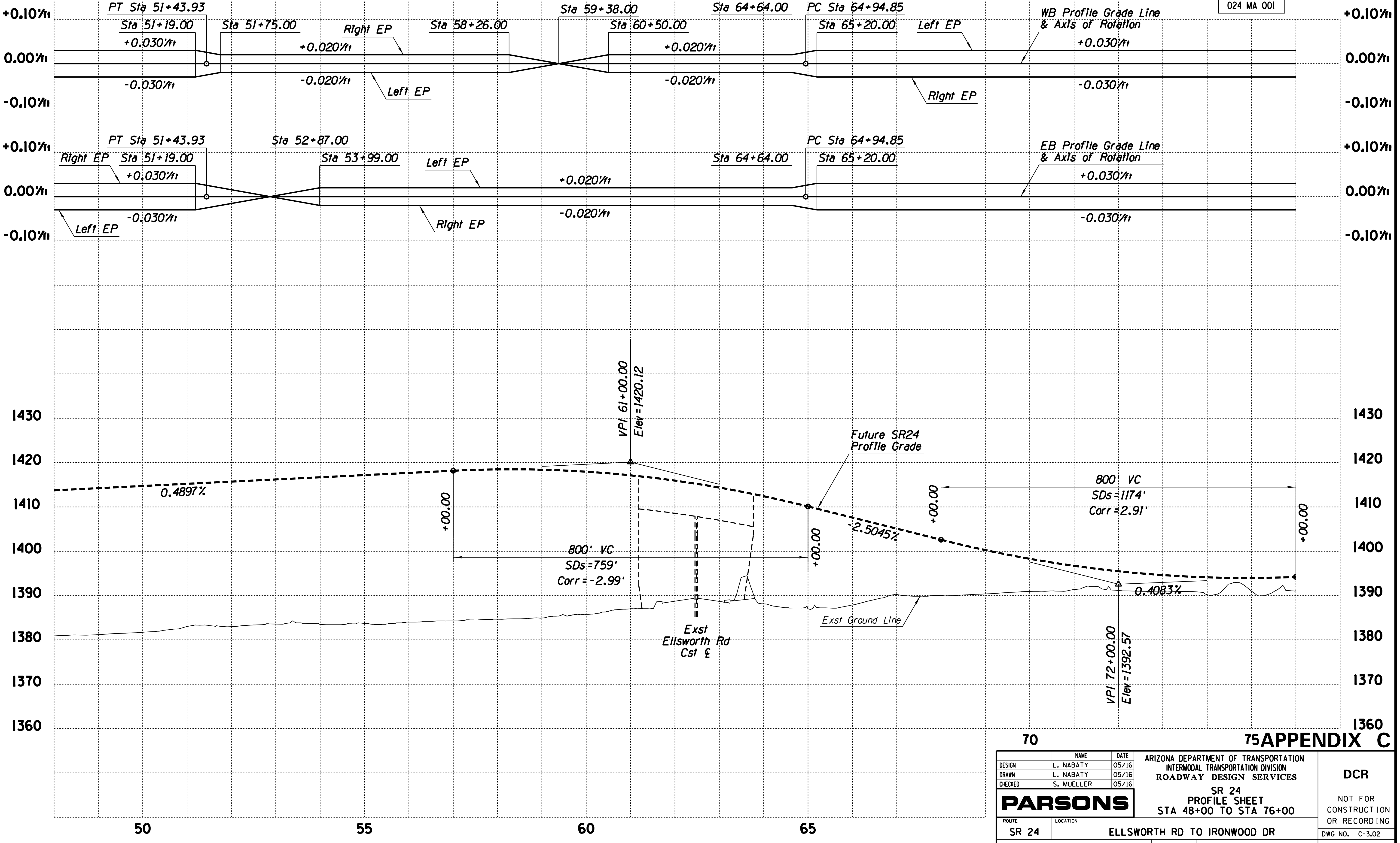
____ OF ____

SURVEY NO.
FINISHED PLANS
REVISIONS
LOCATION
DATE
SURVEY NO.
FINISHED PLANS
REVISIONS
LOCATION
DATE

79412 SR24_Roadway_Plans.tbl 11:21:57 AM 4/25/2016 c:\pw_working\azdot\79412\dms17776\C-3.01 h6867p03.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 48+00 TO STA 76+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.02

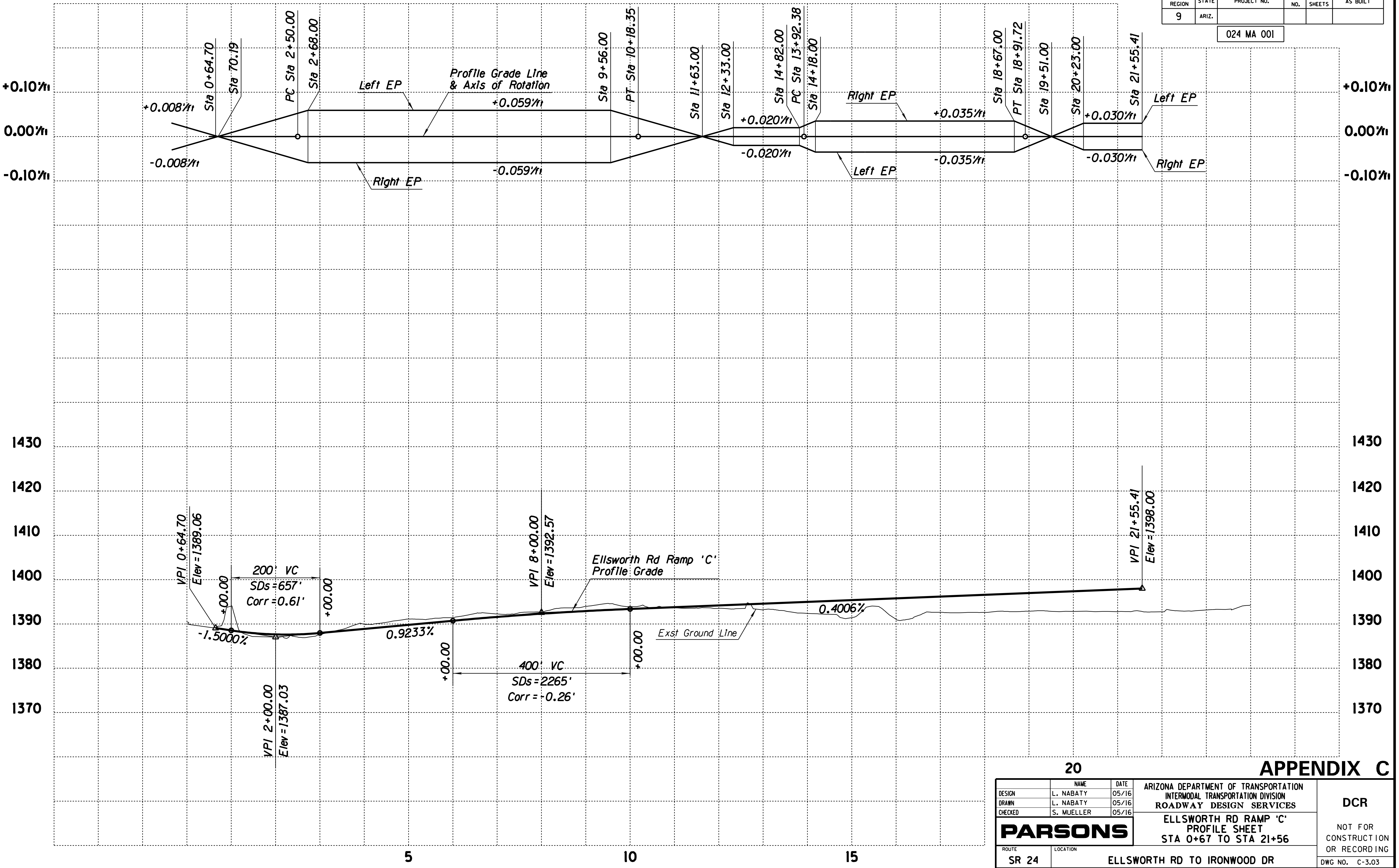
TRACS NO. H8915 01L/02L

___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLSWORTH RD RAMP 'C'
PROFILE SHEET
STA 0+67 TO STA 21+56

DCR

NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-3.03

ROUTE SR 24

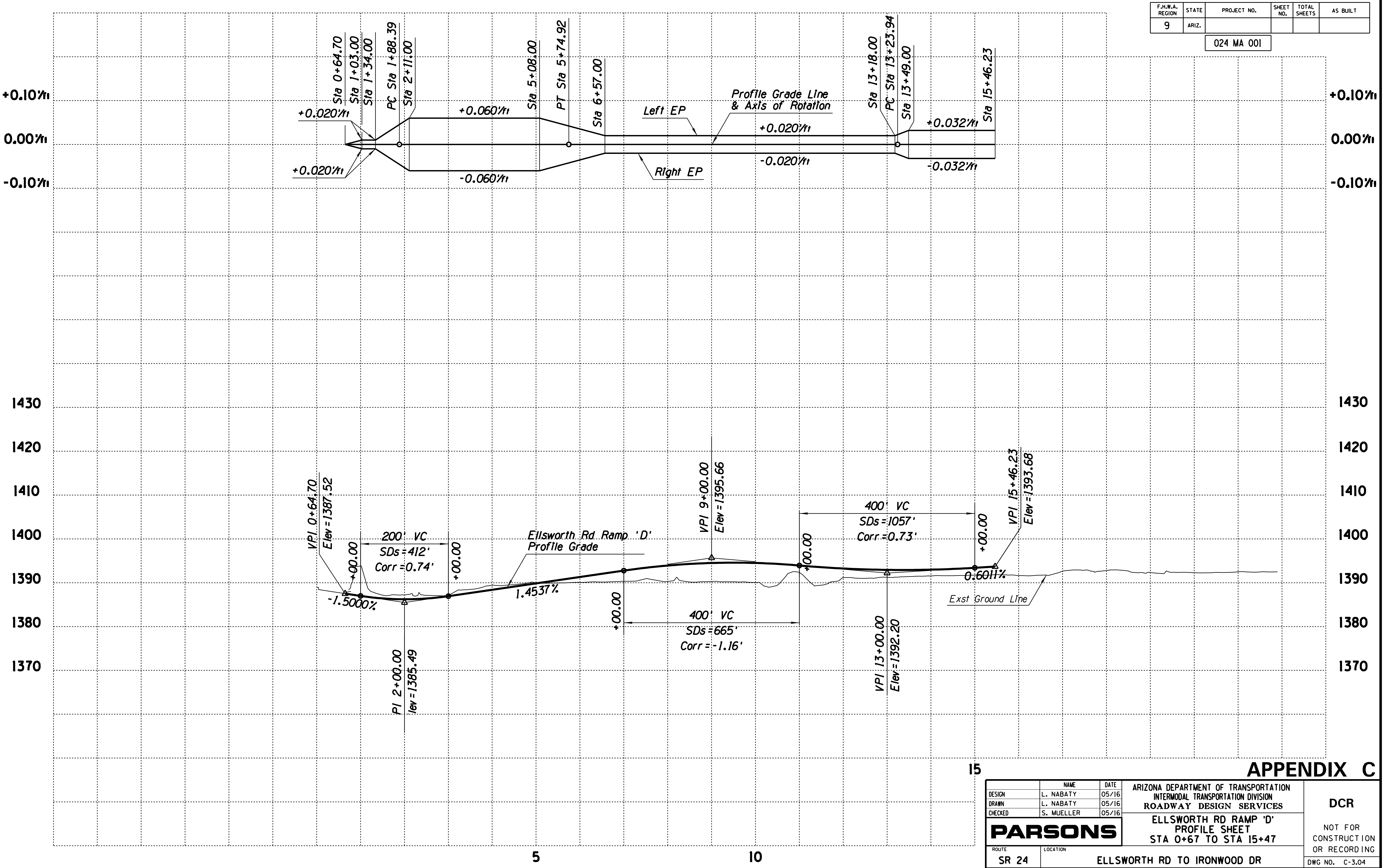
LOCATION ELLSWORTH RD TO IRONWOOD DR

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLSWORTH RD RAMP 'D'
PROFILE SHEET
STA 0+67 TO STA 15+47

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.04

TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

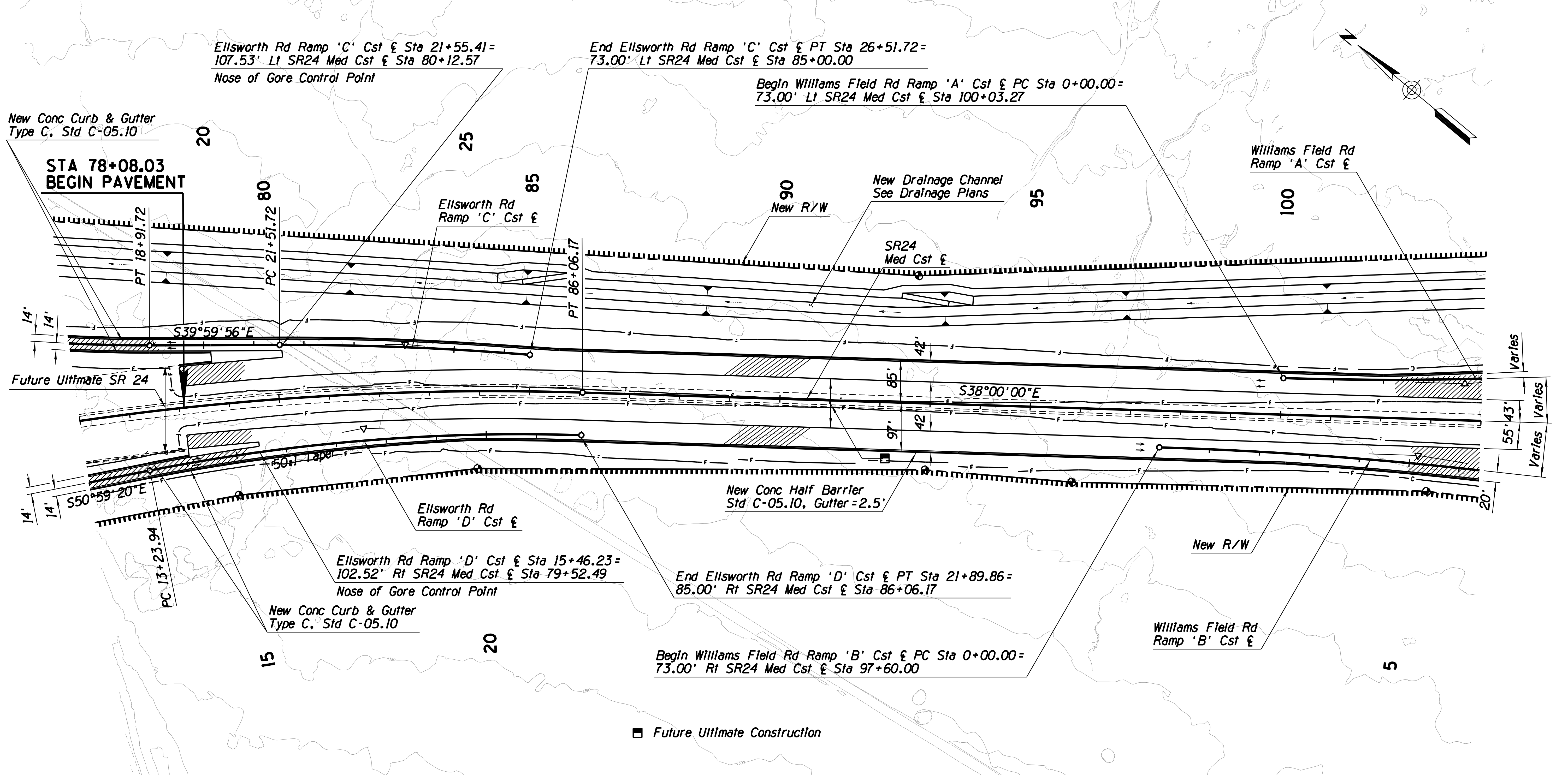
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)



▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

INTERIM SR 24
PLAN SHEET
STA 76+00 TO STA 104+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.05

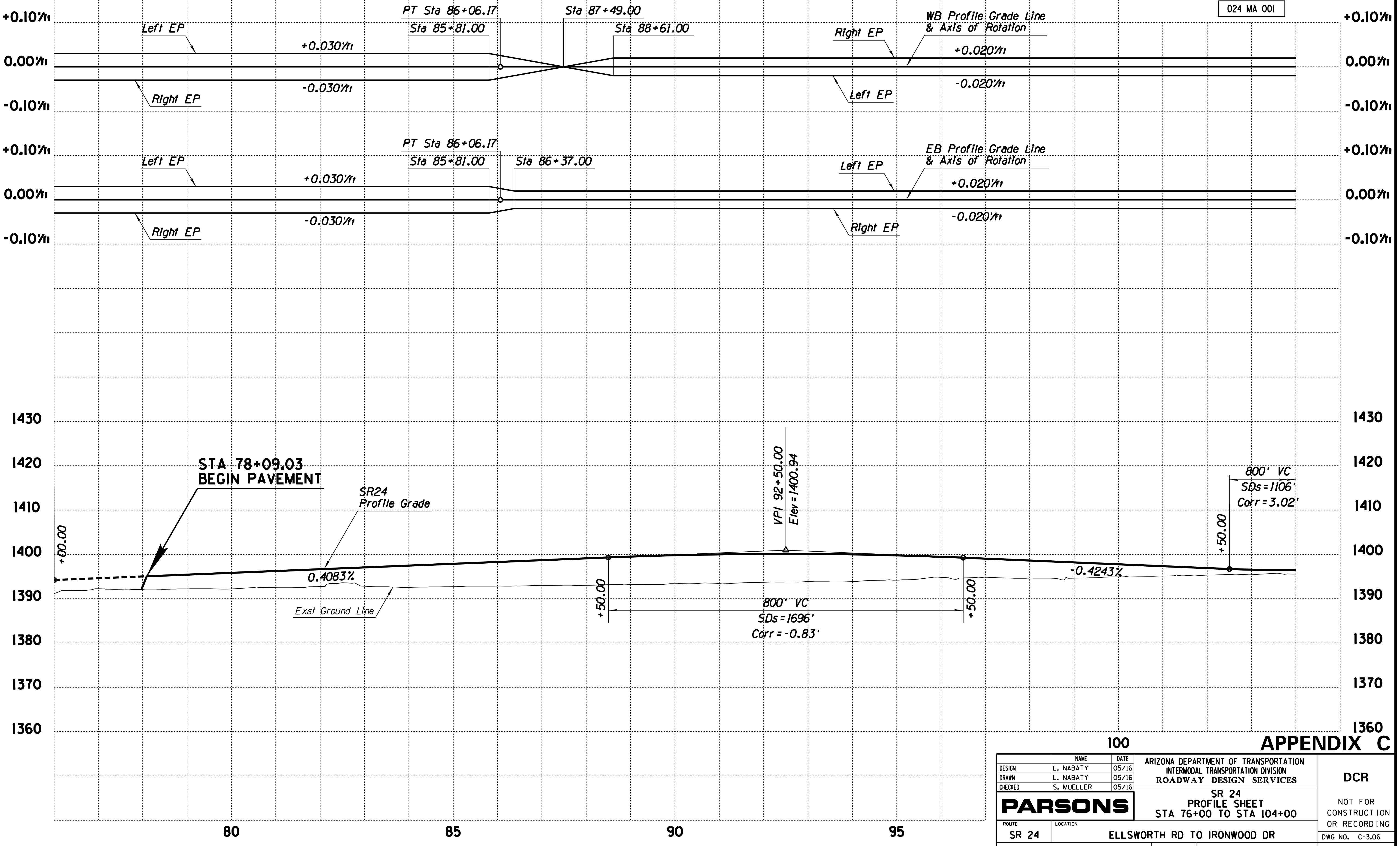
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 76+00 TO STA 104+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

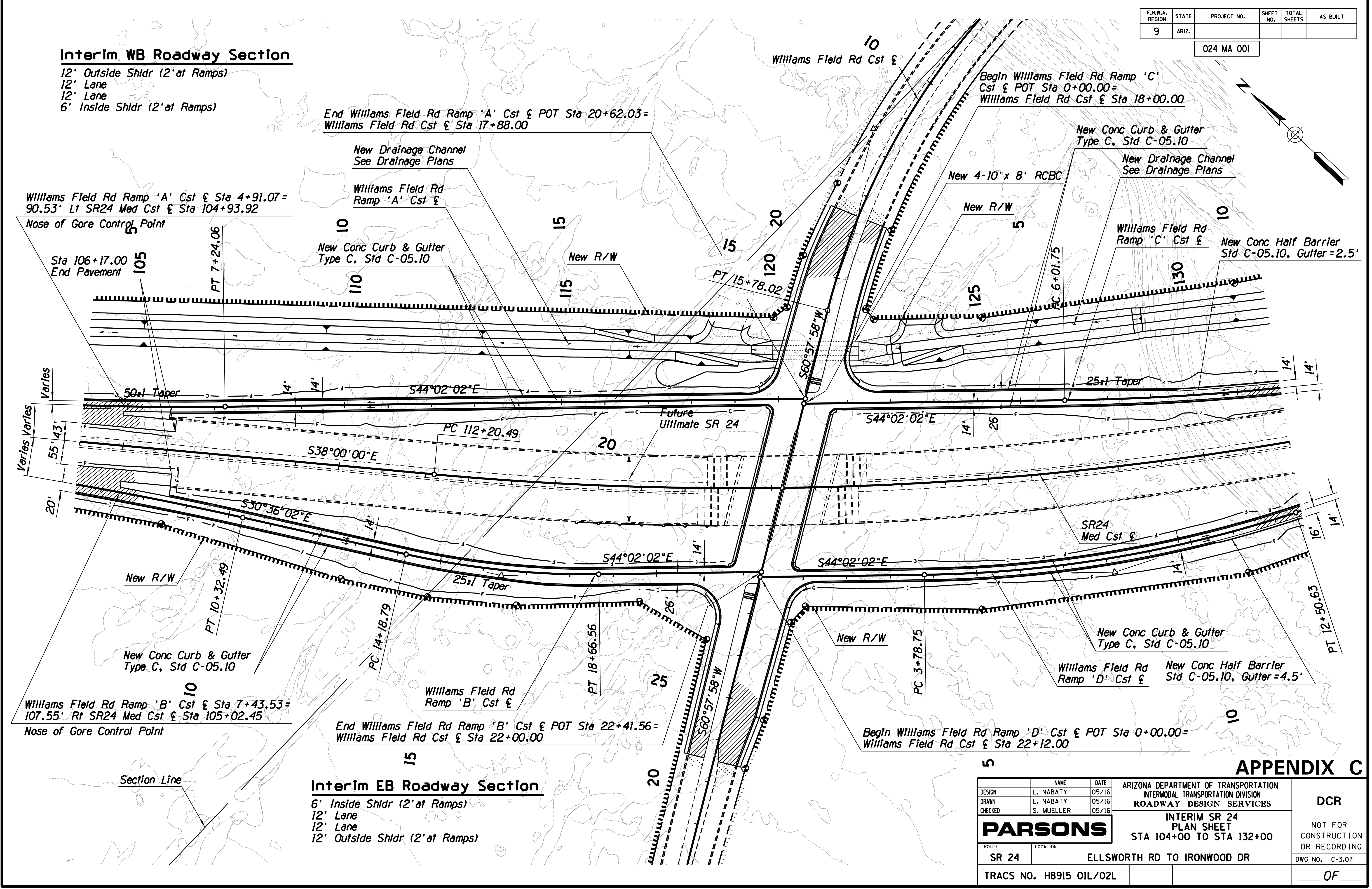
DWG NO. C-3.06

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



Interim WB Roadway Section

12' Outside Shldr (2' at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2' at Ramps)

Interim EB Roadway Section

6' Inside Shldr (2' at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2' at Ramps)

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 104+00 TO STA 132+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

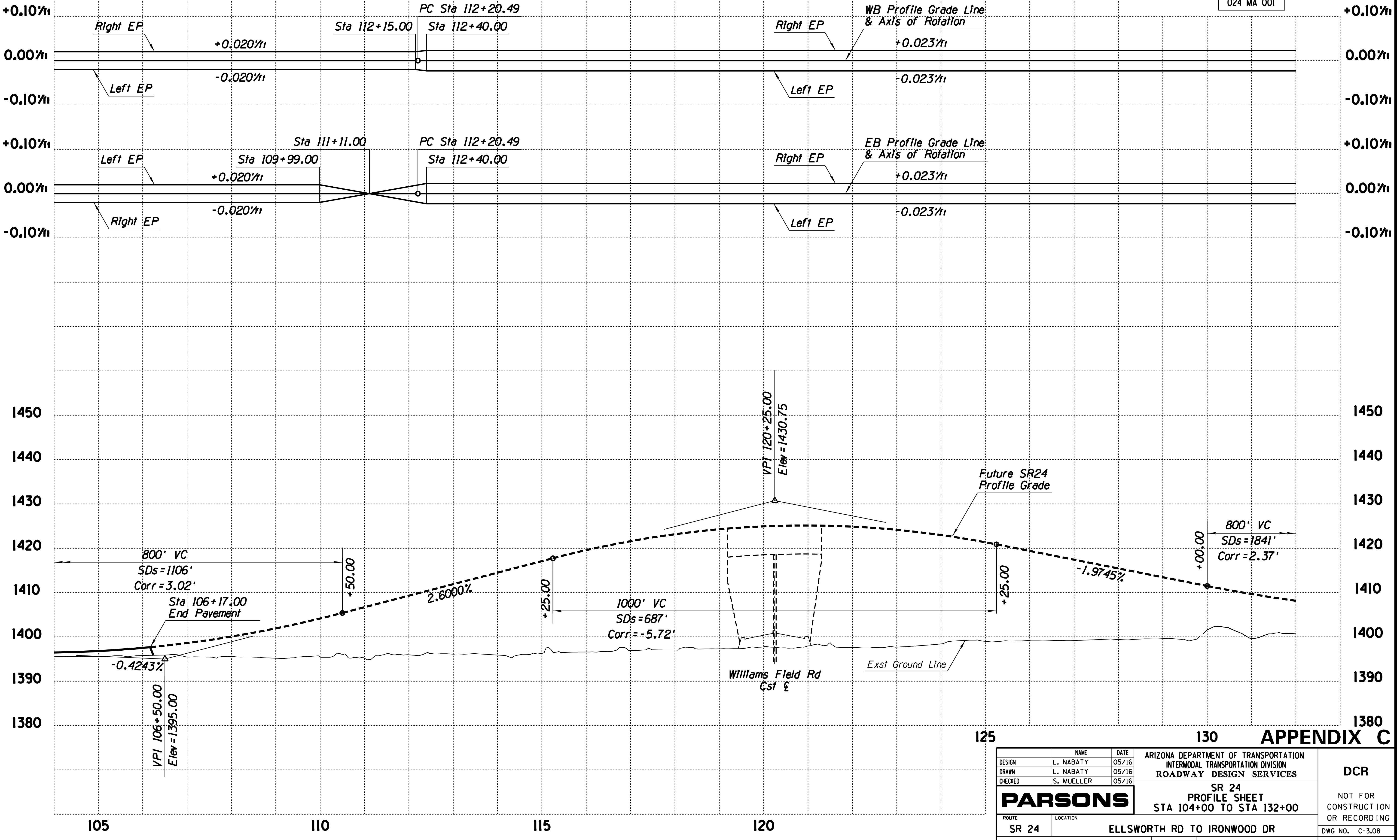
DWG NO. C-3.07

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 104+00 TO STA 132+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.08

TRACS NO. H8915 01L/02L

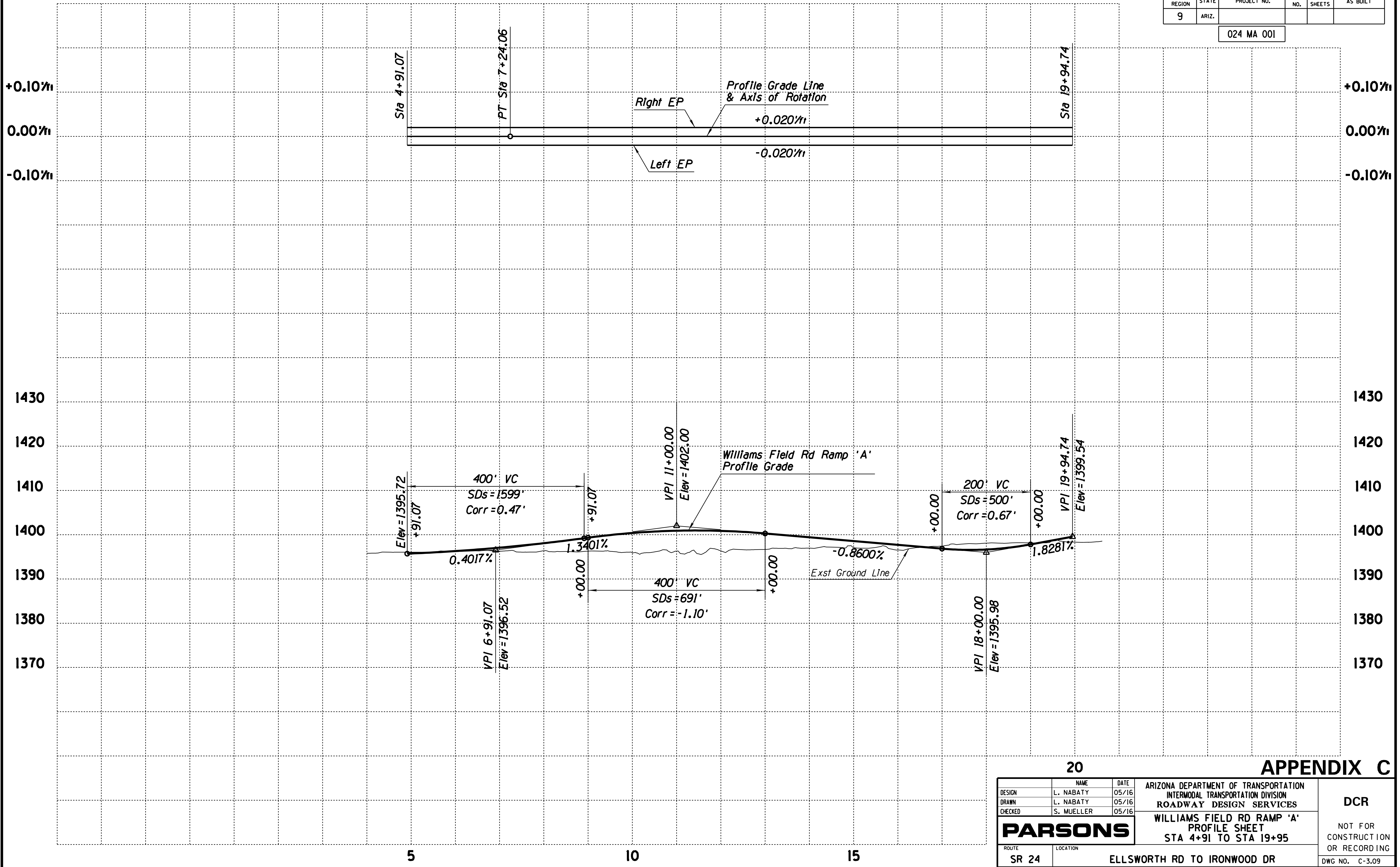
____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

p006886b SR24_Roadway_Plans.tbl 5:00:00 PM 10/25/2016 c:\pw_working\arizona\p006886b\dms17776\C-3.08 h6867v16.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

WILLIAMS FIELD RD RAMP 'A'
PROFILE SHEET
STA 4+91 TO STA 19+95

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.09

TRACS NO. H8915 01L/02L

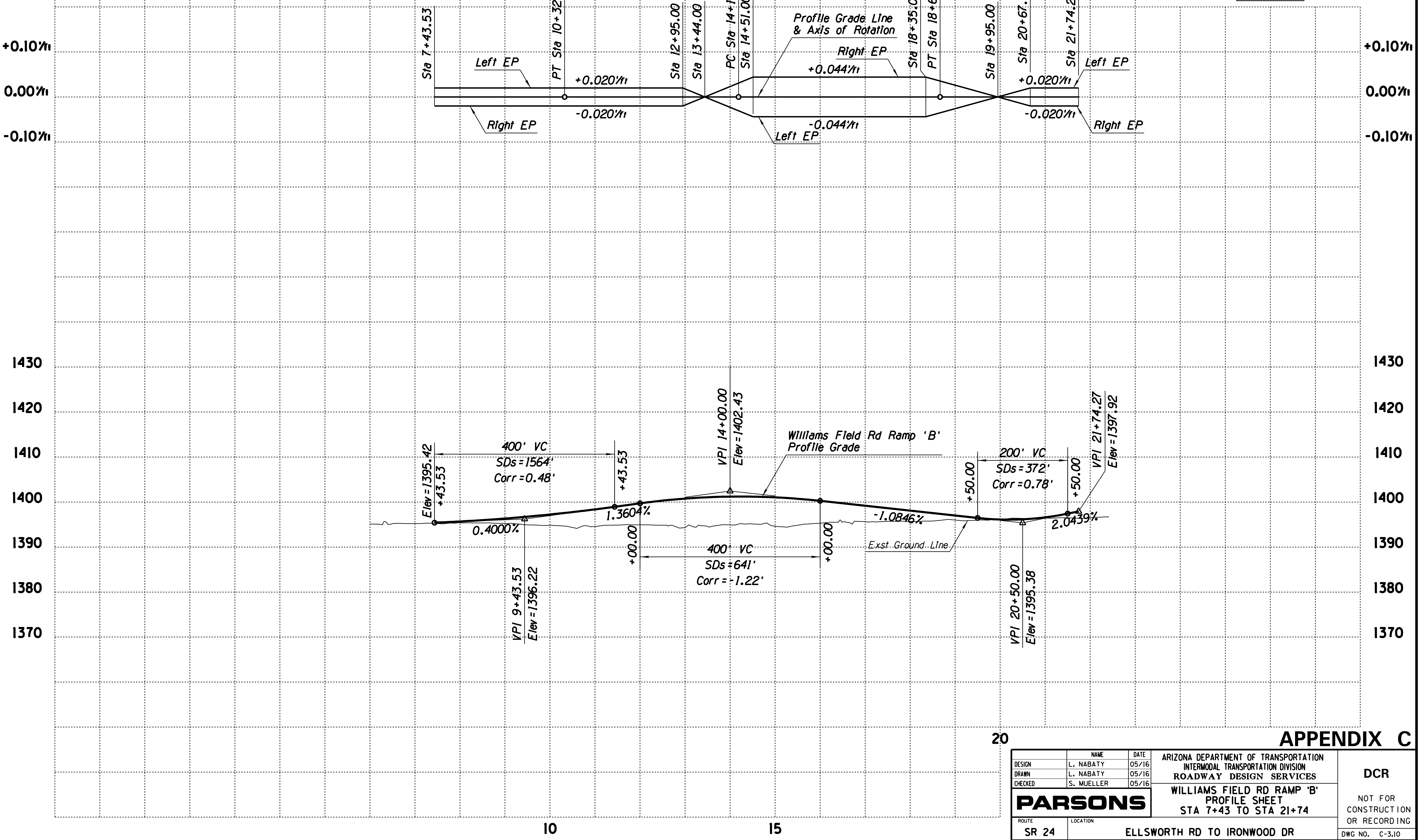
___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

WILLIAMS FIELD RD RAMP 'B'
PROFILE SHEET
STA 7+43 TO STA 21+74

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.10

TRACS NO. H8915 01L/02L

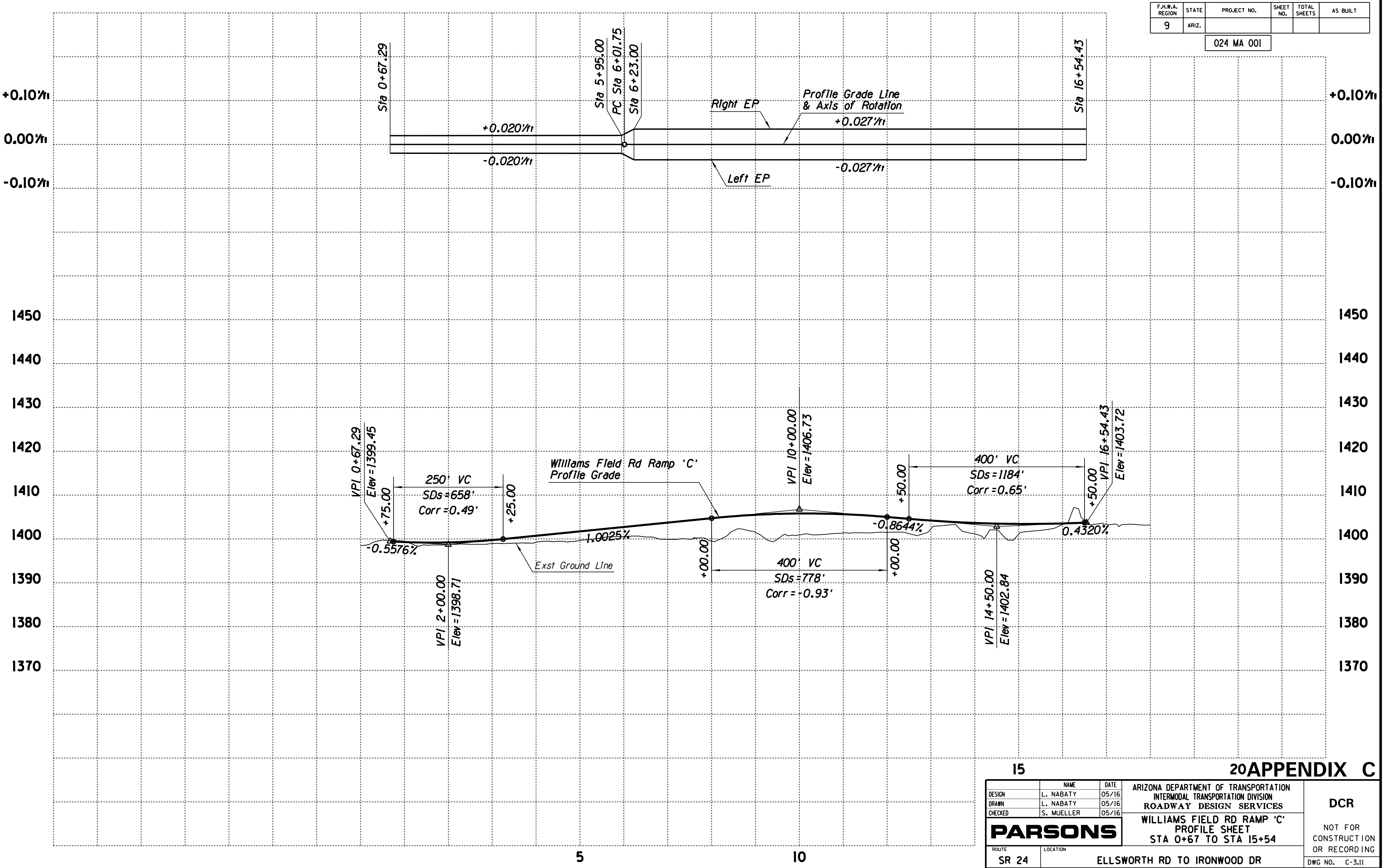
___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



20APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

WILLIAMS FIELD RD RAMP 'C'
PROFILE SHEET
STA 0+67 TO STA 15+54

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

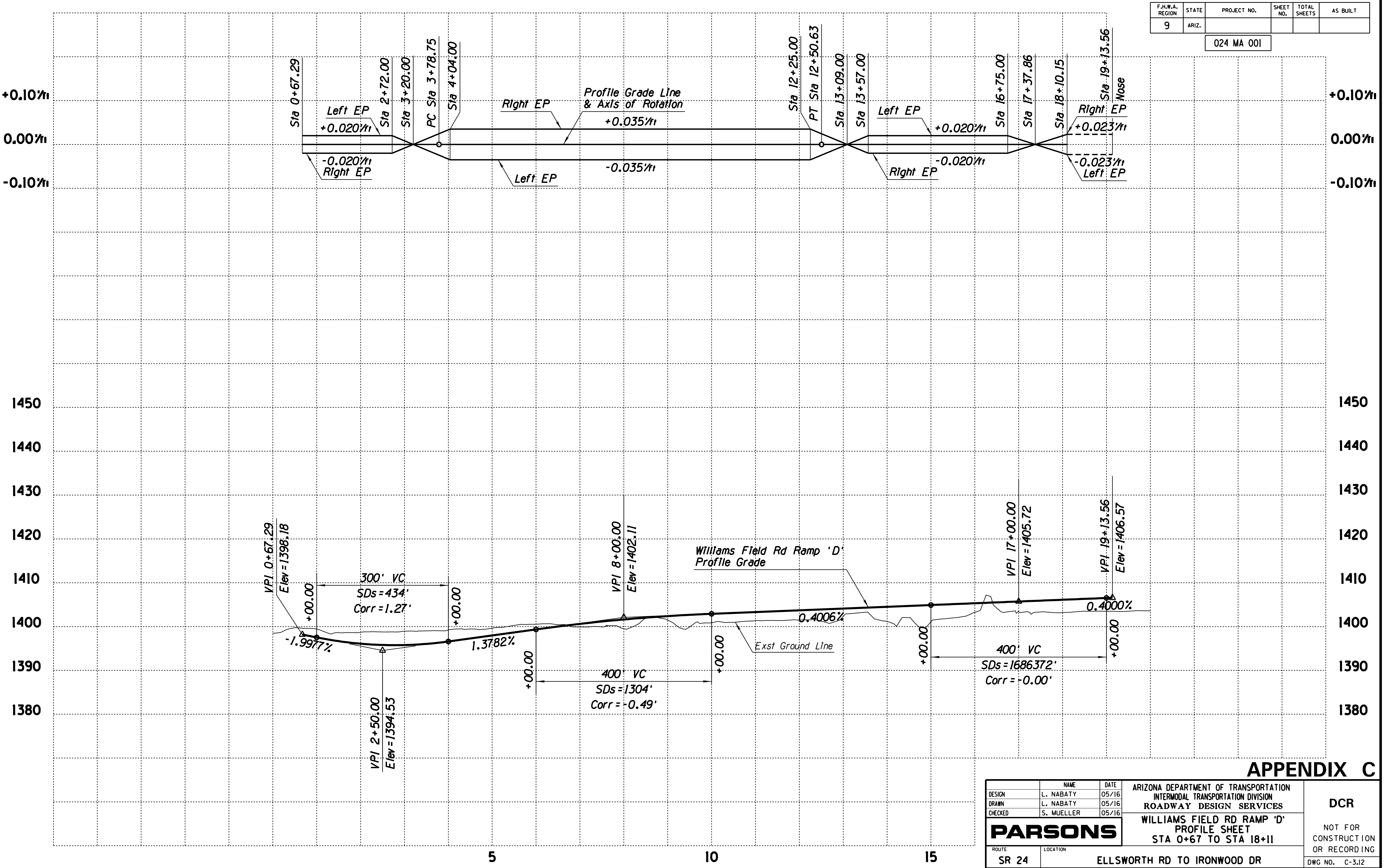
DWG NO. C-3.11

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

WILLIAMS FIELD RD RAMP 'D'
PROFILE SHEET
STA 0+67 TO STA 18+11

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.12

TRACS NO. H8915 01L/02L

____ OF ____

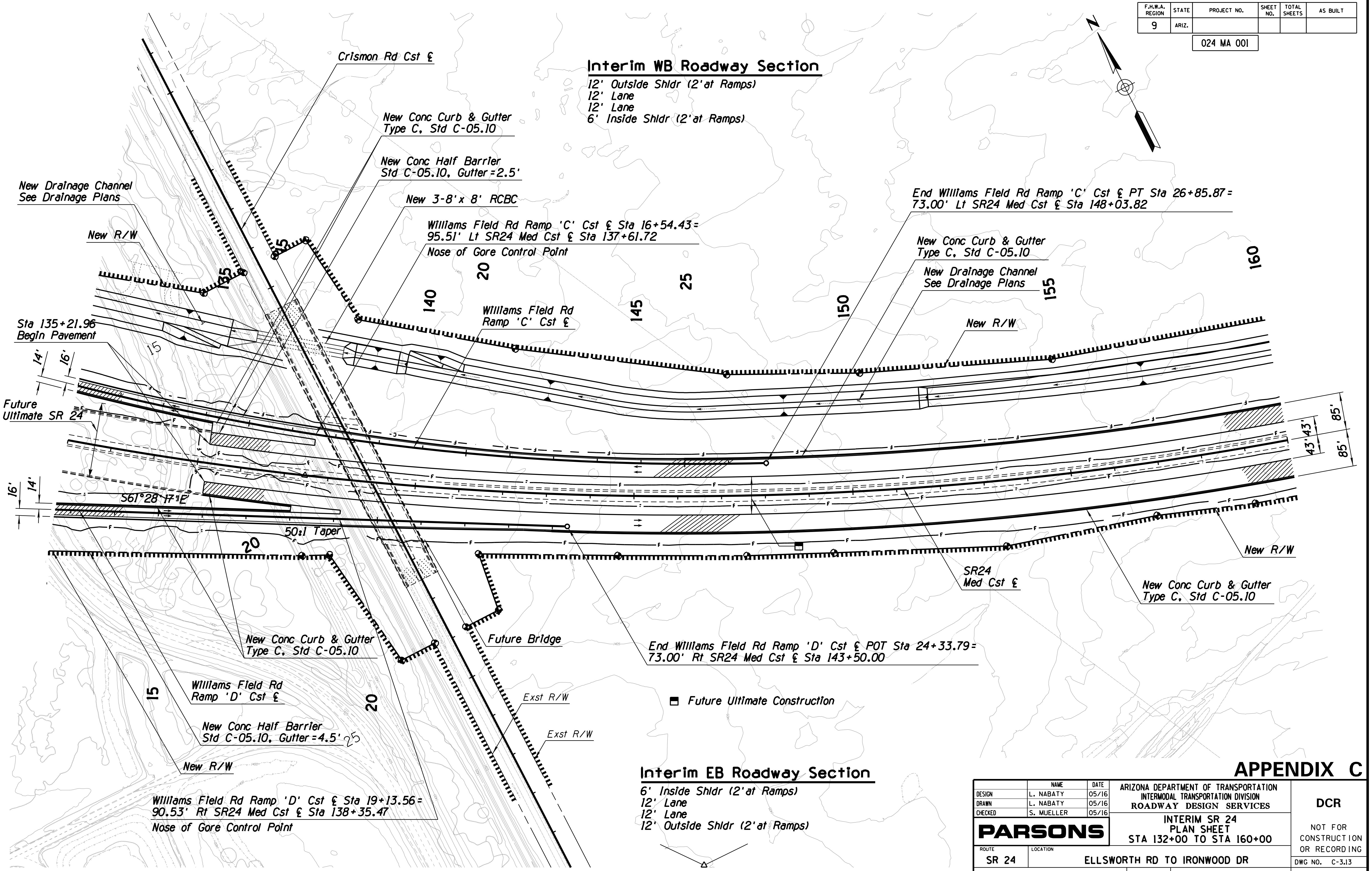
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)



▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 132+00 TO STA 160+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 24
LOCATION: ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.13

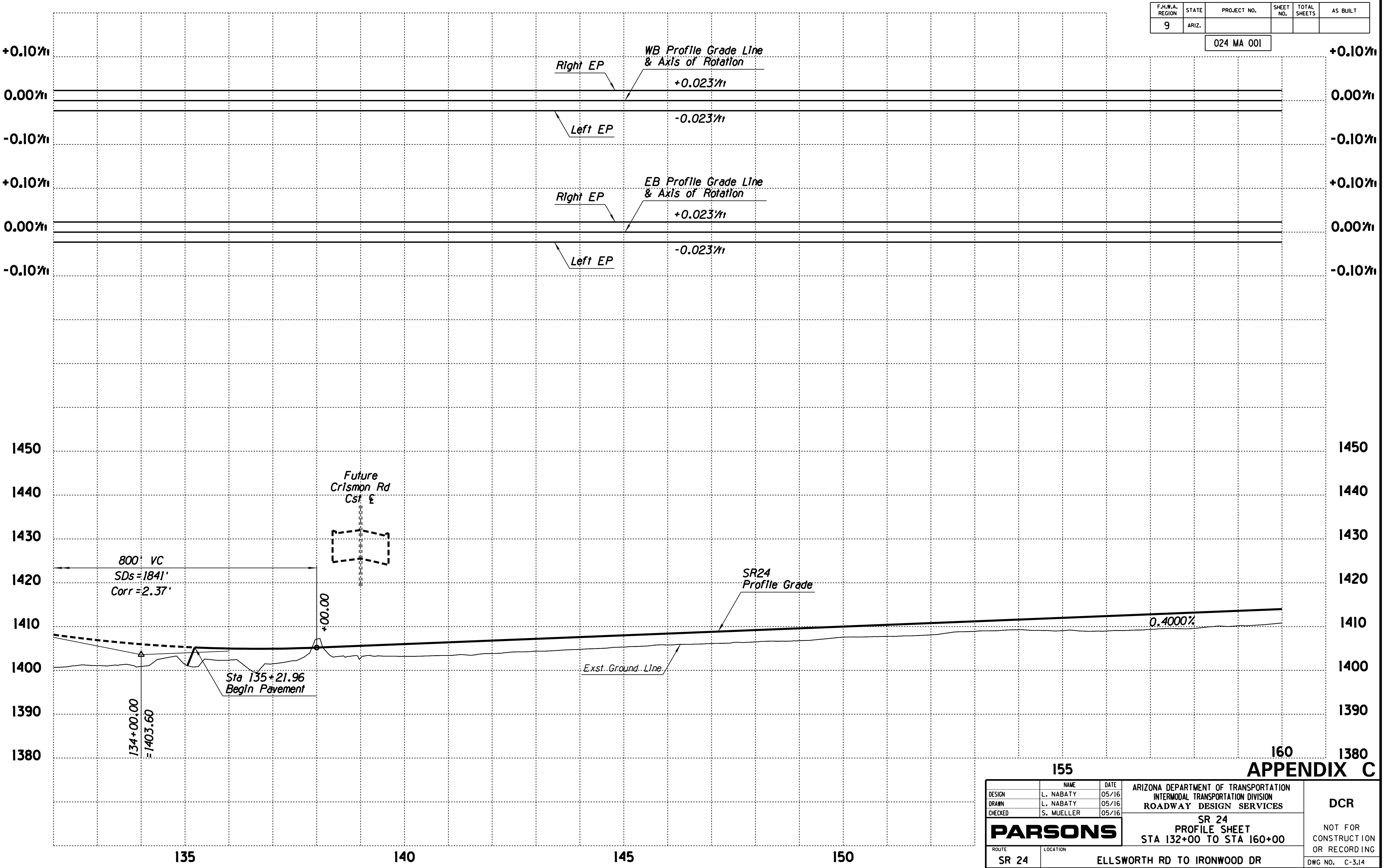
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 132+00 TO STA 160+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.14

TRACS NO. H8915 01L/02L

___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

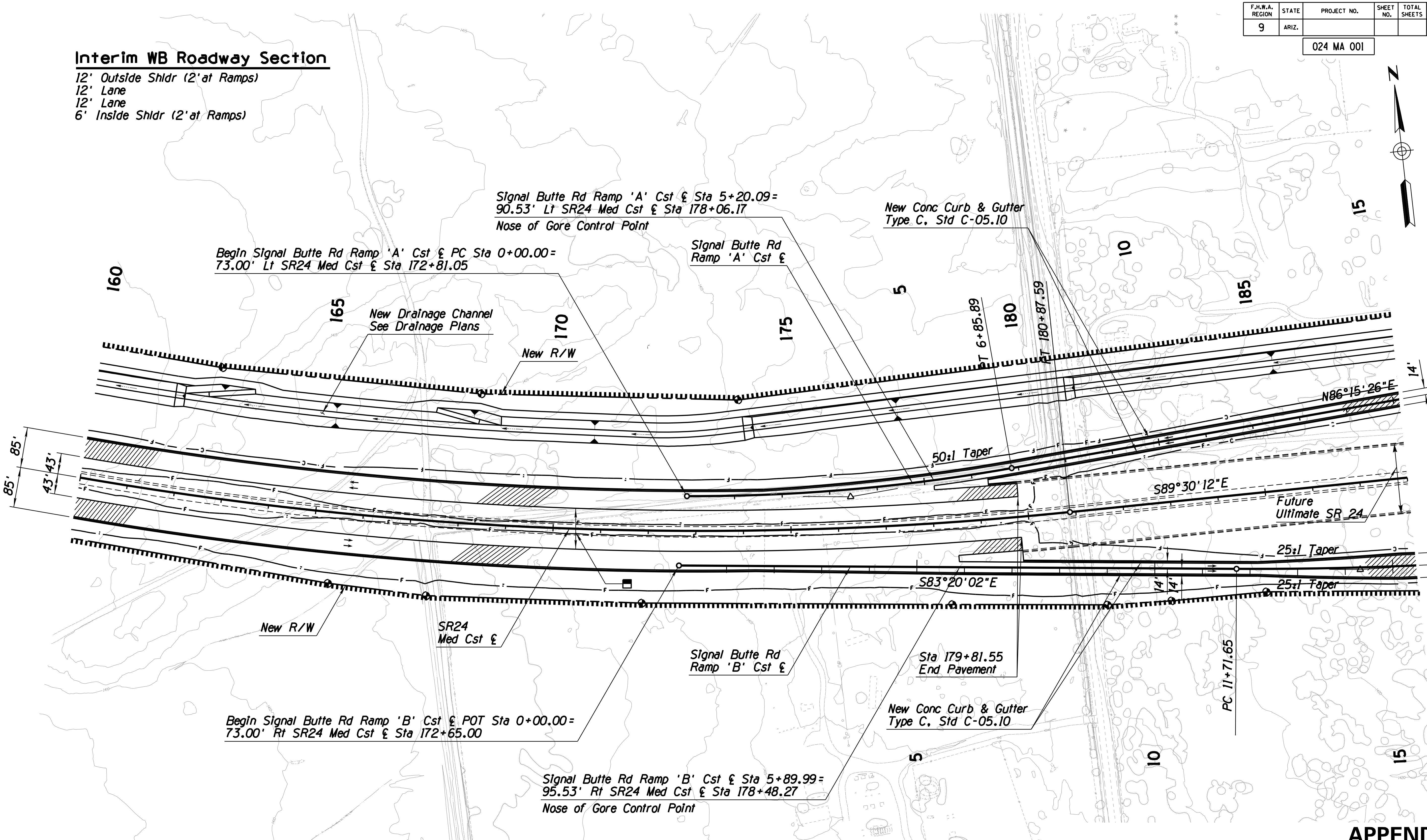
DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

Interim WB Roadway Section

12' Outside Shldr (2' at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2' at Ramps)



APPENDIX C

Interim EB Roadway Section

6' Inside Shldr (2' at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2' at Ramps)

▬ Future Ultimate Construction

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 160+00 TO STA 188+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE: SR 24
LOCATION: ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.15

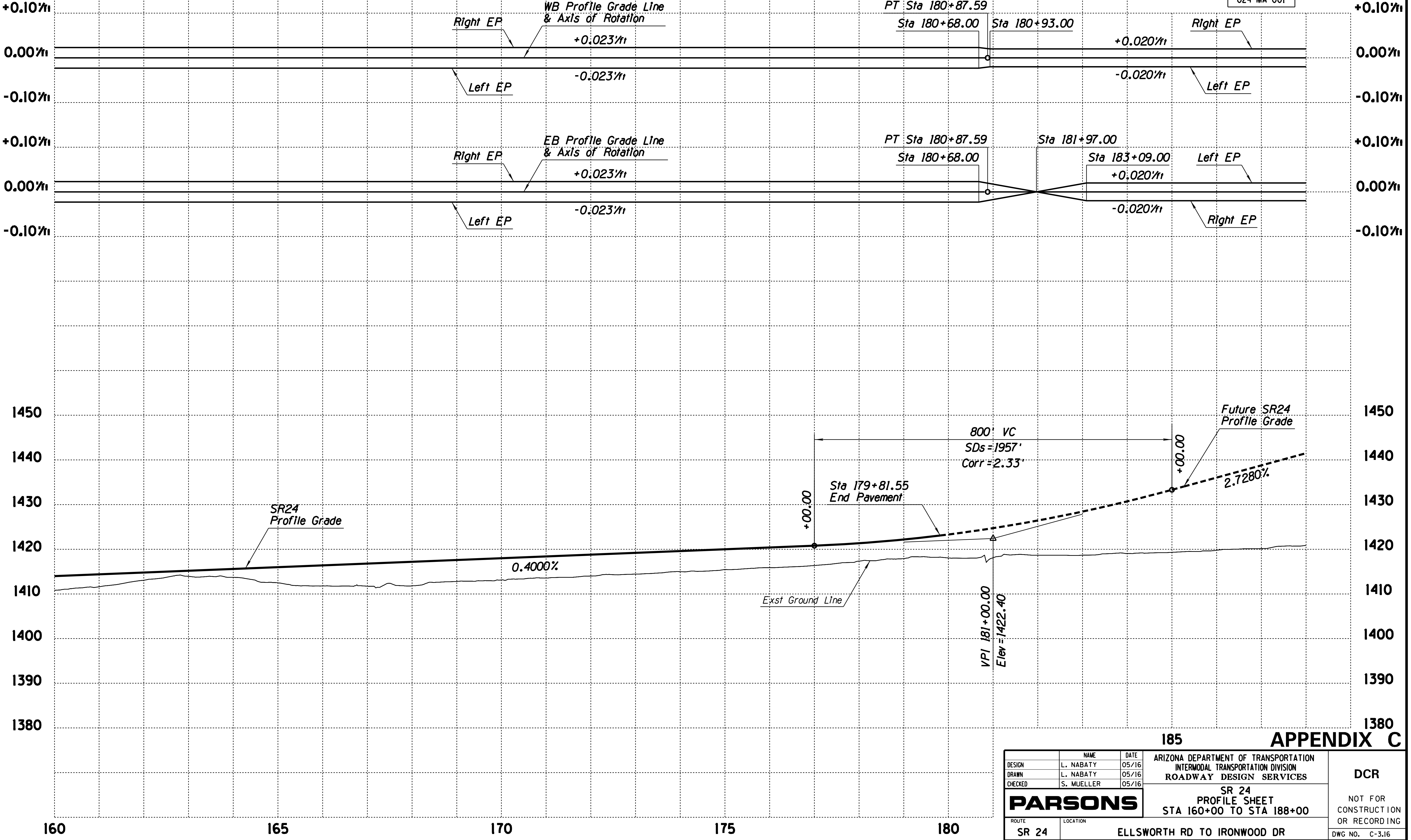
TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.- FINISHED PLANS- REVISIONS- LOCATION- DATE-
SURVEY NO.- FINISHED PLANS- REVISIONS- LOCATION- DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 160+00 TO STA 188+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-3.16

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

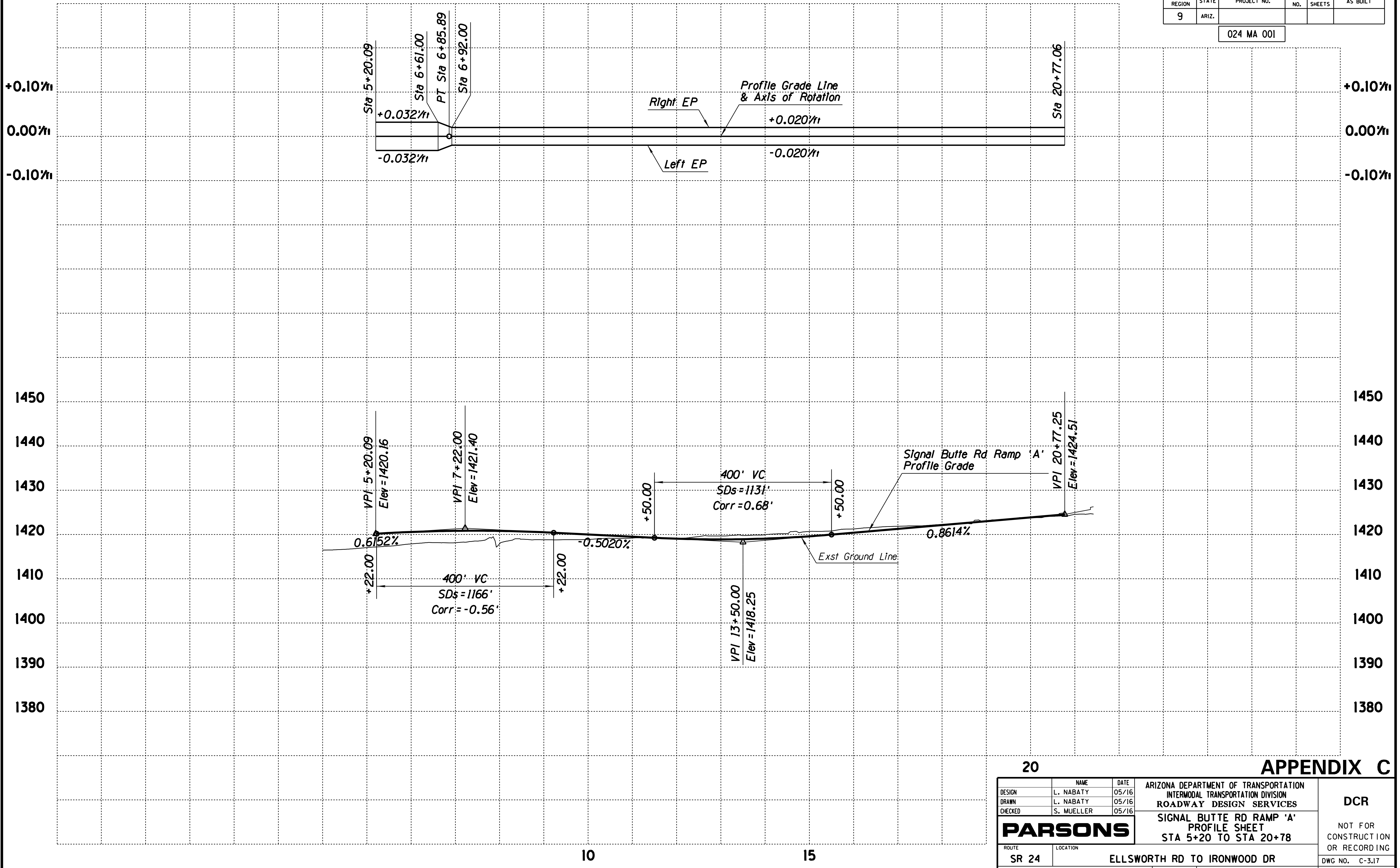
TRACS NO. H8915 01L/02L

___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SIGNAL BUTTE RD RAMP 'A'
PROFILE SHEET
STA 5+20 TO STA 20+78

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

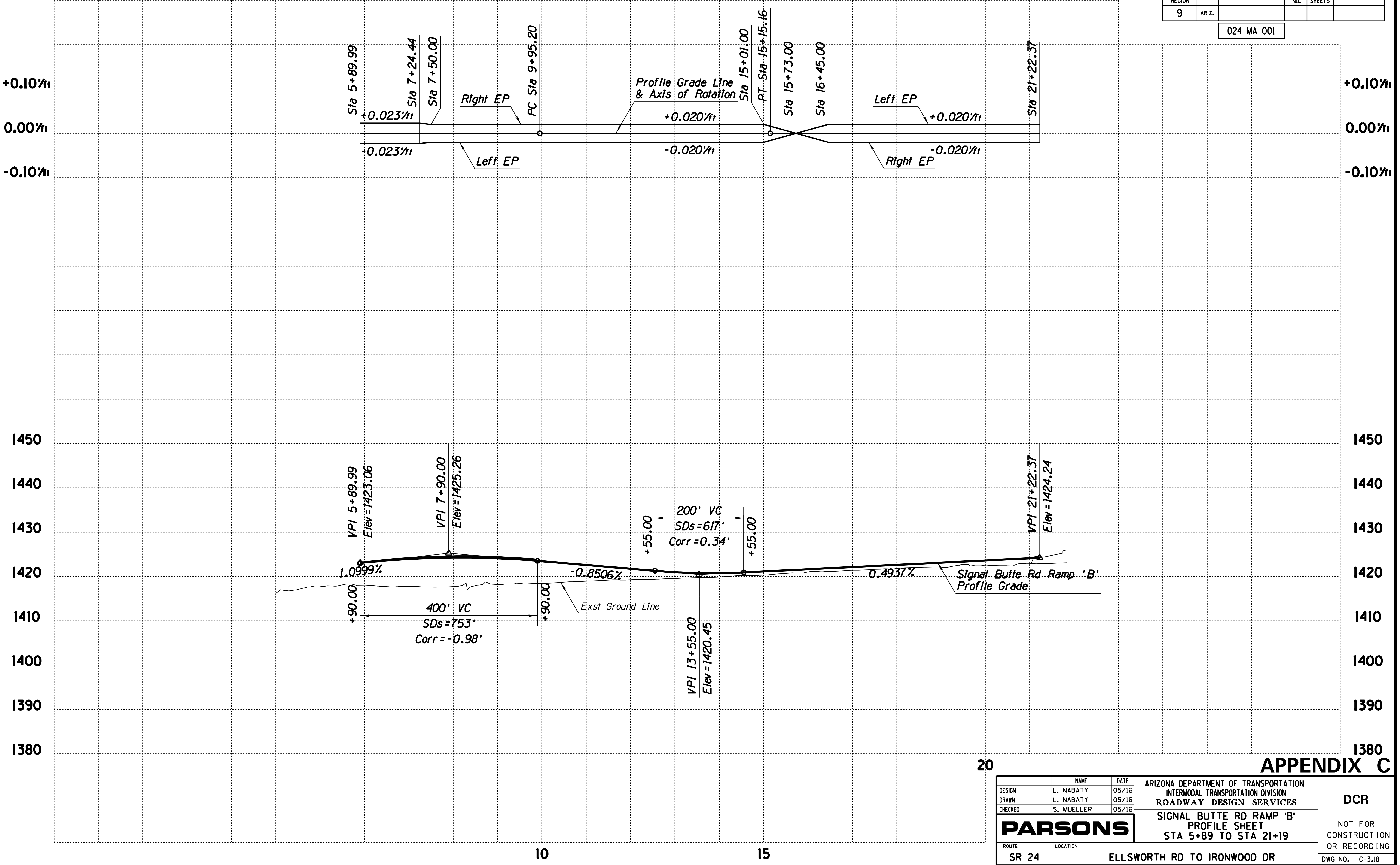
DWG NO. C-3.17

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SIGNAL BUTTE RD RAMP 'B'
PROFILE SHEET
STA 5+89 TO STA 21+19

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.18

TRACS NO. H8915 01L/02L

___ OF ___

SURVEY NO. FINISHED PLANS- REVISIONS- LOCATION- DATE-

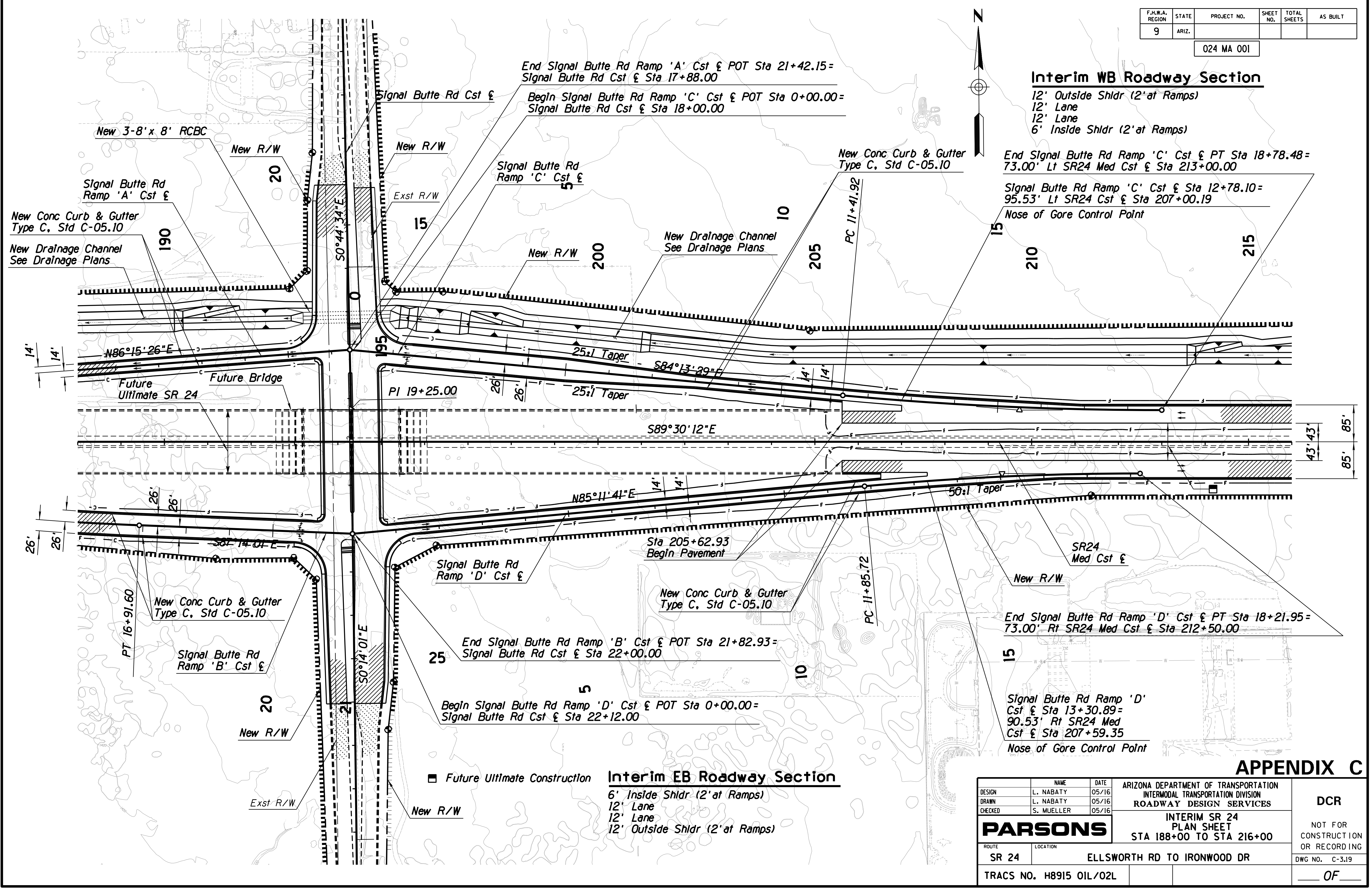
SURVEY NO. FINISHED PLANS- REVISIONS- LOCATION- DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)



▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 188+00 TO STA 216+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.19

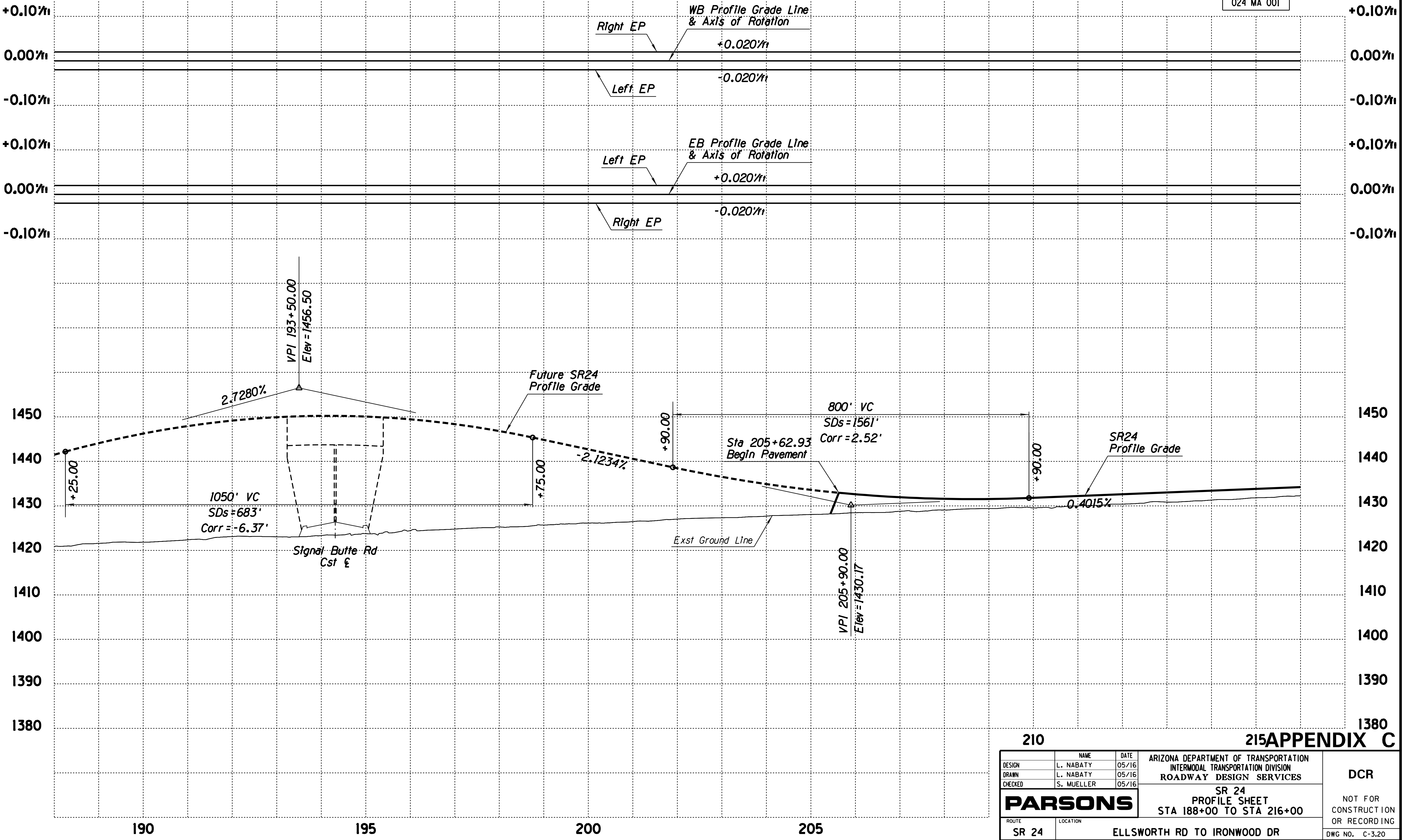
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 188+00 TO STA 216+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.20

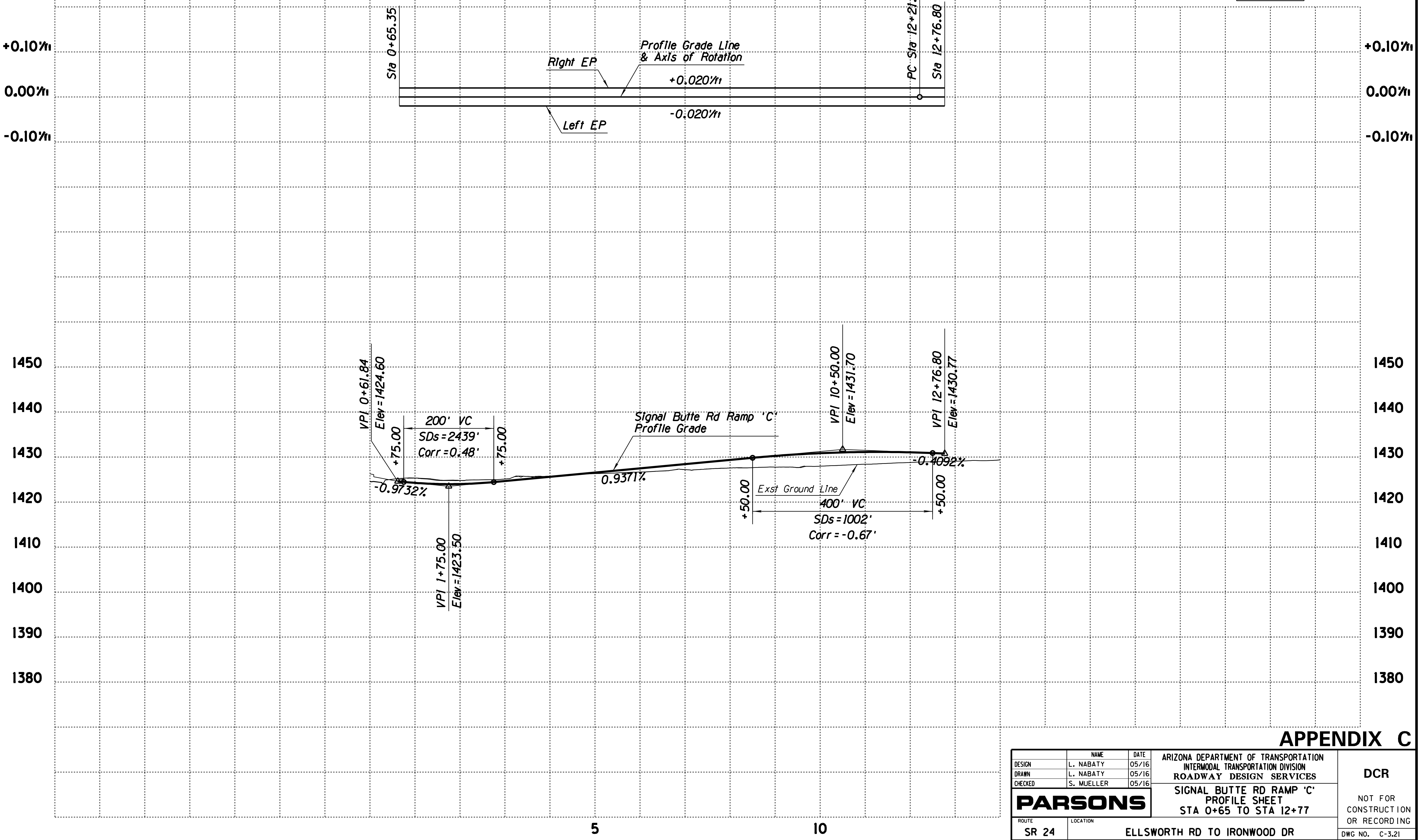
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SIGNAL BUTTE RD RAMP 'C'
PROFILE SHEET
STA 0+65 TO STA 12+77

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.21

TRACS NO. H8915 01L/02L

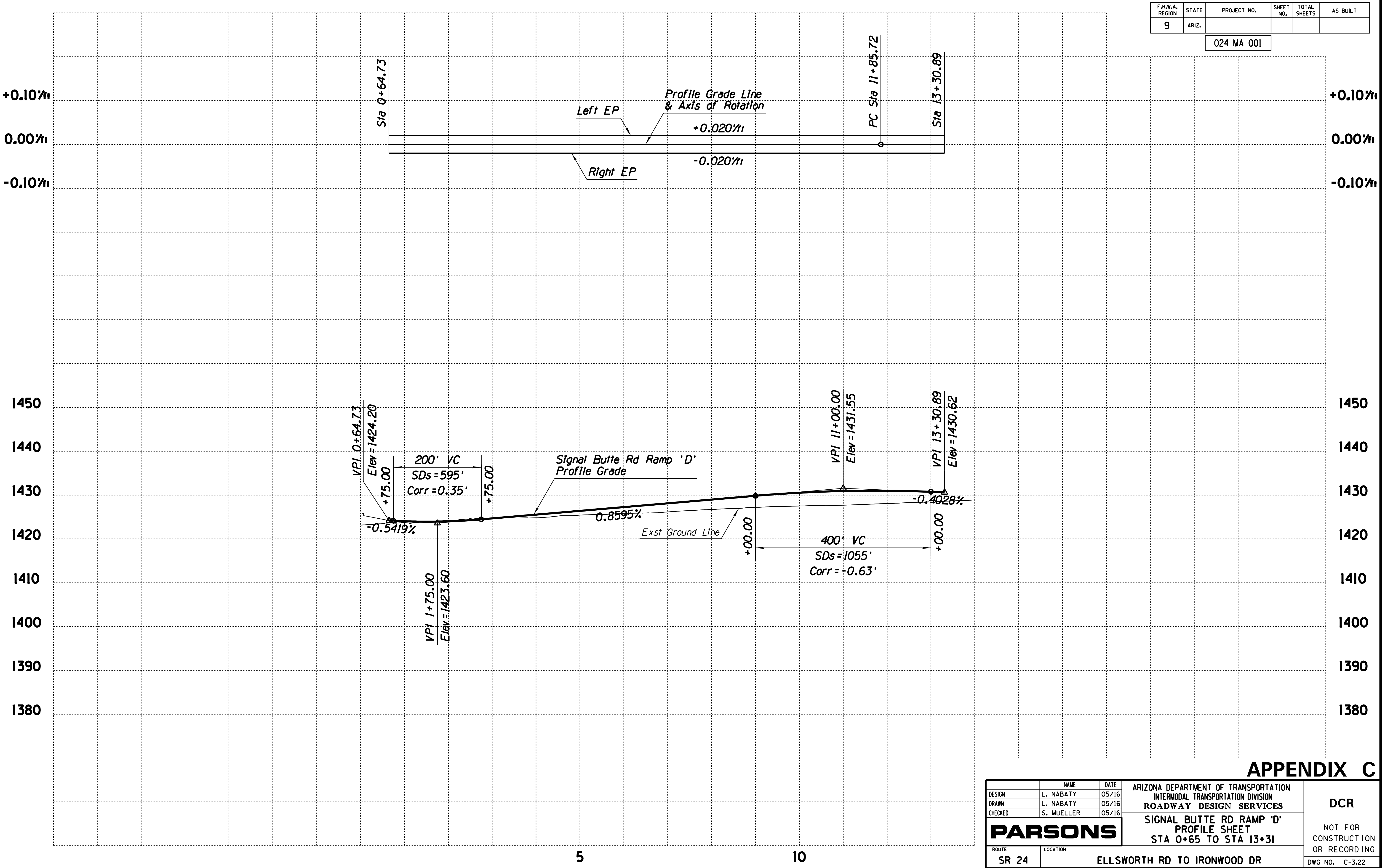
___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SIGNAL BUTTE RD RAMP 'D'
PROFILE SHEET
STA 0+65 TO STA 13+31

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

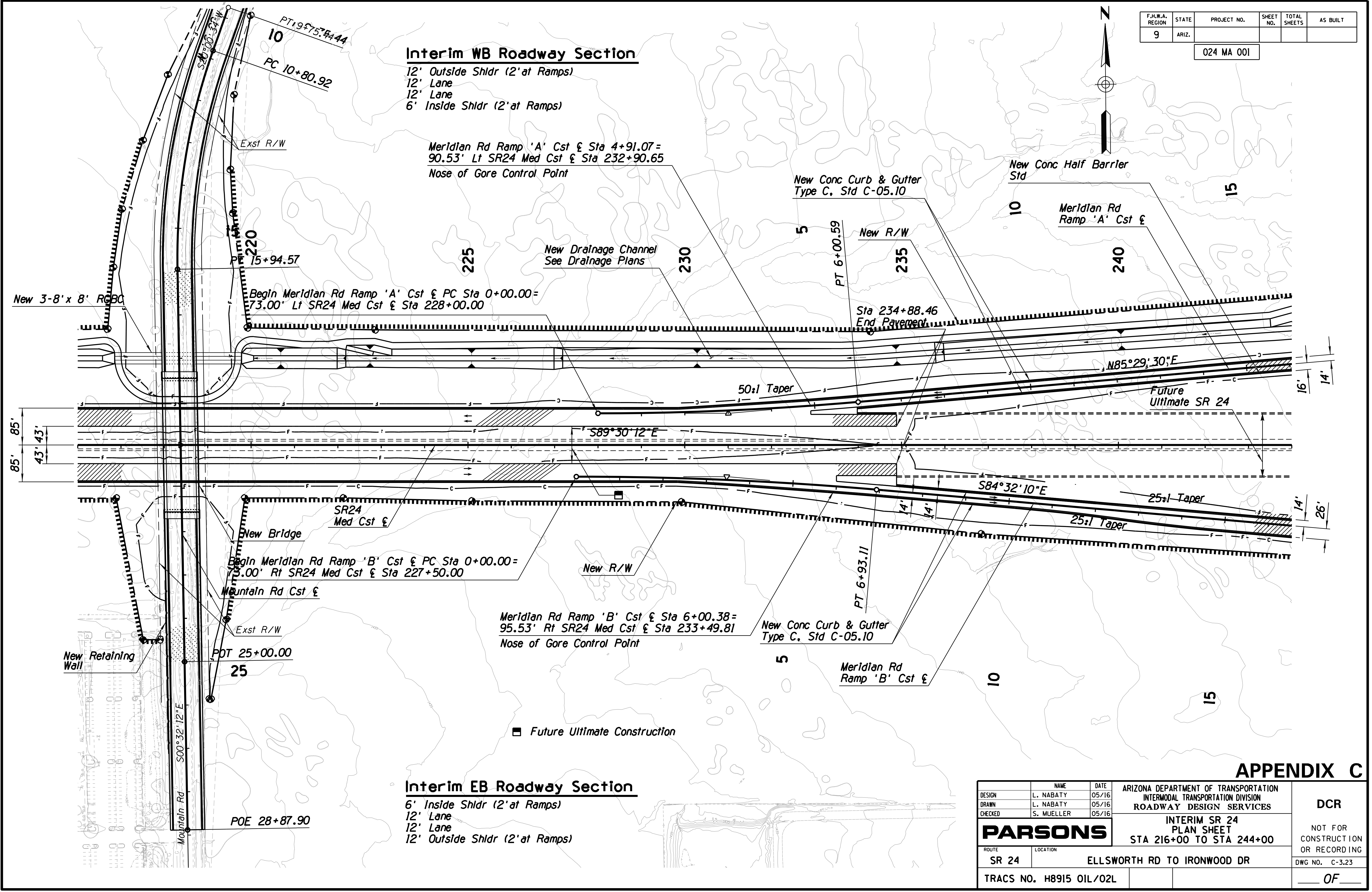
DWG NO. C-3.22

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



■ Future Ultimate Construction

Interim WB Roadway Section

12' Outside Shldr (2' at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2' at Ramps)

Interim EB Roadway Section

6' Inside Shldr (2' at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2' at Ramps)

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 216+00 TO STA 244+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

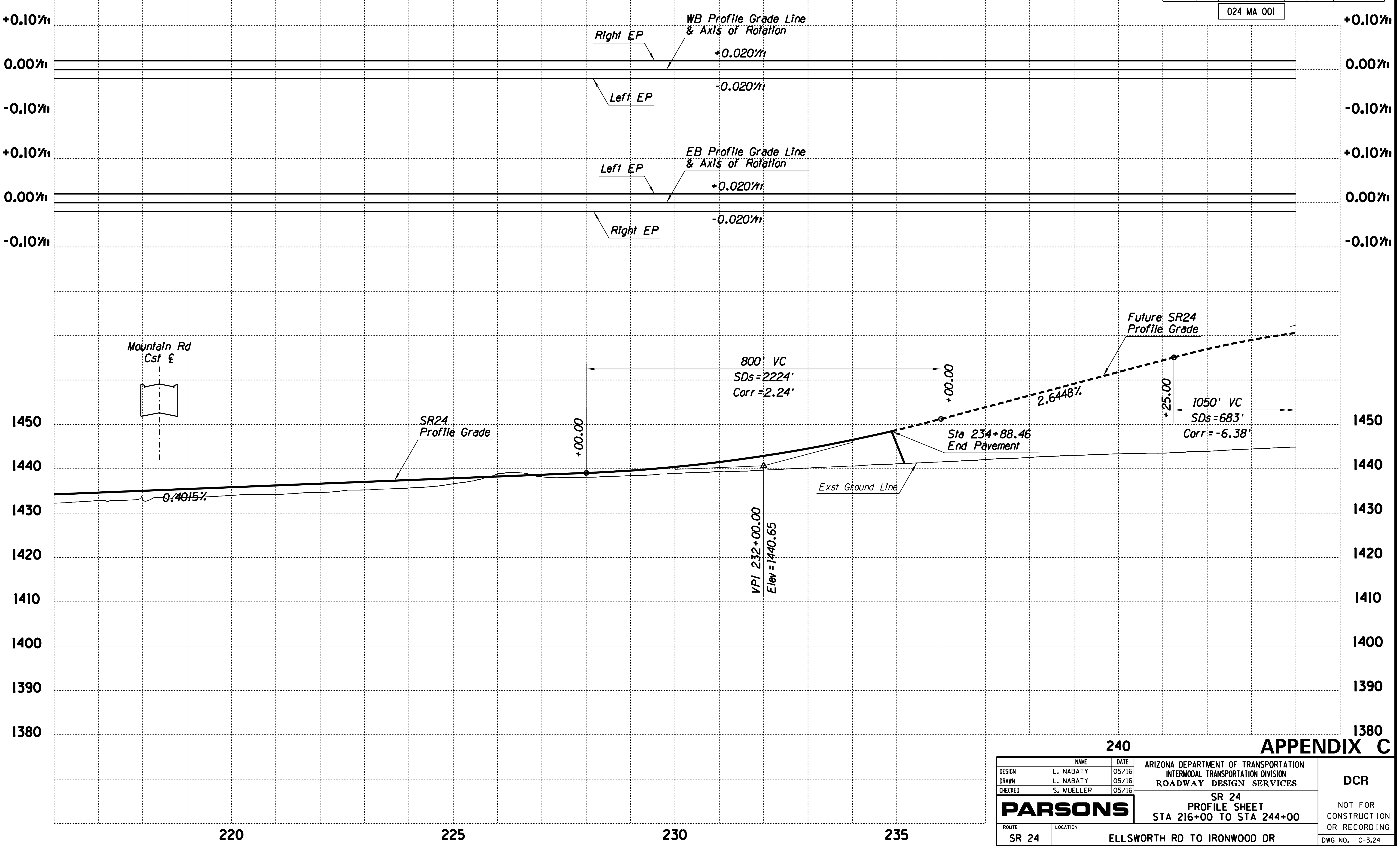
DWG NO. C-3.23

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 216+00 TO STA 244+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.24

TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

DATE-

LOCATION-

REVISIONS-

FINISHED PLANS-

SURVEY NO.

DATE-

LOCATION-

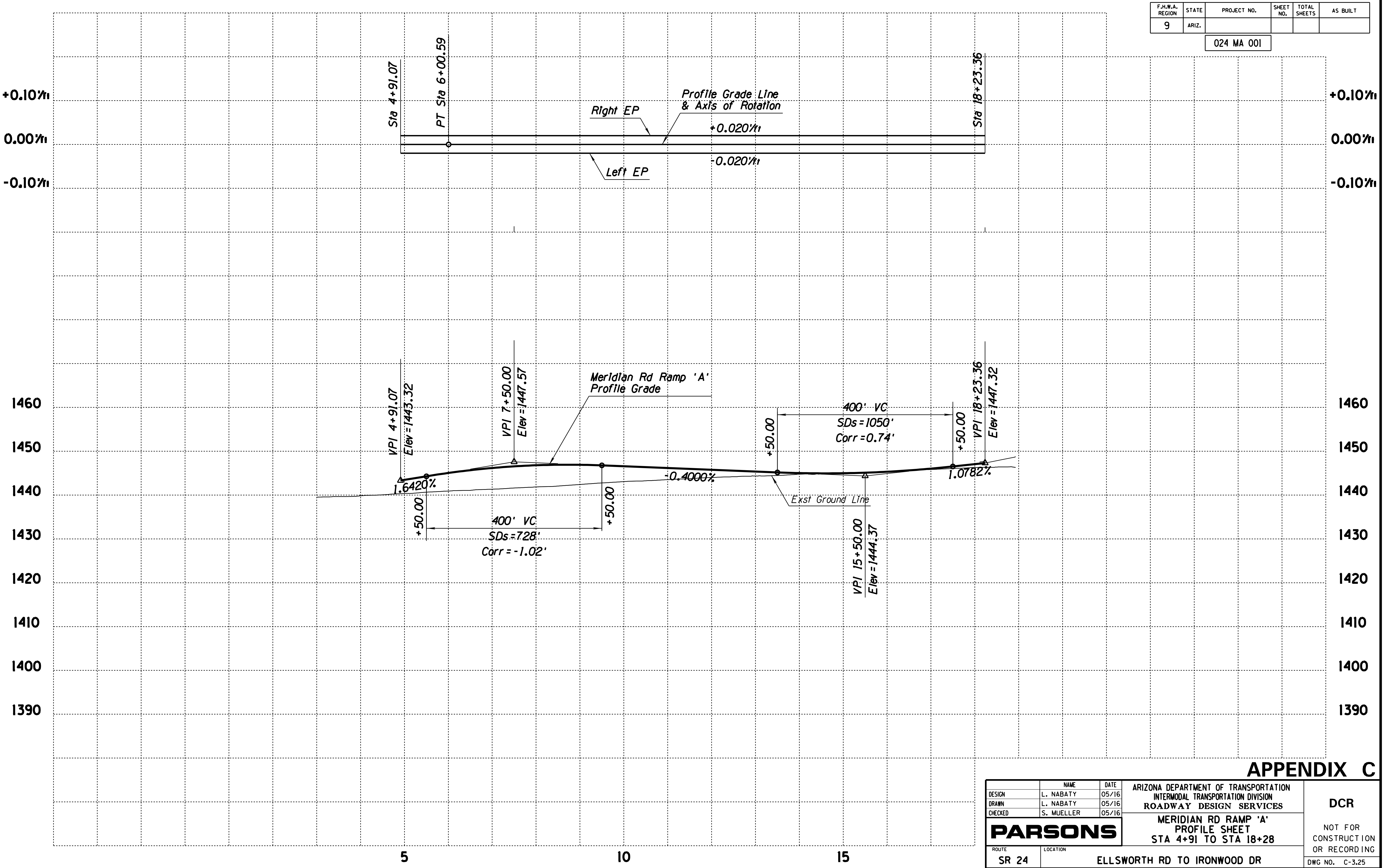
REVISIONS-

FINISHED PLANS-

SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MERIDIAN RD RAMP 'A'
PROFILE SHEET
STA 4+91 TO STA 18+28

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

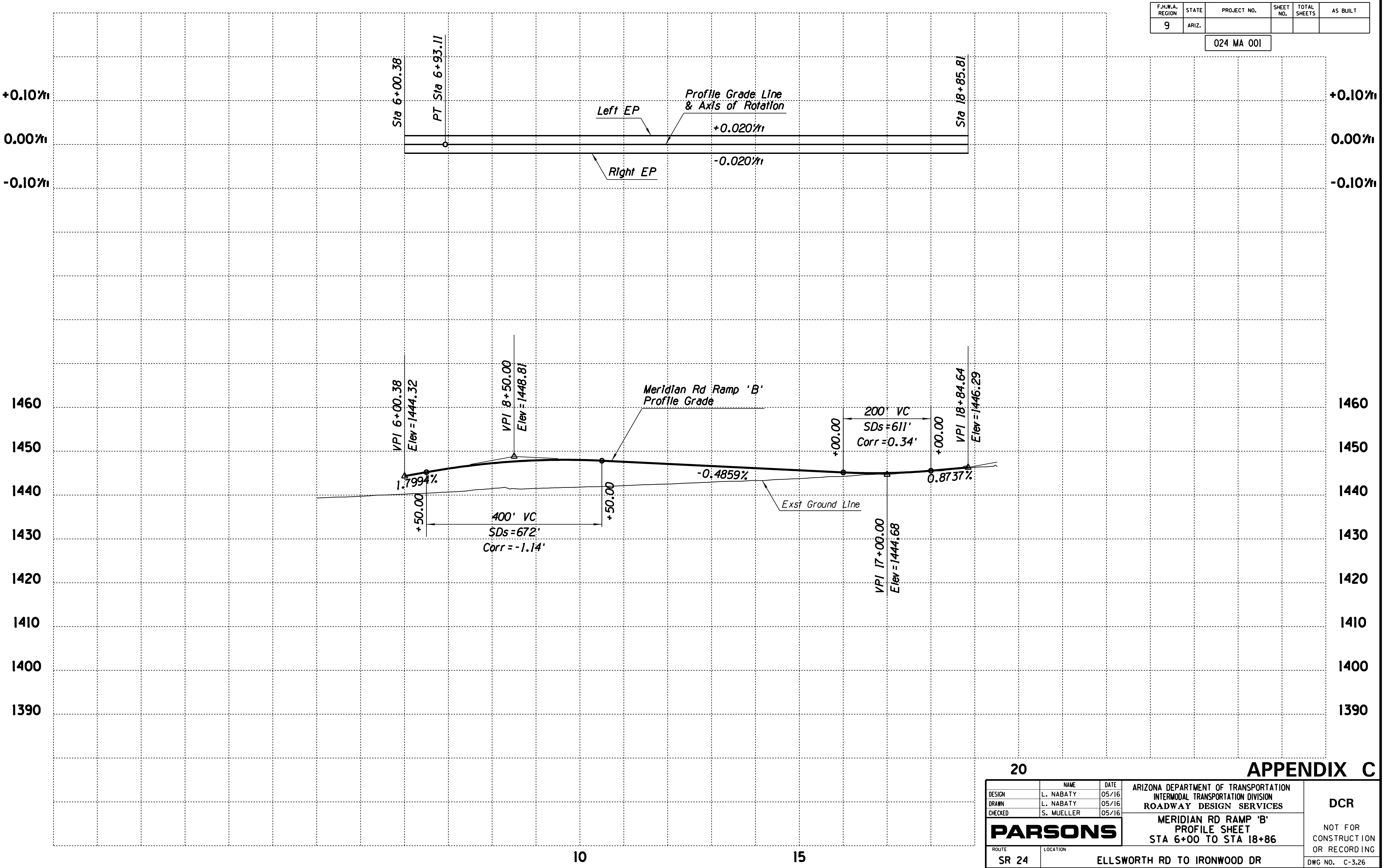
DWG NO. C-3.25

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MERIDIAN RD RAMP 'B'
PROFILE SHEET
STA 6+00 TO STA 18+86

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.26

TRACS NO. H8915 01L/02L

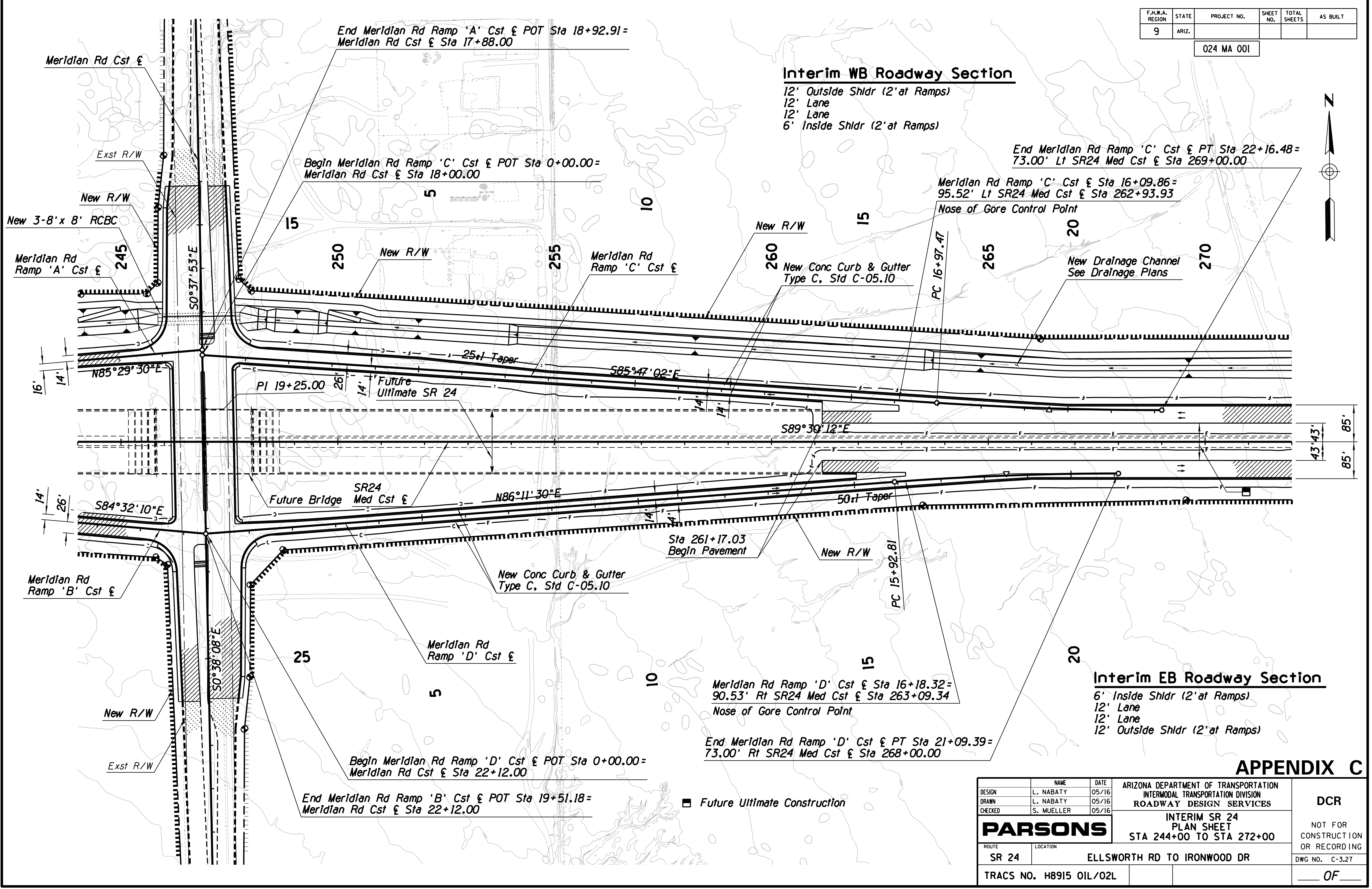
____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

APPENDIX C



	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 244+00 TO STA 272+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

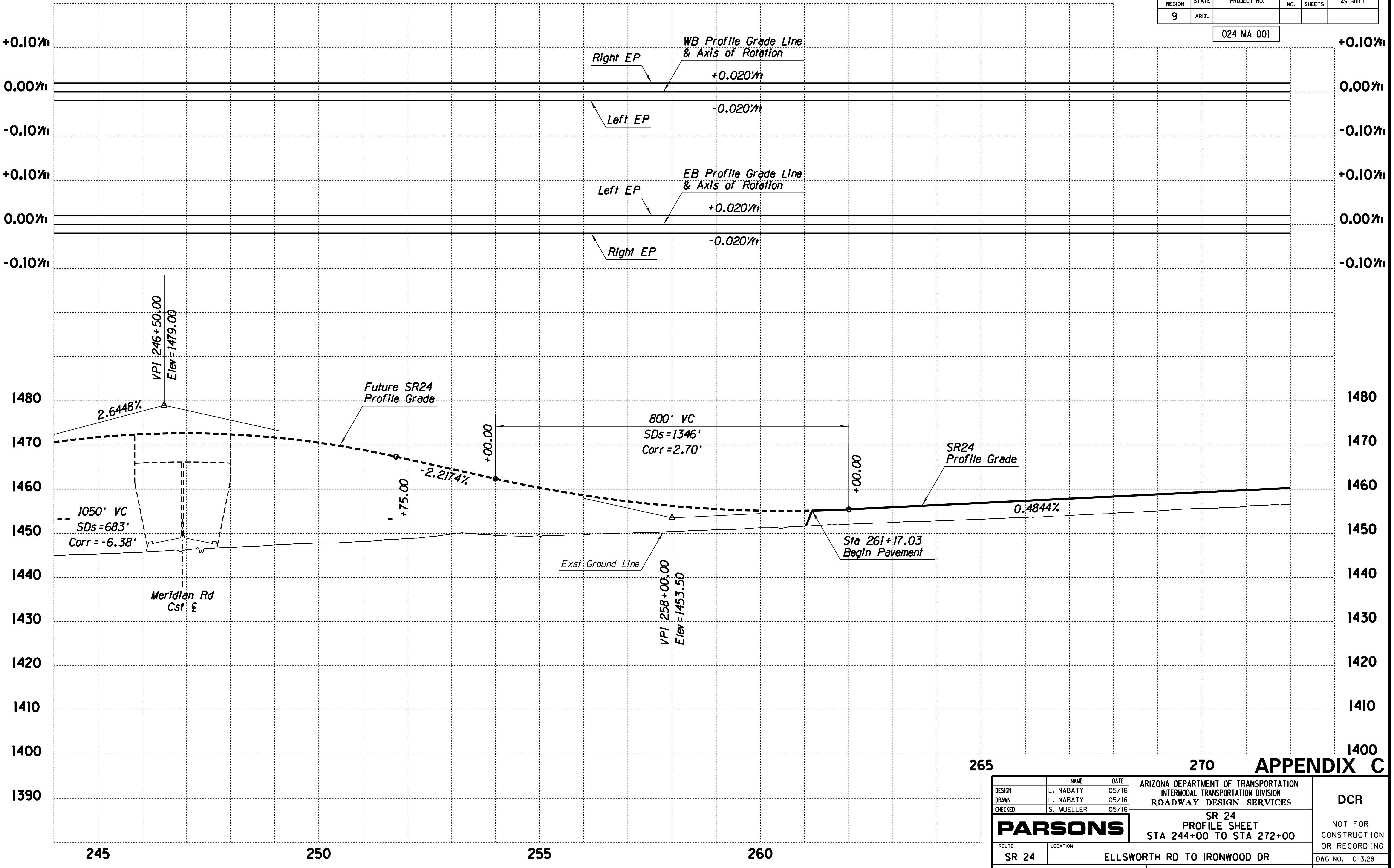
DWG NO. C-3.27

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 244+00 TO STA 272+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.28

TRACS NO. H8915 01L/02L

____ OF ____

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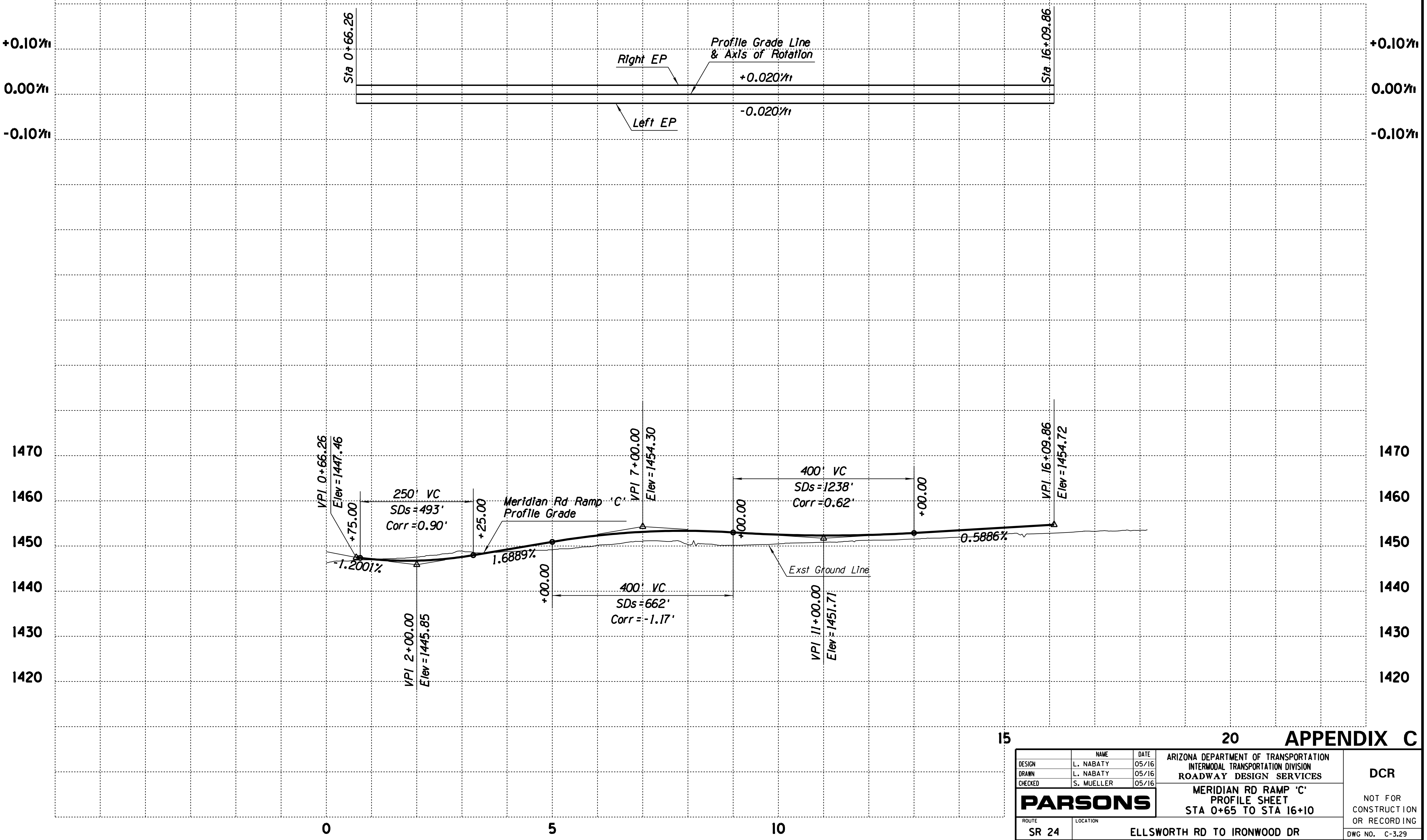
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MERIDIAN RD RAMP 'C'
PROFILE SHEET
STA 0+65 TO STA 16+10

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

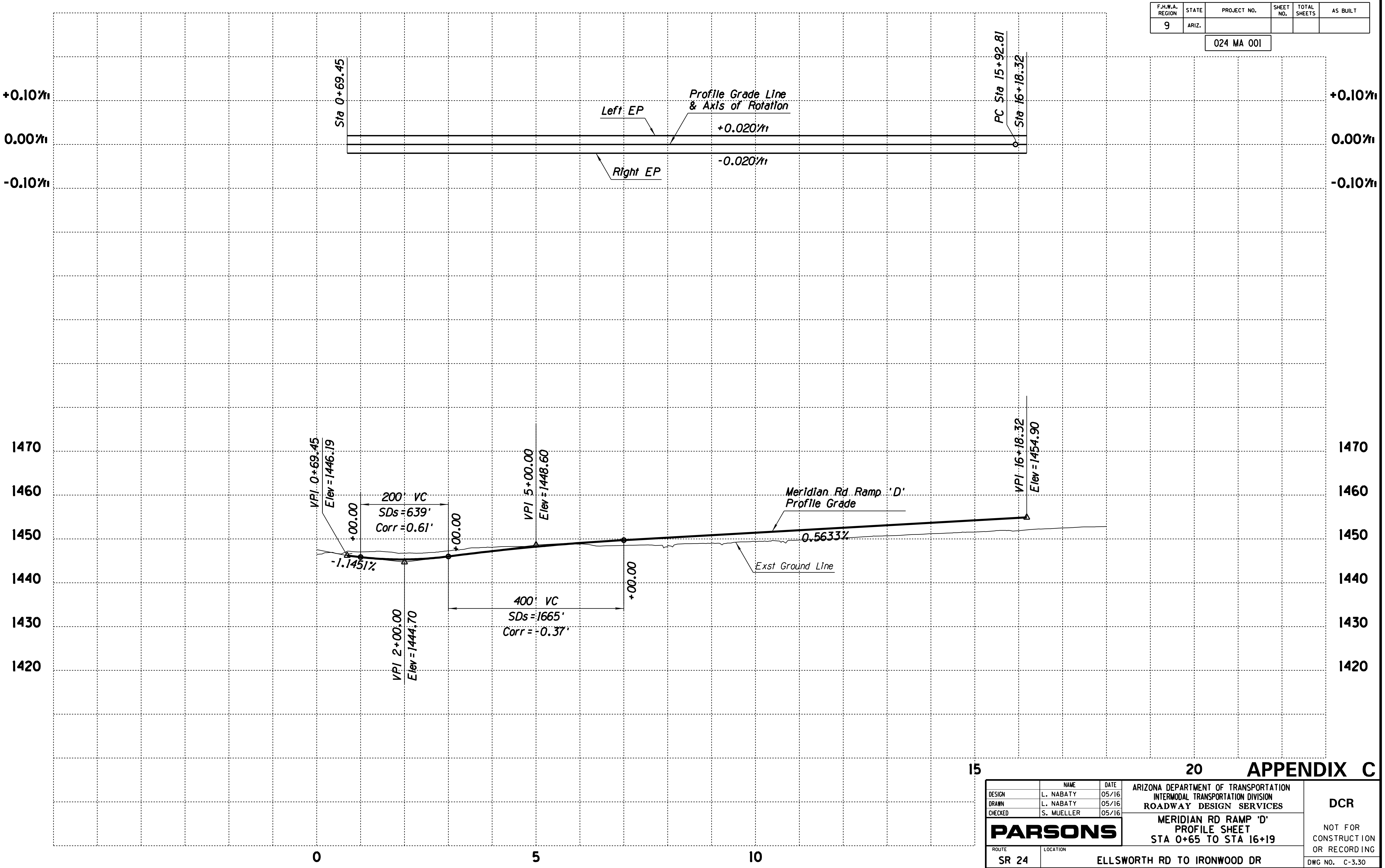
DWG NO. C-3.29

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MERIDIAN RD RAMP 'D'
PROFILE SHEET
STA 0+65 TO STA 16+19

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.30

TRACS NO. H8915 01L/02L

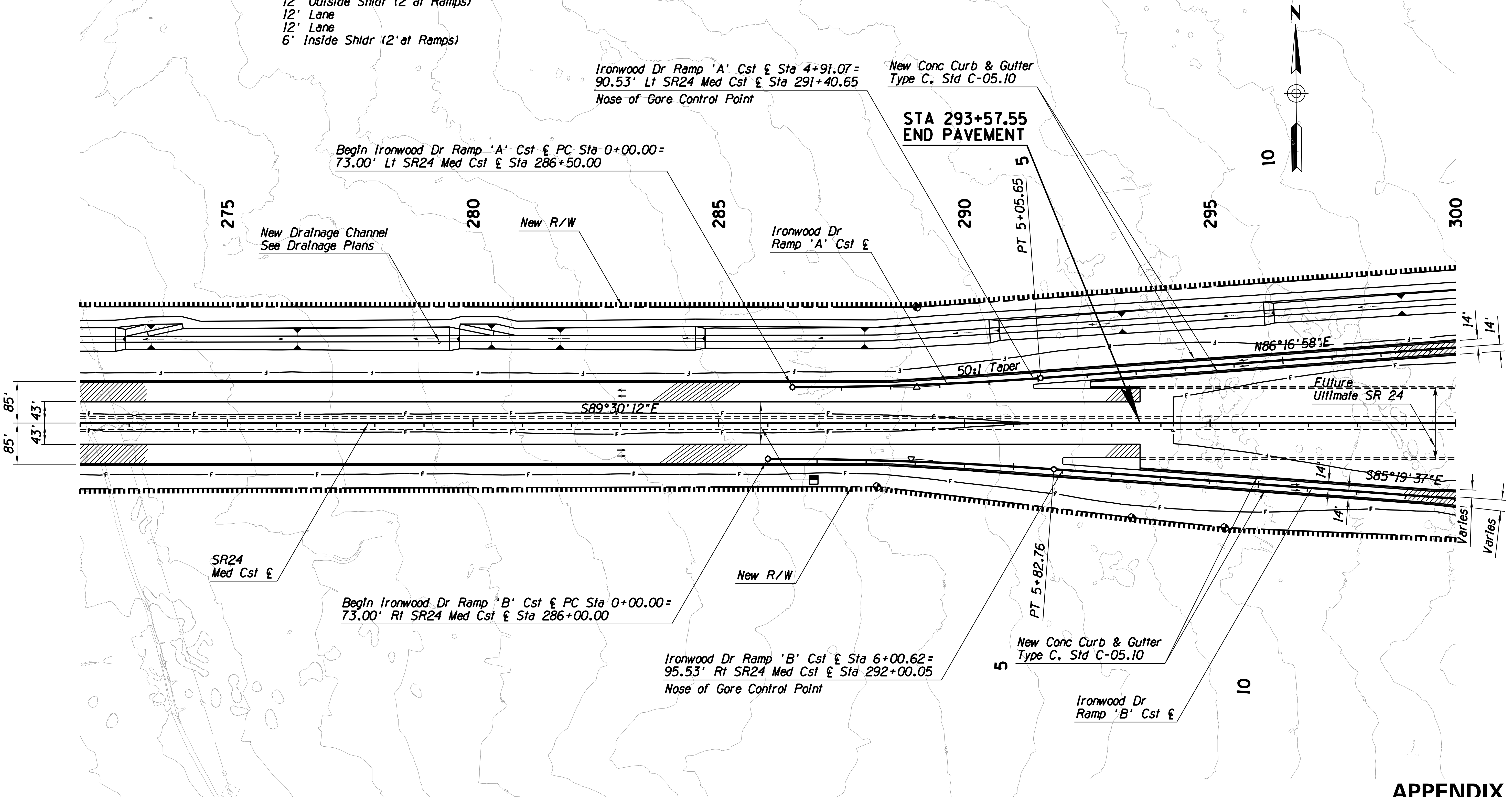
____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)



▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 272+00 TO STA 300+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

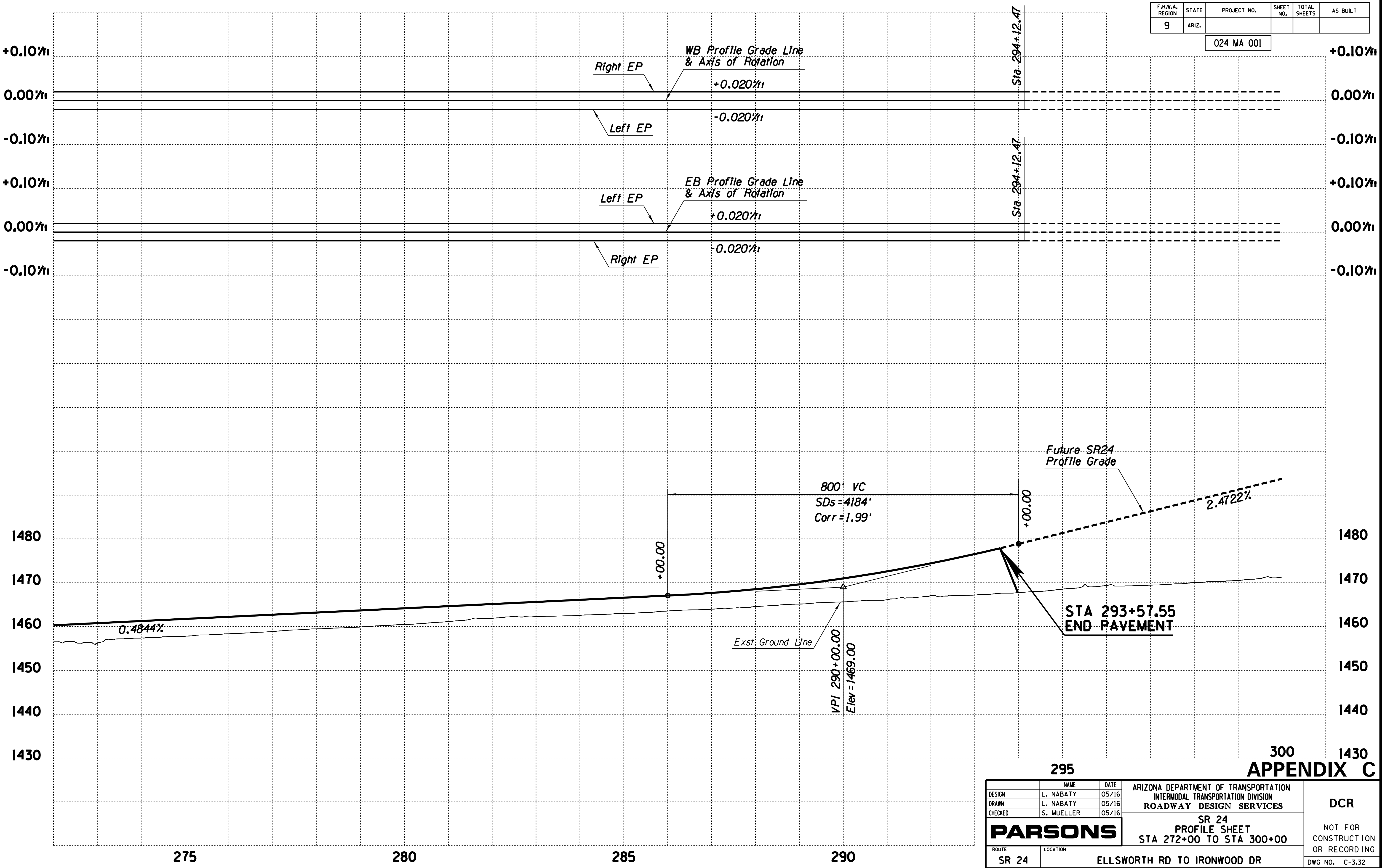
DWG NO. C-3.31

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 272+00 TO STA 300+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.32

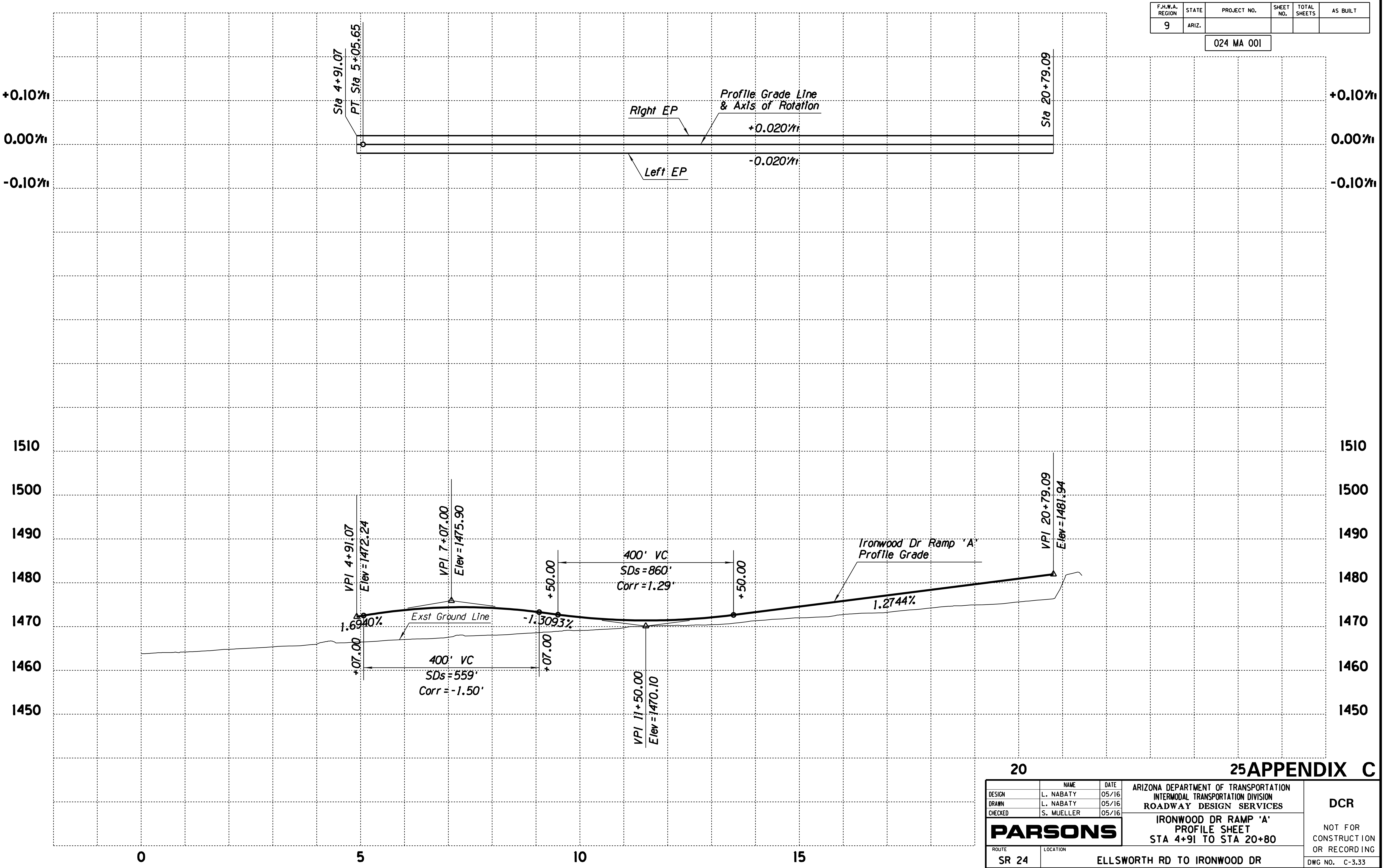
TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

IRONWOOD DR RAMP 'A'
PROFILE SHEET
STA 4+91 TO STA 20+80

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

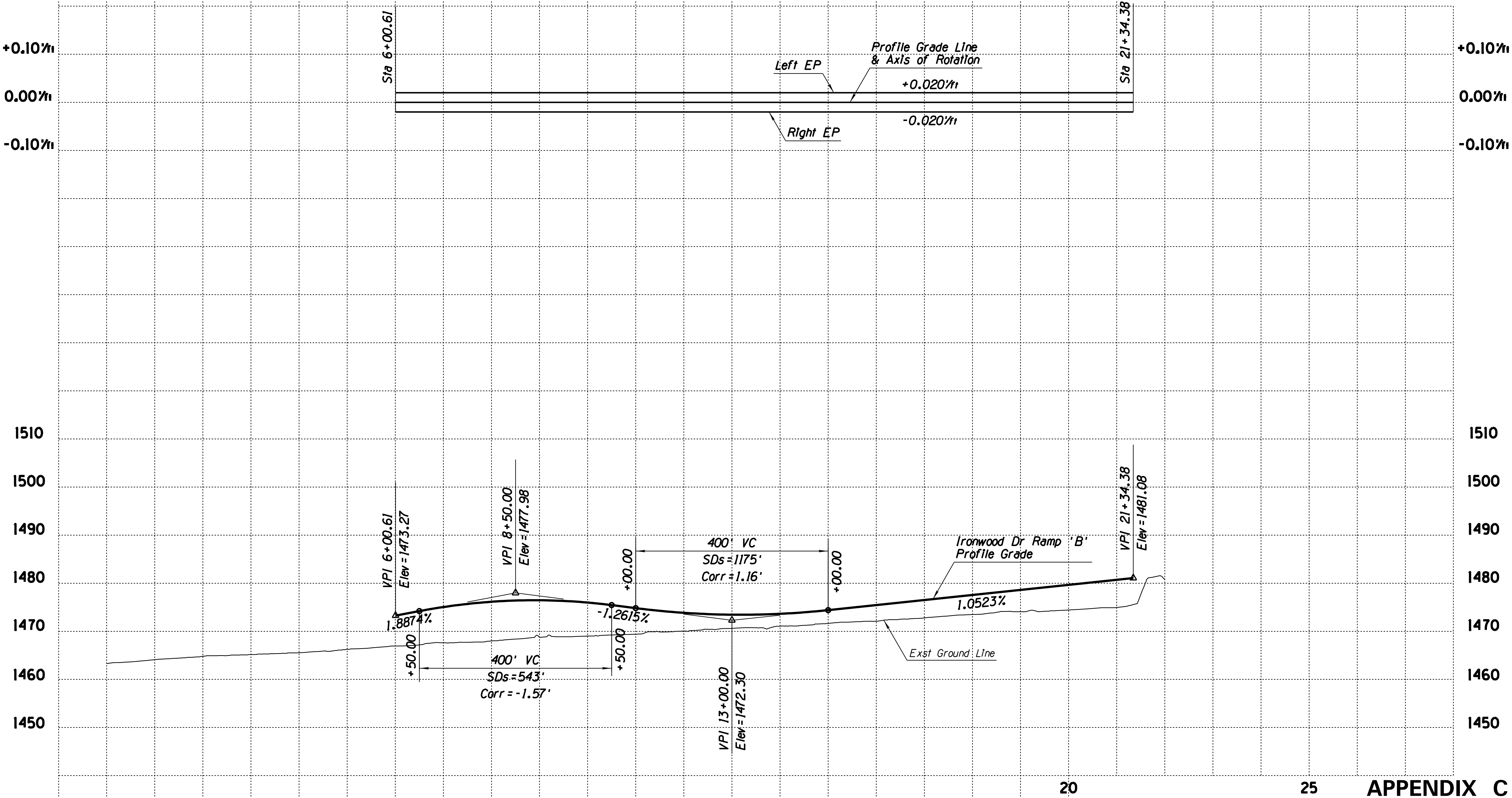
DWG NO. C-3.33

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



5 10 15 20 25

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

DCR

PARSONS

IRONWOOD DR RAMP 'B'
PROFILE SHEET
STA 6+55 TO STA 21+35

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

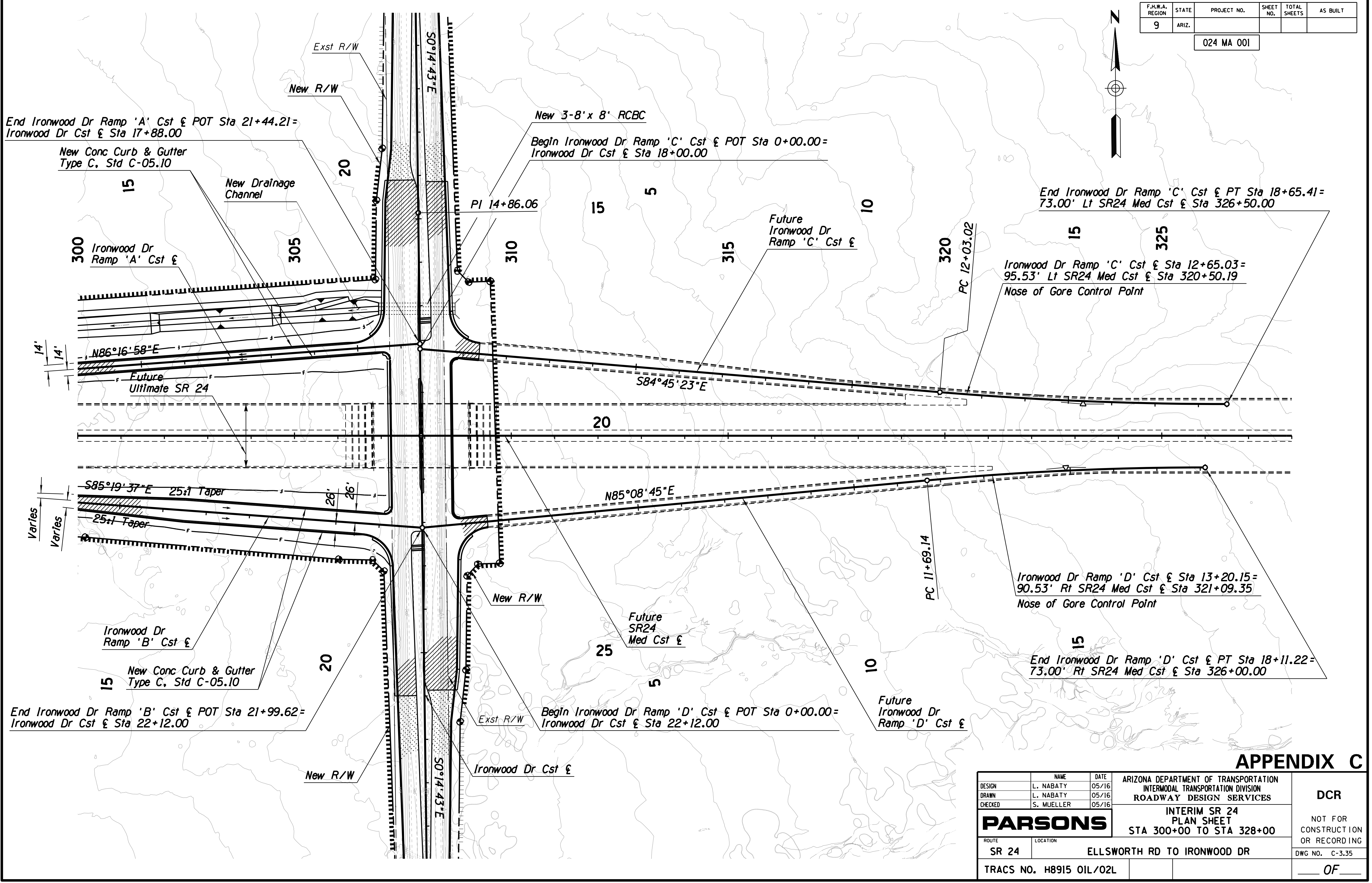
DWG NO. C-3.34

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 300+00 TO STA 328+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.35

TRACS NO. H8915 01L/02L

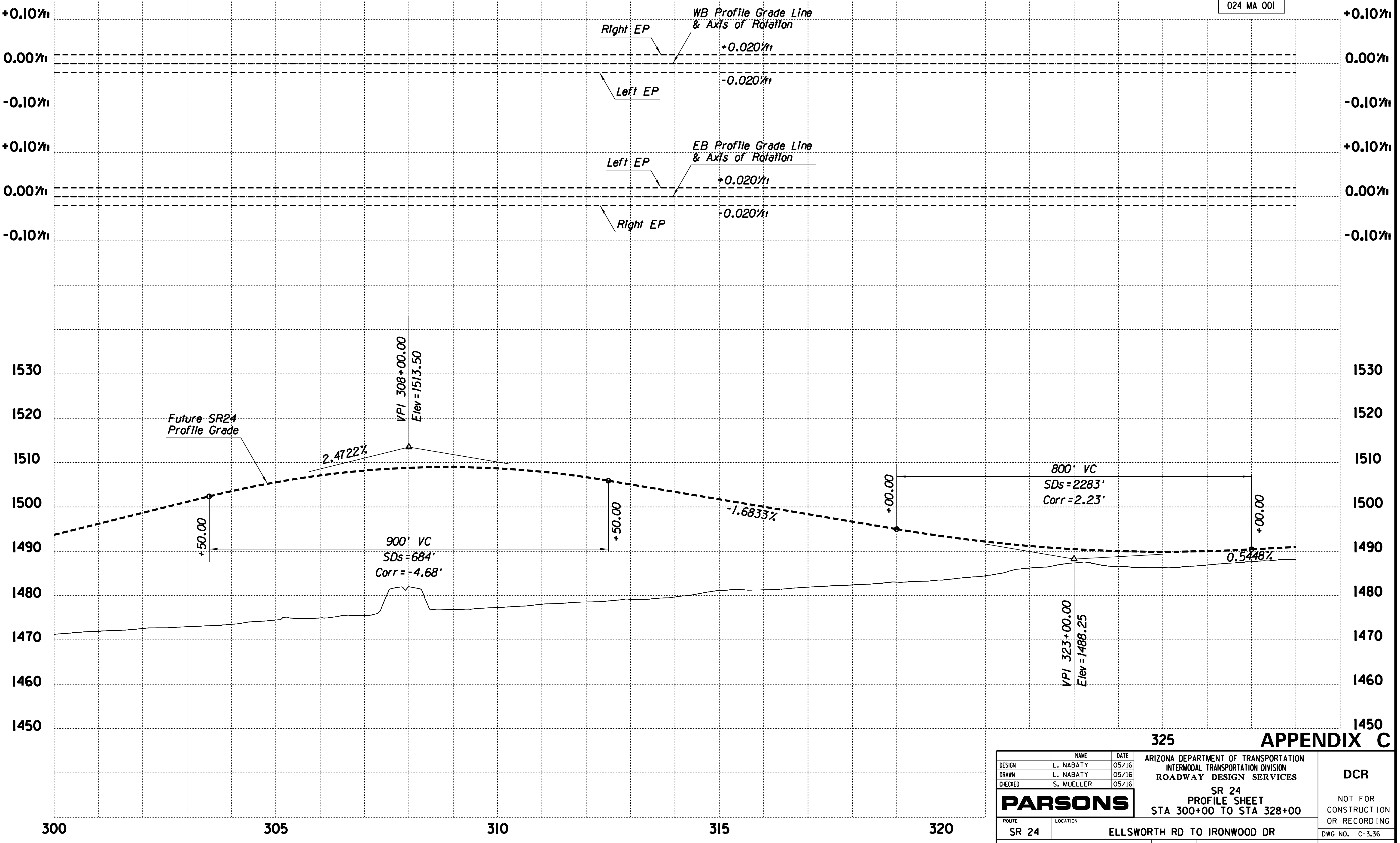
____ OF ____

79412 SR24_Roadway_Plans.tbl 11:26:29 AM 4/25/2016 c:\pw_working\azdot\79412\dms17776\C-3.35 h6867p23.dgn

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
PROFILE SHEET
STA 300+00 TO STA 328+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

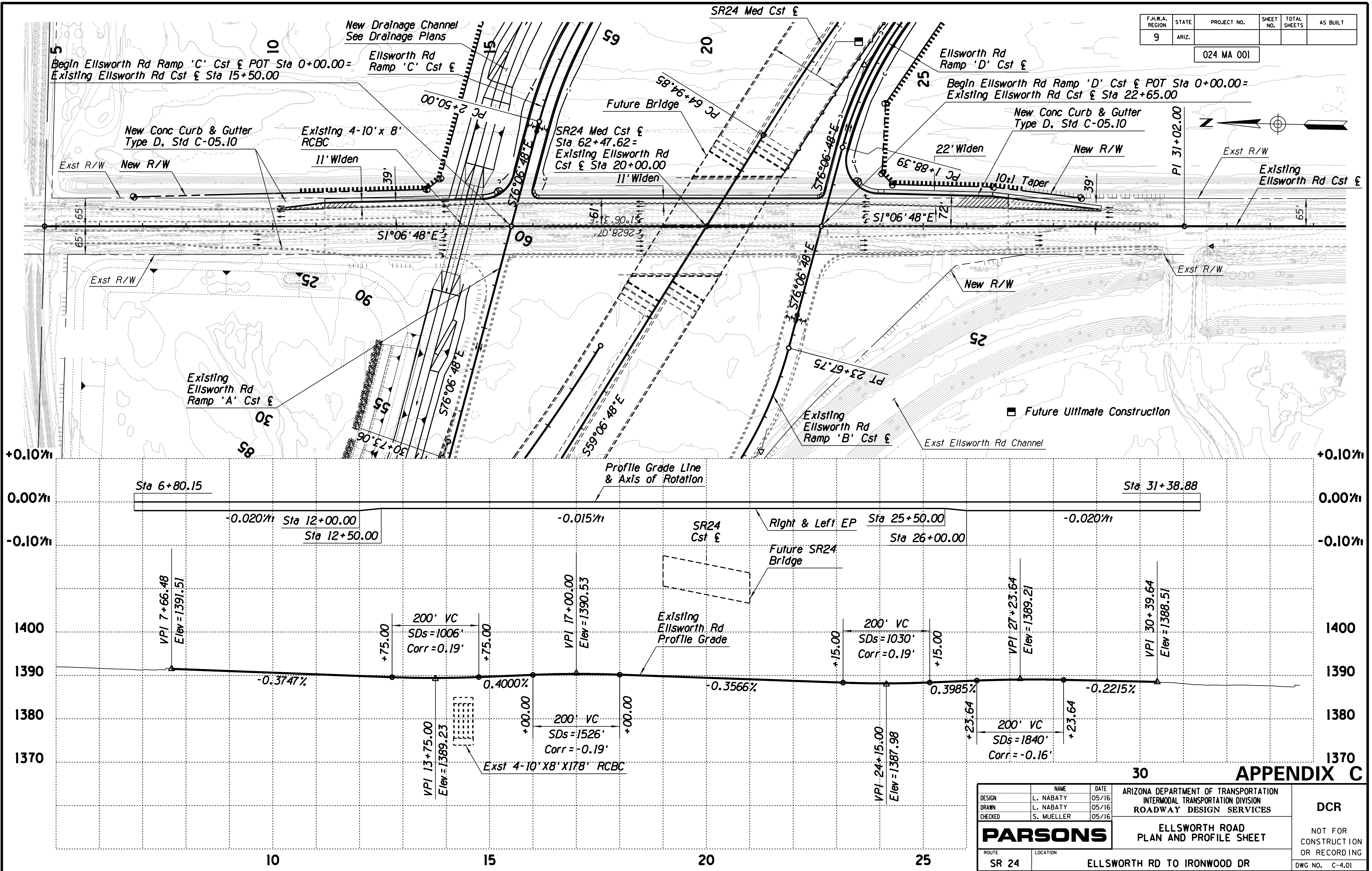
DWG NO. C-3.36

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

30

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

PARSONS

ELLSWORTH ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

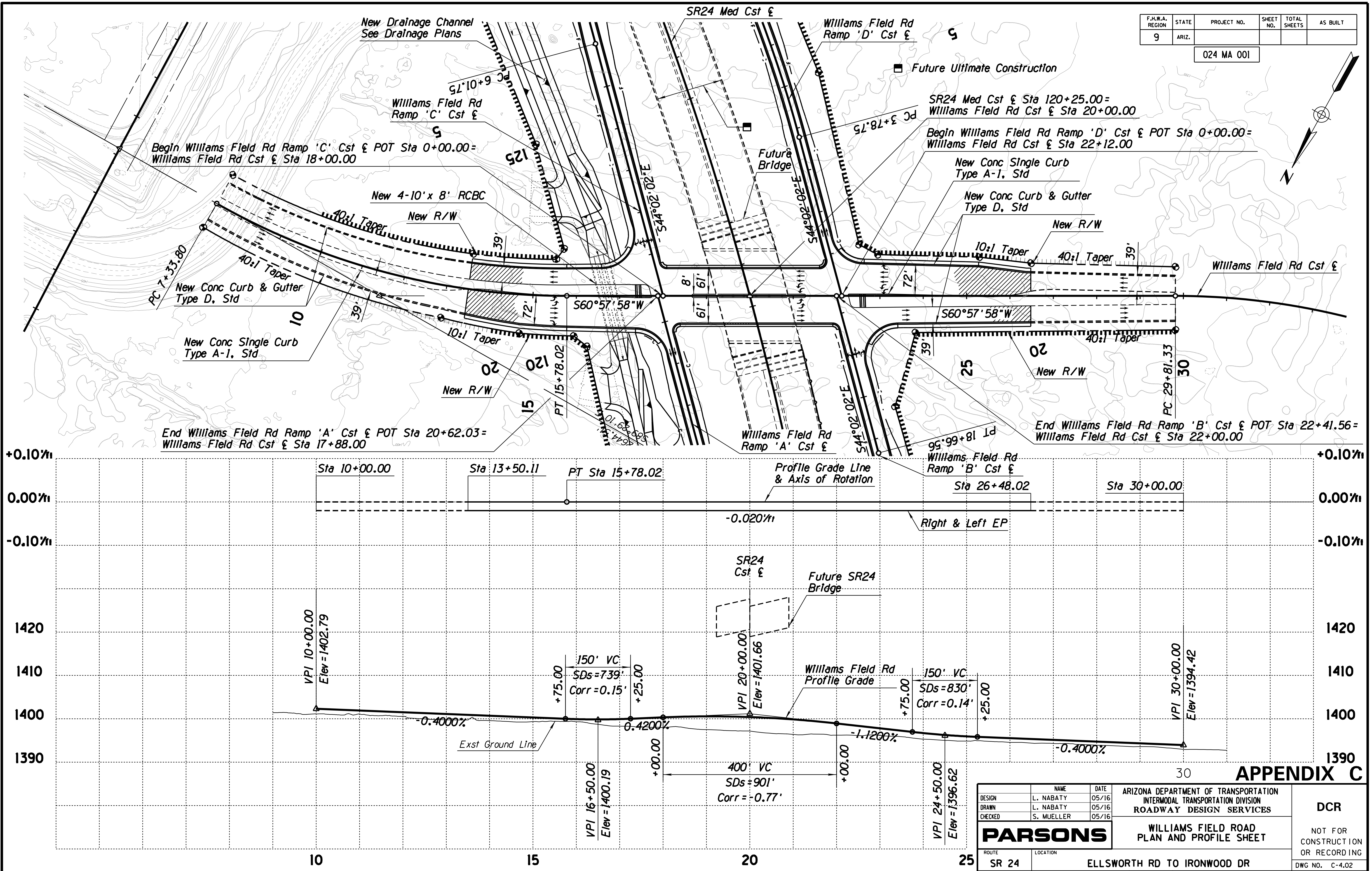
DWG NO. C-4.01

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



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APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

WILLIAMS FIELD ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

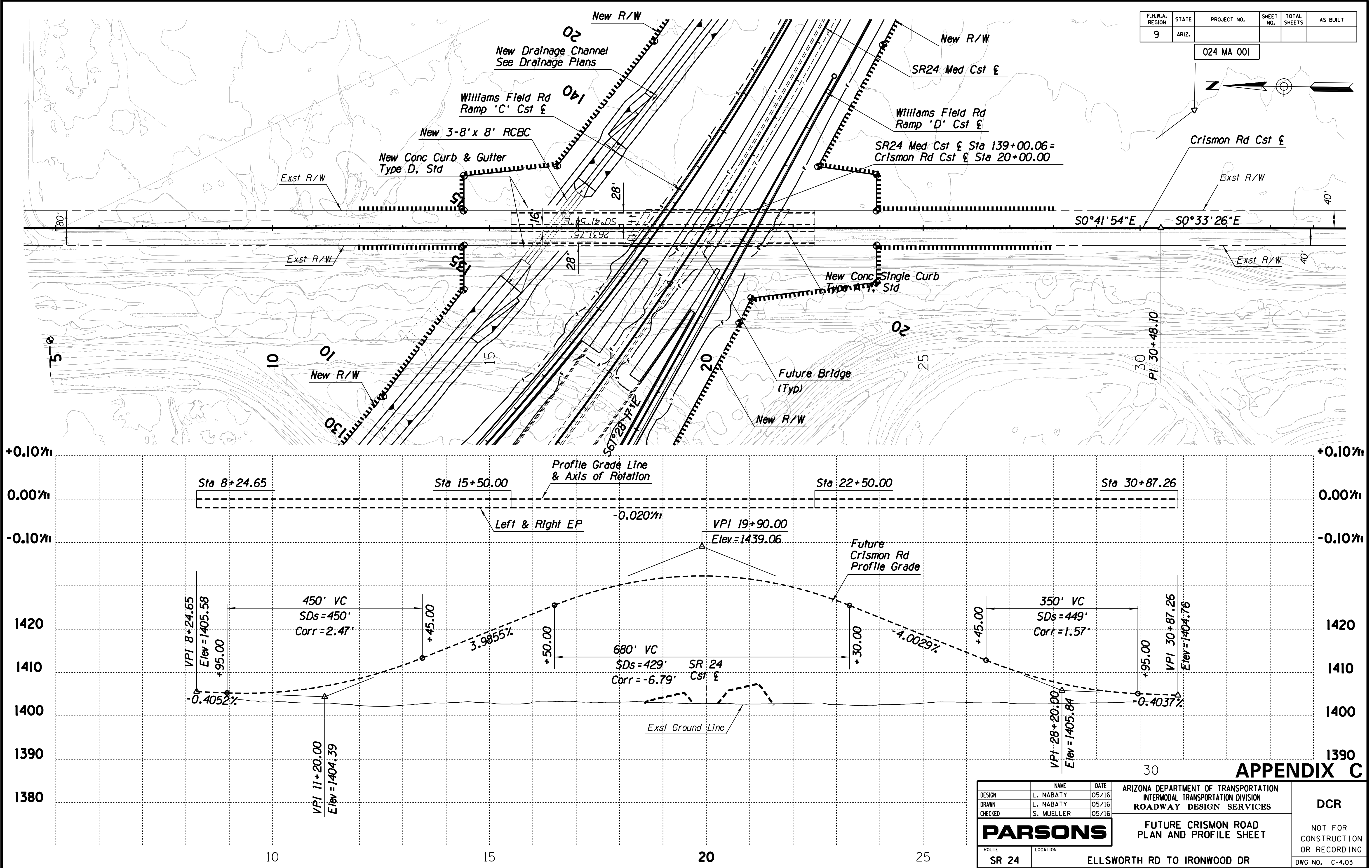
DWG NO. C-4.02

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

FUTURE CRISMON ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-4.03

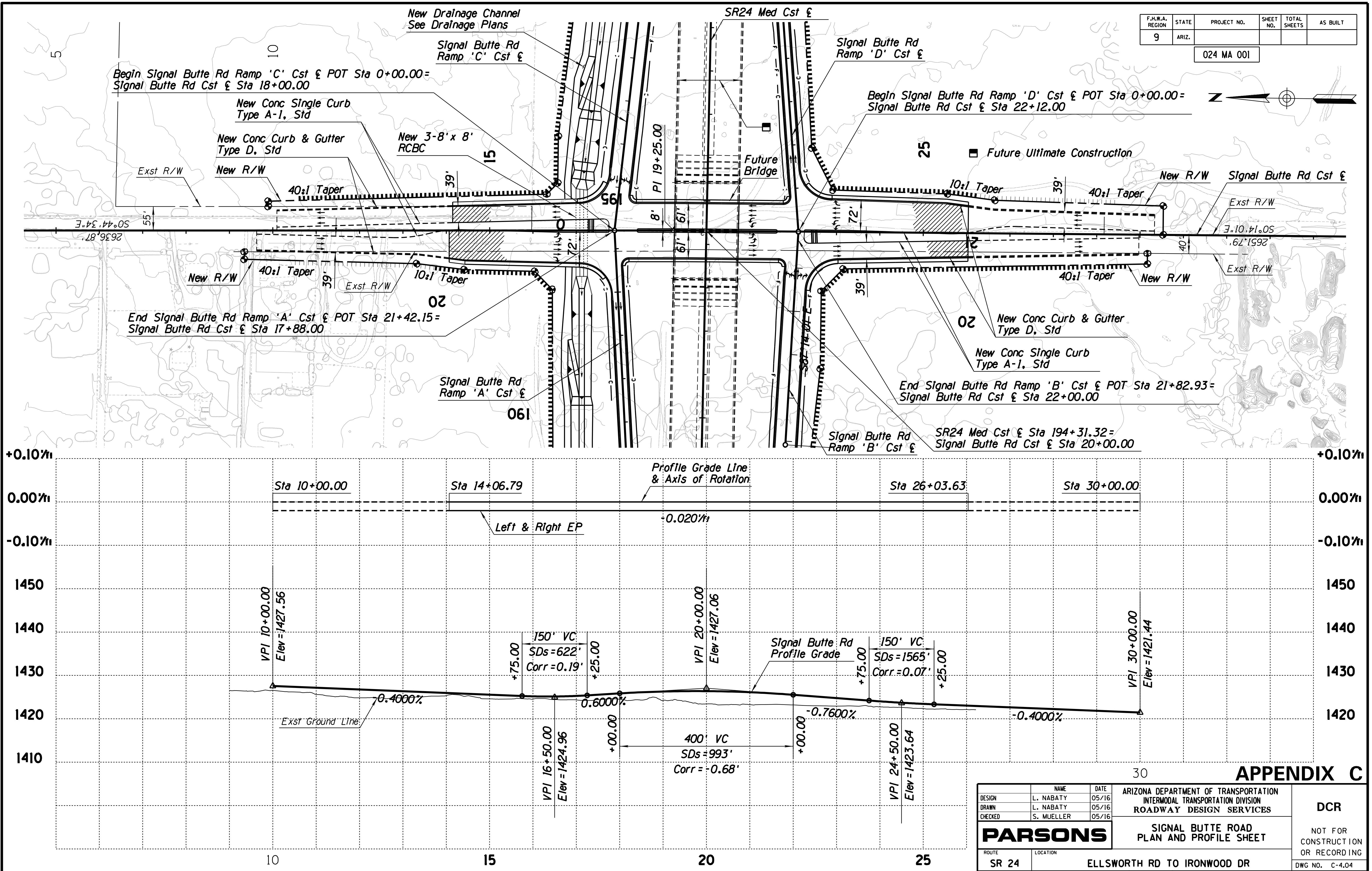
TRACS NO. H8915 01L/02L

____ OF ____

79412 SR24_Roadway_Plans.tbl 11:27:26 AM 4/25/2016 c:\pw_working\azdot\79412\dms17776\C-4.03 h6867p28.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SIGNAL BUTTE ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

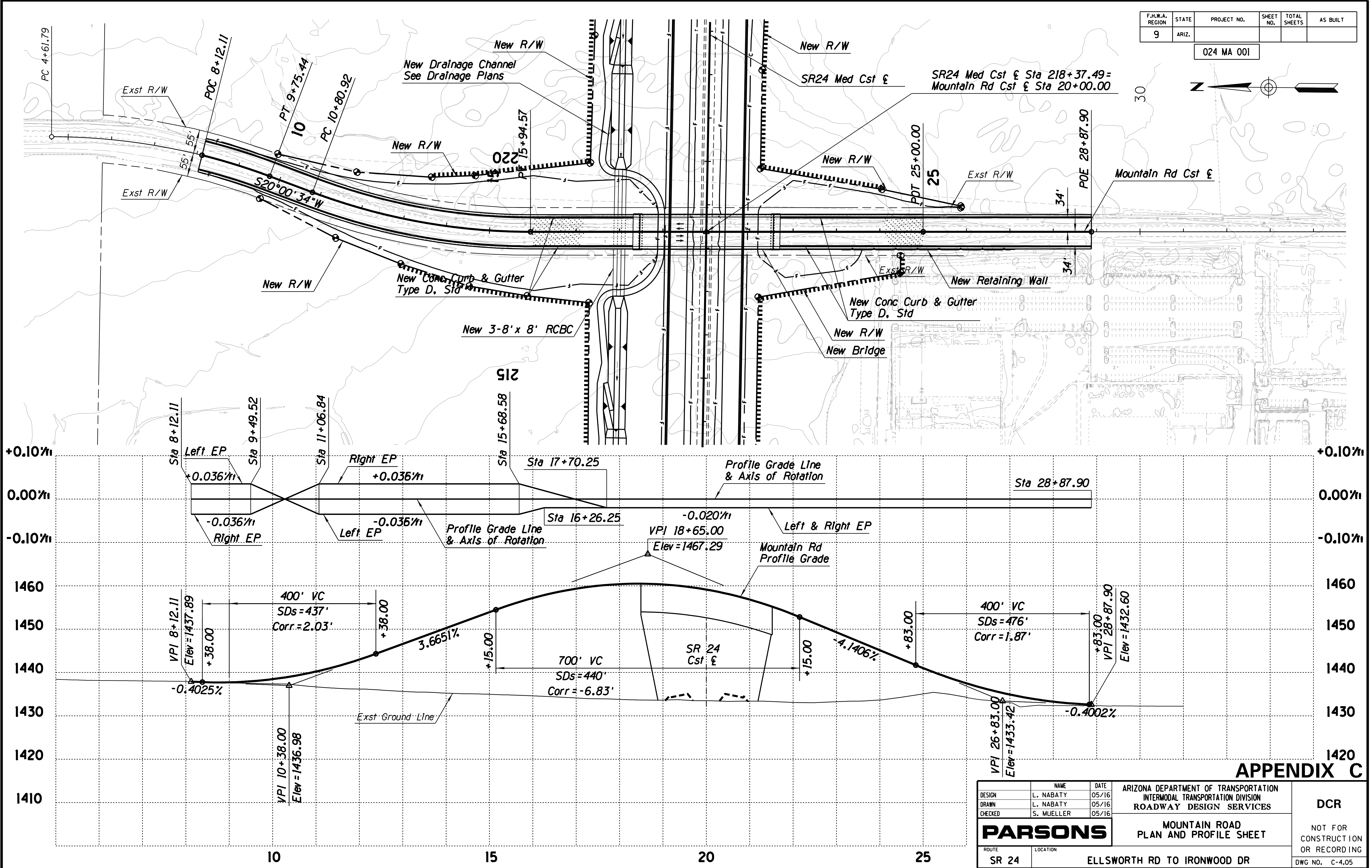
ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-4.04

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MOUNTAIN ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

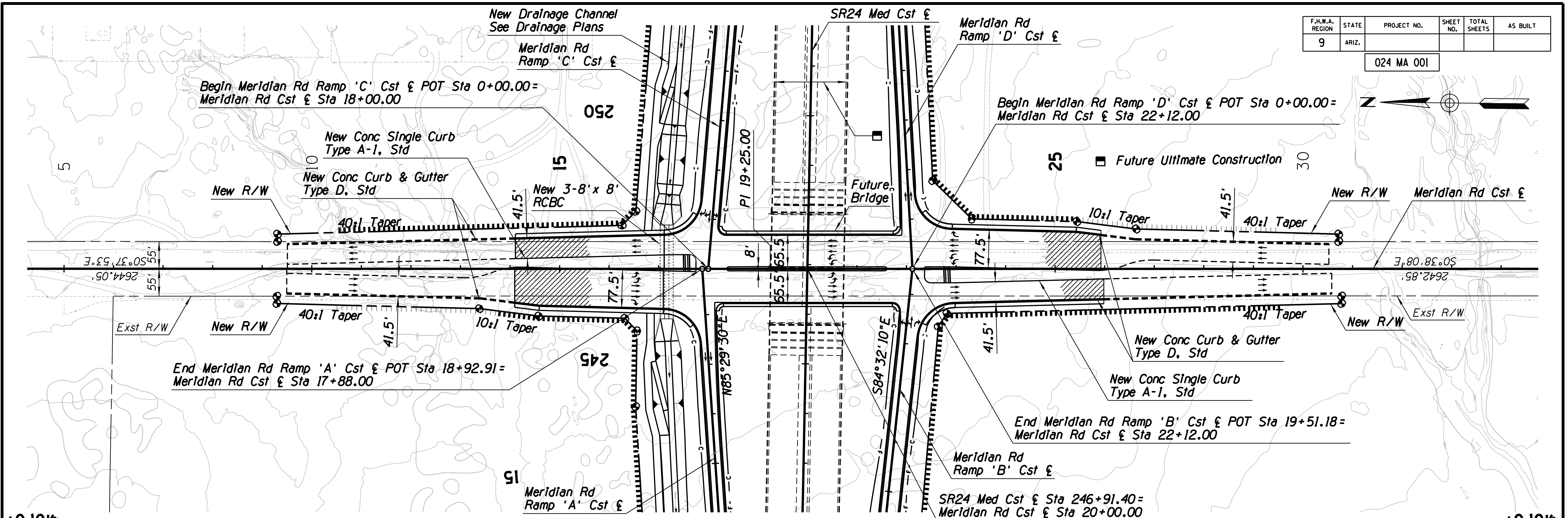
DWG NO. C-4.05

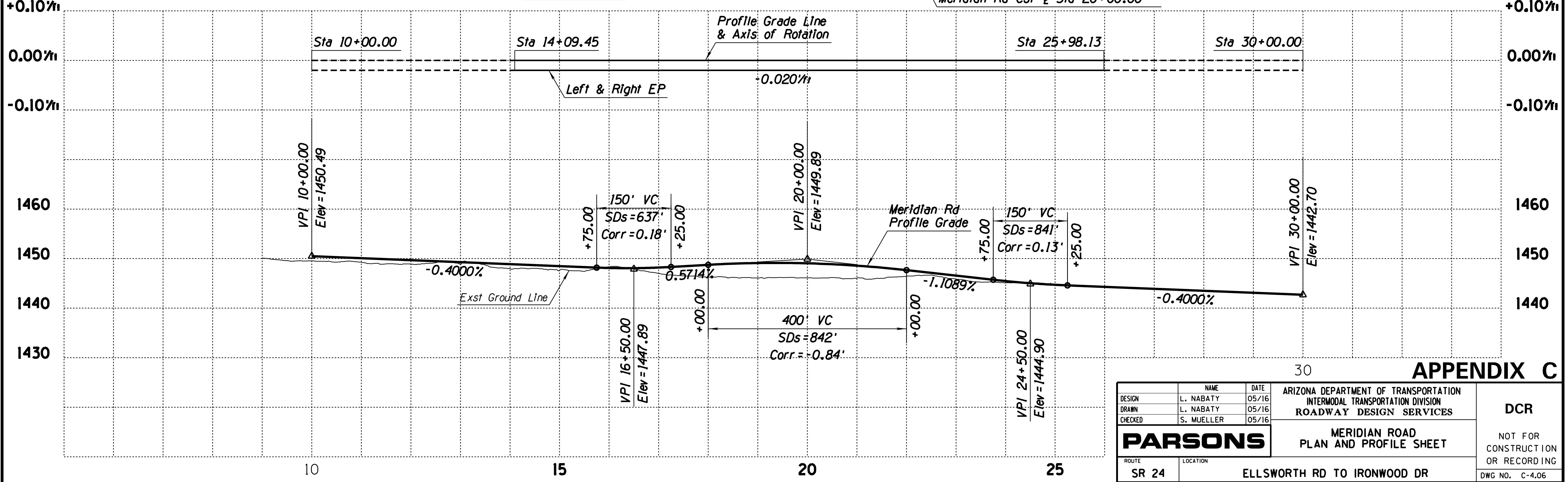
TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001





APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MERIDIAN ROAD
PLAN AND PROFILE SHEET

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

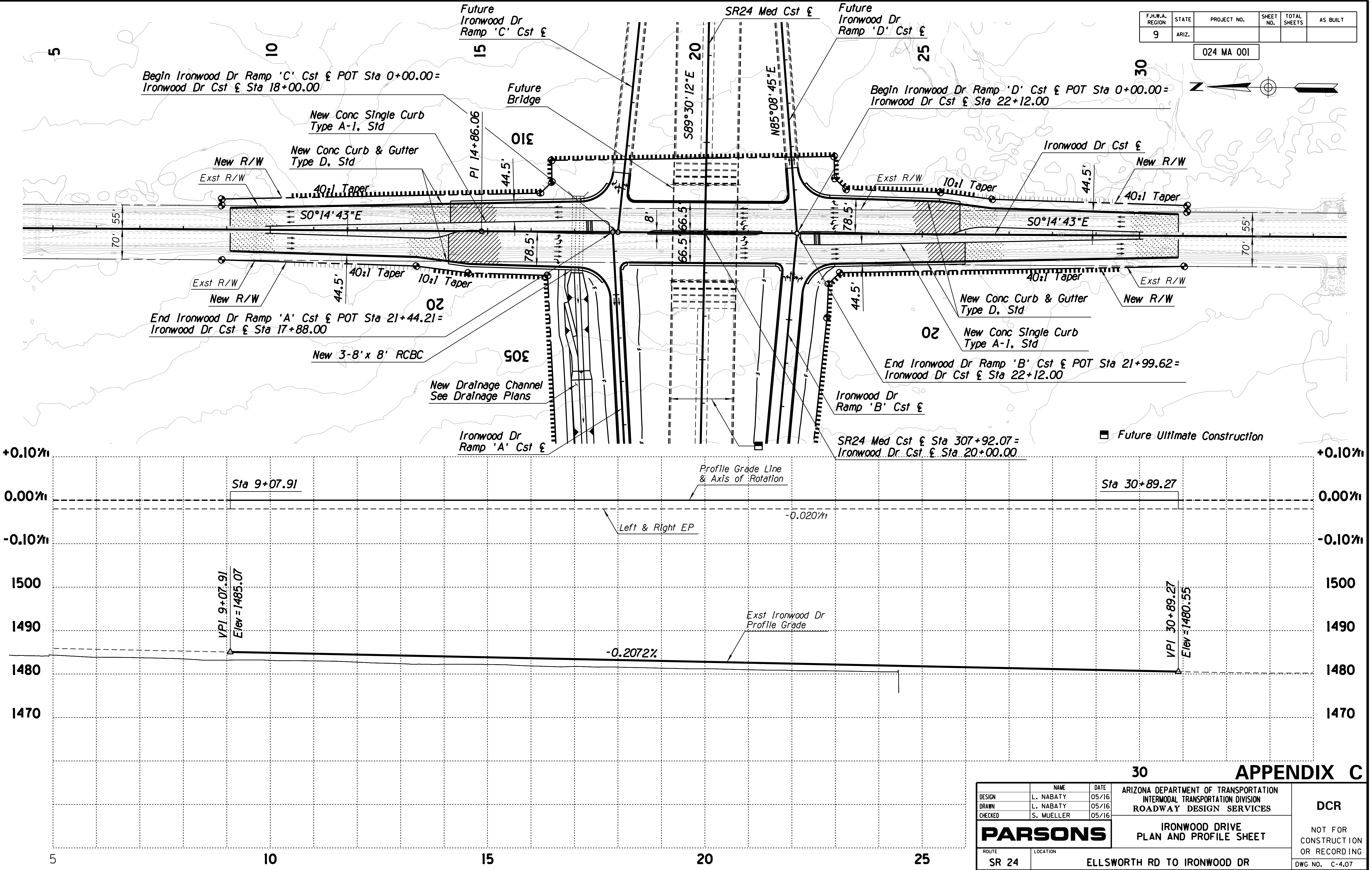
DWG NO. C-4.06

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

IRONWOOD DRIVE
PLAN AND PROFILE SHEET

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-4.07

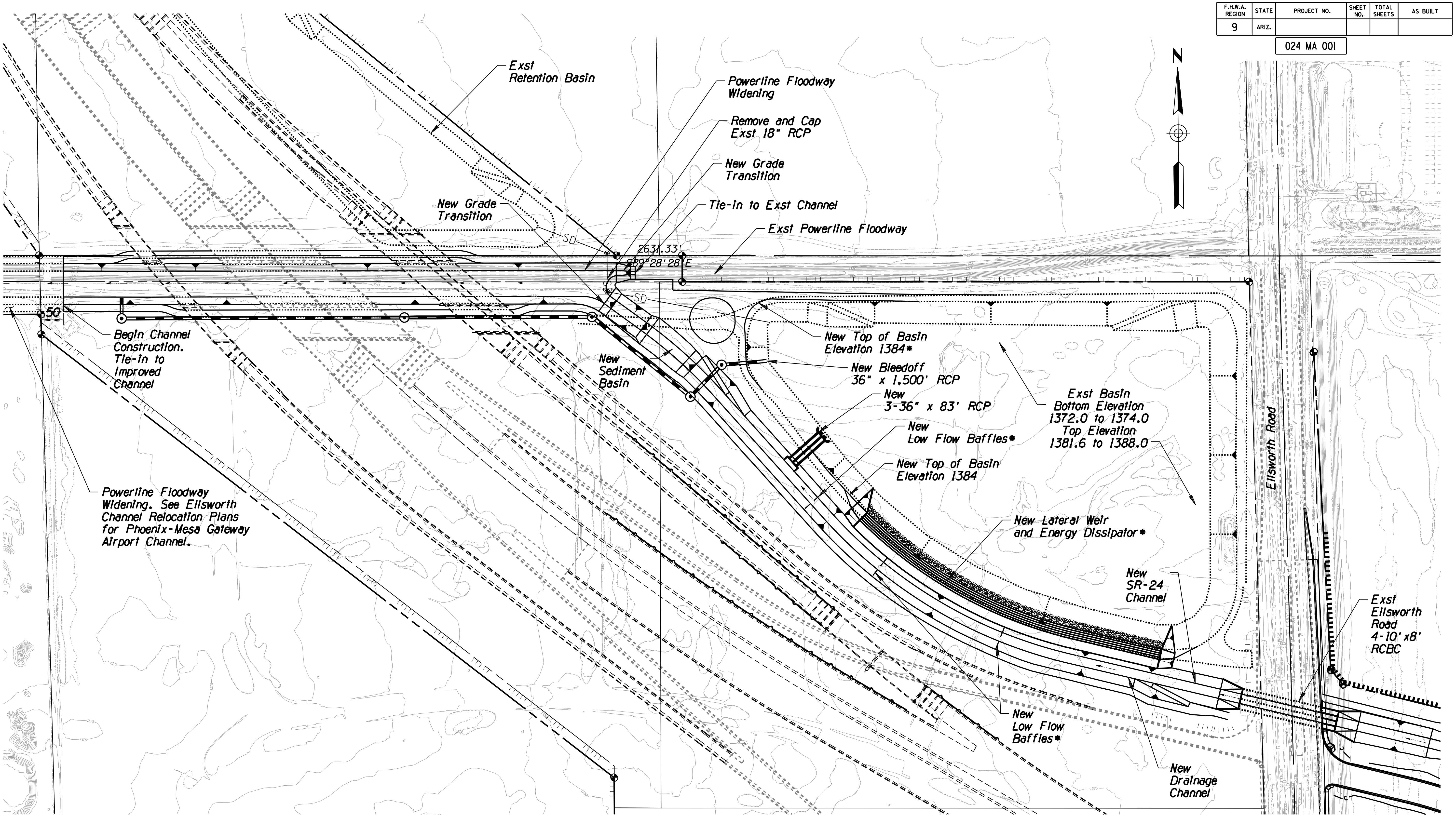
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



DESIGN NOTE:

* The Lateral Weir (740 LF), Low Flow Baffles and elevated top of basin as shown are conceptual and will be refined in final design to reduce the estimated maximum 100-year, 24-hour channel peak flow discharging to Powerline Floodway to approximately 1,650 cfs. The maximum channel peak flow is estimated based on hydrology illustrating the January 2016 development conditions, and assuming that the SR-24 alignment extends to Central Arizona Project Canal intercepting all flows approaching from the north and the northeast. As development progress, peak flows reduce.
The SR-24 Interim Phase II off-site channel will collect flows only to Ironwood Drive. The length and operation of the lateral weir and of the Ellsworth Road Basin should be revised based on the magnitude of the peak flow at the time of construction.

	NAME	DATE
DESIGN	L. FERRERAS	07/16
DRAWN	A. ISLAM	07/16
CHECKED	F. BRAILEANU	07/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLSWORTH BASIN
LAYOUT PLAN

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. D-1.01

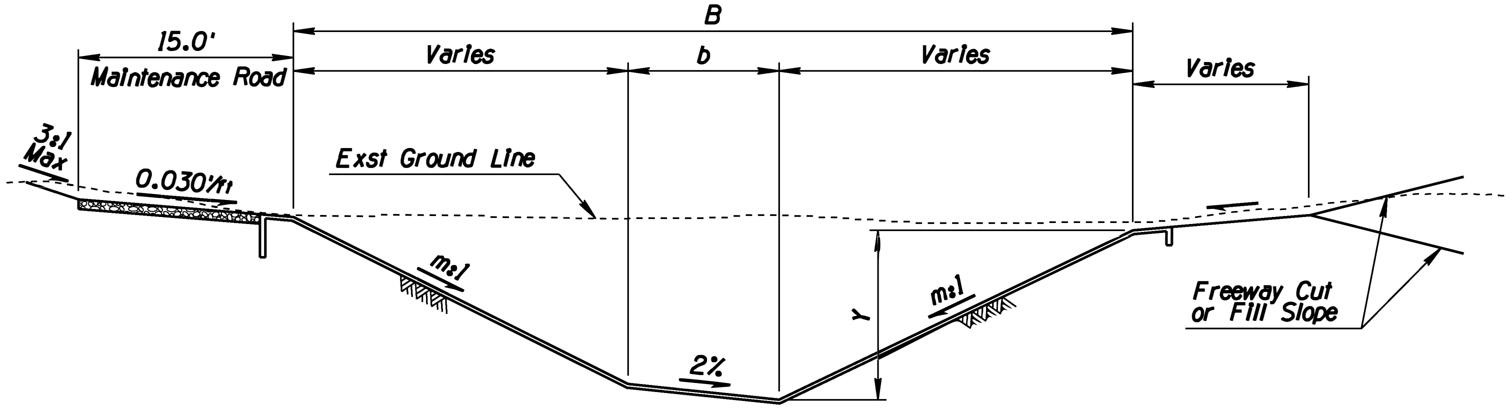
TRACS NO. H8915 01L/02L

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



TYPICAL SECTION

Stationing	From Station	To Station	Bottom Width (b) 1	Side Slope (m:1)	Depth (Y) 1	Top Width (T) 1,2
Ellsworth, Ramp A	9+21	26+01	20	2	9.25	56.5
SR 24	60+44	120+04	20	2	9.25	55.2
	122+13	135+97	12-20 ^{3}	2	7.75	42.5-50.5
	138+06	193+20	12	2	7.75	42.5-50.5
	195+21	216+85	12	2	7.25	40.5-48.5
	219+79	245+85	12	2	7.25	40.5-48.5
	247+75	306+94	12	2	7.25	40.5-48.5

Notes:

1. *All Dimensions are in feet*
2. *Stepped Channel maximum top width accounts for a 2ft step.*
3. *Larger bottom width downstream of confluence with offsite channel from Pacific Proving Grounds North Developement west of Crismon Rd.*

	NAME	DATE
DESIGN	L. FERRERAS	02/16
DRAWN	A. ISLAM	02/16
CHECKED	F. BRAILEANU	02/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

OFFSITE CHANNEL
TYPICAL SECTION

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD RD

DWG NO. D-1.02

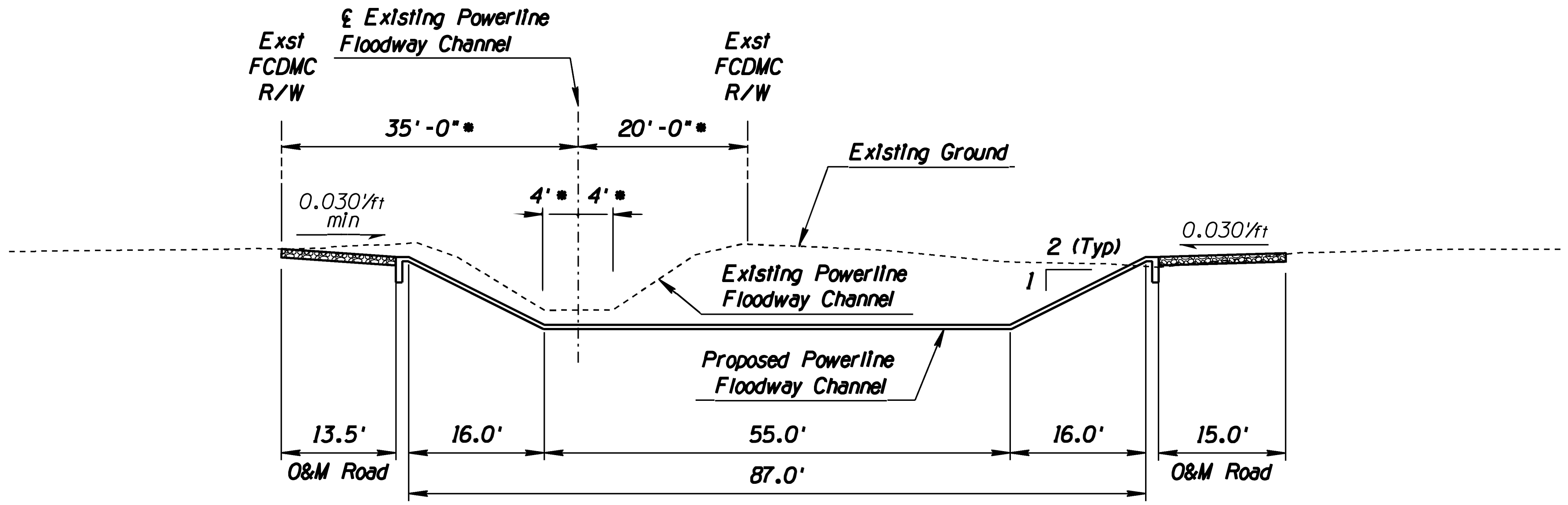
TRACS NO. H8915 01L/02L

___ OF ___

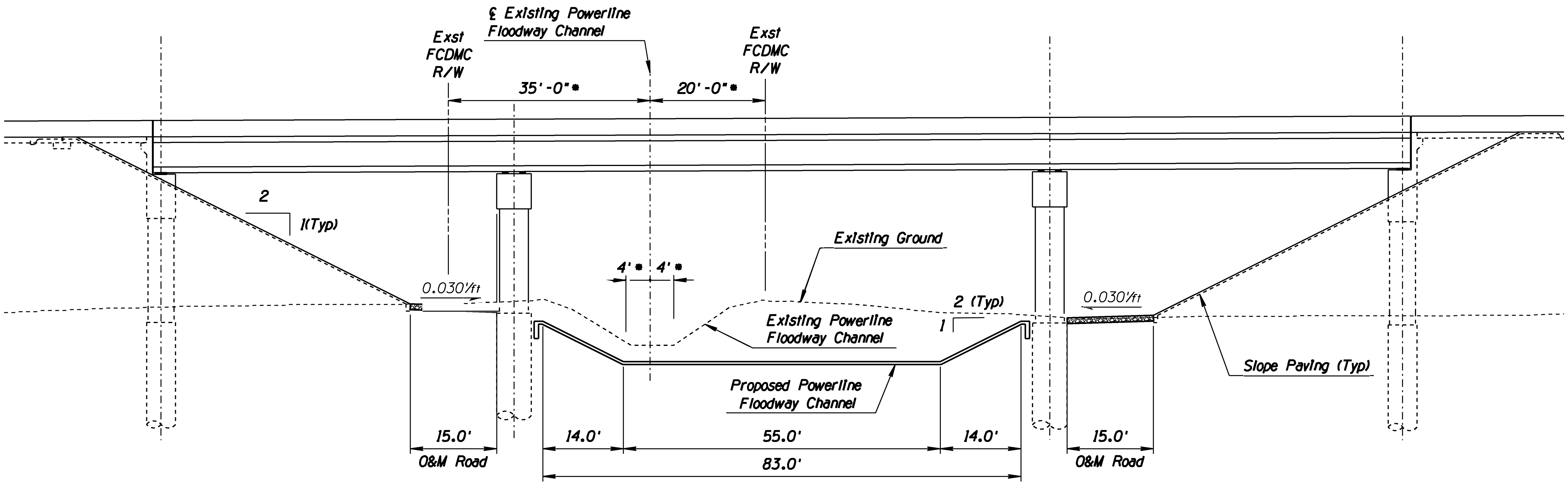
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



TYPICAL SECTION - POWERLINE FLOODWAY WIDENING
OUTSIDE OF SR 24 MAINLINE AND RAMP STRUCTURES



TYPICAL SECTION - POWERLINE FLOODWAY WIDENING
AT SR 24 MAINLINE AND RAMP STRUCTURES

* R/W Data Based on Powerline Floodway As-Built Plans.

Note: Dimensions are Normal to Channel.

	NAME	DATE
DESIGN	L. FERRERAS	07/16
DRAWN	A. ISLAM	07/16
CHECKED	F. BRAILEANU	07/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

POWERLINE FLOODWAY
TYPICAL SECTIONS

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

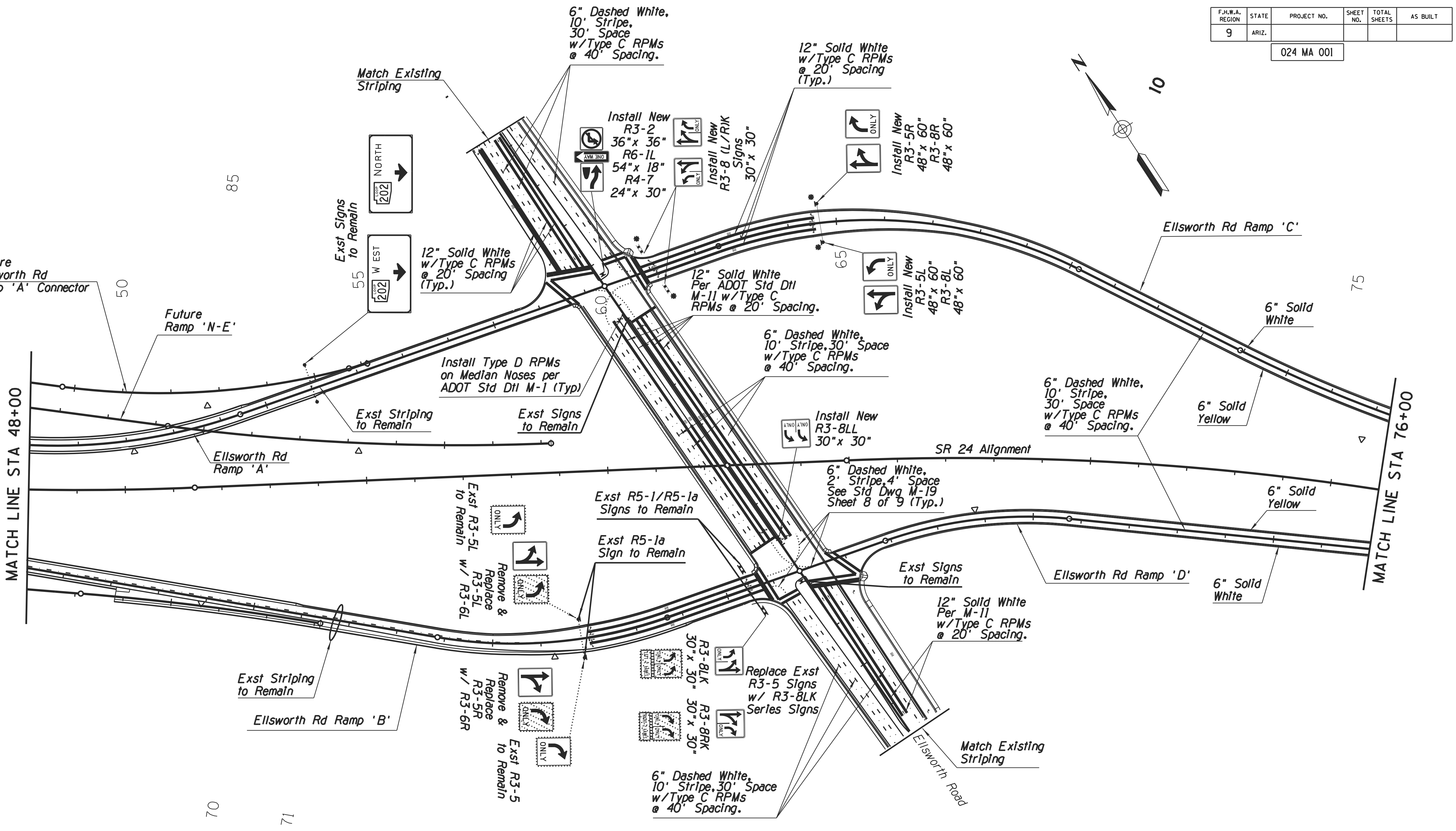
DWG NO. D-1.03

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

Note:
1. Install R5-1a and R5-1 (Wrong Way/Do Not Enter) Signage Per ADOT Latest Standards for Off Ramp Intersections
2. Install R5-1a (Wrong Way) Signs On Sign Structure Poles and Mast Arm Per ADOT Latest Standards

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 48+00 TO STA 76+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.01

TRACS NO. H8915 01L/02L

___ OF ___

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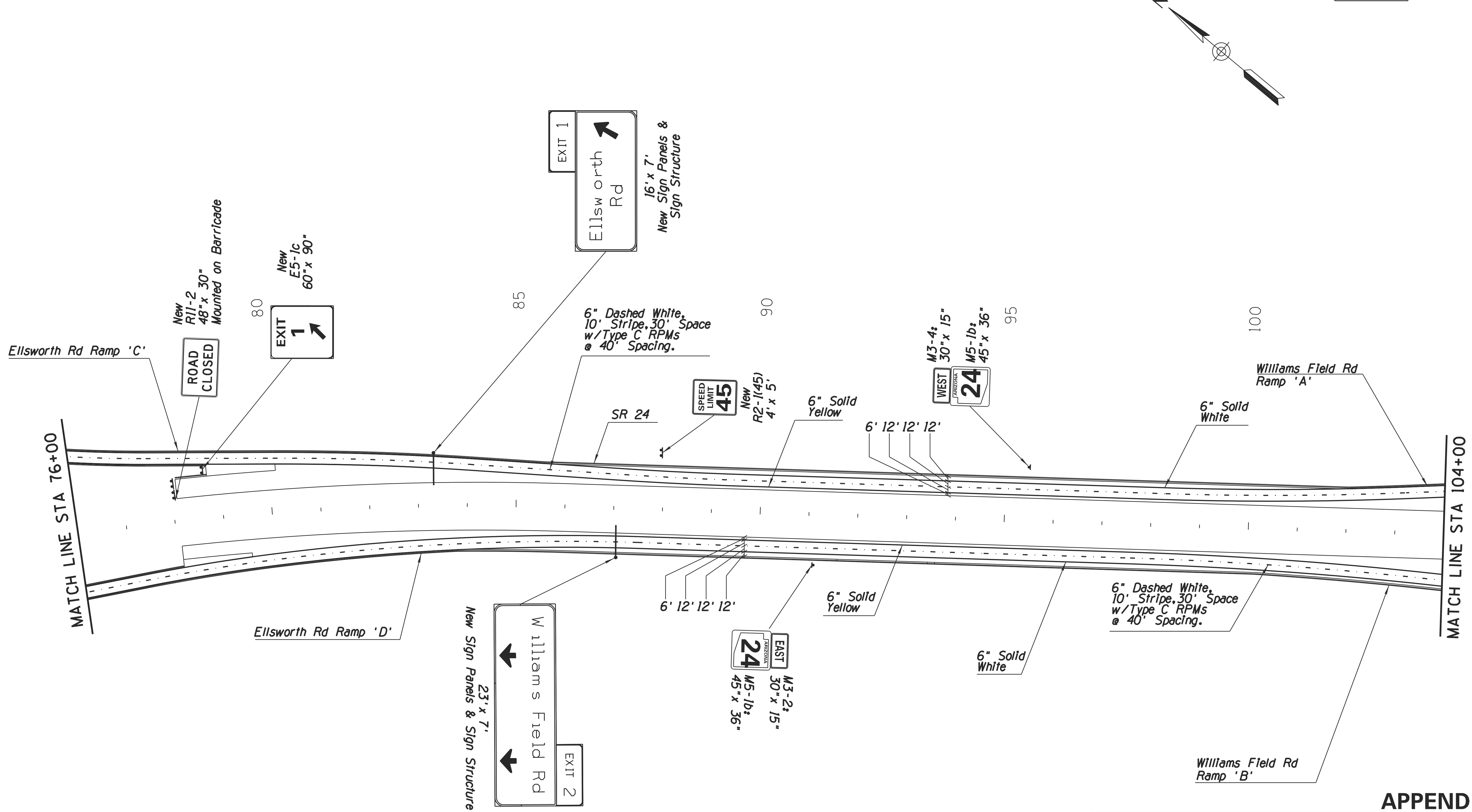
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



SURVEY NO.
LOCATION-
DATE-
FINISHED PLANS-
REVISIONS-

APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 76+00 TO STA 104+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

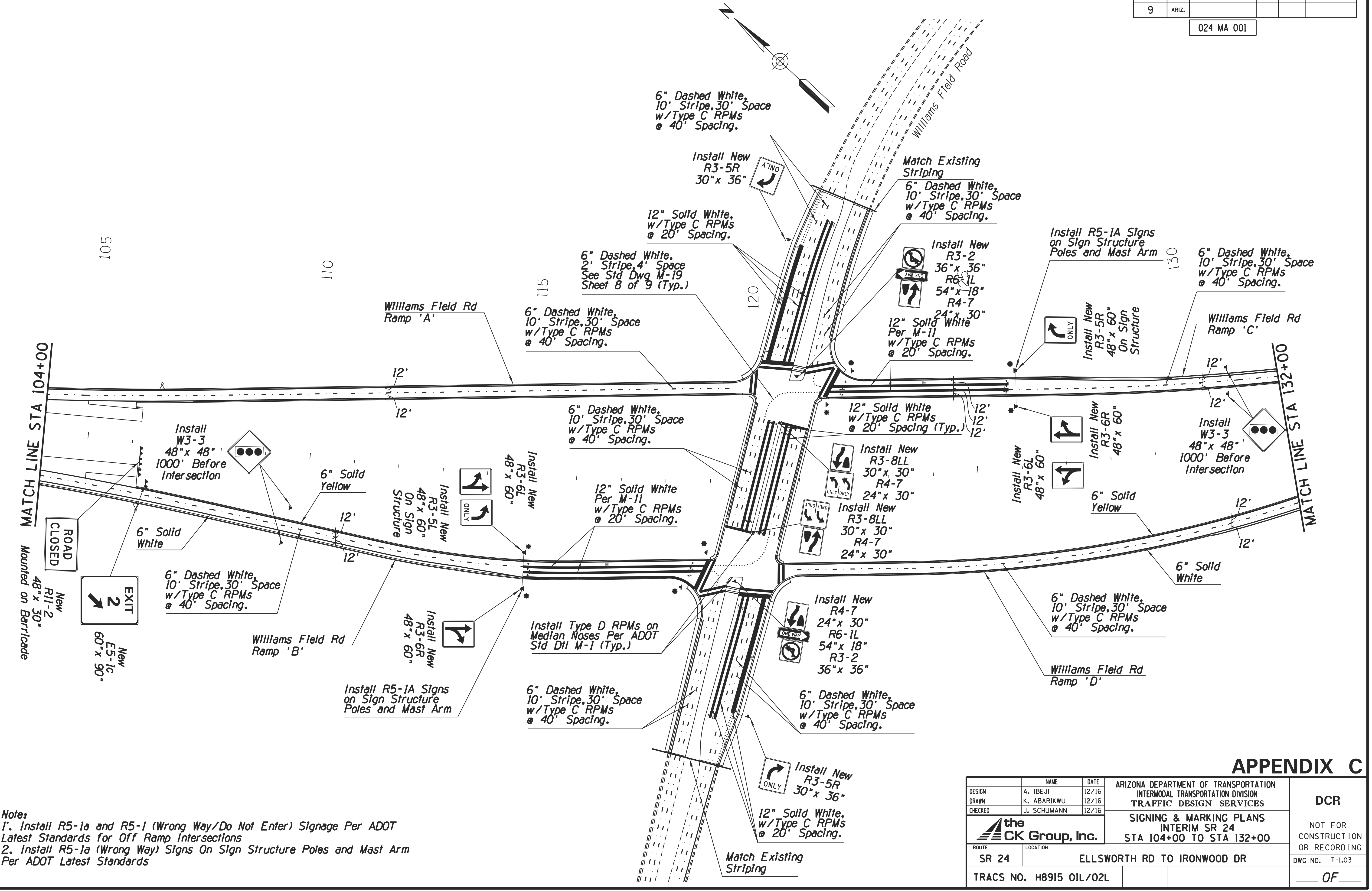
DWG NO. T-1.02

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



Note:
1. Install R5-1a and R5-1 (Wrong Way/Do Not Enter) Signage Per ADOT Latest Standards for Off Ramp Intersections
2. Install R5-1a (Wrong Way) Signs On Sign Structure Poles and Mast Arm Per ADOT Latest Standards

APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 104+00 TO STA 132+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

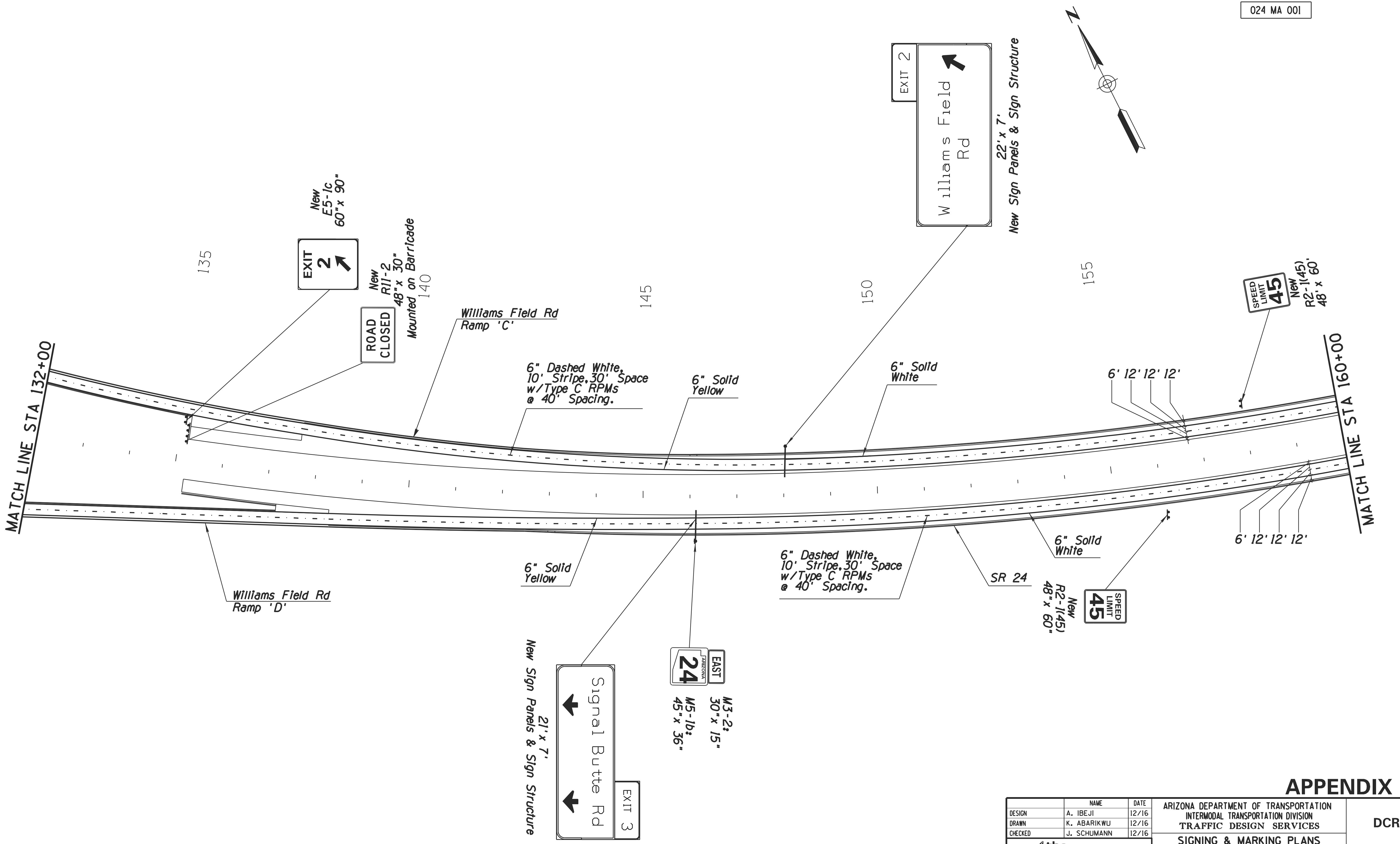
ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. T-1.03

TRACS NO. H8915 01L/02L

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 132+00 TO STA 160+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.04

TRACS NO. H8915 01L/02L

____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

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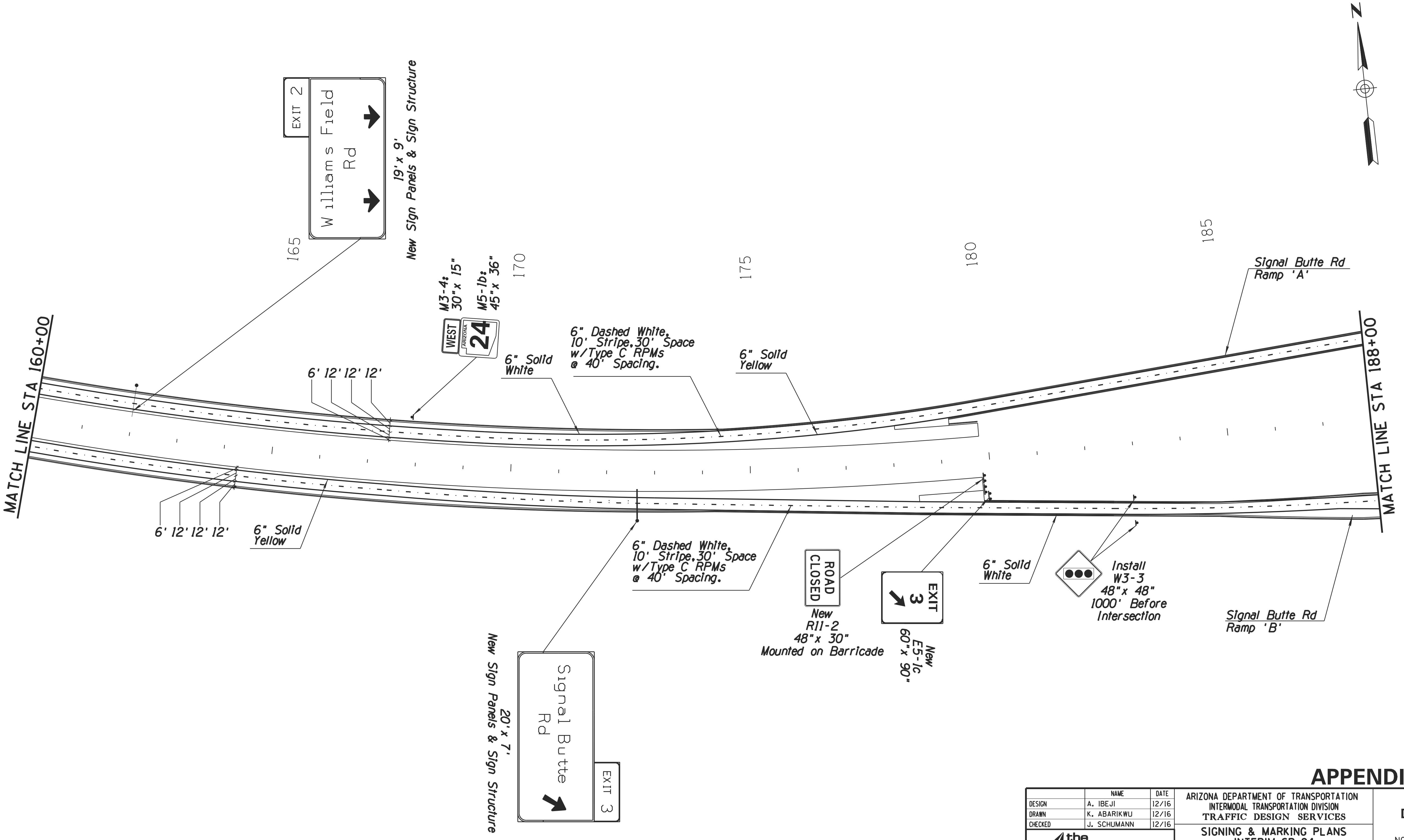
SURVEY NO. FINISHED PLANS- REVISIONS- LOCATION- DATE-



APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 160+00 TO STA 188+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.05

TRACS NO. H8915 01L/02L

____ OF ____

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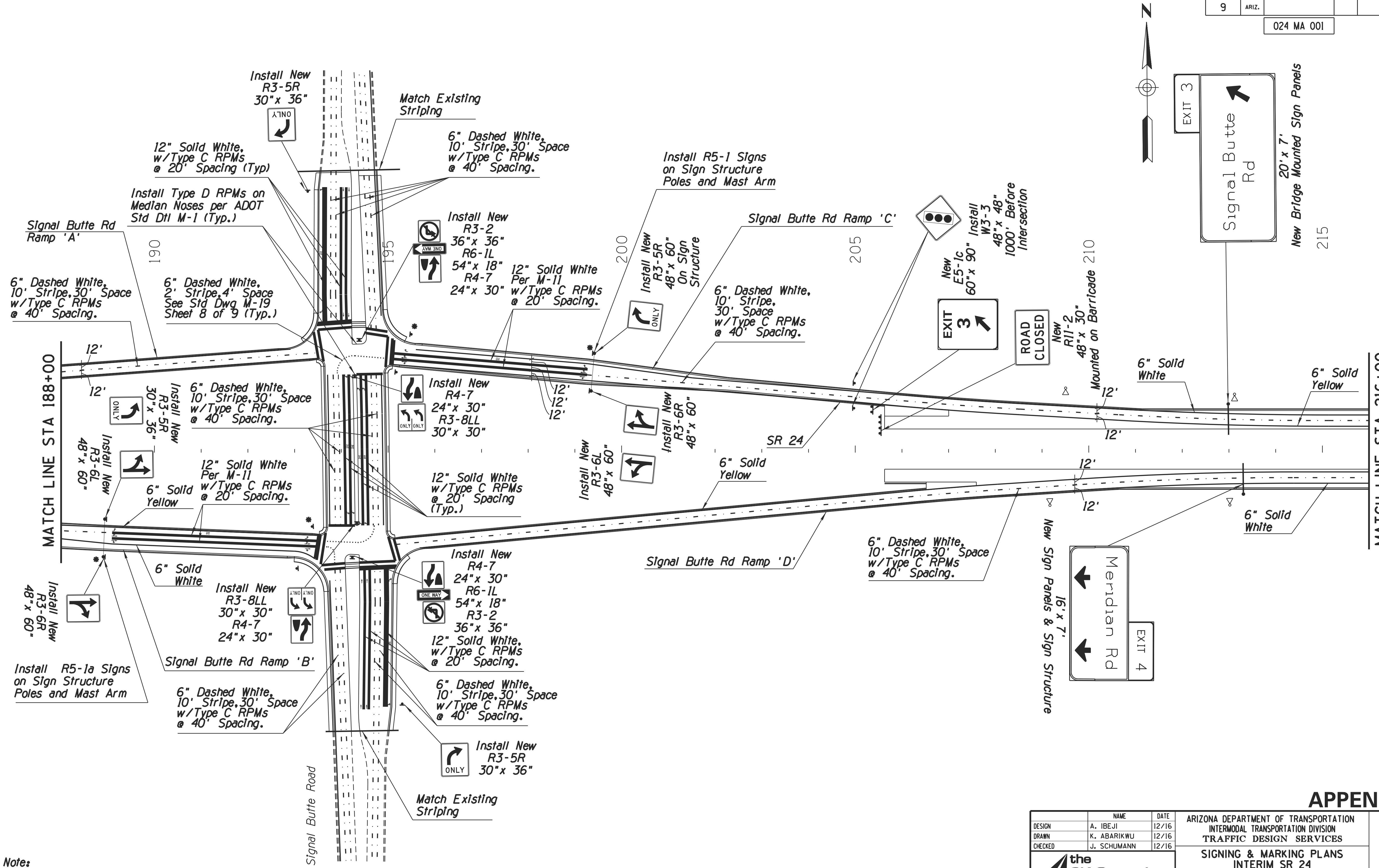
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

Note:
1. Install R5-1a and R5-1 (Wrong Way/Do Not Enter) Signage Per ADOT Latest Standards for Off Ramp Intersections
2. Install R5-1a (Wrong Way) Signs On Sign Structure Poles and Mast Arm Per ADOT Latest Standards

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 188+00 TO STA 216+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 24
LOCATION: ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.06

TRACS NO. H8915 01L/02L

____ OF ____

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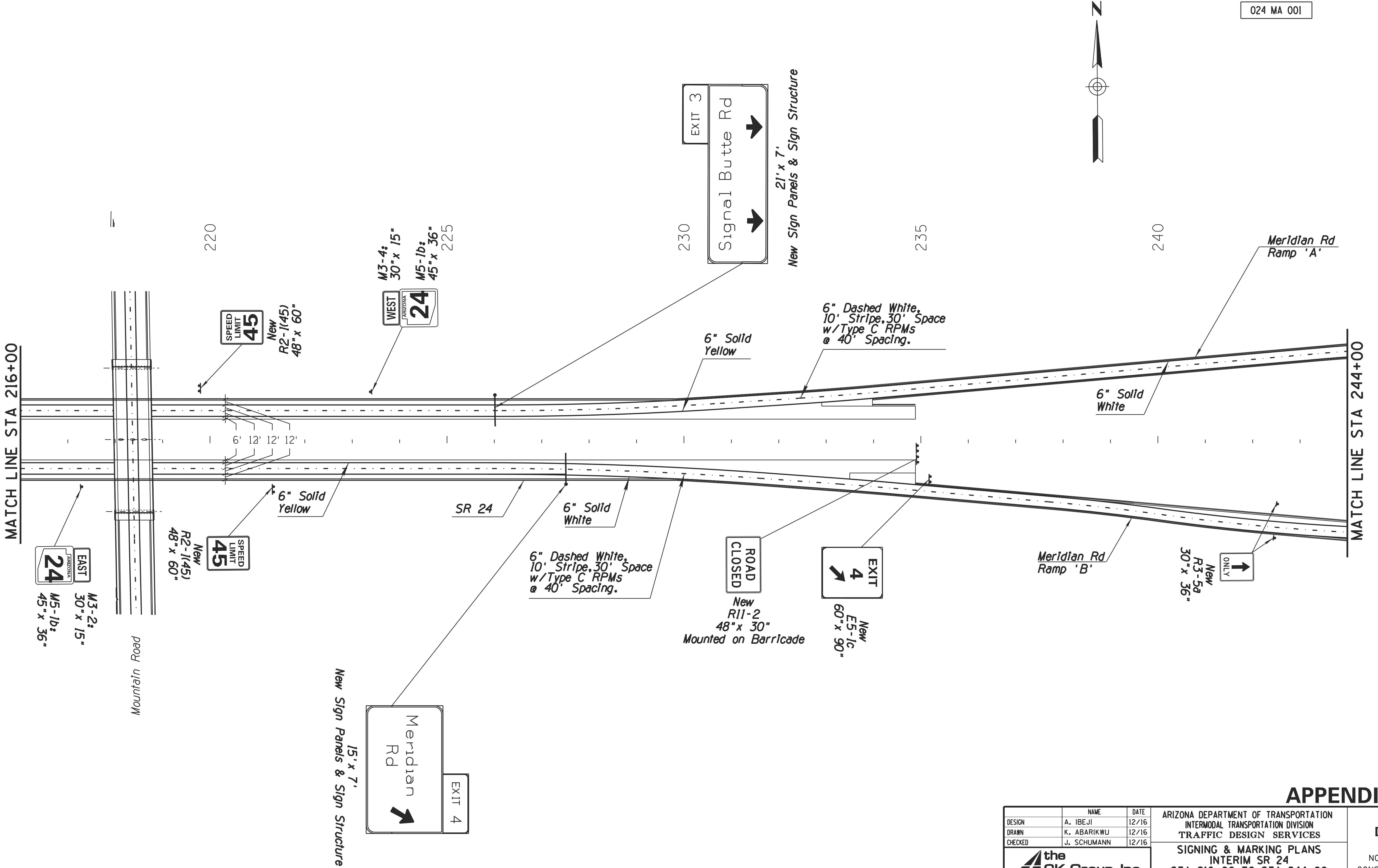
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 216+00 TO STA 244+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.07

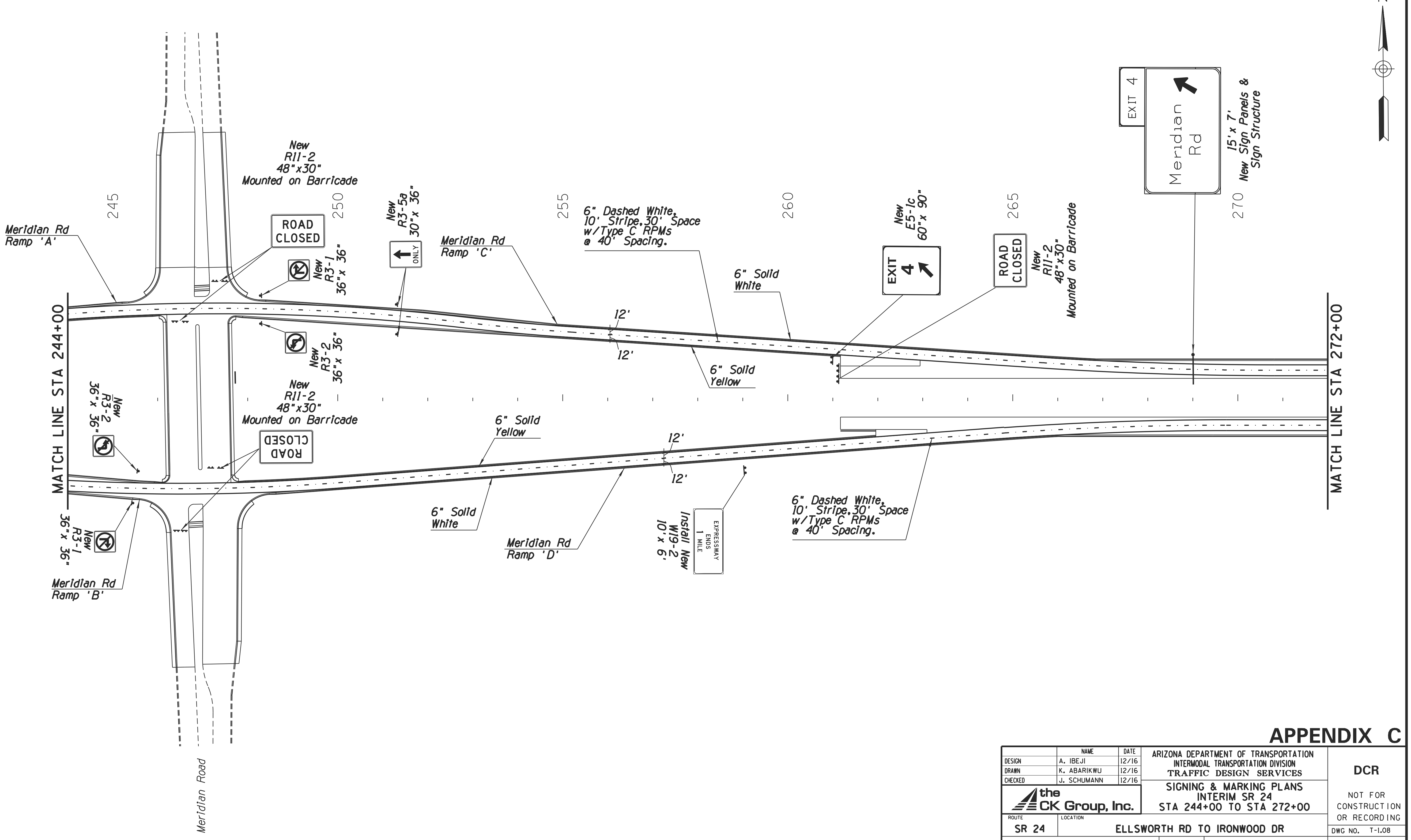
TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 244+00 TO STA 272+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.08

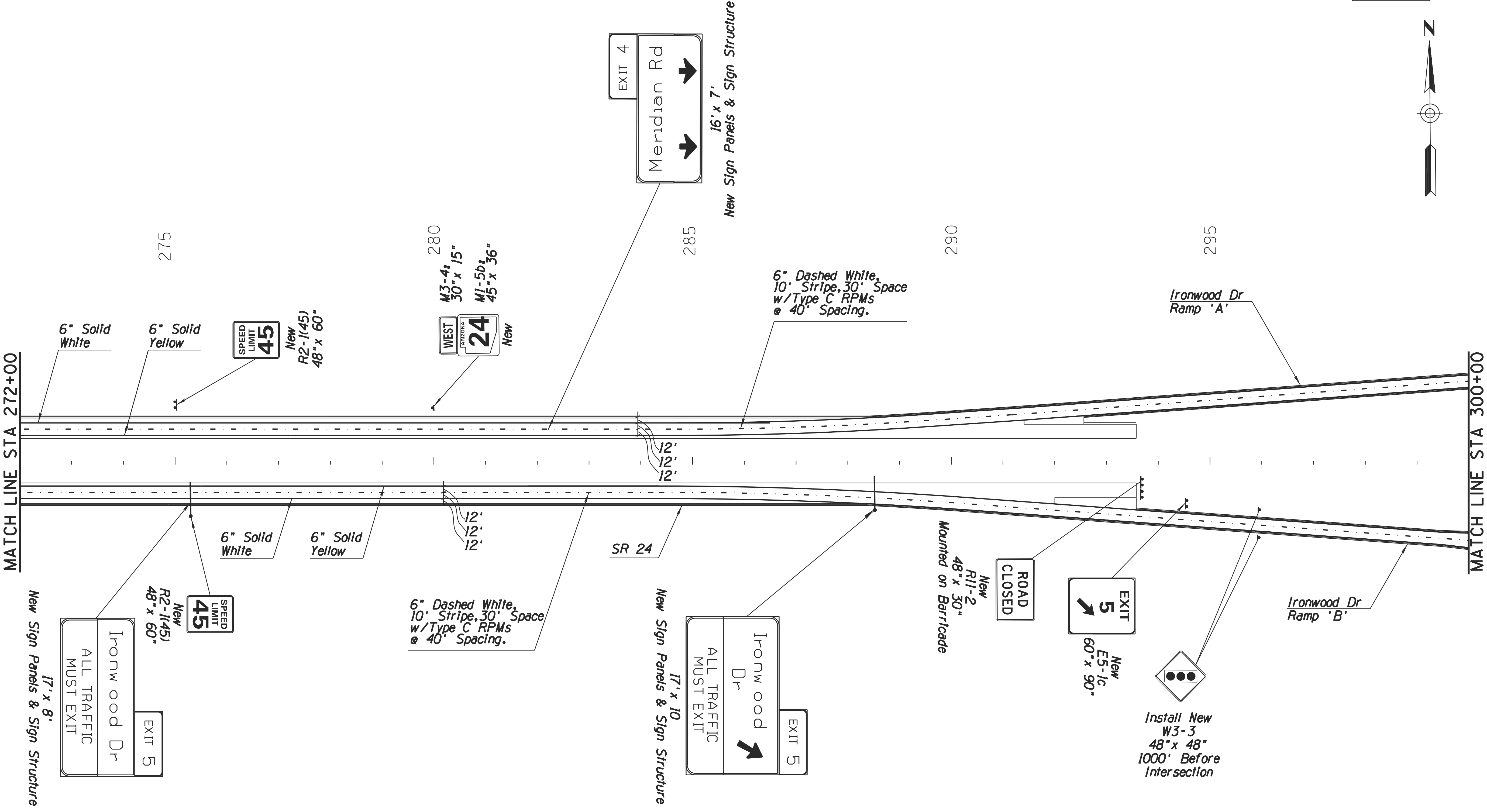
TRACS NO. H8915 01L/02L

___ OF ___

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



APPENDIX C

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 272+00 TO STA 300+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24

LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. T-1.09

TRACS NO. H8915 01L/02L

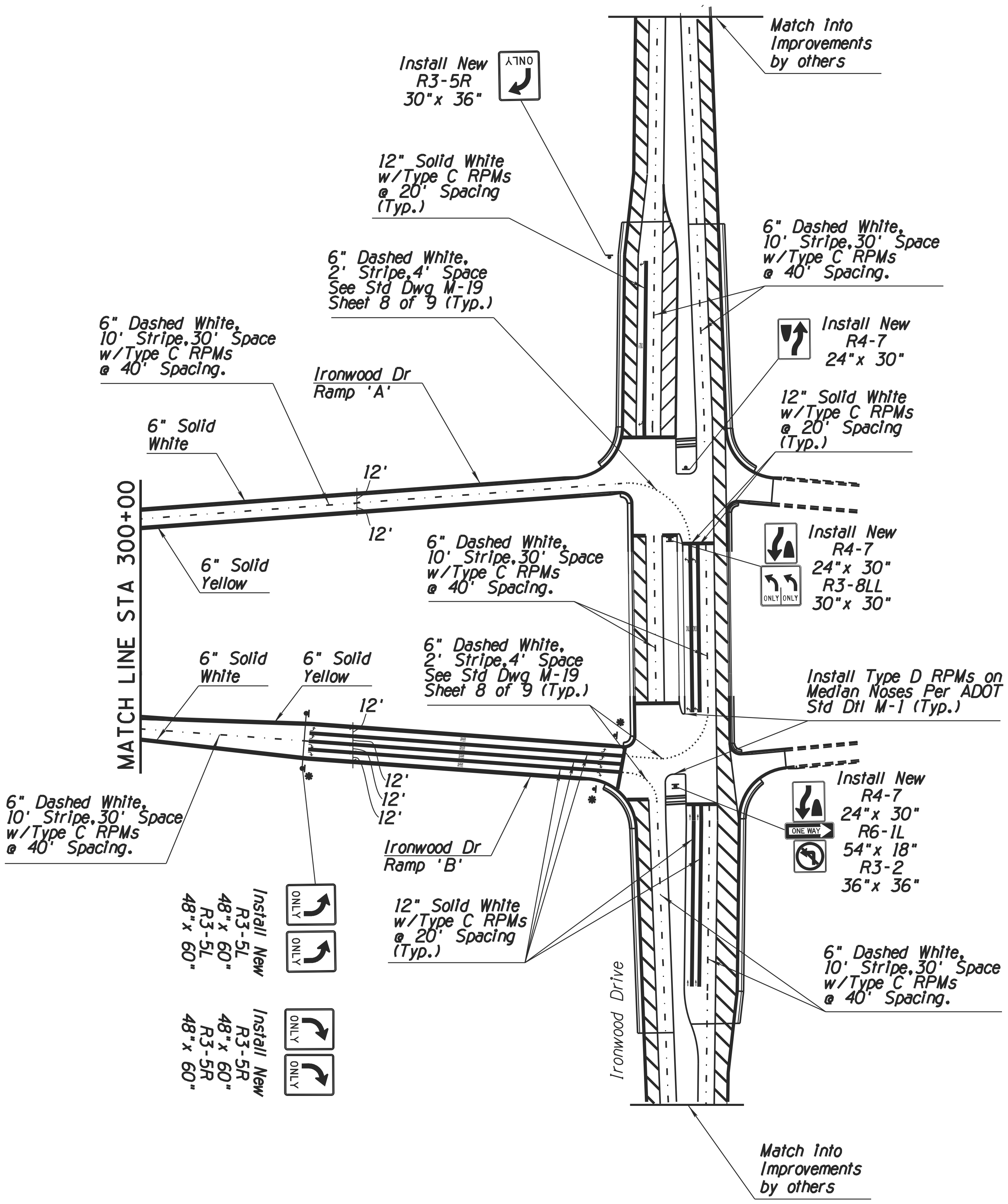
____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



N

APPENDIX C

Note:
1. Install R5-1a and R5-1 (Wrong Way/Do Not Enter) Signage Per ADOT Latest Standards for Off Ramp Intersections
2. Install R5-1a (Wrong Way) Signs On Sign Structure Poles and Mast Arm Per ADOT Latest Standards

	NAME	DATE
DESIGN	A. IBEJI	12/16
DRAWN	K. ABARIKWU	12/16
CHECKED	J. SCHUMANN	12/16

the CK Group, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
TRAFFIC DESIGN SERVICES

SIGNING & MARKING PLANS
INTERIM SR 24
STA 300+00 TO STA 328+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. T-1.10

TRACS NO. H8915 01L/02L

____ OF ____

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

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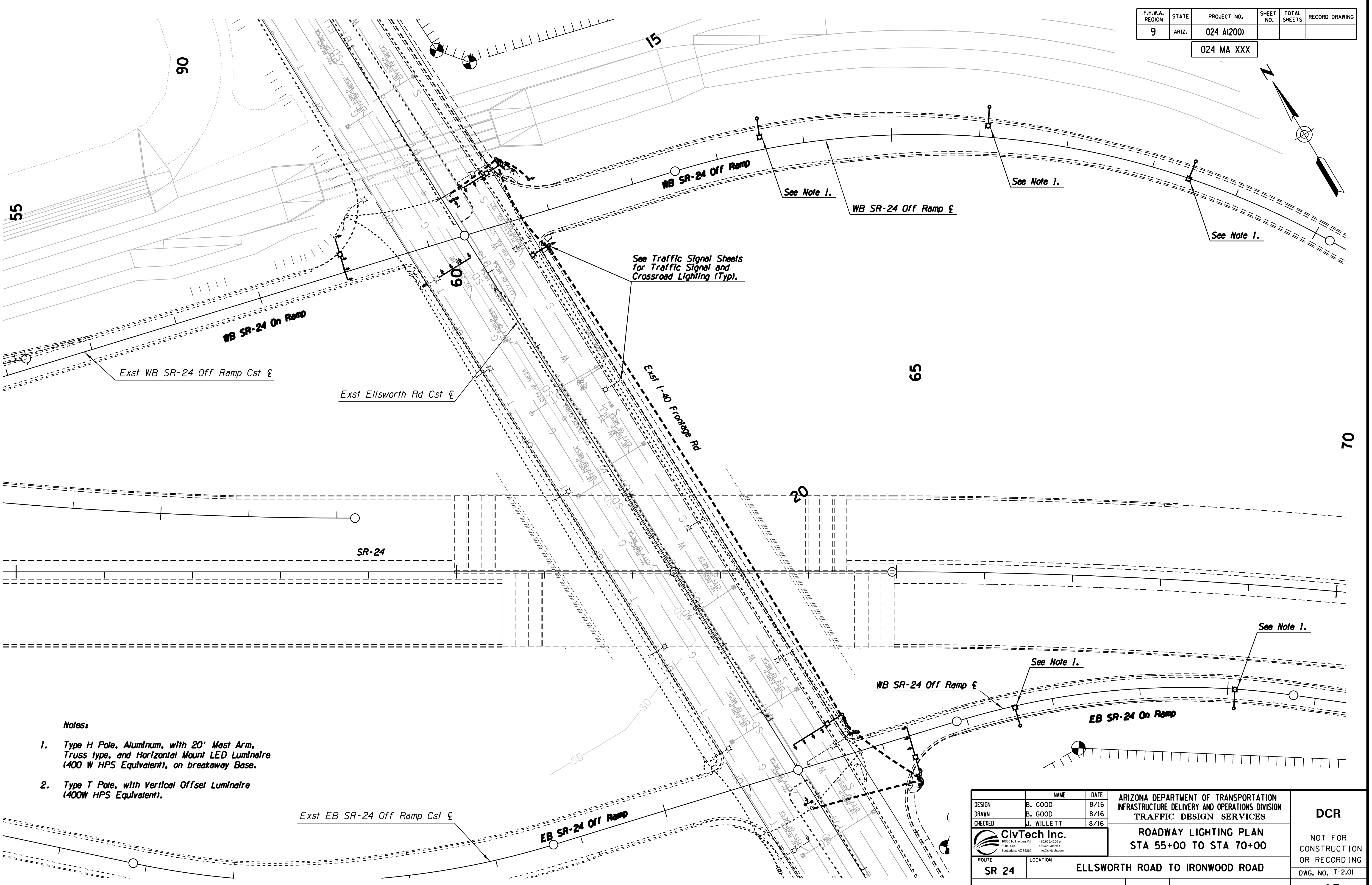
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.
2. Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.
10605 N. Hayden Rd.
Suite 140
Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 55+00 TO STA 70+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.01

TRACS NO. H8915 01L/02L

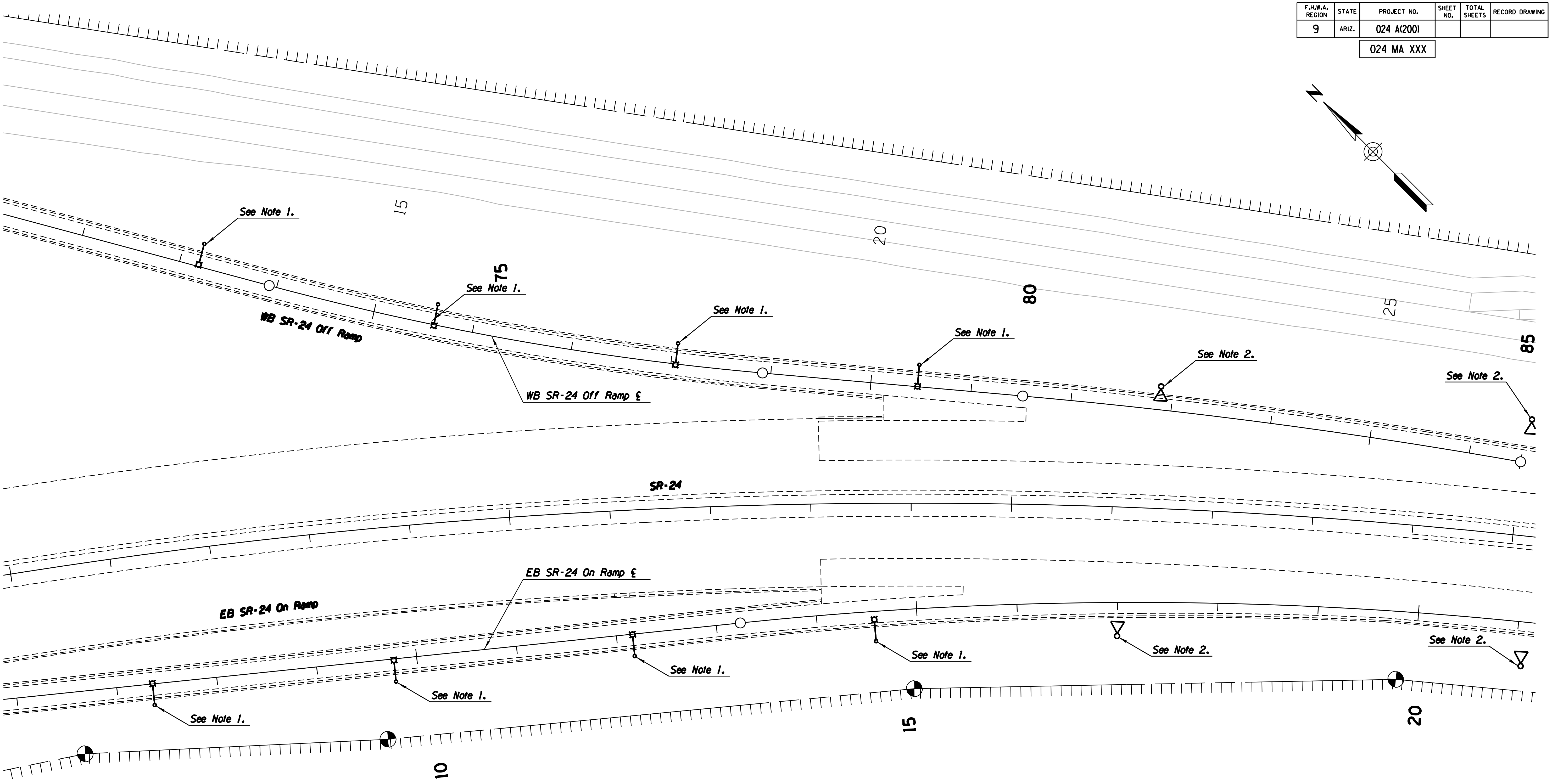
024 A (200)

___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*

2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.
10605 N. Hayden Rd.
Suite 140
Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 70+00 TO STA 85+00

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

DWG. NO. T-2.02

TRACS NO. H8915 01L/02L

024 A (200)

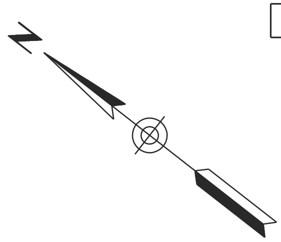
___ OF ___

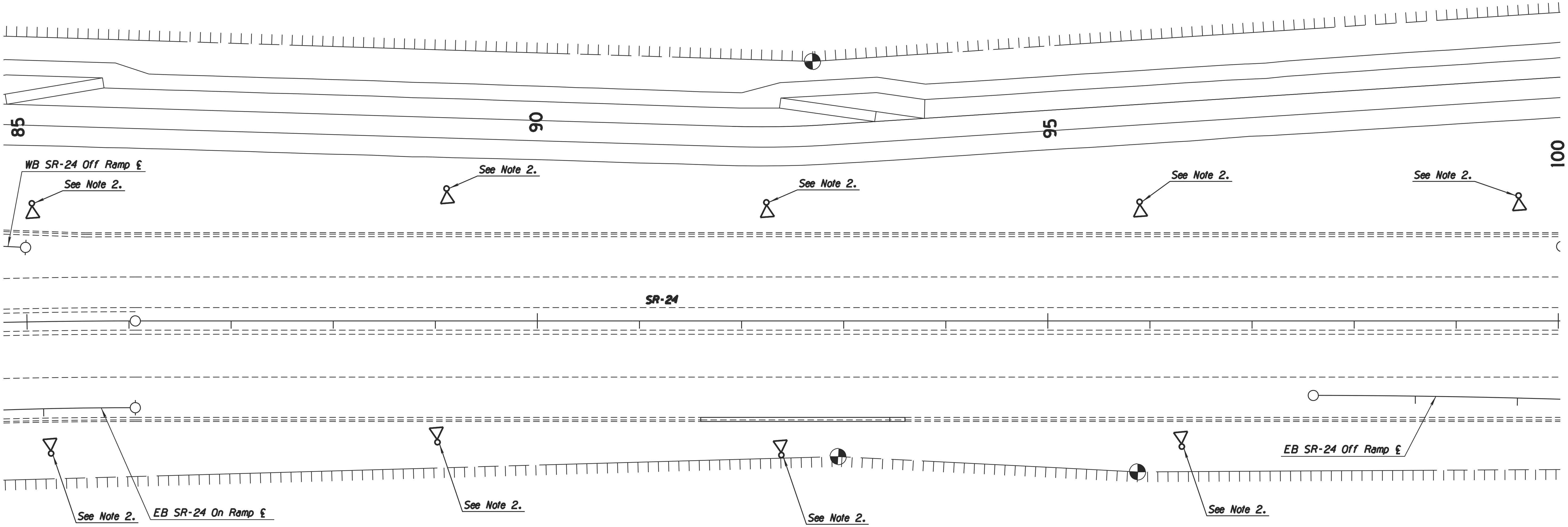
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX





Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.
10605 N. Hayden Rd.
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info@civtech.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 85+00 TO STA 100+00

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

TRACS NO. H8915 01L/02L

024 A (200)

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

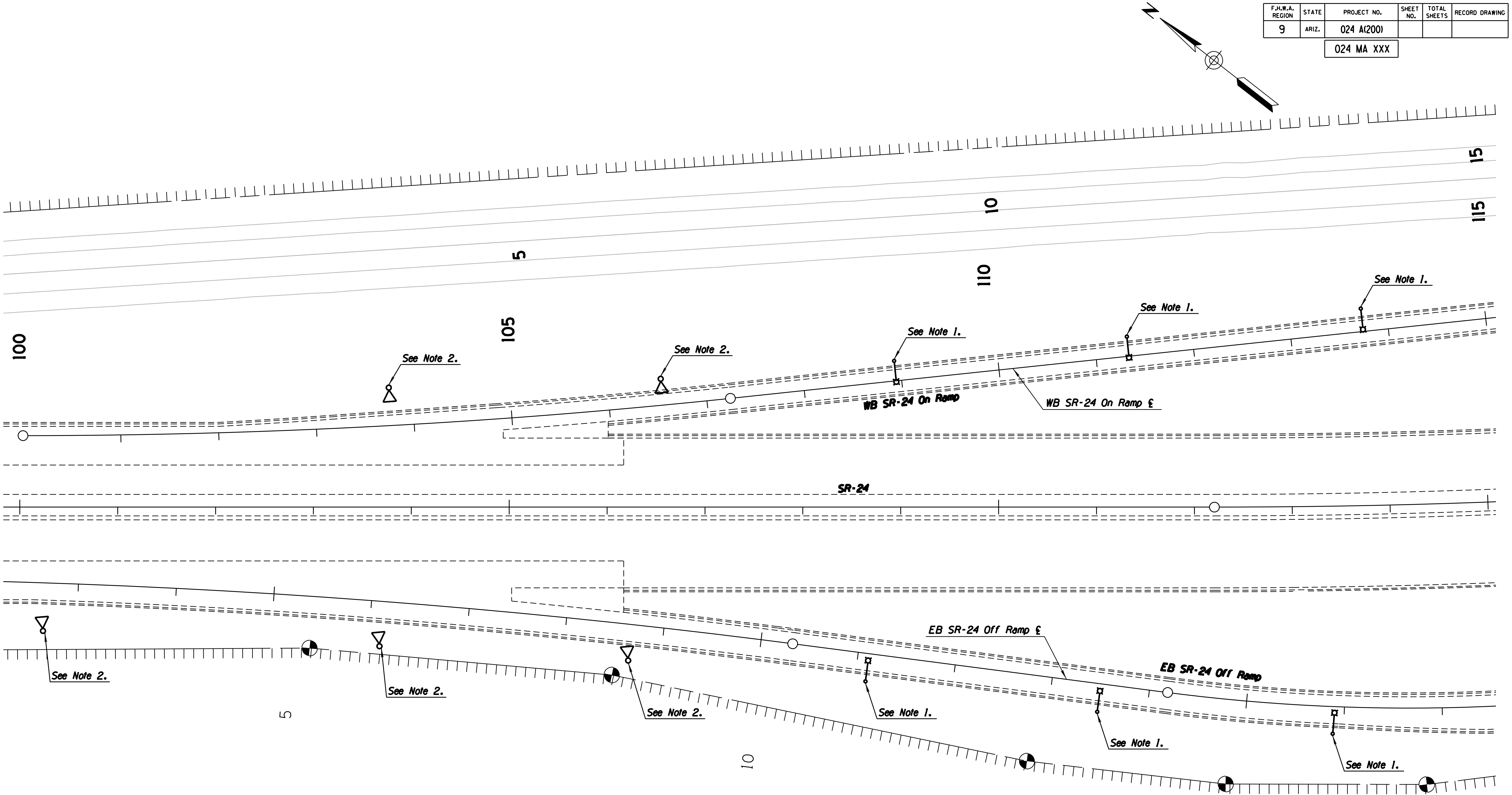
DWG. NO. T-2.03

___ OF ___

8/19/2016 c:\pw_working\arizona\epw14096\dms17795\10.0 h6867 lt03.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.
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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 100+00 TO STA 115+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.04

TRACS NO. H8915 01L/02L

024 A (200)

____ OF ____

SURVEY NO. FINISHED PLANS- REVISIONS- LOCATION- DATE-
SURVEY NO. FINISHED PLANS- REVISIONS- LOCATION- DATE-

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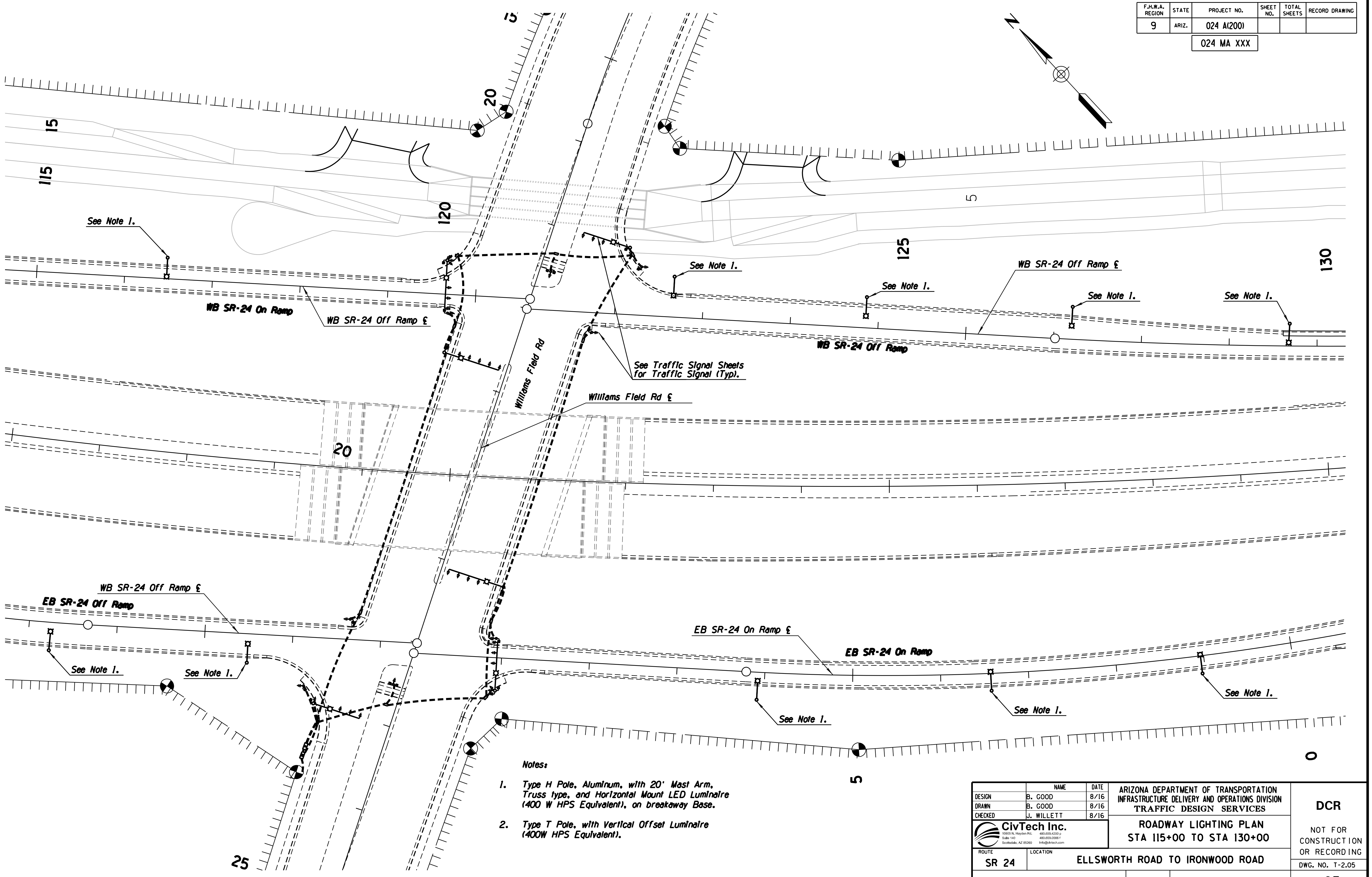
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.
2. Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 115+00 TO STA 130+00

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

DWG. NO. T-2.05

TRACS NO. H8915 01L/02L

024 A (200)

____ OF ____

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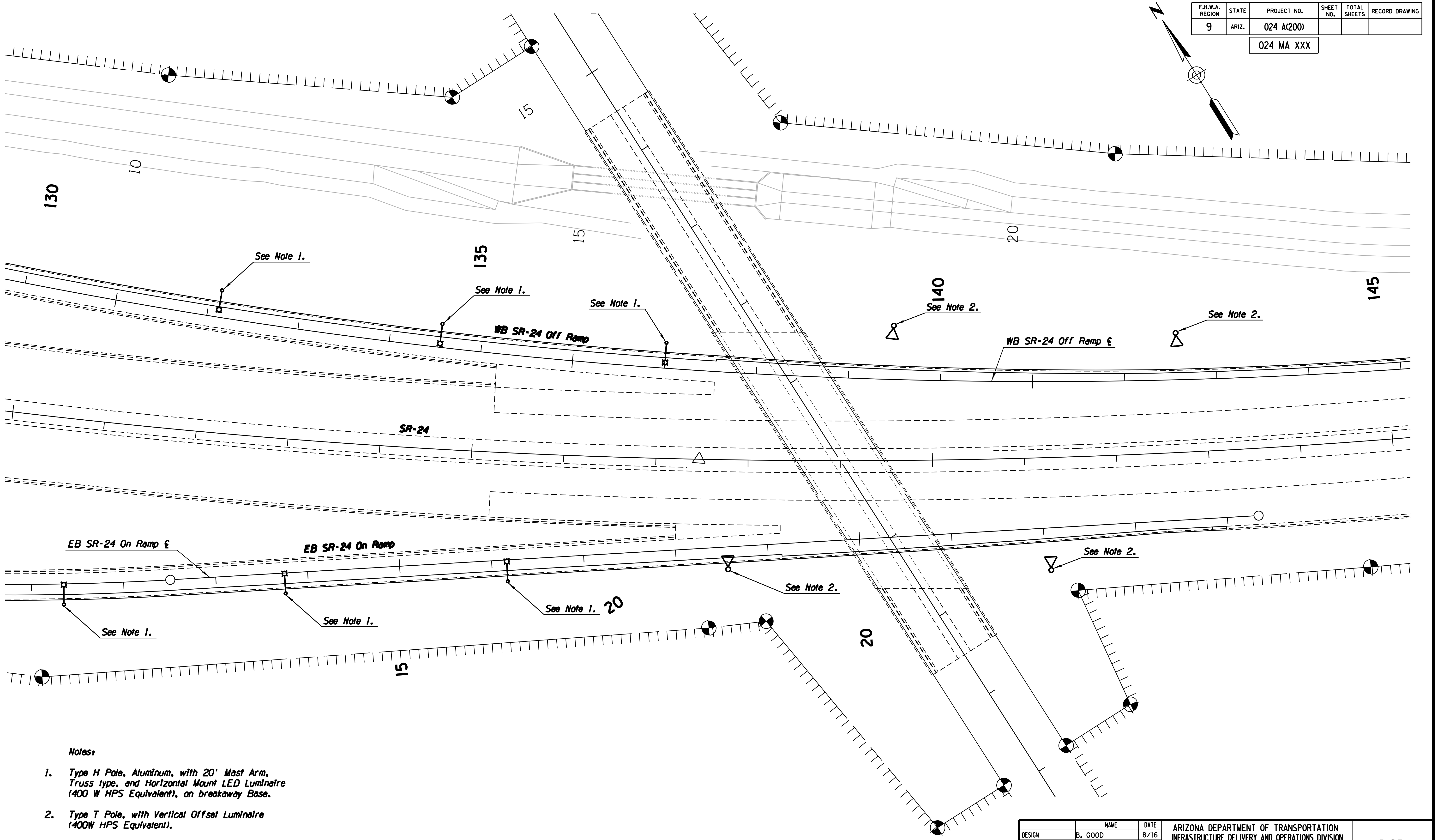
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.
2. Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 130+00 TO STA 145+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.06

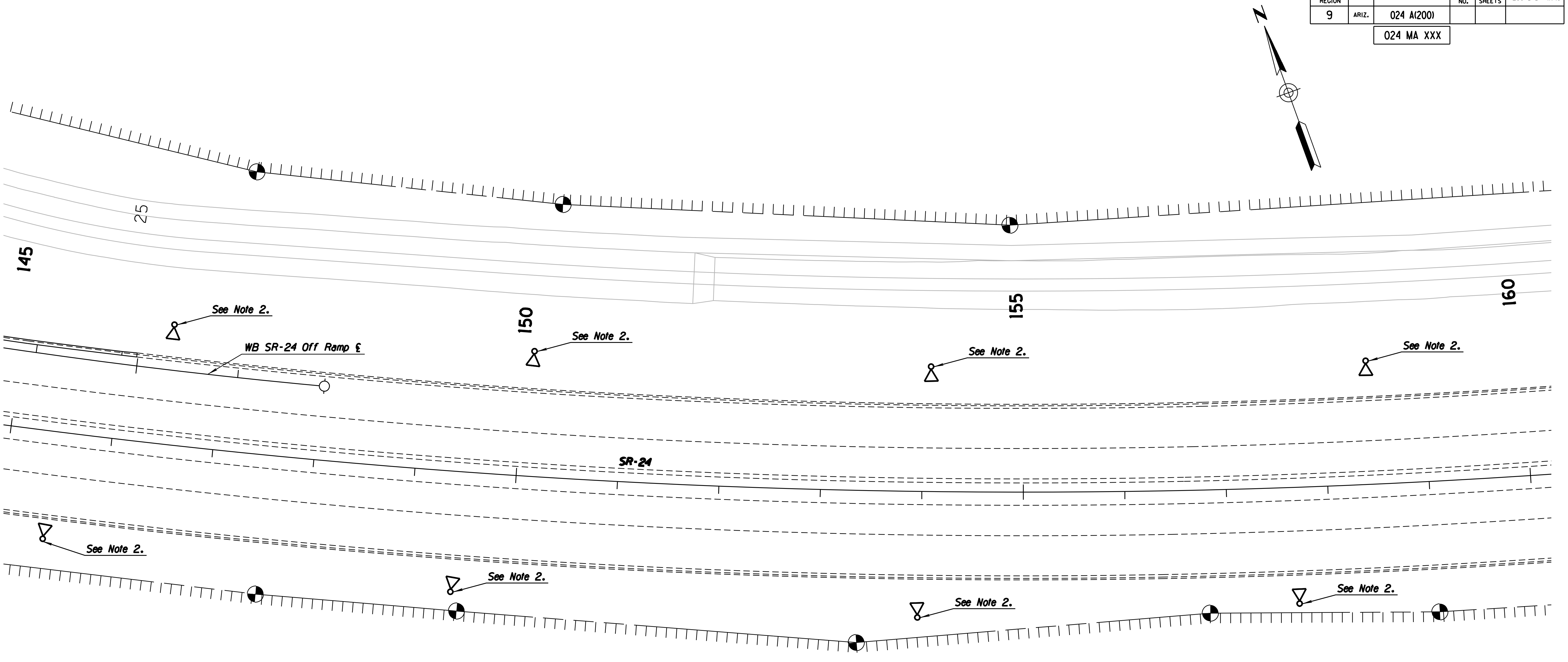
TRACS NO. H8915 01L/02L

024 A (200)

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.

2. Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 145+00 TO STA 160+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.07

TRACS NO. H8915 01L/02L

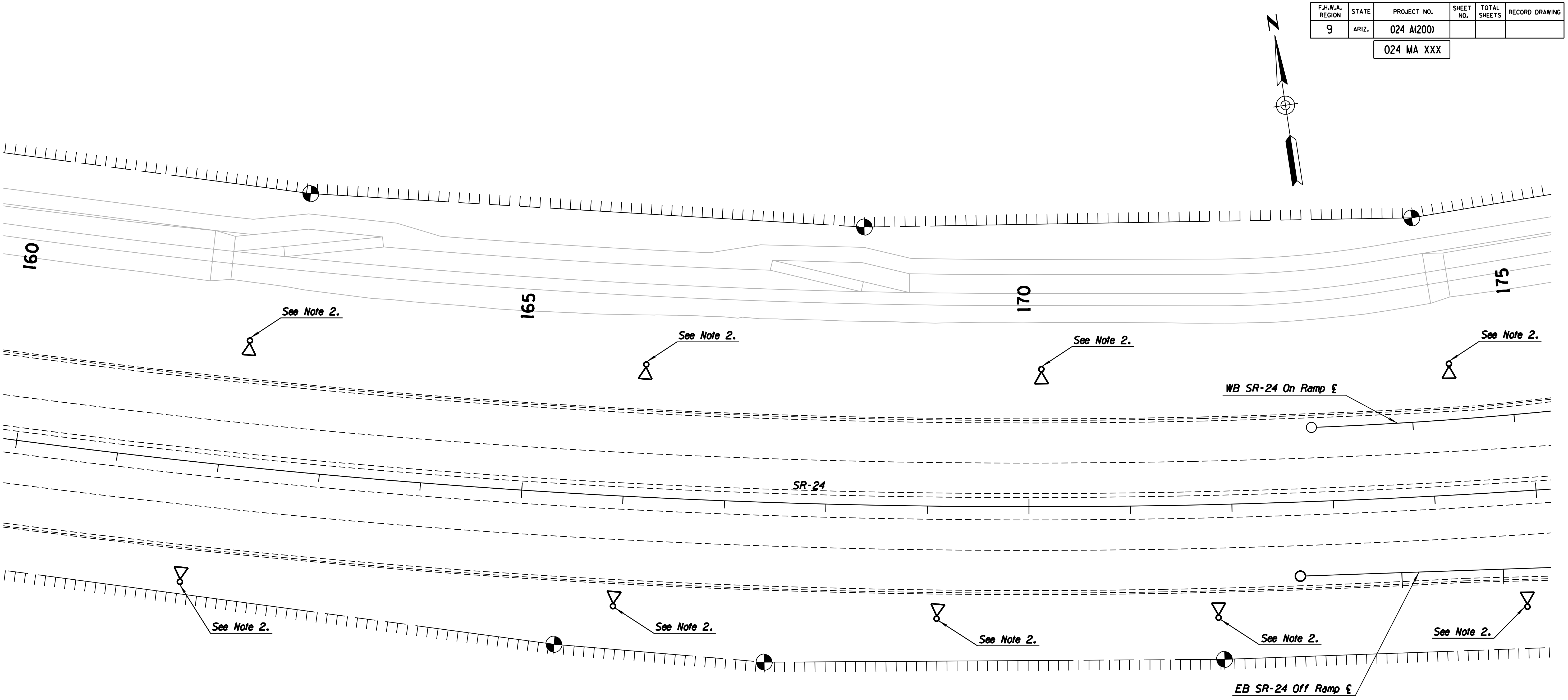
024 A (200)

____ OF ____

DATE-	LOCATION-	REVISIONS-	FINISHED PLANS-	SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 160+00 TO STA 175+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

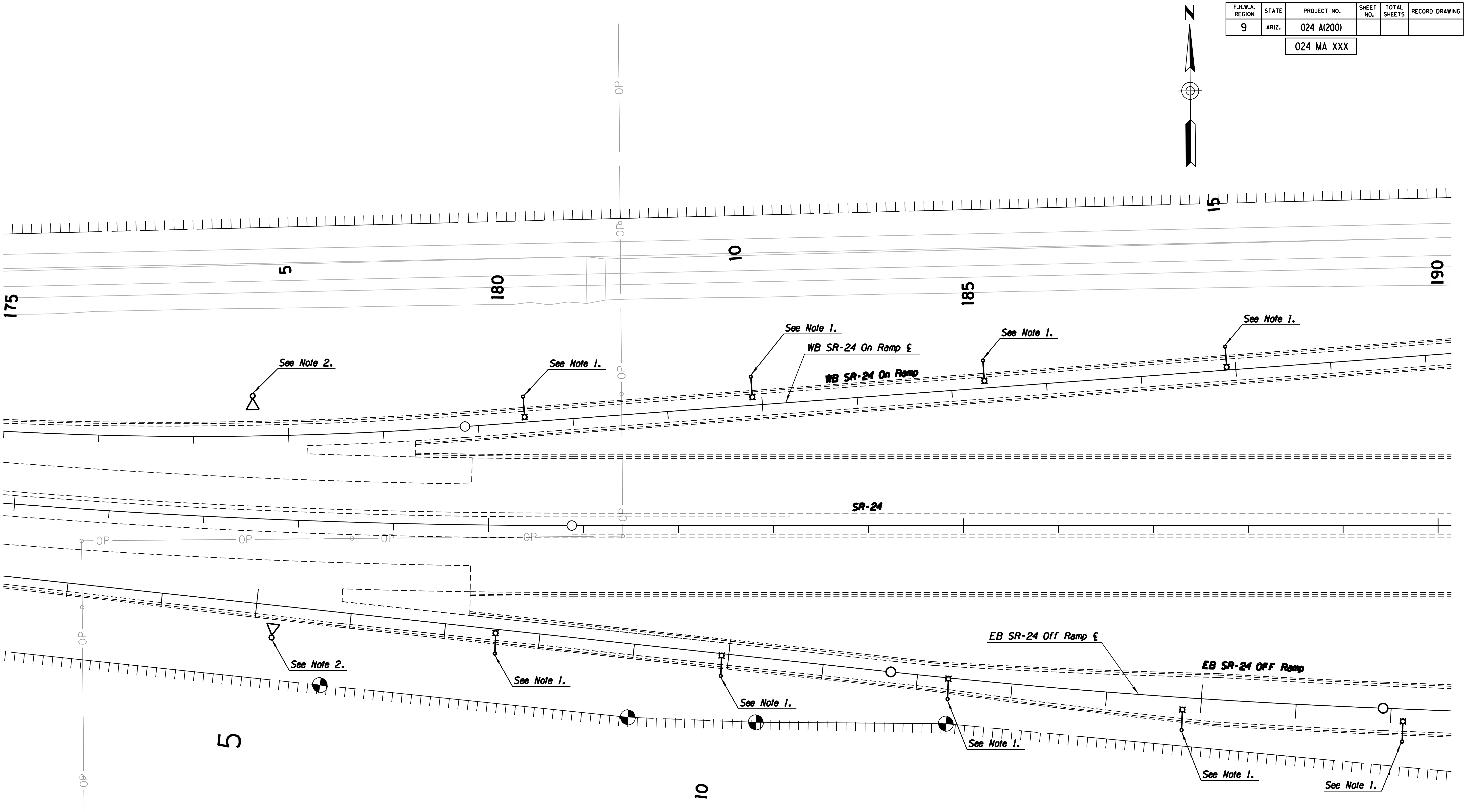
DWG. NO. T-2.08

TRACS NO. H8915 01L/02L

024 A (200)

___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			
		024 MA XXX			



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 175+00 TO STA 190+00

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

DWG. NO. T-2.09

TRACS NO. H8915 01L/02L

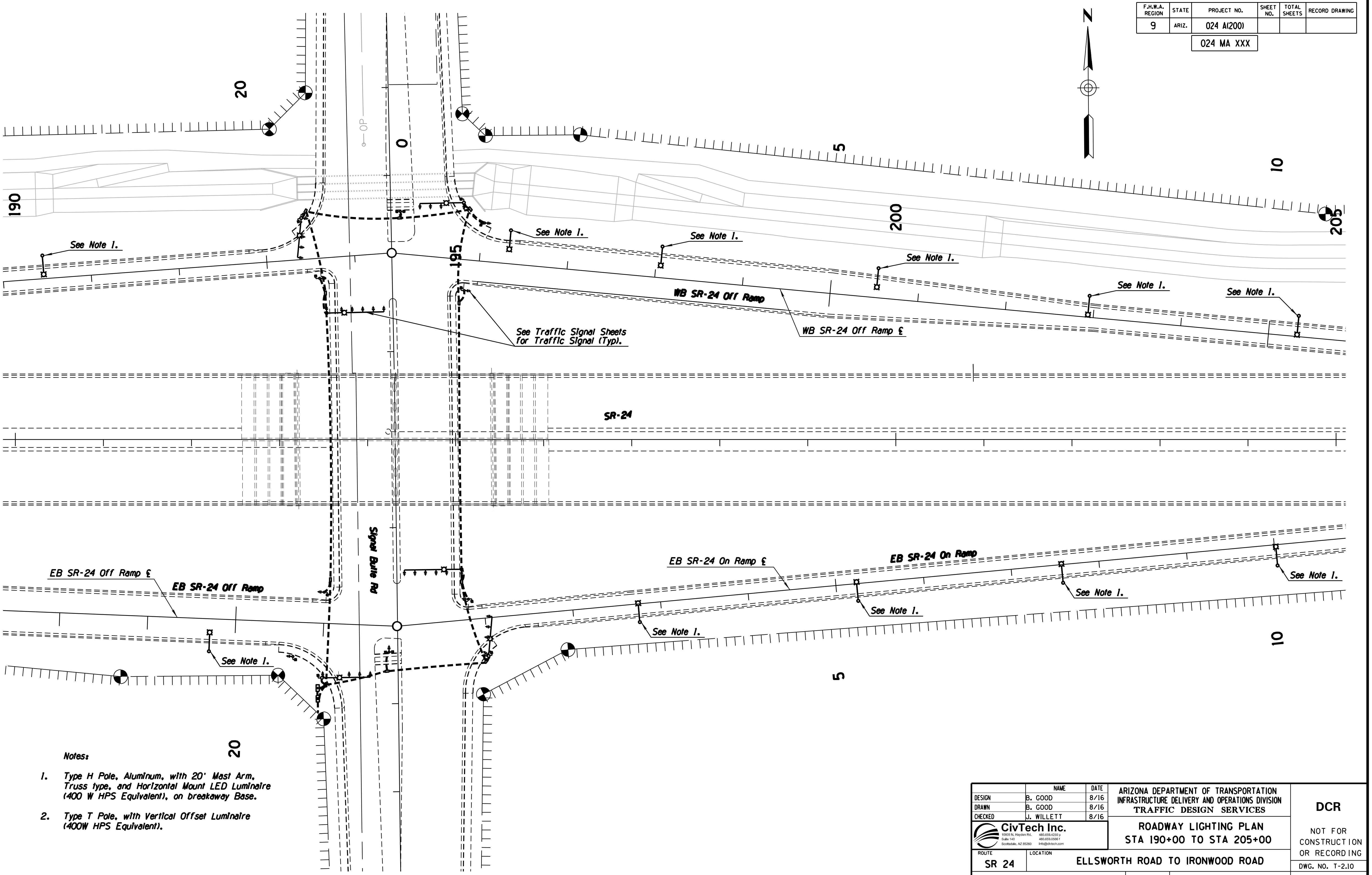
024 A (200)

____ OF ____

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 190+00 TO STA 205+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.10

TRACS NO. H8915 01L/02L

024 A (200)

___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

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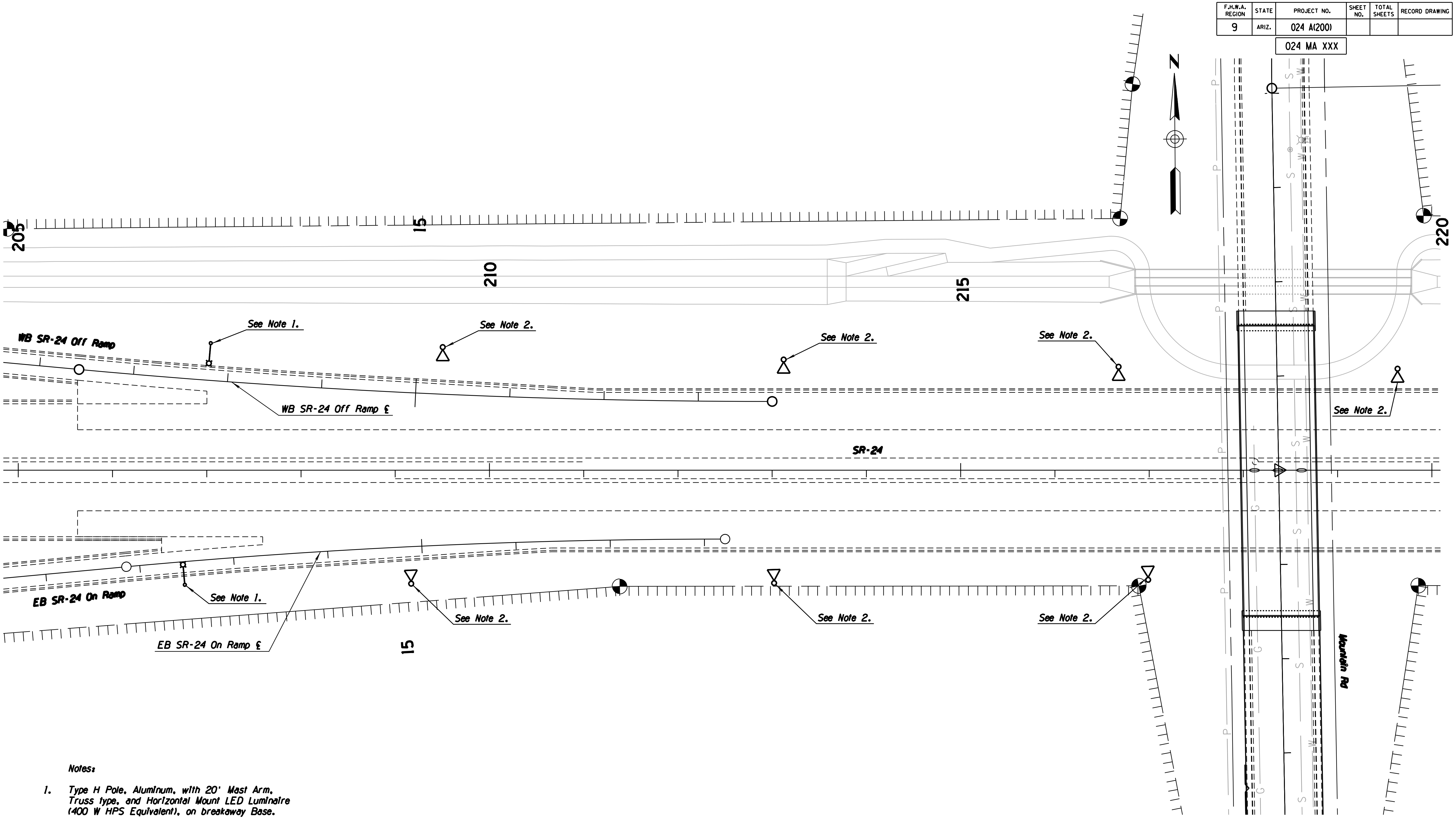
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 205+00 TO STA 220+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.11

TRACS NO. H8915 01L/02L

024 A (200)

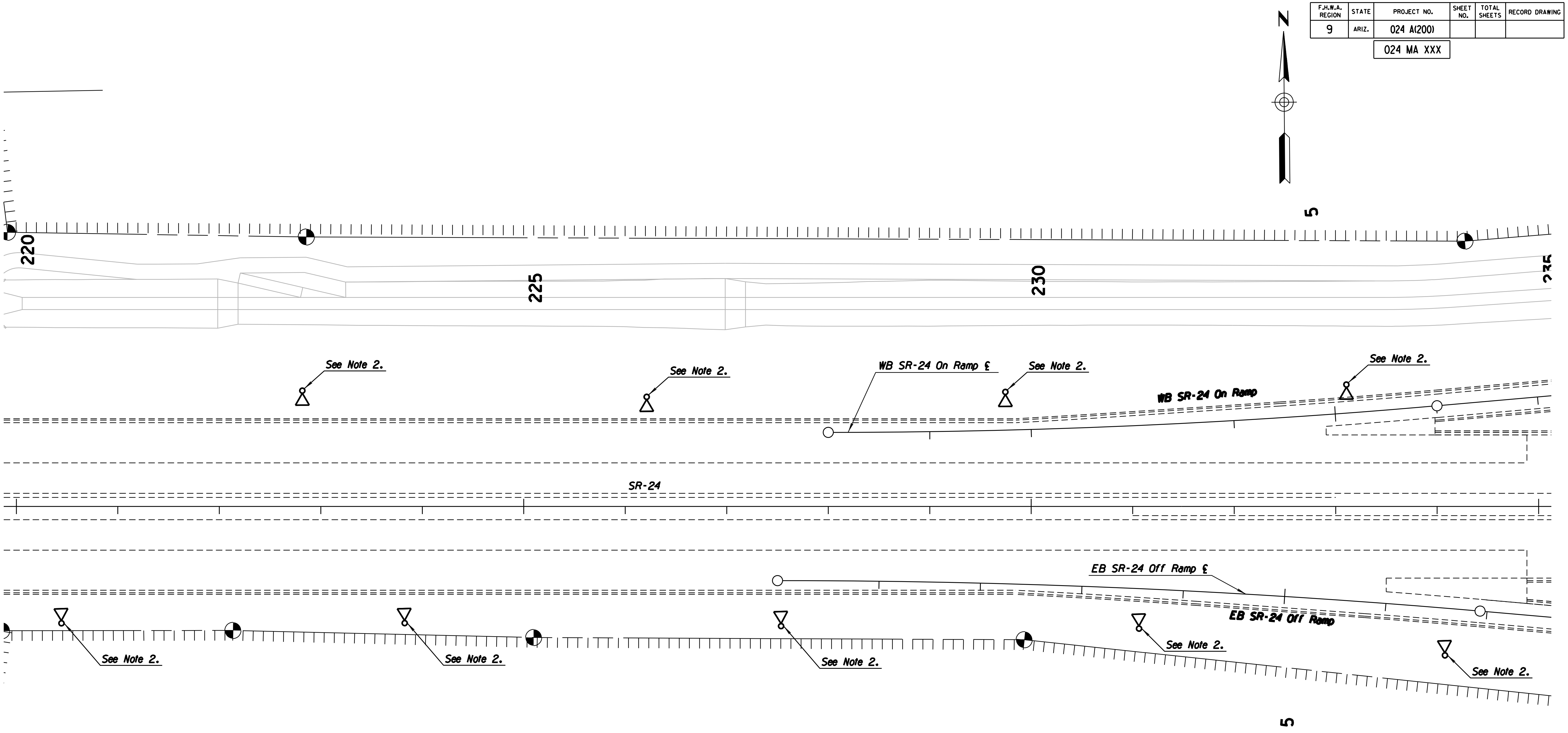
___ OF ___

SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

8/19/2016 c:\pw_working\arizona\epw14096\dms17795\10.0 h6867 1t11.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*

2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 220+00 TO STA 235+00

ROUTE: SR 24

LOCATION: ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

NOT FOR CONSTRUCTION OR RECORDING

DWG. NO. T-2.12

TRACS NO. H8915 01L/02L

024 A (200)

____ OF ____

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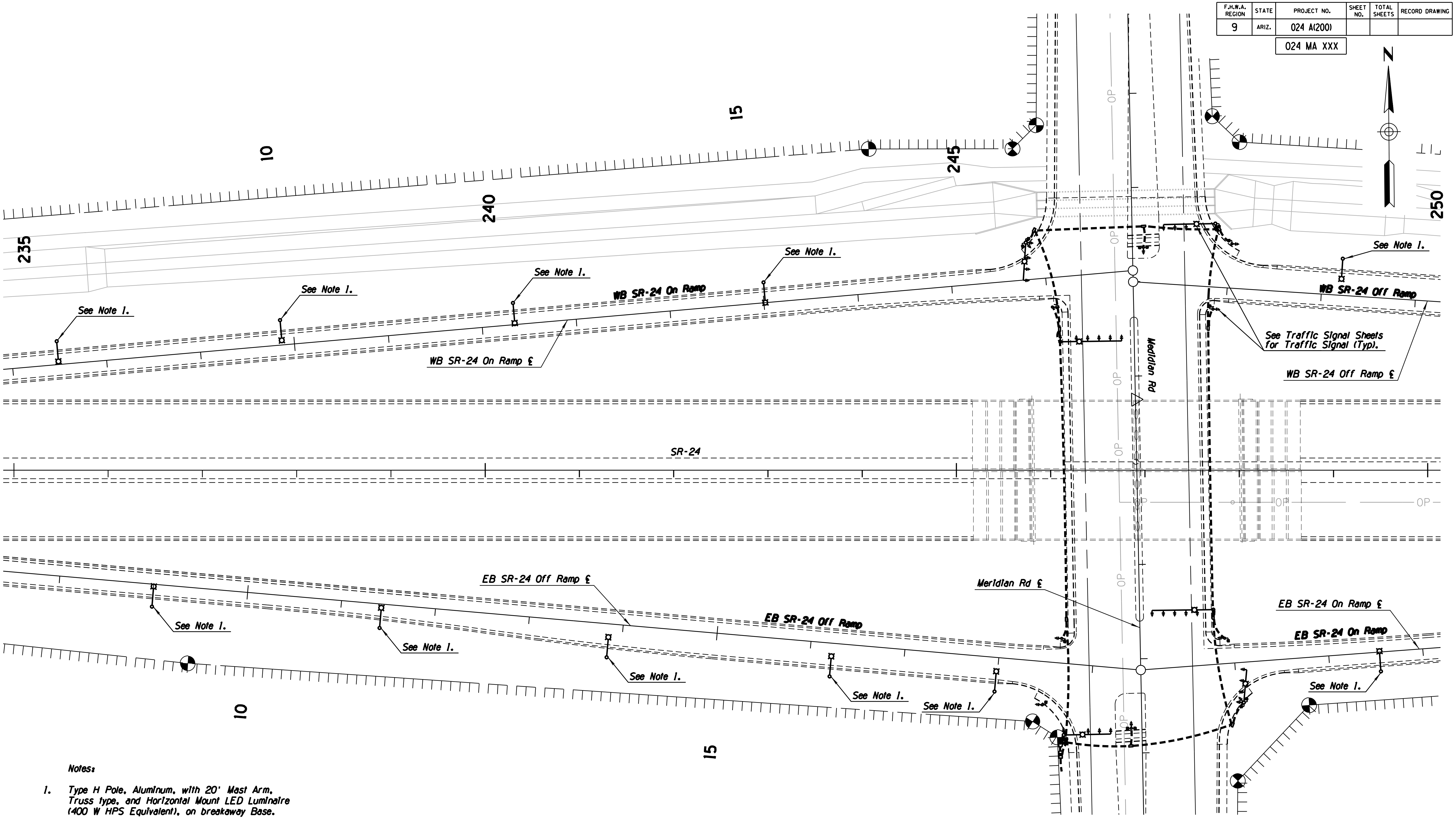
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.

2. Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 235+00 TO STA 250+00

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

NOT FOR CONSTRUCTION OR RECORDING

DWG. NO. T-2.13

TRACS NO. H8915 01L/02L

024 A (200)

____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

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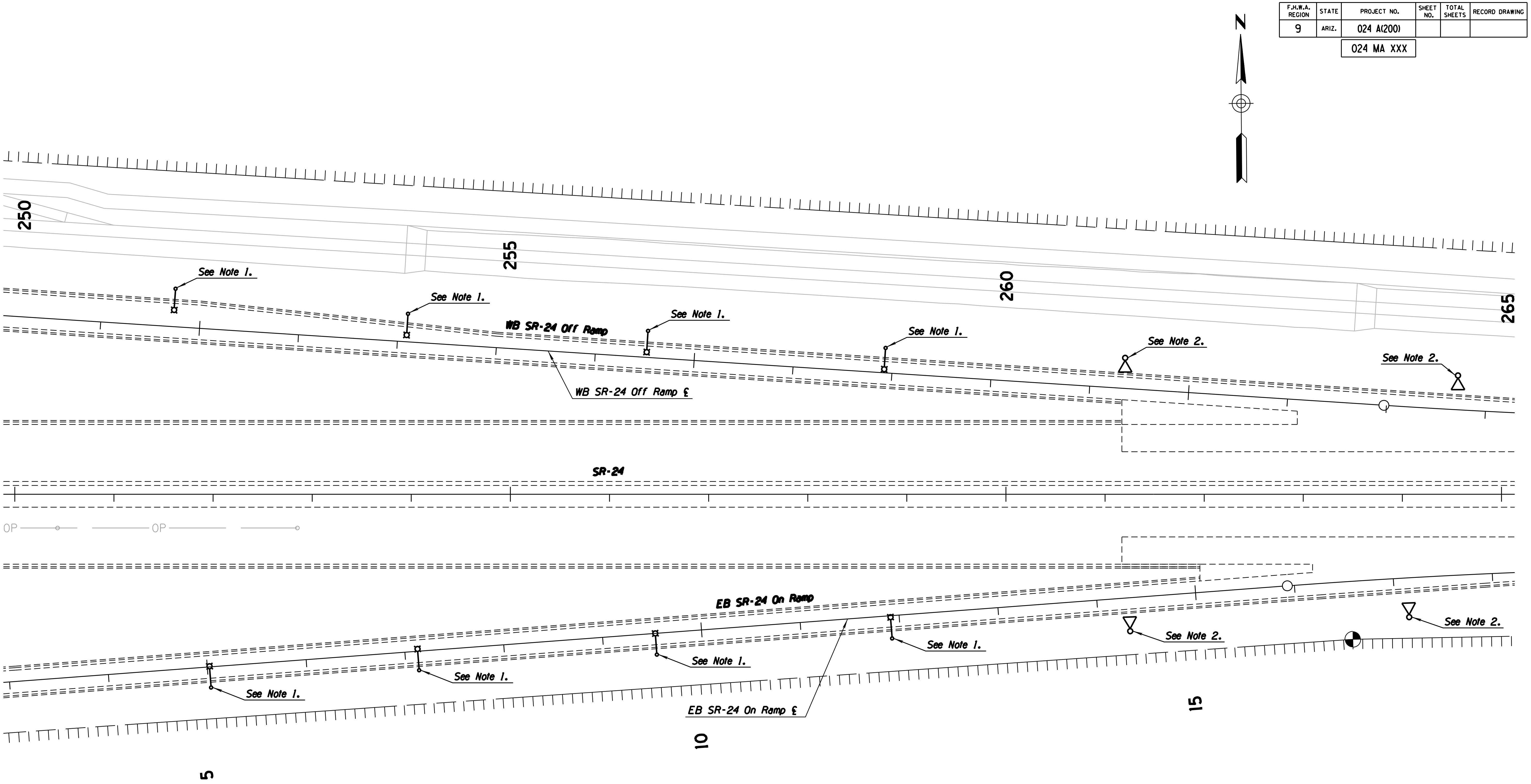
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-
SURVEY NO.
FINISHED PLANS-
REVISIONS-
LOCATION-
DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			
		024 MA XXX			



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*

2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 250+00 TO STA 265+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.14

TRACS NO. H8915 01L/02L

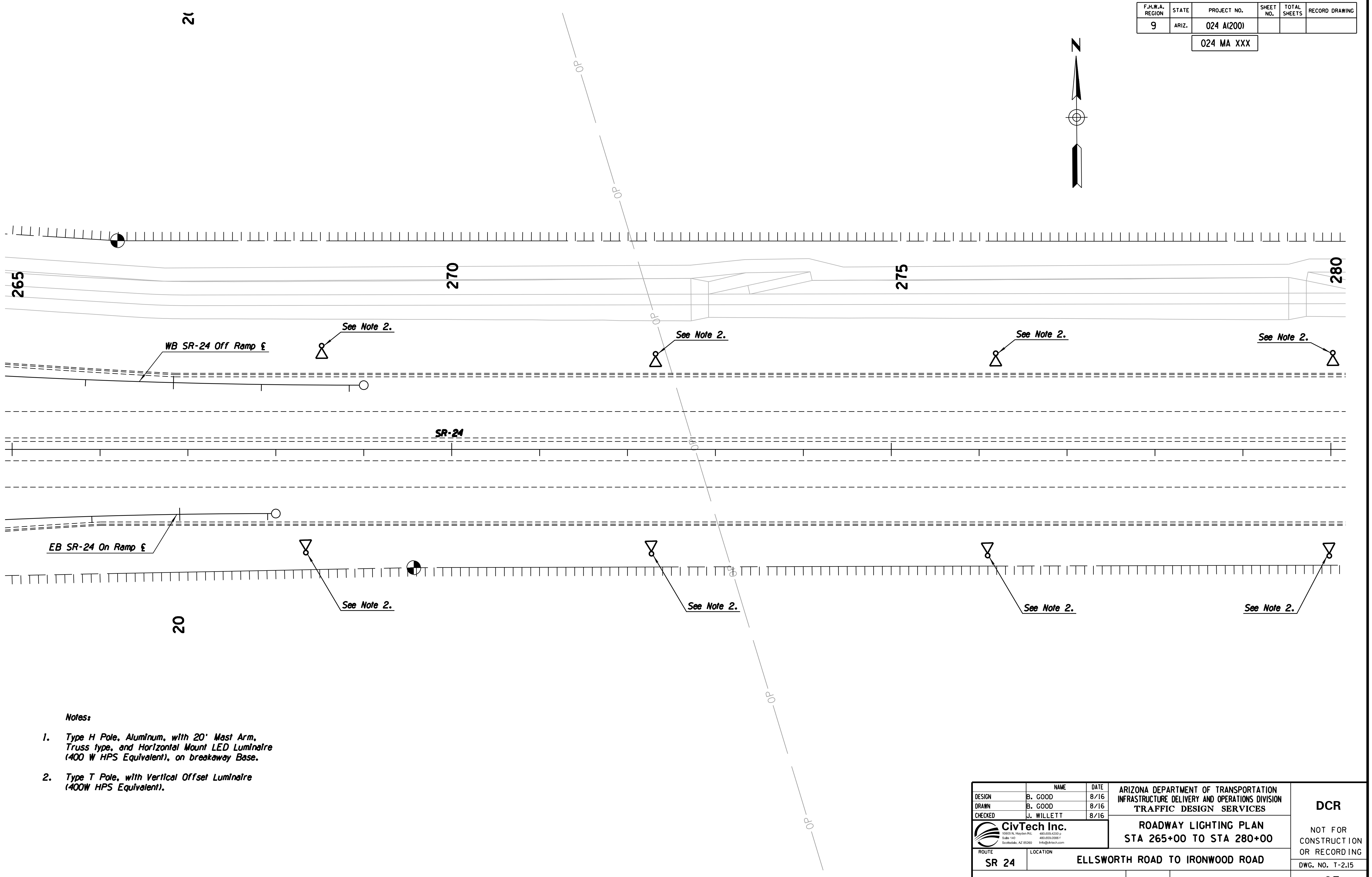
024 A (200)

____ OF ____

8/19/2016 c:\pw_working\arizona\epw14096\dms17795\10.0 h6867 1t14.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 265+00 TO STA 280+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.15

TRACS NO. H8915 01L/02L

024 A (200)

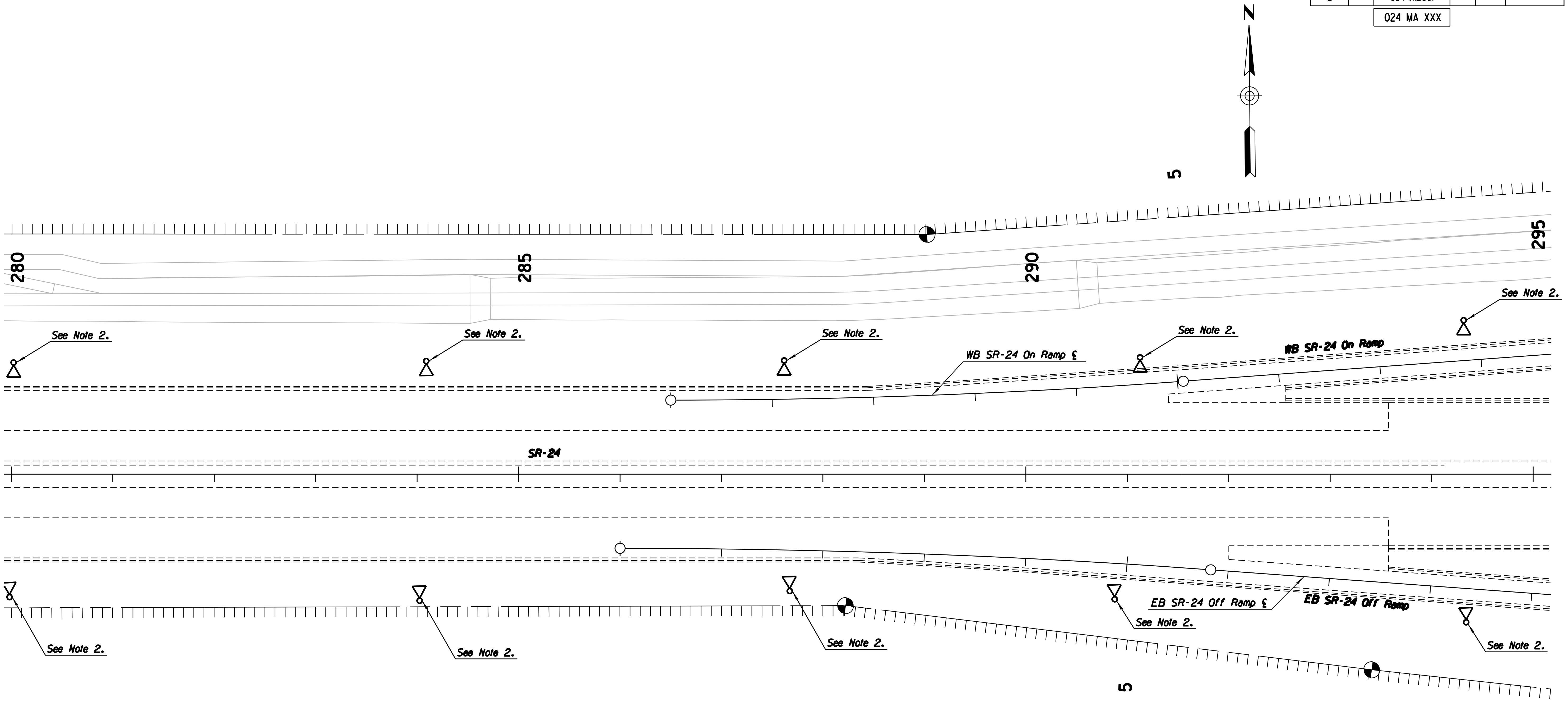
____ OF ____

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

8/19/2016 c:\pw_working\arizona\epw14096\dms17795\10.0 h6867 lt15.dgn

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			
		024 MA XXX			



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*
2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 280+00 TO STA 295+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.16

TRACS NO. H8915 01L/02L

024 A (200)

____ OF ____

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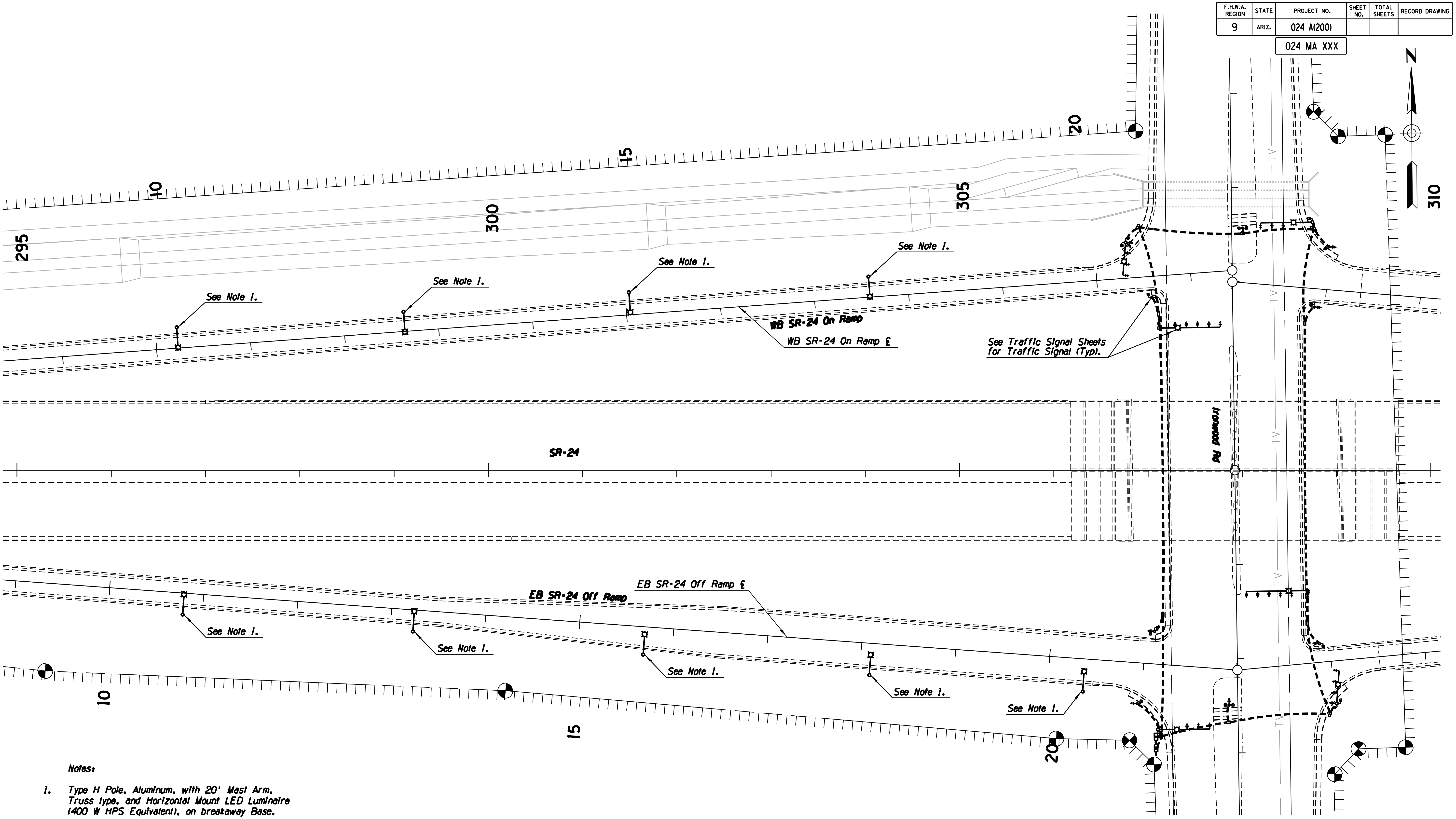
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Notes:

1. *Type H Pole, Aluminum, with 20' Mast Arm, Truss type, and Horizontal Mount LED Luminaire (400 W HPS Equivalent), on breakaway Base.*

2. *Type T Pole, with Vertical Offset Luminaire (400W HPS Equivalent).*

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

ROADWAY LIGHTING PLAN
STA 295+00 TO STA 310+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-2.17

TRACS NO. H8915 01L/02L

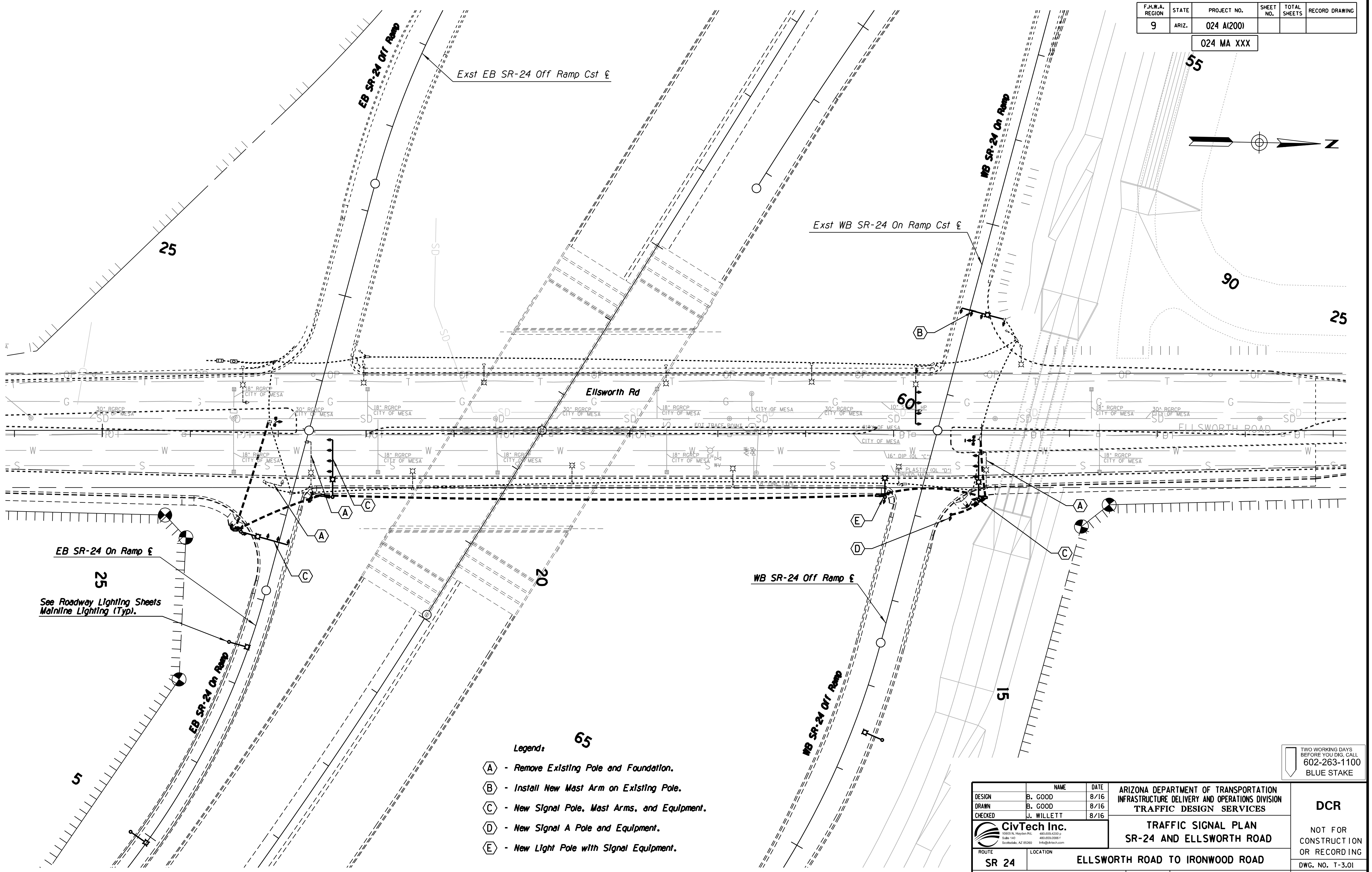
024 A (200)

___ OF ___

DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.
DATE-
LOCATION-
REVISIONS-
FINISHED PLANS-
SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	024 A(200)			

024 MA XXX



Legend:

Ⓐ - Remove Existing Pole and Foundation.

Ⓑ - Install New Mast Arm on Existing Pole.

Ⓒ - New Signal Pole, Mast Arms, and Equipment.

Ⓓ - New Signal A Pole and Equipment.

Ⓔ - New Light Pole with Signal Equipment.

TWO WORKING DAYS
BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

	NAME	DATE
DESIGN	B. GOOD	8/16
DRAWN	B. GOOD	8/16
CHECKED	J. WILLETT	8/16

CivTech Inc.
10605 N. Hayden Rd.
Suite 140
Scottsdale, AZ 85260
480.659.4250 p
480.659.0566 f
info@civtech.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
TRAFFIC DESIGN SERVICES

TRAFFIC SIGNAL PLAN
SR-24 AND ELLSWORTH ROAD

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-3.01

TRACS NO. H8915 01L/02L

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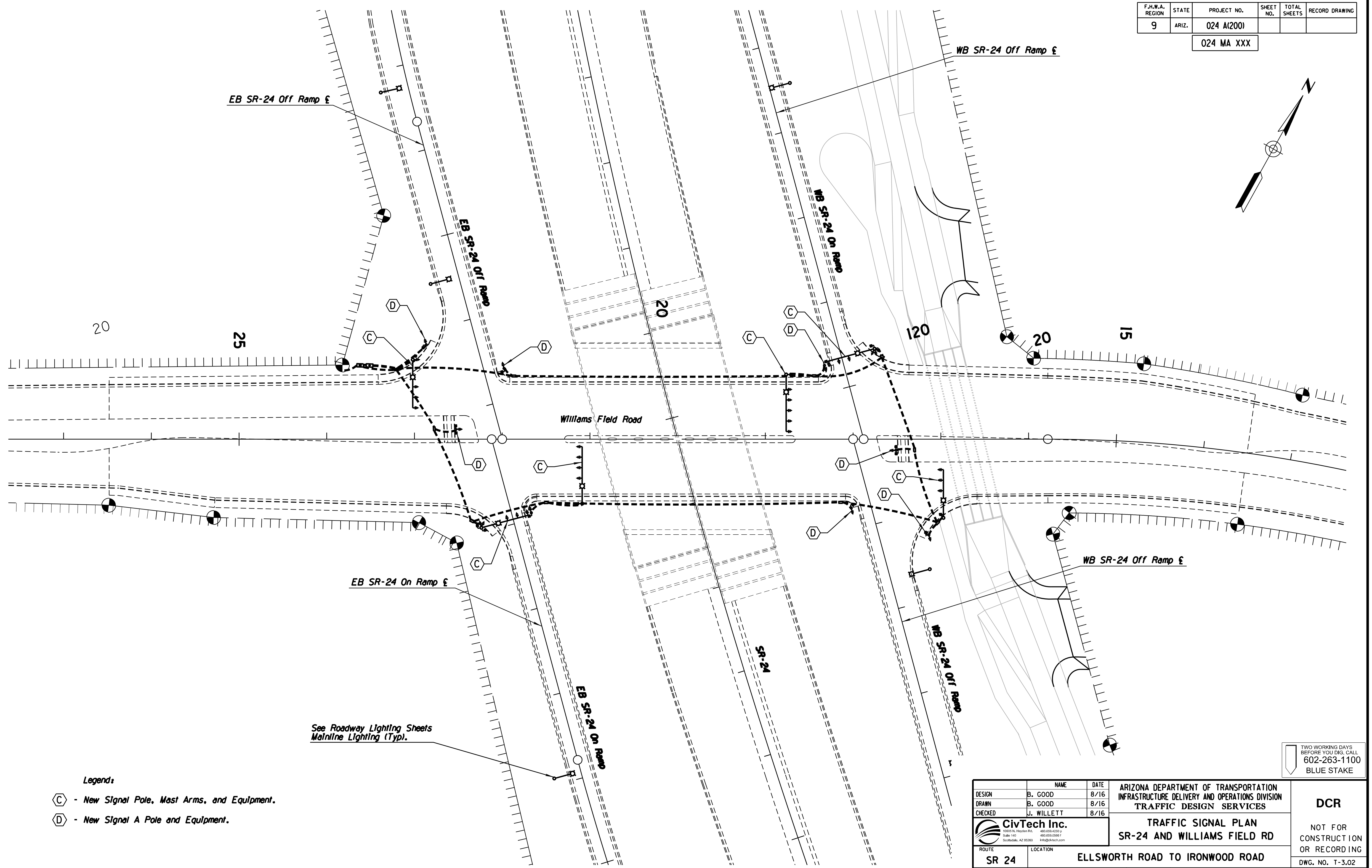

Legend:

Ⓒ - New Signal Pole, Mast Arms, and Equipment.

Ⓓ - New Signal A Pole and Equipment.

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602-263-1100
BLUE STAKE

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TRAFFIC DESIGN SERVICES

TRAFFIC SIGNAL PLAN
SR-24 AND WILLIAMS FIELD RD

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-3.02

TRACS NO. H8915 01L/02L

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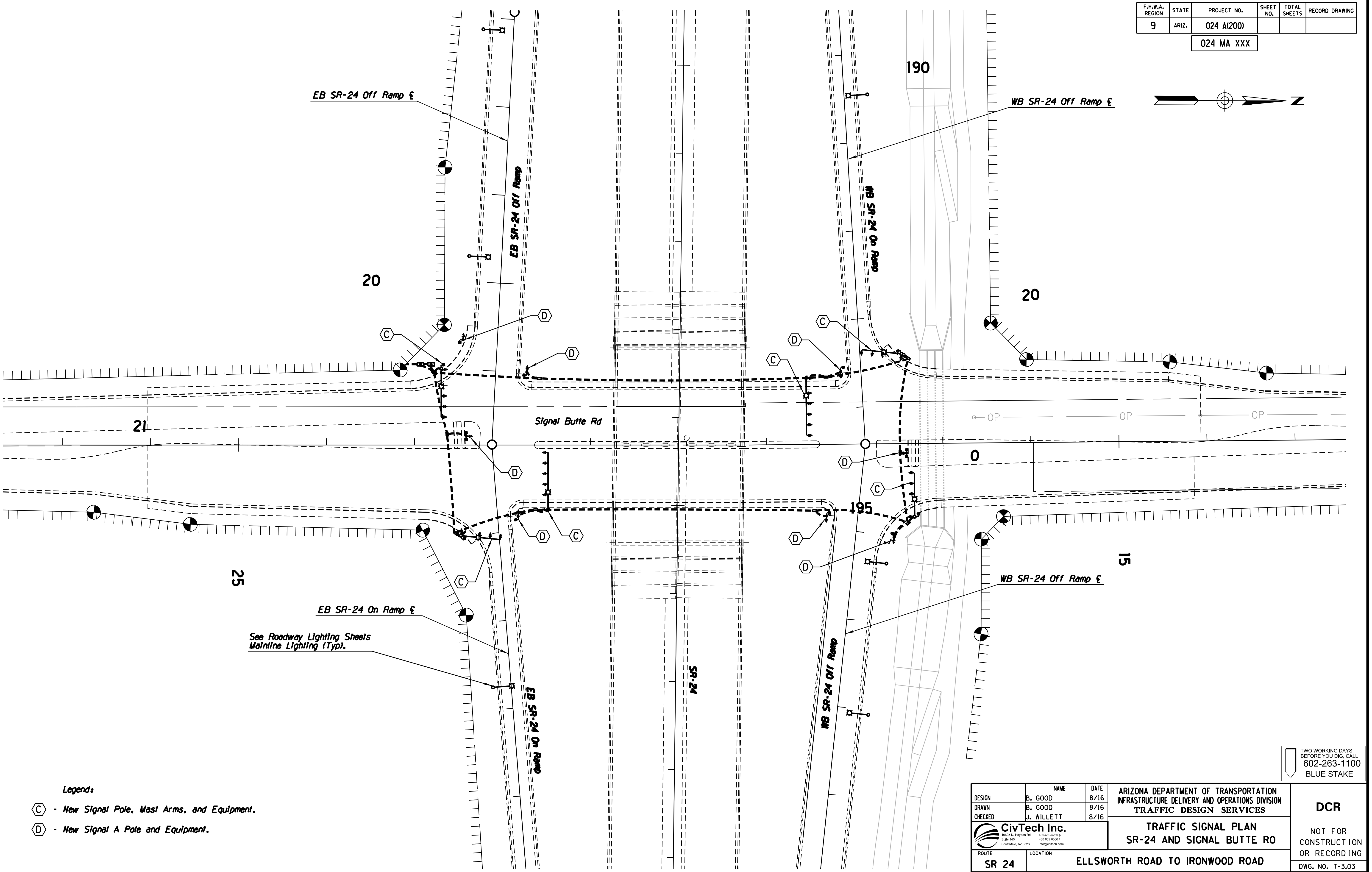

Legend:

- Ⓒ - *New Signal Pole, Mast Arms, and Equipment.*
- Ⓓ - *New Signal A Pole and Equipment.*

TWO WORKING DAYS
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TRAFFIC SIGNAL PLAN
SR-24 AND SIGNAL BUTTE RO

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CONSTRUCTION
OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-3.03

TRACS NO. H8915 01L/02L

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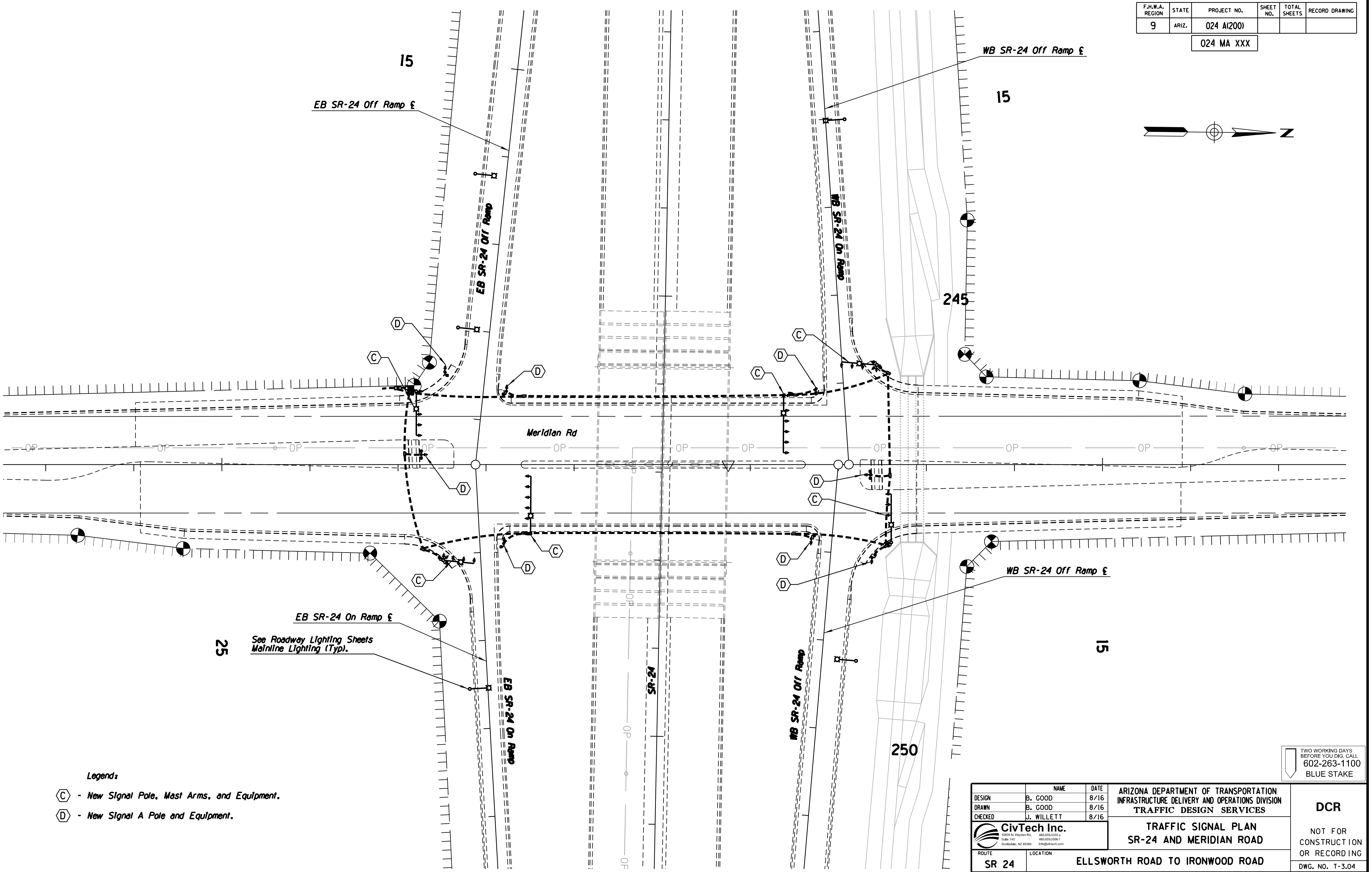

Legend:

Ⓒ - New Signal Pole, Mast Arms, and Equipment.

Ⓓ - New Signal A Pole and Equipment.

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BEFORE YOU DIG, CALL
602-263-1100
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TRAFFIC DESIGN SERVICES

TRAFFIC SIGNAL PLAN
SR-24 AND MERIDIAN ROAD

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DCR

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CONSTRUCTION
OR RECORDING

DWG. NO. T-3.04

TRACS NO. H8915 01L/02L

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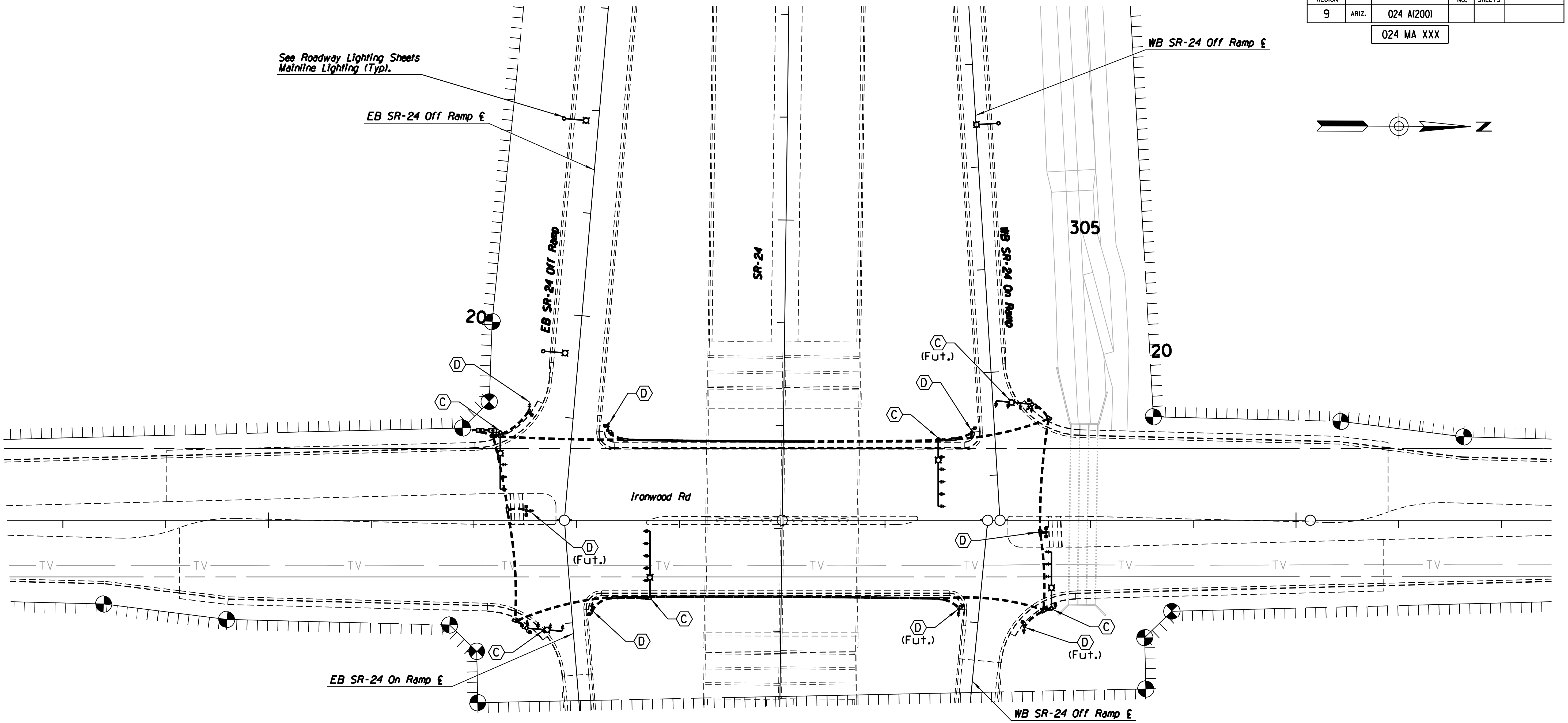

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OR RECORDING

ROUTE
SR 24

LOCATION
ELLSWORTH ROAD TO IRONWOOD ROAD

DWG. NO. T-3.05

TRACS NO. H8915 01L/02L

024 A (200)

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FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

APPENDIX D – INITIAL DRAINAGE REPORT

Initial Drainage Report

in support of the
Interim Phase II DCR Plans

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Drive, in Maricopa County and Pinal County, Arizona

ADOT TRACS No. H8915 01L/02L
FHWA Federal Aid Project No. 024 A (200)

Prepared For:

Arizona Department of Transportation

July 2016

Registered Professional Engineer (Civil)
Certificate No. 44682
FLORIN BRAILEANU
Date Signed 7/29/16
Arizona U.S.A.
Expires 6/30/18

Prepared by:

PARSONS
Parsons Transportation Group

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F. Retention Basin Calculations
G. Draft Initial DCR Review Comments and Resolutions

Registered Professional Engineer (Civil) Certificate No. 44682
FLORIN BRAILEANU
Date Signed 7/29/16
Arizona U.S.A.
Expires 6/30/18

1.0 BACKGROUND

State Route 24 (SR 24) (Gateway Freeway) is an important element of the Maricopa Association of Governments (MAG) (which is a Council of Governments that serves as the regional planning and policy agency for the metropolitan Phoenix area) adopted Regional Freeway System in the southeast portion of Maricopa County and extending into Pinal County. This area southeast of State Route 202 Loop (SR 202L) Santan Freeway within the City of Mesa and unincorporated areas of Maricopa County has been under development, the primary drivers being the improvements at the Phoenix-Mesa Gateway Airport (Airport), and the residential and commercial developments within the area of the former General Motors Proving Grounds. The regional traffic is projected to increase as development and its supporting arterial transportation systems are being expanded and improved. When fully completed, the SR 24 project will connect the existing and future arterial streets to the SR 202L to the west, and into Pinal County, to the east.

As a transportation corridor, the purpose of SR 24 is to provide regional connectivity to the residential and commercial centers by enhancing regional mobility of goods and services between Maricopa County and Pinal County, and to enhance access to the Airport. The MAG 2035 Regional Transportation Plan (RTP) (MAG, 2014) incorporated the SR 24 project under two segments:

- Segment I, between SR 202L and Ellsworth Road was constructed in 2014 as an interim project, including a full freeway-to-freeway interchange with the Santan Fwy and at-grade roadway improvements at Ellsworth Road. Two major drainage components were also constructed with Segment I: the Ellsworth Basin located north of SR 24 and west of Ellsworth Road, and the reinforced concrete box culvert (RCBC) under Ellsworth Road.
- Segment II, from Ellsworth Road to Ironwood Drive is part of Group 3 (MAG, 2014) projects scheduled between Fiscal Year (FY) 2027 and FY 2035, and was identified for final construction to be a six-lane freeway from Ellsworth Road to Meridian Road.

A timeline of events is summarized in *SR-24 Williams Gateway Freeway, Ellsworth Road - Ironwood Drive Interim Phase II Feasibility Study* (MAG, 2015).

With the increased development in the area, MAG and the City of Mesa are considering an interim project for Segment II ahead of the FY 2027 - FY 2035 construction window, which is the subject of the present analysis. The improvements will extend Segment I of SR 24 by approximately 4.6 miles east of Ellsworth Road (See Figure 1 for the project location). The proposed work would include two general purpose travel lanes in each direction separated by median, from Ellsworth Road to Ironwood Drive. The project would follow the alignment approved for the ultimate facility presented in the *SR 24, Gateway Freeway Final Design Concept Report* (FDCR) (ADOT 2011), but on a modified profile that maintains the roadway closely above existing ground for most of its extent and eliminates the need for a pump station to handle on-site drainage.

The major roadway work during the interim project would comprise:

- Constructing pavement for the outer two lanes of the ultimate facility between on- and off-ramps,
- Building one bridge structure to ultimate width,

- Constructing entrance and exit ramps that carry mainline traffic during the interim project, and improvements on surface streets within the Access Control limits.

The major drainage items of work would include:

- Constructing a concrete-lined drainage channel with in-line sedimentation basins along the entire project, including the portion of Segment I between Powerline Floodway and Ellsworth Road;
- Enlarging the Powerline Floodway to the west limits of the ADOT right-of-way and constructing the confluence with the SR 24 channel;
- Building a concrete-lined lateral weir, emergency spillway and a RCBC to connect the SR 24 channel to the Ellsworth Basin,
- Extending the existing RCBC at Ellsworth Road and building six RCBC structures under existing and future surface streets.

1.1 Project Location

The drainage project begins at SR 24 Station 32+23, approximately 50 feet east of the western limit of the ADOT right-of-way where a new confluence with Powerline Floodway. Here the enlarged Powerline Floodway would extend west and tie into an improved channel section developed as part of the Ellsworth Channel. The Ellsworth Channel Relocation work is done by the Airport as a separate project in conjunction with their improvements.

The drainage project ends at SR 24 Station 308+71, which is approximately the eastern end of the RCBC under Ironwood Drive.

Drainage improvements west of Meridian Road will be within the City of Mesa or Maricopa County Unincorporated Area situated within the City of Mesa planning area. Drainage improvements east of Meridian Road will be located within unincorporated Pinal County. (Figure 1 and Figure 2)

1.2 Description

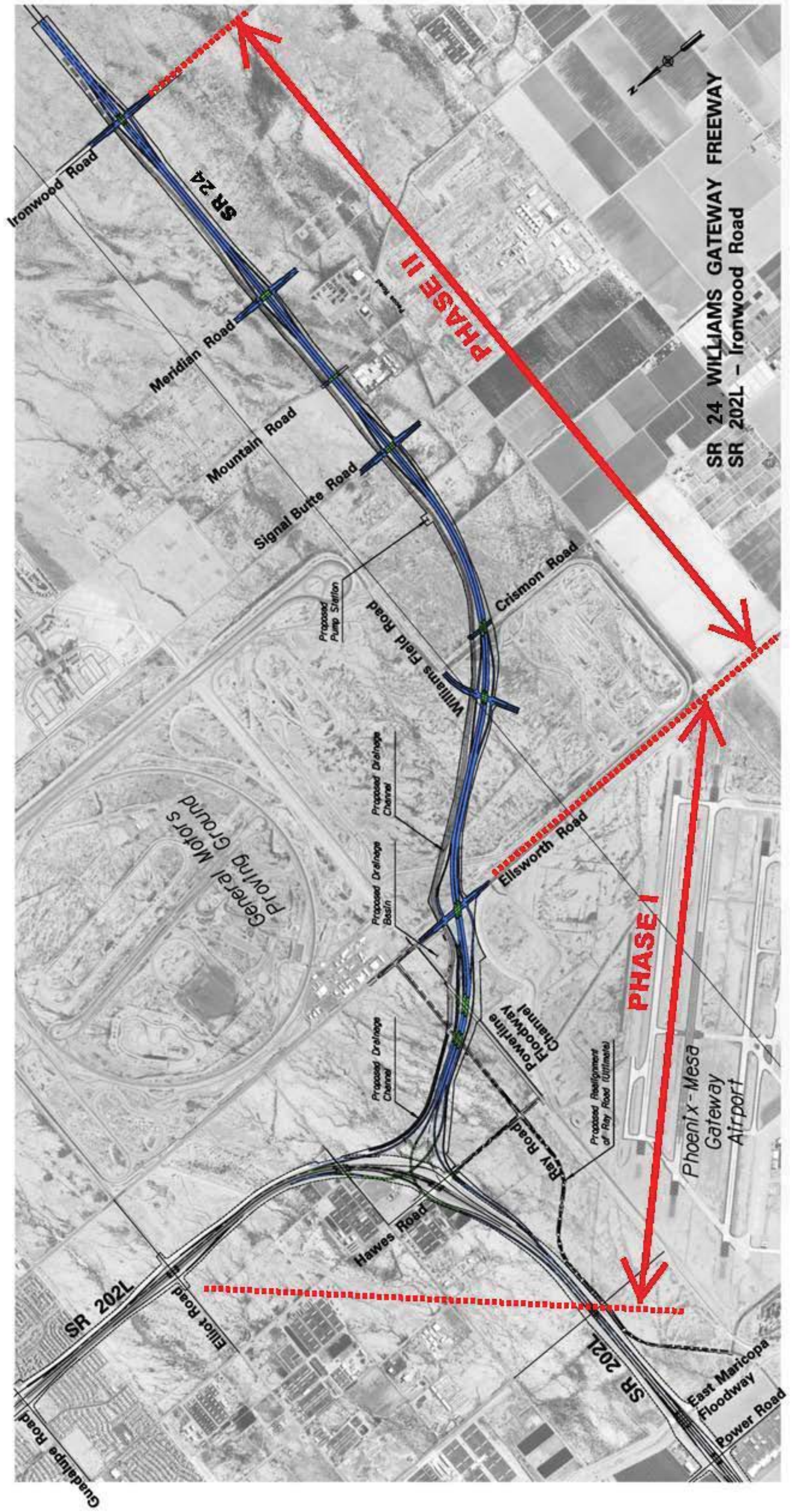
This Draft Initial Drainage Report is a supporting document for the Interim Phase II DCR design submittal to the Arizona Department of Transportation (ADOT) made in February 2016. This report summarizes the design recommendations for the off-site drainage systems for the SR 24 Gateway Freeway, Ellsworth Road to Ironwood Drive, TRACS No. H8915 01L/02L, ADOT.

The hydrologic and hydraulic concepts for this project were prepared in accordance with current ADOT and FHWA design criteria, using hydrologic models developed by the Flood Control District of Maricopa County (FCDMC).

A set of DCR Civil Plans are included in Appendix A. The plans show the best available information for ADOT-owned facilities and private utilities. The existing utilities shown are in conformance with the utility designation survey performed for the *SR 24 Gateway Freeway FDCR*, (ADOT, 2011).

Figure 1 – Location Map (Based on State Highway System, 2014 ADOT Map Book)

Figure 2 – Vicinity Map



2.0 CONCEPT PLAN DEVELOPMENT

This interim project is an extension of the interim Phase I project completed in March 2014. It is a green-field project extending from Ellsworth Road east to Ironwood Drive for approximately 4.6 miles. At the time this report is released, the proposed roadway passes though a predominantly undeveloped, or suburban environment, but master planned residential and commercial developments are being planned particularly north of the roadway.

There are no existing grade separation bridge structures east of Ellsworth Road within this project corridor, as major arterial streets that cross SR 24 (Signal Butte Road and Meridian Road) have not been developed/improved yet.

Transportation improvements are being discussed for simultaneous implementation with the SR 24 interim project to provide regional north-south connectivity within the project limits. The City of Mesa has expressed a willingness to accelerate the improvements for Signal Butte Road, from Williams Field Road to Pecos Road. Also, the segment of Signal Butte Road north of Williams Field Road, and the north side of Williams Field Road east of Signal Butte Road, are currently being constructed/improved by developers.

The roadway improvements that are being, or will be, constructed with the project and adjacent to the project constitute the existing condition and basis of design for the interim SR 24 Ellsworth Road to Ironwood Drive project.

2.1 Local Watershed

The general topography north of SR 24 and east of SR 202L slopes from the north and northeast to the south and southwest. Storm water runoff is conveyed to a slight depression located between SR 24 and Pecos Road (See Figure 2, where washes are indicated by darker vegetated areas). This depression concentrates flows approaching from northeast, and from the east and southeast. In the proposed condition SR 24 will form a barrier prohibiting flow across the freeway from the north and northeast. For a detailed description of the watershed see SR 24 Gateway Freeway FDCR (ADOT, 2011), and East Mesa ADMPU (FCDMC, 2013a).

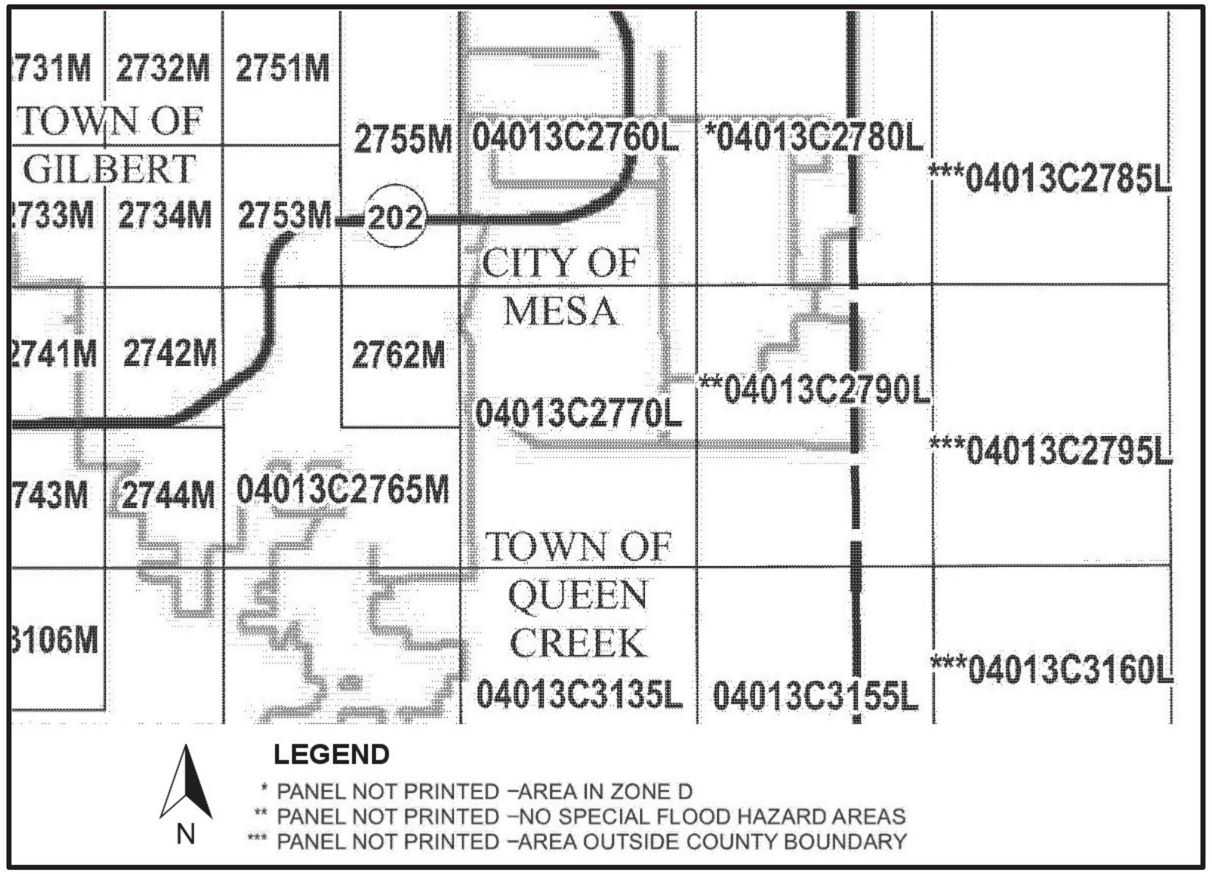
2.2 Floodplain Locations

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for the project area indicates that this project is located within portions of a 100-year floodplain. Figure 3 shows an excerpt of the FIRM Map index (04013CIND0C) for Maricopa County, AZ, but flood hazards have either been listed as Zone D (04013C2780L) or have not been mapped (04013C2760L, 04013C2770L and 04013C2790L) in the project area located within Maricopa County. According to FEMA, the Zone D designation is used for areas where there are possible but undetermined flood hazards, as no analysis of flood hazards has been conducted (FEMA, 2011).

However, the FIRM maps within Pinal County identify flood hazards north of and crossing the SR 24 corridor. These areas identified as floodplains include a crossing of SR 24 at Meridian Road (Zone A and Zone X in map panel 04021C0200E, December 4, 2007); this hazard would extend into Maricopa County west of Meridian Road to Signal Butte Road, but it is not mapped as such. It is also noted that the effective FIRM was not revised subsequent to the Ironwood Drive Improvements.

Copies of the floodplain maps within the project area are included in Appendix B.

Figure 3 – FIRM Map Index (04013CIND0C) for Maricopa County, AZ (November 4, 2015) - Excerpt



This project would intercept the flows approaching the transportation corridor from the northeast between Signal Butte Road and Meridian Road and divert them to the west. Future floodplains would be revised by the project, but at the moment no flooding hazard is mapped in this area.

2.3 Review of Previous Studies, Reports and Design/As-Built Plans

Several existing studies have been performed in the project area. A list and description (where applicable) of each study is presented below.

- *East Mesa Area Drainage Master Plan Update, Arizona, November 2013 by Entellus for FCDMC.* The Flood Control District of Maricopa County requested an update of the East Mesa Area Drainage Master Plan (ADMP) dating back to 1998. East Mesa Area Drainage Master Plan Update (ADMPU) developed and recommended strategies to reduce flood hazards and protect public safety in a 58-square-mile portion of southeastern Maricopa County. The study area includes portions of Mesa, Queen Creek, Gilbert, and unincorporated Maricopa and Pinal counties. Multiple hydrologic models were developed for existing and ultimate-development conditions using a range of storm frequency events (FCDMC, 2013a).

- *Powerline Floodway Hydraulic Analysis Technical Memorandum, East Mesa Area Drainage Master Plan Update, Arizona, November 2013 by Entellus for FCDMC.* This memorandum focused on a capacity analysis for Powerline Floodway, which is a concrete-lined channel draining the Powerline, Vineyard Road, and Rittenhouse Flood Retarding Structures (FCDMC, 2013b).

- *City of Mesa Storm Drain Master Plan (SDMP), Arizona, January 2010 by Entellus for City of Mesa.* The SDMP studied the current City Storm Drain System and identified necessary improvements. The system was evaluated against the latest City drainage criteria and hydrologic modeling results developed by the City and the Flood Control District of Maricopa County. The recommended changes included revisions to the City Drainage Regulations for retention design, minimum storm drain sizes, manhole spacing, and first flush requirements for AZPDES, including recommendations for inclusion of green drainage solutions (Entellus, 2010).

- *Bella Via Mountain Road, Mesa, Arizona, Final Drainage Report, February 2014 by HilgartWilson for Pulte Group.* The report documented the drainage analysis and improvements of the Mountain Road alignment as part of the Bella Via (formerly known as Mountain Horizons) master planned development (HilgartWilson, 2014).

- *Master Drainage Report Update for Eastmark, Revised April 24, 2014, by Wood Patel and Associates for DMB Mesa Proving Grounds, LLC*. This document incorporated proposed land use for Eastmark (previously known as Mesa Proving Grounds) Development. The report updated the hydrologic modeling as well as the hydraulic analysis and design within the Development, including that of the off-site channel that runs along the southeast corner of the property (Wood Patel, 2014).

- *Final Drainage Report for Gila River Ranches, Warner and Meridian, Mesa, Arizona, Second Revision January 25, 2005 by CMX for Gila River Ranches LLC*. The report documented on-site and off-site pre- and post-development hydrologic estimates, calculated street, ditch and storm drain flows as well as the volumes necessary to meet retention requirements. To protect the east boundary of the property from the off-site 100-year flows, Meridian Drive was elevated. Off-site runoff north of the Powerline Floodway was directed south along Meridian Road. South of the Powerline Floodway off-site runoff transitioned back into sheet flow conditions and drain southwesterly in historic flow patterns (CMX, 2005a).

- *Off-site Flow Management for Gila River Ranches 4625 S Mountain Road at Warner and Meridian, Mesa, Arizona Revised June 15, 2005 by CMX for Meritage Homes*. The report addresses the drainage management plan for the off-site flows that impact the east boundary of the Gila River Ranches. The plan proposed to direct the off-site flows along the east side of Meridian Road, which will be elevated above natural ground, toward the Powerline Floodway Channel. Also, the capacity of Powerline Floodway was improved to Signal Butte Road (CMX, 2005b).

- *Final Drainage Report Ironwood Drive Ocotillo Road – US 60 – Phase B, April 2007, by Kimley-Horn and Associates for Pinal County Department of Public Works*. The report identified drainage improvements for the Ironwood Drive/Gantzel Road Project, that extended between Ocotillo Road and the intersection of US 60 and Ironwood Drive. This report documents the methodology and results of the hydrologic analysis as well as the existing and proposed drainage conditions along the approximately 9.5 mile-long project. Existing type, size, and location of cross drainage structures were documented and recommendations were made for improvements to the drainage infrastructure. Analysis of the off-site hydrology, existing cross culverts, and roadway drainage was performed in accordance with Pinal County Drainage Standards and the Draft Drainage Design Manual (Drainage Manual). The analysis was supplemented by ADOT hydrologic design criteria. This design was implemented with the Ironwood Drive roadway improvements and the results of the analysis were later used for a split flow calculation that was incorporated in the East Mesa ADMPU (Kimley-Horn, 2007).

- *Preliminary Drainage Report for Keighley Place, August 2, 2005, by LandAide Inc. for Providence Homes.* The report documents on-site and off-site hydrology estimates for the Keighley Place Development located at the northwest corner of Meridian Road and Ray Road. The subdivision layout indicated that off-site runoff approaching from northeast and moving to southwest crosses the site within the pre-development drainage corridor (LandAide, 2005)

- *Final Drainage Report for Mountain Horizons South of the Powerline Floodway 5210 South Mountain Road, Mesa, AZ by CMX LLC for Pulte Homes, August 2006.* The report detailed the pre- and post-development on-site and off-site drainage analysis. It included hydrology estimates and hydraulic calculations for storm drains and retention capacities. The off-site drainage analysis was based on regional hydrology developed for the East Mesa Area Drainage Master Plan prior to its 2013 update. (CMX, 2006)

- *Addendum to Final Drainage Report for Mountain Horizons South of the Powerline Floodway 5210 South Mountain Road, Mesa, AZ (August 2006) by CMX LLC for Pulte Homes, January 2008.* The addendum incorporated revisions due to modifications of the Mountain Horizons grading plans. It included updated post-development hydraulic calculations for storm drains and retention capacities. (CMX, 2008)

- *Master Drainage Report for Harvard Investments Pacific Proving Grounds North (PPGN), City of Mesa, Arizona, March 2013, by EPS Group for Harvard Investments.* The report focused on the existing surrounding regional conditions, the proposed regional conditions with the development of PPGN among other planned regional improvements, and it presented the results of a broad analysis of the PPGN drainage areas, runoff, retention, storage, and drainage management strategy in compliance with City of Mesa standards. The report discussed the management of off-site flows, particularly of those approaching from the east at the south boundary of the development. These flows would be conveyed through an extension of the channel departing the Eastmark development by heading west along future Williams Field Road, and then turning south after crossings the Crismon Road alignment. This channel would ultimately outfall into the SR 24 channel once the latter is constructed (EPG, 2013).

The following As-Built and Final Design plans have been reviewed:

- *024 MA 000 H6867 01 C, SR 24: SR 202L to Ellsworth Road, March 5, 2015.*

2.4 Design Constraints and Opportunities

According to the ADOT *SR 24 Gateway Freeway Final Design Concept Report, April 2011* the recommended alternative for the ultimate project profile consists of a four-lane mainline with grade-separated intersections. The cross streets are maintained at or just above existing grade. The intersections at Ellsworth Road, Williams Field Road and Crismon Road are overpasses. Provisions are made for the Ironwood Drive intersection to be a proposed overpass, as well. Between approximate Station 156+50 to approximate Station 275+20 the mainline profile is depressed below existing ground, hence the intersections at Signal Butte Road, Mountain Road and Meridian Road are underpasses. The depressed profile requires a deep on-site drainage system serviced by a pump station that would outfall into the SR 24 channel proposed on the north side of the roadway.

The phased development of SR 24 involving an interim facility to Ironwood Drive presents an opportunity for a revised roadway profile, which keeps the proposed grade slightly above existing ground. This opportunity is also justified by the elimination of a costly pump station and deep storm drain trunk line that would be required for a depressed mainline profile. Furthermore, some of the major roads do not exist yet or are at a very incipient stage; it would be more cost effective for the crossings at Crismon Road and Mountain Road, for instance, to go over SR 24 through a bridge structure either by being constructed at a later date, or with the interim SR 24 project.

A coherent drainage design concept could be implemented for both on-site and off-site by using elements of the recommended ultimate project. The off-site channel would be maintained on the north side of the project to intercept overland runoff through sheet flow as well as concentrated input. The flow approaching from the north is a major design constraint that dictates the size and the capacity of the channel along the project. Provisions would be made for the channel to be concrete-lined and provide sufficient flow capacity to accommodate existing 100-year flows within the freeboard. The channel could also be relocated closer to the roadway taking advantage of the smaller roadway footprint and reducing the need for right-of-way.

The on-site drainage elements of the interim project would be greatly simplified by maximizing the use of sheet flow and surface conveyance in ditches. Water quality treatment would be provided in shallow linear basins located on both sides of the roadway within the existing right-of-way. These basins would be located in cascading sequence and sized for handling the ultimate water quality volume. The medians would require minimal grading and runoff collected within would flow overland downstream to the next cross road where the flow would be collected and transferred to the infield areas.

3.0 ON-SITE DRAINAGE DESIGN

SR 24 is discussed in this section as an interim project between Ellsworth Road and Ironwood Drive, but provisions are made for the ultimate configurations and runoff flows. The pavement will be normal crowned at most locations to allow for continued drainage to the outside shoulder and to roadside ditches. The proposed interim two lanes of traffic would be located at the outside limit of the ultimate section. In super-elevated sections, catch basins would be placed along the median barrier rail to collect runoff.

3.1 On-Site Existing Conditions

The existing drainage improvements on the corridor are related to Segment I of the project finalized in May 2014 between SR 202L and Ellsworth Road, and the improved Ellsworth Road and Ironwood Drive. At Mountain Road the on-site drainage is limited to roadside ditches.

Currently, on-site freeway drainage is collected in catch basins and conveyed through lateral pipes into existing off-site drainage systems. Runoff is also collected by catch basin inlets within the limits of the Ellsworth Road improvements. Ironwood Drive is a median-separated facility and runoff sheet flows off the edge of the pavement to the outside ditches; median flows are intercepted at the culverts crossing the road.

The existing on-site drainage system would see minor modifications including:

- Several cross pipes that currently discharge into the Ellsworth Basin across the future SR 24 channel would be cut short and discharge into the SR 24 channel once that is built.
- Should the need for a grade-separated crossing at Ellsworth Road be justified by the traffic analysis, the footprint of the temporary basin between the existing on- and off-ramps at Ellsworth Road would be reduced to construct the mainline embankment.
- At Mountain Road a grade-separated crossing is proposed. Mountain Road would cross above SR 24 through a bridge and the roadway section would be improved. Existing roadway side ditches north of the project would be intercepted by the SR 24 channel.
- Ironwood Drive would be improved within the access control limits. Curb and gutter and catch basins would direct and intercept the on-site runoff on each side of the road. Storm drain pipes would convey the flow to the SR 24 channel or the RCBC crossing Ironwood Drive.

In areas of super-elevation, catch basins along the concrete median half barrier are provided to intercept and remove drainage flows from the roadway.

3.2 Design Criteria

The on-site hydrology has not been analyzed as part of this study, and such an analysis is deferred to a later design stage. In the meantime, the on-site hydrologic analysis done for the *SR 24 Gateway Freeway Final Design Concept Report*, April 2011 (ADOT, 2011) is referenced herein.

The procedures described in the *ADOT Roadway Design Guidelines* (RDG) (ADOT, 2014a), *ADOT Highway Drainage Design Manual, Volume 2, Hydrology* (HDDM2) (ADOT, 2014b) and *ADOT Highway Drainage Design Manual, Volume 3, Hydraulics* (HDDM3) (ADOT, 2014c), are applicable.

The Rational Method is used to develop the 10-year and 50-year peak runoffs based on a site-specific Intensity-Duration Frequency (I-D-F) (ADOT, 2011).

The Rational Formula is:

$Q = C\ i\ A$

where:

Q = the peak discharge in cfs

C = runoff coefficient

i = the average rainfall intensity, in inches/hour (in/hr) for the selected rainfall return period

A = the contributing drainage area in acres

The following values of "C" are used:

- Paved surfaces – 0.95
- Highway landscaped slopes – 0.70

The rainfall intensity is estimated based upon the time of concentration at the point being analyzed. A site-specific I-D-F Graph, developed from the procedures in the HDDM2, is used to estimate the average rainfall intensity. The initial time of concentration is calculated from Equation 2-2 of the HDDM2 as follows:

$$T_c = 11.4\ L^{0.5}\ K_b^{0.52}\ S^{-031}\ I^{-0.38}$$

where:

T_c = time of concentration in hours

L = the length of the longest flow path in miles

K_b = the watershed resistance coefficient from Table 2-1, HDDM2

S = the slope of the longest flow path in ft/mile

I = the average rainfall intensity in in/hr (same as Equation 2-1, HDDM2)

The minimum T_c, and therefore the minimum rainfall duration, is ten (10) minutes. For Stage II design, all on-site drainage areas have been assumed to have a 10 minute time of concentration.

The following drainage criteria will be applied to the on-site hydrology design and are found in Chapter 600, of the *ADOT Roadway Design Guidelines* (ADOT, 2014a):

- Storm Drain Design Storm Frequency is 10 years for at grade/elevated mainline, ramps and crossroads and 50 years for depressed areas per Section 603.2.

- Hydraulic grade line shall be at least 6 inches below the top of the catch basin grate for the Storm Drainage System per Section 603.2.

- For the 10-year storm, the allowable spread (ponding width) shall not exceed the width of the roadway gutter, shoulder, parking lane and/or distress lane and one-half of the adjacent lane (for roadways with more than one lane) per Section 603.2.

- Inlet Capture Ratios shall conform to Table 606.2 of RDG.

- Restrictions on types of inlets are found in subsection 606.2.B of RDG.

- Minimum pipe size for storm drains shall be 24 inches except those pipes connecting catch basins to trunk lines may not be less than 18 inches per Section 607.1.

- Desirable "self cleaning" velocity is 3 feet per sec (fps) flowing full. The minimum velocity flowing full is 2 fps per Section 607.1. Some exceptions occur due to catch basins requirements at transitions and end of barriers and short pipe connections of flanking inlets.

- Allowable ponding depth on highways shall not exceed the height of the curb for a 10-year storm frequency per Section 603.2.

- The capacity of ditches that are parallel to the roadway and serve to convey on-site roadway drainage shall be designed to meet the requirements of the 10-year storm frequency and the Hydraulic Grade Line must be below the subgrade, (or 3"below pavement elevation for the 50-year storm) per Section 603.2. In addition, the ditches that drain sag points must be checked for the 50-year storm peak flow.

- Storm drain lengths are limited to the desirable maximum distance between manholes per Table 607.2.

  Pipes under 33 inches in diameter – 330 feet
  Pipes 36 and 39 inches in diameter – 440 feet
  Pipes from 42 to 69 inches in diameter – 660 feet
  Pipes 72 inches in diameter and larger – 1,200 feet

The following pipe design criteria will be used on this project and are found in the *ADOT Pipe Selection Guidelines and Procedures* (ADOT, 1996).

- Approved pipe types are reinforced concrete pipe (RCP), non-reinforced concrete pipe (NRCP), and corrugated high density polyethylene plastic pipe (CHDPEPP) Class S up to

42 inches in diameter in fills less than 10 feet. No corrugated pipe is allowed in closed systems.

- Pipe roughness values of 0.012 shall be used for all pipes except for non-reinforced cast-in-place concrete pipe (NRCIPCP) which has a pipe roughness value of 0.014.

Drainage areas, which include shoulders, median and side slopes, are identified by examination of the roadway plan and profile. New inlet catch basins that are to be placed along the median barrier are sized for the ultimate freeway section.

3.3 Inlet Design

The standard catch basin inlets used for the project are ADOT Standards C-15.91 and C-15.92. Slotted drains (ADOT Standard C-13.60) supplement catch basins; they have been used extensively to minimize the number of inlets in the system and to control runoff spread. These inlets would be used at the superelevated or grade-elevated sections of the project (approaches to grade-separated crossings) where curb and gutter is used, or to improved surface streets with curb and gutter. For the rest of the interim project, as the finished grade profile is only slightly elevated above the existing grade and the pavement width is limited to two lanes of traffic plus shoulders, the curb and gutter could be eliminated leaving the on-site runoff to sheetflow over the edge of pavement.

New C-15.90 area catch basins are considered for the future infield areas at Ellsworth Road, future William Field Road, Signal Butte Road, Meridian Road and Ironwood Drive. For the interim project these inlets would bleed-off the areas between on- and off-ramps that would be used for water quality treatment. Median inlets are not anticipated with the interim project.

Grate inlets are designed with a 50% clogging factor except when flanking catch basins are provided at sag locations. The flanking inlets would be placed with a 0.1-foot vertical difference in grate elevation where possible.

Slotted drains are designed with a capture ratio 67% when on grade and 50% when located in a sump.

Deck drains are not anticipated.

Pavement Inlet Design Procedure

The following steps are used to locate and size the mainline catch basins on curb and gutter or concrete barrier sections:

a. Assume a length of pavement for the initial inlet based upon the ultimate pavement width, and using the Rational Formula, calculate the 10-year peak and 50-year peak discharge value (Q) in cfs.

b. Utilizing HEC – 22 design procedures, calculate the spread for the 10-year (50-year if in a sag location) return storm and RDG inlet capture ratios. Check spread and depth at curb against design criteria. Add slotted drain if necessary. Calculate bypass flow.

c. Continue steps "a" and "b" until all mainline inlets have been located. Include bypass flow from previous inlet when analyzing the next inlet.

In addition to the procedure outlined above, catch basin inlets should be located at critical points as recommended by the ADOT RDG (ADOT, 2014a), Chapter 600.

The inlet analysis was not done as part of this study, and such an analysis is deferred to a later design stage. Until then, the inlet analysis done for the SR 24 Gateway Freeway Final Design Concept Report, April 2011 (ADOT, 2011) is referenced herein.

3.4 Storm Drain Design & Analysis

Based upon inlet locations, design the storm drain trunk line and catch basin laterals as follows:

1. Size the storm drain trunk line.
2. Define the maximum hydraulic grade line (HGL) at the end of the pipe run.
3. Calculate the HGL for the pipe network using ADOT accepted design procedures.
4. Review the HGL to determine if pipe size reductions are possible and confirm that the HGL is not higher than allowable at catch basins.
5. Iterate steps 3 and 4 as necessary to optimize the pipe network.

The on-site storm drain network was not analyzed as part of this study, and such an analysis is deferred to a later design stage. Until then, the on-site storm drain analysis done for the SR 24 Gateway Freeway Final Design Concept Report, April 2011 (ADOT, 2011) is referenced herein.

3.5 Outlet Design

Outlets from the elevated roadway into the existing channel are designed for the 10-year frequency storm in the outlet pipe and minimal flow (crown elevation tailwater) in the channel, but no less than 6” above the channel invert. The catch basin grates should be checked with existing 100-year frequency storm hydraulic grade line in the off-site channel. The outlet design was not analyzed for this study,

3.6 Proposed On-Site Drainage Features

Due to the mix of developed (developing) urban, suburban and undeveloped landscape within the project area, the recommended alternative for pavement drainage is sheet flow over the edge of pavement to adjacent roadway ditches. Concrete half barrier or curb and gutter is recommended adjacent to the outside shoulder of the roadway for superelevated or grade-elevated roadway segments (approaches to grade-separated crossings).

The pavement will have a 2% cross grade draining to the outside for a majority of the project, except for the superelevated sections.

The proposed drainage system would include installation of shallow linear detention basins for water quality treatment, roadside ditches, catch basins and storm drain pipes. Such features are only loosely indicated on the plans and calculations were not done at this design stage; this work is deferred to a later design phase.

ADOT C-15.91 catch basins would be installed along curb and gutter sections to collect the pavement runoff. Similarly, ADOT C-15.92 catch basins would be installed in locations with concrete half barrier. Additional catch basins (flanking inlets) would be added at sag curves and superelevation transitions to reduce bypass flows. Flanking inlets could be supplemented by slotted drains.

Runoff collected in the catch basins will be conveyed to cut ditches or storm drains. New storm drain would be installed to convey flows to a discharge point, or a connection between the new catch basins and existing storm drain laterals is made, where possible.

The on- and off- ramps would not include catch basins unless curb and gutter is required.

The areas between on- and off- ramps at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road and Ironwood Drive would be used for water quality retention basins. These areas would be regraded to a more traditional infield configuration when the ultimate project is constructed.

Several existing pipes would be shortened to discharge into the SR 24 channel (between Powerline Floodway and Ellsworth Road). The remaining pipes not being used would be abandoned in place, capped and filled with sand/cement slurry.

In addition to the general approach described above, Table 1 summarizes the future on-site drainage features by segment.

Table 1 – Future On-Site Drainage Features and Runoff Flow Patterns

Begin Approach	End Approach	Northern Runoff	Southern Runoff
East of Powerline Floodway	West of Ellsworth Road	- Several on-site retention bleed-off and pavement runoff pipes that discharge to the northeast into the Ellsworth Basin would be shortened to discharge into the SR 24 channel.	-- The temporary infield basin between the on- and off- ramps west of Ellsworth Road would be re-graded to accommodate the mainline embankment, should a grade-separated intersection at Ellsworth Road be needed; - the regrading would result into two distinct infield basins that would be connected by an equalization/ bleedoff pipe.
East of Ellsworth Road	West of Williams Field Road	- Runoff on the mainline will sheetflow or be collected by catch basin and conveyed to a side ditch located between the WB lanes and the SR 24 channel; - The side ditch would convey the flow to the northwest and cross the WB lanes east of Ellsworth Road to a water quality basin located at the northeast infield of the intersecton. This basin would provide water quality treatment for the entire segment. - The water quality retention basin would bleed-off to the SR 24 channel.	- Runoff on mainline will sheetflow or be collected by catch basins and be conveyed to a side ditch; - the side ditch would convey the flow to the west and cross the EB lane east of Ellsworth Road to a water quality retention basin in the northeast infield of the intersecton.
East of Williams Field Road	West of Crismon Road	- Runoff on the mainline will sheetflow or be collected by catch basins and conveyed to a linear water quality basins located between the WB lanes and the SR 24 channel; - The shallow linear water quality retention basin would bleed-off to the SR 24 channel.	- Runoff on mainline will sheetflow or be collected by catch basins and conveyed to a side ditch; - the side ditch would convey the flow to the northwest and cross the EB lanes east of Williams Field Road to a water quality retention basin in the infield; - The water quality retention basin would bleed-off to the SR 24 channel.
East of Crismon Road	West of Signal Butte Road	- Runoff on mainline will sheetflow or be collected by catch basins and be conveyed to linear water quality basins located between the WB lanes and the SR 24 channel; - The water quality retention basins would be separated by check dams and bleed-off to the SR 24 channel.	- Runoff on mainline will sheetflow or be collected by catch basins and conveyed to a side ditch; - the side ditch would convey the flow to the west and cross the EB and WB lanes east of Crismon Road to a water quality retention basin; - The water quality retention basin would bleed-off to the SR 24 channel.

Begin Approach	End Approach	Northern Runoff	Southern Runoff
East of Signal Butte Road	West of Meridian Road	- Runoff on the mainline will sheetflow or be collected by catch basins and conveyed to linear water quality basins located between the WB lanes and the SR 24 channel; - The water quality retention basins would be separated by check dams and bleed-off to the SR 24 channel.	- Runoff on mainline will sheetflow or be collected by catch basins and conveyed to a side ditch; - the side ditch would convey the flow to the west and cross both EB and WB lanes east of Mountain Road to a water quality retention basin; - west of Mountain Road the side ditch would continue to the west and cross the EB lanes east of Signal Butte Road to a water quality retention basin in the infield; - The water quality retention basins would bleed-off to the SR 24 channel.
East of Meridian Road	West of Ironwood Drive	- Runoff on mainline will sheetflow or be collected by catch basins and conveyed to linear water quality basins located between the WB lanes and the SR 24 channel; - The water quality retention basins would be separated by check dams and bleed-off to the SR 24 channel.	- Runoff on mainline will sheetflow or be collected by catch basins and conveyed to a side ditch; - the side ditch would convey the flow to the west and cross the EB lanes west of Ironwood Drive and east of Meridian Road to water quality retention basins; - The water quality retention basins would bleed-off to the SR 24 channel.

Proposed on-site drainage features are shown in Figure 4 and on the plan sheets included in Appendix A. Supporting documentation for the design of various drainage components are included in Appendices D and F.

The bridge anticipated with the project is the Mountain Road Overpass. Drainage calculations have not been done at this design stage, but both structures are relatively short and have sufficient longitudinal grade to ensure positive drainage and contain the runoff spread within design. Deck drains are not anticipated, but spillway embankments will be designed as needed in later design phases.

3.8 Final Design Issues

Several issues will need to be considered with the final design of the drainage features.

Runoff spread, interception and conveyance of pavement runoff generated throughout the interim project was not evaluated.

- Consideration of the effect of the time of concentration on the rainfall intensity for peak flow calculations. Most of pavement drainage areas are likely to generate a time of concentration of 10 minutes, but that was not calculated for this study.

- For curb and gutter sections, slotted drain could be considered to supplement the interception capacity at most catch basin inlets. Based on current construction costs, it makes economic sense to use a slotted drain up to 60-65 ft in length instead of a new catch basin inlet with the same length of discharge pipe. However, this concept will need to be revised based on capital and maintenance costs at the time the final design is performed.

- Roadside ditches were not analyzed with this study. They will require analysis for transport of drainage flows to water quality basins at all locations within the right-of-way.

- Available retention capacity for water quality treatment shall be analyzed and sized to contain the first flush volume (equivalent to that generated by the first 0.5 inches of rainfall on impervious surfaces) at the minimum as indicated in FCDMC *Drainage Policies and Standards for Maricopa County, Arizona,* (FCDMC, 2007).

4.0 OFF-SITE DRAINAGE DESIGN

This section is intended as an update to the analysis performed by ADOT for the project area as part of the *SR 24 Gateway Freeway FDCR* (ADOT, 2011), and extensive references will be made to the ADOT, 2011 report and its accompanying Initial Drainage Report. The update relies heavily on the extensive regional evaluation done by FCDMC for the East Mesa ADMPU (FCDMC 2013a, FCDMC 2013b) using hydrologic models modified for the purpose of the SR 24 interim project.

4.1 Existing Conditions

Several existing or proposed regional drainage facilities in the project area will have an influence upon or be affected by the project. They are:

- Powerline Flood Retarding Structure (FRS) and Vineyard FRS in Pinal County, designed to provide flood protection to Central Arizona Project (CAP) Canal and to downstream areas in Pinal County and Maricopa County;
- Powerline Floodway, a concrete-lined channel that extends from the Powerline FRS to the East Maricopa Floodway; it is primarily designed to drain the FRS structures;
- Ellsworth Channel, which runs along the east and west sides of Ellsworth Road between Pecos Road and the Powerline Floodway;
- Former General Motors Proving Grounds perimeter channel, which will be improved by developers;
- East Maricopa Floodway, which serves as a regional outfall for eastern Maricopa County;
- Pecos Road Channel is one of the proposed drainage improvements in the East Mesa ADMPU, it is intended to run along Pecos Road and to discharge into Ellsworth Channel.

The SR 202L Santan drainage channel is not affected by this project.

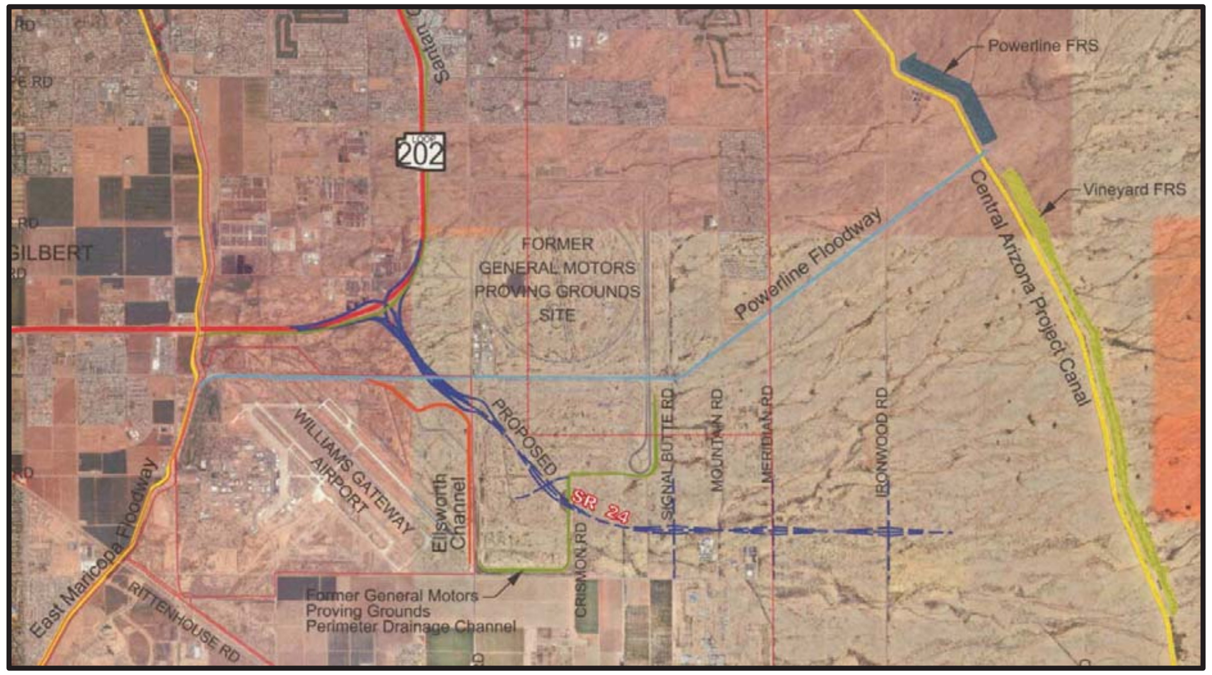
The ADOT, 2011 accompanying Initial Drainage Report provides a list of design flows in the major existing facilities in the area. These flows are presented in Table 2:

Table 2 – Existing Drainage Facility Design Flows (from ADOT, 2011 Initial Drainage Report)

Drainage Facility	Design Flow (cfs)
SR 202L Santan Channel	2,200
Powerline Floodway at confluence with Ellsworth Channel	3,935
Ellsworth Channel	3,500
East Maricopa Floodway at confluence with Powerline Floodway	8,460

An extensive description of these drainage facilities is provided in the ADOT, 2011 and its accompanying Initial Drainage Report. See Figure 4 for an illustration of existing drainage facilities in the project area.

Figure 4 – Existing Regional Drainage Facilities (Excerpt from ADOT, 2011 Initial Drainage Report, Figure 2)



4.2 Existing (Pre-project) Hydrology

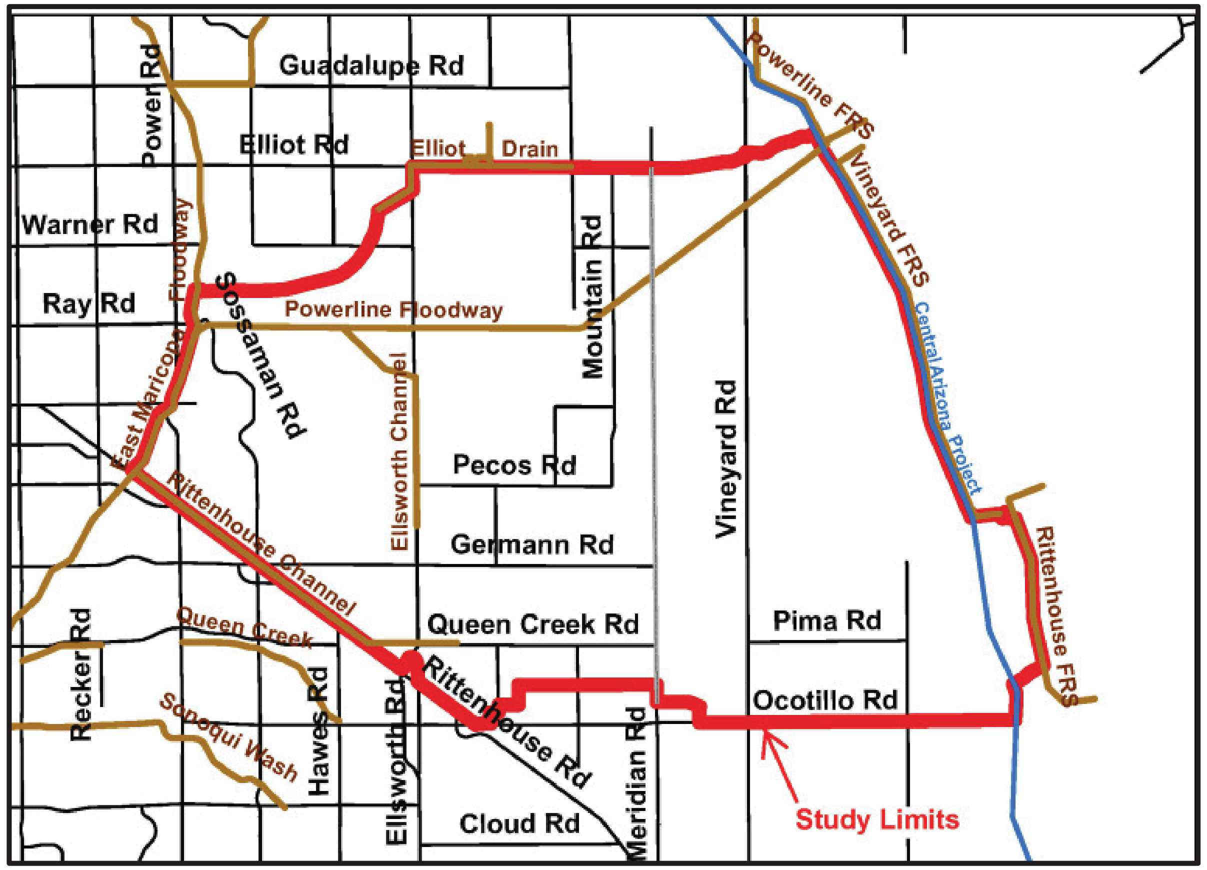
Pertinent pre- and post-project hydrology was developed by ADOT for the *SR 24 Gateway Freeway FDCR* (ADOT, 2011) Initial Drainage Report. The most current hydrologic analysis in the project watershed was performed by FCDMC in the *East Mesa ADMPU* (FCDMC, 2013a and FCDMC, 2013b). The latter study updated the existing condition regional hydrology to reflect major infrastructure improvements in the area (Ironwood Drive Improvement, FCDMC 2013b).

Both ADOT and FCDMC hydrology indicated that the existing condition flows within the SR 24 project area are higher in most cases than the ultimate development flows. This is justified by the existing undeveloped or suburban areas and the lack of regional retention facilities. With development extending in the region, drainage regulations require implementation of the 100-year, 2-hour retention capacity for new areas to be developed, which leads to an attenuation of peak flows and reduction of runoff volume.

The East Mesa ADMPU covered an extensive area (see Figure 5) and developed hydrology and HEC-1 models for existing (2013) and ultimate development conditions in the watershed for several storm frequencies and durations. The hydrology was based on National Oceanic and

Atmospheric Agency (NOAA) Atlas 14 and implemented specific requirements by both Maricopa County and Pinal County.

Figure 5 – Mesa ADMPU Study Limits (From FCDMC, 2013a, Figure 1-1)



See ADOT 2011, FCDMC 2013a and FCDMC 2013b for extensive details regarding the hydrologic procedures applied by the ADOT and FCDMC studies.

4.3 Proposed Options

According to ADOT, the interim SR 24 project could be constructed in the next 3- to 10 years. The proposed off-site drainage system would be based on the default conceptual drainage design provided with the *SR 24 Gateway Freeway DCR* (ADOT, 2011), but sized for a revised hydrology that accounts for development likely to occur in the watershed within this time frame. This concept shows an off-site channel on the north side of SR 24 that is sized for the larger existing (pre-project) condition design flows (Figure 6). The SR 24 channel outfalls into the Powerline Floodway, which would be widened to the confluence with Ellsworth Channel. A detention/retention basin at Ellsworth Road (Ellsworth Basin) would regulate the SR 24 channel peak flow before the outfall into Powerline Floodway. This concept represents the baseline approach to off-site drainage design.

The interim SR 24 project would contribute additional flows to the existing off-site runoff due to the new pavement surface. Although on-site runoff will increase, the proposed off-site collection

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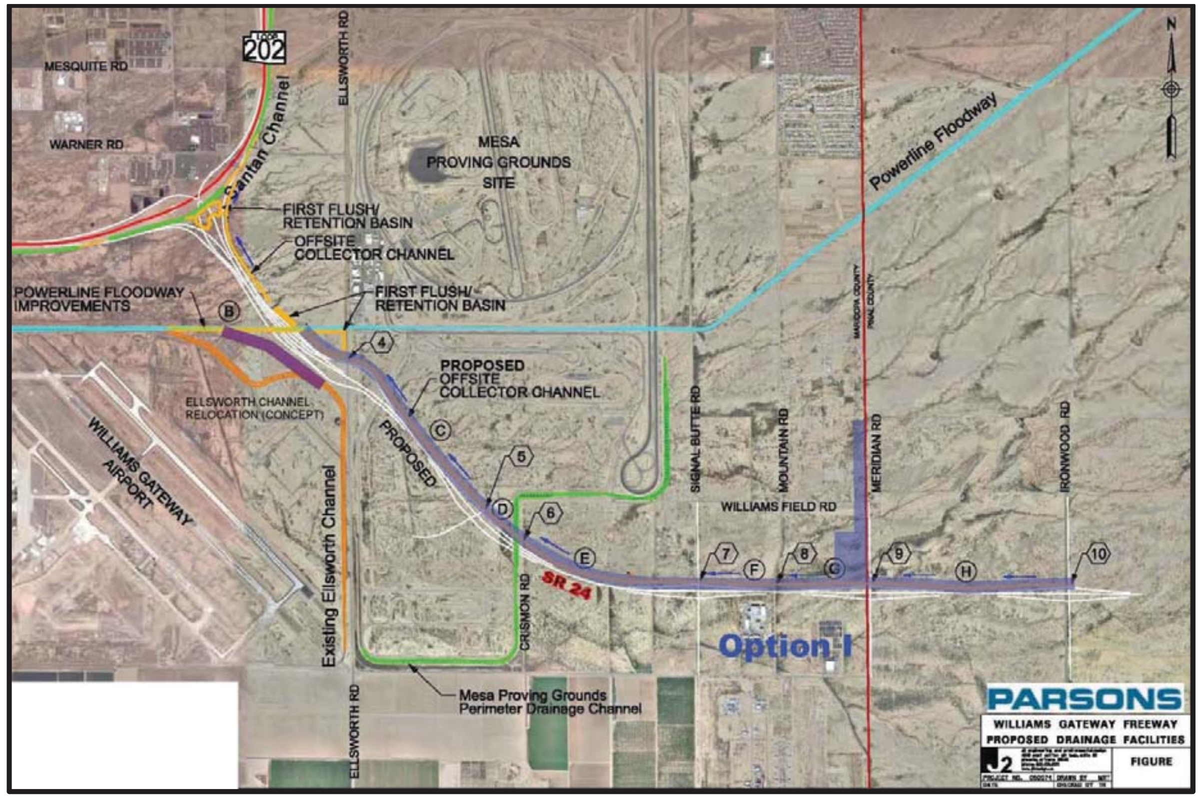
infrastructure would not be affected as the on-site and off-site peak flows are far apart. The peak flows approaching the SR 24 alignment would only be affected by the development in the upstream watershed.

Figure 6 – Baseline SR 24 Off-site Drainage Improvements for the Ultimate Project (From ADOT, 2011, Figure 25, Modified)

With the projected reduction in flows as development occurs in the watershed, the off-site drainage would need to be reassessed for opportunities of peak flow and runoff volume reduction. For that purpose, three possible options for the proposed off-site drainage infrastructure were presented to the stakeholders, and examined. These options were In addition to the baseline design, and were all inspired by alternatives presented and discussed in East Mesa ADMPU (FCDMC, 2013a), and in the City of Mesa SDMP (Entellus, 2010):

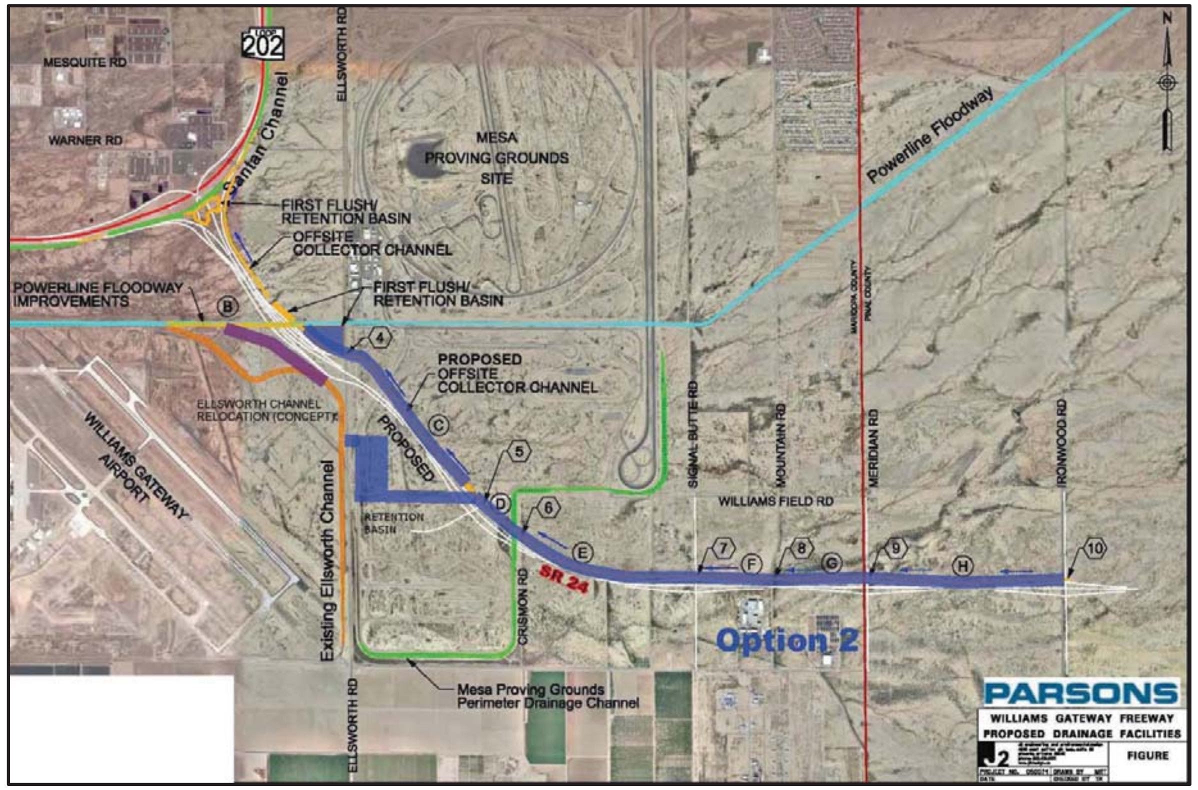
- Option 1 – Baseline design, with a detention basin at Meridian Road and an approximately one mile long channel running north-south along Meridian Road (Figure 7). The detention basin would be sized according to Pinal County development requirements, reduce the peak flow in the SR 24 system and protect an area west of Meridian Road from flooding. The planned relocation of the Ellsworth Channel at the Airport is also indicated in the figure.

Figure 7 – Option 1 - SR 24 Off-site Drainage Improvements for the Interim Project (Based on ADOT, 2011, Figure 25, Modified)



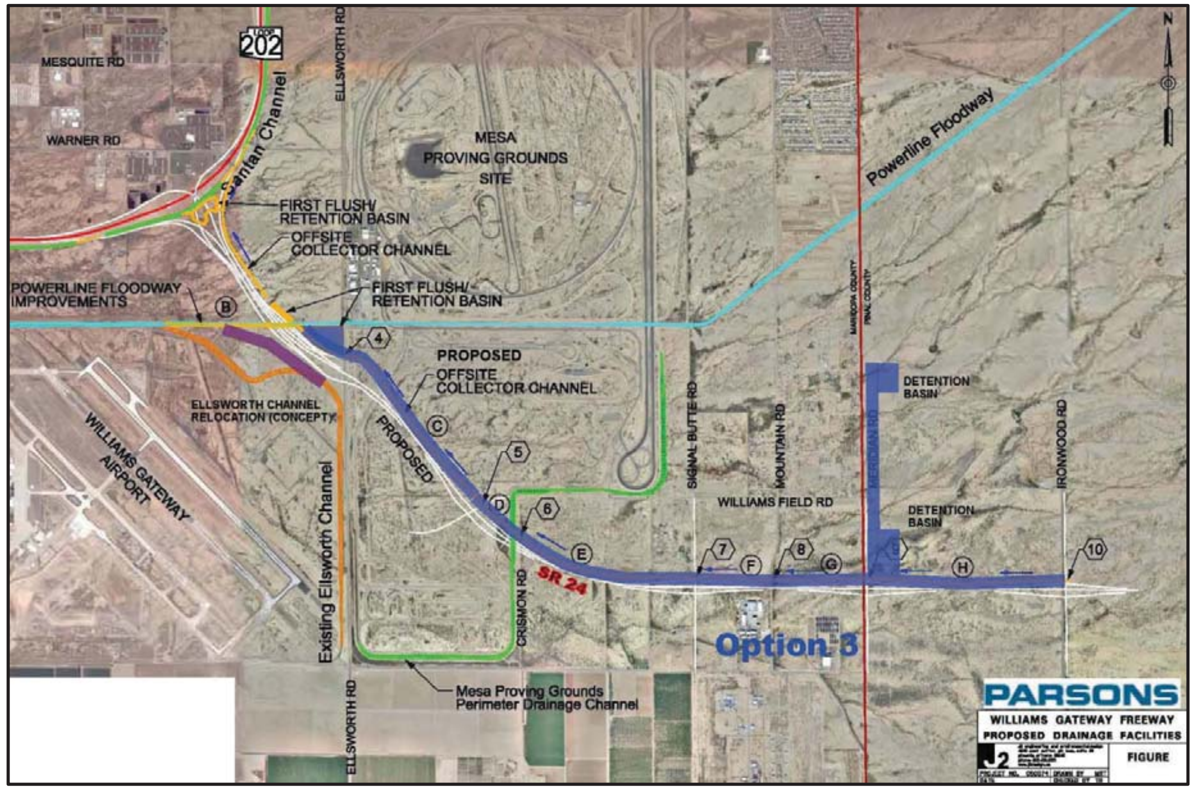
- Option 2 – Off-site channel from Ironwood Drive to Williams Field Road following the baseline design, but continuing west to Ellsworth Road; a detention basin would be located east of Ellsworth with an outfall connection to Ellsworth Channel. A smaller SR 24 channel would begin north of Williams Field Road following the baseline design. Powerline Floodway would be widened downstream of the confluence to the relocated confluence of Ellsworth Channel. (Figure 8).

Figure 8 – Option 2 - SR 24 Off-site Drainage Improvements for the Interim Project (Based on ADOT, 2011, Figure 25, Modified)



- Option 3 – Baseline design, with two detention basins at Meridian Road and an approximately one mile long channel running north-south connecting the basins. (Figure 9). The detention basins would be sized according to Pinal County development requirements, reduce the peak flow in the SR 24 system and protect an area west of Meridian Road from flooding.

Figure 9 – Option 3 - SR 24 Off-site Drainage Improvements for the Interim Project (Based on ADOT, 2011, Figure 25, Modified)



The three options were discussed with ADOT, MAG, State Land Department, Pinal County, City of Mesa and FCDMC. All options were eventually eliminated from consideration in relation to the Interim SR 24 project because they would require facilities located outside of the current environmentally-cleared footprint.

Therefore, the baseline SR 24 off-site drainage configuration, amended with the relocation of Ellsworth Channel at the Airport, was selected to be applied for further hydrologic analysis and conceptual hydraulic design.

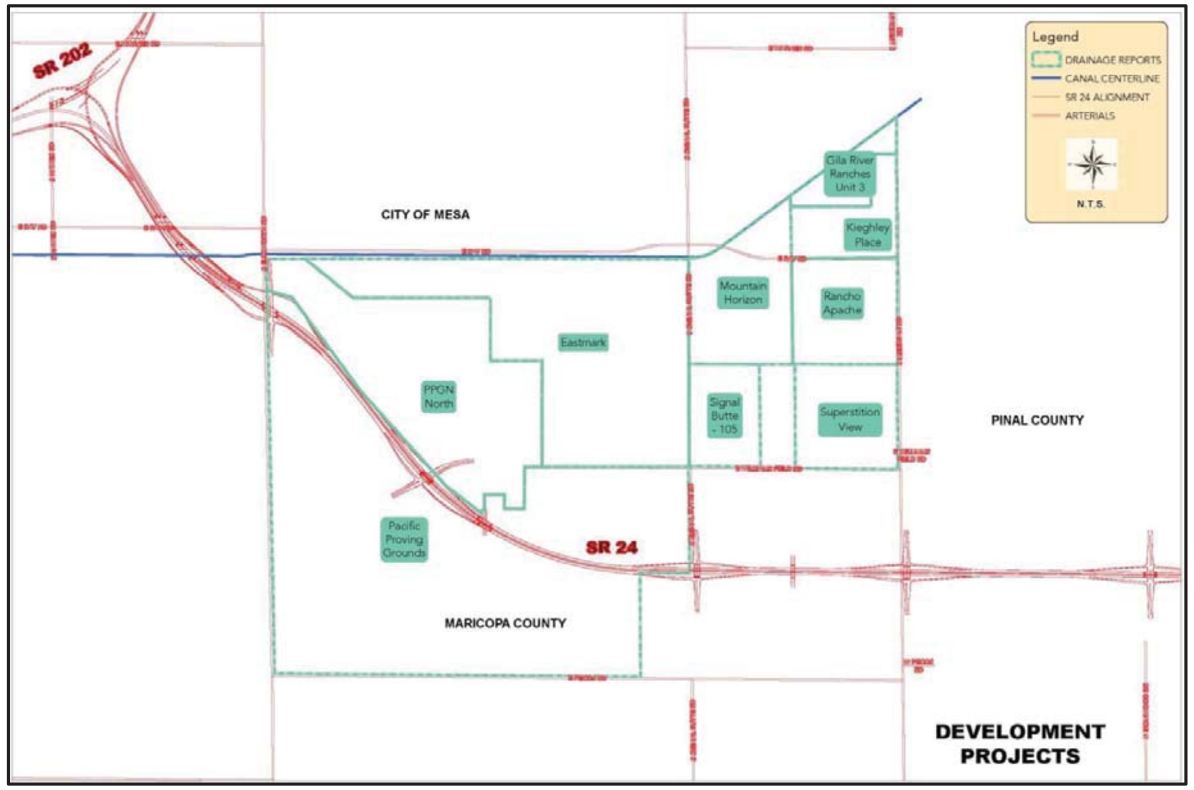
4.4 Proposed Conditions for the Interim Project

The East Mesa ADMPU existing condition and ultimate development condition hydrologic models for 50-year, 24-hour and 100-year, 24-hour were of particular interest for the Interim SR 24 analysis. The ultimate condition models were well updated by the ADMPU to reflect proposed residential and commercial development in the watershed, and included the SR 24 off-site channel. Hence, the ultimate development condition models were taken and revised for the hydrologic analysis of the Interim SR 24 Project.

The revisions consisted of:

- Reverting the watershed area within Pinal County to undeveloped hydrologic conditions. This was achieved by replacing the sub-basin modules from the ultimate development models with corresponding ones from the existing condition models, and by removing the retention volumes at the sub-basins. These changes are documented in the HEC-1 models included in Appendix D;
- Evaluating the rate of development within Maricopa County and City of Mesa portion of the watershed, based on site development documentation provided by City of Mesa. Figure 10 presents a schematic of the developments that were reviewed and their location in relation to the project. The evaluation considered the rate of development and construction, and looked at whether the required retention volume was or is in the process of being constructed. From the hydrologic stand point, developments that are fully mass graded but only partially constructed were considered at ultimate development. These changes are documented in the HEC-1 models included in Appendix D;

Figure 10 – Development Projects within Maricopa County and City of Mesa



- Changing some of the routing parameters to reflect channel conditions presented in the development plans, as well as modifications of the SR 24 off-site channel. These changes are documented in the HEC-1 models included in Appendix D, which includes a schematic of the components of the hydrologic model that were revised.

Three materials were considered for the off-site channel lining: grass, gravel and concrete. Two lining materials (gravel and concrete) were used in the hydrologic models for comparison. Minor revisions of routing parameters were required to accommodate the two materials.

4.5 Design Criteria

The procedures described in the *ADOT Roadway Design Guidelines* (RDG) (ADOT, 2014a), *ADOT Highway Drainage Design Manual, Volume 2, Hydrology* (HDDM2) (ADOT, 2014b) and *ADOT Highway Drainage Design Manual, Volume 3, Hydraulics* (HDDM3) (ADOT, 2014c), are applicable.

The channel design was based on 50-year, 24-hour peak flows with freeboard. It is desirable to adjust the channel longitudinal slope to maintain a subcritical flow regime with a maximum Froude number below 0.86; as such, the channel freeboard would be 1 foot. Flow regimes with Froude numbers between 0.86 and 1.1 create flow instability and should be avoided.

The channel should convey the 100-year, 24-hour flow with no freeboard and the flow should be contained within the ADOT right-of-way.

A trapezoidal channel section is typical, with the bottom sloping 2% to one side when concrete lining is used. The minimum width of the channel bottom must accommodate maintenance access. The side slopes are no steeper than 2 to 1 horizontal to vertical for concrete lining, and no steeper than 3 to 1 horizontal to vertical for gravel lining.

Important feedback was received from the ADOT Maintenance and Construction Districts. Concrete-lined channels are preferred because of ease of maintenance, and the conceptual design and the cost estimates were developed for such a facility. In addition, multiple access ramps are desired at the channel with spacing no larger than one half-mile, and a 15-foot wide Operation and Maintenance Road provided on the north side of the channel.

4.6 Proposed Conceptual Design – SR 24 Channel

The channel design was optimized to maintain hydraulic conditions within the design parameters described above. In addition, several factors specific to the project were considered:

- The Ellsworth Basin was constructed with Interim Phase I of SR 24 as a future off-line detention basin designed to control the outfall rate of flows exiting the SR 24 drainage channel into Powerline Floodway. The basin would divert channel flows through a lateral weir and therefore trim the peak of the flow hydrograph. The *SR 24 Gateway Freeway DCR* (ADOT, 2011) assumed a controlled flow of 1,650 cfs at the channel outfall. As constructed, the basin has a limited operational volume, which is estimated to approximately 100 acre-feet;

- The Ellsworth Basin may not require a lateral weir during SR 24 Interim Phase II. Under this phase, the SR 24 Channel collects only a limited amount of runoff originating from south of Powerline Floodway to east of Ironwood Drive, and the 100-year, 24-hour peak flow at Ellsworth Road is 1754 cfs (Appendix D). Unsteady flow hydraulic modeling of this scenario (Appendix F) shows that the Ellsworth Basin could successfully attenuate the flow below 1650 cfs by using 3-36" pipe culverts that operate unrestricted. The culverts could operate in conjunction with a future lateral weir that would be required to attenuate the larger peak flow when SR 24 and its channel extend east of Ironwood Drive;

- According to development plans for PPGN (Wood Patel, 2014), flow in excess of the 100-year, 24-hour storm event would cross Ellsworth Road and discharge into the Ellsworth Basin. This would limit the volume available for channel peak flow attenuation;

- An efficient concrete lined channel would convey flow at high velocities accelerating the hydrograph. The Ellsworth Basin would fill too quickly and become less effective for peak flow attenuation. This condition reinforced the argument of designing the channel for a subcritical flow regime, operating at a lower design velocity;

- Reducing the design velocity in the channel would require a mild longitudinal grade (in the range of 0.15% to 0.17%) which would increase the channel cross section, as well as the cost of excavation and concrete lining;

- The natural terrain along the channel is several times steeper (up to 0.0049 ft/ft) than the mild longitudinal channel slope, which would require a deep channel unless channel steps are provided. The stepped channel approach was used, and 2- or 3-foot vertical transitions were placed where necessary using 10 to 1 horizontal to vertical slopes at each transition;

- The Ellsworth Road RCBC was constructed with the Interim Phase I project and it restricts the channel slope to the Powerline Floodway outfall to approximately 0.069%. This slope is difficult to construct, but it provides an opportunity for a sediment basin downstream of the RCBC;

- Provisions were made for in-line sediment basins upstream of the Meridian Road and Signal Butte Road culvert crossings, and upstream of the Powerline Floodway confluence. They are approximately 60 to 100 feet long, and are created through a 2-foot depression at the bottom of the channel; the upstream end of the transition is sloping 10 to 1 to allow access and maintenance, while the downstream end is vertical.

- The widening of Powerline Floodway was coordinated with the improvements and widening due to the relocation of Ellsworth Channel at the Airport. The channel cross-section is similar to that presented in the *SR 24 Gateway Freeway DCR* (ADOT, 2011) (See drainage plans in Appendix A), but it is shallower with 2 to 1 side slopes instead of 1.5 to 1. This cross section was designed based on FCDMC design peak flow frequency and magnitude requirements and it is identical to the section downstream of the new Ellsworth Channel confluence at the Airport.

Typical sections and a summary of SR 24 channel dimensions are presented in Appendix A. Table 3 provides a summary of channel dimensions and design flow versus capacity. The design is documented in the drainage plans in Appendix A, and in the calculations included in Appendix E.

Table 3 – Proposed SR 24 Concrete-lined Channel Dimensions and Flows

Channel Reach	Channel ID	Design/Check Flows Q_{50}/Q_{100}[1] (cfs)	Bottom Width (ft)	Depth[2] (ft)	Top of Channel Flow Capacity (cfs)
Powerline Floodway Widening	B	4400/4400[3]	55	8.0[4]	-
Ellsworth Road to Powerline Floodway	C	2002/2479	20	9.0	2670
Wlliams Field Road to Ellsworth Road	C	1977/2452	20	7.5	2725
Crismon Road to Wlliams Field Road	D	1329/1630	12 to 20	7.5	2097
Signal Butte Road to Crismon Road	E	1335/1637	12	7.5	2097
Mountain Road to Signal Butte Road	F	1173/1440	12	7.0	1815
Meridian Road to Mountain Road	G	1176/1445	12	7.0	1815
Ironwood Drive to Meridian Road	H	1166/1432	12	7.0	1815

.

The cross culverts were not revised from the dimensions provided in the *SR 24 Gateway Freeway DCR* (ADOT, 2011).

4.7 Final Design Considerations

Integrating the operation of the SR 24 channel with the Ellsworth Basin and the widened section of Powerline Floodway will require modifications to the Basin and the on-site drainage infrastructure constructed west of Ellsworth Road. Also, the operation of the Ellsworth Basin will change from a water quality treatment basin to a detention basin with a water quality treatment component. The following aspects must be considered during final design:

- A new 36" bleed-off line to drain Ellsworth Basin to the widened Powerline Floodway. The new bleed-off line would run along the south bank of the widened Powerline Floodway and take the role of draining the Basin within 36 hours from the existing 18-inch line that drains to the retention basin located north of the existing Powerline Flodway. The existing bleed-off line cannot be maintained because it is in conflict with the proposed SR 24 - Powerline Floodway confluence. The confluence requires a deeper cross section than that of the current concrete-lined channel. In addition, the capacity of the existing bleed-off line is not sufficient to drain the larger storm water volumes that Ellsworth Basin would handle under its detention role.
- Storm drain collector lines that outfall to the Ellsworth Basin from the south and southwest must be modified in order to provide water quality treatment. These storm drains are in conflict with, and cannot outfall directly to the SR 24 Channel without prior water quality treatment. Either the pipes are lowered and use inverted siphons to continue discharge into the Ellsworth Basin, or the storm drain system is reconfigured to use hydrodynamic separator devices that would be placed before the storm drains outfall to the SR 24 Channel. The storm drains that outfall to Ellsworth Channel from the east do not require modifications;
- Depending on the final thalweg elevation and profile of the widened Powerline Flodway, a control structure and energy dissipater will be required downstream of SR 24 Channel at the confluence with Powerline Floodway.

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[1] Powerline Floodway is a facility operated by FCDMC. The design flow frequency for flood control facilities is the 100-year event.
[2] Average depth along the reach.
[3] The design flow magnitude requested by FCDMC for the Powerline Floodway Widening is 4,400 cfs.
[4] Channel is supercritical; depth of channel was selected to contain most of the velocity head.

5.0 REFERENCES

ADOT, 1996 - Arizona Department of Transportation, “Pipe Selection Guidelines and Procedures”, February 1, 1996 with March 21, 1996 Revisions.

ADOT, 2011 - Arizona Department of Transportation, “SR 24 Gateway Freeway Final Design Concept Report”, April 2011.

ADOT, 2014a - Arizona Department of Transportation, "Roadway Design Guidelines", Revised April 2014.

ADOT, 2014b - Arizona Department of Transportation, "Highway Drainage Design Manual, Volume 2, Hydrology, Second Edition," January 2014.

ADOT, 2015 - Arizona Department of Transportation, "Highway Drainage Design Manual, Volume 3, Hydraulics, Second Edition," January 2015.

CMX, 2005a – CMX LLC, “Final Drainage Report for Gila River Ranches, Warner and Meridian, Mesa, Arizona”, Second Revision, January 25, 2005.

CMX, 2005b – CMX LLC, “Offsite Flow Management for Gila River Ranches 4625 S Mountain Road at Warner and Meridian, Mesa, Arizona”, Revised June 15, 2005.

CMX, 2006 – CMX LLC, “Final Drainage Report for Mountain Horizons South of the Powerline Floodway 5210 South Mountain Road, Mesa, AZ”, August 2006.

CMX, 2008 – CMX LLC, “Addendum to Final Drainage Report for Mountain Horizons South of the Powerline Floodway 5210 South Mountain Road, Mesa, AZ”, January 2008.

Entellus, 2010 – Entellus, “City of Mesa Storm Drain Master Plan”, January 2010.

EPG, 2013 – EPG Group, “Master Drainage Report for Harvard Investments Pacific Proving Grounds North, City of Mesa, Arizona”, March 2013

FCDMC, 2007 - Flood Control District of Maricopa County, “Drainage Policies and Standards for Maricopa County, Arizona”, April 2007.

FCDMC, 2013a - Flood Control District of Maricopa County, “East Mesa Area Drainage Master Plan Update”, November 2013.

FCDMC, 2013b - Flood Control District of Maricopa County, “Powerline Floodway Hydraulic Analysis Technical Memorandum, East Mesa Area Drainage Master Plan Update”, November 2013.

FEMA, 2011 – Federal Emergency Management Agency, “Understanding Zone D - A Fact Sheet for Stakeholders”, August 1, 2011

HilgartWilson, 2014 – HilgartWilson, “Bella Via Mountain Road, Mesa, Arizona, Final Drainage Report”, February 2014.

Kimley-Horn, 2007 – Kimley-Horn and Associates, “Final Drainage Report Ironwood Drive Ocotillo Road – US 60 – Phase B”, April 2007.

LandAide, 2005 – LandAide Inc., “Preliminary Drainage Report for Keighley Place”, August 2, 2005

MAG, 2014 – Maricopa Association of Governments, “2035 Regional Transportation Plan”, January, 2014.

MAG, 2015 - Maricopa Association of Governments, “SR-24 Williams Gateway Freeway, Ellsworth Road - Ironwood Drive Interim Phase II Feasibility Study”, March 18, 2015.

Wood Patel, 2014 – Wood Patel and Associates, “Master Drainage Report Update for Eastmark”, Revised April 24, 2014.

APPENDIX A

PLANS (DCR STAGE - NOT FOR CONSTRUCTION)

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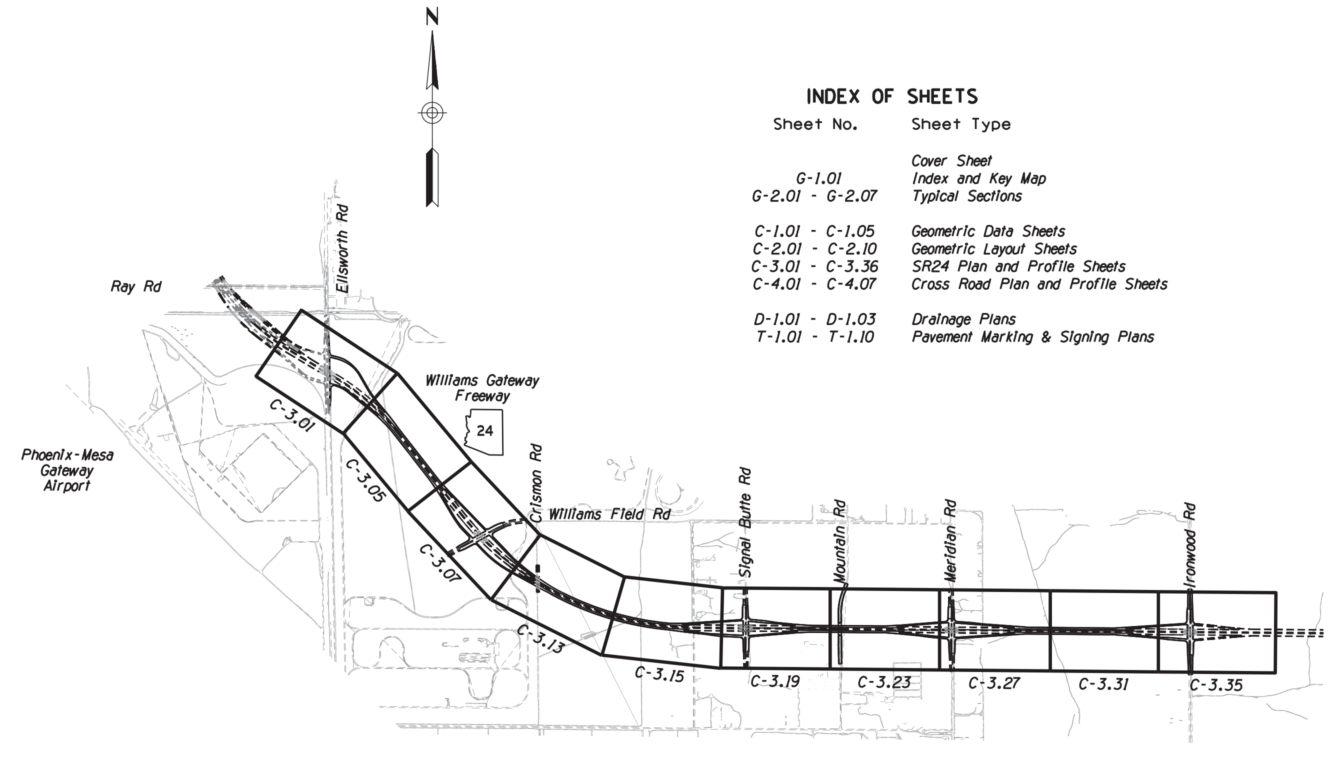
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001

INDEX OF SHEETS

Sheet No.	Sheet Type
	Cover Sheet
G-1.01	Index and Key Map
G-2.01 - G-2.07	Typical Sections
C-1.01 - C-1.05	Geometric Data Sheets
C-2.01 - C-2.10	Geometric Layout Sheets
C-3.01 - C-3.36	SR24 Plan and Profile Sheets
C-4.01 - C-4.07	Cross Road Plan and Profile Sheets
D-1.01 - D-1.03	Drainage Plans
T-1.01 - T-1.10	Pavement Marking & Signing Plans



Access Control Legend (See Roadway Plans for Location)

⊖┈┈┈┈┈⊖	Right-In-Right-out Access Control only
⊖┅┅┅┅┅⊖	Full Access Control

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

SR 24
SHEET INDEX AND KEY MAP

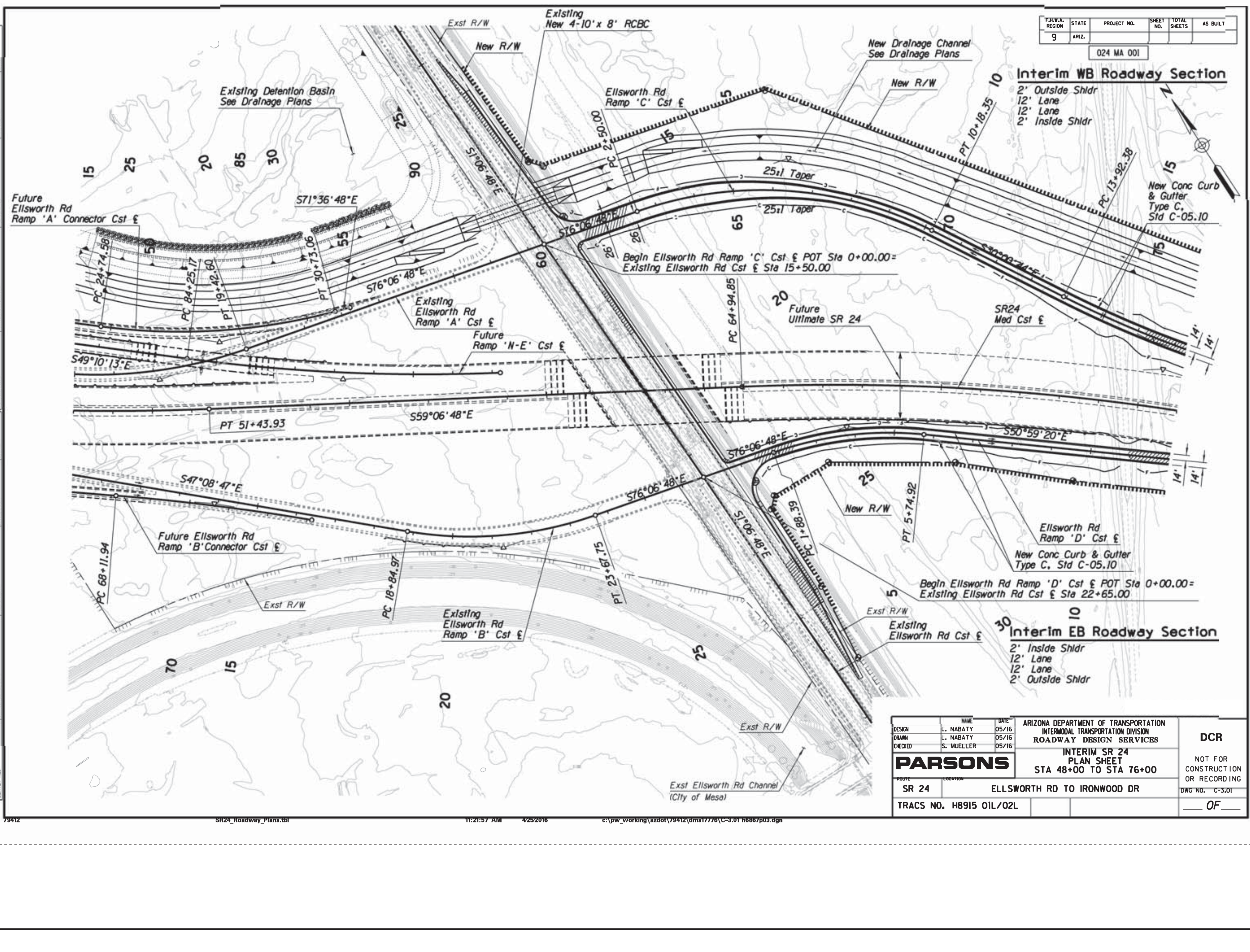
DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. G-1.01
TRACS NO. H8915 01L/02L
____ OF ____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

024 MA 001



Interim WB Roadway Section
2' Outside Shldr
12' Lane
12' Lane
2' Inside Shldr

Interim EB Roadway Section
2' Inside Shldr
12' Lane
12' Lane
2' Outside Shldr

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

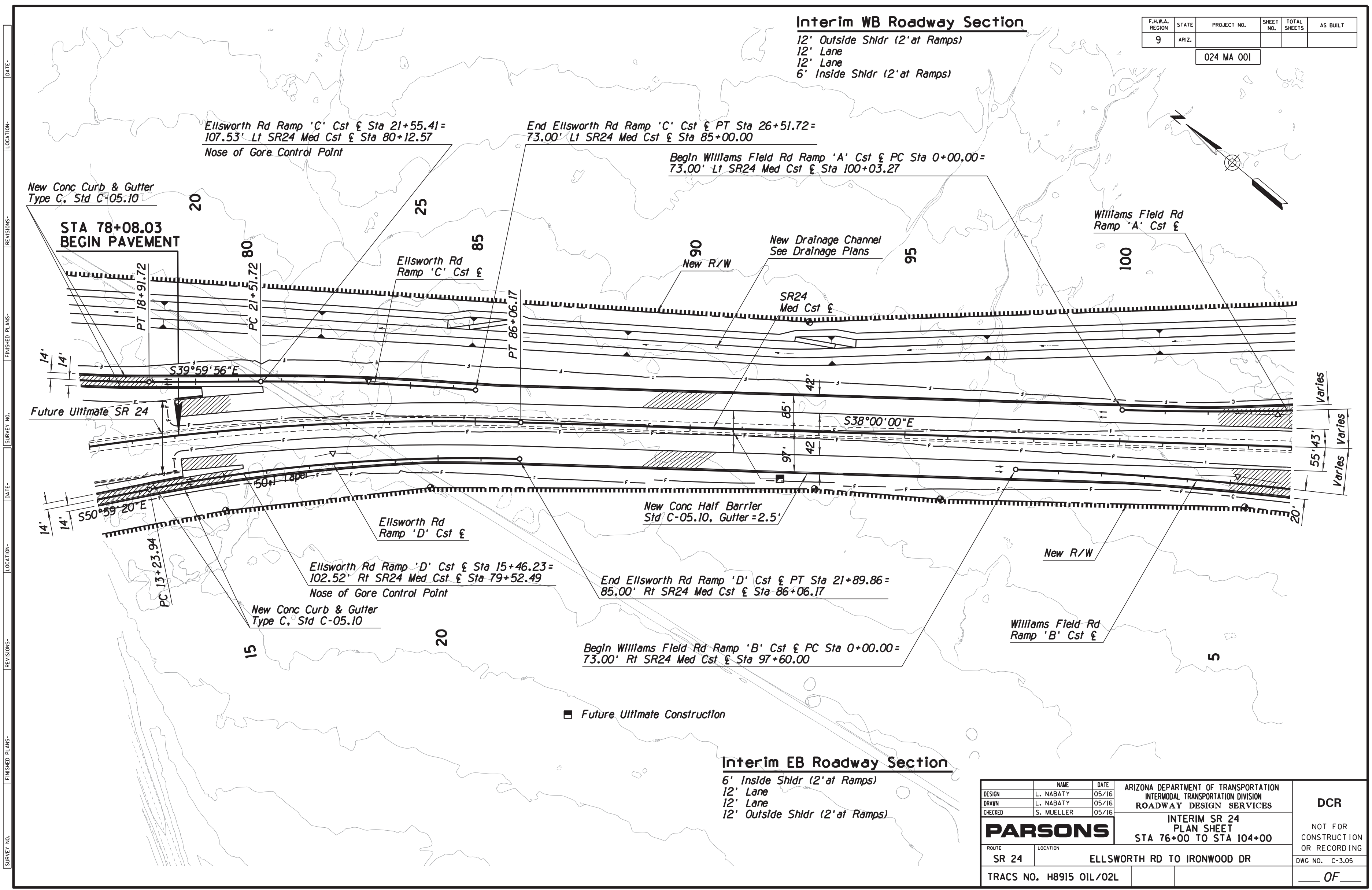
ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 48+00 TO STA 76+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.01
TRACS NO. H8915 01L/02L
____ OF ____



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DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 76+00 TO STA 104+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.05

TRACS NO. H8915 01L/02L

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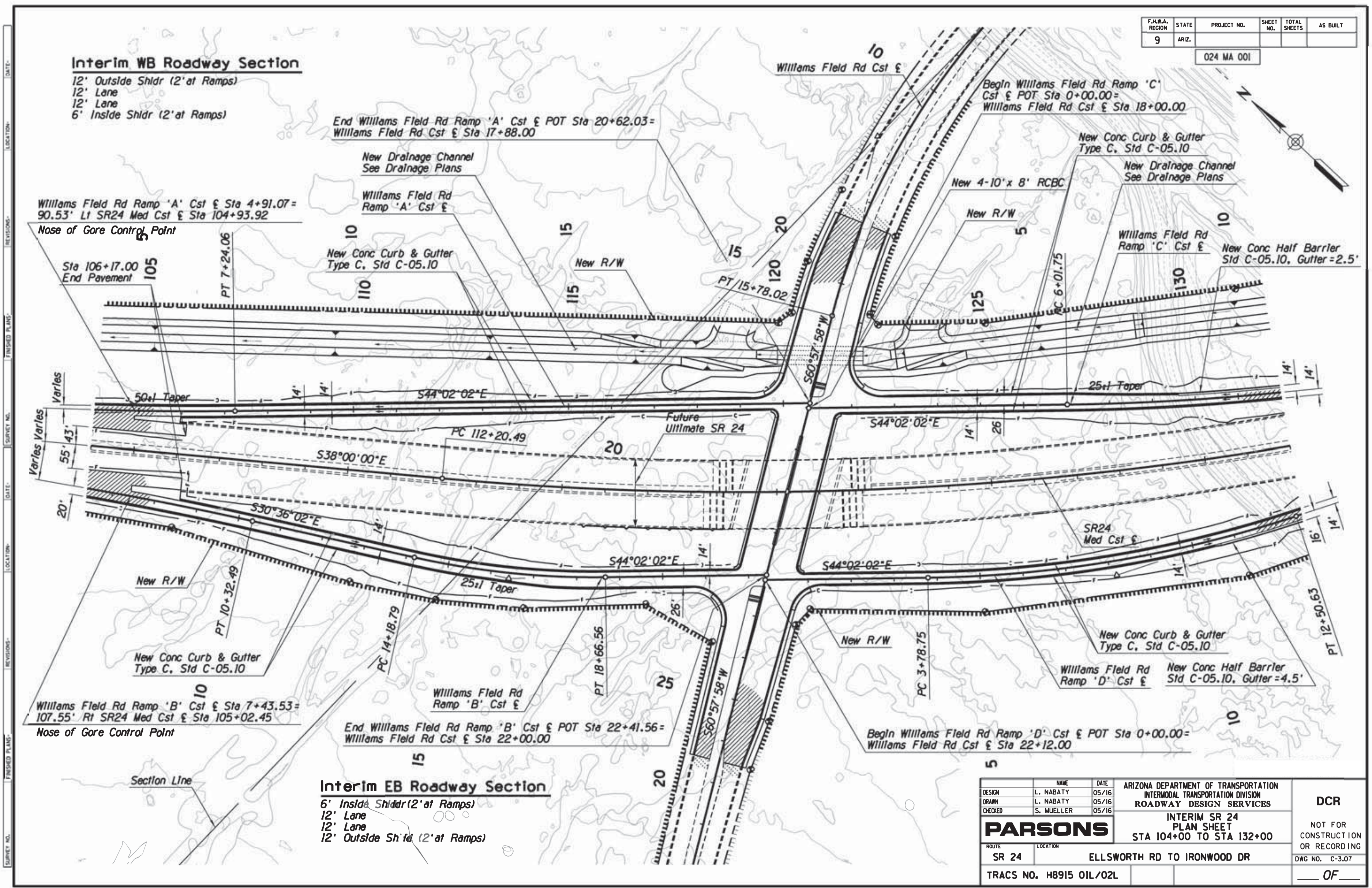

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DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 104+00 TO STA 132+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.07

TRACS NO. H8915 01L/02L

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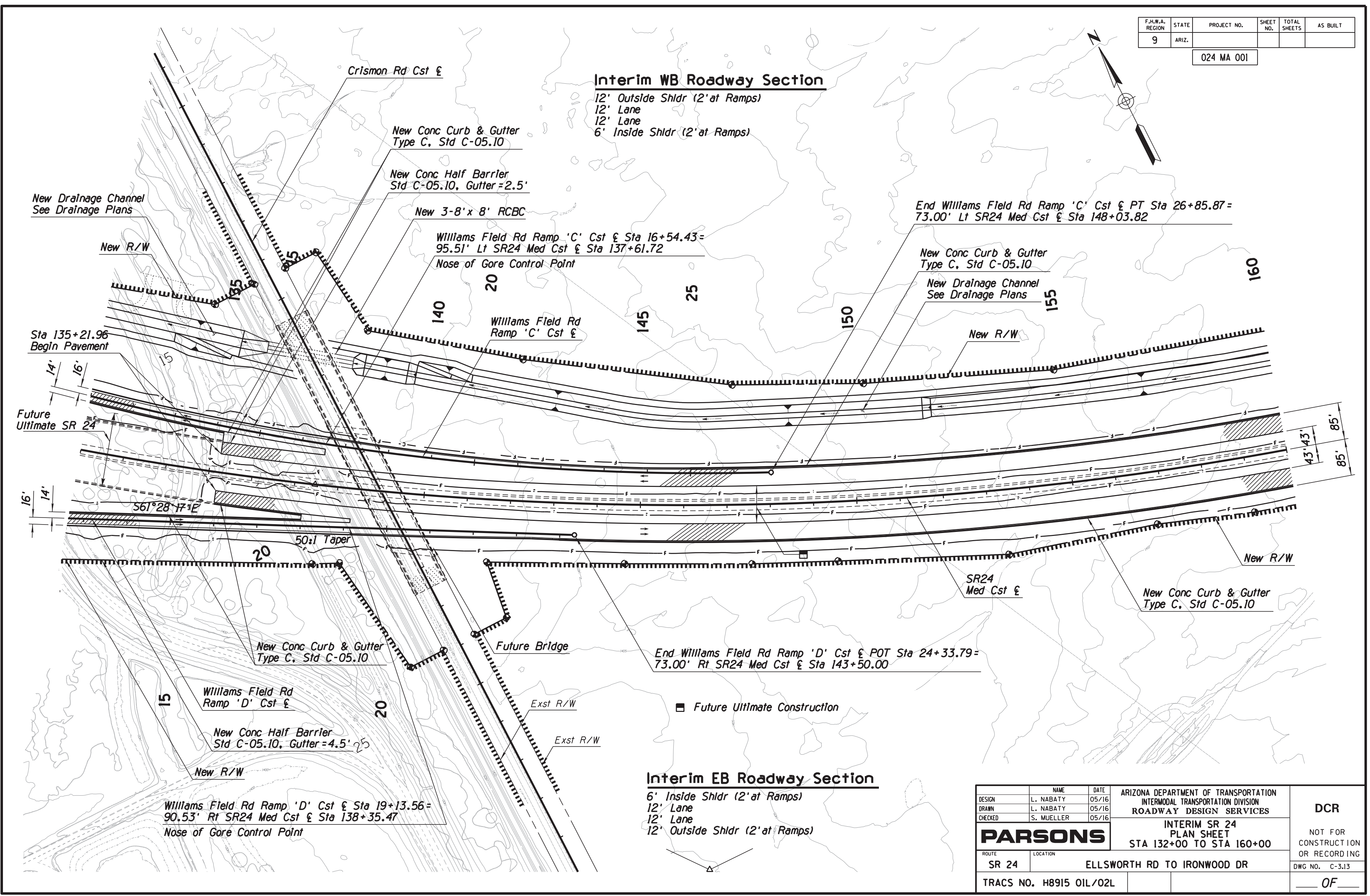

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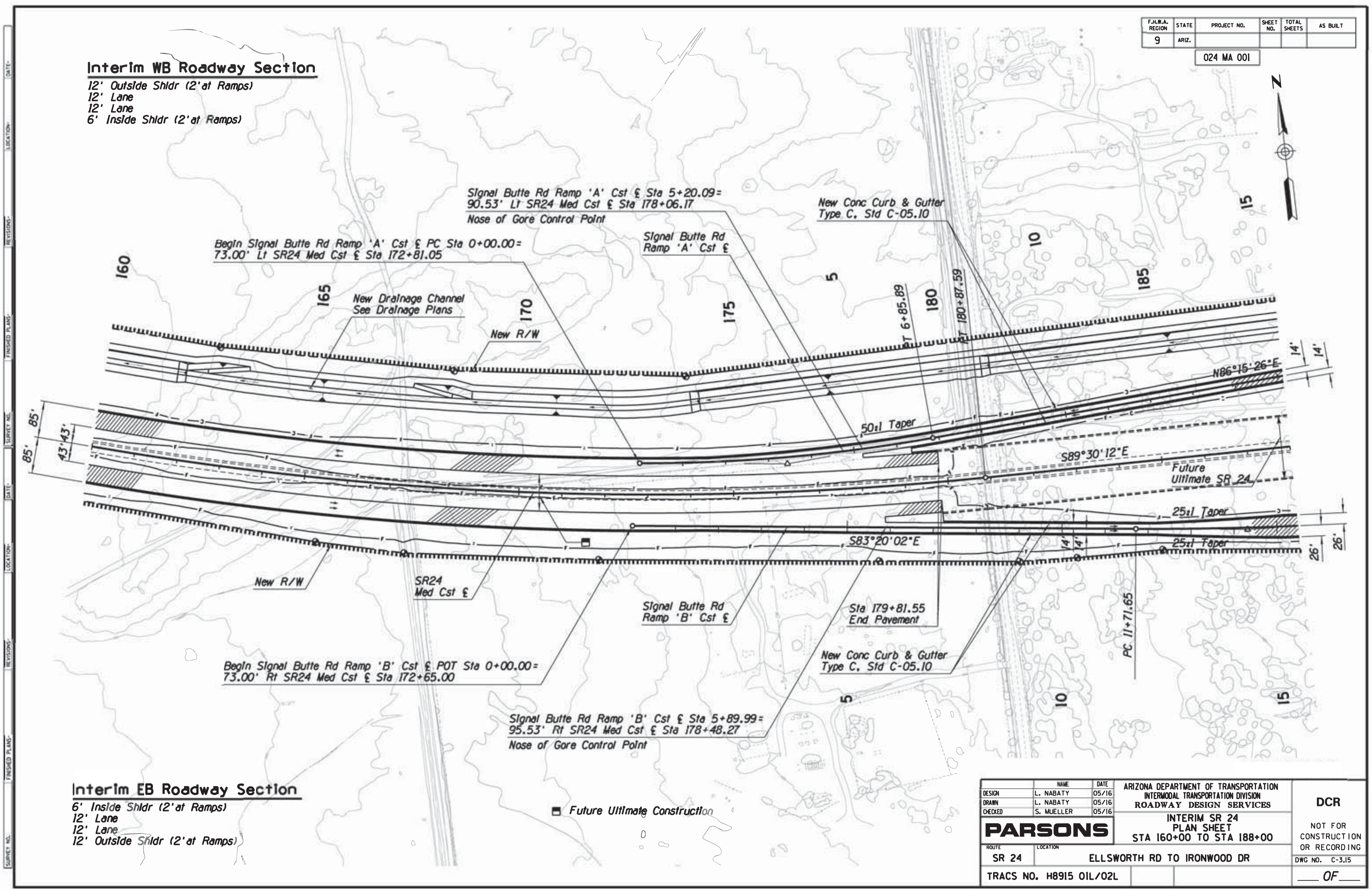

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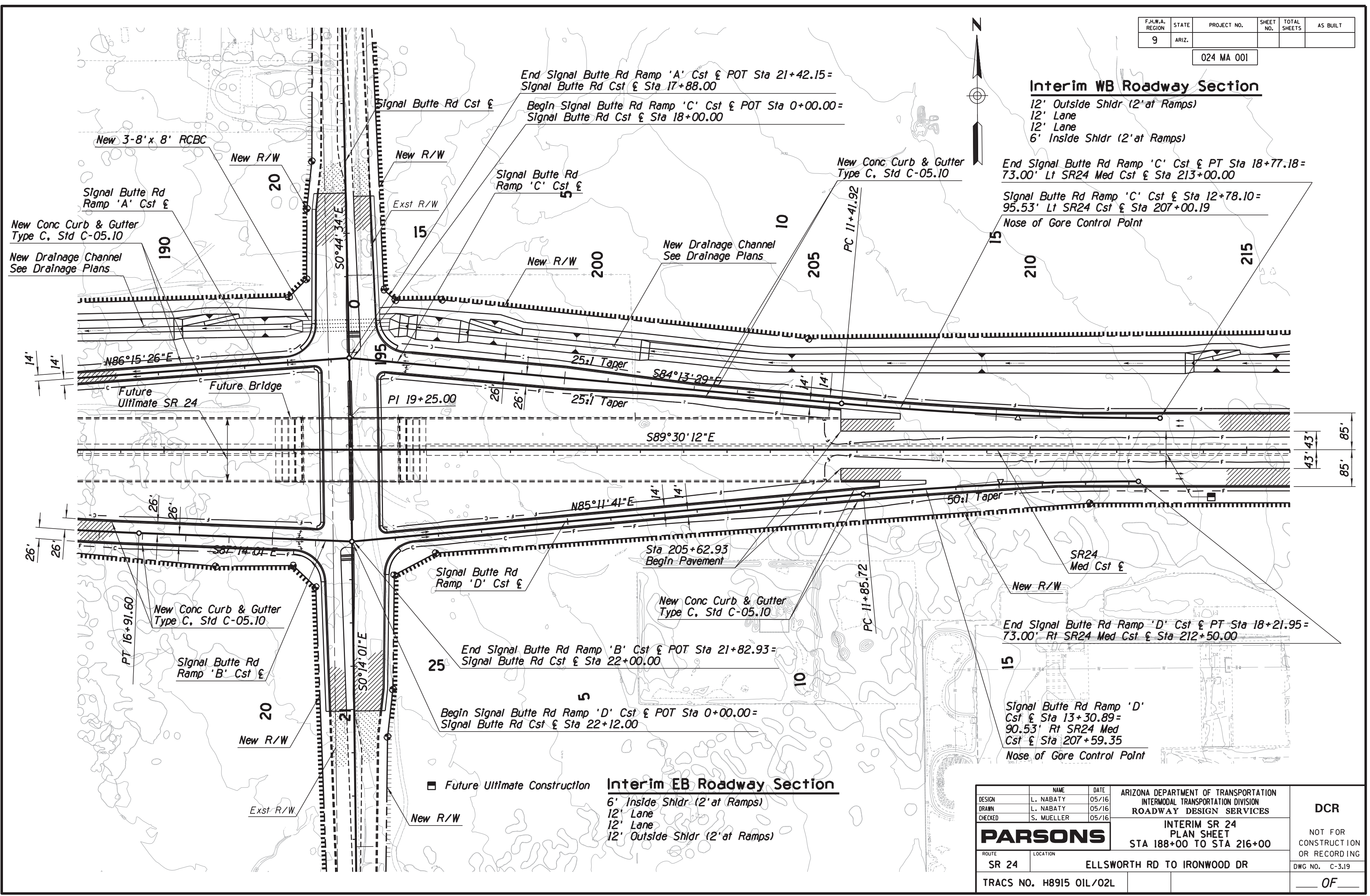

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)

▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 188+00 TO STA 216+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR

DWG NO. C-3.19

TRACS NO. H8915 01L/02L

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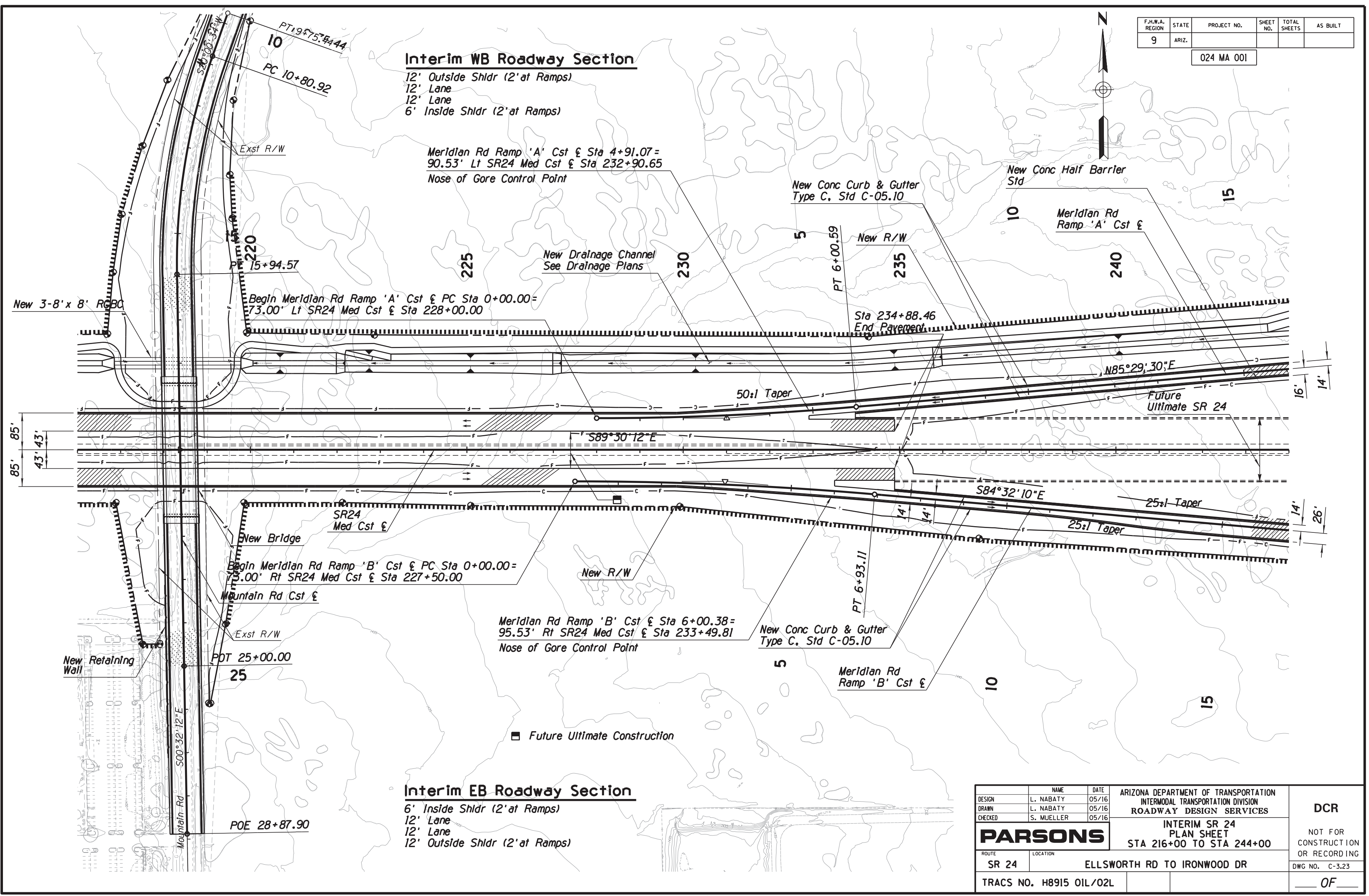

Interim WB Roadway Section

12' Outside Shldr (2'at Ramps)
12' Lane
12' Lane
6' Inside Shldr (2'at Ramps)

▬ Future Ultimate Construction

Interim EB Roadway Section

6' Inside Shldr (2'at Ramps)
12' Lane
12' Lane
12' Outside Shldr (2'at Ramps)

	NAME	DATE
DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 216+00 TO STA 244+00

DCR

NOT FOR CONSTRUCTION OR RECORDING

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DWG NO. C-3.23

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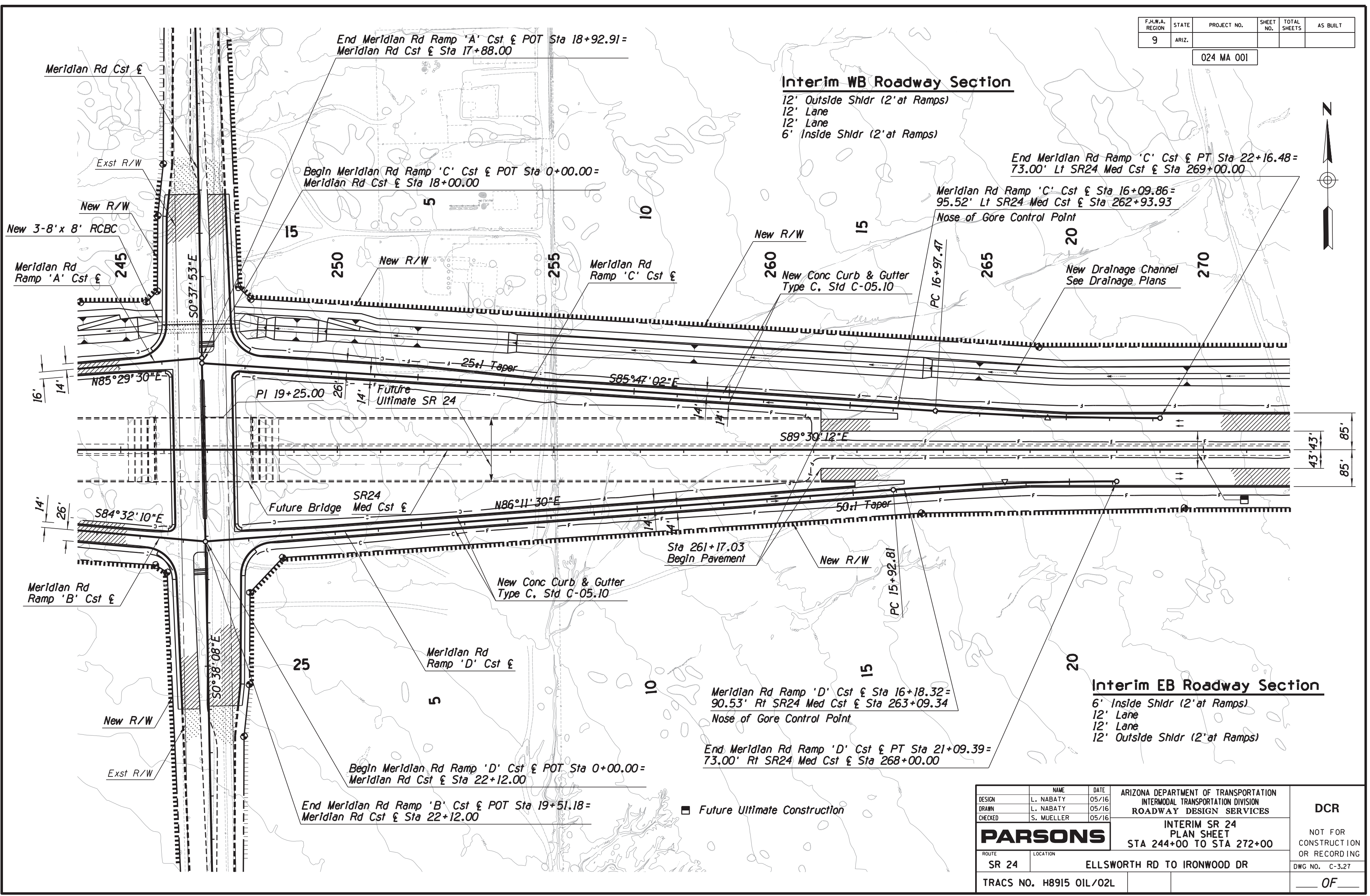

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9	ARIZ.				

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CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 244+00 TO STA 272+00

DCR
NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.27
TRACS NO. H8915 01L/02L
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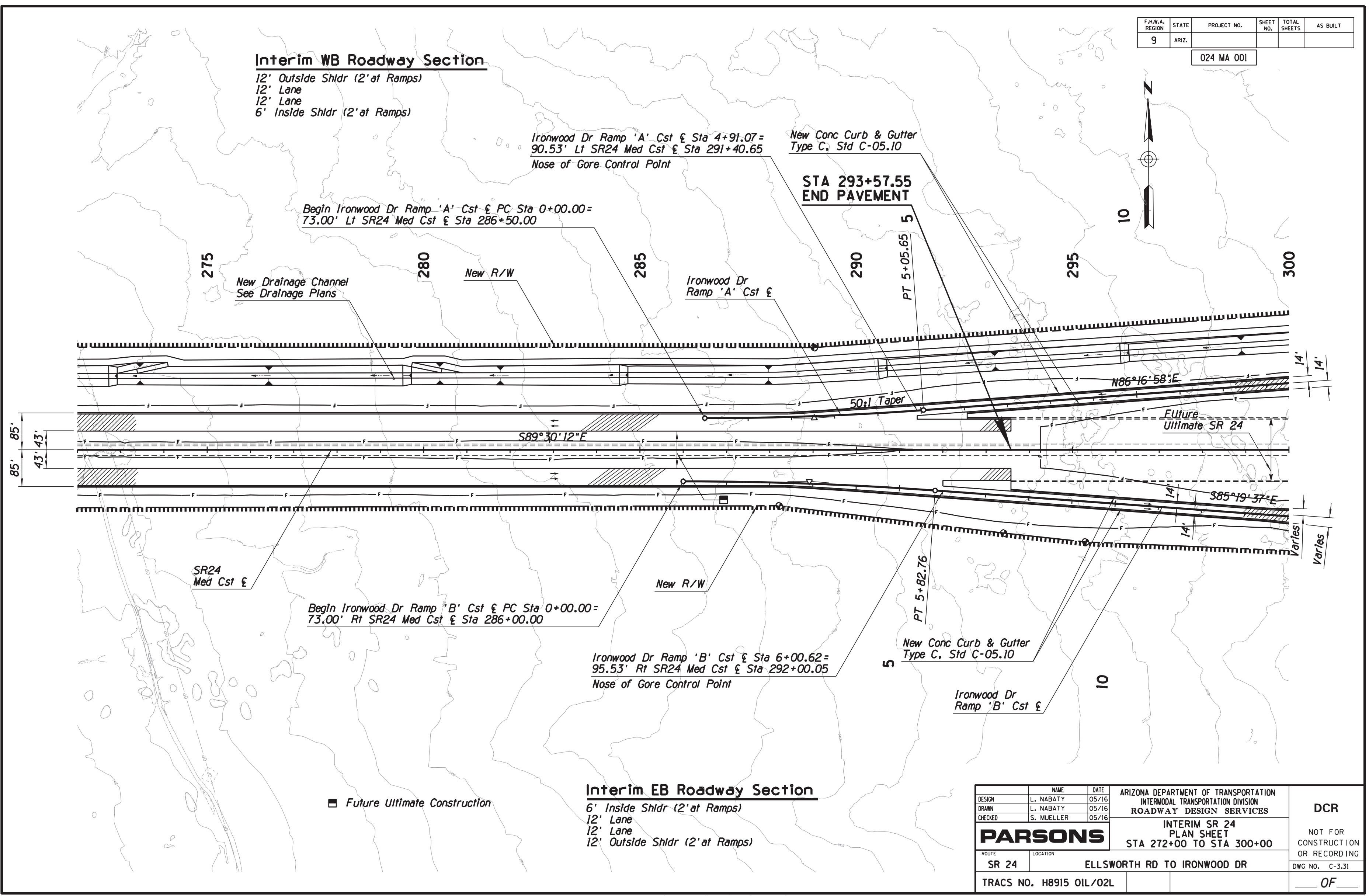

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DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 272+00 TO STA 300+00

DCR
NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.31
TRACS NO. H8915 01L/02L
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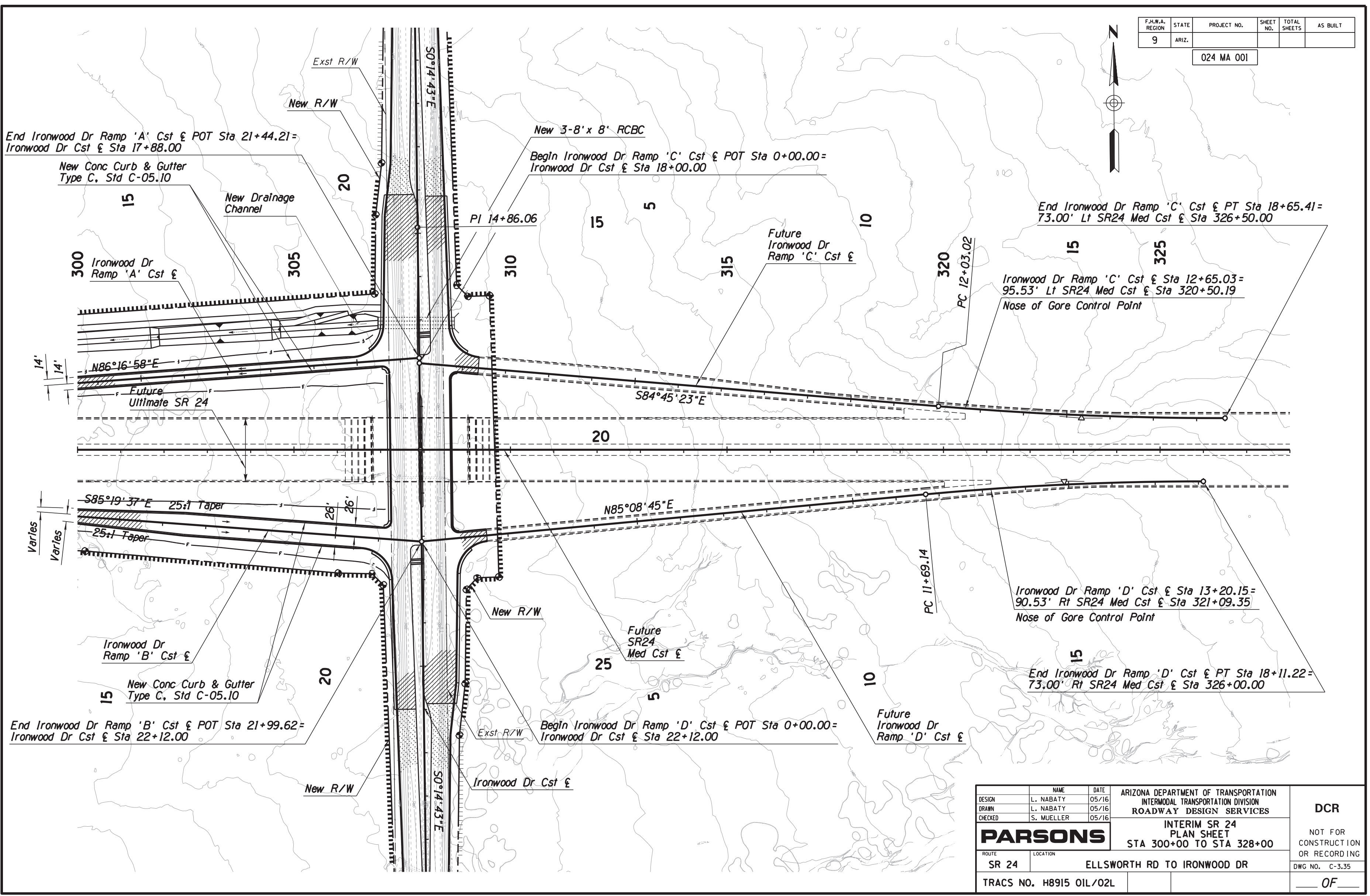

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DESIGN	L. NABATY	05/16
DRAWN	L. NABATY	05/16
CHECKED	S. MUELLER	05/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

INTERIM SR 24
PLAN SHEET
STA 300+00 TO STA 328+00

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. C-3.35
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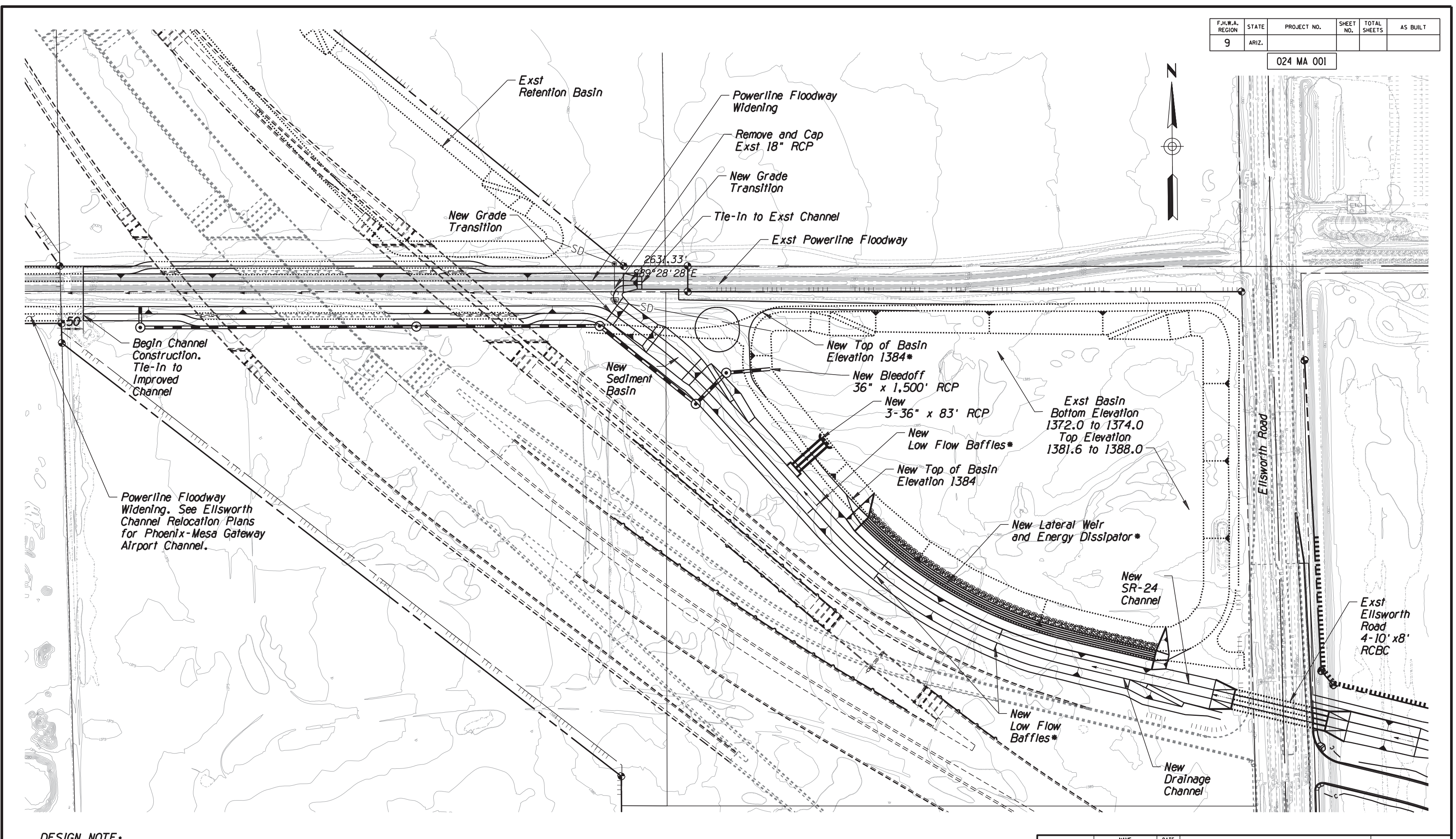

DESIGN NOTE:

- ● The Lateral Weir (740 LF), Low Flow Baffles and elevated top of basin as shown are conceptual and will be refined in final design to reduce the estimated maximum 100-year, 24-hour channel peak flow discharging to Powerline Floodway to approximately 1,650 cfs. The maximum channel peak flow is estimated based on hydrology illustrating the January 2016 development conditions, and assuming that the SR-24 alignment extends to Central Arizona Project Canal intercepting all flows approaching from the north and the northeast. As development progress, peak flows reduce.
The SR-24 Interim Phase II off-site channel will collect flows only to Ironwood Drive. The length and operation of the lateral weir and of the Ellsworth Road Basin should be revised based on the magnitude of the peak flow at the time of construction.

	NAME	DATE
DESIGN	L. FERRERAS	07/16
DRAWN	A. ISLAM	07/16
CHECKED	F. BRAILEANU	07/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLSWORTH BASIN
LAYOUT PLAN

DCR

NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. D-1.01
TRACS NO. H8915 01L/02L
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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

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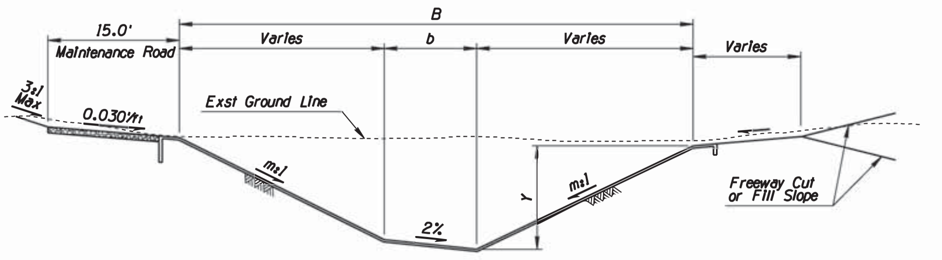

TYPICAL SECTION

Stationing	From Station	To Station	Bottom Width (b) 1	Side Slope (m:1)	Depth (Y) 1	Top Width (T) 1,2
Ellsworth, Ramp A	9+21	26+01	20	2	9.25	56.5
SR 24	60+44	120+04	20	2	9.25	55.2
	122+13	135+97	$12\text{-}20^3$	2	7.75	42.5-50.5
	138+06	193+20	12	2	7.75	42.5-50.5
	195+21	216+85	12	2	7.25	40.5-48.5
	219+79	245+85	12	2	7.25	40.5-48.5
	247+75	306+94	12	2	7.25	40.5-48.5

Notes:
1. All Dimensions are in feet
2. Stepped Channel maximum top width accounts for a 2ft step.
3. Larger bottom width downstream of confluence with offsite channel from Pacific Proving Grounds North Developement west of Crismon Rd.

	NAME	DATE
DESIGN	L. FERRERAS	02/16
DRAWN	A. ISLAM	02/16
CHECKED	F. BRAILEANU	02/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

OFFSITE CHANNEL
TYPICAL SECTION

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD RD
DWG NO. D-1.02
TRACS NO. H8915 01L/02L
___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

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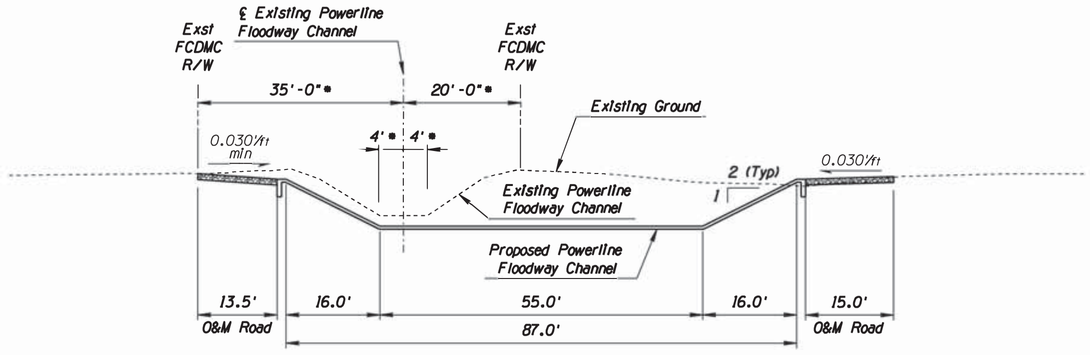
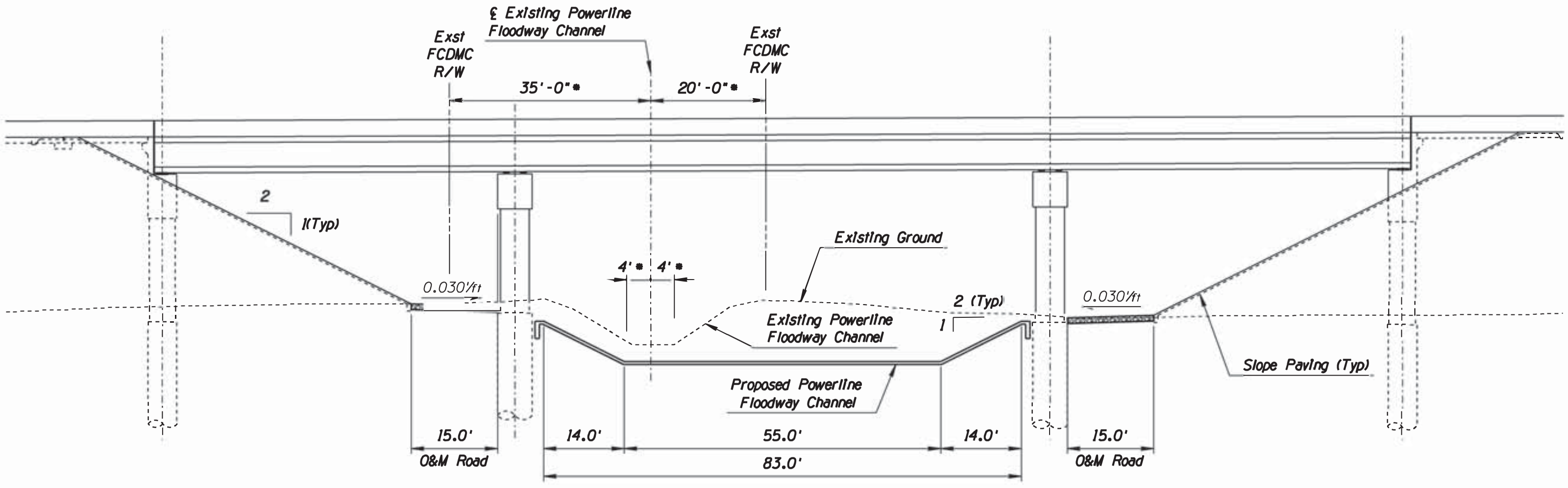
024 MA 001



TYPICAL SECTION - POWERLINE FLOODWAY WIDENING
OUTSIDE OF SR 24 MAINLINE AND RAMP STRUCTURES



TYPICAL SECTION - POWERLINE FLOODWAY WIDENING
AT SR 24 MAINLINE AND RAMP STRUCTURES

• R/W Data Based on Powerline Floodway As-Built Plans.

Note: Dimensions are Normal to Channel.

	NAME	DATE
DESIGN	L. FERRERAS	07/16
DRAWN	A. ISLAM	07/16
CHECKED	F. BRAILEANU	07/16

PARSONS

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

POWERLINE FLOODWAY
TYPICAL SECTIONS

DCR

NOT FOR CONSTRUCTION OR RECORDING

ROUTE SR 24
LOCATION ELLSWORTH RD TO IRONWOOD DR
DWG NO. D-1.03
TRACS NO. H8915 01L/02L
___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

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APPENDIX B

FLOODPLAIN MAPS

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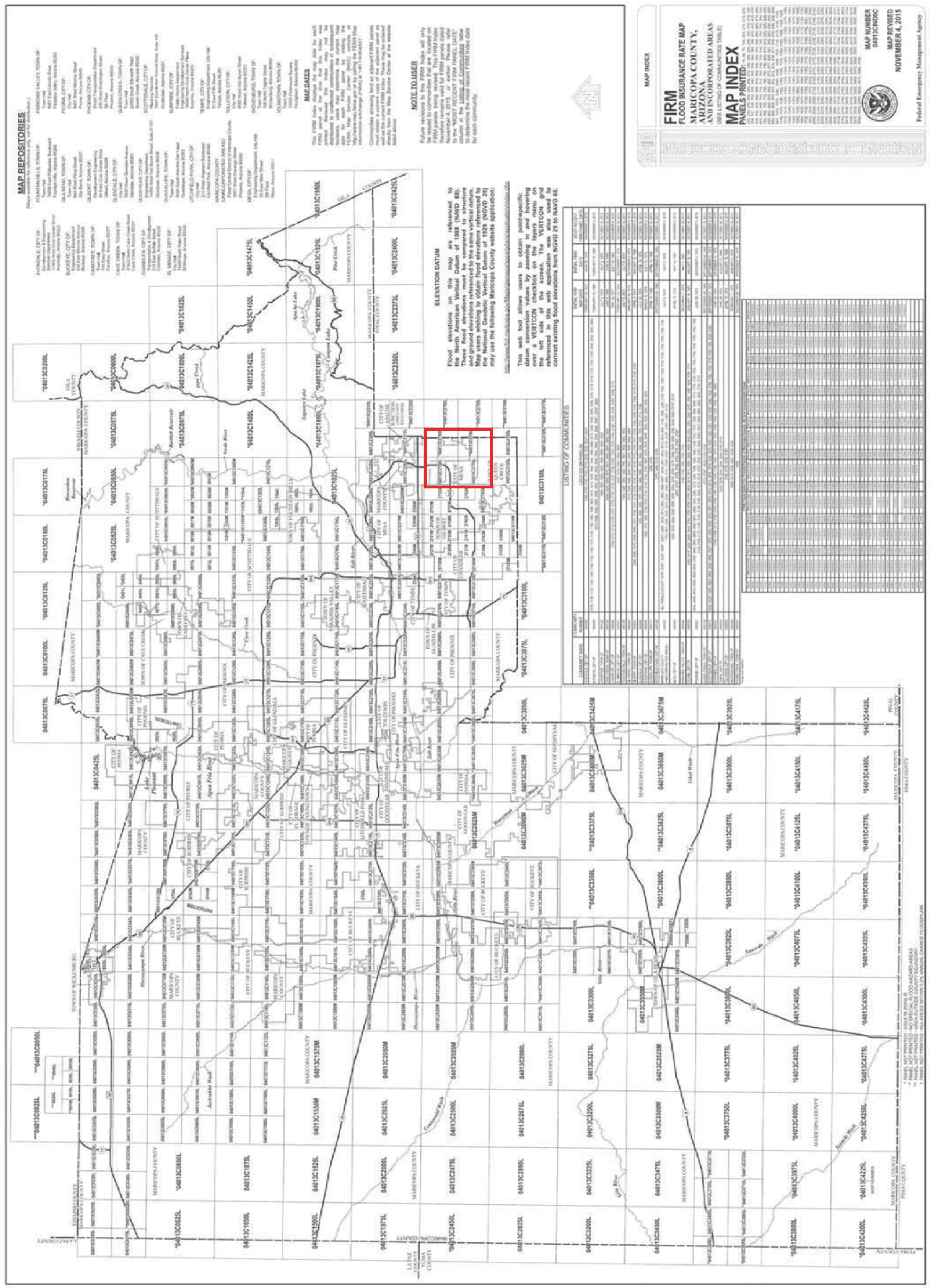
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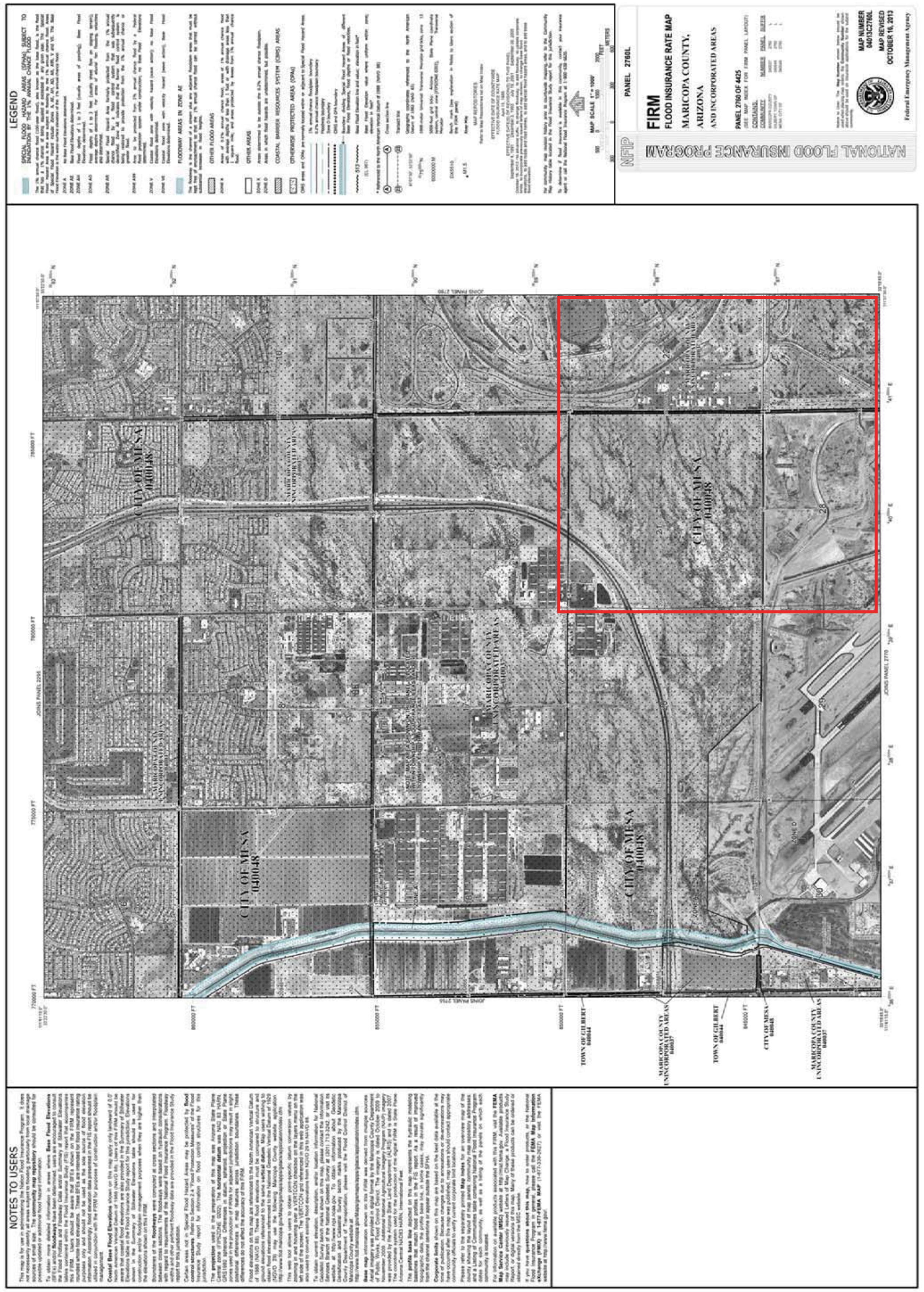
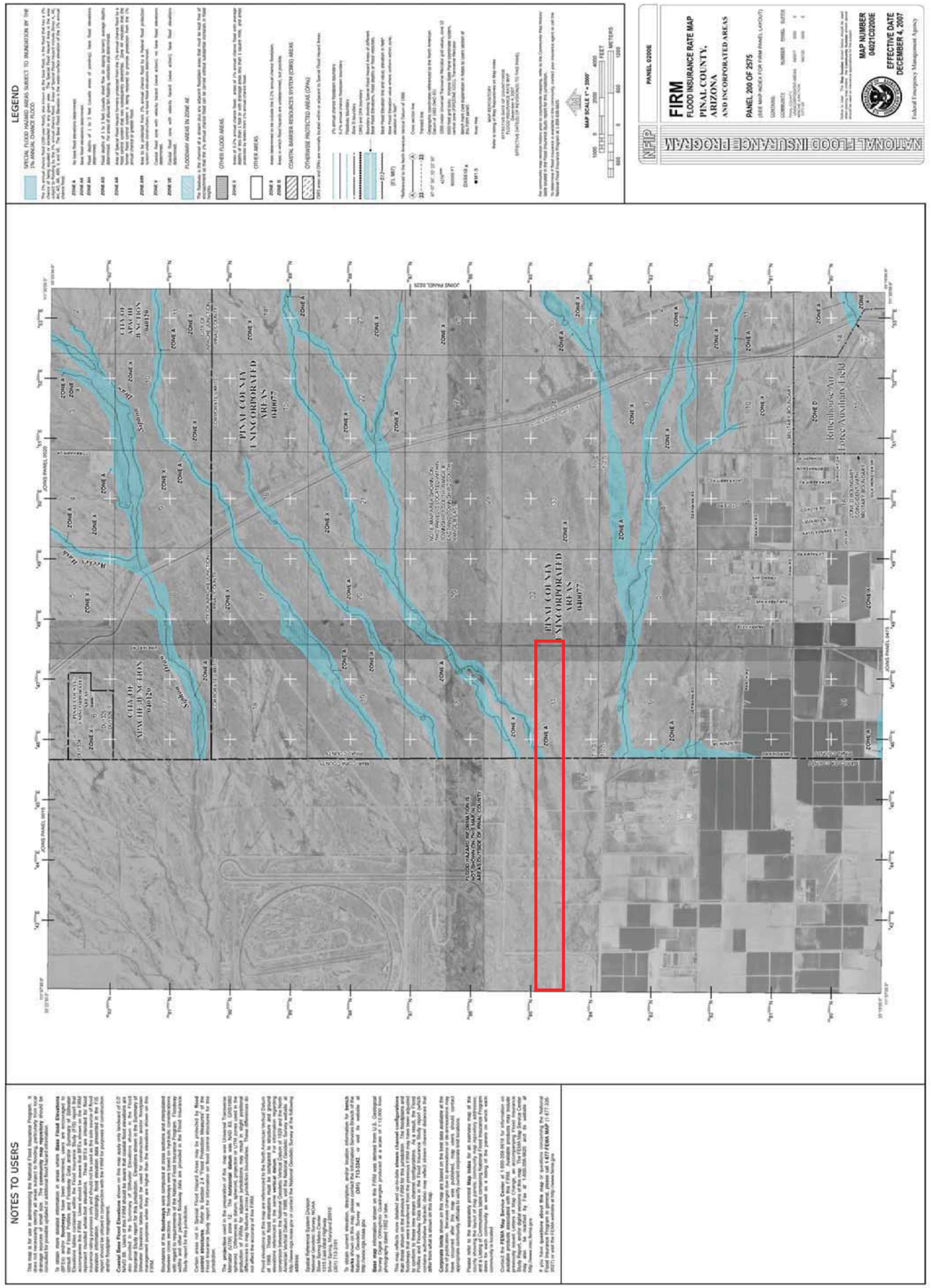
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS
(SEE LISTING OF COMMUNITIES TABLE)
MAP INDEX
PANELS PRINTED:
MAP NUMBER
04013CIND0C
MAP REVISED
NOVEMBER 4, 2015
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
MAP REPOSITORIES
NOTE TO USER
ELEVATION DATUM
LISTING OF COMMUNITIES


LEGEND
NOTES TO USERS
PANEL 2760L
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS
PANEL 2760 OF 4425
MAP NUMBER
04013C2760L
MAP REVISED
OCTOBER 16, 2013
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
CITY OF MESA
TOWN OF GILBERT
MARICOPA COUNTY UNINCORPORATED AREAS


NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY, ARIZONA AND INCORPORATED AREAS
MAP INDEX
MAP NUMBER 04021CIND0B
MAP REVISED JUNE 16, 2014
Federal Emergency Management Agency
LISTING OF COMMUNITIES
MAP REPOSITORIES
NOTES TO USER
MAP DATES
BASE MAP SOURCE
ELEVATION DATUM
04021C0200E


LEGEND
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 200 OF 2575
MAP NUMBER 04021C0200E
EFFECTIVE DATE DECEMBER 4, 2007
Federal Emergency Management Agency
NOTES TO USERS
PINAL COUNTY UNINCORPORATED AREAS 040077
CITY OF APACHE JUNCTION 040120
ZONE A

APPENDIX C

RAINFALL INTENSITY CALCULATIONS (FROM EAST MESA ADMPU)

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NOAA 14 Point Precipitation Values (in inches) for overall EMADMPU study watershed

(Maricopa and Pinal Counties combined)

Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
5 MIN	0.251	0.340	0.408	0.500	0.572	0.645
10 MIN	0.383	0.518	0.621	0.762	0.871	0.981
15 MIN	0.474	0.642	0.770	0.944	1.079	1.216
30 MIN	0.639	0.865	1.037	1.272	1.453	1.638
1 HOUR	0.791	1.070	1.283	1.574	1.799	2.027
2 HOUR	0.897	1.193	1.422	1.731	1.971	2.219
3 HOUR	0.944	1.239	1.472	1.797	2.055	2.324
6 HOUR	1.126	1.438	1.686	2.025	2.293	2.572
12 HOUR	1.278	1.611	1.874	2.231	2.505	2.785
24 HOUR	1.547	1.982	2.330	2.809	3.184	3.579

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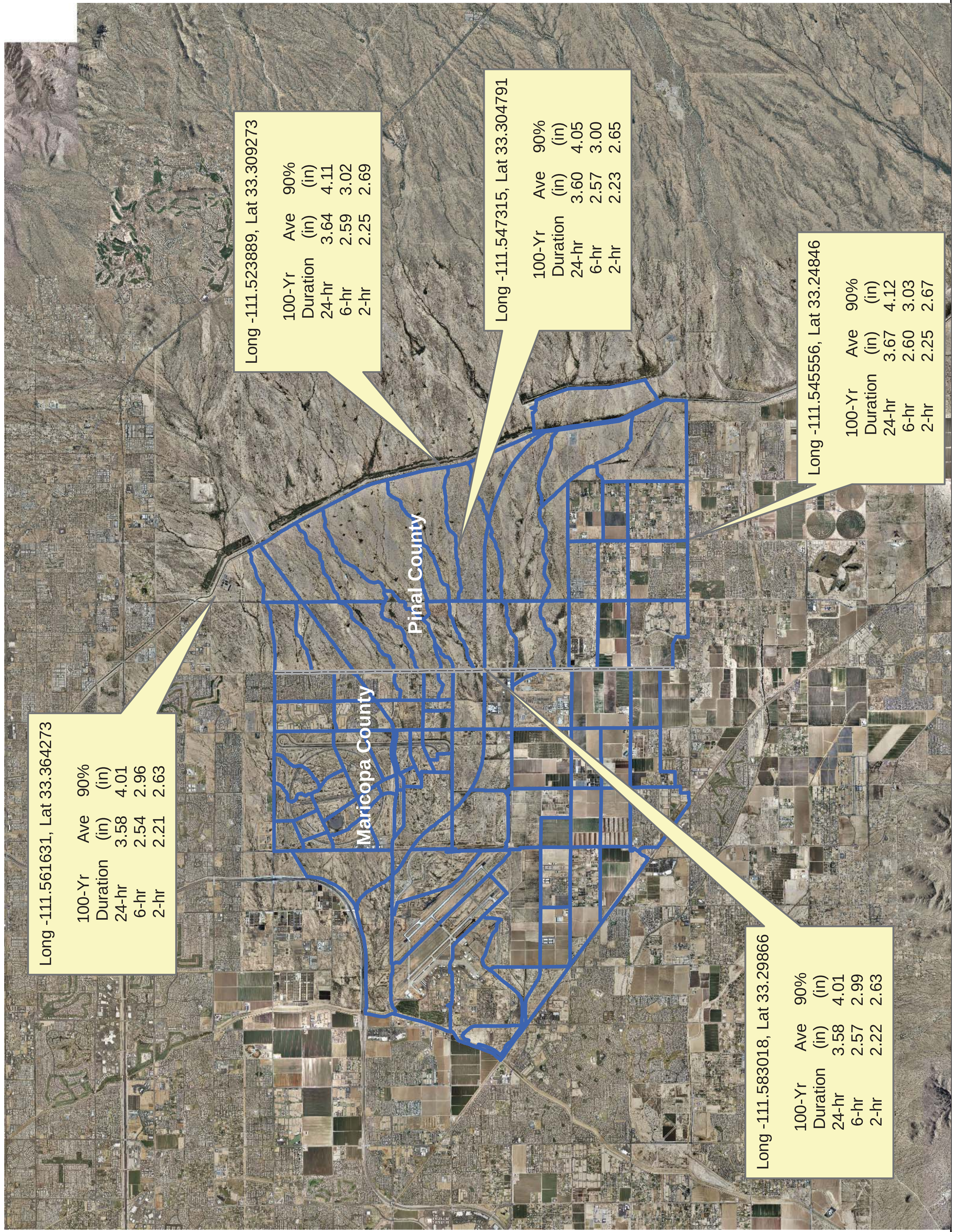

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APPENDIX D

OFF-SITE HYDROLOGY

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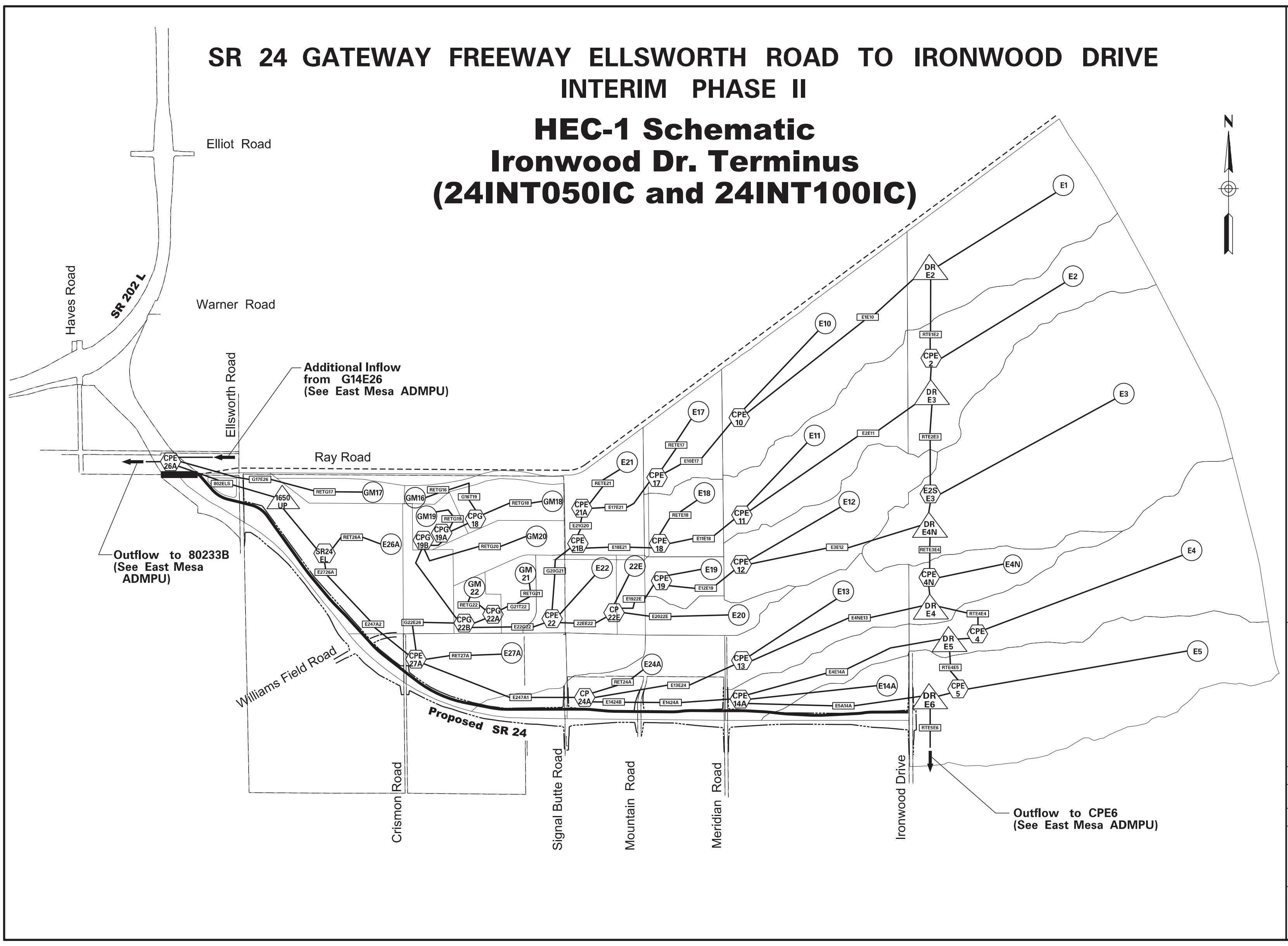
SR 24 GATEWAY FREEWAY ELLSWORTH ROAD TO IRONWOOD DRIVE
INTERIM PHASE II

HEC-1 Schematic
Ironwood Dr. Terminus
(24INT050IC and 24INT100IC)



Reference Items :

East Mesa ADMP Subbasin Boundary
Right of Way
Major Arterials
SR 24 Channel
Powerline Floodway (Existing)
Powerline Floodway (Widened)

HEC-1 Items :

E10 Subbasin
CPE 21A Concentration Point
E1E10 Routing Path
RETG19 Retention
DR E2 Diversion
Flow Direction
Model Connections

DATE :
JULY 2016

PREPARED BY :

PARSONS
222 S. MILL AVENUE, SUITE 220
TEMPE, ARIZONA 85281-2025

1500 0 1500 3000
SCALE : 1" = 1500'

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Date:
Prepared by: F. Braileanu 12/22/2015
Checked by: L. Ferreras 1/11/2016

SR 24 - Revised Routes for the INT models using concrete lining

ROUTE	FROM	TO	TIME STEP	LENGTH	VELOCITY	Time Steps
			(sec)	(ft)	(ft/s)	
			300			
E2726A	Wlliams Field Road	Ellsworth Road	300	6350	10.72	4
E247A2	Ellsworth Road	Crismon Road	300	1528	10.35	1
E247A1	Crismon Road	Signal Butte Road	300	5594	10.35	4
E1424B	Signal Butte Road	Mountain Road	300	2461	9.97	2
E1424A	Mountain Road	Meridian Road	300	2808	9.97	2
E5A14A	Meridian Road	Ironwood Road	300	6121	9.97	4

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1*****************************************                                       ***************************************
 *                                       *                                       *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                       *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998               *                                       *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                       *         609 SECOND STREET           *
 *                                       *                                       *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04JUL16  TIME  13:51:13   *                                       *          (916) 756-1104             *
 *                                       *                                       *                                     *
 *****************************************                                       ***************************************



                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X        XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X       XXXXX   X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX



          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                        HEC-1 INPUT                                         PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1          ID        24INT050IC  100-YEAR, 24-hr Interim Phase II Conditions   2016-07-04
             2          ID        Assuming concrete-lined channel for the following routes:
             3          ID        E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
             4          ID        by Parsons Corporation
             5          ID
             6          ID        The model reflects interim drainage conditions for SR 24 and it is based
             7          ID        on Mesa ADMPU with revisions reflecting development work around the
             8          ID        corridor.
             9          ID        This model simulates that the SR 24 corridor extends to Ironwood Dr,
            10          ID        which would eliminate the need to intercept runoff from subbasins
            11          ID        E5A, E6A and RTE4E5.
            12          ID        Therefore, subbasins E5A and E5B, and E6A and E6B were reconfigured to
            13          ID        match the layout, characteristics and hydrologic connectivity of
            14          ID        subbasins E5 and E6 in the existing condition model (24EX100). Also,
            15          ID        diversion DRE6 was reintroduced to simulate the cascading flows
            16          ID        east of Ironwood Dr.
            17          ID
            18          ID  **********************************************************************
            19          ID        FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
            20          ID        Flood Control District of Maricopa County
            21          ID        50 YEAR
            22          ID        24 Hour Storm
            23          ID        Unit Hydrograph: S-Graph
            24          ID        08/05/2011
            25          IT       5       0       0    2000
            26          IN      15
            27          IO       5
                        *DIAGRAM
                        *
            28          JD   3.184  0.0001
            29          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
            30          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
            31          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
            32          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
            33          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
            34          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
            35          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
            36          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
            37          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
            38          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
            39          JD   3.168     1.0
            40          JD   3.104     5.0
            41          JD   3.025    10.0
            42          JD   2.923    20.0
            43          JD   2.866    30.0
            44          JD   2.824    40.0
            45          JD   2.792    50.0
            46          JD   2.770    60.0
                        *
1                                        HEC-1 INPUT                                         PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            47          KK      P1   BASIN
            48          KM
            49          KM     Used the unit hydrograph for undeveloped conditions
            50          KM     by Parsons Corporation 2015-11
            51          BA   0.387
            52          LG    0.35    0.35    3.95    0.47       0
            53          UI       0      29      29      99     134     162     189     226     301     369
            54          UI     298     248     210     175     144     108      65      50      45      29
            55          UI      26       9       9       9       9       9       9       0       0       0
            56          UI       0       0       0       0       0       0       0       0       0       0
            57          UI       0       0       0       0       0       0       0       0       0       0
```

```
                        *
            58          KM  KK DIVP1  DIVERT
            59          KM
            60          KM     Revised by removing the retention to account for undeveloped conditions
            61          KM     by Parsons Corporation 2015-11
                        *DT RETP1    29.5     0.0
                        *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                        *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                        *

            62          KK  DP1PFW  DIVERT
            63          KM
            64          DT   DRPFW     0.0     0.0
            65          DI     0.0    50.0   100.0   150.0   200.0   250.0   300.0   400.0   500.0   600.0
            66          DQ     0.0    10.0    42.0    81.0   123.0   166.0   211.0   301.0   392.0   485.0
                        *

            67          KK    P1P2   ROUTE
            68          KM
            69          KM     Revised by using routing for undeveloped conditions
            70          KM     by Parsons Corporation 2015-11
            71          RS      22    FLOW
            72          RC   0.045   0.040   0.045    6529  0.0061    5.50
            73          RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
            74          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                        *

            75          KK      P2   BASIN
            76          KM
            77          KM     Used the unit hydrograph for undeveloped conditions
            78          KM     by Parsons Corporation 2015-11
            79          BA   0.577
            80          LG    0.35    0.35    4.10    0.44       0
            81          UI       0      38      38      92     151     187     214     247     287     357
            82          UI     476     428     352     306     263     226     190     158     108      67
            83          UI      63      55      38      38      14      12      12      12      12      12
            84          UI      12       0       0       0       0       0       0       0       0       0
            85          UI       0       0       0       0       0       0       0       0       0       0
                        *
            86          KM  KK DIVP2  DIVERT
            87          KM
            88          KM     Revised by removing the retention to account for undeveloped conditions
            89          KM     by Parsons Corporation 2015-11
                        *DT RETP2    44.3     0.0
                        *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                        *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                        *
1                                        HEC-1 INPUT                                         PAGE  3

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            90          KK    CPP2 COMBINE
            91          KM         Combine Sub-basin P2 and routed flows from sub-basin P1
            92          HC       2
                        *

            93          KK    P2P4   ROUTE
            94          KM
            95          RS       5    FLOW
            96          RC   0.060   0.050   0.060    2856  0.0063    5.00
            97          RX    0.00  100.00  110.00  145.00  150.00  200.00  210.00  325.00
            98          RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    5.00
                        *

            99          KK      P4   BASIN
           100          KM
           101          BA   0.497
           102          LG    0.25    0.25    5.40    0.27      30
           103          UI       0      49      94     206     267     331     431     603     478     383
           104          UI     303     239     159      85      75      49      29      15      15      15
           105          UI      15       0       0       0       0       0       0       0       0       0
           106          UI       0       0       0       0       0       0       0       0       0       0
           107          UI       0       0       0       0       0       0       0       0       0       0
                        *

           108          KK   DIVP4  DIVERT
           109          KM
           110          DT   RETP4    50.8     0.0
           111          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           112          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

           113          KK    CPP4 COMBINE
           114          KM
           115          HC       2
                        *

           116          KK    P4P6   ROUTE
           117          KM
           118          RS       6    FLOW
           119          RC   0.035   0.050   0.045    3423  0.0053    7.00
           120          RX    0.00   10.00   35.00  100.00  105.00  120.00  125.00  140.00
           121          RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    7.00
                        *

           122          KK      P6   BASIN
           123          KM
           124          BA   0.504
           125          LG    0.25    0.25    5.20    0.31      31
           126          UI       0      39      39     137     182     219     258     310     423     485
           127          UI     379     319     266     221     180     126      72      65      49      39
           128          UI      23      12      12      12      12      12       0       0       0       0
```

```
        129          UI       0       0       0       0       0       0       0       0       0       0
        130          UI       0       0       0       0       0       0       0       0       0       0
                     *
1                                                            HEC-1 INPUT                                    PAGE  4

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        131          KK   DIVP6  DIVERT
        132          KM
        133          DT   RETP6    50.4     0.0
        134          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        135          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

        136          KK    CPP6 COMBINE
        137          KM
        138          HC       2
                     *

        139          KK   P6GM8   ROUTE
        140          KM
        141          RS       3    FLOW
        142          RC   0.035   0.030   0.035    2432  0.0019    5.00
        143          RX  950.00  989.00  991.00 1003.00 1007.00 1019.00 1021.00 1050.00
        144          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                     *

        145          KK  GM8G10   ROUTE
        146          KM
        147          RS       3    FLOW
        148          RC   0.035   0.035   0.035    2628  0.0051    5.00
        149          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
        150          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                     *

        151          KK   DRPFWRETRIEVE
        152          KM
        153          DR   DRPFW
                     *

        154          KK   P1PFW   ROUTE
        155          KM
        156          KM     Revised by using routing for undeveloped conditions
        157          KM     by Parsons Corporation 2015-11
        158          RS       2    FLOW
        159          RC   0.030   0.016   0.030    8110  0.0062    8.00
        160          RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
        161          RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                     *

        162          KK      P3   BASIN
        163          KM
        164          KM     Used the unit hydrograph for undeveloped conditions
        165          KM     by Parsons Corporation 2015-11
        166          BA   0.522
        167          LG    0.35    0.35    3.95    0.47       0
        168          UI       0      27      27      29      91     112     132     149     165     187
        169          UI     209     250     317     349     290     251     224     201     175     156
        170          UI     136     117      89      61      48      45      43      27      27      25
        171          UI       8       8       8       8       8       8       8       8       8       0
        172          UI       0       0       0       0       0       0       0       0       0       0
                     *
1                                                            HEC-1 INPUT                                    PAGE  5

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        173          KM  KK DIVP3  DIVERT
        174          KM
        175          KM     Revised by removing the retention to account for undeveloped conditions
        176          KM     by Parsons Corporation 2015-11
                     *DT RETP3    39.9     0.0
                     *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                     *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                     *

        177          KK    CPP3 COMBINE
        178          KM
        179          HC       2    0.91
                     *

        180          KK    P3P5   ROUTE
        181          KM
        182          RS       1    FLOW
        183          RC   0.030   0.016   0.030    2889  0.0062    8.00
        184          RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
        185          RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                     *

        186          KK      P5   BASIN
        187          KM
        188          BA   0.254
        189          LG    0.25    0.25    6.00    0.22      30
        190          UI       0      23      40      93     123     149     186     269     264     204
        191          UI     167     134     104      64      40      34      23      14       7       7
        192          UI       7       7       0       0       0       0       0       0       0       0
        193          UI       0       0       0       0       0       0       0       0       0       0
        194          UI       0       0       0       0       0       0       0       0       0       0
                     *

        195          KK   DIVP5  DIVERT
        196          KM
        197          DT   RETP5    17.4     0.0
```

```
        198          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        199          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

        200          KK    CPP5 COMBINE
        201          KM
        202          HC       2
                     *

        203          KK    P5P7   ROUTE
        204          KM        Powerline Floodway
        205          RS       1    FLOW
        206          RC   0.030   0.016   0.030    3146  0.0057    8.00
        207          RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
        208          RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                     *
1                                                            HEC-1 INPUT                                    PAGE  6

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        209          KK      P7   BASIN
        210          KM
        211          BA   0.429
        212          LG    0.25    0.19    6.60    0.17      30
        213          UI       0      40      71     163     214     260     328     478     436     341
        214          UI     276     220     170      94      68      52      40      16      12      12
        215          UI      12      12       0       0       0       0       0       0       0       0
        216          UI       0       0       0       0       0       0       0       0       0       0
        217          UI       0       0       0       0       0       0       0       0       0       0
                     *

        218          KK   DIVP7  DIVERT
        219          KM
        220          DT   RETP7    31.0     0.0
        221          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        222          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

        223          KK    CPP7 COMBINE
        224          KM
        225          HC       3    3.17
                     *

        226          KK  P7GM14   ROUTE
        227          KM
        228          RS       9    FLOW
        229          RC   0.025   0.016   0.025   10659  0.0036    7.00
        230          RX    0.00   14.50   16.00   24.60   32.60   41.20   42.70   57.20
        231          RY    7.00    7.00    6.00    0.25    0.25    6.00    7.00    7.00
                     *

        232          KK     GM1   BASIN
        233          KM
        234          BA   0.345
        235          LG    0.10    0.15    8.00    0.13       5
        236          UI       0      38      93     178     228     297     447     394     303     232
        237          UI     175      98      64      45      30      12      12      12      12       0
        238          UI       0       0       0       0       0       0       0       0       0       0
        239          UI       0       0       0       0       0       0       0       0       0       0
        240          UI       0       0       0       0       0       0       0       0       0       0
                     *

        241          KK     GM2   BASIN
        242          KM
        243          BA   0.683
        244          LG    0.20    0.25    6.00    0.23      48
        245          UI       0     104     415     625     942    1178     805     560     298     165
        246          UI      96      32      32      32       0       0       0       0       0       0
        247          UI       0       0       0       0       0       0       0       0       0       0
        248          UI       0       0       0       0       0       0       0       0       0       0
        249          UI       0       0       0       0       0       0       0       0       0       0
                     *
1                                                            HEC-1 INPUT                                    PAGE  7

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        250          KK     GM3   BASIN
        251          KM
        252          BA   0.288
        253          LG    0.13    0.15    8.80    0.08      71
        254          UI       0     279     882     743     244      57       0       0       0       0
        255          UI       0       0       0       0       0       0       0       0       0       0
        256          UI       0       0       0       0       0       0       0       0       0       0
        257          UI       0       0       0       0       0       0       0       0       0       0
        258          UI       0       0       0       0       0       0       0       0       0       0
                     *

        259          KK  CPG123 COMBINE
        260          KM
        261          HC       3
                     *

        262          KK   DIVG1  DIVERT
        263          KM
        264          DT   RETG1   102.1     0.0
        265          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        266          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

        267          KK   GM1T5   ROUTE
        268          KM
```

```
             269           RS       1    FLOW
             270           RC   0.040   0.035   0.040    2680  0.0050    5.00
             271           RX    0.00    5.00   10.00   22.00   33.00   45.00   50.00   55.00
             272           RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                           *

             273           KK     GM5   BASIN
             274           KM
             275           BA   0.176
             276           LG    0.11    0.13   10.10    0.05      60
             277           UI       0      68     210     385     353     206      81      36      12      12
             278           UI       0       0       0       0       0       0       0       0       0       0
             279           UI       0       0       0       0       0       0       0       0       0       0
             280           UI       0       0       0       0       0       0       0       0       0       0
             281           UI       0       0       0       0       0       0       0       0       0       0
                           *

             282           KK   DIVG5  DIVERT
             283           KM
             284           DT   RETG5    13.6     0.0
             285           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             286           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *
 1                                                       HEC-1 INPUT                                             PAGE  8

            LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             287           KK    CPG5 COMBINE
             288           KM
             289           HC       2
                           *

             290           KK   GM5T7   ROUTE
             291           KM
             292           RS       3    FLOW
             293           RC   0.032   0.032   0.032    3745  0.0020    5.50
             294           RX    0.00    5.00   10.00   24.00   44.00   58.00   63.00   68.00
             295           RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                           *

             296           KK     GM6   BASIN
             297           KM
             298           BA   0.368
             299           LG    0.25    0.15    8.00    0.10      38
             300           UI       0     240     705    1079     558     177      55      32       0       0
             301           UI       0       0       0       0       0       0       0       0       0       0
             302           UI       0       0       0       0       0       0       0       0       0       0
             303           UI       0       0       0       0       0       0       0       0       0       0
             304           UI       0       0       0       0       0       0       0       0       0       0
                           *

             305           KK   DIVG6  DIVERT
             306           KM
             307           DT   RETG6    26.8     0.0
             308           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             309           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *

             310           KK     GM7   BASIN
             311           KM
             312           BA   0.216
             313           LG    0.14    0.19    6.60    0.21      16
             314           UI       0      29      95     155     208     328     286     209     152      88
             315           UI      49      32      15       9       9       9       0       0       0       0
             316           UI       0       0       0       0       0       0       0       0       0       0
             317           UI       0       0       0       0       0       0       0       0       0       0
             318           UI       0       0       0       0       0       0       0       0       0       0
                           *

             319           KK   DIVG7  DIVERT
             320           KM
             321           DT   RETG7    14.6     0.0
             322           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             323           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *
 1                                                       HEC-1 INPUT                                             PAGE  9

            LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             324           KK   CPG7A COMBINE
             325           KM
             326           HC       2
                           *

             327           KK   CPG7B COMBINE
             328           KM
             329           HC       2
                           *

             330           KK   GM7T9   ROUTE
             331           KM
             332           RS       1    FLOW
             333           RC   0.032   0.032   0.032    2140  0.0020    5.50
             334           RX    0.00    5.00   10.00   24.00   44.00   58.00   63.00   68.00
             335           RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                           *

             336           KK     GM8   BASIN
             337           KM
             338           BA   0.558
             339           LG    0.24    0.25    5.60    0.27      43
```

```
             340           UI       0      82     310     473     681     964     681     481     306     140
             341           UI      94      41      25      25       0       0       0       0       0       0
             342           UI       0       0       0       0       0       0       0       0       0       0
             343           UI       0       0       0       0       0       0       0       0       0       0
             344           UI       0       0       0       0       0       0       0       0       0       0
                           *

             345           KK   DIVG8  DIVERT
             346           KM
             347           DT   RETG8    40.1     0.0
             348           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             349           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *

             350           KK     GM9   BASIN
             351           KM
             352           BA   0.095
             353           LG    0.16    0.25    5.40    0.32      22
             354           UI       0      69     206     278     127      39      10       0       0       0
             355           UI       0       0       0       0       0       0       0       0       0       0
             356           UI       0       0       0       0       0       0       0       0       0       0
             357           UI       0       0       0       0       0       0       0       0       0       0
             358           UI       0       0       0       0       0       0       0       0       0       0
                           *

             359           KK   DIVG9  DIVERT
             360           KM
             361           DT   RETG9     6.7     0.0
             362           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             363           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *
 1                                                       HEC-1 INPUT                                             PAGE 10

            LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             364           KK   CPG9A COMBINE
             365           KM
             366           HC       2
                           *

             367           KK    GM10   BASIN
             368           KM
             369           BA   0.280
             370           LG    0.23    0.17    6.80    0.17      40
             371           UI       0      38     131     210     285     447     362     265     188      98
             372           UI      62      38      13      12      12       0       0       0       0       0
             373           UI       0       0       0       0       0       0       0       0       0       0
             374           UI       0       0       0       0       0       0       0       0       0       0
             375           UI       0       0       0       0       0       0       0       0       0       0
                           *

             376           KK  DIVG10  DIVERT
             377           KM
             378           DT  RETG10    17.5     0.0
             379           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             380           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *

             381           KK    GM11   BASIN
             382           KM
             383           BA   0.075
             384           LG    0.19    0.25    4.00    0.63      30
             385           UI       0      23      75     125     162     101      54      23      10       5
             386           UI       5       0       0       0       0       0       0       0       0       0
             387           UI       0       0       0       0       0       0       0       0       0       0
             388           UI       0       0       0       0       0       0       0       0       0       0
             389           UI       0       0       0       0       0       0       0       0       0       0
                           *

             390           KK  DIVG11  DIVERT
             391           KM
             392           DT  RETG11     5.4     0.0
             393           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             394           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                           *

             395           KK   CPG11 COMBINE
             396           KM
             397           HC       2
                           *

             398           KK   CPG9B COMBINE
             399           KM
             400           HC       3
                           *
 1                                                       HEC-1 INPUT                                             PAGE 11

            LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             401           KK  GM9T14   ROUTE
             402           KM
             403           RS       3    FLOW
             404           RC   0.032   0.032   0.032    3560  0.0020    6.00
             405           RX    0.00   15.00   20.00   34.00   46.00   60.00   65.00   80.00
             406           RY    6.00    5.00    4.50    1.00    1.00    4.50    5.00    6.00
                           *

             407           KK    GM12   BASIN
             408           KM
             409           BA   0.118
             410           LG    0.10    0.15    8.80    0.09      78
```

```
     411          UI       0     129     402     284      76      17       0       0       0       0
     412          UI       0       0       0       0       0       0       0       0       0       0
     413          UI       0       0       0       0       0       0       0       0       0       0
     414          UI       0       0       0       0       0       0       0       0       0       0
     415          UI       0       0       0       0       0       0       0       0       0       0
                  *

     416          KK  DIVG12  DIVERT
     417          KM
     418          DT  RETG12     9.4     0.0
     419          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     420          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                  *

     421          KK  G12T13   ROUTE
     422          KM
     423          RS       2    FLOW
     424          RC   0.032   0.032   0.032    4000  0.0042    6.00
     425          RX  950.00  985.00  995.00 1003.00 1005.00 1013.00 1023.00 1068.00
     426          RY    6.00    5.50    5.00    1.00    1.00    5.00    5.50    6.00
                  *

     427          KK    GM13   BASIN
     428          KM
     429          BA   0.292
     430          LG    0.23    0.25    5.60    0.27      49
     431          UI       0     256     804     796     294      78      29       0       0       0
     432          UI       0       0       0       0       0       0       0       0       0       0
     433          UI       0       0       0       0       0       0       0       0       0       0
     434          UI       0       0       0       0       0       0       0       0       0       0
     435          UI       0       0       0       0       0       0       0       0       0       0
                  *

     436          KK  DIVG13  DIVERT
     437          KM
     438          DT  RETG13    22.6     0.0
     439          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     440          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                  *
1                                            HEC-1 INPUT                                        PAGE 12

    LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     441          KK   CPG13 COMBINE
     442          KM
     443          HC       2
                  *

     444          KK  G13T14   ROUTE
     445          KM
     446          RS       1    FLOW
     447          RC   0.032   0.018   0.032    1320  0.0030    3.50
     448          RX    0.00    5.00   12.00   15.00   65.00   68.00  135.00  140.00
     449          RY    3.50    3.00    2.50    1.00    1.00    2.50    3.00    3.50
                  *

     450          KK    GM14   BASIN
     451          KM
     452          BA   0.347
     453          LG    0.17    0.25    4.55    0.44      56
     454          UI       0     211     619    1004     558     194      62      29       0       0
     455          UI       0       0       0       0       0       0       0       0       0       0
     456          UI       0       0       0       0       0       0       0       0       0       0
     457          UI       0       0       0       0       0       0       0       0       0       0
     458          UI       0       0       0       0       0       0       0       0       0       0
                  *

     459          KK  DIVG14  DIVERT
     460          KM
     461          DT  RETG14    25.6     0.0
     462          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     463          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                  *

     464          KK  CPG14A COMBINE
     465          KM
     466          HC       2
                  *

     467          KK  CPG14B COMBINE
     468          KM
     469          HC       2
                  *

     470          KK  CPG14C COMBINE
     471          KM
     472          HC       2
                  *

     473          KK  G14E26   ROUTE
     474          KM
     475          RS       1    FLOW
     476          RC   0.025   0.015   0.025    1450  0.0045    9.00
     477          RX    0.00   13.00   15.30   25.00   33.00   42.70   45.00   58.00
     478          RY    9.00    9.00    7.50    1.00    1.00    7.50    9.00    9.00
                  *
     479          KM
1                                            HEC-1 INPUT                                        PAGE 13

    LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
     480          KK      E1   BASIN
     481          KM
     482          BA   0.886
     483          LG    0.35    0.35    3.95    0.47       0
     484          UI       0      55      55     115     203     259     301     338     392     455
     485          UI     596     700     574     488     430     369     320     273     228     162
     486          UI      96      92      88      55      55      34      17      17      17      17
     487          UI      17      17      17       0       0       0       0       0       0       0
     488          UI       0       0       0       0       0       0       0       0       0       0
                  *
     489          KM  KK DIVE1  DIVERT
     490          KM
     491          KM     Revised by removing the retention to account for undeveloped conditions
     492          KM     by Parsons Corporation 2015-11
                  *DT RETE1    67.6     0.0
                  *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                  *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                  *

     493          KK    DE1S  DIVERT
     494          KM
     495          DT    DRE2     0.0     0.0
     496          DI     0.0    88.0   176.0   264.0   352.0   440.0   528.0     0.0     0.0     0.0
     497          DQ     0.0    58.0   126.0   201.0   277.0   355.0   434.0     0.0     0.0     0.0
                  *

     498          KK   E1E10   ROUTE
     499          KM
     500          KM     Revised by using routing for undeveloped conditions
     501          KM     by Parsons Corporation 2015-11
     502          RS      26    FLOW
     503          RC   0.060   0.050   0.060    7806  0.0063    5.00
     504          RX    0.00  500.00 1000.00 1003.00 1007.00 1011.00 1511.00 2011.00
     505          RY    5.00    4.50    4.00    1.00    1.00    3.00    3.50    4.00
                  *

     506          KK     E10   BASIN
     507          KM
     508          KM     Used the unit hydrograph for undeveloped conditions
     509          KM     by Parsons Corporation 2015-11
     510          BA   0.823
     511          LG    0.35    0.35    3.95    0.47       0
     512          UI       0      47      47      79     167     211     246     276     312     358
     513          UI     427     556     592     483     418     373     322     283     243     211
     514          UI     157     105      83      77      65      47      47      24      14      14
     515          UI      14      14      14      14      14      14       0       0       0       0
     516          UI       0       0       0       0       0       0       0       0       0       0
                  *
     517          KM  KKDIVE10  DIVERT
     518          KM
     519          KM     Revised by removing the retention to account for undeveloped conditions
     520          KM     by Parsons Corporation 2015-11
     521          KM  DTRETE10    62.9     0.0
     522          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
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    LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     523          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                  *

     524          KK   CPE10 COMBINE
     525          KM
     526          HC       2
                  *

     527          KK  E10E17   ROUTE
     528          KM
     529          KM     Buildout routing steps reduced from 5 to 3 through the interim condition
     530          KM     by Parsons Corporation 2015-11
     531          RS       3    FLOW
     532          RC   0.045   0.035   0.045    3407  0.0048    5.00
     533          RX    0.00  100.00  110.00  145.00  150.00  200.00  210.00  325.00
     534          RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    5.00
                  *

     535          KK     E17   BASIN
     536          KM
     537          KM     Gila River Ranches Unit 3
     538          KM     Buildout conditions existent through the interim condition
     539          KM
     540          KM     Kieghley Place
     541          KM     Buildout conditions assumed through the interim condition
     542          KM     by Parsons Corporation 2015-11
     543          BA   0.271
     544          LG    0.26    0.25    5.00    0.33      29
     545          UI       0      27      55     118     153     190     260     331     254     204
     546          UI     160     123      71      46      36      27       9       8       8       8
     547          UI       8       0       0       0       0       0       0       0       0       0
     548          UI       0       0       0       0       0       0       0       0       0       0
     549          UI       0       0       0       0       0       0       0       0       0       0
                  *

     550          KK  DIVE17  DIVERT
     551          KM
     552          KM     Buildout retention in place through the interim condition
     553          KM     by Parsons Corporation 2015-11
     554          DT  RETE17    18.0     0.0
     555          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     556          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                  *

     557          KK   CPE17 COMBINE
```

```
          558          KM
          559          HC       2
                       *

          560          KK  E17E21   ROUTE
          561          KM
          562          KM     Buildout routing steps kept at 4
          563          KM     by Parsons Corporation 2015-11
          564          RS       4    FLOW
          565          RC   0.030   0.045   0.030    2832  0.0042 1440.20
1                                                  HEC-1 INPUT                                              PAGE 15

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          566          RX    0.00   90.00  100.00  115.00  180.00  195.00  255.00  260.00
          567          RY  1440.0 1439.90 1439.80 1438.00 1438.00 1440.00 1440.10 1440.20
                       *

          568          KK     E21   BASIN
          569          KM
          570          KM     Mountain Horizons
          571          KM     Buildout conditions assumed through the interim condition
          572          KM     by Parsons Corporation 2015-11
          573          BA   0.311
          574          LG    0.25    0.25    6.00    0.22      30
          575          UI       0      30      56     125     162     199     257     368     305     243
          576          UI     193     153     108      59      49      31      24       9       9       9
          577          UI       9       0       0       0       0       0       0       0       0       0
          578          UI       0       0       0       0       0       0       0       0       0       0
          579          UI       0       0       0       0       0       0       0       0       0       0
                       *

          580          KK  DIVE21  DIVERT
          581          KM
          582          KM     Buildout retention in place through the interim condition
          583          KM     by Parsons Corporation 2015-11
          584          DT  RETE21    20.3     0.0
          585          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          586          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

          587          KK  CPE21A COMBINE
          588          KM
          589          HC       2
                       *

          590          KK  E21G20   ROUTE
          591          KM
          592          RS       1    FLOW
          593          RC   0.032   0.032   0.032    1655  0.0036    5.50
          594          RX    0.00    5.00   10.00   24.00   34.00   48.00   53.00   58.00
          595          RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                       *
          596          KM

          597          KK    DRE2RETRIEVE
          598          KM
          599          DR    DRE2
                       *

          600          KK  RTE1E2   ROUTE
          601          KM
          602          KM     Revised by using routing for undeveloped conditions
          603          KM     by Parsons Corporation 2015-11
          604          RS       4    FLOW
          605          RC   0.035   0.030   0.025    4100  0.0035    6.00
          606          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
          607          RY    6.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                       *
1                                                  HEC-1 INPUT                                              PAGE 16

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          608          KK      E2   BASIN
          609          KM
          610          KM     Used the unit hydrograph for undeveloped conditions
          611          KM     by Parsons Corporation 2015-11
          612          BA   0.779
          613          LG    0.35    0.35    4.25    0.41       0
          614          UI       0      45      45      77     159     202     234     263     298     342
          615          UI     412     536     556     456     394     352     304     267     228     196
          616          UI     145      95      78      74      58      45      45      19      14      14
          617          UI      14      14      14      14      14       0       0       0       0       0
          618          UI       0       0       0       0       0       0       0       0       0       0
                       *
          619          KM  KK DIVE2  DIVERT
          620          KM
          621          KM     Revised by removing the retention to account for undeveloped conditions
          622          KM     by Parsons Corporation 2015-11
                       *DT RETE2    60.4     0.0
                       *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                       *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                       *

          623          KK    CPE2 COMBINE
          624          KM
          625          HC       2    1.67
                       *

          626          KK    DE2S  DIVERT
          627          KM
          628          DT    DRE3     0.0     0.0
```

```
          629          DI     0.0   135.0   279.0   431.0   583.0   738.0   894.0     0.0     0.0     0.0
          630          DQ     0.0    15.0   121.0   243.0   370.0   504.0   636.0     0.0     0.0     0.0
                       *

          631          KK   E2E11   ROUTE
          632          KM
          633          KM     Revised by using routing for undeveloped conditions
          634          KM     by Parsons Corporation 2015-11
          635          RS      34    FLOW
          636          RC   0.055   0.045   0.055    9374  0.0052    5.00
          637          RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
          638          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                       *

          639          KK     E11   BASIN
          640          KM
          641          KM     Used the unit hydrograph for undeveloped conditions
          642          KM     by Parsons Corporation 2015-11
          643          BA   0.600
          644          LG    0.35    0.35    3.95    0.47       0
          645          UI       0      37      37      76     135     174     201     226     261     303
          646          UI     394     472     392     332     293     252     220     186     157     114
          647          UI      70      63      60      39      37      28      11      11      11      11
          648          UI      11      11      11       0       0       0       0       0       0       0
          649          UI       0       0       0       0       0       0       0       0       0       0
                       *
1                                                  HEC-1 INPUT                                              PAGE 17

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          650          KM  KKDIVE11  DIVERT
          651          KM
          652          KM     Revised by removing the retention to account for undeveloped conditions
          653          KM     by Parsons Corporation 2015-11
          654          KM  DTRETE11    45.8     0.0
          655          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
          656          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                       *

          657          KK   CPE11 COMBINE
          658          KM
          659          HC       2
                       *

          660          KK  E11E18   ROUTE
          661          KM
          662          KM     Buildout routing steps reduced from 22 to 9 through the interim condition
          663          KM     by Parsons Corporation 2015-11
          664          RS       9    FLOW
          665          RC   0.045   0.040   0.045    3164  0.0044    5.50
          666          RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
          667          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                       *

          668          KK     E18   BASIN
          669          KM
          670          KM     Rancho Apache
          671          KM     Existing and Buildout conditions are the same
          672          KM     by Parsons Corporation 2015-11
          673          BA   0.224
          674          LG    0.30    0.15    7.00    0.14      16
          675          UI       0      30     103     166     224     352     291     213     153      82
          676          UI      51      30      12       9       9       0       0       0       0       0
          677          UI       0       0       0       0       0       0       0       0       0       0
          678          UI       0       0       0       0       0       0       0       0       0       0
          679          UI       0       0       0       0       0       0       0       0       0       0
                       *

          680          KK  DIVE18  DIVERT
          681          KM
          682          DT  RETE18     0.3     0.0
          683          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          684          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

          685          KK   CPE18 COMBINE
          686          KM
          687          HC       2
                       *
1                                                  HEC-1 INPUT                                              PAGE 18

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          688          KK  E18E21   ROUTE
          689          KM
          690          KM     Buildout routing steps unchanged
          691          KM     by Parsons Corporation 2015-11
          692          RS       2    FLOW
          693          RC   0.035   0.040   0.045    2664  0.0053    5.00
          694          RX    0.00   15.00   50.00   60.00  100.00  110.00  290.00  300.00
          695          RY    3.50    3.00    3.00    1.00    1.00    3.00    3.00    5.00
                       *

          696          KK  CPE21B COMBINE
          697          KM
          698          HC       2    3.90
                       *

          699          KK  G20G21   ROUTE
          700          KM
          701          KM
          702          RS       2    FLOW
```

```
            703           RC   0.032   0.032   0.032    1901  0.0021    5.50
            704           RX    0.00    1.00    5.00   24.00  124.00  138.00  143.00  148.00
            705           RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                          *
            706           KM

            707           KK    DRE3RETRIEVE
            708           KM
            709           DR    DRE3
                          *

            710           KK  RTE2E3   ROUTE
            711           KM
            712           KM     Revised by using routing for undeveloped conditions
            713           KM     by Parsons Corporation 2015-11
            714           RS       4    FLOW
            715           RC   0.035   0.030   0.025    3678  0.0035    6.00
            716           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
            717           RY    6.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *

            718           KK      E3   BASIN
            719           KM
            720           KM     Used the unit hydrograph for undeveloped conditions
            721           KM     by Parsons Corporation 2015-11
            722           BA   2.234
            723           LG    0.35    0.35    4.60    0.33       0
            724           UI       0      91      91      91     136     303     356     427     467     510
            725           UI     552     605     672     731     857    1035    1206    1075     936     840
            726           UI     769     712     638     576     531     468     432     369     285     220
            727           UI     162     158     150     150      92      91      91      79      28      28
            728           UI      28      28      28      28      28      28      28      28      28      28
            729           UI       0       0       0       0       0       0       0       0       0       0
                          *
            730           KM  KK DIVE3  DIVERT
1                                                       HEC-1 INPUT                                              PAGE 19

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            731           KM
            732           KM     Revised by removing the retention to account for undeveloped conditions
            733           KM     by Parsons Corporation 2015-11
                          *DT RETE3   178.6     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *

            734           KK   E2SE3 COMBINE
            735           KM
            736           HC       2     3.9
                          *

            737           KK    DE3S  DIVERT
            738           KM
            739           DT   DRE4N     0.0     0.0
            740           DI     0.0   192.0   476.0   774.0  1079.0  1390.0  1699.0     0.0     0.0     0.0
            741           DQ     0.0     5.0   197.0   415.0   656.0   912.0  1175.0     0.0     0.0     0.0
                          *

            742           KK   E3E12   ROUTE
            743           KM
            744           KM     Revised by using routing for undeveloped conditions
            745           KM     by Parsons Corporation 2015-11
            746           RS      15    FLOW
            747           RC   0.060   0.050   0.060    4852  0.0054    5.50
            748           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
            749           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

            750           KK     E12   BASIN
            751           KM
            752           KM     Used the unit hydrograph for undeveloped conditions.
            753           KM     by Parsons Corporation 2015-11
            754           BA   0.573
            755           LG    0.35    0.35    4.60    0.33       0
            756           UI       0      32      32      49     112     140     164     184     208     237
            757           UI     275     354     415     346     296     263     232     202     177     154
            758           UI     126      89      57      55      53      35      32      30      10      10
            759           UI      10      10      10      10      10      10       0       0       0       0
            760           UI       0       0       0       0       0       0       0       0       0       0
                          *
            761           KM  KKDIVE12  DIVERT
            762           KM
            763           KM     Revised by removing the retention to account for undeveloped conditions
            764           KM     by Parsons Corporation 2015-11
            765           KM  DTRETE12    43.7     0.0
            766           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
            767           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *
1                                                       HEC-1 INPUT                                              PAGE 20

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            768           KK   CPE12 COMBINE
            769           KM
            770           HC       2
                          *

            771           KK  E12E19   ROUTE
            772           KM
            773           KM     Buildout routing steps kept at 9 through the interim condition
            774           KM     by Parsons Corporation 2015-11
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```
            775           RS       9    FLOW
            776           RC   0.060   0.055   0.060    2707  0.0052    5.50
            777           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
            778           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

            779           KK     E19   BASIN
            780           KM
            781           KM     Part of Superstition View
            782           KM     Existing conditions assumed through the interim condition
            783           KM     by Parsons Corporation 2015-11
            784           BA   0.135
            785           LG    0.30    0.15    8.00    0.10      15
            786           UI       0      35     119     186     288     194     122      51      29       9
            787           UI       8       0       0       0       0       0       0       0       0       0
            788           UI       0       0       0       0       0       0       0       0       0       0
            789           UI       0       0       0       0       0       0       0       0       0       0
            790           UI       0       0       0       0       0       0       0       0       0       0
                          *
            791           KM  KKDIVE19  DIVERT
            792           KM
            793           KM     Revised by removing the retention to account for undeveloped conditions
            794           KM     by Parsons Corporation 2015-11
            795           KM  DTRETE19     0.2     0.0
            796           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
            797           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *

            798           KK   CPE19 COMBINE
            799           KM
            800           HC       2
                          *

            801           KK  E1922E   ROUTE
            802           KM
            803           KM     No change between existing (pre-buildup) and buildup conditions
            804           KM     by Parsons Corporation 2015-11
            805           RS       4    FLOW
            806           RC   0.050   0.040   0.050    1912  0.0042   10.00
            807           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
            808           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *
1                                                       HEC-1 INPUT                                              PAGE 21

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            809           KK     22E   BASIN
            810           KM
            811           KM     Used the unit hydrograph for existing (partially developed) conditions.
            812           KM     by Parsons Corporation 2015-11
            813           BA   0.089
            814           LG    0.31    0.19    8.40    0.08      11
            815           UI       0      19      69     104     173     137      91      48      24      12
            816           UI       5       5       0       0       0       0       0       0       0       0
            817           UI       0       0       0       0       0       0       0       0       0       0
            818           UI       0       0       0       0       0       0       0       0       0       0
            819           UI       0       0       0       0       0       0       0       0       0       0
                          *
            820           KM  KKDIV22E  DIVERT
            821           KM
            822           KM     Revised by removing the retention to account for undeveloped conditions
            823           KM     by Parsons Corporation 2015-11
            824           KM  DTRET22E     7.8     0.0
            825           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
            826           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *

            827           KK     E20   BASIN
            828           KM
            829           KM     Used the unit hydrograph for existing (partially developed) conditions.
            830           KM     by Parsons Corporation 2015-11
            831           BA   0.169
            832           LG    0.32    0.28    4.50    0.35      10
            833           UI       0      17      33      72      93     115     153     206     161     129
            834           UI     102      79      50      29      24      17       8       5       5       5
            835           UI       5       0       0       0       0       0       0       0       0       0
            836           UI       0       0       0       0       0       0       0       0       0       0
            837           UI       0       0       0       0       0       0       0       0       0       0
                          *
            838           KM  KKDIVE20  DIVERT
            839           KM
            840           KM     Revised by removing the retention to account for existing (pre-buildout)
            841           KM     conditions
            842           KM     by Parsons Corporation 2015-11
            843           KM  DTRETE20     3.2     0.0
            844           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
            845           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *

            846           KK  E2022E   ROUTE
            847           KM
            848           KM     Revised by using routing for existing (pre-buildout) conditions
            849           KM     by Parsons Corporation 2015-11
            850           RS       3    FLOW
            851           RC   0.045   0.035   0.045    1115  0.0054   10.00
            852           RX    0.00  500.00 1000.00 1005.00 1007.00 1010.00 1511.00 2011.00
            853           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                          *
1                                                       HEC-1 INPUT                                              PAGE 22

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
         854       KK   CP22E COMBINE
         855       KM
         856       HC       3
                   *

         857       KK  22EE22   ROUTE
         858       KM
         859       RS       1    FLOW
         860       RC   0.045   0.040   0.045    1740  0.0046   10.00
         861       RX  950.00  973.00  993.00 1005.00 1013.00 1025.00 1045.00 1055.00
         862       RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                   *

         863       KK     E22   BASIN
         864       KM
         865       KM     Revised by using the unit hydrograph for undeveloped conditions
         866       KM     by Parsons Corporation 2015-11
         867       BA   0.158
         868       LG    0.35    0.32    7.60    0.10       1
         869       UI       0      18      18      58      81      99     114     136     171     232
         870       UI     200     164     141     117      98      80      55      32      30      23
         871       UI      18      12       6       6       6       6       6       6       0       0
         872       UI       0       0       0       0       0       0       0       0       0       0
         873       UI       0       0       0       0       0       0       0       0       0       0
                   *
         874       KM   KKDIVE22  DIVERT
         875       KM
         876       KM     Revised by removing the retention to account for undeveloped conditions
         877       KM     by Parsons Corporation 2015-11
         878       KM  DTRETE22    13.8     0.0
         879       KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
         880       KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                   *

         881       KK   CPE22 COMBINE
         882       KM
         883       HC       3    7.25
                   *

         884       KK  E22G22   ROUTE
         885       KM
         886       RS       3    FLOW
         887       RC   0.040   0.050   0.040    4418  0.0043    8.00
         888       RX  720.00  750.00  785.00  805.00  845.00  865.00  880.00  910.00
         889       RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                   *

         890       KK    GM21   BASIN
         891       KM
         892       BA   0.210
         893       LG    0.10    0.15    7.30    0.14      75
         894       UI       0      51     176     272     437     309     200      90      49      19
         895       UI      12      12       0       0       0       0       0       0       0       0
         896       UI       0       0       0       0       0       0       0       0       0       0
1                                                     HEC-1 INPUT                                       PAGE 23

        LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         897       UI       0       0       0       0       0       0       0       0       0       0
         898       UI       0       0       0       0       0       0       0       0       0       0
                   *

         899       KK  DIVG21  DIVERT
         900       KM
         901       DT  RETG21    17.3     0.0
         902       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         903       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         904       KK  G21T22   ROUTE
         905       KM
         906       RS       1    FLOW
         907       RC   0.032   0.008   0.032    1500  0.0020    3.00
         908       RX    0.00    2.00    4.00    6.00   60.00   62.00   64.00   66.00
         909       RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                   *

         910       KK    GM22   BASIN
         911       KM
         912       BA   0.095
         913       LG    0.10    0.15    8.80    0.08      79
         914       UI       0      67     197     280     134      40      11       0       0       0
         915       UI       0       0       0       0       0       0       0       0       0       0
         916       UI       0       0       0       0       0       0       0       0       0       0
         917       UI       0       0       0       0       0       0       0       0       0       0
         918       UI       0       0       0       0       0       0       0       0       0       0
                   *

         919       KK  DIVG22  DIVERT
         920       KM
         921       DT  RETG22     8.0     0.0
         922       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         923       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         924       KK  CPG22A COMBINE
         925       KM
         926       HC       2
                   *

         927       KK    GM16   BASIN
         928       KM
```

```
         929       BA   0.069
         930       LG    0.26    0.25    4.50    0.48      44
         931       UI       0      10      38      59      84     119      84      59      38      17
         932       UI      12       5       3       3       0       0       0       0       0       0
         933       UI       0       0       0       0       0       0       0       0       0       0
         934       UI       0       0       0       0       0       0       0       0       0       0
         935       UI       0       0       0       0       0       0       0       0       0       0
                   *
1                                                     HEC-1 INPUT                                       PAGE 24

        LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         936       KK  DIVG16  DIVERT
         937       KM
         938       DT  RETG16     4.9     0.0
         939       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         940       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         941       KK  G16T19   ROUTE
         942       KM
         943       RS       2    FLOW
         944       RC   0.032   0.016   0.032    1200  0.0020    3.00
         945       RX    0.00    2.00    4.00    6.00   60.00   62.00   64.00   66.00
         946       RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                   *

         947       KK    GM18   BASIN
         948       KM
         949       BA   0.173
         950       LG    0.25    0.25    5.30    0.29      44
         951       UI       0      39     137     209     346     262     172      87      44      21
         952       UI       9       9       0       0       0       0       0       0       0       0
         953       UI       0       0       0       0       0       0       0       0       0       0
         954       UI       0       0       0       0       0       0       0       0       0       0
         955       UI       0       0       0       0       0       0       0       0       0       0
                   *

         956       KK  DIVG18  DIVERT
         957       KM
         958       DT  RETG18    12.4     0.0
         959       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         960       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         961       KK   CPG18 COMBINE
         962       KM
         963       HC       2
                   *

         964       KK    GM19   BASIN
         965       KM
         966       BA   0.085
         967       LG    0.17    0.15    7.60    0.14      22
         968       UI       0      52     152     246     137      48      15       7       0       0
         969       UI       0       0       0       0       0       0       0       0       0       0
         970       UI       0       0       0       0       0       0       0       0       0       0
         971       UI       0       0       0       0       0       0       0       0       0       0
         972       UI       0       0       0       0       0       0       0       0       0       0
                   *
1                                                     HEC-1 INPUT                                       PAGE 25

        LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         973       KK  DIVG19  DIVERT
         974       KM
         975       DT  RETG19     5.5     0.0
         976       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         977       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         978       KK  CPG19A COMBINE
         979       KM
         980       HC       2
                   *

         981       KK    GM20   BASIN
         982       KM
         983       BA   0.183
         984       LG    0.25    0.15    8.80    0.07      44
         985       UI       0      72     224     413     362     209      80      33      13       0
         986       UI       0       0       0       0       0       0       0       0       0       0
         987       UI       0       0       0       0       0       0       0       0       0       0
         988       UI       0       0       0       0       0       0       0       0       0       0
         989       UI       0       0       0       0       0       0       0       0       0       0
                   *

         990       KK  DIVG20  DIVERT
         991       KM
         992       DT  RETG20    14.5     0.0
         993       DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         994       DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

         995       KK  CPG19B COMBINE
         996       KM
         997       HC       2
                   *

         998       KK  CPG22B COMBINE
         999       KM
```

```
           1000           KM     Modified to combining 3 hydrographs instead of 2 due to adding CPG19B
           1001           KM     by Parsons Corporation 2015-02
           1002           HC       3
                          *

           1003           KK  G22E26   ROUTE
           1004           KM
           1005           RS       2    FLOW
           1006           RC   0.040   0.030   0.040    2939  0.0031    8.00
           1007           RX    0.00  500.00  800.00  805.00  820.00  825.00 1125.00 1625.00
           1008           RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                          *
           1009           KM
1                                                       HEC-1 INPUT                                             PAGE 26

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1010           KK   DRE4NRETRIEVE
           1011           KM
           1012           DR   DRE4N
                          *

           1013           KK  RTE3E4   ROUTE
           1014           KM
           1015           KM     Revised by using routing for undeveloped conditions
           1016           KM     by Parsons Corporation 2015-11
           1017           RS       2    FLOW
           1018           RC   0.035   0.030   0.025    2000  0.0035    6.00
           1019           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
           1020           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *

           1021           KK     E4N   BASIN
           1022           KM
           1023           KM     Used the unit hydrograph for undeveloped conditions
           1024           KM     by Parsons Corporation 2015-11
           1025           BA   0.307
           1026           LG    0.35    0.35    3.95    0.47       0
           1027           UI       0      18      18      30      63      80      93     104     118     135
           1028           UI     163     213     219     179     155     138     119     105      90      77
           1029           UI      57      37      31      29      23      18      18       7       5       5
           1030           UI       5       5       5       5       5       0       0       0       0       0
           1031           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1032           KM  KKDIVE4N  DIVERT
           1033           KM
           1034           KM     Revised by removing the retention to account for undeveloped conditions
           1035           KM     by Parsons Corporation 2015-11
                          *DTRETE4N    23.4     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                          *

           1036           KK   CPE4N COMBINE
           1037           KM
           1038           HC       2    4.21
                          *

           1039           KK   DE4NS  DIVERT
           1040           KM
           1041           DT    DRE4     0.0     0.0
           1042           DI     0.0    34.0   255.0   502.0   772.0  1056.0  1348.0     0.0     0.0     0.0
           1043           DQ     0.0    11.0   171.0   378.0   614.0   868.0  1133.0     0.0     0.0     0.0
                          *

           1044           KK  E4NE13   ROUTE
           1045           KM
           1046           KM     Revised by using routing for undeveloped conditions
           1047           KM     by Parsons Corporation 2015-11
           1048           RS      23    FLOW
           1049           RC   0.055   0.045   0.055    6955  0.0046    5.50
1                                                       HEC-1 INPUT                                             PAGE 27

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1050           RX    0.00  500.00  980.00 1003.00 1010.00 1050.00 1511.00 2011.00
           1051           RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                          *

           1052           KK     E13   BASIN
           1053           KM
           1054           BA   0.477
           1055           LG    0.35    0.36    5.00    0.27       0
           1056           UI       0      28      28      50     100     127     147     165     188     215
           1057           UI     264     345     334     274     239     213     183     160     138     116
           1058           UI      83      50      48      46      31      28      24       9       9       9
           1059           UI       9       9       9       9       9       0       0       0       0       0
           1060           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1061           KM  KKDIVE13  DIVERT
           1062           KM
           1063           KM     Revised by removing the retention to account for undeveloped conditions
           1064           KM     by Parsons Corporation 2015-11
           1065           KM  DTRETE13    38.8     0.0
           1066           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
           1067           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *

           1068           KK   CPE13 COMBINE
           1069           KM
           1070           HC       2
                          *
```

```
           1071           KK  E13E24   ROUTE
           1072           KM
           1073           RS       8    FLOW
           1074           RC   0.035   0.030   0.035    5921  0.0042    6.00
           1075           RX  980.00  990.00  995.00 1003.00 1007.00 1015.00 1520.00 1530.00
           1076           RY    4.00    3.50    3.00    1.00    1.00    3.00    3.50    4.00
                          *
           1077           KM

           1078           KK    DRE4RETRIEVE
           1079           KM
           1080           DR    DRE4
                          *

           1081           KK  RTE4E4   ROUTE
           1082           KM
           1083           KM     Revised by using routing for undeveloped conditions
           1084           KM     by Parsons Corporation 2015-11
           1085           RS      10    FLOW
           1086           RC   0.035   0.030   0.025    9400  0.0035    6.00
           1087           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
           1088           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *
1                                                       HEC-1 INPUT                                             PAGE 28

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1089           KK      E4   BASIN
           1090           KM
           1091           KM     Used the unit hydrograph for undeveloped conditions
           1092           KM     by Parsons Corporation 2015-11
           1093           BA   1.200
           1094           LG    0.35    0.35    4.15    0.43       0
           1095           UI       0      49      49      49      71     162     189     228     249     271
           1096           UI     294     322     357     388     453     550     639     582     506     452
           1097           UI     414     384     345     312     287     254     233     202     159     125
           1098           UI      86      86      80      80      54      49      49      48      15      15
           1099           UI      15      15      15      15      15      15      15      15      15      15
           1100           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1101           KM  KK DIVE4  DIVERT
           1102           KM
           1103           KM     Revised by removing the retention to account for undeveloped conditions
           1104           KM     by Parsons Corporation 2015-11
                          *DT RETE4    92.6     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                          *

           1105           KK    CPE4 COMBINE
           1106           KM
           1107           HC       2    5.41
                          *

           1108           KK    DE4S  DIVERT
           1109           KM
           1110           DT    DRE5     0.0     0.0
           1111           DI     0.0    97.0   343.0   637.0   959.0  1299.0  1650.0     0.0     0.0     0.0
           1112           DQ     0.0    89.0   330.0   622.0   943.0  1283.0  1633.0     0.0     0.0     0.0
                          *

           1113           KK  E4E14A   ROUTE
           1114           KM
           1115           KM     Revised by using routing for undeveloped conditions (E4E14N) from
           1116           KM     existing condition (pre-SR 24) model
           1117           KM     by Parsons Corporation 2015-11
           1118           RS      12    FLOW
           1119           RC   0.060   0.050   0.060    6921  0.0049    5.50
           1120           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
           1121           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

           1122           KK    E14A   BASIN
           1123           KM
           1124           KM     Used the unit hydrograph for undeveloped conditions for Basin E14N from
           1125           KM     existing condition model (pre-SR 24)
           1126           KM     by Parsons Corporation 2015-11
           1127           BA   0.481
           1128           LG    0.35    0.35    4.10    0.44       0
           1129           UI       0      20      20      47      78      97     112     129     150     185
           1130           UI     247     226     185     161     139     119     101      84      59      35
1                                                       HEC-1 INPUT                                             PAGE 29

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1131           UI      33      30      20      20       8       6       6       6       6       6
           1132           UI       6       0       0       0       0       0       0       0       0       0
           1133           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1134           KM  KKDIV14A  DIVERT
           1135           KM
           1136           KM     Revised by removing the retention to account for undeveloped conditions
           1137           KM     by Parsons Corporation 2015-11
           1138           KM  DTRET14A    38.6     0.0
           1139           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
           1140           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *
           1141           KM  KK   E6A   BASIN
           1142           KM
           1143           KM     Revised to replace subbasins E6A and E6B with subbasin E6 under existing
           1144           KM     (pre-development) conditions as SR 24 does not continue beyond Ironwood Dr.
```

```
        1145           KM     by Parsons Corporation 2015-11
        1146           KM  BA 0.581
        1147           KM  LG  0.16    0.25    5.70    0.27      59
        1148           KM  UI     0      46      46      46      77     155     183     217     238     2
        1149           KM  UI   282     311     346     381     455     556     598     511     450     4
        1150           KM  UI   374     343     305     278     251     226     201     161     130
        1151           KM  UI    81      76      76      55      46      46      46      14      14
        1152           KM  UI    14      14      14      14      14      14      14      14      14
                       *
        1153           KM  KKDIVE6A  DIVERT
        1154           KM
        1155           KM     Revised by removing the retention to account for undeveloped conditions
        1156           KM     by Parsons Corporation 2015-11
        1157           KM  DTRETE6A    53.1     0.0
        1158           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
        1159           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                       *
        1160           KM  KKE6AE5A   ROUTE
        1161           KM
        1162           KM     Revised by removing the route to account for undeveloped conditions as SR 2
        1163           KM     does not continue beyond Ironwood Dr.
        1164           KM     by Parsons Corporation 2015-11
        1165           KM  RS     6    FLOW
        1166           KM  RC 0.020   0.020   0.020    7264  0.0010  100.00
        1167           KM  RX  0.00    1.00    2.00   20.00   30.00   48.00   49.00   50.00
        1168           KM  RY100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                       *

        1169           KK    DRE5RETRIEVE
        1170           KM
        1171           DR    DRE5
                       *

        1172           KK  RTE4E5   ROUTE
        1173           KM
        1174           KM     Revised by using routing for undeveloped conditions as SR24 does not extend
        1175           KM     beyond Ironwood Dr.
        1176           KM     by Parsons Corporation 2015-11
        1177           RS       3    FLOW
1                                             HEC-1 INPUT                                          PAGE 30

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1178           RC   0.035   0.030   0.025    3700  0.0035    6.00
        1179           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
        1180           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                       *

        1181           KK      E5   BASIN
        1182           KM
        1183           KM     Used the footprint, unit hydrograph and LG for undeveloped conditions
        1184           KM     by Parsons Corporation 2015-11
        1185           BA   1.426
        1186           LG    0.35    0.35    3.95    0.47       0
        1187           UI       0      59      59      59      89     195     229     274     300     328
        1188           UI     354     389     432     471     555     670     773     682     595     535
        1189           UI     489     453     407     366     336     298     275     232     177     134
        1190           UI     104     101      96      92      59      59      59      45      18      18
        1191           UI      18      18      18      18      18      18      18      18      18       0
                       *
                       *
        1192           KM  KKDIVE5A  DIVERT
        1193           KM
        1194           KM     Revised by removing the retention to account for undeveloped conditions
        1195           KM     by Parsons Corporation 2015-11
                       *DTRETE5A    89.1     0.0
                       *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                       *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                       *

        1196           KK    CPE5 COMBINE
        1197           KM
        1198           KM     Used the hydrograph combine from existing condition model as SR24 does not
        1199           KM     extend beyond Ironwood Dr.
        1200           KM     by Parsons Corporation 2015-11
        1201           HC       2    6.84
                       *
        1202           KM  KKCPE5A2 COMBINE
        1203           KM
        1204           KM     Revised by replacing CPE5A2 combine with DE5S diversion
        1205           KM     by Parsons Corporation 2015-11
        1206           KM  HC     2
                       *

        1207           KK    DE5S  DIVERT
        1208           KM     Revised by replacing CPE5A2 combine with DE5S diversion
        1209           KM     by Parsons Corporation 2015-11
        1210           DT    DRE6     0.0     0.0
        1211           DI     0.0   212.0   527.0   921.0  1342.0  1783.0  2234.0     0.0     0.0     0.0
        1212           DQ     0.0     1.0   206.0   431.0   723.0  1076.0  1460.0     0.0     0.0     0.0
                       *

        1213           KK  E5A14A   ROUTE
        1214           KM
        1215           KM     Revised for channel length/time steps and cross section between
        1216           KM     Ironwood Dr. and Meridian Rd. to account for concrete-lined channel.
        1217           KM     by Parsons Corporation 2015-12
        1218           RS       4    FLOW
1                                             HEC-1 INPUT                                          PAGE 31

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1219           RC   0.016   0.016   0.016    6121  0.0017   97.00
```

```
        1220           RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
        1221           RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                       *

        1222           KK  CPE14A COMBINE
        1223           KM   ***** PARSONS 10/30/2015 *****
        1224           KO       1
        1225           HC       3    7.61
                       *

        1226           KK  E1424A   ROUTE
        1227           KM
        1228           KM     Revised for channel length and time steps between Mountain Rd
        1229           KM     and Meridian Rd to account for concrete lining.
        1230           KM     by Parsons Corporation 2016-03
        1231           RS       2    FLOW
        1232           RC   0.016   0.016   0.016    2808  0.0017   97.00
        1233           RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
        1234           RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                       *

        1235           KK  E1424B   ROUTE
        1236           KM
        1237           KM     Introduced for channel length and time steps between
        1238           KM     Signal Bute Rd. and Mountain Rd. to account for concrete lining.
        1239           KM     by Parsons Corporation 2015-12
        1240           RS       2    FLOW
        1241           RC   0.016   0.016   0.016    2461  0.0017   97.00
        1242           RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
        1243           RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                       *

        1244           KK    E24A   BASIN
        1245           KM
        1246           BA   0.528
        1247           LG    0.14    0.25    6.00    0.24      59
        1248           UI       0      81     324     487     736     911     620     431     224     126
        1249           UI      72      25      25      25       0       0       0       0       0       0
        1250           UI       0       0       0       0       0       0       0       0       0       0
        1251           UI       0       0       0       0       0       0       0       0       0       0
        1252           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1253           KK  DIV24A  DIVERT
        1254           KM
        1255           DT  RET24A    39.6     0.0
        1256           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1257           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *
1                                             HEC-1 INPUT                                          PAGE 32

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1258           KK   CP24A COMBINE
        1259           KM
        1260           HC       3    8.62
                       *

        1261           KK  E247A1   ROUTE
        1262           KM
        1263           KM     Revised for channel length/routing steps and cross section between
        1264           KM     Signal Butte Rd. and Crimson Rd. to account for concrete lining.
        1265           KM     by Parsons Corporation 2015-12
        1266           RS       4    FLOW
        1267           RC   0.016   0.016   0.016    5594  0.0017   97.50
        1268           RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
        1269           RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                       *

        1270           KK    E27A   BASIN
        1271           KM
        1272           BA   0.544
        1273           LG    0.20    0.15    7.00    0.15      54
        1274           UI       0      50      84     198     261     316     393     565     570     439
        1275           UI     360     288     227     143      86      75      50      32      15      15
        1276           UI      15      15      15       0       0       0       0       0       0       0
        1277           UI       0       0       0       0       0       0       0       0       0       0
        1278           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1279           KK  DIV27A  DIVERT
        1280           KM
        1281           DT  RET27A    42.0     0.0
        1282           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1283           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

        1284           KK  CPE27A COMBINE
        1285           KM
        1286           KM     Confluence of channel south of Eastmark/southeast of PPG North and portion
        1287           KM     of PPG with SR 24 offsite channel.
        1288           KM     by Parsons Corporation 2015-11
        1289           HC       3   12.81
                       *

        1290           KK  E247A2   ROUTE
        1291           KM
        1292           KM     Revised for channel length/routing steps and cross section between
        1293           KM     Signal Butte Rd. and Crismon Rd. to account for concrete lining.
        1294           KM     by Parsons Corporation 2015-12
        1295           RS       1    FLOW
        1296           RC   0.016   0.016   0.016    1528  0.0017   97.50
```

```
          1297          RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
          1298          RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                        *
1                                                   HEC-1 INPUT                                                     PAGE 33

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1299          KK  E2726A   ROUTE
          1300          KO       1
          1301          KM
          1302          KM     Revised for channel length/routing steps and cross section between
          1303          KM     Signal Butte Rd. and Crismon Rd. to account for concrete lining.
          1304          KM     by Parsons Corporation 2015-12
          1305          RS       4    FLOW
          1306          RC   0.016   0.016   0.016    6350  0.0016   97.50
          1307          RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
          1308          RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                        *

          1309          KK    E26A   BASIN
          1310          KM
          1311          BA   0.865
          1312          LG    0.22    0.15    7.30    0.14      52
          1313          UI       0      86     172     370     479     596     804    1055     818     656
          1314          UI     516     400     244     148     119      86      36      26      26      26
          1315          UI      26       0       0       0       0       0       0       0       0       0
          1316          UI       0       0       0       0       0       0       0       0       0       0
          1317          UI       0       0       0       0       0       0       0       0       0       0
                        *

          1318          KK  DIV26A  DIVERT
          1319          KM
          1320          DT  RET26A    66.0     0.0
          1321          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1322          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

          1323          KK  SR24EL COMBINE
          1324          KO       1
          1325          KM
          1326          KM     Combine hydrographs from E2726A and RET26A prior to routing through.
          1327          KM     SR 24 offline detention basin at Ellsworth Rd. and Powerline Floodway
          1328          KM     by Parsons Corporation 2015-11
          1329          HC       2   13.68
                        *
          1330          KM  KKELSRC1  DIVERT
          1331          KM  KO     1
          1332          KM
          1333          KM     Diversion to SR 24 ramp C offline detention basin at Ellsworth Rd.
          1334          KM     Basin capacity estimated at 10 ac-ft. Diversion for 80% as effective volume
          1335          KM     (8 ac-ft as 0.8*10 ac-ft).
          1336          KM     by Parsons Corporation 2016-03
          1337          KM
          1338          KM     Diversion deactivated as not needed with the SR-24 alignment extending to
          1339          KM     Irronwood Drive
          1340          KM     by Parsons Corporation 2016-07
          1341          KM  DTRC1DIV     8.0     0.0
          1342          KM  DI   0.0  1650.0  5000.0     0.0     0.0     0.0     0.0     0.0     0.0       0
          1343          KM  DQ   0.0     0.0  3350.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                        *
1                                                   HEC-1 INPUT                                                     PAGE 34

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1344          KK  802ELS  DIVERT
          1345          KO       1
          1346          KM
          1347          KM     Diversion to SR 24 offline detention basin at Ellsworth Rd. and Powerline
          1348          KM     Floodway. Basin capacity estimated at 100 ac-ft. Diversion modified to
          1349          KM     include finite detention volume (80 ac-ft as 0.8*100 ac-ft).
          1350          KM     by Parsons Corporation 2016-07
          1351          KO
          1352          DT  1650UP   100.0     0.0
          1353          DI     0.0  1650.0  5000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1354          DQ     0.0     0.0  3350.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
          1355          KM  KKG19E26   ROUTE
          1356          KM
          1357          KM     Revised by removing the Routing to Powerline Floodway as result of
          1358          KM     the Eastmark Development
          1359          KM     by Parsons Corporation 2016-11
          1360          KM  RS     4    FLOW
          1361          KM  RC 0.020   0.020   0.020    9348  0.0038  100.00
          1362          KM  RX  0.00    1.00    2.00   20.00   45.00   63.00   64.00   65.00
          1363          KM  RY100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                        *

          1364          KK    GM17   BASIN
          1365          KO       1
          1366          KM
          1367          KM     Part of Eastmark
          1368          KM     by Parsons Corporation 2015-11
          1369          BA   0.104
          1370          LG    0.25    0.25    4.10    0.55      45
          1371          UI       0      42     129     238     205     117      44      18       7       0
          1372          UI       0       0       0       0       0       0       0       0       0       0
          1373          UI       0       0       0       0       0       0       0       0       0       0
          1374          UI       0       0       0       0       0       0       0       0       0       0
          1375          UI       0       0       0       0       0       0       0       0       0       0
                        *
```

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          1376          KK  DIVG17  DIVERT
          1377          KM
          1378          KM     Revised by retaining the entire volume from GM17,
          1379          KM     per Master Drainage Report Update for Eastmark (Wood-Patel, Rev. 10-24-14)
          1380          KM     by Parsons Corporation 2015-11
          1381          DT  RETG17     0.0     0.0
          1382          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1383          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

          1384          KK  G17E26   ROUTE
          1385          KM
          1386          RS       4    FLOW
          1387          RC   0.020   0.020   0.020    3933  0.0063  100.00
          1388          RX    0.00    1.00    2.00   20.00   45.00   63.00   64.00   65.00
          1389          RY  100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                        *
1                                                   HEC-1 INPUT                                                     PAGE 35

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1390          KK  CPE26A COMBINE
          1391          KO       1
          1392          KM
          1393          KM     Modified to combining 4 hydrographs instead of 5
          1394          KM     by Parsons Corporation 2015-11
          1395          KM     Modified to combining 3 hydrographs instead of 4 due to removing G19E26
          1396          KM     by Parsons Corporation 2015-02
          1397          HC       3
                        *

          1398          KK  80233B   ROUTE
          1399          KM
          1400          KM
          1401          KM
          1402          KM
          1403          KM
          1404          RS       1    FLOW
          1405          RC   0.025   0.029   0.025    4205  0.0045    9.00
          1406          RX    0.00   13.00   15.30   25.00   33.00   42.70   45.00   58.00
          1407          RY    9.00    9.00    7.50    1.00    1.00    7.50    9.00    9.00
                        *

          1408          KK      E7   BASIN
          1409          KM
          1410          BA   1.124
          1411          LG    0.24    0.26    5.10    0.32      35
          1412          UI       0      64      64     102     224     281     328     369     416     477
          1413          UI     561     725     814     670     575     512     449     390     339     300
          1414          UI     226     159     113     106      99      64      64      46      20      20
          1415          UI      20      20      20      20      20      20       0       0       0       0
          1416          UI       0       0       0       0       0       0       0       0       0       0
                        *

          1417          KK   DIVE7  DIVERT
          1418          KM
          1419          DT   RETE7    85.5     0.0
          1420          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1421          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

          1422          KK  E7STOR STORAGE
          1423          KM
          1424          KO
          1425          RS       1    STOR
          1426          SV           22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
          1427          SQ                    1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
          1428          SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
          1429          ST  1574.0 10000.0     3.0     1.5
                        *
1                                                   HEC-1 INPUT                                                     PAGE 36

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1430          KK    E7E6   ROUTE
          1431          KM
          1432          KM
          1433          KM
          1434          RS      23    FLOW
          1435          RC   0.035   0.030   0.030   16362  0.0062    5.50
          1436          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
          1437          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                        *

          1438          KK    DRE6RETRIEVE
          1439          KM
          1440          KM     Revised to retrieve diversion to south along Ironwood Dr. when SR 24 does
          1441          KM     not extend beyond Ironwood Dr. This diversion is identical with that in
          1442          KM     the existing condition model (24EX100).
          1443          KM     by Parsons Corporation 2015-11
          1444          DR    DRE6
                        *

          1445          KK  RTE5E6   ROUTE
          1446          KM
          1447          KM     Revised to route diversion to south along Ironwood Dr. when SR 24 does
          1448          KM     not extend beyond Ironwood Dr. This route is identical with that in
          1449          KM     the existing condition model (24EX100).
          1450          RS       5    FLOW
          1451          RC   0.035   0.030   0.025    3700  0.0035    6.00
          1452          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
```

```
           1453           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *

           1454           KK      E6   BASIN
           1455           KM
           1456           KM     Revised to existing conditions (predevelopment) when SR 24 does not extend
           1457           KM     beyond Ironwood Dr. This diversion is identical with that in the existing
           1458           KM     condition model (24EX100).
           1459           BA   2.530
           1460           LG    0.35    0.40    6.00    0.18       0
           1461           UI       0      90      90      90      90     225     312     359     421     456
           1462           UI     495     527     571     619     679     731     846    1019    1146    1132
           1463           UI     986     887     810     752     704     641     588     539     495     451
           1464           UI     420     357     285     240     159     159     151     148     143      90
           1465           UI      90      90      90      44      28      28      28      28      28      28
           1466           UI      28      28      28      28      28      28      28       0       0       0
                          *
           1467           KM  KKDIVE6B  DIVERT
           1468           KM
           1469           KM  DTRETE6B   179.9     0.0
           1470           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
           1471           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                          *
1                                                      HEC-1 INPUT                                            PAGE 37

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1472           KK      E8   BASIN
           1473           KM
           1474           BA   1.099
           1475           LG    0.21    0.25    4.50    0.44      39
           1476           UI       0      75      75     201     313     383     441     514     604     798
           1477           UI     955     771     649     563     475     401     337     241     145     127
           1478           UI     114      75      75      28      23      23      23      23      23      23
           1479           UI       0       0       0       0       0       0       0       0       0       0
           1480           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1481           KK   DIVE8  DIVERT
           1482           KM
           1483           DT   RETE8    80.9     0.0
           1484           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1485           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1486           KK    E8E6   ROUTE
           1487           KM
           1488           RS       9    FLOW
           1489           RC   0.060   0.035   0.060    9833  0.0052    5.50
           1490           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
           1491           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

           1492           KK    CPE6 COMBINE
           1493           KM
           1494           HC       3    3.05
                          *

           1495           KK    DE6S  DIVERT
           1496           KM
           1497           DT    DRE9     0.0     0.0
           1498           DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
           1499           DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
                          *

           1500           KK   E6E15   ROUTE
           1501           KM
           1502           RS       7    FLOW
           1503           RC   0.035   0.030   0.035    8259  0.0042    5.50
           1504           RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
           1505           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

           1506           KK     E15   BASIN
           1507           KM
           1508           BA   0.777
           1509           LG    0.15    0.25    5.10    0.35      57
           1510           UI       0     106     363     582     791    1239    1004     734     522     273
           1511           UI     171     106      36      32      32       0       0       0       0       0
           1512           UI       0       0       0       0       0       0       0       0       0       0
           1513           UI       0       0       0       0       0       0       0       0       0       0
1                                                      HEC-1 INPUT                                            PAGE 38

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1514           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1515           KK  DIVE15  DIVERT
           1516           KM
           1517           DT  RETE15    67.7     0.0
           1518           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1519           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1520           KK    DRE9RETRIEVE
           1521           KM
           1522           DR    DRE9
                          *

           1523           KK  RTE6E9   ROUTE
           1524           KM
```

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           1525           RS       5    FLOW
           1526           RC   0.035   0.030   0.025    2200  0.0035    6.00
           1527           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
           1528           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *

           1529           KK      E9   BASIN
           1530           KM
           1531           BA   0.723
           1532           LG    0.14    0.25    5.40    0.30      58
           1533           UI       0      88     253     450     585     836    1040     754     570     416
           1534           UI     225     148      92      48      27      27      27       0       0       0
           1535           UI       0       0       0       0       0       0       0       0       0       0
           1536           UI       0       0       0       0       0       0       0       0       0       0
           1537           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1538           KK   DIVE9  DIVERT
           1539           KM
           1540           DT   RETE9    65.4     0.0
           1541           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1542           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1543           KK    CPE9 COMBINE
           1544           KM
           1545           HC       2
                          *

           1546           KK    DE9S  DIVERT
           1547           KM
           1548           DT    DRR5     0.0     0.0
           1549           DI     0.0    78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
           1550           DQ     0.0     1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
                          *
1                                                      HEC-1 INPUT                                            PAGE 39

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1551           KK   E9E16   ROUTE
           1552           KM
           1553           RS       6    FLOW
           1554           RC   0.035   0.030   0.035    6751  0.0040    5.50
           1555           RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
           1556           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

           1557           KK     E16   BASIN
           1558           KM
           1559           BA   0.396
           1560           LG    0.15    0.25    5.10    0.35      57
           1561           UI       0      58     224     342     497     684     480     338     207     100
           1562           UI      64      26      18      18       0       0       0       0       0       0
           1563           UI       0       0       0       0       0       0       0       0       0       0
           1564           UI       0       0       0       0       0       0       0       0       0       0
           1565           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1566           KK  DIVE16  DIVERT
           1567           KM
           1568           DT  RETE16    35.1     0.0
           1569           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1570           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1571           KK   CPE16 COMBINE
           1572           KM
           1573           HC       2
                          *

           1574           KK  E16E15   ROUTE
           1575           KM
           1576           RS      10    FLOW
           1577           RC   0.030   0.012   0.030    4112  0.0015    5.00
           1578           RX   45.00   65.00   71.00   83.00   87.00   99.00  105.00  125.00
           1579           RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                          *

           1580           KK   CPE15 COMBINE
           1581           KM
           1582           HC       3    4.95
                          *

           1583           KK  E1524B   ROUTE
           1584           KM
           1585           RS       3    FLOW
           1586           RC   0.035   0.030   0.035    4705  0.0033    5.00
           1587           RX    0.00   60.00   71.00   83.00   87.00   99.00  110.00  170.00
           1588           RY    5.00    5.00    5.00    1.00    1.00    2.00    3.00    4.00
                          *
1                                                      HEC-1 INPUT                                            PAGE 40

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1589           KK     E5B   BASIN
           1590           KM
           1591           BA   0.286
           1592           LG    0.14    0.25    3.95    0.64      62
           1593           UI       0      64     225     342     567     435     287     148      74      36
           1594           UI      15      15       0       0       0       0       0       0       0       0
           1595           UI       0       0       0       0       0       0       0       0       0       0
```

```
        1596          UI       0       0       0       0       0       0       0       0       0       0
        1597          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1598          KK  DIVE5B  DIVERT
        1599          KM
        1600          DT  RETE5B    25.0     0.0
        1601          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1602          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1603          KK  E5E14B   ROUTE
        1604          KM
        1605          RS       5    FLOW
        1606          RC   0.035   0.030   0.035    6256  0.0054    5.50
        1607          RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1050.00
        1608          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                      *

        1609          KK    E14B   BASIN
        1610          KM
        1611          BA   0.528
        1612          LG    0.14    0.25    5.60    0.29      60
        1613          UI       0     125     435     667    1086     785     512     237     126      53
        1614          UI      29      29       0       0       0       0       0       0       0       0
        1615          UI       0       0       0       0       0       0       0       0       0       0
        1616          UI       0       0       0       0       0       0       0       0       0       0
        1617          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1618          KK  DIV14B  DIVERT
        1619          KM
        1620          DT  RET14B    48.4     0.0
        1621          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1622          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1623          KK   CP14B COMBINE
        1624          KM
        1625          HC       2
                      *
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        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1626          KK  E14E24   ROUTE
        1627          KM
        1628          RS       5    FLOW
        1629          RC   0.030   0.030   0.030    6080  0.0032    9.00
        1630          RX  970.00  990.00 1001.00 1010.00 1014.00 1023.00 1034.00 1054.00
        1631          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                      *

        1632          KK    E24B   BASIN
        1633          KM
        1634          BA   0.464
        1635          LG    0.15    0.15    7.30    0.14      57
        1636          UI       0      92     339     513     852     731     493     294     133      76
        1637          UI      24      24       0       0       0       0       0       0       0       0
        1638          UI       0       0       0       0       0       0       0       0       0       0
        1639          UI       0       0       0       0       0       0       0       0       0       0
        1640          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1641          KK  DIV24B  DIVERT
        1642          KM
        1643          DT  RET24B    38.7     0.0
        1644          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1645          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1646          KK  CPE24B COMBINE
        1647          KM
        1648          HC       3
                      *

        1649          KK  E24E28   ROUTE
        1650          KM
        1651          RS       4    FLOW
        1652          RC   0.035   0.035   0.035    6172  0.0036   10.00
        1653          RX  940.00  960.00  980.00 1000.00 1010.00 1030.00 1050.00 1070.00
        1654          RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                      *

        1655          KK    E28B   BASIN
        1656          KM
        1657          BA   0.539
        1658          LG    0.20    0.15    8.40    0.09      51
        1659          UI       0      65     183     329     427     606     772     566     430     318
        1660          UI     179     110      73      41      20      20      20       0       0       0
        1661          UI       0       0       0       0       0       0       0       0       0       0
        1662          UI       0       0       0       0       0       0       0       0       0       0
        1663          UI       0       0       0       0       0       0       0       0       0       0
                      *
1                                             HEC-1 INPUT                                           PAGE 42

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1664          KK  DIV28B  DIVERT
        1665          KM
        1666          DT  RET28B    42.0     0.0
```

```
        1667          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1668          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1669          KK  CPE28B COMBINE
        1670          KM
        1671          HC       2
                      *

        1672          KK  E28E31   ROUTE
        1673          KM
        1674          RS       3    FLOW
        1675          RC   0.040   0.040   0.040    5081  0.0036   10.00
        1676          RX  950.00  975.00  985.00 1005.00 1010.00 1030.00 1040.00 1065.00
        1677          RY    7.00    6.50    6.00    1.00    1.00    6.00    6.50    7.00
                      *

        1678          KK     E25   BASIN
        1679          KM
        1680          BA   0.932
        1681          LG    0.15    0.25    5.40    0.30      55
        1682          UI       0      86     146     342     451     546     683     986     969     749
        1683          UI     613     490     383     234     148     125      86      51      26      26
        1684          UI      26      26       0       0       0       0       0       0       0       0
        1685          UI       0       0       0       0       0       0       0       0       0       0
        1686          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1687          KK  DIVE25  DIVERT
        1688          KM
        1689          DT  RETE25   110.7     0.0
        1690          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1691          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1692          KK  E25E29   ROUTE
        1693          KM
        1694          RS      20    FLOW
        1695          RC   0.030   0.030   0.030    7016  0.0022    2.50
        1696          RX  976.00  996.00 1003.00 1005.00 1006.00 1008.00 1015.00 1025.00
        1697          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                      *

        1698          KK     E29   BASIN
        1699          KM
        1700          BA   1.002
        1701          LG    0.15    0.23    6.20    0.22      55
        1702          UI       0     103     218     452     586     733    1019    1240     924     737
        1703          UI     574     428     229     172     116      82      31      31      31      31
        1704          UI       0       0       0       0       0       0       0       0       0       0
        1705          UI       0       0       0       0       0       0       0       0       0       0
1                                             HEC-1 INPUT                                           PAGE 43

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1706          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1707          KK  DIVE29  DIVERT
        1708          KM
        1709          DT  RETE29    73.9     0.0
        1710          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1711          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1712          KK   CPE29 COMBINE
        1713          KM
        1714          HC       2
                      *

        1715          KK  E29E31   ROUTE
        1716          KM
        1717          RS       4    FLOW
        1718          RC   0.030   0.030   0.030    7025  0.0034   10.00
        1719          RX  950.00  975.00  985.00 1005.00 1006.00 1026.00 1036.00 1070.00
        1720          RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                      *

        1721          KK     E32   BASIN
        1722          KM
        1723          BA   0.246
        1724          LG    0.14    0.25    4.25    0.55      58
        1725          UI       0      72     238     387     535     337     190      78      37      15
        1726          UI      15       0       0       0       0       0       0       0       0       0
        1727          UI       0       0       0       0       0       0       0       0       0       0
        1728          UI       0       0       0       0       0       0       0       0       0       0
        1729          UI       0       0       0       0       0       0       0       0       0       0
                      *

        1730          KK  DIVE32  DIVERT
        1731          KM
        1732          DT  RETE32    17.2     0.0
        1733          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1734          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

        1735          KK  E32E31   ROUTE
        1736          KM
        1737          RS       5    FLOW
        1738          RC   0.025   0.060   0.025    3272  0.0028 1388.60
        1739          RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
        1740          RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
                      *
```

```
           1741           KK     E31   BASIN
           1742           KM
           1743           BA   0.810
           1744           LG    0.15    0.25    4.80    0.39      55
           1745           UI       0      86     197     391     504     641     943     970     728     571
           1746           UI     441     296     151     126      86      37      26      26      26       0
1                                                       HEC-1 INPUT                                             PAGE 44

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1747           UI       0       0       0       0       0       0       0       0       0       0
           1748           UI       0       0       0       0       0       0       0       0       0       0
           1749           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1750           KK  DIVE31  DIVERT
           1751           KM
           1752           DT  RETE31    56.5     0.0
           1753           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1754           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1755           KK   CPE31 COMBINE
           1756           KM
           1757           HC       4
                          *

           1758           KK  E31E30   ROUTE
           1759           KM
           1760           RS       5    FLOW
           1761           RC   0.025   0.045   0.025    4404  0.0008 1387.00
           1762           RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
           1763           RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
                          *

           1764           KK    E30B   BASIN
           1765           KM
           1766           BA   0.882
           1767           LG    0.24    0.15    8.40    0.09      47
           1768           UI       0      56      56     128     217     272     314     357     416     500
           1769           UI     668     683     552     475     416     355     303     261     191     124
           1770           UI      98      92      66      56      44      17      17      17      17      17
           1771           UI      17      17       0       0       0       0       0       0       0       0
           1772           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1773           KK  DIV30B  DIVERT
           1774           KM
           1775           DT  RET30B    67.1     0.0
           1776           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1777           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1778           KK   CPE30 COMBINE
           1779           KM
           1780           HC       2
                          *

           1781           KK  E30E26   ROUTE
           1782           KM
           1783           RS       1    FLOW
           1784           RC   0.025   0.035   0.025     822  0.0005 1387.00
           1785           RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
           1786           RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
                          *
1                                                       HEC-1 INPUT                                             PAGE 45

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1787           KK    E26B   BASIN
           1788           KM
           1789           BA   0.259
           1790           LG    0.24    0.15    8.80    0.07      48
           1791           UI       0      38     145     222     320     448     315     222     139      65
           1792           UI      43      18      12      12       0       0       0       0       0       0
           1793           UI       0       0       0       0       0       0       0       0       0       0
           1794           UI       0       0       0       0       0       0       0       0       0       0
           1795           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1796           KK  DIV26B  DIVERT
           1797           KM
           1798           DT  RET26B    20.1     0.0
           1799           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1800           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1801           KK   CPE26 COMBINE
           1802           KM
           1803           HC       2
                          *

           1804           KK  E26E33   ROUTE
           1805           KM
           1806           RS       5    FLOW
           1807           RC   0.025   0.030   0.025    8929  0.0028 1379.67
           1808           RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
           1809           RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
                          *

           1810           KK    E33B   BASIN
```

```
           1811           KM
           1812           BA   0.851
           1813           LG    0.15    0.15    7.30    0.14      56
           1814           UI       0     117     409     651     892    1385    1087     793     558     278
           1815           UI     179     110      36      36      36       0       0       0       0       0
           1816           UI       0       0       0       0       0       0       0       0       0       0
           1817           UI       0       0       0       0       0       0       0       0       0       0
           1818           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1819           KK  DIV33B  DIVERT
           1820           KM
           1821           DT  RET33B    66.8     0.0
           1822           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1823           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                       HEC-1 INPUT                                             PAGE 46

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1824           KK  CPE33B COMBINE
           1825           KM
           1826           HC       3
                          *

           1827           KK  E33P9A   ROUTE
           1828           KM
           1829           RS       1    FLOW
           1830           RC   0.025   0.060   0.025    2115  0.0039    8.00
           1831           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1832           RY    8.00    8.00    6.50    0.50    0.50    6.50    8.00    8.00
                          *

           1833           KK  E33P9B   ROUTE
           1834           KM
           1835           RS       1    FLOW
           1836           RC   0.025   0.060   0.025    2299  0.0029    8.20
           1837           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1838           RY    8.20    8.00    6.50    0.50    0.50    6.50    8.00    8.20
                          *

           1839           KK      P9   BASIN
           1840           KM
           1841           BA   1.122
           1842           LG    0.11    0.15    8.00    0.12      74
           1843           UI       0     119     271     539     695     881    1292    1349    1011     795
           1844           UI     612     416     214     177     119      55      36      36      36       0
           1845           UI       0       0       0       0       0       0       0       0       0       0
           1846           UI       0       0       0       0       0       0       0       0       0       0
           1847           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1848           KK   DIVP9  DIVERT
           1849           KM
           1850           DT   RETP9    36.4     0.0
           1851           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1852           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1853           KK    CPP9 COMBINE
           1854           KM
           1855           HC       2
                          *

           1856           KK  P9EMF1   ROUTE
           1857           KM
           1858           RS       1    FLOW
           1859           RC   0.025   0.029   0.025    4403  0.0029    8.00
           1860           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1861           RY    8.00    8.00    6.50    0.50    0.50    6.50    8.00    8.00
                          *
1                                                       HEC-1 INPUT                                             PAGE 47

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1862           KK   EMF1B   BASIN
           1863           KM
           1864           BA   1.036
           1865           LG    0.12    0.14    7.60    0.13      63
           1866           UI       0     117     296     556     717     944    1407    1153     891     677
           1867           UI     493     256     194     117      66      36      36      36       0       0
           1868           UI       0       0       0       0       0       0       0       0       0       0
           1869           UI       0       0       0       0       0       0       0       0       0       0
           1870           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1871           KK  DEMF1B  DIVERT
           1872           KM
           1873           DT  REMF1B    85.0     0.0
           1874           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1875           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1876           KK  CPEMF1 COMBINE
           1877           KM
           1878           HC       2
                          *

           1879           KK  EM1EM2   ROUTE
           1880           KM
           1881           RS      19    FLOW
```

```
           1882           RC   0.030   0.015   0.030    5153  0.0012 1326.70
           1883           RX  4931.0 4943.00 4952.00 4974.00 5022.00 5047.00 5058.00 5064.00
           1884           RY  1324.0 1323.90 1323.80 1312.60 1312.70 1323.30 1324.30 1326.70
                          *

           1885           KK    EMF2   BASIN
           1886           KM
           1887           BA   1.850
           1888           LG    0.13    0.21    6.40    0.22      62
           1889           UI       0     108     108     195     388     494     572     641     733     839
           1890           UI    1028    1347    1292    1063     927     823     707     618     533     447
           1891           UI     319     191     184     178     116     108      90      33      33      33
           1892           UI      33      33      33      33      33       0       0       0       0       0
           1893           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1894           KK  DIVEM2  DIVERT
           1895           KM
           1896           DT  RETEM2    96.9     0.0
           1897           DI     0.0    78.0    79.0 10079.0     0.0     0.0     0.0     0.0     0.0     0.0
           1898           DQ     0.0     0.0     1.0 10001.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                      HEC-1 INPUT                                                    PAGE 48

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1899           KK  CPEMF2 COMBINE
           1900           KM
           1901           HC       2
                          *

           1902           KK  EM2M3A   ROUTE
           1903           KM
           1904           RS       1    FLOW
           1905           RC   0.030   0.030   0.030    1085  0.0002 1326.40
           1906           RX  4945.0 4946.00 4947.00 4976.00 5027.00 5057.00 5109.00 5120.00
           1907           RY  1324.1 1324.10 1324.10 1311.10 1311.10 1325.20 1325.30 1326.40
                          *

           1908           KK  EM2M3B   ROUTE
           1909           KM
           1910           RS       1    FLOW
           1911           RC   0.030   0.020   0.030     972  0.0002 1324.10
           1912           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
           1913           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                          *

           1914           KK    EMF3   BASIN
           1915           KM
           1916           BA   1.489
           1917           LG    0.21    0.24    4.80    0.42      52
           1918           UI       0     104     104     298     444     544     625     737     879    1196
           1919           UI    1278    1014     866     740     627     521     421     265     184     171
           1920           UI     124     104      69      32      32      32      32      32      32       0
           1921           UI       0       0       0       0       0       0       0       0       0       0
           1922           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1923           KK  DIVEM3  DIVERT
           1924           KM
           1925           DT  RETEM3    59.1     0.0
           1926           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1927           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1928           KK  CPEMF3 COMBINE
           1929           KM
           1930           HC       2
                          *

           1931           KK  EMF3RB   ROUTE
           1932           KM
           1933           RS       1    FLOW
           1934           RC   0.030   0.025   0.030     939  0.0007 1324.10
           1935           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
           1936           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                          *
1                                                      HEC-1 INPUT                                                    PAGE 49

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1937           KK  RITBAS   BASIN
           1938           KM
           1939           BA   0.294
           1940           LG    0.01    0.02    4.80    0.25       0
           1941           UI       0    1043    1115     112       0       0       0       0       0       0
           1942           UI       0       0       0       0       0       0       0       0       0       0
           1943           UI       0       0       0       0       0       0       0       0       0       0
           1944           UI       0       0       0       0       0       0       0       0       0       0
           1945           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1946           KK  RITBAS STORAGE
           1947           KM
           1948           KO
           1949           RS       1    STOR
           1950           SV           22.00   99.00  213.00  331.00  451.00  571.00  693.00
           1951           SQ            1.00    2.00    3.00    4.00    5.00    6.00    7.00
           1952           SE  1311.0 1312.00 1313.00 1314.00 1315.00 1316.00 1317.00 1318.00
           1953           ST  1318.0   900.0     3.0     1.5
                          *
```

```
           1954           KK  CPRITB COMBINE
           1955           KM
           1956           HC       2
                          *

           1957           KK  RBEMF4   ROUTE
           1958           KM
           1959           RS       3    FLOW
           1960           RC   0.030   0.030   0.030    2391  0.0001 1324.10
           1961           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
           1962           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                          *
           1963           KM

           1964           KK      R2   BASIN
           1965           KM
           1966           BA   0.677
           1967           LG    0.28    0.25    5.80    0.23      22
           1968           UI       0      52      52     176     237     287     335     402     537     651
           1969           UI     517     432     364     303     251     182     109      88      75      52
           1970           UI      42      16      16      16      16      16      16       0       0       0
           1971           UI       0       0       0       0       0       0       0       0       0       0
           1972           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1973           KK   DIVR2  DIVERT
           1974           KM
           1975           DT   RETR2    18.5     0.0
           1976           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1977           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                      HEC-1 INPUT                                                    PAGE 50

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1978           KK      R3   BASIN
           1979           KM
           1980           BA   0.413
           1981           LG    0.27    0.25    4.65    0.36      19
           1982           UI       0      34      42     122     165     196     235     293     413     372
           1983           UI     298     250     205     167     122      71      57      45      34      20
           1984           UI      10      10      10      10      10       0       0       0       0       0
           1985           UI       0       0       0       0       0       0       0       0       0       0
           1986           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1987           KK   DIVR3  DIVERT
           1988           KM
           1989           DT   RETR3    15.6     0.0
           1990           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1991           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1992           KK  CPR2R3 COMBINE
           1993           KM
           1994           HC       2
                          *

           1995           KK  R2R3R6   ROUTE
           1996           KM
           1997           RS      18    FLOW
           1998           RC   0.045   0.040   0.045    7280  0.0033    2.50
           1999           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
           2000           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                          *

           2001           KK      R6   BASIN
           2002           KM
           2003           BA   0.504
           2004           LG    0.30    0.25    4.65    0.39      15
           2005           UI       0      40      46     143     194     231     274     336     472     469
           2006           UI     369     312     255     211     166      99      70      63      40      35
           2007           UI      12      12      12      12      12      12       0       0       0       0
           2008           UI       0       0       0       0       0       0       0       0       0       0
           2009           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2010           KK    CPR6 COMBINE
           2011           KM
           2012           HC       2
                          *

           2013           KK    R6R9   ROUTE
           2014           KM
           2015           RS       4    FLOW
           2016           RC   0.035   0.035   0.035    6687  0.0040    6.00
           2017           RX  961.00  981.00  989.00 1001.00 1005.00 1017.00 1025.00 1045.00
           2018           RY    6.00    5.00    4.00    1.00    1.00    4.00    5.00    6.00
                          *
1                                                      HEC-1 INPUT                                                    PAGE 51

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2019           KK      R9   BASIN
           2020           KM
           2021           BA   0.592
           2022           LG    0.16    0.25    4.80    0.40      64
           2023           UI       0      80     269     435     585     924     773     566     409     222
           2024           UI     134      81      34      24      24       0       0       0       0       0
           2025           UI       0       0       0       0       0       0       0       0       0       0
```

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           2026          UI       0       0       0       0       0       0       0       0       0       0
           2027          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2028          KK   DIVR9  DIVERT
           2029          KM
           2030          DT   RETR9    54.2     0.0
           2031          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2032          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           2033          KK    CPR9 COMBINE
           2034          KM
           2035          HC       2
                         *

           2036          KK   R9R11   ROUTE
           2037          KM
           2038          RS       7    FLOW
           2039          RC   0.035   0.035   0.035    7667  0.0030    6.00
           2040          RX  950.00  977.00  989.00 1001.00 1006.00 1018.00 1030.00 1050.00
           2041          RY    6.00    5.00    4.00    1.00    1.00    4.00    5.00    6.00
                         *

           2042          KK     R11   BASIN
           2043          KM
           2044          BA   0.986
           2045          LG    0.14    0.23    6.20    0.23      45
           2046          UI       0     101     213     442     574     717     994    1219     912     728
           2047          UI     567     426     229     169     116      84      31      31      31      31
           2048          UI       0       0       0       0       0       0       0       0       0       0
           2049          UI       0       0       0       0       0       0       0       0       0       0
           2050          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2051          KK  DIVR11  DIVERT
           2052          KM
           2053          DT  RETR11    67.9     0.0
           2054          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2055          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                           PAGE 52

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2056          KK    DRR5RETRIEVE
           2057          KM
           2058          DR    DRR5
                         *

           2059          KK      R5   BASIN
           2060          KM
           2061          BA   0.504
           2062          LG    0.29    0.25    5.40    0.27      21
           2063          UI       0      53     120     241     310     393     574     608     455     358
           2064          UI     277     189      98      80      53      26      16      16      16      16
           2065          UI       0       0       0       0       0       0       0       0       0       0
           2066          UI       0       0       0       0       0       0       0       0       0       0
           2067          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2068          KK   DIVR5  DIVERT
           2069          KM
           2070          DT   RETR5     1.0     0.0
           2071          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2072          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           2073          KK    CPR5 COMBINE
           2074          KM
           2075          HC       2    1.22
                         *

           2076          KK    R5R8   ROUTE
           2077          KM
           2078          RS       5    FLOW
           2079          RC   0.040   0.035   0.040    6587  0.0043    5.00
           2080          RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
           2081          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                         *

           2082          KK      R8   BASIN
           2083          KM
           2084          BA   0.554
           2085          LG    0.16    0.25    4.60    0.45      64
           2086          UI       0      69     208     360     471     695     788     567     421     299
           2087          UI     149     105      69      23      21      21      21       0       0       0
           2088          UI       0       0       0       0       0       0       0       0       0       0
           2089          UI       0       0       0       0       0       0       0       0       0       0
           2090          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2091          KK   DIVR8  DIVERT
           2092          KM
           2093          DT   RETR8    50.5     0.0
           2094          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2095          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                           PAGE 53

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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           2096          KK    CPR8 COMBINE
           2097          KM
           2098          HC       2
                         *

           2099          KK   R8R11   ROUTE
           2100          KM
           2101          RS       7    FLOW
           2102          RC   0.070   0.030   0.040    5355  0.0037   15.00
           2103          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2104          RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                         *

           2105          KK   CPR11 COMBINE
           2106          KM
           2107          HC       3
                         *

           2108          KK  R11R13   ROUTE
           2109          KM
           2110          RS       6    FLOW
           2111          RC   0.040   0.025   0.040    5263  0.0027   15.00
           2112          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2113          RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                         *

           2114          KK     R13   BASIN
           2115          KM
           2116          BA   0.501
           2117          LG    0.15    0.25    3.95    0.63      56
           2118          UI       0      80     322     483     750     853     575     392     188     110
           2119          UI      58      24      24       0       0       0       0       0       0       0
           2120          UI       0       0       0       0       0       0       0       0       0       0
           2121          UI       0       0       0       0       0       0       0       0       0       0
           2122          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2123          KK  DIVR13  DIVERT
           2124          KM
           2125          DT  RETR13    33.8     0.0
           2126          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2127          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           2128          KK   CPR13 COMBINE
           2129          KM
           2130          HC       2
                         *
1                                                      HEC-1 INPUT                                           PAGE 54

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2131          KK  R13R16   ROUTE
           2132          KM
           2133          RS       7    FLOW
           2134          RC   0.070   0.025   0.045    5239  0.0031   15.00
           2135          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2136          RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                         *

           2137          KK     R16   BASIN
           2138          KM
           2139          BA   0.498
           2140          LG    0.13    0.25    4.25    0.57      67
           2141          UI       0      90     343     515     840     812     552     353     157      97
           2142          UI      39      25      25       0       0       0       0       0       0       0
           2143          UI       0       0       0       0       0       0       0       0       0       0
           2144          UI       0       0       0       0       0       0       0       0       0       0
           2145          UI       0       0       0       0       0       0       0       0       0       0
                         *

           2146          KK  DIVR16  DIVERT
           2147          KM
           2148          DT  RETR16    37.2     0.0
           2149          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2150          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           2151          KK   CPR16 COMBINE
           2152          KM
           2153          HC       2
                         *

           2154          KK  R16R21   ROUTE
           2155          KM
           2156          RS      12    FLOW
           2157          RC   0.070   0.035   0.045   10034  0.0042   15.00
           2158          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2159          RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                         *

           2160          KK     R21   BASIN
           2161          KM
           2162          BA   0.836
           2163          LG    0.22    0.24    4.80    0.35      33
           2164          UI       0      65      65     227     302     364     428     515     701     804
           2165          UI     628     529     440     366     299     210     120     108      82      65
           2166          UI      38      20      20      20      20      20       0       0       0       0
           2167          UI       0       0       0       0       0       0       0       0       0       0
           2168          UI       0       0       0       0       0       0       0       0       0       0
                         *
```

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1                                     HEC-1 INPUT                                       PAGE 55

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         2169          KK  DIVR21  DIVERT
         2170          KM
         2171          DT  RETR21    18.4     0.0
         2172          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2173          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *
         2174          KM

         2175          KK      R1   BASIN
         2176          KM
         2177          BA   1.448
         2178          LG    0.25    0.25    4.55    0.42      30
         2179          UI       0     132     222     523     691     836    1039    1490    1523    1171
         2180          UI     960     769     608     389     230     203     132      90      40      40
         2181          UI      40      40      40       0       0       0       0       0       0       0
         2182          UI       0       0       0       0       0       0       0       0       0       0
         2183          UI       0       0       0       0       0       0       0       0       0       0
                       *

         2184          KK   DIVR1  DIVERT
         2185          KM
         2186          DT   RETR1   100.2     0.0
         2187          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2188          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

         2189          KK    R1R4   ROUTE
         2190          KM
         2191          RS      26    FLOW
         2192          RC   0.070   0.070   0.070    5946  0.0054    2.50
         2193          RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
         2194          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                       *

         2195          KK      R4   BASIN
         2196          KM
         2197          BA   0.998
         2198          LG    0.30    0.25    4.60    0.40       5
         2199          UI       0      87     129     330     440     526     643     871    1074     840
         2200          UI     691     562     455     345     198     148     118      87      48      27
         2201          UI      27      27      27      27       0       0       0       0       0       0
         2202          UI       0       0       0       0       0       0       0       0       0       0
         2203          UI       0       0       0       0       0       0       0       0       0       0
                       *

         2204          KK    CPR4 COMBINE
         2205          KM
         2206          HC       2
                       *
1                                     HEC-1 INPUT                                       PAGE 56

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         2207          KK    R4R7   ROUTE
         2208          KM
         2209          RS       6    FLOW
         2210          RC   0.050   0.025   0.070    5336  0.0052   15.00
         2211          RX    0.00   10.00   20.00   25.00   65.00   75.00  575.00 1075.00
         2212          RY   15.00   14.50   14.00   12.00   11.00   12.50   14.00   15.00
                       *

         2213          KK      R7   BASIN
         2214          KM
         2215          BA   1.003
         2216          LG    0.25    0.25    4.65    0.40      34
         2217          UI       0      88     135     338     450     538     662     900    1088     835
         2218          UI     690     557     450     331     188     148     111      88      37      27
         2219          UI      27      27      27       0       0       0       0       0       0       0
         2220          UI       0       0       0       0       0       0       0       0       0       0
         2221          UI       0       0       0       0       0       0       0       0       0       0
                       *

         2222          KK   DIVR7  DIVERT
         2223          KM
         2224          DT   RETR7    47.2     0.0
         2225          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2226          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

         2227          KK    CPR7 COMBINE
         2228          KM
         2229          HC       2
                       *

         2230          KK   R7R10   ROUTE
         2231          KM
         2232          RS       8    FLOW
         2233          RC   0.025   0.040   0.035    6813  0.0029    9.00
         2234          RX   75.00   78.00   88.00  100.00  130.00  145.00  155.00  500.00
         2235          RY    9.00    4.00    4.00    1.00    1.00    4.00    5.00    6.00
                       *

         2236          KK     R10   BASIN
         2237          KM
         2238          BA   1.010
         2239          LG    0.23    0.25    4.70    0.38      35
         2240          UI       0      64      64     142     244     307     355     401     468     556
```

```
         2241          UI     737     791     638     548     482     409     354     303     230     153
         2242          UI     112     104      83      64      60      19      19      19      19      19
         2243          UI      19      19       0       0       0       0       0       0       0       0
         2244          UI       0       0       0       0       0       0       0       0       0       0
                       *
1                                     HEC-1 INPUT                                       PAGE 57

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         2245          KK  DIVR10  DIVERT
         2246          KM
         2247          DT  RETR10    69.7     0.0
         2248          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2249          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

         2250          KK   CPR10 COMBINE
         2251          KM
         2252          HC       2
                       *

         2253          KK  R10R12   ROUTE
         2254          KM
         2255          RS       4    FLOW
         2256          RC   0.035   0.030   0.035    7002  0.0026   10.00
         2257          RX  940.00  961.00  981.00 1001.00 1005.00 1025.00 1050.00 1075.00
         2258          RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                       *

         2259          KK     R12   BASIN
         2260          KM
         2261          BA   0.486
         2262          LG    0.10    0.25    4.80    0.43      80
         2263          UI       0     198     609    1126     949     536     201      81      34       0
         2264          UI       0       0       0       0       0       0       0       0       0       0
         2265          UI       0       0       0       0       0       0       0       0       0       0
         2266          UI       0       0       0       0       0       0       0       0       0       0
         2267          UI       0       0       0       0       0       0       0       0       0       0
                       *

         2268          KK  DIVR12  DIVERT
         2269          KM
         2270          DT  RETR12    40.3     0.0
         2271          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2272          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

         2273          KK   CPR12 COMBINE
         2274          KM
         2275          HC       2
                       *

         2276          KK  R12R15   ROUTE
         2277          KM
         2278          RS      11    FLOW
         2279          RC   0.045   0.040   0.045    5352  0.0035    2.50
         2280          RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
         2281          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                       *
1                                     HEC-1 INPUT                                       PAGE 58

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         2282          KK     R15   BASIN
         2283          KM
         2284          BA   0.562
         2285          LG    0.24    0.25    4.80    0.37      35
         2286          UI       0      59     132     265     342     432     626     684     510     402
         2287          UI     311     216     114      92      59      33      18      18      18      18
         2288          UI       0       0       0       0       0       0       0       0       0       0
         2289          UI       0       0       0       0       0       0       0       0       0       0
         2290          UI       0       0       0       0       0       0       0       0       0       0
                       *

         2291          KK  DIVR15  DIVERT
         2292          KM
         2293          DT  RETR15    22.9     0.0
         2294          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         2295          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

         2296          KK   CPR15 COMBINE
         2297          KM
         2298          HC       2
                       *

         2299          KK  R15R18   ROUTE
         2300          KM
         2301          RS       5    FLOW
         2302          RC   0.045   0.040   0.020    7738  0.0041 1410.00
         2303          RX  959.00  960.00  975.00 1000.00 1020.00 1042.50 1097.50 1120.00
         2304          RY  1413.0 1408.10 1408.00 1403.00 1403.00 1407.50 1408.00 1410.00
                       *

         2305          KK     R18   BASIN
         2306          KM
         2307          BA   0.797
         2308          LG    0.25    0.25    4.60    0.41      32
         2309          UI       0      58      58     179     254     308     358     425     526     720
         2310          UI     649     527     452     378     318     264     187     109      97      81
         2311          UI      58      48      18      18      18      18      18      18       0       0
```

```
          2312           UI       0       0       0       0       0       0       0       0       0       0
          2313           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2314           KK  DIVR18  DIVERT
          2315           KM
          2316           DT  RETR18    50.8     0.0
          2317           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2318           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                            PAGE 59

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2319           KK   CPR18 COMBINE
          2320           KM
          2321           HC       2
                         *

          2322           KK  R18R22   ROUTE
          2323           KM
          2324           RS       5    FLOW
          2325           RC   0.025   0.050   0.025    7103  0.0031 1374.50
          2326           RX  947.00  954.00  966.00  995.00 1005.00 1034.00 1038.00 1053.00
          2327           RY  1374.5 1374.20 1373.70 1366.50 1366.50 1373.70 1373.70 1374.50
                         *

          2328           KK     R22   BASIN
          2329           KM
          2330           BA   0.574
          2331           LG    0.17    0.24    4.65    0.41      53
          2332           UI       0      79     273     436     596     929     736     538     380     192
          2333           UI     122      76      24      24      24       0       0       0       0       0
          2334           UI       0       0       0       0       0       0       0       0       0       0
          2335           UI       0       0       0       0       0       0       0       0       0       0
          2336           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2337           KK  DIVR22  DIVERT
          2338           KM
          2339           DT  RETR22    37.6     0.0
          2340           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2341           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2342           KK     R14   BASIN
          2343           KM
          2344           BA   0.497
          2345           LG    0.14    0.25    4.55    0.46      61
          2346           UI       0     117     405     621    1015     742     487     229     120      52
          2347           UI      27      27       0       0       0       0       0       0       0       0
          2348           UI       0       0       0       0       0       0       0       0       0       0
          2349           UI       0       0       0       0       0       0       0       0       0       0
          2350           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2351           KK  DIVR14  DIVERT
          2352           KM
          2353           DT  RETR14    33.9     0.0
          2354           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2355           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                            PAGE 60

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2356           KK  R14R17   ROUTE
          2357           KM
          2358           RS       5    FLOW
          2359           RC   0.035   0.030   0.035    6503  0.0031   10.00
          2360           RX  950.00  960.00  980.00 1000.00 1005.00 1025.00 1045.00 1055.00
          2361           RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                         *

          2362           KK     R17   BASIN
          2363           KM
          2364           BA   0.491
          2365           LG    0.22    0.25    4.55    0.43      43
          2366           UI       0      45      75     177     234     284     352     505     516     397
          2367           UI     325     261     206     132      78      69      45      31      14      14
          2368           UI      14      14      14       0       0       0       0       0       0       0
          2369           UI       0       0       0       0       0       0       0       0       0       0
          2370           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2371           KK  DIVR17  DIVERT
          2372           KM
          2373           DT  RETR17    30.4     0.0
          2374           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2375           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2376           KK   CPR17 COMBINE
          2377           KM
          2378           HC       2
                         *

          2379           KK  R17R22   ROUTE
          2380           KM
          2381           RS       4    FLOW
          2382           RC   0.045   0.035   0.045    6645  0.0048   15.00
```

```
          2383           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
          2384           RY   15.00   14.50   14.00   12.00   11.00   14.00   14.50   15.00
                         *

          2385           KK   CPR22 COMBINE
          2386           KM
          2387           HC       3
                         *

          2388           KK  R22R21   ROUTE
          2389           KM
          2390           RS       3    FLOW
          2391           RC   0.025   0.050   0.025    4455  0.0022 1363.30
          2392           RX  947.00  954.00  966.00  995.00 1005.00 1034.00 1038.00 1053.00
          2393           RY  1363.3 1363.00 1362.50 1355.30 1355.30 1362.50 1362.50 1363.30
                         *
1                                                      HEC-1 INPUT                                            PAGE 61

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2394           KK   CPR21 COMBINE
          2395           KM
          2396           HC       3
                         *

          2397           KK  R21R25   ROUTE
          2398           KM
          2399           RS       3    FLOW
          2400           RC   0.025   0.050   0.025    6771  0.0032 1342.30
          2401           RX  941.00  947.00  959.00  984.00 1012.00 1042.00 1046.00 1061.00
          2402           RY  1342.3 1341.50 1341.00 1334.60 1333.60 1341.00 1341.00 1341.30
                         *

          2403           KK     R25   BASIN
          2404           KM
          2405           BA   0.279
          2406           LG    0.15    0.23    4.80    0.36      43
          2407           UI       0      62     219     334     553     424     280     144      72      35
          2408           UI      15      15       0       0       0       0       0       0       0       0
          2409           UI       0       0       0       0       0       0       0       0       0       0
          2410           UI       0       0       0       0       0       0       0       0       0       0
          2411           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2412           KK  DIVR25  DIVERT
          2413           KM
          2414           DT  RETR25    14.2     0.0
          2415           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2416           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2417           KK     R20   BASIN
          2418           KM
          2419           BA   0.503
          2420           LG    0.17    0.26    3.45    0.85      47
          2421           UI       0      61     176     313     407     582     724     524     396     290
          2422           UI     156     103      64      33      19      19      19       0       0       0
          2423           UI       0       0       0       0       0       0       0       0       0       0
          2424           UI       0       0       0       0       0       0       0       0       0       0
          2425           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2426           KK  DIVR20  DIVERT
          2427           KM
          2428           DT  RETR20    34.4     0.0
          2429           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2430           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                            PAGE 62

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2431           KK  R20R23   ROUTE
          2432           KM
          2433           RS       6    FLOW
          2434           RC   0.050   0.040   0.050    5267  0.0040   15.00
          2435           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
          2436           RY   15.00   14.00   13.00   12.00   11.00   14.00   14.50   15.00
                         *

          2437           KK     R23   BASIN
          2438           KM
          2439           BA   0.496
          2440           LG    0.15    0.25    4.65    0.42      55
          2441           UI       0      70     254     397     553     833     621     448     304     144
          2442           UI      95      53      22      22      22       0       0       0       0       0
          2443           UI       0       0       0       0       0       0       0       0       0       0
          2444           UI       0       0       0       0       0       0       0       0       0       0
          2445           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2446           KK  DIVR23  DIVERT
          2447           KM
          2448           DT  RETR23    35.2     0.0
          2449           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2450           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2451           KK   CPR23 COMBINE
          2452           KM
          2453           HC       2
```

```
                         *

          2454           KK  R23R25   ROUTE
          2455           KM
          2456           RS       3    FLOW
          2457           RC   0.035   0.030   0.035    5186  0.0044   15.00
          2458           RX  960.00  980.00 1004.00 1010.00 1050.00 1052.00 1070.00 1090.00
          2459           RY   15.00   13.00   12.50   11.00   11.00   14.00   14.50   15.00
                         *

          2460           KK   CPR25 COMBINE
          2461           KM
          2462           HC       3
                         *

          2463           KK  R25R24   ROUTE
          2464           KM
          2465           RS      22    FLOW
          2466           RC   0.100   0.010   0.100     454  0.0044 1336.30
          2467           RX  847.00  857.00  939.00  940.00 1031.00 1033.00 1109.00 1137.00
          2468           RY  1333.6 1333.50 1333.40 1326.90 1326.90 1333.40 1334.10 1336.30
                         *
1                                                      HEC-1 INPUT                                             PAGE 63

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2469           KK     R19   BASIN
          2470           KM
          2471           BA   1.533
          2472           LG    0.14    0.25    4.35    0.52      60
          2473           UI       0     164     380     749     965    1230    1825    1821    1373    1071
          2474           UI     828     534     285     231     164      60      50      50      50       0
          2475           UI       0       0       0       0       0       0       0       0       0       0
          2476           UI       0       0       0       0       0       0       0       0       0       0
          2477           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2478           KK  DIVR19  DIVERT
          2479           KM
          2480           DT  RETR19   108.8     0.0
          2481           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2482           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2483           KK  DIV19R  DIVERT
          2484           KM
          2485           DT  DETR19    35.2     0.0
          2486           DI     0.0   171.0   172.0 10172.0     0.0     0.0     0.0     0.0     0.0     0.0
          2487           DQ     0.0     0.0     1.0 10001.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          2488           KK  R19R24   ROUTE
          2489           KM
          2490           RS       8    FLOW
          2491           RC   0.040   0.020   0.040    5577  0.0038    2.50
          2492           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
          2493           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                         *

          2494           KK     R24   BASIN
          2495           KM
          2496           BA   0.294
          2497           LG    0.18    0.25    4.80    0.40      52
          2498           UI       0      40     133     216     291     459     384     281     203     110
          2499           UI      67      40      17      12      12       0       0       0       0       0
          2500           UI       0       0       0       0       0       0       0       0       0       0
          2501           UI       0       0       0       0       0       0       0       0       0       0
          2502           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2503           KK  DIVR24  DIVERT
          2504           KM
          2505           DT  RETR24    19.7     0.0
          2506           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          2507           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                      HEC-1 INPUT                                             PAGE 64

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          2508           KK   CPR24 COMBINE
          2509           KM
          2510           HC       3
                         *

          2511           KK  R24EM4   ROUTE
          2512           KM
          2513           RS       1    FLOW
          2514           RC   0.025   0.025   0.025    3679  0.0044 1325.00
          2515           RX  933.00  939.00  951.00  977.00 1019.00 1049.00 1053.00 1069.00
          2516           RY  1325.0 1323.60 1323.10 1316.70 1315.70 1323.10 1323.10 1325.00
                         *

          2517           KK    EMF4   BASIN
          2518           KM
          2519           BA   0.060
          2520           LG    0.08    0.08    4.80    0.25       0
          2521           UI       0     102     258      87      14       0       0       0       0       0
          2522           UI       0       0       0       0       0       0       0       0       0       0
          2523           UI       0       0       0       0       0       0       0       0       0       0
          2524           UI       0       0       0       0       0       0       0       0       0       0
```

```
          2525           UI       0       0       0       0       0       0       0       0       0       0
                         *

          2526           KK  CPEMF4 COMBINE
          2527           HC       3   55.93
                         *
          2528           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    47          P1
                 .
                 .
    64           .------->   DRPFW
    62      DP1PFW
                 V
                 V
    67        P1P2
                 .
                 .
    75           .          P2
                 .           .
                 .           .
    90        CPP2............
                 V
                 V
    93        P2P4
                 .
                 .
    99           .          P4
                 .           .
                 .           .
   110           .           .------->   RETP4
   108           .       DIVP4
                 .           .
                 .           .
   113        CPP4............
                 V
                 V
   116        P4P6
                 .
                 .
   122           .          P6
                 .           .
                 .           .
   133           .           .------->   RETP6
   131           .       DIVP6
                 .           .
                 .           .
   136        CPP6............
                 V
                 V
   139       P6GM8
                 V
                 V
   145      GM8G10
                 .
                 .
   153           .           .<-------   DRPFW
   151           .       DRPFW
                 .           V
                 .           V
   154           .       P1PFW
                 .           .
                 .           .
   162           .           .          P3
                 .           .           .
                 .           .           .
   177           .        CPP3............
                 .           V
                 .           V
   180           .        P3P5
                 .           .
                 .           .
   186           .           .          P5
                 .           .           .
                 .           .           .
   197           .           .           .------->   RETP5
   195           .           .       DIVP5
                 .           .           .
                 .           .           .
   200           .        CPP5............
                 .           V
                 .           V
   203           .        P5P7
                 .           .
                 .           .
   209           .           .          P7
                 .           .           .
                 .           .           .
   220           .           .           .------->   RETP7
   218           .           .       DIVP7
                 .           .           .
                 .           .           .
   223        CPP7........................
                 V
                 V
   226      P7GM14
                 .
```

```
              .
232           .         GM1
              .           .
              .           .
241           .           .         GM2
              .           .           .
              .           .           .
250           .           .           .         GM3
              .           .           .           .
              .           .           .           .
259           .      CPG123........................
              .           .
              .           .
264           .           .------->   RETG1
262           .       DIVG1
              .           V
              .           V
267           .       GM1T5
              .           .
              .           .
273           .           .         GM5
              .           .           .
              .           .           .
284           .           .           .------->   RETG5
282           .           .       DIVG5
              .           .           .
              .           .           .
287           .        CPG5............
              .           V
              .           V
290           .       GM5T7
              .           .
              .           .
296           .           .         GM6
              .           .           .
              .           .           .
307           .           .           .------->   RETG6
305           .           .       DIVG6
              .           .           .
              .           .           .
310           .           .           .         GM7
              .           .           .           .
              .           .           .           .
321           .           .           .           .------->   RETG7
319           .           .           .       DIVG7
              .           .           .           .
              .           .           .           .
324           .           .       CPG7A............
              .           .           .
              .           .           .
327           .       CPG7B............
              .           V
              .           V
330           .       GM7T9
              .           .
              .           .
336           .           .         GM8
              .           .           .
              .           .           .
347           .           .           .------->   RETG8
345           .           .       DIVG8
              .           .           .
              .           .           .
350           .           .           .         GM9
              .           .           .           .
              .           .           .           .
361           .           .           .           .------->   RETG9
359           .           .           .       DIVG9
              .           .           .           .
              .           .           .           .
364           .           .       CPG9A............
              .           .           .
              .           .           .
367           .           .           .        GM10
              .           .           .           .
              .           .           .           .
378           .           .           .           .------->  RETG10
376           .           .           .      DIVG10
              .           .           .           .
              .           .           .           .
381           .           .           .           .        GM11
              .           .           .           .           .
              .           .           .           .           .
392           .           .           .           .           .------->  RETG11
390           .           .           .           .      DIVG11
              .           .           .           .           .
              .           .           .           .           .
395           .           .           .       CPG11............
              .           .           .           .
              .           .           .           .
398           .       CPG9B........................
              .           V
              .           V
401           .      GM9T14
              .           .
              .           .
407           .           .        GM12
              .           .           .
              .           .           .
418           .           .           .------->  RETG12
416           .           .      DIVG12
              .           .           V
              .           .           V
```

```
421           .           .      G12T13
              .           .           .
              .           .           .
427           .           .           .        GM13
              .           .           .           .
              .           .           .           .
438           .           .           .           .------->  RETG13
436           .           .           .      DIVG13
              .           .           .           .
              .           .           .           .
441           .           .       CPG13............
              .           .           V
              .           .           V
444           .           .      G13T14
              .           .           .
              .           .           .
450           .           .           .        GM14
              .           .           .           .
              .           .           .           .
461           .           .           .           .------->  RETG14
459           .           .           .      DIVG14
              .           .           .           .
              .           .           .           .
464           .           .      CPG14A............
              .           .           .
              .           .           .
467           .      CPG14B............
              .           .
              .           .
470      CPG14C............
              V
              V
473      G14E26
              .
              .
480           .          E1
              .           .
              .           .
495           .           .------->    DRE2
493           .        DE1S
              .           V
              .           V
498           .       E1E10
              .           .
              .           .
506           .           .         E10
              .           .           .
              .           .           .
524           .       CPE10............
              .           V
              .           V
527           .      E10E17
              .           .
              .           .
535           .           .         E17
              .           .           .
              .           .           .
554           .           .           .------->  RETE17
550           .           .      DIVE17
              .           .           .
              .           .           .
557           .       CPE17............
              .           V
              .           V
560           .      E17E21
              .           .
              .           .
568           .           .         E21
              .           .           .
              .           .           .
584           .           .           .------->  RETE21
580           .           .      DIVE21
              .           .           .
              .           .           .
587           .      CPE21A............
              .           V
              .           V
590           .      E21G20
              .           .
              .           .
599           .           .           .<-------    DRE2
597           .           .        DRE2
              .           .           V
              .           .           V
600           .           .      RTE1E2
              .           .           .
              .           .           .
608           .           .           .          E2
              .           .           .           .
              .           .           .           .
623           .           .        CPE2............
              .           .           .
              .           .           .
628           .           .           .------->    DRE3
626           .           .        DE2S
              .           .           V
              .           .           V
631           .           .       E2E11
              .           .           .
              .           .           .
639           .           .           .         E11
              .           .           .           .
              .           .           .           .
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   657           .           .       CPE11............
                 .           .           V
                 .           .           V
   660           .           .      E11E18
                 .           .           .
                 .           .           .
   668           .           .           .         E18
                 .           .           .           .
                 .           .           .           .
   682           .           .           .           .------->  RETE18
   680           .           .           .      DIVE18
                 .           .           .           .
                 .           .           .           .
   685           .           .       CPE18............
                 .           .           V
                 .           .           V
   688           .           .      E18E21
                 .           .           .
                 .           .           .
   696           .     CPE21B............
                 .           V
                 .           V
   699           .     G20G21
                 .           .
                 .           .
   709           .           .           .<-------    DRE3
   707           .           .        DRE3
                 .           .           V
                 .           .           V
   710           .           .      RTE2E3
                 .           .           .
                 .           .           .
   718           .           .           .          E3
                 .           .           .           .
                 .           .           .           .
   734           .           .       E2SE3............
                 .           .           .
                 .           .           .
   739           .           .           .------->   DRE4N
   737           .           .        DE3S
                 .           .           V
                 .           .           V
   742           .           .       E3E12
                 .           .           .
                 .           .           .
   750           .           .           .         E12
                 .           .           .           .
                 .           .           .           .
   768           .           .       CPE12............
                 .           .           V
                 .           .           V
   771           .           .      E12E19
                 .           .           .
                 .           .           .
   779           .           .           .         E19
                 .           .           .           .
                 .           .           .           .
   798           .           .       CPE19............
                 .           .           V
                 .           .           V
   801           .           .      E1922E
                 .           .           .
                 .           .           .
   809           .           .           .         22E
                 .           .           .           .
                 .           .           .           .
   827           .           .           .           .         E20
                 .           .           .           .           V
                 .           .           .           .           V
   846           .           .           .           .      E2022E
                 .           .           .           .           .
                 .           .           .           .           .
   854           .           .       CP22E........................
                 .           .           V
                 .           .           V
   857           .           .      22EE22
                 .           .           .
                 .           .           .
   863           .           .           .         E22
                 .           .           .           .
                 .           .           .           .
   881           .      CPE22........................
                 .           V
                 .           V
   884           .     E22G22
                 .           .
                 .           .
   890           .           .        GM21
                 .           .           .
                 .           .           .
   901           .           .           .------->  RETG21
   899           .           .      DIVG21
                 .           .           V
                 .           .           V
   904           .           .      G21T22
                 .           .           .
                 .           .           .
   910           .           .           .        GM22
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   921           .           .           .           .------->  RETG22
   919           .           .           .      DIVG22
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   924           .           .     CPG22A............
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   927           .           .           .        GM16
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   938           .           .           .           .------->  RETG16
   936           .           .           .      DIVG16
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                 .           .           .           V
   941           .           .           .      G16T19
                 .           .           .           .
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   947           .           .           .           .        GM18
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   958           .           .           .           .           .------->  RETG18
   956           .           .           .           .      DIVG18
                 .           .           .           .           .
                 .           .           .           .           .
   961           .           .           .       CPG18............
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   964           .           .           .           .        GM19
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   975           .           .           .           .           .------->  RETG19
   973           .           .           .           .      DIVG19
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   981           .           .           .           .        GM20
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   992           .           .           .           .           .------->  RETG20
   990           .           .           .           .      DIVG20
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   995           .           .           .      CPG19B............
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                 .           .           .           .
   998           .     CPG22B........................
                 .           V
                 .           V
  1003           .     G22E26
                 .           .
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  1012           .           .           .<-------   DRE4N
  1010           .           .       DRE4N
                 .           .           V
                 .           .           V
  1013           .           .      RTE3E4
                 .           .           .
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  1021           .           .           .         E4N
                 .           .           .           .
                 .           .           .           .
  1036           .           .       CPE4N............
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                 .           .           .
  1041           .           .           .------->    DRE4
  1039           .           .       DE4NS
                 .           .           V
                 .           .           V
  1044           .           .      E4NE13
                 .           .           .
                 .           .           .
  1052           .           .           .         E13
                 .           .           .           .
                 .           .           .           .
  1068           .           .       CPE13............
                 .           .           V
                 .           .           V
  1071           .           .      E13E24
                 .           .           .
                 .           .           .
  1080           .           .           .           .<-------    DRE4
  1078           .           .           .        DRE4
                 .           .           .           V
                 .           .           .           V
  1081           .           .           .      RTE4E4
                 .           .           .           .
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  1089           .           .           .           .          E4
                 .           .           .           .           .
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  1105           .           .           .        CPE4............
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                 .           .           .           .
  1110           .           .           .           .------->    DRE5
  1108           .           .           .        DE4S
                 .           .           .           V
                 .           .           .           V
  1113           .           .           .      E4E14A
                 .           .           .           .
                 .           .           .           .
  1122           .           .           .           .        E14A
                 .           .           .           .           .
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  1171           .           .           .           .           .           .<-------    DRE5
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1169           .           .           .           .           .        DRE5
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               .           .           .           .           .           V
1172           .           .           .           .           .      RTE4E5
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               .           .           .           .           .           .
1181           .           .           .           .           .           .          E5
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1196           .           .           .           .           .        CPE5............
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1210           .           .           .           .           .           .------->   DRE6
1207           .           .           .           .           .        DE5S
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1213           .           .           .           .           .      E5A14A
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1222           .           .           .      CPE14A........................
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               .           .           .           V
1226           .           .           .      E1424A
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1235           .           .           .      E1424B
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1244           .           .           .           .        E24A
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1255           .           .           .           .           .------->  RET24A
1253           .           .           .           .      DIV24A
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1258           .           .      CP24A........................
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1261           .           .      E247A1
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1270           .           .           .        E27A
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1281           .           .           .           .------->  RET27A
1279           .           .           .      DIV27A
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1284           .      CPE27A........................
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               .           V
1290           .      E247A2
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               .           V
1299           .      E2726A
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1309           .           .        E26A
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1320           .           .           .------->  RET26A
1318           .           .      DIV26A
               .           .           .
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1323           .      SR24EL............
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1352           .           .------->  1650UP
1344           .      802ELS
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1364           .           .        GM17
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1381           .           .           .------->  RETG17
1376           .           .      DIVG17
               .           .           V
               .           .           V
1384           .           .      G17E26
               .           .           .
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1390      CPE26A........................
               V
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1398      80233B
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1408           .          E7
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1419           .           .------->   RETE7
1417           .       DIVE7
               .           V
               .           V
1422           .      E7STOR
               .           V
               .           V
1430           .        E7E6
               .           .
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1444           .           .           .<-------   DRE6
1438           .           .        DRE6
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1445           .           .      RTE5E6
               .           .           .
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1454           .           .           .          E6
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1472           .           .           .           .          E8
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1483           .           .           .           .           .------->   RETE8
1481           .           .           .           .       DIVE8
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               .           .           .           .           V
1486           .           .           .           .        E8E6
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1492           .           .        CPE6........................
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1497           .           .           .------->   DRE9
1495           .           .        DE6S
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1500           .           .       E6E15
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1506           .           .           .         E15
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1517           .           .           .           .------->  RETE15
1515           .           .           .      DIVE15
               .           .           .           .
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1522           .           .           .           .           .<-------   DRE9
1520           .           .           .           .        DRE9
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               .           .           .           .           V
1523           .           .           .           .      RTE6E9
               .           .           .           .           .
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1529           .           .           .           .           .          E9
               .           .           .           .           .           .
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1540           .           .           .           .           .           .------->   RETE9
1538           .           .           .           .           .       DIVE9
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1543           .           .           .           .        CPE9............
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               .           .           .           .           .
1548           .           .           .           .           .------->   DRR5
1546           .           .           .           .        DE9S
               .           .           .           .           V
               .           .           .           .           V
1551           .           .           .           .       E9E16
               .           .           .           .           .
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1557           .           .           .           .           .         E16
               .           .           .           .           .           .
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1568           .           .           .           .           .           .------->  RETE16
1566           .           .           .           .           .      DIVE16
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1571           .           .           .           .       CPE16............
               .           .           .           .           V
               .           .           .           .           V
1574           .           .           .           .      E16E15
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1580           .           .       CPE15........................
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1583           .           .      E1524B
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1589           .           .           .         E5B
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1600           .           .           .           .------->  RETE5B
1598           .           .           .      DIVE5B
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               .           .           .           V
1603           .           .           .      E5E14B
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1609           .           .           .           .        E14B
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1620           .           .           .           .           .------->  RET14B
1618           .           .           .           .      DIV14B
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1623           .           .           .       CP14B............
               .           .           .           V
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1626           .           .           .      E14E24
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1632           .           .           .           .        E24B
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1643           .           .           .           .           .------->  RET24B
1641           .           .           .           .      DIV24B
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1646           .           .      CPE24B........................
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1649           .           .      E24E28
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1655           .           .           .        E28B
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1666           .           .           .           .------->  RET28B
1664           .           .           .      DIV28B
               .           .           .           .
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1669           .           .      CPE28B............
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1672           .           .      E28E31
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1678           .           .           .         E25
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1689           .           .           .           .------->  RETE25
1687           .           .           .      DIVE25
               .           .           .           V
               .           .           .           V
1692           .           .           .      E25E29
               .           .           .           .
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1698           .           .           .           .         E29
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1709           .           .           .           .           .------->  RETE29
1707           .           .           .           .      DIVE29
               .           .           .           .           .
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1712           .           .           .       CPE29............
               .           .           .           V
               .           .           .           V
1715           .           .           .      E29E31
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1721           .           .           .           .         E32
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1732           .           .           .           .           .------->  RETE32
1730           .           .           .           .      DIVE32
               .           .           .           .           V
               .           .           .           .           V
1735           .           .           .           .      E32E31
               .           .           .           .           .
               .           .           .           .           .
1741           .           .           .           .           .         E31
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1752           .           .           .           .           .           .------->  RETE31
1750           .           .           .           .           .      DIVE31
               .           .           .           .           .           .
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1755           .           .       CPE31....................................
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1758           .           .      E31E30
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1764           .           .           .        E30B
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1775           .           .           .           .------->  RET30B
1773           .           .           .      DIV30B
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1778           .           .       CPE30............
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1781           .           .      E30E26
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1787           .           .           .        E26B
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1798           .           .           .           .------->  RET26B
1796           .           .           .      DIV26B
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1804           .           .      E26E33
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1810           .           .           .        E33B
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1821           .           .           .           .------->  RET33B
1819           .           .           .      DIV33B
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1824           .      CPE33B........................
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1827           .      E33P9A
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1833           .      E33P9B
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1839           .           .          P9
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1850           .           .           .------->   RETP9
1848           .           .       DIVP9
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1853           .        CPP9............
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1856           .      P9EMF1
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1862           .           .       EMF1B
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1873           .           .           .------->  REMF1B
1871           .           .      DEMF1B
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1876           .      CPEMF1............
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1879           .      EM1EM2
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1885           .           .        EMF2
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1896           .           .           .------->  RETEM2
1894           .           .      DIVEM2
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1899           .      CPEMF2............
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1902           .      EM2M3A
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1908           .      EM2M3B
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1914           .           .        EMF3
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1925           .           .           .------->  RETEM3
1923           .           .      DIVEM3
               .           .           .
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1928           .      CPEMF3............
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1931           .      EMF3RB
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1937           .           .      RITBAS
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1946           .           .      RITBAS
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1954           .      CPRITB............
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1957           .      RBEMF4
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1964           .           .          R2
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1975           .           .           .------->   RETR2
1973           .           .       DIVR2
               .           .           .
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1978           .           .           .          R3
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1989           .           .           .           .------->   RETR3
1987           .           .           .       DIVR3
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1992           .           .      CPR2R3............
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1995           .           .      R2R3R6
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2001           .           .           .          R6
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2010           .           .        CPR6............
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               .           .           V
2013           .           .        R6R9
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2019           .           .           .          R9
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2030           .           .           .           .------->   RETR9
2028           .           .           .       DIVR9
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2033           .           .        CPR9............
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               .           .           V
2036           .           .       R9R11
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2042           .           .           .         R11
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2053           .           .           .           .------->  RETR11
2051           .           .           .      DIVR11
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2058           .           .           .           .           .<-------    DRR5
2056           .           .           .           .        DRR5
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2059           .           .           .           .           .          R5
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2070           .           .           .           .           .           .------->   RETR5
2068           .           .           .           .           .       DIVR5
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2073           .           .           .           .        CPR5............
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2076           .           .           .           .        R5R8
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2082           .           .           .           .           .          R8
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2093           .           .           .           .           .           .------->   RETR8
2091           .           .           .           .           .       DIVR8
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2096           .           .           .           .        CPR8............
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               .           .           .           .           V
2099           .           .           .           .       R8R11
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2105           .           .       CPR11........................
               .           .           V
               .           .           V
2108           .           .      R11R13
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2114           .           .           .         R13
               .           .           .           .
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2125           .           .           .           .------->  RETR13
2123           .           .           .      DIVR13
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2128           .           .       CPR13............
               .           .           V
               .           .           V
2131           .           .      R13R16
               .           .           .
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2137           .           .           .         R16
               .           .           .           .
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2148           .           .           .           .------->  RETR16
2146           .           .           .      DIVR16
               .           .           .           .
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2151           .           .       CPR16............
               .           .           V
               .           .           V
2154           .           .      R16R21
               .           .           .
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2160           .           .           .         R21
               .           .           .           .
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2171           .           .           .           .------->  RETR21
2169           .           .           .      DIVR21
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               .           .           .           .
2175           .           .           .           .          R1
               .           .           .           .           .
               .           .           .           .           .
2186           .           .           .           .           .------->   RETR1
2184           .           .           .           .       DIVR1
               .           .           .           .           V
               .           .           .           .           V
2189           .           .           .           .        R1R4
               .           .           .           .           .
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2195           .           .           .           .           .          R4
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2204           .           .           .           .        CPR4............
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2207           .           .           .           .        R4R7
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               .           .           .           .           .
2213           .           .           .           .           .          R7
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2224           .           .           .           .           .           .------->   RETR7
2222           .           .           .           .           .       DIVR7
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2227           .           .           .           .        CPR7............
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               .           .           .           .           V
2230           .           .           .           .       R7R10
               .           .           .           .           .
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2236           .           .           .           .           .         R10
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               .           .           .           .           .           .
2247           .           .           .           .           .           .------->  RETR10
2245           .           .           .           .           .      DIVR10
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2250           .           .           .           .       CPR10............
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2253           .           .           .           .      R10R12
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2259           .           .           .           .           .         R12
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2270           .           .           .           .           .           .------->  RETR12
2268           .           .           .           .           .      DIVR12
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2273           .           .           .           .       CPR12............
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               .           .           .           .           V
2276           .           .           .           .      R12R15
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               .           .           .           .           .
2282           .           .           .           .           .         R15
               .           .           .           .           .           .
               .           .           .           .           .           .
2293           .           .           .           .           .           .------->  RETR15
2291           .           .           .           .           .      DIVR15
               .           .           .           .           .           .
               .           .           .           .           .           .
2296           .           .           .           .       CPR15............
               .           .           .           .           V
               .           .           .           .           V
2299           .           .           .           .      R15R18
               .           .           .           .           .
               .           .           .           .           .
2305           .           .           .           .           .         R18
               .           .           .           .           .           .
               .           .           .           .           .           .
2316           .           .           .           .           .           .------->  RETR18
2314           .           .           .           .           .      DIVR18
               .           .           .           .           .           .
               .           .           .           .           .           .
2319           .           .           .           .       CPR18............
               .           .           .           .           V
               .           .           .           .           V
2322           .           .           .           .      R18R22
               .           .           .           .           .
               .           .           .           .           .
2328           .           .           .           .           .         R22
               .           .           .           .           .           .
               .           .           .           .           .           .
2339           .           .           .           .           .           .------->  RETR22
2337           .           .           .           .           .      DIVR22
               .           .           .           .           .           .
               .           .           .           .           .           .
2342           .           .           .           .           .           .         R14
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
2353           .           .           .           .           .           .           .------->  RETR14
2351           .           .           .           .           .           .      DIVR14
               .           .           .           .           .           .           V
               .           .           .           .           .           .           V
2356           .           .           .           .           .           .      R14R17
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
2362           .           .           .           .           .           .           .         R17
               .           .           .           .           .           .           .           .
               .           .           .           .           .           .           .           .
2373           .           .           .           .           .           .           .           .------->  RETR17
2371           .           .           .           .           .           .           .      DIVR17
               .           .           .           .           .           .           .           .
               .           .           .           .           .           .           .           .
2376           .           .           .           .           .           .       CPR17............
               .           .           .           .           .           .           V
               .           .           .           .           .           .           V
2379           .           .           .           .           .           .      R17R22
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
2385           .           .           .           .       CPR22........................
               .           .           .           .           V
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                 .           .           .           .           V
 2388            .           .           .           .      R22R21
                 .           .           .           .           .
                 .           .           .           .           .
 2394            .           .      CPR21........................
                 .           .           V
                 .           .           V
 2397            .           .      R21R25
                 .           .           .
                 .           .           .
 2403            .           .           .         R25
                 .           .           .           .
                 .           .           .           .
 2414            .           .           .           .------->  RETR25
 2412            .           .           .      DIVR25
                 .           .           .           .
                 .           .           .           .
 2417            .           .           .           .         R20
                 .           .           .           .           .
                 .           .           .           .           .
 2428            .           .           .           .           .------->  RETR20
 2426            .           .           .           .      DIVR20
                 .           .           .           .           V
                 .           .           .           .           V
 2431            .           .           .           .      R20R23
                 .           .           .           .           .
                 .           .           .           .           .
 2437            .           .           .           .           .         R23
                 .           .           .           .           .           .
                 .           .           .           .           .           .
 2448            .           .           .           .           .           .------->  RETR23
 2446            .           .           .           .           .      DIVR23
                 .           .           .           .           .           .
                 .           .           .           .           .           .
 2451            .           .           .           .       CPR23............
                 .           .           .           .           V
                 .           .           .           .           V
 2454            .           .           .           .      R23R25
                 .           .           .           .           .
                 .           .           .           .           .
 2460            .           .       CPR25........................
                 .           .           V
                 .           .           V
 2463            .           .      R25R24
                 .           .           .
                 .           .           .
 2469            .           .           .         R19
                 .           .           .           .
                 .           .           .           .
 2480            .           .           .           .------->  RETR19
 2478            .           .           .      DIVR19
                 .           .           .           .
                 .           .           .           .
 2485            .           .           .           .------->  DETR19
 2483            .           .           .      DIV19R
                 .           .           .           V
                 .           .           .           V
 2488            .           .           .      R19R24
                 .           .           .           .
                 .           .           .           .
 2494            .           .           .           .         R24
                 .           .           .           .           .
                 .           .           .           .           .
 2505            .           .           .           .           .------->  RETR24
 2503            .           .           .           .      DIVR24
                 .           .           .           .           .
                 .           .           .           .           .
 2508            .           .       CPR24........................
                 .           .           V
                 .           .           V
 2511            .           .      R24EM4
                 .           .           .
                 .           .           .
 2517            .           .           .        EMF4
                 .           .           .           .
                 .           .           .           .
 2526            .      CPEMF4........................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                   ***************************************
 *                                       *                                                   *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEERS     *
 *              JUN   1998               *                                                   *    HYDROLOGIC ENGINEERING CENTER    *
 *           VERSION 4.1                 *                                                   *          609 SECOND STREET          *
 *                                       *                                                   *       DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   04JUL16  TIME  13:51:13   *                                                   *           (916) 756-1104            *
 *                                       *                                                   *                                     *
 *****************************************                                                   ***************************************




                                 24INT050IC  100-YEAR, 24-hr Interim Phase II Conditions   2016-07-04
                                 Assuming concrete-lined channel for the following routes:
                                 E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
                                 by Parsons Corporation

                                 The model reflects interim drainage conditions for SR 24 and it is based
                                 on Mesa ADMPU with revisions reflecting development work around the
                                 corridor.
                                 This model simulates that the SR 24 corridor extends to Ironwood Dr,
                                 which would eliminate the need to intercept runoff from subbasins
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 WARNING --- ROUTED OUTFLOW (    899.) IS GREATER THAN MAXIMUM OUTFLOW (    873.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    909.) IS GREATER THAN MAXIMUM OUTFLOW (    873.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    905.) IS GREATER THAN MAXIMUM OUTFLOW (    873.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    889.) IS GREATER THAN MAXIMUM OUTFLOW (    873.) IN STORAGE-OUTFLOW TABLE



 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***



             **************
             *            *
 1946 KK     *    RITBAS  *      STORAGE
             *            *
             **************

 1948 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
1
                                                           RUNOFF SUMMARY
                                                   FLOW IN CUBIC FEET PER SECOND
                                                TIME IN HOURS,  AREA IN SQUARE MILES

                                       PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION      FLOW     PEAK                                            AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                               P1      194.    12.67         25.          6.          2.       0.39

          DIVERSION TO
+                            DRPFW      118.    12.67         12.          3.          1.       0.39

          HYDROGRAPH AT
+                           DP1PFW       76.    12.67         13.          3.          1.       0.39

          ROUTED TO
+                             P1P2       49.    14.58         13.          3.          1.       0.39

          HYDROGRAPH AT
+                               P2      258.    12.75         38.         10.          3.       0.58

          2 COMBINED AT
+                             CPP2      258.    12.75         52.         13.          4.       0.96

          ROUTED TO
+                             P2P4      242.    13.00         52.         13.          4.       0.96

          HYDROGRAPH AT
+                               P4      459.    12.50         68.         21.          7.       0.50

          DIVERSION TO
+                            RETP4      459.    12.50         68.         21.          7.       0.50

          HYDROGRAPH AT
+                            DIVP4        0.     0.00          0.          0.          0.       0.50

          2 COMBINED AT
+                             CPP4      242.    13.00         52.         13.          4.       1.46

          ROUTED TO
+                             P4P6      220.    13.33         51.         13.          4.       1.46

          HYDROGRAPH AT
+                               P6      390.    12.67         68.         21.          7.       0.50

          DIVERSION TO
+                            RETP6      390.    12.67         68.         21.          7.       0.50

          HYDROGRAPH AT
+                            DIVP6        0.     0.00          0.          0.          0.       0.50

          2 COMBINED AT
+                             CPP6      220.    13.33         51.         13.          4.       1.96

          ROUTED TO
+                            P6GM8      210.    13.50         50.         13.          4.       1.96

          ROUTED TO
+                           GM8G10      201.    13.67         50.         13.          4.       1.96

          HYDROGRAPH AT
+                            DRPFW      118.    12.67         12.          3.          1.       0.39

          ROUTED TO
+                            P1PFW       92.    12.83         12.          3.          1.       0.39

          HYDROGRAPH AT
+                               P3      191.    13.00         34.          8.          3.       0.52

          2 COMBINED AT
+                             CPP3      275.    12.92         45.         11.          4.       0.91

          ROUTED TO
+                             P3P5      271.    13.00         45.         11.          4.       0.91

          HYDROGRAPH AT
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+                         P5      229.   12.50         35.       11.        4.      0.25
        DIVERSION TO
+                      RETP5      229.   12.50         33.        9.        3.      0.25
        HYDROGRAPH AT
+                      DIVP5       34.   13.25          6.        2.        1.      0.25
        2 COMBINED AT
+                       CPP5      271.   13.00         50.       13.        4.      1.16
        ROUTED TO
+                       P5P7      263.   13.08         50.       13.        4.      1.16
        HYDROGRAPH AT
+                         P7      419.   12.50         64.       19.        6.      0.43
        DIVERSION TO
+                      RETP7      419.   12.50         59.       16.        5.      0.43
        HYDROGRAPH AT
+                      DIVP7       60.   13.17         11.        4.        1.      0.43
        3 COMBINED AT
+                       CPP7      360.   13.58        106.       28.        9.      3.17
        ROUTED TO
+                     P7GM14      348.   13.83        105.       28.        9.      3.17
        HYDROGRAPH AT
+                        GM1      377.   12.42         44.       12.        4.      0.34
        HYDROGRAPH AT
+                        GM2      888.   12.33        113.       36.       12.      0.68
        HYDROGRAPH AT
+                        GM3      577.   12.08         60.       20.        7.      0.29
        3 COMBINED AT
+                     CPG123     1521.   12.17        217.       68.       23.      1.32
        DIVERSION TO
+                      RETG1     1521.   12.17        189.       51.       17.      1.32
        HYDROGRAPH AT
+                      DIVG1      354.   12.75         51.       16.        5.      1.32
        ROUTED TO
+                      GM1T5      223.   12.92         50.       16.        5.      1.32
        HYDROGRAPH AT
+                        GM5      310.   12.17         37.       12.        4.      0.18
        DIVERSION TO
+                      RETG5      310.   12.17         25.        7.        2.      0.18
        HYDROGRAPH AT
+                      DIVG5      218.   12.33         17.        5.        2.      0.18
        2 COMBINED AT
+                       CPG5      246.   12.92         65.       21.        7.      1.49
        ROUTED TO
+                      GM5T7      206.   13.25         63.       21.        7.      1.49
        HYDROGRAPH AT
+                        GM6      685.   12.17         63.       19.        6.      0.37
        DIVERSION TO
+                      RETG6      685.   12.17         50.       14.        5.      0.37
        HYDROGRAPH AT
+                      DIVG6      282.   12.33         19.        6.        2.      0.37
        HYDROGRAPH AT
+                        GM7      249.   12.33         27.        8.        3.      0.22
        DIVERSION TO
+                      RETG7      249.   12.33         27.        7.        2.      0.22
        HYDROGRAPH AT
+                      DIVG7        2.   16.75          1.        0.        0.      0.22
        2 COMBINED AT
+                      CPG7A      282.   12.33         20.        6.        2.      0.58
        2 COMBINED AT
+                      CPG7B      236.   12.33         79.       26.        9.      2.08
        ROUTED TO
+                      GM7T9      200.   13.42         78.       26.        9.      2.08
        HYDROGRAPH AT
+                        GM8      692.   12.33         86.       28.        9.      0.56
        DIVERSION TO
+                      RETG8      692.   12.33         74.       20.        7.      0.56
        HYDROGRAPH AT
+                      DIVG8      192.   12.67         23.        7.        2.      0.56
        HYDROGRAPH AT
+                        GM9      153.   12.17         11.        3.        1.      0.09
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        DIVERSION TO
+                      RETG9      153.   12.17         11.        3.        1.      0.09
        HYDROGRAPH AT
+                      DIVG9        0.   23.83          0.        0.        0.      0.09
        2 COMBINED AT
+                      CPG9A      192.   12.67         23.        7.        2.      0.65
        HYDROGRAPH AT
+                       GM10      357.   12.33         46.       14.        5.      0.28
        DIVERSION TO
+                     RETG10      357.   12.33         32.        9.        3.      0.28
        HYDROGRAPH AT
+                     DIVG10      236.   12.50         18.        5.        2.      0.28
        HYDROGRAPH AT
+                       GM11       91.   12.25          9.        3.        1.      0.08
        DIVERSION TO
+                     RETG11       91.   12.25          9.        3.        1.      0.08
        HYDROGRAPH AT
+                     DIVG11        1.   23.00          0.        0.        0.      0.08
        2 COMBINED AT
+                      CPG11      236.   12.50         18.        5.        2.      0.36
        3 COMBINED AT
+                      CPG9B      344.   12.75        114.       38.       13.      3.08
        ROUTED TO
+                     GM9T14      299.   12.92        112.       38.       13.      3.08
        HYDROGRAPH AT
+                       GM12      244.   12.08         26.        9.        3.      0.12
        DIVERSION TO
+                     RETG12      244.   12.08         16.        5.        2.      0.12
        HYDROGRAPH AT
+                     DIVG12      212.   12.17         13.        4.        1.      0.12
        ROUTED TO
+                     G12T13       82.   12.42         13.        4.        1.      0.12
        HYDROGRAPH AT
+                       GM13      519.   12.08         48.       16.        5.      0.29
        DIVERSION TO
+                     RETG13      519.   12.08         42.       11.        4.      0.29
        HYDROGRAPH AT
+                     DIVG13       75.   12.42         13.        4.        1.      0.29
        2 COMBINED AT
+                      CPG13      156.   12.42         26.        8.        3.      0.41
        ROUTED TO
+                     G13T14      132.   12.50         25.        8.        3.      0.41
        HYDROGRAPH AT
+                       GM14      591.   12.17         59.       19.        6.      0.35
        DIVERSION TO
+                     RETG14      591.   12.17         46.       13.        4.      0.35
        HYDROGRAPH AT
+                     DIVG14      254.   12.33         21.        7.        2.      0.35
        2 COMBINED AT
+                     CPG14A      292.   12.33         46.       15.        5.      0.76
        2 COMBINED AT
+                     CPG14B      386.   12.92        151.       51.       17.      3.84
        2 COMBINED AT
+                     CPG14C      540.   13.83        236.       75.       25.      7.01
        ROUTED TO
+                     G14E26      537.   13.83        235.       75.       25.      7.01
        HYDROGRAPH AT
+                         E1      374.   12.83         57.       14.        5.      0.89
        DIVERSION TO
+                       DRE2      296.   12.83         42.       11.        4.      0.89
        HYDROGRAPH AT
+                       DE1S       77.   12.83         15.        4.        1.      0.89
        ROUTED TO
+                      E1E10       48.   14.83         15.        4.        1.      0.89
        HYDROGRAPH AT
+                        E10      326.   12.92         53.       13.        4.      0.82
        2 COMBINED AT
+                      CPE10      340.   12.92         67.       17.        6.      1.71
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          ROUTED TO
+                           E10E17      308.   13.17        67.        17.        6.      1.71

          HYDROGRAPH AT
+                              E17      245.   12.50        35.        11.        4.      0.27

          DIVERSION TO
+                           RETE17      245.   12.50        34.         9.        3.      0.27

          HYDROGRAPH AT
+                           DIVE17       18.   13.50         5.         2.        1.      0.27

          2 COMBINED AT
+                            CPE17      308.   13.17        71.        18.        6.      1.98

          ROUTED TO
+                           E17E21      291.   13.33        70.        18.        6.      1.98

          HYDROGRAPH AT
+                              E21      291.   12.50        43.        13.        4.      0.31

          DIVERSION TO
+                           RETE21      291.   12.50        38.        10.        3.      0.31

          HYDROGRAPH AT
+                           DIVE21       63.   13.00         9.         3.        1.      0.31

          2 COMBINED AT
+                          CPE21A       319.   13.33        78.        21.        7.      2.29

          ROUTED TO
+                           E21G20      311.   13.42        78.        21.        7.      2.29

          HYDROGRAPH AT
+                             DRE2      296.   12.83        42.        11.        4.      0.89

          ROUTED TO
+                           RTE1E2      234.   13.25        42.        11.        4.      0.89

          HYDROGRAPH AT
+                               E2      325.   12.92        53.        13.        4.      0.78

          2 COMBINED AT
+                             CPE2      472.   13.00        94.        24.        8.      1.67

          DIVERSION TO
+                             DRE3      277.   13.00        39.        10.        3.      1.67

          HYDROGRAPH AT
+                             DE2S      195.   13.00        55.        14.        5.      1.67

          ROUTED TO
+                            E2E11      151.   15.92        54.        14.        5.      1.67

          HYDROGRAPH AT
+                              E11      251.   12.83        39.        10.        3.      0.60

          2 COMBINED AT
+                            CPE11      246.   12.83        83.        23.        8.      2.27

          ROUTED TO
+                           E11E18      173.   13.75        80.        23.        8.      2.27

          HYDROGRAPH AT
+                              E18      278.   12.33        31.         9.        3.      0.22

          DIVERSION TO
+                           RETE18        1.    4.50         1.         0.        0.      0.22

          HYDROGRAPH AT
+                           DIVE18      278.   12.33        31.         8.        3.      0.22

          2 COMBINED AT
+                            CPE18      274.   12.33        96.        31.       10.      2.49

          ROUTED TO
+                           E18E21      247.   12.50        95.        31.       10.      2.49

          2 COMBINED AT
+                          CPE21B       417.   13.67       169.        52.       17.      3.90

          ROUTED TO
+                           G20G21      413.   13.75       168.        52.       17.      3.90

          HYDROGRAPH AT
+                             DRE3      277.   13.00        39.        10.        3.      1.67

          ROUTED TO
+                           RTE2E3      241.   13.42        39.        10.        3.      1.67

          HYDROGRAPH AT
+                               E3      748.   13.25       165.        41.       14.      2.23

          2 COMBINED AT
+                            E2SE3      938.   13.25       200.        50.       17.      3.90

          DIVERSION TO
+                            DRE4N      545.   13.25        81.        20.        7.      3.90

          HYDROGRAPH AT
+                             DE3S      394.   13.25       119.        30.       10.      3.90

          ROUTED TO
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+                             E3E12      347.   14.50       119.        30.       10.      3.90

          HYDROGRAPH AT
+                              E12      256.   12.92        43.        11.        4.      0.57

          2 COMBINED AT
+                            CPE12      468.   12.92       160.        40.       13.      4.47

          ROUTED TO
+                           E12E19      416.   13.75       160.        40.       13.      4.47

          HYDROGRAPH AT
+                              E19      205.   12.25        19.         5.        2.      0.14

          2 COMBINED AT
+                            CPE19      418.   13.75       178.        45.       15.      4.61

          ROUTED TO
+                           E1922E      404.   14.08       178.        45.       15.      4.61

          HYDROGRAPH AT
+                              22E      130.   12.25        13.         3.        1.      0.09

          HYDROGRAPH AT
+                              E20      133.   12.50        16.         5.        2.      0.17

          ROUTED TO
+                           E2022E      107.   12.75        16.         5.        2.      0.17

          3 COMBINED AT
+                            CP22E      407.   14.08       205.        53.       18.      4.87

          ROUTED TO
+                           22EE22      402.   14.25       205.        53.       18.      4.87

          HYDROGRAPH AT
+                              E22      188.   12.67        28.         7.        2.      0.16

          3 COMBINED AT
+                            CPE22      756.   14.00       381.       108.       36.      7.25

          ROUTED TO
+                           E22G22      747.   14.17       377.       108.       36.      7.25

          HYDROGRAPH AT
+                             GM21      335.   12.25        45.        15.        5.      0.21

          DIVERSION TO
+                           RETG21      335.   12.25        31.         9.        3.      0.21

          HYDROGRAPH AT
+                           DIVG21      216.   12.42        21.         6.        2.      0.21

          ROUTED TO
+                           G21T22      180.   12.50        21.         6.        2.      0.21

          HYDROGRAPH AT
+                             GM22      184.   12.17        21.         7.        2.      0.09

          DIVERSION TO
+                           RETG22      176.   12.08        14.         4.        1.      0.09

          HYDROGRAPH AT
+                           DIVG22      143.   12.25        10.         3.        1.      0.09

          2 COMBINED AT
+                          CPG22A       210.   12.50        30.         9.        3.      0.31

          HYDROGRAPH AT
+                             GM16       79.   12.33        10.         3.        1.      0.07

          DIVERSION TO
+                           RETG16       79.   12.33         9.         2.        1.      0.07

          HYDROGRAPH AT
+                           DIVG16       12.   12.83         2.         1.        0.      0.07

          ROUTED TO
+                           G16T19        7.   13.17         2.         1.        0.      0.07

          HYDROGRAPH AT
+                             GM18      238.   12.25        27.         9.        3.      0.17

          DIVERSION TO
+                           RETG18      238.   12.25        23.         6.        2.      0.17

          HYDROGRAPH AT
+                           DIVG18       62.   12.58         7.         2.        1.      0.17

          2 COMBINED AT
+                            CPG18       62.   12.58        10.         3.        1.      0.24

          HYDROGRAPH AT
+                             GM19      152.   12.17        12.         4.        1.      0.09

          DIVERSION TO
+                           RETG19      152.   12.17        11.         3.        1.      0.09

          HYDROGRAPH AT
+                           DIVG19       34.   12.42         3.         1.        0.      0.09

          2 COMBINED AT
+                          CPG19A        73.   12.58        12.         4.        1.      0.33
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          HYDROGRAPH AT
+                   GM20      317.   12.17        34.        10.         3.       0.18
          DIVERSION TO
+                 RETG20      317.   12.17        27.         7.         2.       0.18
          HYDROGRAPH AT
+                 DIVG20      113.   12.42        10.         3.         1.       0.18
          2 COMBINED AT
+                 CPG19B      145.   12.42        22.         7.         2.       0.51
          3 COMBINED AT
+                 CPG22B      779.   14.17       417.       121.        40.       8.06
          ROUTED TO
+                 G22E26      751.   14.50       416.       121.        40.       8.06
          HYDROGRAPH AT
+                  DRE4N      545.   13.25        81.        20.         7.       3.90
          ROUTED TO
+                 RTE3E4      496.   13.50        81.        20.         7.       3.90
          HYDROGRAPH AT
+                    E4N      122.   12.92        20.         5.         2.       0.31
          2 COMBINED AT
+                  CPE4N      546.   13.42       100.        25.         8.       4.21
          DIVERSION TO
+                   DRE4      416.   13.42        69.        17.         6.       4.21
          HYDROGRAPH AT
+                  DE4NS      130.   13.42        31.         8.         3.       4.21
          ROUTED TO
+                E4NE13       105.   15.17        31.         8.         3.       4.21
          HYDROGRAPH AT
+                    E13      231.   12.92        39.        10.         3.       0.48
          2 COMBINED AT
+                  CPE13      223.   12.92        68.        17.         6.       4.69
          ROUTED TO
+                 E13E24      154.   13.92        67.        17.         6.       4.69
          HYDROGRAPH AT
+                   DRE4      416.   13.42        69.        17.         6.       4.21
          ROUTED TO
+                 RTE4E4      312.   14.33        69.        17.         6.       4.21
          HYDROGRAPH AT
+                     E4      364.   13.25        80.        20.         7.       1.20
          2 COMBINED AT
+                   CPE4      385.   14.25       144.        36.        12.       5.41
          DIVERSION TO
+                   DRE5      372.   14.25       137.        34.        11.       5.41
          HYDROGRAPH AT
+                   DE4S       13.   14.25         7.         2.         1.       5.41
          ROUTED TO
+                 E4E14A       13.   15.33         7.         2.         1.       5.41
          HYDROGRAPH AT
+                   E14A      135.   12.83        20.         5.         2.       0.48
          HYDROGRAPH AT
+                   DRE5      372.   14.25       137.        34.        11.       5.41
          ROUTED TO
+                 RTE4E5      344.   14.58       137.        34.        11.       5.41
          HYDROGRAPH AT
+                     E5      421.   13.25        91.        23.         8.       1.43
          2 COMBINED AT
+                   CPE5      604.   13.33       219.        55.        18.       6.84
          DIVERSION TO
+                   DRE6      250.   13.33        56.        14.         5.       6.84
          HYDROGRAPH AT
+                   DE5S      354.   13.33       163.        41.        14.       6.84
          ROUTED TO
+                 E5A14A      347.   13.58       163.        41.        14.       6.84
          3 COMBINED AT
+                 CPE14A      369.   13.50       186.        47.        16.       7.61
          ROUTED TO
+                 E1424A      367.   13.58       186.        47.        16.       7.61
          ROUTED TO
+                 E1424B      367.   13.67       185.        47.        16.       7.61
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          HYDROGRAPH AT
+                   E24A      710.   12.33        96.        32.        11.       0.53
          DIVERSION TO
+                 RET24A      710.   12.33        71.        20.         7.       0.53
          HYDROGRAPH AT
+                 DIV24A      432.   12.50        38.        12.         4.       0.53
          3 COMBINED AT
+                  CP24A      538.   13.75       282.        73.        24.       8.62
          ROUTED TO
+                E247A1       536.   13.92       280.        73.        24.       8.62
          HYDROGRAPH AT
+                   E27A      568.   12.50       101.        32.        11.       0.54
          DIVERSION TO
+                 RET27A      568.   12.50        76.        21.         7.       0.54
          HYDROGRAPH AT
+                 DIV27A      310.   12.83        37.        11.         4.       0.54
          3 COMBINED AT
+                 CPE27A     1244.   13.00       697.       197.        66.      12.81
          ROUTED TO
+                E247A2      1241.   13.08       696.       197.        66.      12.81
          ROUTED TO
+                 E2726A     1226.   13.25       694.       197.        66.      12.81
          HYDROGRAPH AT
+                   E26A      959.   12.50       158.        51.        17.       0.87
          DIVERSION TO
+                 RET26A      959.   12.50       120.        33.        11.       0.87
          HYDROGRAPH AT
+                 DIV26A      485.   12.83        57.        17.         6.       0.87
          2 COMBINED AT
+                 SR24EL     1348.   13.25       734.       209.        70.      13.68
          DIVERSION TO
+                 1650UP        0.    0.00         0.         0.         0.      13.68
          HYDROGRAPH AT
+                 802ELS     1348.   13.25       734.       209.        70.      13.68
          HYDROGRAPH AT
+                   GM17      150.   12.17        15.         5.         2.       0.10
          DIVERSION TO
+                 RETG17      150.   12.17        15.         5.         2.       0.10
          HYDROGRAPH AT
+                 DIVG17        0.    0.00         0.         0.         0.       0.10
          ROUTED TO
+                 G17E26        0.    0.00         0.         0.         0.       0.10
          3 COMBINED AT
+                 CPE26A     1642.   13.33       883.       260.        87.      20.80
          ROUTED TO
+                 80233B     1617.   13.42       880.       260.        87.      20.80
          HYDROGRAPH AT
+                     E7      702.   12.92       157.        49.        16.       1.12
          DIVERSION TO
+                   RETE7     702.   12.92       156.        43.        14.       1.12
          HYDROGRAPH AT
+                   DIVE7      29.   15.17        17.         6.         2.       1.12
          ROUTED TO
+                 E7STOR        0.    0.00         0.         0.         0.       1.12
          ROUTED TO
+                   E7E6        0.    0.00         0.         0.         0.       1.12
          HYDROGRAPH AT
+                   DRE6      250.   13.33        56.        14.         5.       6.84
          ROUTED TO
+                 RTE5E6      225.   13.83        56.        14.         5.       6.84
          HYDROGRAPH AT
+                     E6      859.   13.42       218.        55.        18.       2.53
          HYDROGRAPH AT
+                     E8      770.   12.75       155.        49.        16.       1.10
          DIVERSION TO
+                   RETE8     770.   12.75       148.        41.        14.       1.10
          HYDROGRAPH AT
+                   DIVE8      70.   14.08        25.         8.         3.       1.10
          ROUTED TO
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+                         E8E6       43.   15.25         23.          8.          3.       1.10
          3 COMBINED AT
+                         CPE6     1001.   13.50        291.         77.         26.       3.05
          DIVERSION TO
+                         DRE9      151.   13.50         15.          4.          1.       3.05
          HYDROGRAPH AT
+                         DE6S      850.   13.50        276.         74.         25.       3.05
          ROUTED TO
+                        E6E15      800.   14.00        275.         74.         25.       3.05
          HYDROGRAPH AT
+                          E15      955.   12.33        135.         45.         15.       0.78
          DIVERSION TO
+                       RETE15      955.   12.33        123.         34.         11.       0.78
          HYDROGRAPH AT
+                       DIVE15      120.   13.00         31.         11.          4.       0.78
          HYDROGRAPH AT
+                         DRE9      151.   13.50         15.          4.          1.       3.05
          ROUTED TO
+                       RTE6E9      126.   13.83         15.          4.          1.       3.05
          HYDROGRAPH AT
+                           E9      846.   12.42        128.         42.         14.       0.72
          DIVERSION TO
+                        RETE9      846.   12.42        119.         33.         11.       0.72
          HYDROGRAPH AT
+                        DIVE9      102.   13.17         28.          9.          3.       0.72
          2 COMBINED AT
+                         CPE9      193.   13.75         45.         14.          5.       0.72
          DIVERSION TO
+                         DRR5       65.   13.75          6.          1.          0.       0.72
          HYDROGRAPH AT
+                         DE9S      128.   13.75         39.         12.          4.       0.72
          ROUTED TO
+                        E9E16      119.   14.17         38.         12.          4.       0.72
          HYDROGRAPH AT
+                          E16      508.   12.33         69.         23.          8.       0.40
          DIVERSION TO
+                       RETE16      508.   12.33         64.         18.          6.       0.40
          HYDROGRAPH AT
+                       DIVE16       48.   13.08         15.          5.          2.       0.40
          2 COMBINED AT
+                        CPE16      138.   14.17         52.         17.          6.       1.12
          ROUTED TO
+                       E16E15      138.   14.33         51.         17.          6.       1.12
          3 COMBINED AT
+                        CPE15      923.   14.17        338.         97.         32.       4.95
          ROUTED TO
+                       E1524B      909.   14.33        337.         97.         32.       4.95
          HYDROGRAPH AT
+                          E5B      387.   12.25         50.         17.          6.       0.29
          DIVERSION TO
+                       RETE5B      387.   12.25         45.         13.          4.       0.29
          HYDROGRAPH AT
+                       DIVE5B       41.   12.92         12.          4.          1.       0.29
          ROUTED TO
+                       E5E14B       27.   13.58         12.          4.          1.       0.29
          HYDROGRAPH AT
+                         E14B      774.   12.25         96.         32.         11.       0.53
          DIVERSION TO
+                       RET14B      774.   12.25         88.         24.          8.       0.53
          HYDROGRAPH AT
+                       DIV14B       74.   12.92         22.          7.          2.       0.53
          2 COMBINED AT
+                        CP14B       74.   12.92         33.         12.          4.       0.81
          ROUTED TO
+                       E14E24       63.   13.92         32.         12.          4.       0.81
          HYDROGRAPH AT
+                         E24B      695.   12.25         88.         28.          9.       0.46
          DIVERSION TO
+                       RET24B      695.   12.25         71.         20.          7.       0.46
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          HYDROGRAPH AT
+                       DIV24B      238.   12.58         29.          9.          3.       0.46
          3 COMBINED AT
+                       CPE24B      948.   14.33        372.        113.         38.       6.23
          ROUTED TO
+                       E24E28      933.   14.58        370.        113.         38.       6.23
          HYDROGRAPH AT
+                         E28B      681.   12.42        101.         32.         11.       0.54
          DIVERSION TO
+                       RET28B      681.   12.42         77.         21.          7.       0.54
          HYDROGRAPH AT
+                       DIV28B      377.   12.67         36.         11.          4.       0.54
          2 COMBINED AT
+                       CPE28B      942.   14.58        392.        121.         40.       6.77
          ROUTED TO
+                       E28E31      922.   14.92        388.        121.         40.       6.77
          HYDROGRAPH AT
+                          E25      903.   12.50        161.         53.         18.       0.93
          DIVERSION TO
+                       RETE25      903.   12.50        161.         53.         18.       0.93
          HYDROGRAPH AT
+                       DIVE25        0.    0.00          0.          0.          0.       0.93
          ROUTED TO
+                       E25E29        0.    0.00          0.          0.          0.       0.93
          HYDROGRAPH AT
+                          E29     1079.   12.50        178.         58.         19.       1.00
          DIVERSION TO
+                       RETE29     1079.   12.50        134.         37.         12.       1.00
          HYDROGRAPH AT
+                       DIVE29      640.   12.75         68.         21.          7.       1.00
          2 COMBINED AT
+                        CPE29      577.   12.75         66.         20.          7.       1.93
          ROUTED TO
+                       E29E31      303.   13.17         64.         20.          7.       1.93
          HYDROGRAPH AT
+                          E32      351.   12.25         42.         14.          5.       0.25
          DIVERSION TO
+                       RETE32      351.   12.25         31.          9.          3.       0.25
          HYDROGRAPH AT
+                       DIVE32      192.   12.42         17.          5.          2.       0.25
          ROUTED TO
+                       E32E31       79.   12.83         16.          5.          2.       0.25
          HYDROGRAPH AT
+                          E31      838.   12.50        137.         45.         15.       0.81
          DIVERSION TO
+                       RETE31      838.   12.50        101.         28.          9.       0.81
          HYDROGRAPH AT
+                       DIVE31      466.   12.75         55.         17.          6.       0.81
          4 COMBINED AT
+                        CPE31      961.   14.92        476.        152.         51.       9.76
          ROUTED TO
+                       E31E30      947.   15.25        468.        152.         51.       9.76
          HYDROGRAPH AT
+                         E30B      739.   12.83        162.         51.         17.       0.88
          DIVERSION TO
+                       RET30B      739.   12.83        123.         34.         11.       0.88
          HYDROGRAPH AT
+                       DIV30B      415.   13.25         57.         17.          6.       0.88
          2 COMBINED AT
+                        CPE30      960.   15.25        505.        164.         55.      10.64
          ROUTED TO
+                       E30E26      958.   15.33        503.        164.         55.      10.64
          HYDROGRAPH AT
+                         E26B      366.   12.33         49.         15.          5.       0.26
          DIVERSION TO
+                       RET26B      366.   12.33         37.         10.          3.       0.26
          HYDROGRAPH AT
+                       DIV26B      178.   12.58         17.          5.          2.       0.26
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          2 COMBINED AT
+                       CPE26      960.   15.33        507.        167.         56.      10.90
          ROUTED TO
+                       E26E33     945.   15.67        499.        167.         56.      10.90
          HYDROGRAPH AT
+                        E33B     1148.   12.33        160.         52.         17.       0.85
          DIVERSION TO
+                       RET33B    1148.   12.33        121.         34.         11.       0.85
          HYDROGRAPH AT
+                       DIV33B     630.   12.58         59.         18.          6.       0.85
          3 COMBINED AT
+                       CPE33B     945.   15.67        508.        178.         59.      12.87
          ROUTED TO
+                       E33P9A     932.   15.75        502.        176.         59.      12.87
          ROUTED TO
+                       E33P9B     922.   15.92        500.        176.         59.      12.87
          HYDROGRAPH AT
+                          P9     1338.   12.42        236.         79.         26.       1.12
          DIVERSION TO
+                        RETP9     177.   11.75         54.         18.          6.       1.12
          HYDROGRAPH AT
+                        DIVP9    1338.   12.42        218.         61.         20.       1.12
          2 COMBINED AT
+                         CPP9    1254.   12.42        621.        229.         77.      13.99
          ROUTED TO
+                       P9EMF1    1107.   12.58        610.        229.         77.      13.99
          HYDROGRAPH AT
+                        EMF1B    1271.   12.42        205.         67.         22.       1.04
          DIVERSION TO
+                       REMF1B    1271.   12.42        153.         43.         14.       1.04
          HYDROGRAPH AT
+                       DEMF1B     681.   12.67         80.         24.          8.       1.04
          2 COMBINED AT
+                       CPEMF1    1303.   12.75        663.        246.         82.      15.03
          ROUTED TO
+                       EM1EM2    1240.   13.00        661.        246.         82.      15.03
          HYDROGRAPH AT
+                         EMF2    1409.   12.83        345.        114.         38.       1.85
          DIVERSION TO
+                       RETEM2    1331.   12.83        195.         49.         16.       1.85
          HYDROGRAPH AT
+                       DIVEM2     814.   13.33        149.         65.         22.       1.85
          2 COMBINED AT
+                       CPEMF2    1289.   13.00        760.        288.        100.      16.88
          ROUTED TO
+                       EM2M3A    1245.   13.00        756.        288.        100.      16.88
          ROUTED TO
+                       EM2M3B    1214.   13.08        753.        288.        100.      16.88
          HYDROGRAPH AT
+                         EMF3    1144.   12.75        241.         79.         26.       1.49
          DIVERSION TO
+                       RETEM3     801.   12.42        100.         30.         10.       1.49
          HYDROGRAPH AT
+                       DIVEM3    1144.   12.75        175.         50.         17.       1.49
          2 COMBINED AT
+                       CPEMF3    1911.   12.92        887.        327.        113.      18.37
          ROUTED TO
+                       EMF3RB    1900.   13.00        883.        327.        113.      18.37
          HYDROGRAPH AT
+                       RITBAS     610.   12.08         37.          9.          3.       0.29
          ROUTED TO
+                       RITBAS       1.   12.92          1.          1.          1.       0.29
          2 COMBINED AT
+                       CPRITB    1900.   13.00        883.        328.        114.      18.66
          ROUTED TO
+                       RBEMF4    1686.   13.33        861.        327.        113.      18.66
          HYDROGRAPH AT
+                           R2     519.   12.67         86.         25.          8.       0.68
          DIVERSION TO
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+                        RETR2     383.   12.42         33.          9.          3.       0.68
          HYDROGRAPH AT
+                        DIVR2     519.   12.67         59.         16.          5.       0.68
          HYDROGRAPH AT
+                           R3     301.   12.58         47.         14.          5.       0.41
          DIVERSION TO
+                        RETR3     301.   12.58         29.          8.          3.       0.41
          HYDROGRAPH AT
+                        DIVR3     241.   12.75         21.          6.          2.       0.41
          2 COMBINED AT
+                       CPR2R3     718.   12.75         79.         21.          7.       1.09
          ROUTED TO
+                       R2R3R6     331.   14.33         74.         21.          7.       1.09
          HYDROGRAPH AT
+                           R6     342.   12.67         52.         15.          5.       0.50
          2 COMBINED AT
+                         CPR6     338.   12.67        119.         35.         12.       1.59
          ROUTED TO
+                         R6R9     305.   14.67        118.         35.         12.       1.59
          HYDROGRAPH AT
+                           R9     733.   12.33        108.         36.         12.       0.59
          DIVERSION TO
+                        RETR9     733.   12.33         98.         27.          9.       0.59
          HYDROGRAPH AT
+                        DIVR9     102.   13.00         27.          9.          3.       0.59
          2 COMBINED AT
+                         CPR9     337.   13.00        142.         44.         15.       2.19
          ROUTED TO
+                        R9R11     303.   15.17        140.         44.         15.       2.19
          HYDROGRAPH AT
+                          R11    1022.   12.50        160.         51.         17.       0.99
          DIVERSION TO
+                       RETR11    1022.   12.50        124.         34.         11.       0.99
          HYDROGRAPH AT
+                       DIVR11     460.   12.83         55.         17.          6.       0.99
          HYDROGRAPH AT
+                          DRR5     65.   13.75          6.          1.          0.       0.72
          HYDROGRAPH AT
+                           R5     465.   12.50         61.         18.          6.       0.50
          DIVERSION TO
+                        RETR5       3.    5.00          2.          1.          0.       0.50
          HYDROGRAPH AT
+                        DIVR5     465.   12.50         61.         17.          6.       0.50
          2 COMBINED AT
+                         CPR5     463.   12.50         66.         19.          6.       1.22
          ROUTED TO
+                         R5R8     392.   12.83         66.         19.          6.       1.22
          HYDROGRAPH AT
+                           R8     647.   12.42        101.         34.         11.       0.55
          DIVERSION TO
+                        RETR8     647.   12.42         91.         25.          8.       0.55
          HYDROGRAPH AT
+                        DIVR8      91.   13.08         25.          9.          3.       0.55
          2 COMBINED AT
+                         CPR8     392.   12.83         89.         27.          9.       1.77
          ROUTED TO
+                        R8R11     357.   13.25         87.         27.          9.       1.77
          3 COMBINED AT
+                        CPR11     714.   12.83        268.         84.         28.       4.95
          ROUTED TO
+                       R11R13     652.   13.75        266.         84.         28.       4.95
          HYDROGRAPH AT
+                          R13     612.   12.33         81.         27.          9.       0.50
          DIVERSION TO
+                       RETR13     612.   12.33         60.         17.          6.       0.50
          HYDROGRAPH AT
+                       DIVR13     362.   12.50         33.         10.          3.       0.50
          2 COMBINED AT
+                        CPR13     675.   13.75        288.         92.         31.       5.45
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          ROUTED TO
+                          R13R16     640.   14.25        285.        92.        31.      5.45
          HYDROGRAPH AT
+                             R16     666.   12.25         92.        31.        10.      0.50
          DIVERSION TO
+                          RETR16     666.   12.25         66.        19.         6.      0.50
          HYDROGRAPH AT
+                          DIVR16     368.   12.50         40.        12.         4.      0.50
          2 COMBINED AT
+                           CPR16     661.   14.25        314.       103.        35.      5.95
          ROUTED TO
+                          R16R21     601.   15.25        309.       103.        35.      5.95
          HYDROGRAPH AT
+                             R21     649.   12.67        114.        35.        12.      0.84
          DIVERSION TO
+                          RETR21     333.   12.25         30.         9.         3.      0.84
          HYDROGRAPH AT
+                          DIVR21     649.   12.67         96.        26.         9.      0.84
          HYDROGRAPH AT
+                              R1    1164.   12.58        182.        56.        19.      1.45
          DIVERSION TO
+                           RETR1    1164.   12.58        182.        51.        17.      1.45
          HYDROGRAPH AT
+                           DIVR1      22.   15.08         17.         6.         2.      1.45
          ROUTED TO
+                            R1R4      18.   20.42         15.         6.         2.      1.45
          HYDROGRAPH AT
+                              R4     673.   12.58         86.        23.         8.      1.00
          2 COMBINED AT
+                            CPR4     660.   12.58         84.        27.         9.      2.45
          ROUTED TO
+                            R4R7     513.   13.08         84.        27.         9.      2.45
          HYDROGRAPH AT
+                              R7     823.   12.58        134.        42.        14.      1.00
          DIVERSION TO
+                           RETR7     823.   12.58         86.        24.         8.      1.00
          HYDROGRAPH AT
+                           DIVR7     624.   12.75         64.        18.         6.      1.00
          2 COMBINED AT
+                            CPR7     990.   12.75        142.        44.        15.      3.45
          ROUTED TO
+                           R7R10     853.   13.25        140.        44.        15.      3.45
          HYDROGRAPH AT
+                             R10     667.   12.83        139.        43.        14.      1.01
          DIVERSION TO
+                          RETR10     667.   12.83        129.        35.        12.      1.01
          HYDROGRAPH AT
+                          DIVR10     110.   13.83         25.         8.         3.      1.01
          2 COMBINED AT
+                           CPR10     853.   13.25        160.        51.        17.      4.46
          ROUTED TO
+                          R10R12     725.   13.67        156.        51.        17.      4.46
          HYDROGRAPH AT
+                             R12     828.   12.17        101.        35.        12.      0.49
          DIVERSION TO
+                          RETR12     828.   12.17         71.        20.         7.      0.49
          HYDROGRAPH AT
+                          DIVR12     550.   12.33         47.        14.         5.      0.49
          2 COMBINED AT
+                           CPR12     764.   13.67        196.        64.        22.      4.95
          ROUTED TO
+                          R12R15     590.   14.67        188.        64.        22.      4.95
          HYDROGRAPH AT
+                             R15     528.   12.50         77.        24.         8.      0.56
          DIVERSION TO
+                          RETR15     477.   12.42         41.        12.         4.      0.56
          HYDROGRAPH AT
+                          DIVR15     528.   12.50         45.        13.         4.      0.56
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          2 COMBINED AT
+                           CPR15     598.   14.67        220.        75.        25.      5.51
          ROUTED TO
+                          R15R18     564.   15.08        214.        75.        25.      5.51
          HYDROGRAPH AT
+                             R18     560.   12.67        104.        32.        11.      0.80
          DIVERSION TO
+                          RETR18     560.   12.67         94.        26.         9.      0.80
          HYDROGRAPH AT
+                          DIVR18     108.   13.50         21.         7.         2.      0.80
          2 COMBINED AT
+                           CPR18     572.   15.08        225.        79.        27.      6.30
          ROUTED TO
+                          R18R22     534.   15.58        221.        78.        27.      6.30
          HYDROGRAPH AT
+                             R22     689.   12.33         95.        31.        10.      0.57
          DIVERSION TO
+                          RETR22     689.   12.33         67.        19.         6.      0.57
          HYDROGRAPH AT
+                          DIVR22     432.   12.50         41.        12.         4.      0.57
          HYDROGRAPH AT
+                             R14     703.   12.25         88.        29.        10.      0.50
          DIVERSION TO
+                          RETR14     703.   12.25         60.        17.         6.      0.50
          HYDROGRAPH AT
+                          DIVR14     458.   12.42         41.        12.         4.      0.50
          ROUTED TO
+                          R14R17     220.   12.83         40.        12.         4.      0.50
          HYDROGRAPH AT
+                             R17     427.   12.58         73.        23.         8.      0.49
          DIVERSION TO
+                          RETR17     427.   12.58         55.        15.         5.      0.49
          HYDROGRAPH AT
+                          DIVR17     219.   12.83         27.         8.         3.      0.49
          2 COMBINED AT
+                           CPR17     436.   12.83         66.        20.         7.      0.99
          ROUTED TO
+                          R17R22     275.   13.25         63.        20.         7.      0.99
          3 COMBINED AT
+                           CPR22     575.   15.58        287.       105.        35.      7.87
          ROUTED TO
+                          R22R21     550.   15.92        283.       104.        35.      7.87
          3 COMBINED AT
+                           CPR21     839.   15.58        571.       208.        70.     14.65
          ROUTED TO
+                          R21R25     816.   15.92        560.       207.        70.     14.65
          HYDROGRAPH AT
+                             R25     378.   12.25         43.        14.         5.      0.28
          DIVERSION TO
+                          RETR25     346.   12.17         25.         7.         2.      0.28
          HYDROGRAPH AT
+                          DIVR25     353.   12.33         23.         6.         2.      0.28
          HYDROGRAPH AT
+                             R20     482.   12.42         72.        24.         8.      0.50
          DIVERSION TO
+                          RETR20     482.   12.42         62.        17.         6.      0.50
          HYDROGRAPH AT
+                          DIVR20     103.   12.92         20.         6.         2.      0.50
          ROUTED TO
+                          R20R23      47.   13.75         18.         6.         2.      0.50
          HYDROGRAPH AT
+                             R23     608.   12.33         84.        28.         9.      0.50
          DIVERSION TO
+                          RETR23     608.   12.33         63.        18.         6.      0.50
          HYDROGRAPH AT
+                          DIVR23     309.   12.58         32.        10.         3.      0.50
          2 COMBINED AT
+                           CPR23     309.   12.58         49.        16.         5.      1.00
          ROUTED TO
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+                        R23R25       135.   13.00          47.          16.           5.        1.00

          3 COMBINED AT
+                         CPR25       828.   15.83         591.         222.          75.       15.93

          ROUTED TO
+                        R25R24       828.   15.92         591.         222.          75.       15.93

          HYDROGRAPH AT
+                           R19      1566.   12.50         263.          88.          29.        1.53

          DIVERSION TO
+                        RETR19      1566.   12.50         194.          55.          18.        1.53

          HYDROGRAPH AT
+                        DIVR19       875.   12.75         110.          34.          11.        1.53

          DIVERSION TO
+                        DETR19       704.   12.75          36.           9.           3.        1.53

          HYDROGRAPH AT
+                        DIV19R       171.   12.67          74.          25.           8.        1.53

          ROUTED TO
+                        R19R24       160.   13.92          70.          25.           8.        1.53

          HYDROGRAPH AT
+                           R24       346.   12.33          48.          16.           5.        0.29

          DIVERSION TO
+                        RETR24       346.   12.33          36.          10.           3.        0.29

          HYDROGRAPH AT
+                        DIVR24       196.   12.58          19.           6.           2.        0.29

          3 COMBINED AT
+                         CPR24       865.   15.75         649.         245.          82.       17.75

          ROUTED TO
+                        R24EM4       860.   15.92         647.         245.          82.       17.75

          HYDROGRAPH AT
+                          EMF4       119.   12.08           7.           2.           1.        0.06

          3 COMBINED AT
+                        CPEMF4      1800.   13.42        1207.         475.         164.       55.93
1                                 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   E7STOR
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

      PLAN  1 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.55       0.00         12.         0.      0.00         0.00        0.00

      PLAN  2 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.52       0.00         12.         0.      0.00         0.00        0.00

      PLAN  3 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.41       0.00          9.         0.      0.00         0.00        0.00

      PLAN  4 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.28       0.00          6.         0.      0.00         0.00        0.00

      PLAN  5 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
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                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.10       0.00          2.         0.      0.00         0.00        0.00

      PLAN  6 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.01       0.00          0.         0.      0.00         0.00        0.00

      PLAN  7 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.00       0.00          0.         0.      0.00         0.00        0.00

      PLAN  8 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.00       0.00          0.         0.      0.00         0.00        0.00

      PLAN  9 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1566.00           1574.00         1574.00
                              STORAGE               0.              607.            607.
                              OUTFLOW               0.              104.            104.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1566.00       0.00          0.         0.      0.00         0.00        0.00
1                                 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   RITBAS
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

      PLAN  1 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1311.00           1318.00         1318.00
                              STORAGE               0.              693.            693.
                              OUTFLOW               0.                7.              7.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1311.84       0.00         18.         1.      0.00        12.92        0.00

      PLAN  2 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1311.00           1318.00         1318.00
                              STORAGE               0.              693.            693.
                              OUTFLOW               0.                7.              7.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1311.83       0.00         18.         1.      0.00        12.92        0.00

      PLAN  3 ..............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                              ELEVATION        1311.00           1318.00         1318.00
                              STORAGE               0.              693.            693.
                              OUTFLOW               0.                7.              7.


                    RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                     OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                     PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS       HOURS       HOURS

                    1.00      1311.81       0.00         18.         1.      0.00        12.92        0.00
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    PLAN  4 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.78       0.00         17.         1.      0.00       12.83        0.00

    PLAN  5 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.74       0.00         16.         1.      0.00       12.75        0.00

    PLAN  6 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.72       0.00         16.         1.      0.00       12.75        0.00

    PLAN  7 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.71       0.00         16.         1.      0.00       12.75        0.00

    PLAN  8 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.70       0.00         15.         1.      0.00       12.75        0.00

    PLAN  9 ..............                   INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION        1311.00           1318.00          1318.00
                           STORAGE               0.               693.             693.
                           OUTFLOW               0.                 7.               7.

               RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS       HOURS        HOURS

               1.00      1311.69       0.00         15.         1.      0.00       12.75        0.00


*** NORMAL END OF HEC-1 ***
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1*****************************************                              ***************************************
 *                                       *                              *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998               *                              *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                              *         609 SECOND STREET           *
 *                                       *                              *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04JUL16  TIME  13:39:43   *                              *         (916) 756-1104              *
 *                                       *                              *                                     *
 *****************************************                              ***************************************




                              X     X  XXXXXXX   XXXXX          X
                              X     X  X        X     X        XX
                              X     X  X        X               X
                              XXXXXXX  XXXX     X       XXXXX   X
                              X     X  X        X               X
                              X     X  X        X     X         X
                              X     X  XXXXXXX   XXXXX         XXX




            THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

            THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
            THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
            NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
            DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
            KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                               HEC-1 INPUT                                             PAGE  1

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1           ID        24INT100IC  100-YEAR, 24-hr Interim Phase II Conditions   2016-07-04
             2           ID        Assuming concrete-lined channel for the following routes:
             3           ID        E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
             4           ID        by Parsons Corporation
             5           ID
             6           ID        The model reflects interim drainage conditions for SR 24 and it is based
             7           ID        on Mesa ADMPU with revisions reflecting development work around the
             8           ID        corridor.
             9           ID        This model simulates that the SR 24 corridor extends to Ironwood Dr,
            10           ID        which would eliminate the need to intercept runoff from subbasins
            11           ID        E5A, E6A and RTE4E5.
            12           ID        Therefore, subbasins E5A and E5B, and E6A and E6B were reconfigured to
            13           ID        match the layout, characteristics and hydrologic connectivity of
            14           ID        subbasins E5 and E6 in the existing condition model (24EX100). Also,
            15           ID        diversion DRE6 was reintroduced to simulate the cascading flows
            16           ID        east of Ironwood Dr.
            17           ID
            18           ID  *********************************************************************
            19           ID        FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
            20           ID        Flood Control District of Maricopa County
            21           ID        100 YEAR
            22           ID        24 Hour Storm
            23           ID        Unit Hydrograph: S-Graph
            24           ID        08/05/2011
            25           IT       5       0       0    2000
            26           IN      15
            27           IO       5
                         *DIAGRAM
                         *
            28           JD   3.579  0.0001
            29           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
            30           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
            31           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
            32           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
            33           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
            34           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
            35           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
            36           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
            37           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
            38           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
            39           JD   3.561     1.0
            40           JD   3.490     5.0
            41           JD   3.400    10.0
            42           JD   3.286    20.0
            43           JD   3.221    30.0
            44           JD   3.175    40.0
            45           JD   3.139    50.0
            46           JD   3.114    60.0
                         *
1                                               HEC-1 INPUT                                             PAGE  2

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            47           KK      P1   BASIN
            48           KM
            49           KM     Used the unit hydrograph for undeveloped conditions
            50           KM     by Parsons Corporation 2015-11
            51           BA   0.387
            52           LG    0.35    0.35    3.95    0.47       0
            53           UI       0      29      29      99     134     162     189     226     301     369
            54           UI     298     248     210     175     144     108      65      50      45      29
            55           UI      26       9       9       9       9       9       9       0       0       0
            56           UI       0       0       0       0       0       0       0       0       0       0
            57           UI       0       0       0       0       0       0       0       0       0       0
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 WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    491.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    523.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    513.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    503.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    498.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

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 WARNING --- ROUTED OUTFLOW (    509.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    499.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    491.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE
          WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
1
                                                      RUNOFF SUMMARY
                                               FLOW IN CUBIC FEET PER SECOND
                                            TIME IN HOURS,  AREA IN SQUARE MILES

                                              PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION        STATION            FLOW     PEAK                                              AREA      STAGE     MAX STAGE
+                                                                6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                               P1            244.   12.67          32.          8.          3.       0.39

          DIVERSION TO
+                            DRPFW            161.   12.67          17.          4.          1.       0.39

          HYDROGRAPH AT
+                           DP1PFW             83.   12.67          15.          4.          1.       0.39

          ROUTED TO
+                             P1P2             58.   14.50          15.          4.          1.       0.39

          HYDROGRAPH AT
+                               P2            326.   12.75          49.         12.          4.       0.58

          2 COMBINED AT
+                             CPP2            326.   12.75          65.         16.          5.       0.96

          ROUTED TO
+                             P2P4            310.   13.00          64.         16.          5.       0.96

          HYDROGRAPH AT
+                               P4            536.   12.50          79.         24.          8.       0.50

          DIVERSION TO
+                            RETP4            536.   12.50          79.         24.          8.       0.50

          HYDROGRAPH AT
+                            DIVP4              0.    0.00           0.          0.          0.       0.50

          2 COMBINED AT
+                             CPP4            310.   13.00          64.         16.          5.       1.46

          ROUTED TO
+                             P4P6            289.   13.25          64.         16.          5.       1.46

          HYDROGRAPH AT
+                               P6            456.   12.67          79.         24.          8.       0.50

          DIVERSION TO
+                            RETP6            456.   12.67          79.         24.          8.       0.50

          HYDROGRAPH AT
+                            DIVP6              0.    0.00           0.          0.          0.       0.50

          2 COMBINED AT
+                             CPP6            289.   13.25          64.         16.          5.       1.96

          ROUTED TO
+                            P6GM8            273.   13.42          63.         16.          5.       1.96

          ROUTED TO
+                           GM8G10            265.   13.58          63.         16.          5.       1.96

          HYDROGRAPH AT
+                            DRPFW            161.   12.67          17.          4.          1.       0.39

          ROUTED TO
+                            P1PFW            135.   12.83          17.          4.          1.       0.39

          HYDROGRAPH AT
+                               P3            242.   13.00          43.         11.          4.       0.52

          2 COMBINED AT
+                             CPP3            363.   12.92          60.         15.          5.       0.91

          ROUTED TO
+                             P3P5            358.   13.00          60.         15.          5.       0.91

          HYDROGRAPH AT
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+                        P5     268.   12.50       41.       12.        4.      0.25
          DIVERSION TO
+                     RETP5     268.   12.50       33.        9.        3.      0.25
          HYDROGRAPH AT
+                     DIVP5     121.   12.92       12.        4.        1.      0.25
          2 COMBINED AT
+                      CPP5     463.   12.92       71.       19.        6.      1.16
          ROUTED TO
+                      P5P7     447.   13.00       71.       19.        6.      1.16
          HYDROGRAPH AT
+                        P7     485.   12.50       74.       22.        7.      0.43
          DIVERSION TO
+                     RETP7     485.   12.50       58.       16.        5.      0.43
          HYDROGRAPH AT
+                     DIVP7     212.   12.92       22.        6.        2.      0.43
          3 COMBINED AT
+                      CPP7     586.   13.00      150.       40.       13.      3.17
          ROUTED TO
+                    P7GM14     569.   13.25      149.       40.       13.      3.17
          HYDROGRAPH AT
+                       GM1     435.   12.42       53.       14.        5.      0.34
          HYDROGRAPH AT
+                       GM2    1023.   12.33      130.       42.       14.      0.68
          HYDROGRAPH AT
+                       GM3     651.   12.08       69.       23.        8.      0.29
          3 COMBINED AT
+                    CPG123    1747.   12.17      250.       78.       26.      1.32
          DIVERSION TO
+                     RETG1    1747.   12.17      188.       51.       17.      1.32
          HYDROGRAPH AT
+                     DIVG1     847.   12.58       89.       26.        9.      1.32
          ROUTED TO
+                     GM1T5     640.   12.67       88.       26.        9.      1.32
          HYDROGRAPH AT
+                       GM5     349.   12.17       42.       13.        4.      0.18
          DIVERSION TO
+                     RETG5     325.   12.17       24.        7.        2.      0.18
          HYDROGRAPH AT
+                     DIVG5     334.   12.25       23.        7.        2.      0.18
          2 COMBINED AT
+                      CPG5     686.   12.67      109.       33.       11.      1.49
          ROUTED TO
+                     GM5T7     571.   12.92      107.       33.       11.      1.49
          HYDROGRAPH AT
+                       GM6     777.   12.17       73.       22.        7.      0.37
          DIVERSION TO
+                     RETG6     777.   12.17       50.       14.        5.      0.37
          HYDROGRAPH AT
+                     DIVG6     552.   12.25       30.        9.        3.      0.37
          HYDROGRAPH AT
+                       GM7     290.   12.33       32.        9.        3.      0.22
          DIVERSION TO
+                     RETG7     290.   12.33       28.        7.        2.      0.22
          HYDROGRAPH AT
+                     DIVG7      71.   12.75        5.        2.        1.      0.22
          2 COMBINED AT
+                     CPG7A     552.   12.25       36.       10.        3.      0.58
          2 COMBINED AT
+                     CPG7B     633.   12.92      139.       42.       14.      2.08
          ROUTED TO
+                     GM7T9     585.   13.00      137.       42.       14.      2.08
          HYDROGRAPH AT
+                       GM8     798.   12.33      100.       32.       11.      0.56
          DIVERSION TO
+                     RETG8     798.   12.33       73.       20.        7.      0.56
          HYDROGRAPH AT
+                     DIVG8     516.   12.50       38.       11.        4.      0.56
          HYDROGRAPH AT
+                       GM9     177.   12.17       13.        4.        1.      0.09
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          DIVERSION TO
+                     RETG9     177.   12.17       13.        3.        1.      0.09
          HYDROGRAPH AT
+                     DIVG9       5.   12.75        2.        1.        0.      0.09
          2 COMBINED AT
+                     CPG9A     516.   12.50       40.       12.        4.      0.65
          HYDROGRAPH AT
+                      GM10     409.   12.33       53.       16.        5.      0.28
          DIVERSION TO
+                    RETG10     409.   12.33       32.        9.        3.      0.28
          HYDROGRAPH AT
+                    DIVG10     329.   12.42       26.        7.        2.      0.28
          HYDROGRAPH AT
+                      GM11     108.   12.25       10.        3.        1.      0.08
          DIVERSION TO
+                    RETG11     108.   12.25       10.        3.        1.      0.08
          HYDROGRAPH AT
+                    DIVG11       4.   13.33        1.        1.        0.      0.08
          2 COMBINED AT
+                     CPG11     329.   12.42       28.        8.        3.      0.36
          3 COMBINED AT
+                     CPG9B     946.   12.50      198.       60.       20.      3.08
          ROUTED TO
+                    GM9T14     723.   12.75      195.       60.       20.      3.08
          HYDROGRAPH AT
+                      GM12     275.   12.08       29.       10.        3.      0.12
          DIVERSION TO
+                    RETG12     217.   12.00       16.        5.        2.      0.12
          HYDROGRAPH AT
+                    DIVG12     255.   12.17       17.        5.        2.      0.12
          ROUTED TO
+                    G12T13     130.   12.33       17.        5.        2.      0.12
          HYDROGRAPH AT
+                      GM13     596.   12.08       55.       18.        6.      0.29
          DIVERSION TO
+                    RETG13     596.   12.08       41.       11.        4.      0.29
          HYDROGRAPH AT
+                    DIVG13     376.   12.25       21.        6.        2.      0.29
          2 COMBINED AT
+                     CPG13     471.   12.25       38.       11.        4.      0.41
          ROUTED TO
+                    G13T14     366.   12.33       38.       11.        4.      0.41
          HYDROGRAPH AT
+                      GM14     678.   12.17       67.       22.        7.      0.35
          DIVERSION TO
+                    RETG14     676.   12.17       46.       13.        4.      0.35
          HYDROGRAPH AT
+                    DIVG14     546.   12.25       31.        9.        3.      0.35
          2 COMBINED AT
+                    CPG14A     708.   12.25       69.       21.        7.      0.76
          2 COMBINED AT
+                    CPG14B     849.   12.75      256.       80.       27.      3.84
          2 COMBINED AT
+                    CPG14C    1156.   13.25      379.      113.       38.      7.01
          ROUTED TO
+                    G14E26    1151.   13.25      379.      113.       38.      7.01
          HYDROGRAPH AT
+                        E1     472.   12.83       73.       18.        6.      0.89
          DIVERSION TO
+                      DRE2     383.   12.83       56.       14.        5.      0.89
          HYDROGRAPH AT
+                      DE1S      88.   12.83       18.        4.        1.      0.89
          ROUTED TO
+                     E1E10      55.   15.00       18.        4.        1.      0.89
          HYDROGRAPH AT
+                       E10     411.   12.92       68.       17.        6.      0.82
          2 COMBINED AT
+                     CPE10     435.   12.92       85.       21.        7.      1.71
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          ROUTED TO
+                        E10E17     402.   13.08        84.        21.         7.      1.71
          HYDROGRAPH AT
+                           E17     287.   12.50        41.        13.         4.      0.27
          DIVERSION TO
+                        RETE17     287.   12.50        34.         9.         3.      0.27
          HYDROGRAPH AT
+                        DIVE17     123.   12.83        11.         3.         1.      0.27
          2 COMBINED AT
+                         CPE17     452.   13.08        95.        24.         8.      1.98
          ROUTED TO
+                        E17E21     433.   13.25        94.        24.         8.      1.98
          HYDROGRAPH AT
+                           E21     341.   12.50        51.        15.         5.      0.31
          DIVERSION TO
+                        RETE21     341.   12.50        38.        10.         3.      0.31
          HYDROGRAPH AT
+                        DIVE21     175.   12.83        17.         5.         2.      0.31
          2 COMBINED AT
+                        CPE21A     474.   13.25       110.        29.        10.      2.29
          ROUTED TO
+                        E21G20     465.   13.25       110.        29.        10.      2.29
          HYDROGRAPH AT
+                          DRE2     383.   12.83        56.        14.         5.      0.89
          ROUTED TO
+                        RTE1E2     316.   13.17        56.        14.         5.      0.89
          HYDROGRAPH AT
+                            E2     409.   12.92        68.        17.         6.      0.78
          2 COMBINED AT
+                          CPE2     627.   13.00       122.        31.        10.      1.67
          DIVERSION TO
+                          DRE3     408.   13.00        60.        15.         5.      1.67
          HYDROGRAPH AT
+                          DE2S     219.   13.00        62.        16.         5.      1.67
          ROUTED TO
+                         E2E11     173.   15.83        62.        16.         5.      1.67
          HYDROGRAPH AT
+                           E11     318.   12.83        50.        12.         4.      0.60
          2 COMBINED AT
+                         CPE11     311.   12.83       100.        28.         9.      2.27
          ROUTED TO
+                        E11E18     236.   13.58        97.        28.         9.      2.27
          HYDROGRAPH AT
+                           E18     320.   12.33        36.        10.         3.      0.22
          DIVERSION TO
+                        RETE18       1.    4.17         1.         0.         0.      0.22
          HYDROGRAPH AT
+                        DIVE18     320.   12.33        36.        10.         3.      0.22
          2 COMBINED AT
+                         CPE18     316.   12.33       118.        37.        12.      2.49
          ROUTED TO
+                        E18E21     287.   12.50       117.        37.        12.      2.49
          2 COMBINED AT
+                        CPE21B     576.   13.50       223.        66.        22.      3.90
          ROUTED TO
+                        G20G21     573.   13.58       221.        66.        22.      3.90
          HYDROGRAPH AT
+                          DRE3     408.   13.00        60.        15.         5.      1.67
          ROUTED TO
+                        RTE2E3     365.   13.33        60.        15.         5.      1.67
          HYDROGRAPH AT
+                            E3     935.   13.25       209.        52.        17.      2.23
          2 COMBINED AT
+                         E2SE3    1259.   13.25       264.        66.        22.      3.90
          DIVERSION TO
+                         DRE4N     804.   13.25       125.        31.        10.      3.90
          HYDROGRAPH AT
+                          DE3S     455.   13.25       139.        35.        12.      3.90
          ROUTED TO
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+                          E3E12     401.   14.50       139.        35.        12.      3.90
          HYDROGRAPH AT
+                            E12     318.   12.92        55.        14.         5.      0.57
          2 COMBINED AT
+                          CPE12     546.   12.92       191.        48.        16.      4.47
          ROUTED TO
+                         E12E19     486.   13.67       191.        48.        16.      4.47
          HYDROGRAPH AT
+                            E19     234.   12.25        23.         6.         2.      0.14
          2 COMBINED AT
+                          CPE19     488.   13.67       212.        54.        18.      4.61
          ROUTED TO
+                         E1922E     467.   14.00       212.        54.        18.      4.61
          HYDROGRAPH AT
+                            22E     149.   12.25        15.         4.         1.      0.09
          HYDROGRAPH AT
+                            E20     159.   12.50        20.         5.         2.      0.17
          ROUTED TO
+                         E2022E     129.   12.75        20.         5.         2.      0.17
          3 COMBINED AT
+                          CP22E     472.   14.00       245.        63.        21.      4.87
          ROUTED TO
+                         22EE22     465.   14.17       245.        63.        21.      4.87
          HYDROGRAPH AT
+                            E22     223.   12.67        33.         8.         3.      0.16
          3 COMBINED AT
+                          CPE22     940.   13.83       477.       133.        44.      7.25
          ROUTED TO
+                         E22G22     931.   14.00       473.       133.        44.      7.25
          HYDROGRAPH AT
+                           GM21     379.   12.25        50.        17.         6.      0.21
          DIVERSION TO
+                         RETG21     360.   12.17        30.         9.         3.      0.21
          HYDROGRAPH AT
+                         DIVG21     347.   12.33        28.         8.         3.      0.21
          ROUTED TO
+                         G21T22     298.   12.42        28.         8.         3.      0.21
          HYDROGRAPH AT
+                           GM22     208.   12.17        24.         8.         3.      0.09
          DIVERSION TO
+                         RETG22     199.   12.08        14.         4.         1.      0.09
          HYDROGRAPH AT
+                         DIVG22     177.   12.17        13.         4.         1.      0.09
          2 COMBINED AT
+                         CPG22A     347.   12.42        41.        12.         4.      0.31
          HYDROGRAPH AT
+                           GM16      93.   12.33        12.         4.         1.      0.07
          DIVERSION TO
+                         RETG16      93.   12.33         9.         2.         1.      0.07
          HYDROGRAPH AT
+                         DIVG16      42.   12.58         4.         1.         0.      0.07
          ROUTED TO
+                         G16T19      29.   12.75         4.         1.         0.      0.07
          HYDROGRAPH AT
+                           GM18     274.   12.25        31.        10.         3.      0.17
          DIVERSION TO
+                         RETG18     274.   12.25        23.         6.         2.      0.17
          HYDROGRAPH AT
+                         DIVG18     178.   12.42        12.         4.         1.      0.17
          2 COMBINED AT
+                           CPG18     178.   12.42        16.         5.         2.      0.24
          HYDROGRAPH AT
+                           GM19     174.   12.17        15.         4.         1.      0.09
          DIVERSION TO
+                         RETG19     174.   12.17        11.         3.         1.      0.09
          HYDROGRAPH AT
+                         DIVG19      77.   12.33         5.         1.         0.      0.09
          2 COMBINED AT
+                         CPG19A     218.   12.42        21.         6.         2.      0.33
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         HYDROGRAPH AT
+                   GM20      359.   12.17         39.         12.          4.      0.18
         DIVERSION TO
+                 RETG20      359.   12.17         27.          7.          2.      0.18
         HYDROGRAPH AT
+                 DIVG20      244.   12.33         16.          5.          2.      0.18
         2 COMBINED AT
+                 CPG19B      368.   12.42         37.         11.          4.      0.51
         3 COMBINED AT
+                 CPG22B      970.   14.00        536.        153.         51.      8.06
         ROUTED TO
+                 G22E26      940.   14.33        534.        153.         51.      8.06
         HYDROGRAPH AT
+                  DRE4N      804.   13.25        125.         31.         10.      3.90
         ROUTED TO
+                 RTE3E4      750.   13.42        125.         31.         10.      3.90
         HYDROGRAPH AT
+                    E4N      154.   12.92         25.          6.          2.      0.31
         2 COMBINED AT
+                  CPE4N      813.   13.42        149.         37.         12.      4.21
         DIVERSION TO
+                   DRE4      651.   13.42        110.         27.          9.      4.21
         HYDROGRAPH AT
+                  DE4NS      162.   13.42         40.         10.          3.      4.21
         ROUTED TO
+                 E4NE13      131.   15.33         40.         10.          3.      4.21
         HYDROGRAPH AT
+                    E13      284.   12.83         48.         12.          4.      0.48
         2 COMBINED AT
+                  CPE13      275.   12.83         86.         22.          7.      4.69
         ROUTED TO
+                 E13E24      190.   13.92         85.         22.          7.      4.69
         HYDROGRAPH AT
+                   DRE4      651.   13.42        110.         27.          9.      4.21
         ROUTED TO
+                 RTE4E4      515.   14.25        109.         27.          9.      4.21
         HYDROGRAPH AT
+                     E4      462.   13.25        103.         26.          9.      1.20
         2 COMBINED AT
+                   CPE4      645.   14.17        205.         51.         17.      5.41
         DIVERSION TO
+                   DRE5      630.   14.17        198.         49.         16.      5.41
         HYDROGRAPH AT
+                   DE4S       15.   14.17          8.          2.          1.      5.41
         ROUTED TO
+                 E4E14A       14.   15.17          8.          2.          1.      5.41
         HYDROGRAPH AT
+                   E14A      170.   12.75         26.          6.          2.      0.48
         HYDROGRAPH AT
+                   DRE5      630.   14.17        198.         49.         16.      5.41
         ROUTED TO
+                 RTE4E5      583.   14.42        197.         49.         16.      5.41
         HYDROGRAPH AT
+                     E5      534.   13.25        117.         29.         10.      1.43
         2 COMBINED AT
+                   CPE5      789.   13.33        302.         76.         25.      6.84
         DIVERSION TO
+                   DRE6      356.   13.33        102.         25.          8.      6.84
         HYDROGRAPH AT
+                   DE5S      433.   13.33        200.         50.         17.      6.84
         ROUTED TO
+                 E5A14A      423.   13.58        199.         50.         17.      6.84
         3 COMBINED AT
+                 CPE14A      453.   13.50        228.         58.         19.      7.61
         ROUTED TO
+                 E1424A      451.   13.58        228.         58.         19.      7.61
         ROUTED TO
+                 E1424B      449.   13.67        228.         58.         19.      7.61
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         HYDROGRAPH AT
+                   E24A      812.   12.33        110.         36.         12.      0.53
         DIVERSION TO
+                 RET24A      807.   12.25         70.         20.          7.      0.53
         HYDROGRAPH AT
+                 DIV24A      704.   12.42         55.         16.          5.      0.53
         3 COMBINED AT
+                  CP24A      655.   13.75        356.         93.         31.      8.62
         ROUTED TO
+                 E247A1      652.   13.92        354.         93.         31.      8.62
         HYDROGRAPH AT
+                   E27A      647.   12.50        115.         37.         12.      0.54
         DIVERSION TO
+                 RET27A      647.   12.50         76.         21.          7.      0.54
         HYDROGRAPH AT
+                 DIV27A      478.   12.75         54.         16.          5.      0.54
         3 COMBINED AT
+                 CPE27A     1549.   12.83        898.        250.         83.     12.81
         ROUTED TO
+                 E247A2     1561.   12.83        897.        250.         83.     12.81
         ROUTED TO
+                 E2726A     1522.   13.08        894.        250.         83.     12.81
         HYDROGRAPH AT
+                   E26A     1093.   12.50        181.         58.         19.      0.87
         DIVERSION TO
+                 RET26A     1093.   12.50        119.         33.         11.      0.87
         HYDROGRAPH AT
+                 DIV26A      843.   12.67         84.         24.          8.      0.87
         2 COMBINED AT
+                 SR24EL     1788.   13.00        957.        269.         90.     13.68
         DIVERSION TO
+                 1650UP      138.   13.00          5.          1.          0.     13.68
         HYDROGRAPH AT
+                 802ELS     1650.   13.00        952.        267.         89.     13.68
         HYDROGRAPH AT
+                   GM17      174.   12.17         18.          6.          2.      0.10
         DIVERSION TO
+                 RETG17      174.   12.17         18.          6.          2.      0.10
         HYDROGRAPH AT
+                 DIVG17        0.    0.00          0.          0.          0.      0.10
         ROUTED TO
+                 G17E26        0.    0.00          0.          0.          0.      0.10
         3 COMBINED AT
+                 CPE26A     2364.   13.33       1215.        353.        118.     20.80
         ROUTED TO
+                 80233B     2350.   13.42       1214.        353.        118.     20.80
         HYDROGRAPH AT
+                     E7      820.   12.92        182.         56.         19.      1.12
         DIVERSION TO
+                   RETE7     820.   12.92        159.         43.         14.      1.12
         HYDROGRAPH AT
+                   DIVE7     234.   13.67         43.         13.          4.      1.12
         ROUTED TO
+                 E7STOR        1.   25.67          1.          1.          0.      1.12
         ROUTED TO
+                   E7E6        1.   30.00          1.          1.          0.      1.12
         HYDROGRAPH AT
+                   DRE6      356.   13.33        102.         25.          8.      6.84
         ROUTED TO
+                 RTE5E6      329.   13.75        102.         25.          8.      6.84
         HYDROGRAPH AT
+                     E6     1053.   13.42        270.         68.         23.      2.53
         HYDROGRAPH AT
+                     E8      901.   12.75        180.         57.         19.      1.10
         DIVERSION TO
+                  RETE8      901.   12.75        149.         41.         14.      1.10
         HYDROGRAPH AT
+                  DIVE8      378.   13.25         52.         16.          5.      1.10
         ROUTED TO
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+                           E8E6      191.   14.00         50.         16.          5.      1.10
        3 COMBINED AT
+                           CPE6     1318.   13.50        419.        110.         37.      3.05
        DIVERSION TO
+                           DRE9      353.   13.50         47.         12.          4.      3.05
        HYDROGRAPH AT
+                           DE6S      965.   13.50        372.         98.         33.      3.05
        ROUTED TO
+                          E6E15      935.   14.08        371.         98.         33.      3.05
        HYDROGRAPH AT
+                            E15     1096.   12.33        154.         51.         17.      0.78
        DIVERSION TO
+                         RETE15     1096.   12.33        122.         34.         11.      0.78
        HYDROGRAPH AT
+                         DIVE15      431.   12.67         54.         17.          6.      0.78
        HYDROGRAPH AT
+                           DRE9      353.   13.50         47.         12.          4.      3.05
        ROUTED TO
+                         RTE6E9      316.   13.75         47.         12.          4.      3.05
        HYDROGRAPH AT
+                             E9      968.   12.42        147.         48.         16.      0.72
        DIVERSION TO
+                          RETE9      968.   12.42        118.         33.         11.      0.72
        HYDROGRAPH AT
+                          DIVE9      372.   12.75         49.         15.          5.      0.72
        2 COMBINED AT
+                           CPE9      408.   13.67        103.         29.         10.      0.72
        DIVERSION TO
+                           DRR5      221.   13.67         36.          9.          3.      0.72
        HYDROGRAPH AT
+                           DE9S      186.   13.67         67.         20.          7.      0.72
        ROUTED TO
+                          E9E16      175.   14.08         65.         20.          7.      0.72
        HYDROGRAPH AT
+                            E16      582.   12.33         79.         26.          9.      0.40
        DIVERSION TO
+                         RETE16      582.   12.33         64.         18.          6.      0.40
        HYDROGRAPH AT
+                         DIVE16      213.   12.58         26.          8.          3.      0.40
        2 COMBINED AT
+                          CPE16      201.   12.58         90.         28.          9.      1.12
        ROUTED TO
+                         E16E15      197.   14.25         89.         28.          9.      1.12
        3 COMBINED AT
+                          CPE15     1147.   14.08        497.        139.         46.      4.95
        ROUTED TO
+                         E1524B     1137.   14.33        494.        139.         46.      4.95
        HYDROGRAPH AT
+                            E5B      447.   12.25         57.         19.          6.      0.29
        DIVERSION TO
+                         RETE5B      447.   12.25         45.         13.          4.      0.29
        HYDROGRAPH AT
+                         DIVE5B      204.   12.50         21.          7.          2.      0.29
        ROUTED TO
+                         E5E14B       89.   12.92         20.          7.          2.      0.29
        HYDROGRAPH AT
+                           E14B      884.   12.25        109.         36.         12.      0.53
        DIVERSION TO
+                         RET14B      884.   12.25         88.         24.          8.      0.53
        HYDROGRAPH AT
+                         DIV14B      372.   12.50         37.         12.          4.      0.53
        2 COMBINED AT
+                          CP14B      371.   12.50         57.         18.          6.      0.81
        ROUTED TO
+                         E14E24      180.   13.00         55.         18.          6.      0.81
        HYDROGRAPH AT
+                           E24B      788.   12.25        100.         32.         11.      0.46
        DIVERSION TO
+                         RET24B      788.   12.25         70.         20.          7.      0.46
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        HYDROGRAPH AT
+                         DIV24B      572.   12.42         43.         13.          4.      0.46
        3 COMBINED AT
+                         CPE24B     1205.   14.25        567.        164.         55.      6.23
        ROUTED TO
+                         E24E28     1192.   14.58        562.        164.         55.      6.23
        HYDROGRAPH AT
+                           E28B      773.   12.42        116.         37.         12.      0.54
        DIVERSION TO
+                         RET28B      773.   12.42         76.         21.          7.      0.54
        HYDROGRAPH AT
+                         DIV28B      555.   12.58         54.         16.          5.      0.54
        2 COMBINED AT
+                         CPE28B     1209.   14.50        602.        177.         59.      6.77
        ROUTED TO
+                         E28E31     1195.   14.83        597.        177.         59.      6.77
        HYDROGRAPH AT
+                            E25     1038.   12.50        184.         60.         20.      0.93
        DIVERSION TO
+                         RETE25     1038.   12.50        184.         56.         19.      0.93
        HYDROGRAPH AT
+                         DIVE25       23.   18.08         16.          4.          1.      0.93
        ROUTED TO
+                         E25E29       20.   19.75         16.          4.          1.      0.93
        HYDROGRAPH AT
+                            E29     1237.   12.50        203.         66.         22.      1.00
        DIVERSION TO
+                         RETE29     1237.   12.50        132.         37.         12.      1.00
        HYDROGRAPH AT
+                         DIVE29      906.   12.67         99.         29.         10.      1.00
        2 COMBINED AT
+                          CPE29      897.   12.67         96.         32.         11.      1.93
        ROUTED TO
+                         E29E31      573.   13.00         94.         32.         11.      1.93
        HYDROGRAPH AT
+                            E32      404.   12.25         48.         16.          5.      0.25
        DIVERSION TO
+                         RETE32      394.   12.17         30.          9.          3.      0.25
        HYDROGRAPH AT
+                         DIVE32      344.   12.33         25.          7.          2.      0.25
        ROUTED TO
+                         E32E31      155.   12.75         24.          7.          2.      0.25
        HYDROGRAPH AT
+                            E31      964.   12.42        157.         52.         17.      0.81
        DIVERSION TO
+                         RETE31      964.   12.42        100.         28.          9.      0.81
        HYDROGRAPH AT
+                         DIVE31      835.   12.58         79.         23.          8.      0.81
        4 COMBINED AT
+                          CPE31     1272.   14.75        741.        225.         75.      9.76
        ROUTED TO
+                         E31E30     1257.   15.08        730.        225.         75.      9.76
        HYDROGRAPH AT
+                           E30B      844.   12.83        186.         58.         19.      0.88
        DIVERSION TO
+                         RET30B      844.   12.83        122.         34.         11.      0.88
        HYDROGRAPH AT
+                         DIV30B      619.   13.08         84.         24.          8.      0.88
        2 COMBINED AT
+                          CPE30     1316.   13.33        793.        243.         81.     10.64
        ROUTED TO
+                         E30E26     1294.   13.42        789.        243.         81.     10.64
        HYDROGRAPH AT
+                           E26B      415.   12.33         56.         18.          6.      0.26
        DIVERSION TO
+                         RET26B      415.   12.33         37.         10.          3.      0.26
        HYDROGRAPH AT
+                         DIV26B      280.   12.50         26.          7.          2.      0.26
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            2 COMBINED AT
+                          CPE26      1311.   13.42         796.        248.         83.      10.90

            ROUTED TO
+                          E26E33     1274.   15.50         787.        248.         83.      10.90

            HYDROGRAPH AT
+                          E33B       1304.   12.33         183.         59.         20.       0.85

            DIVERSION TO
+                          RET33B     1304.   12.33         120.         34.         11.       0.85

            HYDROGRAPH AT
+                          DIV33B      972.   12.50          86.         25.          8.       0.85

            3 COMBINED AT
+                          CPE33B     1284.   15.50         797.        264.         88.      12.87

            ROUTED TO
+                          E33P9A     1279.   15.58         793.        264.         88.      12.87

            ROUTED TO
+                          E33P9B     1272.   15.67         791.        263.         88.      12.87

            HYDROGRAPH AT
+                          P9         1513.   12.42         268.         90.         30.       1.12

            DIVERSION TO
+                          RETP9       137.   11.50          53.         18.          6.       1.12

            HYDROGRAPH AT
+                          DIVP9      1513.   12.42         255.         72.         24.       1.12

            2 COMBINED AT
+                          CPP9       1421.   12.50         947.        326.        109.      13.99

            ROUTED TO
+                          P9EMF1     1302.   15.83         939.        326.        109.      13.99

            HYDROGRAPH AT
+                          EMF1B      1442.   12.42         233.         76.         25.       1.04

            DIVERSION TO
+                          REMF1B     1442.   12.42         152.         43.         14.       1.04

            HYDROGRAPH AT
+                          DEMF1B     1142.   12.58         114.         34.         11.       1.04

            2 COMBINED AT
+                          CPEMF1     2089.   12.67        1022.        351.        117.      15.03

            ROUTED TO
+                          EM1EM2     2055.   12.83        1021.        351.        117.      15.03

            HYDROGRAPH AT
+                          EMF2       1610.   12.83         393.        130.         43.       1.85

            DIVERSION TO
+                          RETEM2     1532.   12.83         195.         49.         16.       1.85

            HYDROGRAPH AT
+                          DIVEM2     1181.   13.17         198.         81.         27.       1.85

            2 COMBINED AT
+                          CPEMF2     2098.   12.83        1165.        406.        140.      16.88

            ROUTED TO
+                          EM2M3A     1916.   12.92        1160.        406.        140.      16.88

            ROUTED TO
+                          EM2M3B     1812.   13.00        1156.        406.        140.      16.88

            HYDROGRAPH AT
+                          EMF3       1324.   12.75         277.         91.         30.       1.49

            DIVERSION TO
+                          RETEM3      812.   12.33          98.         30.         10.       1.49

            HYDROGRAPH AT
+                          DIVEM3     1324.   12.75         218.         61.         20.       1.49

            2 COMBINED AT
+                          CPEMF3     2728.   12.92        1325.        455.        156.      18.37

            ROUTED TO
+                          EMF3RB     2683.   13.00        1321.        455.        156.      18.37

            HYDROGRAPH AT
+                          RITBAS      693.   12.08          44.         11.          4.       0.29

            ROUTED TO
+                          RITBAS        1.   12.92           1.          1.          1.       0.29

            2 COMBINED AT
+                          CPRITB     2683.   13.00        1320.        455.        157.      18.66

            ROUTED TO
+                          RBEMF4     2395.   13.25        1295.        455.        156.      18.66

            HYDROGRAPH AT
+                          R2          612.   12.67         101.         29.         10.       0.68

            DIVERSION TO
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+                          RETR2       398.   12.33          33.          9.          3.       0.68

            HYDROGRAPH AT
+                          DIVR2       612.   12.67          76.         20.          7.       0.68

            HYDROGRAPH AT
+                          R3          358.   12.58          55.         16.          5.       0.41

            DIVERSION TO
+                          RETR3       330.   12.50          29.          8.          3.       0.41

            HYDROGRAPH AT
+                          DIVR3       352.   12.67          30.          8.          3.       0.41

            2 COMBINED AT
+                          CPR2R3      962.   12.67         105.         28.          9.       1.09

            ROUTED TO
+                          R2R3R6      467.   14.17         100.         28.          9.       1.09

            HYDROGRAPH AT
+                          R6          409.   12.67          62.         18.          6.       0.50

            2 COMBINED AT
+                          CPR6        470.   14.25         155.         45.         15.       1.59

            ROUTED TO
+                          R6R9        434.   14.58         154.         45.         15.       1.59

            HYDROGRAPH AT
+                          R9          840.   12.33         123.         41.         14.       0.59

            DIVERSION TO
+                          RETR9       840.   12.33          97.         27.          9.       0.59

            HYDROGRAPH AT
+                          DIVR9       351.   12.67          45.         14.          5.       0.59

            2 COMBINED AT
+                          CPR9        609.   12.67         195.         58.         20.       2.19

            ROUTED TO
+                          R9R11       476.   13.25         194.         58.         20.       2.19

            HYDROGRAPH AT
+                          R11        1179.   12.50         184.         58.         19.       0.99

            DIVERSION TO
+                          RETR11     1179.   12.50         123.         34.         11.       0.99

            HYDROGRAPH AT
+                          DIVR11      859.   12.67          83.         24.          8.       0.99

            HYDROGRAPH AT
+                          DRR5        221.   13.67          36.          9.          3.       0.72

            HYDROGRAPH AT
+                          R5          546.   12.50          72.         21.          7.       0.50

            DIVERSION TO
+                          RETR5         4.    4.67           2.          1.          0.       0.50

            HYDROGRAPH AT
+                          DIVR5       546.   12.50          72.         21.          7.       0.50

            2 COMBINED AT
+                          CPR5        544.   12.50         107.         29.         10.       1.22

            ROUTED TO
+                          R5R8        470.   12.92         107.         29.         10.       1.22

            HYDROGRAPH AT
+                          R8          741.   12.42         115.         39.         13.       0.55

            DIVERSION TO
+                          RETR8       741.   12.42          91.         25.          8.       0.55

            HYDROGRAPH AT
+                          DIVR8       366.   12.67          42.         13.          4.       0.55

            2 COMBINED AT
+                          CPR8        721.   12.67         143.         42.         14.       1.77

            ROUTED TO
+                          R8R11       582.   13.33         143.         42.         14.       1.77

            3 COMBINED AT
+                          CPR11      1147.   13.25         400.        119.         40.       4.95

            ROUTED TO
+                          R11R13     1049.   13.75         396.        119.         40.       4.95

            HYDROGRAPH AT
+                          R13         708.   12.33          94.         31.         10.       0.50

            DIVERSION TO
+                          RETR13      705.   12.25          60.         17.          6.       0.50

            HYDROGRAPH AT
+                          DIVR13      599.   12.42          48.         14.          5.       0.50

            2 COMBINED AT
+                          CPR13      1071.   13.75         431.        131.         44.       5.45
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          ROUTED TO
+                        R13R16    1005.   14.25      428.      131.       44.      5.45
          HYDROGRAPH AT
+                           R16     765.   12.25      105.       35.       12.      0.50
          DIVERSION TO
+                        RETR16     765.   12.25       65.       19.        6.      0.50
          HYDROGRAPH AT
+                        DIVR16     604.   12.42       56.       17.        6.      0.50
          2 COMBINED AT
+                         CPR16    1025.   14.25      470.      145.       49.      5.95
          ROUTED TO
+                        R16R21     928.   15.33      464.      145.       49.      5.95
          HYDROGRAPH AT
+                           R21     757.   12.67      133.       41.       14.      0.84
          DIVERSION TO
+                        RETR21     305.   12.17       30.        9.        3.      0.84
          HYDROGRAPH AT
+                        DIVR21     757.   12.67      117.       32.       11.      0.84
          HYDROGRAPH AT
+                            R1    1372.   12.58      214.       66.       22.      1.45
          DIVERSION TO
+                         RETR1    1372.   12.58      187.       51.       17.      1.45
          HYDROGRAPH AT
+                         DIVR1     308.   13.08       48.       15.        5.      1.45
          ROUTED TO
+                          R1R4     108.   15.25       42.       15.        5.      1.45
          HYDROGRAPH AT
+                            R4     817.   12.58      106.       28.        9.      1.00
          2 COMBINED AT
+                          CPR4     802.   12.58      131.       41.       14.      2.45
          ROUTED TO
+                          R4R7     621.   13.08      130.       41.       14.      2.45
          HYDROGRAPH AT
+                            R7     965.   12.58      157.       49.       16.      1.00
          DIVERSION TO
+                         RETR7     938.   12.50       85.       24.        8.      1.00
          HYDROGRAPH AT
+                         DIVR7     890.   12.67       89.       25.        8.      1.00
          2 COMBINED AT
+                          CPR7    1259.   12.67      213.       65.       22.      3.45
          ROUTED TO
+                         R7R10    1040.   13.33      209.       65.       22.      3.45
          HYDROGRAPH AT
+                           R10     781.   12.83      161.       50.       17.      1.01
          DIVERSION TO
+                        RETR10     781.   12.83      129.       35.       12.      1.01
          HYDROGRAPH AT
+                        DIVR10     358.   13.33       50.       15.        5.      1.01
          2 COMBINED AT
+                         CPR10    1384.   13.33      252.       78.       26.      4.46
          ROUTED TO
+                        R10R12    1124.   13.67      247.       78.       26.      4.46
          HYDROGRAPH AT
+                           R12     939.   12.17      114.       39.       13.      0.49
          DIVERSION TO
+                        RETR12     850.   12.17       70.       20.        7.      0.49
          HYDROGRAPH AT
+                        DIVR12     887.   12.25       64.       19.        6.      0.49
          2 COMBINED AT
+                         CPR12    1165.   13.67      297.       96.       32.      4.95
          ROUTED TO
+                        R12R15     949.   14.58      284.       96.       32.      4.95
          HYDROGRAPH AT
+                           R15     616.   12.50       90.       28.        9.      0.56
          DIVERSION TO
+                        RETR15     537.   12.33       40.       12.        4.      0.56
          HYDROGRAPH AT
+                        DIVR15     616.   12.50       60.       17.        6.      0.56
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          2 COMBINED AT
+                         CPR15     953.   14.58      323.      111.       37.      5.51
          ROUTED TO
+                        R15R18     901.   15.00      315.      110.       37.      5.51
          HYDROGRAPH AT
+                           R18     661.   12.67      122.       38.       13.      0.80
          DIVERSION TO
+                        RETR18     661.   12.67       94.       26.        9.      0.80
          HYDROGRAPH AT
+                        DIVR18     354.   13.08       40.       12.        4.      0.80
          2 COMBINED AT
+                         CPR18     907.   15.00      344.      119.       40.      6.30
          ROUTED TO
+                        R18R22     852.   15.42      338.      119.       40.      6.30
          HYDROGRAPH AT
+                           R22     794.   12.33      109.       36.       12.      0.57
          DIVERSION TO
+                        RETR22     794.   12.33       67.       19.        6.      0.57
          HYDROGRAPH AT
+                        DIVR22     723.   12.42       58.       17.        6.      0.57
          HYDROGRAPH AT
+                           R14     806.   12.25      101.       34.       11.      0.50
          DIVERSION TO
+                        RETR14     751.   12.17       59.       17.        6.      0.50
          HYDROGRAPH AT
+                        DIVR14     746.   12.33       56.       17.        6.      0.50
          ROUTED TO
+                        R14R17     370.   12.75       55.       17.        6.      0.50
          HYDROGRAPH AT
+                           R17     497.   12.58       84.       27.        9.      0.49
          DIVERSION TO
+                        RETR17     497.   12.58       55.       15.        5.      0.49
          HYDROGRAPH AT
+                        DIVR17     360.   12.75       40.       12.        4.      0.49
          2 COMBINED AT
+                         CPR17     729.   12.75       94.       28.        9.      0.99
          ROUTED TO
+                        R17R22     519.   13.08       91.       28.        9.      0.99
          3 COMBINED AT
+                         CPR22     893.   15.42      444.      157.       53.      7.87
          ROUTED TO
+                        R22R21     857.   15.67      436.      156.       53.      7.87
          3 COMBINED AT
+                         CPR21    1527.   15.58      881.      302.      101.     14.65
          ROUTED TO
+                        R21R25    1477.   15.92      870.      301.      101.     14.65
          HYDROGRAPH AT
+                           R25     436.   12.25       49.       16.        5.      0.28
          DIVERSION TO
+                        RETR25     402.   12.17       25.        7.        2.      0.28
          HYDROGRAPH AT
+                        DIVR25     406.   12.33       30.        8.        3.      0.28
          HYDROGRAPH AT
+                           R20     562.   12.42       82.       27.        9.      0.50
          DIVERSION TO
+                        RETR20     562.   12.42       62.       17.        6.      0.50
          HYDROGRAPH AT
+                        DIVR20     296.   12.67       32.       10.        3.      0.50
          ROUTED TO
+                        R20R23     141.   13.17       30.       10.        3.      0.50
          HYDROGRAPH AT
+                           R23     700.   12.33       96.       32.       11.      0.50
          DIVERSION TO
+                        RETR23     700.   12.33       63.       18.        6.      0.50
          HYDROGRAPH AT
+                        DIVR23     492.   12.50       47.       14.        5.      0.50
          2 COMBINED AT
+                         CPR23     492.   12.50       76.       24.        8.      1.00
          ROUTED TO
```

```
+                          R23R25       282.  12.75         73.         24.          8.       1.00

          3 COMBINED AT
+                           CPR25      1495.  15.92        923.        324.        109.      15.93

          ROUTED TO
+                          R25R24      1495.  15.92        923.        324.        109.      15.93

          HYDROGRAPH AT
+                             R19      1808.  12.42        302.        101.         34.       1.53

          DIVERSION TO
+                          RETR19      1808.  12.42        192.         55.         18.       1.53

          HYDROGRAPH AT
+                          DIVR19      1558.  12.58        156.         46.         15.       1.53

          DIVERSION TO
+                          DETR19      1387.  12.58         70.         18.          6.       1.53

          HYDROGRAPH AT
+                          DIV19R       229.  13.17         86.         29.         10.       1.53

          ROUTED TO
+                          R19R24       191.  13.83         82.         29.         10.       1.53

          HYDROGRAPH AT
+                             R24       400.  12.33         55.         18.          6.       0.29

          DIVERSION TO
+                          RETR24       400.  12.33         35.         10.          3.       0.29

          HYDROGRAPH AT
+                          DIVR24       305.  12.50         28.          8.          3.       0.29

          3 COMBINED AT
+                           CPR24      1536.  15.92        991.        351.        118.      17.75

          ROUTED TO
+                          R24EM4      1526.  16.00        990.        351.        118.      17.75

          HYDROGRAPH AT
+                            EMF4       135.  12.08          8.          2.          1.       0.06

          3 COMBINED AT
+                          CPEMF4      2722.  13.33       1899.        690.        237.      55.93
1                                   SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   E7STOR
                               (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


      PLAN  1 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1567.20       0.00         27.         1.      0.00       25.75        0.00

      PLAN  2 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1567.17       0.00         27.         1.      0.00       25.75        0.00

      PLAN  3 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1567.06       0.00         24.         0.      0.00       26.00        0.00

      PLAN  4 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.91       0.00         21.         0.      0.00        0.00        0.00

      PLAN  5 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
```

```
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.72       0.00         16.         0.      0.00        0.00        0.00

      PLAN  6 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.61       0.00         14.         0.      0.00        0.00        0.00

      PLAN  7 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.53       0.00         12.         0.      0.00        0.00        0.00

      PLAN  8 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.47       0.00         11.         0.      0.00        0.00        0.00

      PLAN  9 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1566.00          1574.00         1574.00
                                 STORAGE               0.              607.            607.
                                 OUTFLOW               0.              104.            104.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1566.43       0.00         10.         0.      0.00        0.00        0.00
1                                   SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   RITBAS
                               (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


      PLAN  1 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1311.00          1318.00         1318.00
                                 STORAGE               0.              693.            693.
                                 OUTFLOW               0.                7.              7.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1311.98       0.00         22.         1.      0.00       13.00        0.00

      PLAN  2 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1311.00          1318.00         1318.00
                                 STORAGE               0.              693.            693.
                                 OUTFLOW               0.                7.              7.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1311.98       0.00         21.         1.      0.00       13.00        0.00

      PLAN  3 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                                 ELEVATION        1311.00          1318.00         1318.00
                                 STORAGE               0.              693.            693.
                                 OUTFLOW               0.                7.              7.


                      RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION    TIME OF      TIME OF
                        OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP  MAX OUTFLOW   FAILURE
                       PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS      HOURS        HOURS

                      1.00      1311.95       0.00         21.         1.      0.00       13.00        0.00
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     PLAN  4 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.92        0.00         20.         1.      0.00        13.00        0.00

     PLAN  5 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.87        0.00         19.         1.      0.00        13.00        0.00

     PLAN  6 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.85        0.00         19.         1.      0.00        13.00        0.00

     PLAN  7 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.83        0.00         18.         1.      0.00        12.92        0.00

     PLAN  8 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.82        0.00         18.         1.      0.00        12.92        0.00

     PLAN  9 ..............                   INITIAL VALUE     SPILLWAY CREST      TOP OF DAM
                                ELEVATION        1311.00            1318.00           1318.00
                                STORAGE               0.               693.              693.
                                OUTFLOW               0.                 7.                7.


                     RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                       OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                      PMF      W.S.ELEV    OVER DAM     AC-FT       CFS        HOURS        HOURS       HOURS

                     1.00      1311.81        0.00         18.         1.      0.00        12.92        0.00


*** NORMAL END OF HEC-1 ***
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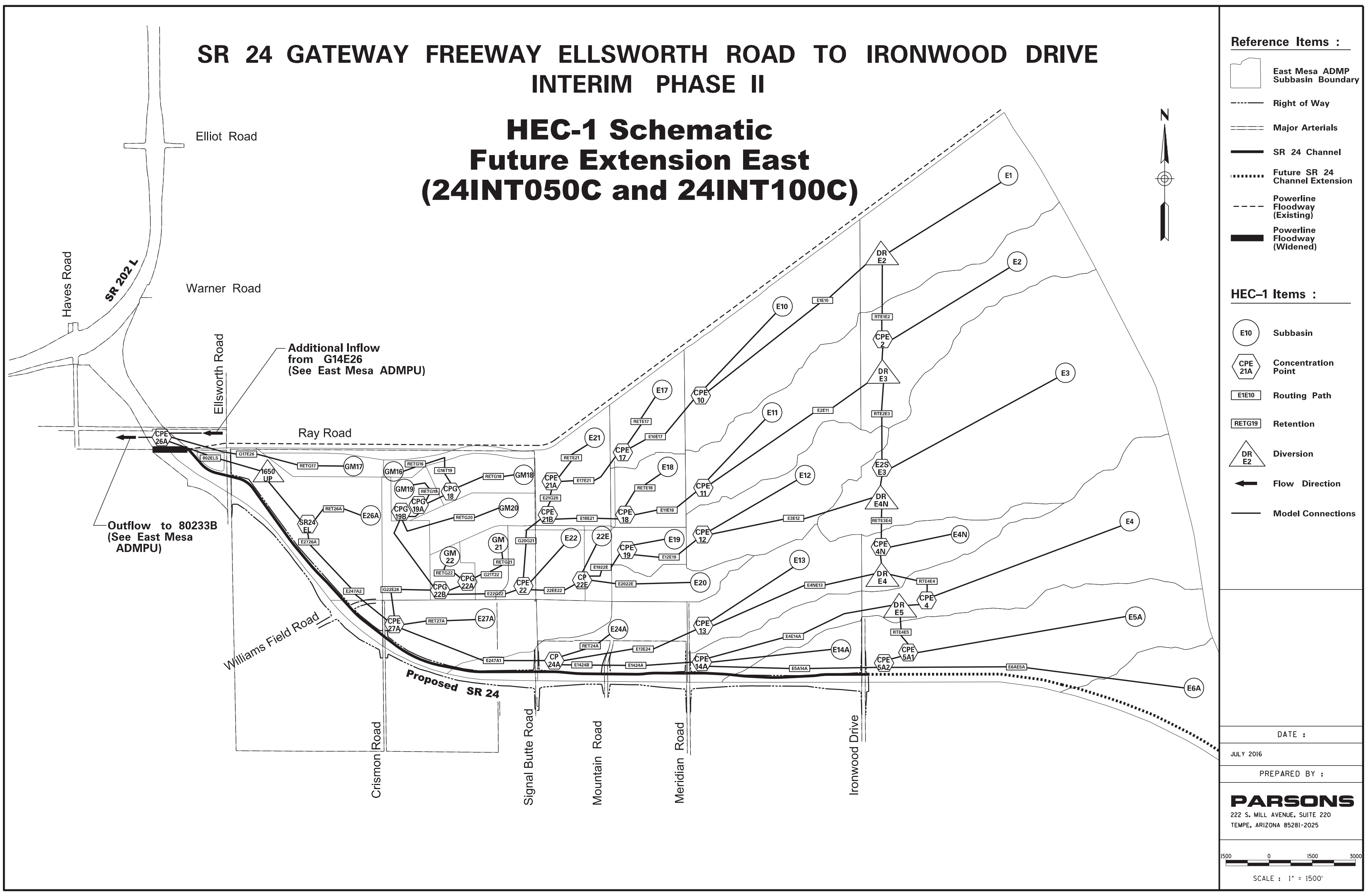
SR 24 GATEWAY FREEWAY ELLSWORTH ROAD TO IRONWOOD DRIVE
INTERIM PHASE II

HEC-1 Schematic
Future Extension East
(24INT050C and 24INT100C)



DATE :

JULY 2016

PREPARED BY :

PARSONS
222 S. MILL AVENUE, SUITE 220
TEMPE, ARIZONA 85281-2025

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1*****************************************                                                 ***************************************
 *                                       *                                                 *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                 *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                                                 *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                  *                                                 *        609 SECOND STREET            *
 *                                       *                                                 *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04JUL16  TIME  08:39:40   *                                                 *          (916) 756-1104             *
 *                                       *                                                 *                                     *
 *****************************************                                                 ***************************************




                                             X     X  XXXXXXX   XXXXX          X
                                             X     X  X        X     X        XX
                                             X     X  X        X               X
                                             XXXXXXX  XXXX     X       XXXXX   X
                                             X     X  X        X               X
                                             X     X  X        X     X         X
                                             X     X  XXXXXXX   XXXXX         XXX




           THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

           THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
           THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
           NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
           DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
           KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                  HEC-1 INPUT                                         PAGE  1

  LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     1            ID        24INT050C  50-YEAR, 24-hr Interim Conditions   2016-03-02
     2            ID        Copy of 24INT100 assumng concrete-lined channel for the following routes
     3            ID        E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
     4            ID        by Parsons Corporation
     5            ID
     6            ID        2015-12-22 The model reflects interim drainage conditions for SR 24
     7            ID        and it is based on Mesa ADMPU with revisions reflecting development work
     8            ID        around the corridor.
     9            ID
    10            ID        2016-03-02 Modified to combine CPG19B to CPG22B as result of the Eastmar
    11            ID        Development. G19E26 was subsequently removed.
    12            ID
    13            ID        2016-07-04 Modified to include concrete lining for the SR 24 Channel.
    14            ID
    15            ID
    16            ID  *********************************************************************
    17            ID        FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
    18            ID        Flood Control District of Maricopa County
    19            ID        50 YEAR
    20            ID        24 Hour Storm
    21            ID        Unit Hydrograph: S-Graph
    22            ID        08/05/2011
    23            IT       5       0       0    2000
    24            IN      15
    25            IO       5
                  *DIAGRAM
                  *
    26            JD   3.184  0.0001
    27            PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
    28            PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
    29            PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
    30            PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
    31            PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
    32            PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
    33            PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
    34            PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
    35            PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
    36            PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
    37            JD   3.168     1.0
    38            JD   3.104     5.0
    39            JD   3.025    10.0
    40            JD   2.923    20.0
    41            JD   2.866    30.0
    42            JD   2.824    40.0
    43            JD   2.792    50.0
    44            JD   2.770    60.0
                  *
    45            KK      P1   BASIN
    46            KM
    47            KM     Used the unit hydrograph for undeveloped conditions
    48            KM     by Parsons Corporation 2015-11
    49            BA   0.387
    50            LG    0.35    0.35    3.95    0.47       0
    51            UI       0      29      29      99     134     162     189     226     301     369
1                                                  HEC-1 INPUT                                         PAGE  2

  LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    52            UI     298     248     210     175     144     108      65      50      45      29
    53            UI      26       9       9       9       9       9       9       0       0       0
    54            UI       0       0       0       0       0       0       0       0       0       0
    55            UI       0       0       0       0       0       0       0       0       0       0
                  *
    56            KM  KK DIVP1  DIVERT
```

```
    57            KM
    58            KM     Revised by removing the retention to account for undeveloped conditions
    59            KM     by Parsons Corporation 2015-11
                  *DT RETP1    29.5     0.0
                  *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                  *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                  *

    60            KK  DP1PFW  DIVERT
    61            KM
    62            DT   DRPFW     0.0     0.0
    63            DI     0.0    50.0   100.0   150.0   200.0   250.0   300.0   400.0   500.0   600.0
    64            DQ     0.0    10.0    42.0    81.0   123.0   166.0   211.0   301.0   392.0   485.0
                  *

    65            KK    P1P2   ROUTE
    66            KM
    67            KM     Revised by using routing for undeveloped conditions
    68            KM     by Parsons Corporation 2015-11
    69            RS      22    FLOW
    70            RC   0.045   0.040   0.045    6529  0.0061    5.50
    71            RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
    72            RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                  *

    73            KK      P2   BASIN
    74            KM
    75            KM     Used the unit hydrograph for undeveloped conditions
    76            KM     by Parsons Corporation 2015-11
    77            BA   0.577
    78            LG    0.35    0.35    4.10    0.44       0
    79            UI       0      38      38      92     151     187     214     247     287     357
    80            UI     476     428     352     306     263     226     190     158     108      67
    81            UI      63      55      38      38      14      12      12      12      12      12
    82            UI      12       0       0       0       0       0       0       0       0       0
    83            UI       0       0       0       0       0       0       0       0       0       0
                  *
    84            KM  KK DIVP2  DIVERT
    85            KM
    86            KM     Revised by removing the retention to account for undeveloped conditions
    87            KM     by Parsons Corporation 2015-11
                  *DT RETP2    44.3     0.0
                  *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                  *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                  *
1                                                  HEC-1 INPUT                                         PAGE  3

  LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


    88            KK    CPP2 COMBINE
    89            KM        Combine Sub-basin P2 and routed flows from sub-basin P1
    90            HC       2
                  *

    91            KK    P2P4   ROUTE
    92            KM
    93            RS       5    FLOW
    94            RC   0.060   0.050   0.060    2856  0.0063    5.00
    95            RX    0.00  100.00  110.00  145.00  150.00  200.00  210.00  325.00
    96            RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    5.00
                  *

    97            KK      P4   BASIN
    98            KM
    99            BA   0.497
   100            LG    0.25    0.25    5.40    0.27      30
   101            UI       0      49      94     206     267     331     431     603     478     383
   102            UI     303     239     159      85      75      49      29      15      15      15
   103            UI      15       0       0       0       0       0       0       0       0       0
   104            UI       0       0       0       0       0       0       0       0       0       0
   105            UI       0       0       0       0       0       0       0       0       0       0
                  *

   106            KK   DIVP4  DIVERT
   107            KM
   108            DT   RETP4    50.8     0.0
   109            DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   110            DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                  *

   111            KK    CPP4 COMBINE
   112            KM
   113            HC       2
                  *

   114            KK    P4P6   ROUTE
   115            KM
   116            RS       6    FLOW
   117            RC   0.035   0.050   0.045    3423  0.0053    7.00
   118            RX    0.00   10.00   35.00  100.00  105.00  120.00  125.00  140.00
   119            RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    7.00
                  *

   120            KK      P6   BASIN
   121            KM
   122            BA   0.504
   123            LG    0.25    0.25    5.20    0.31      31
   124            UI       0      39      39     137     182     219     258     310     423     485
   125            UI     379     319     266     221     180     126      72      65      49      39
   126            UI      23      12      12      12      12      12       0       0       0       0
   127            UI       0       0       0       0       0       0       0       0       0       0
   128            UI       0       0       0       0       0       0       0       0       0       0
```

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                             *
   1                                                       HEC-1 INPUT                                             PAGE  4

              LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


               129           KK   DIVP6  DIVERT
               130           KM
               131           DT   RETP6    50.4     0.0
               132           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               133           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                             *

               134           KK    CPP6 COMBINE
               135           KM
               136           HC       2
                             *

               137           KK   P6GM8   ROUTE
               138           KM
               139           RS       3    FLOW
               140           RC   0.035   0.030   0.035    2432  0.0019    5.00
               141           RX  950.00  989.00  991.00 1003.00 1007.00 1019.00 1021.00 1050.00
               142           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                             *

               143           KK  GM8G10   ROUTE
               144           KM
               145           RS       3    FLOW
               146           RC   0.035   0.035   0.035    2628  0.0051    5.00
               147           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
               148           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                             *

               149           KK   DRPFWRETRIEVE
               150           KM
               151           DR   DRPFW
                             *

               152           KK   P1PFW   ROUTE
               153           KM
               154           KM     Revised by using routing for undeveloped conditions
               155           KM     by Parsons Corporation 2015-11
               156           RS       2    FLOW
               157           RC   0.030   0.016   0.030    8110  0.0062    8.00
               158           RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
               159           RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                             *

               160           KK      P3   BASIN
               161           KM
               162           KM     Used the unit hydrograph for undeveloped conditions
               163           KM     by Parsons Corporation 2015-11
               164           BA   0.522
               165           LG    0.35    0.35    3.95    0.47       0
               166           UI       0      27      27      29      91     112     132     149     165     187
               167           UI     209     250     317     349     290     251     224     201     175     156
               168           UI     136     117      89      61      48      45      43      27      27      25
               169           UI       8       8       8       8       8       8       8       8       8       0
               170           UI       0       0       0       0       0       0       0       0       0       0
                             *
   1                                                       HEC-1 INPUT                                             PAGE  5

              LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

               171           KM  KK DIVP3  DIVERT
               172           KM
               173           KM     Revised by removing the retention to account for undeveloped conditions
               174           KM     by Parsons Corporation 2015-11
                             *DT RETP3    39.9     0.0
                             *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                             *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                             *

               175           KK    CPP3 COMBINE
               176           KM
               177           HC       2    0.91
                             *

               178           KK    P3P5   ROUTE
               179           KM
               180           RS       1    FLOW
               181           RC   0.030   0.016   0.030    2889  0.0062    8.00
               182           RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
               183           RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                             *

               184           KK      P5   BASIN
               185           KM
               186           BA   0.254
               187           LG    0.25    0.25    6.00    0.22      30
               188           UI       0      23      40      93     123     149     186     269     264     204
               189           UI     167     134     104      64      40      34      23      14       7       7
               190           UI       7       7       0       0       0       0       0       0       0       0
               191           UI       0       0       0       0       0       0       0       0       0       0
               192           UI       0       0       0       0       0       0       0       0       0       0
                             *

               193           KK   DIVP5  DIVERT
               194           KM
               195           DT   RETP5    17.4     0.0
               196           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               197           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
```

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                             *

               198           KK    CPP5 COMBINE
               199           KM
               200           HC       2
                             *

               201           KK    P5P7   ROUTE
               202           KM        Powerline Floodway
               203           RS       1    FLOW
               204           RC   0.030   0.016   0.030    3146  0.0057    8.00
               205           RX    0.00   10.00   11.00   21.00   27.00   37.00   40.00   50.00
               206           RY    8.00    8.00    7.50    1.00    1.00    7.50    8.00    8.00
                             *
   1                                                       HEC-1 INPUT                                             PAGE  6

              LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


               207           KK      P7   BASIN
               208           KM
               209           BA   0.429
               210           LG    0.25    0.19    6.60    0.17      30
               211           UI       0      40      71     163     214     260     328     478     436     341
               212           UI     276     220     170      94      68      52      40      16      12      12
               213           UI      12      12       0       0       0       0       0       0       0       0
               214           UI       0       0       0       0       0       0       0       0       0       0
               215           UI       0       0       0       0       0       0       0       0       0       0
                             *

               216           KK   DIVP7  DIVERT
               217           KM
               218           DT   RETP7    31.0     0.0
               219           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               220           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                             *

               221           KK    CPP7 COMBINE
               222           KM
               223           HC       3    3.17
                             *

               224           KK  P7GM14   ROUTE
               225           KM
               226           RS       9    FLOW
               227           RC   0.025   0.016   0.025   10659  0.0036    7.00
               228           RX    0.00   14.50   16.00   24.60   32.60   41.20   42.70   57.20
               229           RY    7.00    7.00    6.00    0.25    0.25    6.00    7.00    7.00
                             *

               230           KK     GM1   BASIN
               231           KM
               232           BA   0.345
               233           LG    0.10    0.15    8.00    0.13       5
               234           UI       0      38      93     178     228     297     447     394     303     232
               235           UI     175      98      64      45      30      12      12      12      12       0
               236           UI       0       0       0       0       0       0       0       0       0       0
               237           UI       0       0       0       0       0       0       0       0       0       0
               238           UI       0       0       0       0       0       0       0       0       0       0
                             *

               239           KK     GM2   BASIN
               240           KM
               241           BA   0.683
               242           LG    0.20    0.25    6.00    0.23      48
               243           UI       0     104     415     625     942    1178     805     560     298     165
               244           UI      96      32      32      32       0       0       0       0       0       0
               245           UI       0       0       0       0       0       0       0       0       0       0
               246           UI       0       0       0       0       0       0       0       0       0       0
               247           UI       0       0       0       0       0       0       0       0       0       0
                             *
   1                                                       HEC-1 INPUT                                             PAGE  7

              LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


               248           KK     GM3   BASIN
               249           KM
               250           BA   0.288
               251           LG    0.13    0.15    8.80    0.08      71
               252           UI       0     279     882     743     244      57       0       0       0       0
               253           UI       0       0       0       0       0       0       0       0       0       0
               254           UI       0       0       0       0       0       0       0       0       0       0
               255           UI       0       0       0       0       0       0       0       0       0       0
               256           UI       0       0       0       0       0       0       0       0       0       0
                             *

               257           KK  CPG123 COMBINE
               258           KM
               259           HC       3
                             *

               260           KK   DIVG1  DIVERT
               261           KM
               262           DT   RETG1   102.1     0.0
               263           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               264           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                             *

               265           KK   GM1T5   ROUTE
               266           KM
               267           RS       1    FLOW
               268           RC   0.040   0.035   0.040    2680  0.0050    5.00
```

```
   269          RX    0.00    5.00   10.00   22.00   33.00   45.00   50.00   55.00
   270          RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                *

   271          KK     GM5   BASIN
   272          KM
   273          BA   0.176
   274          LG    0.11    0.13   10.10    0.05      60
   275          UI       0      68     210     385     353     206      81      36      12      12
   276          UI       0       0       0       0       0       0       0       0       0       0
   277          UI       0       0       0       0       0       0       0       0       0       0
   278          UI       0       0       0       0       0       0       0       0       0       0
   279          UI       0       0       0       0       0       0       0       0       0       0
                *

   280          KK   DIVG5  DIVERT
   281          KM
   282          DT   RETG5    13.6     0.0
   283          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   284          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *
1                                         HEC-1 INPUT                                             PAGE  8

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   285          KK    CPG5 COMBINE
   286          KM
   287          HC       2
                *

   288          KK   GM5T7   ROUTE
   289          KM
   290          RS       3    FLOW
   291          RC   0.032   0.032   0.032    3745  0.0020    5.50
   292          RX    0.00    5.00   10.00   24.00   44.00   58.00   63.00   68.00
   293          RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                *

   294          KK     GM6   BASIN
   295          KM
   296          BA   0.368
   297          LG    0.25    0.15    8.00    0.10      38
   298          UI       0     240     705    1079     558     177      55      32       0       0
   299          UI       0       0       0       0       0       0       0       0       0       0
   300          UI       0       0       0       0       0       0       0       0       0       0
   301          UI       0       0       0       0       0       0       0       0       0       0
   302          UI       0       0       0       0       0       0       0       0       0       0
                *

   303          KK   DIVG6  DIVERT
   304          KM
   305          DT   RETG6    26.8     0.0
   306          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   307          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

   308          KK     GM7   BASIN
   309          KM
   310          BA   0.216
   311          LG    0.14    0.19    6.60    0.21      16
   312          UI       0      29      95     155     208     328     286     209     152      88
   313          UI      49      32      15       9       9       9       0       0       0       0
   314          UI       0       0       0       0       0       0       0       0       0       0
   315          UI       0       0       0       0       0       0       0       0       0       0
   316          UI       0       0       0       0       0       0       0       0       0       0
                *

   317          KK   DIVG7  DIVERT
   318          KM
   319          DT   RETG7    14.6     0.0
   320          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   321          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *
1                                         HEC-1 INPUT                                             PAGE  9

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   322          KK   CPG7A COMBINE
   323          KM
   324          HC       2
                *

   325          KK   CPG7B COMBINE
   326          KM
   327          HC       2
                *

   328          KK   GM7T9   ROUTE
   329          KM
   330          RS       1    FLOW
   331          RC   0.032   0.032   0.032    2140  0.0020    5.50
   332          RX    0.00    5.00   10.00   24.00   44.00   58.00   63.00   68.00
   333          RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                *

   334          KK     GM8   BASIN
   335          KM
   336          BA   0.558
   337          LG    0.24    0.25    5.60    0.27      43
   338          UI       0      82     310     473     681     964     681     481     306     140
   339          UI      94      41      25      25       0       0       0       0       0       0
```

```
   340          UI       0       0       0       0       0       0       0       0       0       0
   341          UI       0       0       0       0       0       0       0       0       0       0
   342          UI       0       0       0       0       0       0       0       0       0       0
                *

   343          KK   DIVG8  DIVERT
   344          KM
   345          DT   RETG8    40.1     0.0
   346          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   347          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

   348          KK     GM9   BASIN
   349          KM
   350          BA   0.095
   351          LG    0.16    0.25    5.40    0.32      22
   352          UI       0      69     206     278     127      39      10       0       0       0
   353          UI       0       0       0       0       0       0       0       0       0       0
   354          UI       0       0       0       0       0       0       0       0       0       0
   355          UI       0       0       0       0       0       0       0       0       0       0
   356          UI       0       0       0       0       0       0       0       0       0       0
                *

   357          KK   DIVG9  DIVERT
   358          KM
   359          DT   RETG9     6.7     0.0
   360          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   361          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *
1                                         HEC-1 INPUT                                             PAGE 10

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   362          KK   CPG9A COMBINE
   363          KM
   364          HC       2
                *

   365          KK    GM10   BASIN
   366          KM
   367          BA   0.280
   368          LG    0.23    0.17    6.80    0.17      40
   369          UI       0      38     131     210     285     447     362     265     188      98
   370          UI      62      38      13      12      12       0       0       0       0       0
   371          UI       0       0       0       0       0       0       0       0       0       0
   372          UI       0       0       0       0       0       0       0       0       0       0
   373          UI       0       0       0       0       0       0       0       0       0       0
                *

   374          KK  DIVG10  DIVERT
   375          KM
   376          DT  RETG10    17.5     0.0
   377          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   378          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

   379          KK    GM11   BASIN
   380          KM
   381          BA   0.075
   382          LG    0.19    0.25    4.00    0.63      30
   383          UI       0      23      75     125     162     101      54      23      10       5
   384          UI       5       0       0       0       0       0       0       0       0       0
   385          UI       0       0       0       0       0       0       0       0       0       0
   386          UI       0       0       0       0       0       0       0       0       0       0
   387          UI       0       0       0       0       0       0       0       0       0       0
                *

   388          KK  DIVG11  DIVERT
   389          KM
   390          DT  RETG11     5.4     0.0
   391          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
   392          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                *

   393          KK   CPG11 COMBINE
   394          KM
   395          HC       2
                *

   396          KK   CPG9B COMBINE
   397          KM
   398          HC       3
                *
1                                         HEC-1 INPUT                                             PAGE 11

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   399          KK  GM9T14   ROUTE
   400          KM
   401          RS       3    FLOW
   402          RC   0.032   0.032   0.032    3560  0.0020    6.00
   403          RX    0.00   15.00   20.00   34.00   46.00   60.00   65.00   80.00
   404          RY    6.00    5.00    4.50    1.00    1.00    4.50    5.00    6.00
                *

   405          KK    GM12   BASIN
   406          KM
   407          BA   0.118
   408          LG    0.10    0.15    8.80    0.09      78
   409          UI       0     129     402     284      76      17       0       0       0       0
   410          UI       0       0       0       0       0       0       0       0       0       0
```

```
            411           UI       0       0       0       0       0       0       0       0       0       0
            412           UI       0       0       0       0       0       0       0       0       0       0
            413           UI       0       0       0       0       0       0       0       0       0       0
                          *

            414           KK  DIVG12  DIVERT
            415           KM
            416           DT  RETG12     9.4     0.0
            417           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
            418           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

            419           KK  G12T13   ROUTE
            420           KM
            421           RS       2    FLOW
            422           RC   0.032   0.032   0.032    4000  0.0042    6.00
            423           RX  950.00  985.00  995.00 1003.00 1005.00 1013.00 1023.00 1068.00
            424           RY    6.00    5.50    5.00    1.00    1.00    5.00    5.50    6.00
                          *

            425           KK    GM13   BASIN
            426           KM
            427           BA   0.292
            428           LG    0.23    0.25    5.60    0.27      49
            429           UI       0     256     804     796     294      78      29       0       0       0
            430           UI       0       0       0       0       0       0       0       0       0       0
            431           UI       0       0       0       0       0       0       0       0       0       0
            432           UI       0       0       0       0       0       0       0       0       0       0
            433           UI       0       0       0       0       0       0       0       0       0       0
                          *

            434           KK  DIVG13  DIVERT
            435           KM
            436           DT  RETG13    22.6     0.0
            437           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
            438           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                       HEC-1 INPUT                                             PAGE 12

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            439           KK   CPG13 COMBINE
            440           KM
            441           HC       2
                          *

            442           KK  G13T14   ROUTE
            443           KM
            444           RS       1    FLOW
            445           RC   0.032   0.018   0.032    1320  0.0030    3.50
            446           RX    0.00    5.00   12.00   15.00   65.00   68.00  135.00  140.00
            447           RY    3.50    3.00    2.50    1.00    1.00    2.50    3.00    3.50
                          *

            448           KK    GM14   BASIN
            449           KM
            450           BA   0.347
            451           LG    0.17    0.25    4.55    0.44      56
            452           UI       0     211     619    1004     558     194      62      29       0       0
            453           UI       0       0       0       0       0       0       0       0       0       0
            454           UI       0       0       0       0       0       0       0       0       0       0
            455           UI       0       0       0       0       0       0       0       0       0       0
            456           UI       0       0       0       0       0       0       0       0       0       0
                          *

            457           KK  DIVG14  DIVERT
            458           KM
            459           DT  RETG14    25.6     0.0
            460           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
            461           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

            462           KK  CPG14A COMBINE
            463           KM
            464           HC       2
                          *

            465           KK  CPG14B COMBINE
            466           KM
            467           HC       2
                          *

            468           KK  CPG14C COMBINE
            469           KM
            470           HC       2
                          *

            471           KK  G14E26   ROUTE
            472           KM
            473           RS       1    FLOW
            474           RC   0.025   0.015   0.025    1450  0.0045    9.00
            475           RX    0.00   13.00   15.30   25.00   33.00   42.70   45.00   58.00
            476           RY    9.00    9.00    7.50    1.00    1.00    7.50    9.00    9.00
                          *
            477           KM
1                                                       HEC-1 INPUT                                             PAGE 13

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            478           KK      E1   BASIN
            479           KM
```

```
            480           BA   0.886
            481           LG    0.35    0.35    3.95    0.47       0
            482           UI       0      55      55     115     203     259     301     338     392     455
            483           UI     596     700     574     488     430     369     320     273     228     162
            484           UI      96      92      88      55      55      34      17      17      17      17
            485           UI      17      17      17       0       0       0       0       0       0       0
            486           UI       0       0       0       0       0       0       0       0       0       0
                          *
            487           KM  KK DIVE1  DIVERT
            488           KM
            489           KM     Revised by removing the retention to account for undeveloped conditions
            490           KM     by Parsons Corporation 2015-11
                          *DT RETE1    67.6     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *

            491           KK    DE1S  DIVERT
            492           KM
            493           DT    DRE2     0.0     0.0
            494           DI     0.0    88.0   176.0   264.0   352.0   440.0   528.0     0.0     0.0     0.0
            495           DQ     0.0    58.0   126.0   201.0   277.0   355.0   434.0     0.0     0.0     0.0
                          *

            496           KK   E1E10   ROUTE
            497           KM
            498           KM     Revised by using routing for undeveloped conditions
            499           KM     by Parsons Corporation 2015-11
            500           RS      26    FLOW
            501           RC   0.060   0.050   0.060    7806  0.0063    5.00
            502           RX    0.00  500.00 1000.00 1003.00 1007.00 1011.00 1511.00 2011.00
            503           RY    5.00    4.50    4.00    1.00    1.00    3.00    3.50    4.00
                          *

            504           KK     E10   BASIN
            505           KM
            506           KM     Used the unit hydrograph for undeveloped conditions
            507           KM     by Parsons Corporation 2015-11
            508           BA   0.823
            509           LG    0.35    0.35    3.95    0.47       0
            510           UI       0      47      47      79     167     211     246     276     312     358
            511           UI     427     556     592     483     418     373     322     283     243     211
            512           UI     157     105      83      77      65      47      47      24      14      14
            513           UI      14      14      14      14      14      14       0       0       0       0
            514           UI       0       0       0       0       0       0       0       0       0       0
                          *
            515           KM  KKDIVE10  DIVERT
            516           KM
            517           KM     Revised by removing the retention to account for undeveloped conditions
            518           KM     by Parsons Corporation 2015-11
            519           KM  DTRETE10    62.9     0.0
            520           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
1                                                       HEC-1 INPUT                                             PAGE 14

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            521           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                          *

            522           KK   CPE10 COMBINE
            523           KM
            524           HC       2
                          *

            525           KK  E10E17   ROUTE
            526           KM
            527           KM     Buildout routing steps reduced from 5 to 3 through the interim condition
            528           KM     by Parsons Corporation 2015-11
            529           RS       3    FLOW
            530           RC   0.045   0.035   0.045    3407  0.0048    5.00
            531           RX    0.00  100.00  110.00  145.00  150.00  200.00  210.00  325.00
            532           RY    5.00    5.00    3.00    1.00    1.00    3.00    5.00    5.00
                          *

            533           KK     E17   BASIN
            534           KM
            535           KM     Gila River Ranches Unit 3
            536           KM     Buildout conditions existent through the interim condition
            537           KM
            538           KM     Kieghley Place
            539           KM     Buildout conditions assumed through the interim condition
            540           KM     by Parsons Corporation 2015-11
            541           BA   0.271
            542           LG    0.26    0.25    5.00    0.33      29
            543           UI       0      27      55     118     153     190     260     331     254     204
            544           UI     160     123      71      46      36      27       9       8       8       8
            545           UI       8       0       0       0       0       0       0       0       0       0
            546           UI       0       0       0       0       0       0       0       0       0       0
            547           UI       0       0       0       0       0       0       0       0       0       0
                          *

            548           KK  DIVE17  DIVERT
            549           KM
            550           KM     Buildout retention in place through the interim condition
            551           KM     by Parsons Corporation 2015-11
            552           DT  RETE17    18.0     0.0
            553           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
            554           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

            555           KK   CPE17 COMBINE
            556           KM
            557           HC       2
```

```
                      *

         558          KK  E17E21   ROUTE
         559          KM
         560          KM     Buildout routing steps kept at 4
         561          KM     by Parsons Corporation 2015-11
         562          RS       4    FLOW
         563          RC   0.030   0.045   0.030    2832  0.0042 1440.20
1                                            HEC-1 INPUT                                              PAGE 15

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         564          RX    0.00   90.00  100.00  115.00  180.00  195.00  255.00  260.00
         565          RY  1440.0 1439.90 1439.80 1438.00 1438.00 1440.00 1440.10 1440.20
                      *

         566          KK     E21   BASIN
         567          KM
         568          KM     Mountain Horizons
         569          KM     Buildout conditions assumed through the interim condition
         570          KM     by Parsons Corporation 2015-11
         571          BA   0.311
         572          LG    0.25    0.25    6.00    0.22      30
         573          UI       0      30      56     125     162     199     257     368     305     243
         574          UI     193     153     108      59      49      31      24       9       9       9
         575          UI       9       0       0       0       0       0       0       0       0       0
         576          UI       0       0       0       0       0       0       0       0       0       0
         577          UI       0       0       0       0       0       0       0       0       0       0
                      *

         578          KK  DIVE21  DIVERT
         579          KM
         580          KM     Buildout retention in place through the interim condition
         581          KM     by Parsons Corporation 2015-11
         582          DT  RETE21    20.3     0.0
         583          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         584          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

         585          KK  CPE21A COMBINE
         586          KM
         587          HC       2
                      *

         588          KK  E21G20   ROUTE
         589          KM
         590          RS       1    FLOW
         591          RC   0.032   0.032   0.032    1655  0.0036    5.50
         592          RX    0.00    5.00   10.00   24.00   34.00   48.00   53.00   58.00
         593          RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                      *
         594          KM

         595          KK    DRE2RETRIEVE
         596          KM
         597          DR    DRE2
                      *

         598          KK  RTE1E2   ROUTE
         599          KM
         600          KM     Revised by using routing for undeveloped conditions
         601          KM     by Parsons Corporation 2015-11
         602          RS       4    FLOW
         603          RC   0.035   0.030   0.025    4100  0.0035    6.00
         604          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
         605          RY    6.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                      *
1                                            HEC-1 INPUT                                              PAGE 16

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         606          KK      E2   BASIN
         607          KM
         608          KM     Used the unit hydrograph for undeveloped conditions
         609          KM     by Parsons Corporation 2015-11
         610          BA   0.779
         611          LG    0.35    0.35    4.25    0.41       0
         612          UI       0      45      45      77     159     202     234     263     298     342
         613          UI     412     536     556     456     394     352     304     267     228     196
         614          UI     145      95      78      74      58      45      45      19      14      14
         615          UI      14      14      14      14      14       0       0       0       0       0
         616          UI       0       0       0       0       0       0       0       0       0       0
                      *
         617          KM  KK DIVE2  DIVERT
         618          KM
         619          KM     Revised by removing the retention to account for undeveloped conditions
         620          KM     by Parsons Corporation 2015-11
                      *DT RETE2    60.4     0.0
                      *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                      *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                      *

         621          KK    CPE2 COMBINE
         622          KM
         623          HC       2    1.67
                      *

         624          KK    DE2S  DIVERT
         625          KM
         626          DT    DRE3     0.0     0.0
         627          DI     0.0   135.0   279.0   431.0   583.0   738.0   894.0     0.0     0.0     0.0
         628          DQ     0.0    15.0   121.0   243.0   370.0   504.0   636.0     0.0     0.0     0.0
```

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                      *

         629          KK   E2E11   ROUTE
         630          KM
         631          KM     Revised by using routing for undeveloped conditions
         632          KM     by Parsons Corporation 2015-11
         633          RS      34    FLOW
         634          RC   0.055   0.045   0.055    9374  0.0052    5.00
         635          RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
         636          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                      *

         637          KK     E11   BASIN
         638          KM
         639          KM     Used the unit hydrograph for undeveloped conditions
         640          KM     by Parsons Corporation 2015-11
         641          BA   0.600
         642          LG    0.35    0.35    3.95    0.47       0
         643          UI       0      37      37      76     135     174     201     226     261     303
         644          UI     394     472     392     332     293     252     220     186     157     114
         645          UI      70      63      60      39      37      28      11      11      11      11
         646          UI      11      11      11       0       0       0       0       0       0       0
         647          UI       0       0       0       0       0       0       0       0       0       0
                      *
1                                            HEC-1 INPUT                                              PAGE 17

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         648          KM  KKDIVE11  DIVERT
         649          KM
         650          KM     Revised by removing the retention to account for undeveloped conditions
         651          KM     by Parsons Corporation 2015-11
         652          KM  DTRETE11    45.8     0.0
         653          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
         654          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                      *

         655          KK   CPE11 COMBINE
         656          KM
         657          HC       2
                      *

         658          KK  E11E18   ROUTE
         659          KM
         660          KM     Buildout routing steps reduced from 22 to 9 through the interim condition
         661          KM     by Parsons Corporation 2015-11
         662          RS       9    FLOW
         663          RC   0.045   0.040   0.045    3164  0.0044    5.50
         664          RX    0.00  500.00 1000.00 1005.00 1006.00 1010.00 1510.00 2010.00
         665          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                      *

         666          KK     E18   BASIN
         667          KM
         668          KM     Rancho Apache
         669          KM     Existing and Buildout conditions are the same
         670          KM     by Parsons Corporation 2015-11
         671          BA   0.224
         672          LG    0.30    0.15    7.00    0.14      16
         673          UI       0      30     103     166     224     352     291     213     153      82
         674          UI      51      30      12       9       9       0       0       0       0       0
         675          UI       0       0       0       0       0       0       0       0       0       0
         676          UI       0       0       0       0       0       0       0       0       0       0
         677          UI       0       0       0       0       0       0       0       0       0       0
                      *

         678          KK  DIVE18  DIVERT
         679          KM
         680          DT  RETE18     0.3     0.0
         681          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         682          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                      *

         683          KK   CPE18 COMBINE
         684          KM
         685          HC       2
                      *
1                                            HEC-1 INPUT                                              PAGE 18

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         686          KK  E18E21   ROUTE
         687          KM
         688          KM     Buildout routing steps unchanged
         689          KM     by Parsons Corporation 2015-11
         690          RS       2    FLOW
         691          RC   0.035   0.040   0.045    2664  0.0053    5.00
         692          RX    0.00   15.00   50.00   60.00  100.00  110.00  290.00  300.00
         693          RY    3.50    3.00    3.00    1.00    1.00    3.00    3.00    5.00
                      *

         694          KK  CPE21B COMBINE
         695          KM
         696          HC       2    3.90
                      *

         697          KK  G20G21   ROUTE
         698          KM
         699          KM
         700          RS       2    FLOW
         701          RC   0.032   0.032   0.032    1901  0.0021    5.50
         702          RX    0.00    1.00    5.00   24.00  124.00  138.00  143.00  148.00
```

```
      703          RY    5.50    5.00    4.50    1.00    1.00    4.50    5.00    5.50
                   *
      704          KM

      705          KK    DRE3RETRIEVE
      706          KM
      707          DR    DRE3
                   *

      708          KK  RTE2E3   ROUTE
      709          KM
      710          KM     Revised by using routing for undeveloped conditions
      711          KM     by Parsons Corporation 2015-11
      712          RS       4    FLOW
      713          RC   0.035   0.030   0.025    3678  0.0035    6.00
      714          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
      715          RY    6.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                   *

      716          KK      E3   BASIN
      717          KM
      718          KM     Used the unit hydrograph for undeveloped conditions
      719          KM     by Parsons Corporation 2015-11
      720          BA   2.234
      721          LG    0.35    0.35    4.60    0.33       0
      722          UI       0      91      91      91     136     303     356     427     467     510
      723          UI     552     605     672     731     857    1035    1206    1075     936     840
      724          UI     769     712     638     576     531     468     432     369     285     220
      725          UI     162     158     150     150      92      91      91      79      28      28
      726          UI      28      28      28      28      28      28      28      28      28      28
      727          UI       0       0       0       0       0       0       0       0       0       0
                   *
      728          KM  KK DIVE3  DIVERT
1                                          HEC-1 INPUT                                         PAGE 19

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

      729          KM
      730          KM     Revised by removing the retention to account for undeveloped conditions
      731          KM     by Parsons Corporation 2015-11
                   *DT RETE3   178.6     0.0
                   *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                   *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.
                   *

      732          KK   E2SE3 COMBINE
      733          KM
      734          HC       2     3.9
                   *

      735          KK    DE3S  DIVERT
      736          KM
      737          DT   DRE4N     0.0     0.0
      738          DI     0.0   192.0   476.0   774.0  1079.0  1390.0  1699.0     0.0     0.0     0.0
      739          DQ     0.0     5.0   197.0   415.0   656.0   912.0  1175.0     0.0     0.0     0.0
                   *

      740          KK   E3E12   ROUTE
      741          KM
      742          KM     Revised by using routing for undeveloped conditions
      743          KM     by Parsons Corporation 2015-11
      744          RS      15    FLOW
      745          RC   0.060   0.050   0.060    4852  0.0054    5.50
      746          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
      747          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                   *

      748          KK     E12   BASIN
      749          KM
      750          KM     Used the unit hydrograph for undeveloped conditions.
      751          KM     by Parsons Corporation 2015-11
      752          BA   0.573
      753          LG    0.35    0.35    4.60    0.33       0
      754          UI       0      32      32      49     112     140     164     184     208     237
      755          UI     275     354     415     346     296     263     232     202     177     154
      756          UI     126      89      57      55      53      35      32      30      10      10
      757          UI      10      10      10      10      10      10       0       0       0       0
      758          UI       0       0       0       0       0       0       0       0       0       0
                   *
      759          KM  KKDIVE12  DIVERT
      760          KM
      761          KM     Revised by removing the retention to account for undeveloped conditions
      762          KM     by Parsons Corporation 2015-11
      763          KM  DTRETE12    43.7     0.0
      764          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
      765          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                   *
1                                          HEC-1 INPUT                                         PAGE 20

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      766          KK   CPE12 COMBINE
      767          KM
      768          HC       2
                   *

      769          KK  E12E19   ROUTE
      770          KM
      771          KM     Buildout routing steps kept at 9 through the interim condition
      772          KM     by Parsons Corporation 2015-11
      773          RS       9    FLOW
      774          RC   0.060   0.055   0.060    2707  0.0052    5.50
```

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      775          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
      776          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                   *

      777          KK     E19   BASIN
      778          KM
      779          KM     Part of Superstition View
      780          KM     Existing conditions assumed through the interim condition
      781          KM     by Parsons Corporation 2015-11
      782          BA   0.135
      783          LG    0.30    0.15    8.00    0.10      15
      784          UI       0      35     119     186     288     194     122      51      29       9
      785          UI       8       0       0       0       0       0       0       0       0       0
      786          UI       0       0       0       0       0       0       0       0       0       0
      787          UI       0       0       0       0       0       0       0       0       0       0
      788          UI       0       0       0       0       0       0       0       0       0       0
                   *
      789          KM  KKDIVE19  DIVERT
      790          KM
      791          KM     Revised by removing the retention to account for undeveloped conditions
      792          KM     by Parsons Corporation 2015-11
      793          KM  DTRETE19     0.2     0.0
      794          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
      795          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                   *

      796          KK   CPE19 COMBINE
      797          KM
      798          HC       2
                   *

      799          KK  E1922E   ROUTE
      800          KM
      801          KM     No change between existing (pre-buildup) and buildup conditions
      802          KM     by Parsons Corporation 2015-11
      803          RS       4    FLOW
      804          RC   0.050   0.040   0.050    1912  0.0042   10.00
      805          RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
      806          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                   *
1                                          HEC-1 INPUT                                         PAGE 21

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      807          KK     22E   BASIN
      808          KM
      809          KM     Used the unit hydrograph for existing (partially developed) conditions.
      810          KM     by Parsons Corporation 2015-11
      811          BA   0.089
      812          LG    0.31    0.19    8.40    0.08      11
      813          UI       0      19      69     104     173     137      91      48      24      12
      814          UI       5       5       0       0       0       0       0       0       0       0
      815          UI       0       0       0       0       0       0       0       0       0       0
      816          UI       0       0       0       0       0       0       0       0       0       0
      817          UI       0       0       0       0       0       0       0       0       0       0
                   *
      818          KM  KKDIV22E  DIVERT
      819          KM
      820          KM     Revised by removing the retention to account for undeveloped conditions
      821          KM     by Parsons Corporation 2015-11
      822          KM  DTRET22E     7.8     0.0
      823          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
      824          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                   *

      825          KK     E20   BASIN
      826          KM
      827          KM     Used the unit hydrograph for existing (partially developed) conditions.
      828          KM     by Parsons Corporation 2015-11
      829          BA   0.169
      830          LG    0.32    0.28    4.50    0.35      10
      831          UI       0      17      33      72      93     115     153     206     161     129
      832          UI     102      79      50      29      24      17       8       5       5       5
      833          UI       5       0       0       0       0       0       0       0       0       0
      834          UI       0       0       0       0       0       0       0       0       0       0
      835          UI       0       0       0       0       0       0       0       0       0       0
                   *
      836          KM  KKDIVE20  DIVERT
      837          KM
      838          KM     Revised by removing the retention to account for existing (pre-buildout)
      839          KM     conditions
      840          KM     by Parsons Corporation 2015-11
      841          KM  DTRETE20     3.2     0.0
      842          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
      843          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                   *

      844          KK  E2022E   ROUTE
      845          KM
      846          KM     Revised by using routing for existing (pre-buildout) conditions
      847          KM     by Parsons Corporation 2015-11
      848          RS       3    FLOW
      849          RC   0.045   0.035   0.045    1115  0.0054   10.00
      850          RX    0.00  500.00 1000.00 1005.00 1007.00 1010.00 1511.00 2011.00
      851          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                   *
1                                          HEC-1 INPUT                                         PAGE 22

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      852          KK   CP22E COMBINE
```

```
         853         KM
         854         HC       3
                     *

         855         KK  22EE22   ROUTE
         856         KM
         857         RS       1    FLOW
         858         RC   0.045   0.040   0.045    1740  0.0046   10.00
         859         RX  950.00  973.00  993.00 1005.00 1013.00 1025.00 1045.00 1055.00
         860         RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                     *

         861         KK     E22   BASIN
         862         KM
         863         KM     Revised by using the unit hydrograph for undeveloped conditions
         864         KM     by Parsons Corporation 2015-11
         865         BA   0.158
         866         LG    0.35    0.32    7.60    0.10       1
         867         UI       0      18      18      58      81      99     114     136     171     232
         868         UI     200     164     141     117      98      80      55      32      30      23
         869         UI      18      12       6       6       6       6       6       6       0       0
         870         UI       0       0       0       0       0       0       0       0       0       0
         871         UI       0       0       0       0       0       0       0       0       0       0
                     *
         872         KM   KKDIVE22  DIVERT
         873         KM
         874         KM     Revised by removing the retention to account for undeveloped conditions
         875         KM     by Parsons Corporation 2015-11
         876         KM  DTRETE22    13.8     0.0
         877         KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
         878         KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0
                     *

         879         KK   CPE22 COMBINE
         880         KM
         881         HC       3    7.25
                     *

         882         KK  E22G22   ROUTE
         883         KM
         884         RS       3    FLOW
         885         RC   0.040   0.050   0.040    4418  0.0043    8.00
         886         RX  720.00  750.00  785.00  805.00  845.00  865.00  880.00  910.00
         887         RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                     *

         888         KK    GM21   BASIN
         889         KM
         890         BA   0.210
         891         LG    0.10    0.15    7.30    0.14      75
         892         UI       0      51     176     272     437     309     200      90      49      19
         893         UI      12      12       0       0       0       0       0       0       0       0
         894         UI       0       0       0       0       0       0       0       0       0       0
1                                             HEC-1 INPUT                                              PAGE 23

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         895         UI       0       0       0       0       0       0       0       0       0       0
         896         UI       0       0       0       0       0       0       0       0       0       0
                     *

         897         KK  DIVG21  DIVERT
         898         KM
         899         DT  RETG21    17.3     0.0
         900         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         901         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         902         KK  G21T22   ROUTE
         903         KM
         904         RS       1    FLOW
         905         RC   0.032   0.008   0.032    1500  0.0020    3.00
         906         RX    0.00    2.00    4.00    6.00   60.00   62.00   64.00   66.00
         907         RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                     *

         908         KK    GM22   BASIN
         909         KM
         910         BA   0.095
         911         LG    0.10    0.15    8.80    0.08      79
         912         UI       0      67     197     280     134      40      11       0       0       0
         913         UI       0       0       0       0       0       0       0       0       0       0
         914         UI       0       0       0       0       0       0       0       0       0       0
         915         UI       0       0       0       0       0       0       0       0       0       0
         916         UI       0       0       0       0       0       0       0       0       0       0
                     *

         917         KK  DIVG22  DIVERT
         918         KM
         919         DT  RETG22     8.0     0.0
         920         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         921         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         922         KK  CPG22A COMBINE
         923         KM
         924         HC       2
                     *

         925         KK    GM16   BASIN
         926         KM
         927         BA   0.069
         928         LG    0.26    0.25    4.50    0.48      44
```

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         929         UI       0      10      38      59      84     119      84      59      38      17
         930         UI      12       5       3       3       0       0       0       0       0       0
         931         UI       0       0       0       0       0       0       0       0       0       0
         932         UI       0       0       0       0       0       0       0       0       0       0
         933         UI       0       0       0       0       0       0       0       0       0       0
                     *
1                                             HEC-1 INPUT                                              PAGE 24

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         934         KK  DIVG16  DIVERT
         935         KM
         936         DT  RETG16     4.9     0.0
         937         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         938         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         939         KK  G16T19   ROUTE
         940         KM
         941         RS       2    FLOW
         942         RC   0.032   0.016   0.032    1200  0.0020    3.00
         943         RX    0.00    2.00    4.00    6.00   60.00   62.00   64.00   66.00
         944         RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                     *

         945         KK    GM18   BASIN
         946         KM
         947         BA   0.173
         948         LG    0.25    0.25    5.30    0.29      44
         949         UI       0      39     137     209     346     262     172      87      44      21
         950         UI       9       9       0       0       0       0       0       0       0       0
         951         UI       0       0       0       0       0       0       0       0       0       0
         952         UI       0       0       0       0       0       0       0       0       0       0
         953         UI       0       0       0       0       0       0       0       0       0       0
                     *

         954         KK  DIVG18  DIVERT
         955         KM
         956         DT  RETG18    12.4     0.0
         957         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         958         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         959         KK   CPG18 COMBINE
         960         KM
         961         HC       2
                     *

         962         KK    GM19   BASIN
         963         KM
         964         BA   0.085
         965         LG    0.17    0.15    7.60    0.14      22
         966         UI       0      52     152     246     137      48      15       7       0       0
         967         UI       0       0       0       0       0       0       0       0       0       0
         968         UI       0       0       0       0       0       0       0       0       0       0
         969         UI       0       0       0       0       0       0       0       0       0       0
         970         UI       0       0       0       0       0       0       0       0       0       0
                     *
1                                             HEC-1 INPUT                                              PAGE 25

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         971         KK  DIVG19  DIVERT
         972         KM
         973         DT  RETG19     5.5     0.0
         974         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         975         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         976         KK  CPG19A COMBINE
         977         KM
         978         HC       2
                     *

         979         KK    GM20   BASIN
         980         KM
         981         BA   0.183
         982         LG    0.25    0.15    8.80    0.07      44
         983         UI       0      72     224     413     362     209      80      33      13       0
         984         UI       0       0       0       0       0       0       0       0       0       0
         985         UI       0       0       0       0       0       0       0       0       0       0
         986         UI       0       0       0       0       0       0       0       0       0       0
         987         UI       0       0       0       0       0       0       0       0       0       0
                     *

         988         KK  DIVG20  DIVERT
         989         KM
         990         DT  RETG20    14.5     0.0
         991         DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
         992         DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     *

         993         KK  CPG19B COMBINE
         994         KM
         995         HC       2
                     *

         996         KK  CPG22B COMBINE
         997         KM
         998         KM     Modified to combining 3 hydrographs instead of 2 due to adding CPG19B
         999         KM     by Parsons Corporation 2015-02
```

```
           1000           HC       3
                          *

           1001           KK  G22E26   ROUTE
           1002           KM
           1003           RS       2    FLOW
           1004           RC   0.040   0.030   0.040    2939  0.0031    8.00
           1005           RX    0.00  500.00  800.00  805.00  820.00  825.00 1125.00 1625.00
           1006           RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                          *
           1007           KM
1                                                       HEC-1 INPUT                                            PAGE 26

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1008           KK   DRE4NRETRIEVE
           1009           KM
           1010           DR   DRE4N
                          *

           1011           KK  RTE3E4   ROUTE
           1012           KM
           1013           KM     Revised by using routing for undeveloped conditions
           1014           KM     by Parsons Corporation 2015-11
           1015           RS       2    FLOW
           1016           RC   0.035   0.030   0.025    2000  0.0035    6.00
           1017           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
           1018           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *

           1019           KK     E4N   BASIN
           1020           KM
           1021           KM     Used the unit hydrograph for undeveloped conditions
           1022           KM     by Parsons Corporation 2015-11
           1023           BA   0.307
           1024           LG    0.35    0.35    3.95    0.47       0
           1025           UI       0      18      18      30      63      80      93     104     118     135
           1026           UI     163     213     219     179     155     138     119     105      90      77
           1027           UI      57      37      31      29      23      18      18       7       5       5
           1028           UI       5       5       5       5       5       0       0       0       0       0
           1029           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1030           KM  KKDIVE4N  DIVERT
           1031           KM
           1032           KM     Revised by removing the retention to account for undeveloped conditions
           1033           KM     by Parsons Corporation 2015-11
                          *DTRETE4N    23.4     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *

           1034           KK   CPE4N COMBINE
           1035           KM
           1036           HC       2    4.21
                          *

           1037           KK   DE4NS  DIVERT
           1038           KM
           1039           DT    DRE4     0.0     0.0
           1040           DI     0.0    34.0   255.0   502.0   772.0  1056.0  1348.0     0.0     0.0     0.0
           1041           DQ     0.0    11.0   171.0   378.0   614.0   868.0  1133.0     0.0     0.0     0.0
                          *

           1042           KK  E4NE13   ROUTE
           1043           KM
           1044           KM     Revised by using routing for undeveloped conditions
           1045           KM     by Parsons Corporation 2015-11
           1046           RS      23    FLOW
           1047           RC   0.055   0.045   0.055    6955  0.0046    5.50
1                                                       HEC-1 INPUT                                            PAGE 27

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1048           RX    0.00  500.00  980.00 1003.00 1010.00 1050.00 1511.00 2011.00
           1049           RY    3.00    2.50    2.00    1.00    1.00    2.00    2.50    3.00
                          *

           1050           KK     E13   BASIN
           1051           KM
           1052           BA   0.477
           1053           LG    0.35    0.36    5.00    0.27       0
           1054           UI       0      28      28      50     100     127     147     165     188     215
           1055           UI     264     345     334     274     239     213     183     160     138     116
           1056           UI      83      50      48      46      31      28      24       9       9       9
           1057           UI       9       9       9       9       9       0       0       0       0       0
           1058           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1059           KM  KKDIVE13  DIVERT
           1060           KM
           1061           KM     Revised by removing the retention to account for undeveloped conditions
           1062           KM     by Parsons Corporation 2015-11
           1063           KM  DTRETE13    38.8     0.0
           1064           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
           1065           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                          *

           1066           KK   CPE13 COMBINE
           1067           KM
           1068           HC       2
                          *

           1069           KK  E13E24   ROUTE
```

```
           1070           KM
           1071           RS       8    FLOW
           1072           RC   0.035   0.030   0.035    5921  0.0042    6.00
           1073           RX  980.00  990.00  995.00 1003.00 1007.00 1015.00 1520.00 1530.00
           1074           RY    4.00    3.50    3.00    1.00    1.00    3.00    3.50    4.00
                          *
           1075           KM

           1076           KK    DRE4RETRIEVE
           1077           KM
           1078           DR    DRE4
                          *

           1079           KK  RTE4E4   ROUTE
           1080           KM
           1081           KM     Revised by using routing for undeveloped conditions
           1082           KM     by Parsons Corporation 2015-11
           1083           RS      10    FLOW
           1084           RC   0.035   0.030   0.025    9400  0.0035    6.00
           1085           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
           1086           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                          *
1                                                       HEC-1 INPUT                                            PAGE 28

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1087           KK      E4   BASIN
           1088           KM
           1089           KM     Used the unit hydrograph for undeveloped conditions
           1090           KM     by Parsons Corporation 2015-11
           1091           BA   1.200
           1092           LG    0.35    0.35    4.15    0.43       0
           1093           UI       0      49      49      49      71     162     189     228     249     271
           1094           UI     294     322     357     388     453     550     639     582     506     452
           1095           UI     414     384     345     312     287     254     233     202     159     125
           1096           UI      86      86      80      80      54      49      49      48      15      15
           1097           UI      15      15      15      15      15      15      15      15      15      15
           1098           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1099           KM  KK DIVE4  DIVERT
           1100           KM
           1101           KM     Revised by removing the retention to account for undeveloped conditions
           1102           KM     by Parsons Corporation 2015-11
                          *DT RETE4    92.6     0.0
                          *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                          *

           1103           KK    CPE4 COMBINE
           1104           KM
           1105           HC       2    5.41
                          *

           1106           KK    DE4S  DIVERT
           1107           KM
           1108           DT    DRE5     0.0     0.0
           1109           DI     0.0    97.0   343.0   637.0   959.0  1299.0  1650.0     0.0     0.0     0.0
           1110           DQ     0.0    89.0   330.0   622.0   943.0  1283.0  1633.0     0.0     0.0     0.0
                          *

           1111           KK  E4E14A   ROUTE
           1112           KM
           1113           KM     Revised by using routing for undeveloped conditions (E4E14N) from
           1114           KM     existing condition (pre-SR 24) model
           1115           KM     by Parsons Corporation 2015-11
           1116           RS      12    FLOW
           1117           RC   0.060   0.050   0.060    6921  0.0049    5.50
           1118           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
           1119           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                          *

           1120           KK    E14A   BASIN
           1121           KM
           1122           KM     Used the unit hydrograph for undeveloped conditions for Basin E14N from
           1123           KM     existing condition model (pre-SR 24)
           1124           KM     by Parsons Corporation 2015-11
           1125           BA   0.481
           1126           LG    0.35    0.35    4.10    0.44       0
           1127           UI       0      20      20      47      78      97     112     129     150     185
           1128           UI     247     226     185     161     139     119     101      84      59      35
1                                                       HEC-1 INPUT                                            PAGE 29

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1129           UI      33      30      20      20       8       6       6       6       6       6
           1130           UI       6       0       0       0       0       0       0       0       0       0
           1131           UI       0       0       0       0       0       0       0       0       0       0
                          *
           1132           KM  KKDIV14A  DIVERT
           1133           KM
           1134           KM     Revised by removing the retention to account for undeveloped conditions
           1135           KM     by Parsons Corporation 2015-11
           1136           KM  DTRET14A    38.6     0.0
           1137           KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
           1138           KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                          *

           1139           KK     E6A   BASIN
           1140           KM
           1141           KM     Revised the unit hydrograph for undeveloped conditions
           1142           KM     by Parsons Corporation 2015-11
           1143           BA   0.581
```

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      1144          LG    0.16    0.25    5.70    0.27      59
      1145          UI       0      46      46      46      77     155     183     217     238     261
      1146          UI     282     311     346     381     455     556     598     511     450     406
      1147          UI     374     343     305     278     251     226     201     161     130      81
      1148          UI      81      76      76      55      46      46      46      14      14      14
      1149          UI      14      14      14      14      14      14      14      14      14       0
                    *
      1150          KM  KKDIVE6A  DIVERT
      1151          KM
      1152          KM     Revised by removing the retention to account for undeveloped conditions
      1153          KM     by Parsons Corporation 2015-11
      1154          KM  DTRETE6A    53.1     0.0
      1155          KM  DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
      1156          KM  DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                    *

      1157          KK  E6AE5A   ROUTE
      1158          KM
      1159          RS       6    FLOW
      1160          RC   0.020   0.020   0.020    7264  0.0010  100.00
      1161          RX    0.00    1.00    2.00   20.00   30.00   48.00   49.00   50.00
      1162          RY  100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                    *

      1163          KK    DRE5RETRIEVE
      1164          KM
      1165          DR    DRE5
                    *

      1166          KK  RTE4E5   ROUTE
      1167          KM
      1168          KM     Revised by using routing for undeveloped conditions
      1169          KM     by Parsons Corporation 2015-11
      1170          RS       3    FLOW
      1171          RC   0.035   0.030   0.025    3700  0.0035    6.00
      1172          RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
      1173          RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                    *
1                                            HEC-1 INPUT                                            PAGE 30

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      1174          KK     E5A   BASIN
      1175          KM
      1176          KM     Revised the unit hydrograph and LG for undeveloped conditions (Basin E5)
      1177          KM     by Parsons Corporation 2015-11
      1178          BA   1.140
      1179          LG    0.35    0.35    3.95    0.47       0
      1180          UI       0      59      59      59      89     195     229     274     300     328
      1181          UI     354     389     432     471     555     670     773     682     595     535
      1182          UI     489     453     407     366     336     298     275     232     177     134
      1183          UI     104     101      96      92      59      59      59      45      18      18
      1184          UI      18      18      18      18      18      18      18      18      18       0
                    *
      1185          KM  KKDIVE5A  DIVERT
      1186          KM
      1187          KM     Revised by removing the retention to account for undeveloped conditions
      1188          KM     by Parsons Corporation 2015-11
                    *DTRETE5A    89.1     0.0
                    *DI   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                    *DQ   0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0.
                    *

      1189          KK  CPE5A1 COMBINE
      1190          KM
      1191          HC       2    6.55
                    *

      1192          KK  CPE5A2 COMBINE
      1193          KO       1
      1194          KM
      1195          HC       2
                    *

      1196          KK  E5A14A   ROUTE
      1197          KM
      1198          KM     Revised for channel length/time steps and cross section between
      1199          KM     Ironwood Dr. and Meridian Rd. to account for concrete-lined channel.
      1200          KM     by Parsons Corporation 2015-12
      1201          RS       4    FLOW
      1202          RC   0.016   0.016   0.016    6121  0.0017   97.00
      1203          RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
      1204          RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                    *

      1205          KK  CPE14A COMBINE
      1206          KM   ***** PARSONS 10/30/2015 *****
      1207          KO       1
      1208          HC       3    7.61
                    *
1                                            HEC-1 INPUT                                            PAGE 31

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      1209          KK  E1424A   ROUTE
      1210          KM
      1211          KM     Revised for channel length and time steps between Mountain Rd
      1212          KM     and Meridian Rd to account for concrete lining.
      1213          KM     by Parsons Corporation 2016-03
      1214          RS       2    FLOW
      1215          RC   0.016   0.016   0.016    2808  0.0017   97.00
```

```
      1216          RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
      1217          RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                    *

      1218          KK  E1424B   ROUTE
      1219          KM
      1220          KM     Introduced for channel length and time steps between
      1221          KM     Signal Bute Rd. and Mountain Rd. to account for concrete lining.
      1222          KM     by Parsons Corporation 2015-12
      1223          RS       2    FLOW
      1224          RC   0.016   0.016   0.016    2461  0.0017   97.00
      1225          RX    0.00    7.50   15.00   29.00   41.00   55.00   62.50   70.00
      1226          RY   97.45   97.23   97.00   90.00   90.00   97.00   97.23   97.45
                    *

      1227          KK    E24A   BASIN
      1228          KM
      1229          BA   0.528
      1230          LG    0.14    0.25    6.00    0.24      59
      1231          UI       0      81     324     487     736     911     620     431     224     126
      1232          UI      72      25      25      25       0       0       0       0       0       0
      1233          UI       0       0       0       0       0       0       0       0       0       0
      1234          UI       0       0       0       0       0       0       0       0       0       0
      1235          UI       0       0       0       0       0       0       0       0       0       0
                    *

      1236          KK  DIV24A  DIVERT
      1237          KM
      1238          DT  RET24A    39.6     0.0
      1239          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
      1240          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                    *

      1241          KK   CP24A COMBINE
      1242          KM
      1243          HC       3    8.62
                    *

      1244          KK  E247A1   ROUTE
      1245          KM
      1246          KM     Revised for channel length/routing steps and cross section between
      1247          KM     Signal Butte Rd. and Crimson Rd. to account for concrete lining.
      1248          KM     by Parsons Corporation 2015-12
      1249          RS       4    FLOW
      1250          RC   0.016   0.016   0.016    5594  0.0017   97.50
      1251          RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
      1252          RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                    *
1                                            HEC-1 INPUT                                            PAGE 32

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      1253          KK    E27A   BASIN
      1254          KM
      1255          BA   0.544
      1256          LG    0.20    0.15    7.00    0.15      54
      1257          UI       0      50      84     198     261     316     393     565     570     439
      1258          UI     360     288     227     143      86      75      50      32      15      15
      1259          UI      15      15      15       0       0       0       0       0       0       0
      1260          UI       0       0       0       0       0       0       0       0       0       0
      1261          UI       0       0       0       0       0       0       0       0       0       0
                    *

      1262          KK  DIV27A  DIVERT
      1263          KM
      1264          DT  RET27A    42.0     0.0
      1265          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
      1266          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                    *

      1267          KK  CPE27A COMBINE
      1268          KM
      1269          KM     Confluence of channel south of Eastmark/southeast of PPG North and portion
      1270          KM     of PPG with SR 24 offsite channel.
      1271          KM     by Parsons Corporation 2015-11
      1272          HC       3   12.81
                    *

      1273          KK  E247A2   ROUTE
      1274          KM
      1275          KM     Revised for channel length/routing steps and cross section between
      1276          KM     Signal Butte Rd. and Crismon Rd. to account for concrete lining.
      1277          KM     by Parsons Corporation 2015-12
      1278          RS       1    FLOW
      1279          RC   0.016   0.016   0.016    1528  0.0017   97.50
      1280          RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
      1281          RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                    *

      1282          KK  E2726A   ROUTE
      1283          KO       1
      1284          KM
      1285          KM     Revised for channel length/routing steps and cross section between
      1286          KM     Signal Butte Rd. and Crismon Rd. to account for concrete lining.
      1287          KM     by Parsons Corporation 2015-12
      1288          RS       4    FLOW
      1289          RC   0.016   0.016   0.016    6350  0.0016   97.50
      1290          RX    0.00    7.50   15.00   30.00   42.00   57.00   64.50   72.00
      1291          RY   97.95   97.73   97.50   90.00   90.00   97.50   97.73   97.95
                    *
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```

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          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1292           KK    E26A   BASIN
          1293           KM
          1294           BA   0.865
          1295           LG    0.22    0.15    7.30    0.14      52
          1296           UI       0      86     172     370     479     596     804    1055     818     656
          1297           UI     516     400     244     148     119      86      36      26      26      26
          1298           UI      26       0       0       0       0       0       0       0       0       0
          1299           UI       0       0       0       0       0       0       0       0       0       0
          1300           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1301           KK  DIV26A  DIVERT
          1302           KM
          1303           DT  RET26A    66.0     0.0
          1304           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1305           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1306           KK  SR24EL COMBINE
          1307           KO       1
          1308           KM
          1309           KM     Combine hydrographs from E2726A and RET26A prior to routing through.
          1310           KM     SR 24 offline detention basin at Ellsworth Rd. and Powerline Floodway
          1311           KM     by Parsons Corporation 2015-11
          1312           HC       2   13.68
                         *
          1313           KM  KKELSRC1  DIVERT
          1314           KM  KO     1
          1315           KM
          1316           KM     Diversion to SR 24 ramp C offline detention basin at Ellsworth Rd.
          1317           KM     Basin capacity estimated at 10 ac-ft. Diversion for 80% as effective volume
          1318           KM     (8 ac-ft as 0.8*10 ac-ft).
          1319           KM     by Parsons Corporation 2016-03
          1320           KM
          1321           KM     Diversion deactivated as not needed with the SR-24 alignment extending to
          1322           KM     Irronwood Drive
          1323           KM     by Parsons Corporation 2016-07
          1324           KM  DTRC1DIV     8.0     0.0
          1325           KM  DI   0.0  1650.0  5000.0     0.0     0.0     0.0     0.0     0.0     0.0       0
          1326           KM  DQ   0.0     0.0  3350.0     0.0     0.0     0.0     0.0     0.0     0.0       0
                         *

          1327           KK  802ELS  DIVERT
          1328           KM
          1329           KM     Diversion to SR 24 offline detention basin at Ellsworth Rd. and Powerline
          1330           KM     Floodway Basin January 2016 capacity estimated at 100 ac-ft. Elevating the
          1331           KM     top of basin to 1384.00 provides 122.1 ac-ft of effective detention volume
          1332           KM     with one (1) ft of freeboard. Diversion uses full volume in a simplified
          1333           KM     modeling approach. See unsteady flow HEC-RAS 5.0.1 model for the complex
          1334           KM     simulation of detention basin operation.
          1335           KM     by Parsons Corporation 2016-03
          1336           KO       1
          1337           DT  1650UP   122.1     0.0
          1338           DI     0.0  1650.0  5000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
1                                                    HEC-1 INPUT                                           PAGE 34

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1339           DQ     0.0     0.0  3350.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
          1340           KM  KKG19E26   ROUTE
          1341           KM
          1342           KM     Revised by removing the Routing to Powerline Floodway as result of
          1343           KM     the Eastmark Development
          1344           KM     by Parsons Corporation 2016-11
          1345           KM  RS     4    FLOW
          1346           KM  RC 0.020   0.020   0.020    9348  0.0038  100.00
          1347           KM  RX  0.00    1.00    2.00   20.00   45.00   63.00   64.00   65.00
          1348           KM  RY100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                         *

          1349           KK    GM17   BASIN
          1350           KO       1
          1351           KM
          1352           KM     Part of Eastmark
          1353           KM     by Parsons Corporation 2015-11
          1354           BA   0.104
          1355           LG    0.25    0.25    4.10    0.55      45
          1356           UI       0      42     129     238     205     117      44      18       7       0
          1357           UI       0       0       0       0       0       0       0       0       0       0
          1358           UI       0       0       0       0       0       0       0       0       0       0
          1359           UI       0       0       0       0       0       0       0       0       0       0
          1360           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1361           KK  DIVG17  DIVERT
          1362           KM
          1363           KM     Revised by retaining the entire volume from GM17,
          1364           KM     per Master Drainage Report Update for Eastmark (Wood-Patel, Rev. 10-24-14)
          1365           KM     by Parsons Corporation 2015-11
          1366           DT  RETG17     0.0     0.0
          1367           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1368           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1369           KK  G17E26   ROUTE
          1370           KM
          1371           RS       4    FLOW
          1372           RC   0.020   0.020   0.020    3933  0.0063  100.00
          1373           RX    0.00    1.00    2.00   20.00   45.00   63.00   64.00   65.00
```

```
          1374           RY  100.00   99.00   99.00   90.00   90.00   99.00   99.00  100.00
                         *

          1375           KK  CPE26A COMBINE
          1376           KO       1
          1377           KM
          1378           KM     Modified to combining 4 hydrographs instead of 5
          1379           KM     by Parsons Corporation 2015-11
          1380           KM     Modified to combining 3 hydrographs instead of 4 due to removing G19E26
          1381           KM     by Parsons Corporation 2015-02
          1382           HC       3
                         *
1                                                    HEC-1 INPUT                                           PAGE 35

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1383           KK  80233B   ROUTE
          1384           KM
          1385           KM
          1386           KM
          1387           KM
          1388           KM
          1389           RS       1    FLOW
          1390           RC   0.025   0.029   0.025    4205  0.0045    9.00
          1391           RX    0.00   13.00   15.30   25.00   33.00   42.70   45.00   58.00
          1392           RY    9.00    9.00    7.50    1.00    1.00    7.50    9.00    9.00
                         *

          1393           KK      E7   BASIN
          1394           KM
          1395           BA   1.124
          1396           LG    0.24    0.26    5.10    0.32      35
          1397           UI       0      64      64     102     224     281     328     369     416     477
          1398           UI     561     725     814     670     575     512     449     390     339     300
          1399           UI     226     159     113     106      99      64      64      46      20      20
          1400           UI      20      20      20      20      20      20       0       0       0       0
          1401           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1402           KK   DIVE7  DIVERT
          1403           KM
          1404           DT   RETE7    85.5     0.0
          1405           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1406           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1407           KK  E7STOR STORAGE
          1408           KM
          1409           KO
          1410           RS       1    STOR
          1411           SV           22.82   34.23   45.64   78.34  111.03  143.72  176.42  230.23  284.04
          1412           SQ                    1.75    5.50   11.00   17.70   25.70   34.20   43.00   51.70
          1413           SE  1566.0 1567.00 1567.50 1568.00 1568.50 1569.00 1569.50 1570.00 1570.50 1571.00
          1414           ST  1574.0 10000.0     3.0     1.5
                         *

          1415           KK    E7E6   ROUTE
          1416           KM
          1417           KM
          1418           KM
          1419           RS      23    FLOW
          1420           RC   0.035   0.030   0.030   16362  0.0062    5.50
          1421           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
          1422           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *
1                                                    HEC-1 INPUT                                           PAGE 36

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1423           KK     E6B   BASIN
          1424           KM
          1425           BA   1.949
          1426           LG    0.14    0.25    6.00    0.24      59
          1427           UI       0     174     277     677     898    1079    1330    1853    2099    1602
          1428           UI    1321    1068     853     594     331     288     192     162      53      53
          1429           UI      53      53      53       0       0       0       0       0       0       0
          1430           UI       0       0       0       0       0       0       0       0       0       0
          1431           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1432           KK  DIVE6B  DIVERT
          1433           KM
          1434           DT  RETE6B   179.9     0.0
          1435           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1436           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1437           KK      E8   BASIN
          1438           KM
          1439           BA   1.099
          1440           LG    0.21    0.25    4.50    0.44      39
          1441           UI       0      75      75     201     313     383     441     514     604     798
          1442           UI     955     771     649     563     475     401     337     241     145     127
          1443           UI     114      75      75      28      23      23      23      23      23      23
          1444           UI       0       0       0       0       0       0       0       0       0       0
          1445           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1446           KK   DIVE8  DIVERT
          1447           KM
          1448           DT   RETE8    80.9     0.0
```

```
          1449           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1450           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1451           KK    E8E6   ROUTE
          1452           KM
          1453           RS       9    FLOW
          1454           RC   0.060   0.035   0.060    9833  0.0052    5.50
          1455           RX    0.00  500.00  980.00 1003.00 1007.00 1031.00 1511.00 2011.00
          1456           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *

          1457           KK    CPE6 COMBINE
          1458           KM
          1459           HC       3    3.05
                         *
1                                                      HEC-1 INPUT                                              PAGE 37

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1460           KK    DE6S  DIVERT
          1461           KM
          1462           DT    DRE9     0.0     0.0
          1463           DI     0.0   236.0   682.0  1141.0  1670.0  2261.0  2886.0     0.0     0.0     0.0
          1464           DQ     0.0     1.0    13.0   212.0   633.0  1096.0  1568.0     0.0     0.0     0.0
                         *

          1465           KK   E6E15   ROUTE
          1466           KM
          1467           RS       7    FLOW
          1468           RC   0.035   0.030   0.035    8259  0.0042    5.50
          1469           RX  950.00  975.00  991.00 1003.00 1007.00 1019.00 1030.00 1065.00
          1470           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *

          1471           KK     E15   BASIN
          1472           KM
          1473           BA   0.777
          1474           LG    0.15    0.25    5.10    0.35      57
          1475           UI       0     106     363     582     791    1239    1004     734     522     273
          1476           UI     171     106      36      32      32       0       0       0       0       0
          1477           UI       0       0       0       0       0       0       0       0       0       0
          1478           UI       0       0       0       0       0       0       0       0       0       0
          1479           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1480           KK  DIVE15  DIVERT
          1481           KM
          1482           DT  RETE15    67.7     0.0
          1483           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1484           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1485           KK    DRE9RETRIEVE
          1486           KM
          1487           DR    DRE9
                         *

          1488           KK  RTE6E9   ROUTE
          1489           KM
          1490           RS       5    FLOW
          1491           RC   0.035   0.030   0.025    2200  0.0035    6.00
          1492           RX    0.00  100.00  700.00 1050.00 1090.00 1110.00 1140.00 1240.00
          1493           RY    0.00    6.00    4.00    1.00    1.00    5.00    6.00    6.00
                         *

          1494           KK      E9   BASIN
          1495           KM
          1496           BA   0.723
          1497           LG    0.14    0.25    5.40    0.30      58
          1498           UI       0      88     253     450     585     836    1040     754     570     416
          1499           UI     225     148      92      48      27      27      27       0       0       0
          1500           UI       0       0       0       0       0       0       0       0       0       0
          1501           UI       0       0       0       0       0       0       0       0       0       0
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          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1502           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1503           KK   DIVE9  DIVERT
          1504           KM
          1505           DT   RETE9    65.4     0.0
          1506           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1507           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1508           KK    CPE9 COMBINE
          1509           KM
          1510           HC       2
                         *

          1511           KK    DE9S  DIVERT
          1512           KM
          1513           DT    DRR5     0.0     0.0
          1514           DI     0.0    78.0   163.0   440.0   936.0  1475.0  2024.0     0.0     0.0     0.0
          1515           DQ     0.0     1.0    43.0   245.0   670.0  1157.0  1661.0     0.0     0.0     0.0
                         *

          1516           KK   E9E16   ROUTE
          1517           KM
```

```
          1518           RS       6    FLOW
          1519           RC   0.035   0.030   0.035    6751  0.0040    5.50
          1520           RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1060.00
          1521           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *

          1522           KK     E16   BASIN
          1523           KM
          1524           BA   0.396
          1525           LG    0.15    0.25    5.10    0.35      57
          1526           UI       0      58     224     342     497     684     480     338     207     100
          1527           UI      64      26      18      18       0       0       0       0       0       0
          1528           UI       0       0       0       0       0       0       0       0       0       0
          1529           UI       0       0       0       0       0       0       0       0       0       0
          1530           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1531           KK  DIVE16  DIVERT
          1532           KM
          1533           DT  RETE16    35.1     0.0
          1534           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1535           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1536           KK   CPE16 COMBINE
          1537           KM
          1538           HC       2
                         *
1                                                      HEC-1 INPUT                                              PAGE 39

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          1539           KK  E16E15   ROUTE
          1540           KM
          1541           RS      10    FLOW
          1542           RC   0.030   0.012   0.030    4112  0.0015    5.00
          1543           RX   45.00   65.00   71.00   83.00   87.00   99.00  105.00  125.00
          1544           RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                         *

          1545           KK   CPE15 COMBINE
          1546           KM
          1547           HC       3    4.95
                         *

          1548           KK  E1524B   ROUTE
          1549           KM
          1550           RS       3    FLOW
          1551           RC   0.035   0.030   0.035    4705  0.0033    5.00
          1552           RX    0.00   60.00   71.00   83.00   87.00   99.00  110.00  170.00
          1553           RY    5.00    5.00    5.00    1.00    1.00    2.00    3.00    4.00
                         *

          1554           KK     E5B   BASIN
          1555           KM
          1556           BA   0.286
          1557           LG    0.14    0.25    3.95    0.64      62
          1558           UI       0      64     225     342     567     435     287     148      74      36
          1559           UI      15      15       0       0       0       0       0       0       0       0
          1560           UI       0       0       0       0       0       0       0       0       0       0
          1561           UI       0       0       0       0       0       0       0       0       0       0
          1562           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1563           KK  DIVE5B  DIVERT
          1564           KM
          1565           DT  RETE5B    25.0     0.0
          1566           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1567           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1568           KK  E5E14B   ROUTE
          1569           KM
          1570           RS       5    FLOW
          1571           RC   0.035   0.030   0.035    6256  0.0054    5.50
          1572           RX  950.00  985.00  991.00 1003.00 1007.00 1019.00 1025.00 1050.00
          1573           RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *

          1574           KK    E14B   BASIN
          1575           KM
          1576           BA   0.528
          1577           LG    0.14    0.25    5.60    0.29      60
          1578           UI       0     125     435     667    1086     785     512     237     126      53
          1579           UI      29      29       0       0       0       0       0       0       0       0
          1580           UI       0       0       0       0       0       0       0       0       0       0
1                                                      HEC-1 INPUT                                              PAGE 40

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1581           UI       0       0       0       0       0       0       0       0       0       0
          1582           UI       0       0       0       0       0       0       0       0       0       0
                         *

          1583           KK  DIV14B  DIVERT
          1584           KM
          1585           DT  RET14B    48.4     0.0
          1586           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
          1587           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

          1588           KK   CP14B COMBINE
```

```
           1589          KM
           1590          HC       2
                         *

           1591          KK  E14E24   ROUTE
           1592          KM
           1593          RS       5    FLOW
           1594          RC   0.030   0.030   0.030    6080  0.0032    9.00
           1595          RX  970.00  990.00 1001.00 1010.00 1014.00 1023.00 1034.00 1054.00
           1596          RY    5.50    4.50    4.00    1.00    1.00    4.00    4.50    5.50
                         *

           1597          KK    E24B   BASIN
           1598          KM
           1599          BA   0.464
           1600          LG    0.15    0.15    7.30    0.14      57
           1601          UI       0      92     339     513     852     731     493     294     133      76
           1602          UI      24      24       0       0       0       0       0       0       0       0
           1603          UI       0       0       0       0       0       0       0       0       0       0
           1604          UI       0       0       0       0       0       0       0       0       0       0
           1605          UI       0       0       0       0       0       0       0       0       0       0
                         *

           1606          KK  DIV24B  DIVERT
           1607          KM
           1608          DT  RET24B    38.7     0.0
           1609          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1610          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           1611          KK  CPE24B COMBINE
           1612          KM
           1613          HC       3
                         *

           1614          KK  E24E28   ROUTE
           1615          KM
           1616          RS       4    FLOW
           1617          RC   0.035   0.035   0.035    6172  0.0036   10.00
           1618          RX  940.00  960.00  980.00 1000.00 1010.00 1030.00 1050.00 1070.00
           1619          RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                         *
1                                                     HEC-1 INPUT                                           PAGE 41

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1620          KK    E28B   BASIN
           1621          KM
           1622          BA   0.539
           1623          LG    0.20    0.15    8.40    0.09      51
           1624          UI       0      65     183     329     427     606     772     566     430     318
           1625          UI     179     110      73      41      20      20      20       0       0       0
           1626          UI       0       0       0       0       0       0       0       0       0       0
           1627          UI       0       0       0       0       0       0       0       0       0       0
           1628          UI       0       0       0       0       0       0       0       0       0       0
                         *

           1629          KK  DIV28B  DIVERT
           1630          KM
           1631          DT  RET28B    42.0     0.0
           1632          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1633          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           1634          KK  CPE28B COMBINE
           1635          KM
           1636          HC       2
                         *

           1637          KK  E28E31   ROUTE
           1638          KM
           1639          RS       3    FLOW
           1640          RC   0.040   0.040   0.040    5081  0.0036   10.00
           1641          RX  950.00  975.00  985.00 1005.00 1010.00 1030.00 1040.00 1065.00
           1642          RY    7.00    6.50    6.00    1.00    1.00    6.00    6.50    7.00
                         *

           1643          KK     E25   BASIN
           1644          KM
           1645          BA   0.932
           1646          LG    0.15    0.25    5.40    0.30      55
           1647          UI       0      86     146     342     451     546     683     986     969     749
           1648          UI     613     490     383     234     148     125      86      51      26      26
           1649          UI      26      26       0       0       0       0       0       0       0       0
           1650          UI       0       0       0       0       0       0       0       0       0       0
           1651          UI       0       0       0       0       0       0       0       0       0       0
                         *

           1652          KK  DIVE25  DIVERT
           1653          KM
           1654          DT  RETE25   110.7     0.0
           1655          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1656          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *
1                                                     HEC-1 INPUT                                           PAGE 42

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1657          KK  E25E29   ROUTE
           1658          KM
           1659          RS      20    FLOW
```

```
           1660          RC   0.030   0.030   0.030    7016  0.0022    2.50
           1661          RX  976.00  996.00 1003.00 1005.00 1006.00 1008.00 1015.00 1025.00
           1662          RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                         *

           1663          KK     E29   BASIN
           1664          KM
           1665          BA   1.002
           1666          LG    0.15    0.23    6.20    0.22      55
           1667          UI       0     103     218     452     586     733    1019    1240     924     737
           1668          UI     574     428     229     172     116      82      31      31      31      31
           1669          UI       0       0       0       0       0       0       0       0       0       0
           1670          UI       0       0       0       0       0       0       0       0       0       0
           1671          UI       0       0       0       0       0       0       0       0       0       0
                         *

           1672          KK  DIVE29  DIVERT
           1673          KM
           1674          DT  RETE29    73.9     0.0
           1675          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1676          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           1677          KK   CPE29 COMBINE
           1678          KM
           1679          HC       2
                         *

           1680          KK  E29E31   ROUTE
           1681          KM
           1682          RS       4    FLOW
           1683          RC   0.030   0.030   0.030    7025  0.0034   10.00
           1684          RX  950.00  975.00  985.00 1005.00 1006.00 1026.00 1036.00 1070.00
           1685          RY    8.00    7.00    6.00    1.00    1.00    6.00    7.00    8.00
                         *

           1686          KK     E32   BASIN
           1687          KM
           1688          BA   0.246
           1689          LG    0.14    0.25    4.25    0.55      58
           1690          UI       0      72     238     387     535     337     190      78      37      15
           1691          UI      15       0       0       0       0       0       0       0       0       0
           1692          UI       0       0       0       0       0       0       0       0       0       0
           1693          UI       0       0       0       0       0       0       0       0       0       0
           1694          UI       0       0       0       0       0       0       0       0       0       0
                         *
1                                                     HEC-1 INPUT                                           PAGE 43

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1695          KK  DIVE32  DIVERT
           1696          KM
           1697          DT  RETE32    17.2     0.0
           1698          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1699          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           1700          KK  E32E31   ROUTE
           1701          KM
           1702          RS       5    FLOW
           1703          RC   0.025   0.060   0.025    3272  0.0028 1388.60
           1704          RX  100.00  110.00  128.00  149.80  160.00  191.50  209.20  210.00
           1705          RY  1388.3 1388.32 1388.32 1380.37 1380.17 1388.04 1388.39 1388.60
                         *

           1706          KK     E31   BASIN
           1707          KM
           1708          BA   0.810
           1709          LG    0.15    0.25    4.80    0.39      55
           1710          UI       0      86     197     391     504     641     943     970     728     571
           1711          UI     441     296     151     126      86      37      26      26      26       0
           1712          UI       0       0       0       0       0       0       0       0       0       0
           1713          UI       0       0       0       0       0       0       0       0       0       0
           1714          UI       0       0       0       0       0       0       0       0       0       0
                         *

           1715          KK  DIVE31  DIVERT
           1716          KM
           1717          DT  RETE31    56.5     0.0
           1718          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1719          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                         *

           1720          KK   CPE31 COMBINE
           1721          KM
           1722          HC       4
                         *

           1723          KK  E31E30   ROUTE
           1724          KM
           1725          RS       5    FLOW
           1726          RC   0.025   0.045   0.025    4404  0.0008 1387.00
           1727          RX  100.00  107.00  112.50  144.90  175.10  201.50  225.90  244.00
           1728          RY  1386.1 1386.09 1386.09 1377.99 1377.99 1384.59 1385.08 1387.00
                         *

           1729          KK    E30B   BASIN
           1730          KM
           1731          BA   0.882
           1732          LG    0.24    0.15    8.40    0.09      47
           1733          UI       0      56      56     128     217     272     314     357     416     500
           1734          UI     668     683     552     475     416     355     303     261     191     124
```

```
           1735           UI      98      92      66      56      44      17      17      17      17      17
           1736           UI      17      17       0       0       0       0       0       0       0       0
1                                                       HEC-1 INPUT                                             PAGE 44

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1737           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1738           KK  DIV30B  DIVERT
           1739           KM
           1740           DT  RET30B    67.1     0.0
           1741           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1742           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1743           KK   CPE30 COMBINE
           1744           KM
           1745           HC       2
                          *

           1746           KK  E30E26   ROUTE
           1747           KM
           1748           RS       1    FLOW
           1749           RC   0.025   0.035   0.025     822  0.0005 1387.00
           1750           RX  100.00  105.00  108.50  149.90  220.10  251.30  279.10  285.10
           1751           RY  1387.0 1387.00 1386.66 1376.31 1376.31 1384.11 1384.66 1386.00
                          *

           1752           KK    E26B   BASIN
           1753           KM
           1754           BA   0.259
           1755           LG    0.24    0.15    8.80    0.07      48
           1756           UI       0      38     145     222     320     448     315     222     139      65
           1757           UI      43      18      12      12       0       0       0       0       0       0
           1758           UI       0       0       0       0       0       0       0       0       0       0
           1759           UI       0       0       0       0       0       0       0       0       0       0
           1760           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1761           KK  DIV26B  DIVERT
           1762           KM
           1763           DT  RET26B    20.1     0.0
           1764           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1765           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1766           KK   CPE26 COMBINE
           1767           KM
           1768           HC       2
                          *

           1769           KK  E26E33   ROUTE
           1770           KM
           1771           RS       5    FLOW
           1772           RC   0.025   0.030   0.025    8929  0.0028 1379.67
           1773           RX  100.00  100.50  102.50  134.90  205.10  237.50  253.50  255.00
           1774           RY  1379.1 1379.12 1379.35 1371.25 1371.25 1379.35 1379.67 1379.67
                          *
1                                                       HEC-1 INPUT                                             PAGE 45

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1775           KK    E33B   BASIN
           1776           KM
           1777           BA   0.851
           1778           LG    0.15    0.15    7.30    0.14      56
           1779           UI       0     117     409     651     892    1385    1087     793     558     278
           1780           UI     179     110      36      36      36       0       0       0       0       0
           1781           UI       0       0       0       0       0       0       0       0       0       0
           1782           UI       0       0       0       0       0       0       0       0       0       0
           1783           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1784           KK  DIV33B  DIVERT
           1785           KM
           1786           DT  RET33B    66.8     0.0
           1787           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1788           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1789           KK  CPE33B COMBINE
           1790           KM
           1791           HC       3
                          *

           1792           KK  E33P9A   ROUTE
           1793           KM
           1794           RS       1    FLOW
           1795           RC   0.025   0.060   0.025    2115  0.0039    8.00
           1796           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1797           RY    8.00    8.00    6.50    0.50    0.50    6.50    8.00    8.00
                          *

           1798           KK  E33P9B   ROUTE
           1799           KM
           1800           RS       1    FLOW
           1801           RC   0.025   0.060   0.025    2299  0.0029    8.20
           1802           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1803           RY    8.20    8.00    6.50    0.50    0.50    6.50    8.00    8.20
                          *
```

```
           1804           KK      P9   BASIN
           1805           KM
           1806           BA   1.122
           1807           LG    0.11    0.15    8.00    0.12      74
           1808           UI       0     119     271     539     695     881    1292    1349    1011     795
           1809           UI     612     416     214     177     119      55      36      36      36       0
           1810           UI       0       0       0       0       0       0       0       0       0       0
           1811           UI       0       0       0       0       0       0       0       0       0       0
           1812           UI       0       0       0       0       0       0       0       0       0       0
                          *
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           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1813           KK   DIVP9  DIVERT
           1814           KM
           1815           DT   RETP9    36.4     0.0
           1816           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1817           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1818           KK    CPP9 COMBINE
           1819           KM
           1820           HC       2
                          *

           1821           KK  P9EMF1   ROUTE
           1822           KM
           1823           RS       1    FLOW
           1824           RC   0.025   0.029   0.025    4403  0.0029    8.00
           1825           RX    0.00   18.00   21.00   33.00   93.00  105.00  108.00  129.00
           1826           RY    8.00    8.00    6.50    0.50    0.50    6.50    8.00    8.00
                          *

           1827           KK   EMF1B   BASIN
           1828           KM
           1829           BA   1.036
           1830           LG    0.12    0.14    7.60    0.13      63
           1831           UI       0     117     296     556     717     944    1407    1153     891     677
           1832           UI     493     256     194     117      66      36      36      36       0       0
           1833           UI       0       0       0       0       0       0       0       0       0       0
           1834           UI       0       0       0       0       0       0       0       0       0       0
           1835           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1836           KK  DEMF1B  DIVERT
           1837           KM
           1838           DT  REMF1B    85.0     0.0
           1839           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           1840           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1841           KK  CPEMF1 COMBINE
           1842           KM
           1843           HC       2
                          *

           1844           KK  EM1EM2   ROUTE
           1845           KM
           1846           RS      19    FLOW
           1847           RC   0.030   0.015   0.030    5153  0.0012 1326.70
           1848           RX  4931.0 4943.00 4952.00 4974.00 5022.00 5047.00 5058.00 5064.00
           1849           RY  1324.0 1323.90 1323.80 1312.60 1312.70 1323.30 1324.30 1326.70
                          *
1                                                       HEC-1 INPUT                                             PAGE 47

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           1850           KK    EMF2   BASIN
           1851           KM
           1852           BA   1.850
           1853           LG    0.13    0.21    6.40    0.22      62
           1854           UI       0     108     108     195     388     494     572     641     733     839
           1855           UI    1028    1347    1292    1063     927     823     707     618     533     447
           1856           UI     319     191     184     178     116     108      90      33      33      33
           1857           UI      33      33      33      33      33       0       0       0       0       0
           1858           UI       0       0       0       0       0       0       0       0       0       0
                          *

           1859           KK  DIVEM2  DIVERT
           1860           KM
           1861           DT  RETEM2    96.9     0.0
           1862           DI     0.0    78.0    79.0 10079.0     0.0     0.0     0.0     0.0     0.0     0.0
           1863           DQ     0.0     0.0     1.0 10001.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           1864           KK  CPEMF2 COMBINE
           1865           KM
           1866           HC       2
                          *

           1867           KK  EM2M3A   ROUTE
           1868           KM
           1869           RS       1    FLOW
           1870           RC   0.030   0.030   0.030    1085  0.0002 1326.40
           1871           RX  4945.0 4946.00 4947.00 4976.00 5027.00 5057.00 5109.00 5120.00
           1872           RY  1324.1 1324.10 1324.10 1311.10 1311.10 1325.20 1325.30 1326.40
                          *

           1873           KK  EM2M3B   ROUTE
           1874           KM
```

```
        1875           RS       1    FLOW
        1876           RC   0.030   0.020   0.030     972  0.0002 1324.10
        1877           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
        1878           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                       *

        1879           KK    EMF3   BASIN
        1880           KM
        1881           BA   1.489
        1882           LG    0.21    0.24    4.80    0.42      52
        1883           UI       0     104     104     298     444     544     625     737     879    1196
        1884           UI    1278    1014     866     740     627     521     421     265     184     171
        1885           UI     124     104      69      32      32      32      32      32      32       0
        1886           UI       0       0       0       0       0       0       0       0       0       0
        1887           UI       0       0       0       0       0       0       0       0       0       0
                       *
1                                                HEC-1 INPUT                                              PAGE 48

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1888           KK  DIVEM3  DIVERT
        1889           KM
        1890           DT  RETEM3    59.1     0.0
        1891           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1892           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

        1893           KK  CPEMF3 COMBINE
        1894           KM
        1895           HC       2
                       *

        1896           KK  EMF3RB   ROUTE
        1897           KM
        1898           RS       1    FLOW
        1899           RC   0.030   0.025   0.030     939  0.0007 1324.10
        1900           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
        1901           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                       *

        1902           KK  RITBAS   BASIN
        1903           KM
        1904           BA   0.294
        1905           LG    0.01    0.02    4.80    0.25       0
        1906           UI       0    1043    1115     112       0       0       0       0       0       0
        1907           UI       0       0       0       0       0       0       0       0       0       0
        1908           UI       0       0       0       0       0       0       0       0       0       0
        1909           UI       0       0       0       0       0       0       0       0       0       0
        1910           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1911           KK  RITBAS STORAGE
        1912           KM
        1913           KO
        1914           RS       1    STOR
        1915           SV            22.00   99.00  213.00  331.00  451.00  571.00  693.00
        1916           SQ             1.00    2.00    3.00    4.00    5.00    6.00    7.00
        1917           SE  1311.0 1312.00 1313.00 1314.00 1315.00 1316.00 1317.00 1318.00
        1918           ST  1318.0   900.0     3.0     1.5
                       *

        1919           KK  CPRITB COMBINE
        1920           KM
        1921           HC       2
                       *

        1922           KK  RBEMF4   ROUTE
        1923           KM
        1924           RS       3    FLOW
        1925           RC   0.030   0.030   0.030    2391  0.0001 1324.10
        1926           RX  4829.0 4848.00 4879.00 4912.00 5087.00 5120.00 5163.00 5172.00
        1927           RY  1324.1 1322.00 1321.30 1310.50 1309.80 1321.00 1322.70 1324.10
                       *
        1928           KM
1                                                HEC-1 INPUT                                              PAGE 49

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1929           KK      R2   BASIN
        1930           KM
        1931           BA   0.677
        1932           LG    0.28    0.25    5.80    0.23      22
        1933           UI       0      52      52     176     237     287     335     402     537     651
        1934           UI     517     432     364     303     251     182     109      88      75      52
        1935           UI      42      16      16      16      16      16      16       0       0       0
        1936           UI       0       0       0       0       0       0       0       0       0       0
        1937           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1938           KK   DIVR2  DIVERT
        1939           KM
        1940           DT   RETR2    18.5     0.0
        1941           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1942           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

        1943           KK      R3   BASIN
        1944           KM
        1945           BA   0.413
        1946           LG    0.27    0.25    4.65    0.36      19
        1947           UI       0      34      42     122     165     196     235     293     413     372
```

```
        1948           UI     298     250     205     167     122      71      57      45      34      20
        1949           UI      10      10      10      10      10       0       0       0       0       0
        1950           UI       0       0       0       0       0       0       0       0       0       0
        1951           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1952           KK   DIVR3  DIVERT
        1953           KM
        1954           DT   RETR3    15.6     0.0
        1955           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1956           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

        1957           KK  CPR2R3 COMBINE
        1958           KM
        1959           HC       2
                       *

        1960           KK  R2R3R6   ROUTE
        1961           KM
        1962           RS      18    FLOW
        1963           RC   0.045   0.040   0.045    7280  0.0033    2.50
        1964           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
        1965           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                       *
1                                                HEC-1 INPUT                                              PAGE 50

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        1966           KK      R6   BASIN
        1967           KM
        1968           BA   0.504
        1969           LG    0.30    0.25    4.65    0.39      15
        1970           UI       0      40      46     143     194     231     274     336     472     469
        1971           UI     369     312     255     211     166      99      70      63      40      35
        1972           UI      12      12      12      12      12      12       0       0       0       0
        1973           UI       0       0       0       0       0       0       0       0       0       0
        1974           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1975           KK    CPR6 COMBINE
        1976           KM
        1977           HC       2
                       *

        1978           KK    R6R9   ROUTE
        1979           KM
        1980           RS       4    FLOW
        1981           RC   0.035   0.035   0.035    6687  0.0040    6.00
        1982           RX  961.00  981.00  989.00 1001.00 1005.00 1017.00 1025.00 1045.00
        1983           RY    6.00    5.00    4.00    1.00    1.00    4.00    5.00    6.00
                       *

        1984           KK      R9   BASIN
        1985           KM
        1986           BA   0.592
        1987           LG    0.16    0.25    4.80    0.40      64
        1988           UI       0      80     269     435     585     924     773     566     409     222
        1989           UI     134      81      34      24      24       0       0       0       0       0
        1990           UI       0       0       0       0       0       0       0       0       0       0
        1991           UI       0       0       0       0       0       0       0       0       0       0
        1992           UI       0       0       0       0       0       0       0       0       0       0
                       *

        1993           KK   DIVR9  DIVERT
        1994           KM
        1995           DT   RETR9    54.2     0.0
        1996           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
        1997           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

        1998           KK    CPR9 COMBINE
        1999           KM
        2000           HC       2
                       *

        2001           KK   R9R11   ROUTE
        2002           KM
        2003           RS       7    FLOW
        2004           RC   0.035   0.035   0.035    7667  0.0030    6.00
        2005           RX  950.00  977.00  989.00 1001.00 1006.00 1018.00 1030.00 1050.00
        2006           RY    6.00    5.00    4.00    1.00    1.00    4.00    5.00    6.00
                       *
1                                                HEC-1 INPUT                                              PAGE 51

        LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        2007           KK     R11   BASIN
        2008           KM
        2009           BA   0.986
        2010           LG    0.14    0.23    6.20    0.23      45
        2011           UI       0     101     213     442     574     717     994    1219     912     728
        2012           UI     567     426     229     169     116      84      31      31      31      31
        2013           UI       0       0       0       0       0       0       0       0       0       0
        2014           UI       0       0       0       0       0       0       0       0       0       0
        2015           UI       0       0       0       0       0       0       0       0       0       0
                       *

        2016           KK  DIVR11  DIVERT
        2017           KM
        2018           DT  RETR11    67.9     0.0
```

```
           2019           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2020           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2021           KK    DRR5RETRIEVE
           2022           KM
           2023           DR    DRR5
                          *

           2024           KK      R5   BASIN
           2025           KM
           2026           BA   0.504
           2027           LG    0.29    0.25    5.40    0.27      21
           2028           UI       0      53     120     241     310     393     574     608     455     358
           2029           UI     277     189      98      80      53      26      16      16      16      16
           2030           UI       0       0       0       0       0       0       0       0       0       0
           2031           UI       0       0       0       0       0       0       0       0       0       0
           2032           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2033           KK   DIVR5  DIVERT
           2034           KM
           2035           DT   RETR5     1.0     0.0
           2036           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2037           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2038           KK    CPR5 COMBINE
           2039           KM
           2040           HC       2    1.22
                          *

           2041           KK    R5R8   ROUTE
           2042           KM
           2043           RS       5    FLOW
           2044           RC   0.040   0.035   0.040    6587  0.0043    5.00
           2045           RX  966.00  986.00  994.00 1006.00 1012.00 1024.00 1032.00 1052.00
           2046           RY    5.00    4.50    4.00    1.00    1.00    4.00    4.50    5.00
                          *
1                                                       HEC-1 INPUT                                              PAGE 52

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2047           KK      R8   BASIN
           2048           KM
           2049           BA   0.554
           2050           LG    0.16    0.25    4.60    0.45      64
           2051           UI       0      69     208     360     471     695     788     567     421     299
           2052           UI     149     105      69      23      21      21      21       0       0       0
           2053           UI       0       0       0       0       0       0       0       0       0       0
           2054           UI       0       0       0       0       0       0       0       0       0       0
           2055           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2056           KK   DIVR8  DIVERT
           2057           KM
           2058           DT   RETR8    50.5     0.0
           2059           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2060           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2061           KK    CPR8 COMBINE
           2062           KM
           2063           HC       2
                          *

           2064           KK   R8R11   ROUTE
           2065           KM
           2066           RS       7    FLOW
           2067           RC   0.070   0.030   0.040    5355  0.0037   15.00
           2068           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2069           RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                          *

           2070           KK   CPR11 COMBINE
           2071           KM
           2072           HC       3
                          *

           2073           KK  R11R13   ROUTE
           2074           KM
           2075           RS       6    FLOW
           2076           RC   0.040   0.025   0.040    5263  0.0027   15.00
           2077           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2078           RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                          *

           2079           KK     R13   BASIN
           2080           KM
           2081           BA   0.501
           2082           LG    0.15    0.25    3.95    0.63      56
           2083           UI       0      80     322     483     750     853     575     392     188     110
           2084           UI      58      24      24       0       0       0       0       0       0       0
           2085           UI       0       0       0       0       0       0       0       0       0       0
           2086           UI       0       0       0       0       0       0       0       0       0       0
           2087           UI       0       0       0       0       0       0       0       0       0       0
                          *
1                                                       HEC-1 INPUT                                              PAGE 53

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
           2088           KK  DIVR13  DIVERT
           2089           KM
           2090           DT  RETR13    33.8     0.0
           2091           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2092           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2093           KK   CPR13 COMBINE
           2094           KM
           2095           HC       2
                          *

           2096           KK  R13R16   ROUTE
           2097           KM
           2098           RS       7    FLOW
           2099           RC   0.070   0.025   0.045    5239  0.0031   15.00
           2100           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2101           RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                          *

           2102           KK     R16   BASIN
           2103           KM
           2104           BA   0.498
           2105           LG    0.13    0.25    4.25    0.57      67
           2106           UI       0      90     343     515     840     812     552     353     157      97
           2107           UI      39      25      25       0       0       0       0       0       0       0
           2108           UI       0       0       0       0       0       0       0       0       0       0
           2109           UI       0       0       0       0       0       0       0       0       0       0
           2110           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2111           KK  DIVR16  DIVERT
           2112           KM
           2113           DT  RETR16    37.2     0.0
           2114           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2115           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2116           KK   CPR16 COMBINE
           2117           KM
           2118           HC       2
                          *

           2119           KK  R16R21   ROUTE
           2120           KM
           2121           RS      12    FLOW
           2122           RC   0.070   0.035   0.045   10034  0.0042   15.00
           2123           RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
           2124           RY   15.00   14.50   13.00   12.00   11.00   13.00   14.50   15.00
                          *
1                                                       HEC-1 INPUT                                              PAGE 54

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2125           KK     R21   BASIN
           2126           KM
           2127           BA   0.836
           2128           LG    0.22    0.24    4.80    0.35      33
           2129           UI       0      65      65     227     302     364     428     515     701     804
           2130           UI     628     529     440     366     299     210     120     108      82      65
           2131           UI      38      20      20      20      20      20       0       0       0       0
           2132           UI       0       0       0       0       0       0       0       0       0       0
           2133           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2134           KK  DIVR21  DIVERT
           2135           KM
           2136           DT  RETR21    18.4     0.0
           2137           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2138           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
           2139           KM

           2140           KK      R1   BASIN
           2141           KM
           2142           BA   1.448
           2143           LG    0.25    0.25    4.55    0.42      30
           2144           UI       0     132     222     523     691     836    1039    1490    1523    1171
           2145           UI     960     769     608     389     230     203     132      90      40      40
           2146           UI      40      40      40       0       0       0       0       0       0       0
           2147           UI       0       0       0       0       0       0       0       0       0       0
           2148           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2149           KK   DIVR1  DIVERT
           2150           KM
           2151           DT   RETR1   100.2     0.0
           2152           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2153           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2154           KK    R1R4   ROUTE
           2155           KM
           2156           RS      26    FLOW
           2157           RC   0.070   0.070   0.070    5946  0.0054    2.50
           2158           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
           2159           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                          *

           2160           KK      R4   BASIN
           2161           KM
           2162           BA   0.998
```

```
           2163           LG    0.30    0.25    4.60    0.40       5
           2164           UI       0      87     129     330     440     526     643     871    1074     840
           2165           UI     691     562     455     345     198     148     118      87      48      27
           2166           UI      27      27      27      27       0       0       0       0       0       0
           2167           UI       0       0       0       0       0       0       0       0       0       0
           2168           UI       0       0       0       0       0       0       0       0       0       0
                          *
1                                                      HEC-1 INPUT                                             PAGE 55

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2169           KK    CPR4 COMBINE
           2170           KM
           2171           HC       2
                          *

           2172           KK    R4R7   ROUTE
           2173           KM
           2174           RS       6    FLOW
           2175           RC   0.050   0.025   0.070    5336  0.0052   15.00
           2176           RX    0.00   10.00   20.00   25.00   65.00   75.00  575.00 1075.00
           2177           RY   15.00   14.50   14.00   12.00   11.00   12.50   14.00   15.00
                          *

           2178           KK      R7   BASIN
           2179           KM
           2180           BA   1.003
           2181           LG    0.25    0.25    4.65    0.40      34
           2182           UI       0      88     135     338     450     538     662     900    1088     835
           2183           UI     690     557     450     331     188     148     111      88      37      27
           2184           UI      27      27      27       0       0       0       0       0       0       0
           2185           UI       0       0       0       0       0       0       0       0       0       0
           2186           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2187           KK   DIVR7  DIVERT
           2188           KM
           2189           DT   RETR7    47.2     0.0
           2190           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2191           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2192           KK    CPR7 COMBINE
           2193           KM
           2194           HC       2
                          *

           2195           KK   R7R10   ROUTE
           2196           KM
           2197           RS       8    FLOW
           2198           RC   0.025   0.040   0.035    6813  0.0029    9.00
           2199           RX   75.00   78.00   88.00  100.00  130.00  145.00  155.00  500.00
           2200           RY    9.00    4.00    4.00    1.00    1.00    4.00    5.00    6.00
                          *

           2201           KK     R10   BASIN
           2202           KM
           2203           BA   1.010
           2204           LG    0.23    0.25    4.70    0.38      35
           2205           UI       0      64      64     142     244     307     355     401     468     556
           2206           UI     737     791     638     548     482     409     354     303     230     153
           2207           UI     112     104      83      64      60      19      19      19      19      19
           2208           UI      19      19       0       0       0       0       0       0       0       0
           2209           UI       0       0       0       0       0       0       0       0       0       0
                          *
1                                                      HEC-1 INPUT                                             PAGE 56

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2210           KK  DIVR10  DIVERT
           2211           KM
           2212           DT  RETR10    69.7     0.0
           2213           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2214           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2215           KK   CPR10 COMBINE
           2216           KM
           2217           HC       2
                          *

           2218           KK  R10R12   ROUTE
           2219           KM
           2220           RS       4    FLOW
           2221           RC   0.035   0.030   0.035    7002  0.0026   10.00
           2222           RX  940.00  961.00  981.00 1001.00 1005.00 1025.00 1050.00 1075.00
           2223           RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                          *

           2224           KK     R12   BASIN
           2225           KM
           2226           BA   0.486
           2227           LG    0.10    0.25    4.80    0.43      80
           2228           UI       0     198     609    1126     949     536     201      81      34       0
           2229           UI       0       0       0       0       0       0       0       0       0       0
           2230           UI       0       0       0       0       0       0       0       0       0       0
           2231           UI       0       0       0       0       0       0       0       0       0       0
           2232           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2233           KK  DIVR12  DIVERT
```

```
           2234           KM
           2235           DT  RETR12    40.3     0.0
           2236           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2237           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2238           KK   CPR12 COMBINE
           2239           KM
           2240           HC       2
                          *

           2241           KK  R12R15   ROUTE
           2242           KM
           2243           RS      11    FLOW
           2244           RC   0.045   0.040   0.045    5352  0.0035    2.50
           2245           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
           2246           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                          *
1                                                      HEC-1 INPUT                                             PAGE 57

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2247           KK     R15   BASIN
           2248           KM
           2249           BA   0.562
           2250           LG    0.24    0.25    4.80    0.37      35
           2251           UI       0      59     132     265     342     432     626     684     510     402
           2252           UI     311     216     114      92      59      33      18      18      18      18
           2253           UI       0       0       0       0       0       0       0       0       0       0
           2254           UI       0       0       0       0       0       0       0       0       0       0
           2255           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2256           KK  DIVR15  DIVERT
           2257           KM
           2258           DT  RETR15    22.9     0.0
           2259           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2260           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2261           KK   CPR15 COMBINE
           2262           KM
           2263           HC       2
                          *

           2264           KK  R15R18   ROUTE
           2265           KM
           2266           RS       5    FLOW
           2267           RC   0.045   0.040   0.020    7738  0.0041 1410.00
           2268           RX  959.00  960.00  975.00 1000.00 1020.00 1042.50 1097.50 1120.00
           2269           RY  1413.0 1408.10 1408.00 1403.00 1403.00 1407.50 1408.00 1410.00
                          *

           2270           KK     R18   BASIN
           2271           KM
           2272           BA   0.797
           2273           LG    0.25    0.25    4.60    0.41      32
           2274           UI       0      58      58     179     254     308     358     425     526     720
           2275           UI     649     527     452     378     318     264     187     109      97      81
           2276           UI      58      48      18      18      18      18      18      18       0       0
           2277           UI       0       0       0       0       0       0       0       0       0       0
           2278           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2279           KK  DIVR18  DIVERT
           2280           KM
           2281           DT  RETR18    50.8     0.0
           2282           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2283           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                      HEC-1 INPUT                                             PAGE 58

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2284           KK   CPR18 COMBINE
           2285           KM
           2286           HC       2
                          *

           2287           KK  R18R22   ROUTE
           2288           KM
           2289           RS       5    FLOW
           2290           RC   0.025   0.050   0.025    7103  0.0031 1374.50
           2291           RX  947.00  954.00  966.00  995.00 1005.00 1034.00 1038.00 1053.00
           2292           RY  1374.5 1374.20 1373.70 1366.50 1366.50 1373.70 1373.70 1374.50
                          *

           2293           KK     R22   BASIN
           2294           KM
           2295           BA   0.574
           2296           LG    0.17    0.24    4.65    0.41      53
           2297           UI       0      79     273     436     596     929     736     538     380     192
           2298           UI     122      76      24      24      24       0       0       0       0       0
           2299           UI       0       0       0       0       0       0       0       0       0       0
           2300           UI       0       0       0       0       0       0       0       0       0       0
           2301           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2302           KK  DIVR22  DIVERT
           2303           KM
           2304           DT  RETR22    37.6     0.0
```

```
     2305          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2306          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

     2307          KK     R14   BASIN
     2308          KM
     2309          BA   0.497
     2310          LG    0.14    0.25    4.55    0.46      61
     2311          UI       0     117     405     621    1015     742     487     229     120      52
     2312          UI      27      27       0       0       0       0       0       0       0       0
     2313          UI       0       0       0       0       0       0       0       0       0       0
     2314          UI       0       0       0       0       0       0       0       0       0       0
     2315          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2316          KK  DIVR14  DIVERT
     2317          KM
     2318          DT  RETR14    33.9     0.0
     2319          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2320          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *
1                                               HEC-1 INPUT                                             PAGE 59

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     2321          KK  R14R17   ROUTE
     2322          KM
     2323          RS       5    FLOW
     2324          RC   0.035   0.030   0.035    6503  0.0031   10.00
     2325          RX  950.00  960.00  980.00 1000.00 1005.00 1025.00 1045.00 1055.00
     2326          RY    7.00    6.00    5.00    1.00    1.00    5.00    6.00    7.00
                   *

     2327          KK     R17   BASIN
     2328          KM
     2329          BA   0.491
     2330          LG    0.22    0.25    4.55    0.43      43
     2331          UI       0      45      75     177     234     284     352     505     516     397
     2332          UI     325     261     206     132      78      69      45      31      14      14
     2333          UI      14      14      14       0       0       0       0       0       0       0
     2334          UI       0       0       0       0       0       0       0       0       0       0
     2335          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2336          KK  DIVR17  DIVERT
     2337          KM
     2338          DT  RETR17    30.4     0.0
     2339          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2340          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

     2341          KK   CPR17 COMBINE
     2342          KM
     2343          HC       2
                   *

     2344          KK  R17R22   ROUTE
     2345          KM
     2346          RS       4    FLOW
     2347          RC   0.045   0.035   0.045    6645  0.0048   15.00
     2348          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
     2349          RY   15.00   14.50   14.00   12.00   11.00   14.00   14.50   15.00
                   *

     2350          KK   CPR22 COMBINE
     2351          KM
     2352          HC       3
                   *

     2353          KK  R22R21   ROUTE
     2354          KM
     2355          RS       3    FLOW
     2356          RC   0.025   0.050   0.025    4455  0.0022 1363.30
     2357          RX  947.00  954.00  966.00  995.00 1005.00 1034.00 1038.00 1053.00
     2358          RY  1363.3 1363.00 1362.50 1355.30 1355.30 1362.50 1362.50 1363.30
                   *
1                                               HEC-1 INPUT                                             PAGE 60

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     2359          KK   CPR21 COMBINE
     2360          KM
     2361          HC       3
                   *

     2362          KK  R21R25   ROUTE
     2363          KM
     2364          RS       3    FLOW
     2365          RC   0.025   0.050   0.025    6771  0.0032 1342.30
     2366          RX  941.00  947.00  959.00  984.00 1012.00 1042.00 1046.00 1061.00
     2367          RY  1342.3 1341.50 1341.00 1334.60 1333.60 1341.00 1341.00 1341.30
                   *

     2368          KK     R25   BASIN
     2369          KM
     2370          BA   0.279
     2371          LG    0.15    0.23    4.80    0.36      43
     2372          UI       0      62     219     334     553     424     280     144      72      35
     2373          UI      15      15       0       0       0       0       0       0       0       0
     2374          UI       0       0       0       0       0       0       0       0       0       0
     2375          UI       0       0       0       0       0       0       0       0       0       0
```

```
     2376          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2377          KK  DIVR25  DIVERT
     2378          KM
     2379          DT  RETR25    14.2     0.0
     2380          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2381          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

     2382          KK     R20   BASIN
     2383          KM
     2384          BA   0.503
     2385          LG    0.17    0.26    3.45    0.85      47
     2386          UI       0      61     176     313     407     582     724     524     396     290
     2387          UI     156     103      64      33      19      19      19       0       0       0
     2388          UI       0       0       0       0       0       0       0       0       0       0
     2389          UI       0       0       0       0       0       0       0       0       0       0
     2390          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2391          KK  DIVR20  DIVERT
     2392          KM
     2393          DT  RETR20    34.4     0.0
     2394          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2395          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *
1                                               HEC-1 INPUT                                             PAGE 61

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     2396          KK  R20R23   ROUTE
     2397          KM
     2398          RS       6    FLOW
     2399          RC   0.050   0.040   0.050    5267  0.0040   15.00
     2400          RX    0.00 1000.00 1005.00 1010.00 1050.00 1060.00 1560.00 2060.00
     2401          RY   15.00   14.00   13.00   12.00   11.00   14.00   14.50   15.00
                   *

     2402          KK     R23   BASIN
     2403          KM
     2404          BA   0.496
     2405          LG    0.15    0.25    4.65    0.42      55
     2406          UI       0      70     254     397     553     833     621     448     304     144
     2407          UI      95      53      22      22      22       0       0       0       0       0
     2408          UI       0       0       0       0       0       0       0       0       0       0
     2409          UI       0       0       0       0       0       0       0       0       0       0
     2410          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2411          KK  DIVR23  DIVERT
     2412          KM
     2413          DT  RETR23    35.2     0.0
     2414          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
     2415          DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                   *

     2416          KK   CPR23 COMBINE
     2417          KM
     2418          HC       2
                   *

     2419          KK  R23R25   ROUTE
     2420          KM
     2421          RS       3    FLOW
     2422          RC   0.035   0.030   0.035    5186  0.0044   15.00
     2423          RX  960.00  980.00 1004.00 1010.00 1050.00 1052.00 1070.00 1090.00
     2424          RY   15.00   13.00   12.50   11.00   11.00   14.00   14.50   15.00
                   *

     2425          KK   CPR25 COMBINE
     2426          KM
     2427          HC       3
                   *

     2428          KK  R25R24   ROUTE
     2429          KM
     2430          RS      22    FLOW
     2431          RC   0.100   0.010   0.100     454  0.0044 1336.30
     2432          RX  847.00  857.00  939.00  940.00 1031.00 1033.00 1109.00 1137.00
     2433          RY  1333.6 1333.50 1333.40 1326.90 1326.90 1333.40 1334.10 1336.30
                   *
1                                               HEC-1 INPUT                                             PAGE 62

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     2434          KK     R19   BASIN
     2435          KM
     2436          BA   1.533
     2437          LG    0.14    0.25    4.35    0.52      60
     2438          UI       0     164     380     749     965    1230    1825    1821    1373    1071
     2439          UI     828     534     285     231     164      60      50      50      50       0
     2440          UI       0       0       0       0       0       0       0       0       0       0
     2441          UI       0       0       0       0       0       0       0       0       0       0
     2442          UI       0       0       0       0       0       0       0       0       0       0
                   *

     2443          KK  DIVR19  DIVERT
     2444          KM
     2445          DT  RETR19   108.8     0.0
     2446          DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
```

```
           2447           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2448           KK  DIV19R  DIVERT
           2449           KM
           2450           DT  DETR19    35.2     0.0
           2451           DI     0.0   171.0   172.0 10172.0     0.0     0.0     0.0     0.0     0.0     0.0
           2452           DQ     0.0     0.0     1.0 10001.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *

           2453           KK  R19R24   ROUTE
           2454           KM
           2455           RS       8    FLOW
           2456           RC   0.040   0.020   0.040    5577  0.0038    2.50
           2457           RX    0.00  500.00 1000.00 1001.00 1002.00 1500.00 2000.00 2500.00
           2458           RY    2.50    2.00    1.50    1.00    1.00    1.50    2.00    2.50
                          *

           2459           KK     R24   BASIN
           2460           KM
           2461           BA   0.294
           2462           LG    0.18    0.25    4.80    0.40      52
           2463           UI       0      40     133     216     291     459     384     281     203     110
           2464           UI      67      40      17      12      12       0       0       0       0       0
           2465           UI       0       0       0       0       0       0       0       0       0       0
           2466           UI       0       0       0       0       0       0       0       0       0       0
           2467           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2468           KK  DIVR24  DIVERT
           2469           KM
           2470           DT  RETR24    19.7     0.0
           2471           DI     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           2472           DQ     0.0 10000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                          *
1                                                       HEC-1 INPUT                                             PAGE 63

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           2473           KK   CPR24 COMBINE
           2474           KM
           2475           HC       3
                          *

           2476           KK  R24EM4   ROUTE
           2477           KM
           2478           RS       1    FLOW
           2479           RC   0.025   0.025   0.025    3679  0.0044 1325.00
           2480           RX  933.00  939.00  951.00  977.00 1019.00 1049.00 1053.00 1069.00
           2481           RY  1325.0 1323.60 1323.10 1316.70 1315.70 1323.10 1323.10 1325.00
                          *

           2482           KK    EMF4   BASIN
           2483           KM
           2484           BA   0.060
           2485           LG    0.08    0.08    4.80    0.25       0
           2486           UI       0     102     258      87      14       0       0       0       0       0
           2487           UI       0       0       0       0       0       0       0       0       0       0
           2488           UI       0       0       0       0       0       0       0       0       0       0
           2489           UI       0       0       0       0       0       0       0       0       0       0
           2490           UI       0       0       0       0       0       0       0       0       0       0
                          *

           2491           KK  CPEMF4 COMBINE
           2492           HC       3   55.93
                          *
           2493           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    45          P1
                 .
                 .
    62           .------->   DRPFW
    60      DP1PFW
                 V
                 V
    65        P1P2
                 .
                 .
    73           .          P2
                 .           .
                 .           .
    88        CPP2............
                 V
                 V
    91        P2P4
                 .
                 .
    97           .          P4
                 .           .
                 .           .
   108           .           .------->   RETP4
   106           .       DIVP4
                 .           .
                 .           .
   111        CPP4............
                 V
```

```
                 V
   114        P4P6
                 .
                 .
   120           .          P6
                 .           .
                 .           .
   131           .           .------->   RETP6
   129           .       DIVP6
                 .           .
                 .           .
   134        CPP6............
                 V
                 V
   137       P6GM8
                 V
                 V
   143      GM8G10
                 .
                 .
   151           .           .<-------   DRPFW
   149           .       DRPFW
                 .           V
                 .           V
   152           .       P1PFW
                 .           .
                 .           .
   160           .           .          P3
                 .           .           .
                 .           .           .
   175           .        CPP3............
                 .           V
                 .           V
   178           .        P3P5
                 .           .
                 .           .
   184           .           .          P5
                 .           .           .
                 .           .           .
   195           .           .           .------->   RETP5
   193           .           .       DIVP5
                 .           .           .
                 .           .           .
   198           .        CPP5............
                 .           V
                 .           V
   201           .        P5P7
                 .           .
                 .           .
   207           .           .          P7
                 .           .           .
                 .           .           .
   218           .           .           .------->   RETP7
   216           .           .       DIVP7
                 .           .           .
                 .           .           .
   221        CPP7........................
                 V
                 V
   224      P7GM14
                 .
                 .
   230           .         GM1
                 .           .
                 .           .
   239           .           .         GM2
                 .           .           .
                 .           .           .
   248           .           .           .         GM3
                 .           .           .           .
                 .           .           .           .
   257           .      CPG123........................
                 .           .
                 .           .
   262           .           .------->   RETG1
   260           .       DIVG1
                 .           V
                 .           V
   265           .       GM1T5
                 .           .
                 .           .
   271           .           .         GM5
                 .           .           .
                 .           .           .
   282           .           .           .------->   RETG5
   280           .           .       DIVG5
                 .           .           .
                 .           .           .
   285           .        CPG5............
                 .           V
                 .           V
   288           .       GM5T7
                 .           .
                 .           .
   294           .           .         GM6
                 .           .           .
                 .           .           .
   305           .           .           .------->   RETG6
   303           .           .       DIVG6
                 .           .           .
                 .           .           .
   308           .           .           .         GM7
                 .           .           .           .
```

```
              .           .           .           .
319           .           .           .           .------->   RETG7
317           .           .           .       DIVG7
              .           .           .           .
              .           .           .           .
322           .           .       CPG7A............
              .           .           .
              .           .           .
325           .       CPG7B............
              .           V
              .           V
328           .       GM7T9
              .           .
              .           .
334           .           .         GM8
              .           .           .
              .           .           .
345           .           .           .------->   RETG8
343           .           .       DIVG8
              .           .           .
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348           .           .           .         GM9
              .           .           .           .
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359           .           .           .           .------->   RETG9
357           .           .           .       DIVG9
              .           .           .           .
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362           .           .       CPG9A............
              .           .           .
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365           .           .           .        GM10
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376           .           .           .           .------->  RETG10
374           .           .           .      DIVG10
              .           .           .           .
              .           .           .           .
379           .           .           .           .        GM11
              .           .           .           .           .
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390           .           .           .           .           .------->  RETG11
388           .           .           .           .      DIVG11
              .           .           .           .           .
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393           .           .           .       CPG11............
              .           .           .           .
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396           .       CPG9B........................
              .           V
              .           V
399           .      GM9T14
              .           .
              .           .
405           .           .        GM12
              .           .           .
              .           .           .
416           .           .           .------->  RETG12
414           .           .      DIVG12
              .           .           V
              .           .           V
419           .           .      G12T13
              .           .           .
              .           .           .
425           .           .           .        GM13
              .           .           .           .
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436           .           .           .           .------->  RETG13
434           .           .           .      DIVG13
              .           .           .           .
              .           .           .           .
439           .           .       CPG13............
              .           .           V
              .           .           V
442           .           .      G13T14
              .           .           .
              .           .           .
448           .           .           .        GM14
              .           .           .           .
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459           .           .           .           .------->  RETG14
457           .           .           .      DIVG14
              .           .           .           .
              .           .           .           .
462           .           .      CPG14A............
              .           .           .
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465           .      CPG14B............
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468     CPG14C............
              V
              V
471     G14E26
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478           .          E1
              .           .
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493           .           .------->    DRE2
491           .        DE1S
              .           V
              .           V
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496           .       E1E10
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504           .           .         E10
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522           .       CPE10............
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              .           V
525           .      E10E17
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533           .           .         E17
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552           .           .           .------->  RETE17
548           .           .      DIVE17
              .           .           .
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555           .       CPE17............
              .           V
              .           V
558           .      E17E21
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566           .           .         E21
              .           .           .
              .           .           .
582           .           .           .------->  RETE21
578           .           .      DIVE21
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              .           .           .
585           .      CPE21A............
              .           V
              .           V
588           .      E21G20
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597           .           .           .<-------    DRE2
595           .           .        DRE2
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598           .           .      RTE1E2
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606           .           .           .          E2
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621           .           .        CPE2............
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626           .           .           .------->    DRE3
624           .           .        DE2S
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629           .           .       E2E11
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637           .           .           .         E11
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655           .           .       CPE11............
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658           .           .      E11E18
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666           .           .           .         E18
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680           .           .           .           .------->  RETE18
678           .           .           .      DIVE18
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683           .           .       CPE18............
              .           .           V
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686           .           .      E18E21
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694           .      CPE21B............
              .           V
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697           .      G20G21
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707           .           .           .<-------    DRE3
705           .           .        DRE3
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708           .           .      RTE2E3
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716           .           .           .          E3
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732           .           .       E2SE3............
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737           .           .           .------->   DRE4N
735           .           .        DE3S
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   769           .           .      E12E19
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   855           .           .      22EE22
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   882           .      E22G22
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   888           .           .        GM21
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   897           .           .      DIVG21
                 .           .           V
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   902           .           .      G21T22
                 .           .           .
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   908           .           .           .        GM22
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   919           .           .           .           .------->  RETG22
   917           .           .           .      DIVG22
                 .           .           .           .
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   925           .           .           .        GM16
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   936           .           .           .           .------->  RETG16
   934           .           .           .      DIVG16
                 .           .           .           V
                 .           .           .           V
   939           .           .           .      G16T19
                 .           .           .           .
                 .           .           .           .
   945           .           .           .           .        GM18
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   956           .           .           .           .           .------->  RETG18
   954           .           .           .           .      DIVG18
                 .           .           .           .           .
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   962           .           .           .           .        GM19
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   973           .           .           .           .           .------->  RETG19
   971           .           .           .           .      DIVG19
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   976           .           .           .      CPG19A............
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   979           .           .           .           .        GM20
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   990           .           .           .           .           .------->  RETG20
   988           .           .           .           .      DIVG20
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   993           .           .           .      CPG19B............
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  1001           .      G22E26
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  1011           .           .      RTE3E4
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  1039           .           .           .------->   DRE4
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  1069           .           .      E13E24
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  1108           .           .           .           .------->   DRE5
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  1165           .           .           .           .           .           .           .<-------   DRE5
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  1209           .           .           .      E1424A
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  1218           .           .           .      E1424B
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  1227           .           .           .           .        E24A
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  1238           .           .           .           .           .------->  RET24A
  1236           .           .           .           .      DIV24A
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  1241           .           .       CP24A........................
                 .           .           V
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1244            .           .      E247A1
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1253            .           .           .        E27A
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1264            .           .           .           .------->  RET27A
1262            .           .           .      DIV27A
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1267            .      CPE27A........................
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1273            .      E247A2
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1282            .      E2726A
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1292            .           .        E26A
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1303            .           .           .------->  RET26A
1301            .           .      DIV26A
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1306            .      SR24EL............
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1337            .           .------->  1650UP
1327            .      802ELS
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1349            .           .        GM17
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1366            .           .           .------->  RETG17
1361            .           .      DIVG17
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1369            .           .      G17E26
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1375       CPE26A........................
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1383       80233B
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1393            .          E7
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1404            .           .------->   RETE7
1402            .       DIVE7
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1407            .      E7STOR
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1415            .        E7E6
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1423            .           .         E6B
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1434            .           .           .------->  RETE6B
1432            .           .      DIVE6B
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1437            .           .           .          E8
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1448            .           .           .           .------->   RETE8
1446            .           .           .       DIVE8
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1451            .           .           .        E8E6
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1457            .        CPE6........................
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1462            .           .------->    DRE9
1460            .        DE6S
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1465            .       E6E15
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1471            .           .         E15
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1482            .           .           .------->  RETE15
1480            .           .      DIVE15
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1487            .           .           .           .<-------    DRE9
1485            .           .           .        DRE9
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1488            .           .           .      RTE6E9
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1494            .           .           .           .          E9
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1505            .           .           .           .           .------->   RETE9
1503            .           .           .           .       DIVE9
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1508            .           .           .        CPE9............
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1513            .           .           .           .------->    DRR5
1511            .           .           .        DE9S
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1516            .           .           .       E9E16
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1522            .           .           .           .         E16
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1533            .           .           .           .           .------->  RETE16
1531            .           .           .           .      DIVE16
                .           .           .           .           .
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1536            .           .           .       CPE16............
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1539            .           .           .      E16E15
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1545            .       CPE15........................
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1548            .      E1524B
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1554            .           .         E5B
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1565            .           .           .------->  RETE5B
1563            .           .      DIVE5B
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1568            .           .      E5E14B
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1574            .           .           .        E14B
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1585            .           .           .           .------->  RET14B
1583            .           .           .      DIV14B
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1588            .           .       CP14B............
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1591            .           .      E14E24
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1597            .           .           .        E24B
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1608            .           .           .           .------->  RET24B
1606            .           .           .      DIV24B
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1611            .      CPE24B........................
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1614            .      E24E28
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1620            .           .        E28B
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1631            .           .           .------->  RET28B
1629            .           .      DIV28B
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1634            .      CPE28B............
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1637            .      E28E31
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1643            .           .         E25
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1654            .           .           .------->  RETE25
1652            .           .      DIVE25
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1657            .           .      E25E29
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1663            .           .           .         E29
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1674            .           .           .           .------->  RETE29
1672            .           .           .      DIVE29
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1677           .           .       CPE29............
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1680           .           .      E29E31
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1686           .           .           .         E32
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1697           .           .           .           .------->  RETE32
1695           .           .           .      DIVE32
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1700           .           .           .      E32E31
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1706           .           .           .           .         E31
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1717           .           .           .           .           .------->  RETE31
1715           .           .           .           .      DIVE31
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1720           .       CPE31....................................
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1723           .      E31E30
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1729           .           .        E30B
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1740           .           .           .------->  RET30B
1738           .           .      DIV30B
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1743           .       CPE30............
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1746           .      E30E26
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1752           .           .        E26B
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1763           .           .           .------->  RET26B
1761           .           .      DIV26B
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1766           .       CPE26............
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1769           .      E26E33
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1775           .           .        E33B
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1786           .           .           .------->  RET33B
1784           .           .      DIV33B
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1789      CPE33B........................
               V
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1792      E33P9A
               V
               V
1798      E33P9B
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1804           .          P9
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1815           .           .------->   RETP9
1813           .       DIVP9
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1818        CPP9............
               V
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1821      P9EMF1
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1827           .       EMF1B
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1838           .           .------->  REMF1B
1836           .      DEMF1B
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1841      CPEMF1............
               V
               V
1844      EM1EM2
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1850           .        EMF2
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1861           .           .------->  RETEM2
1859           .      DIVEM2
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1864      CPEMF2............
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1867      EM2M3A
               V
               V
1873      EM2M3B
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1879           .        EMF3
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1890           .           .------->  RETEM3
1888           .      DIVEM3
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1893      CPEMF3............
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               V
1896      EMF3RB
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1902           .      RITBAS
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               .           V
1911           .      RITBAS
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1919      CPRITB............
               V
               V
1922      RBEMF4
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1929           .          R2
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1940           .           .------->   RETR2
1938           .       DIVR2
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1943           .           .          R3
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1954           .           .           .------->   RETR3
1952           .           .       DIVR3
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1957           .      CPR2R3............
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1960           .      R2R3R6
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1966           .           .          R6
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1975           .        CPR6............
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1978           .        R6R9
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1984           .           .          R9
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1995           .           .           .------->   RETR9
1993           .           .       DIVR9
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1998           .        CPR9............
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2001           .       R9R11
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2007           .           .         R11
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2018           .           .           .------->  RETR11
2016           .           .      DIVR11
               .           .           .
               .           .           .
2023           .           .           .           .<-------    DRR5
2021           .           .           .        DRR5
               .           .           .           .
               .           .           .           .
2024           .           .           .           .          R5
               .           .           .           .           .
               .           .           .           .           .
2035           .           .           .           .           .------->   RETR5
2033           .           .           .           .       DIVR5
               .           .           .           .           .
               .           .           .           .           .
2038           .           .           .        CPR5............
               .           .           .           V
               .           .           .           V
2041           .           .           .        R5R8
               .           .           .           .
               .           .           .           .
2047           .           .           .           .          R8
               .           .           .           .           .
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               .           .           .           .           .
2058           .           .           .           .           .------->   RETR8
2056           .           .           .           .       DIVR8
               .           .           .           .           .
               .           .           .           .           .
2061           .           .           .        CPR8............
               .           .           .           V
               .           .           .           V
2064           .           .           .       R8R11
               .           .           .           .
               .           .           .           .
2070           .       CPR11........................
               .           V
               .           V
2073           .      R11R13
               .           .
               .           .
2079           .           .         R13
               .           .           .
               .           .           .
2090           .           .           .------->  RETR13
2088           .           .      DIVR13
               .           .           .
               .           .           .
2093           .       CPR13............
               .           V
               .           V
2096           .      R13R16
               .           .
               .           .
2102           .           .         R16
               .           .           .
               .           .           .
2113           .           .           .------->  RETR16
2111           .           .      DIVR16
               .           .           .
               .           .           .
2116           .       CPR16............
               .           V
               .           V
2119           .      R16R21
               .           .
               .           .
2125           .           .         R21
               .           .           .
               .           .           .
2136           .           .           .------->  RETR21
2134           .           .      DIVR21
               .           .           .
               .           .           .
2140           .           .           .          R1
               .           .           .           .
               .           .           .           .
2151           .           .           .           .------->   RETR1
2149           .           .           .       DIVR1
               .           .           .           V
               .           .           .           V
2154           .           .           .        R1R4
               .           .           .           .
               .           .           .           .
2160           .           .           .           .          R4
               .           .           .           .           .
               .           .           .           .           .
2169           .           .           .        CPR4............
               .           .           .           V
               .           .           .           V
2172           .           .           .        R4R7
               .           .           .           .
               .           .           .           .
2178           .           .           .           .          R7
               .           .           .           .           .
               .           .           .           .           .
2189           .           .           .           .           .------->   RETR7
2187           .           .           .           .       DIVR7
               .           .           .           .           .
               .           .           .           .           .
2192           .           .           .        CPR7............
               .           .           .           V
               .           .           .           V
2195           .           .           .       R7R10
               .           .           .           .
               .           .           .           .
2201           .           .           .           .         R10
               .           .           .           .           .
               .           .           .           .           .
2212           .           .           .           .           .------->  RETR10
2210           .           .           .           .      DIVR10
               .           .           .           .           .
               .           .           .           .           .
2215           .           .           .       CPR10............
               .           .           .           V
               .           .           .           V
2218           .           .           .      R10R12
               .           .           .           .
               .           .           .           .
2224           .           .           .           .         R12
               .           .           .           .           .
               .           .           .           .           .
2235           .           .           .           .           .------->  RETR12
2233           .           .           .           .      DIVR12
               .           .           .           .           .
               .           .           .           .           .
2238           .           .           .       CPR12............
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               .           .           .           V
               .           .           .           V
2241           .           .           .      R12R15
               .           .           .           .
               .           .           .           .
2247           .           .           .           .         R15
               .           .           .           .           .
               .           .           .           .           .
2258           .           .           .           .           .------->  RETR15
2256           .           .           .           .      DIVR15
               .           .           .           .           .
               .           .           .           .           .
2261           .           .           .       CPR15............
               .           .           .           V
               .           .           .           V
2264           .           .           .      R15R18
               .           .           .           .
               .           .           .           .
2270           .           .           .           .         R18
               .           .           .           .           .
               .           .           .           .           .
2281           .           .           .           .           .------->  RETR18
2279           .           .           .           .      DIVR18
               .           .           .           .           .
               .           .           .           .           .
2284           .           .           .       CPR18............
               .           .           .           V
               .           .           .           V
2287           .           .           .      R18R22
               .           .           .           .
               .           .           .           .
2293           .           .           .           .         R22
               .           .           .           .           .
               .           .           .           .           .
2304           .           .           .           .           .------->  RETR22
2302           .           .           .           .      DIVR22
               .           .           .           .           .
               .           .           .           .           .
2307           .           .           .           .           .         R14
               .           .           .           .           .           .
               .           .           .           .           .           .
2318           .           .           .           .           .           .------->  RETR14
2316           .           .           .           .           .      DIVR14
               .           .           .           .           .           V
               .           .           .           .           .           V
2321           .           .           .           .           .      R14R17
               .           .           .           .           .           .
               .           .           .           .           .           .
2327           .           .           .           .           .           .         R17
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
2338           .           .           .           .           .           .           .------->  RETR17
2336           .           .           .           .           .           .      DIVR17
               .           .           .           .           .           .           .
               .           .           .           .           .           .           .
2341           .           .           .           .           .       CPR17............
               .           .           .           .           .           V
               .           .           .           .           .           V
2344           .           .           .           .           .      R17R22
               .           .           .           .           .           .
               .           .           .           .           .           .
2350           .           .           .       CPR22........................
               .           .           .           V
               .           .           .           V
2353           .           .           .      R22R21
               .           .           .           .
               .           .           .           .
2359           .       CPR21........................
               .           V
               .           V
2362           .      R21R25
               .           .
               .           .
2368           .           .         R25
               .           .           .
               .           .           .
2379           .           .           .------->  RETR25
2377           .           .      DIVR25
               .           .           .
               .           .           .
2382           .           .           .         R20
               .           .           .           .
               .           .           .           .
2393           .           .           .           .------->  RETR20
2391           .           .           .      DIVR20
               .           .           .           V
               .           .           .           V
2396           .           .           .      R20R23
               .           .           .           .
               .           .           .           .
2402           .           .           .           .         R23
               .           .           .           .           .
               .           .           .           .           .
2413           .           .           .           .           .------->  RETR23
2411           .           .           .           .      DIVR23
               .           .           .           .           .
               .           .           .           .           .
2416           .           .           .       CPR23............
               .           .           .           V
               .           .           .           V
2419           .           .           .      R23R25
               .           .           .           .
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  2425           .       CPR25........................
                 .           V
                 .           V
  2428           .      R25R24
                 .           .
                 .           .
  2434           .           .         R19
                 .           .           .
                 .           .           .
  2445           .           .           .------->  RETR19
  2443           .           .      DIVR19
                 .           .           .
                 .           .           .
  2450           .           .           .------->  DETR19
  2448           .           .      DIV19R
                 .           .           V
                 .           .           V
  2453           .           .      R19R24
                 .           .           .
                 .           .           .
  2459           .           .           .         R24
                 .           .           .           .
                 .           .           .           .
  2470           .           .           .           .------->  RETR24
  2468           .           .           .      DIVR24
                 .           .           .           .
                 .           .           .           .
  2473           .       CPR24........................
                 .           V
                 .           V
  2476           .      R24EM4
                 .           .
                 .           .
  2482           .           .        EMF4
                 .           .           .
                 .           .           .
  2491      CPEMF4........................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                   ****************************************
 *                                       *                                                   *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998              *                                                   *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                                                   *          609 SECOND STREET          *
 *                                       *                                                   *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04JUL16  TIME  08:39:40   *                                                   *           (916) 756-1104             *
 *                                       *                                                   *                                      *
 *****************************************                                                   ****************************************



                                 24INT100C  100-YEAR, 24-hr Interim Conditions   2016-03-02
                                 Copy of 24INT100 assumng concrete-lined channel for the following routes
                                 E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
                                 by Parsons Corporation

                                 2015-12-22 The model reflects interim drainage conditions for SR 24
                                 and it is based on Mesa ADMPU with revisions reflecting development work
                                 around the corridor.

                                 2016-03-02 Modified to combine CPG19B to CPG22B as result of the Eastmar
                                 Development. G19E26 was subsequently removed.

                                 2016-07-04 Modified to include concrete lining for the SR 24 Channel.


                           **********************************************************************
                                 FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
                                 Flood Control District of Maricopa County
                                 50 YEAR
                                 24 Hour Storm
                                 Unit Hydrograph: S-Graph
                                 08/05/2011

   25 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN           5  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      7    0  ENDING DATE
                       NDTIME        2235  ENDING TIME
                        ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL    0.08 HOURS
                         TOTAL TIME BASE  166.58 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

   26 JD          INDEX STORM NO. 1
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 WARNING --- ROUTED OUTFLOW (   3019.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2957.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2881.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2802.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2723.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2797.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2923.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2997.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   3016.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2990.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2934.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2863.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2786.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2785.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2844.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2857.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2832.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2783.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (   2722.) IS GREATER THAN MAXIMUM OUTFLOW (   2721.) IN STORAGE-OUTFLOW TABLE


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


             *************
             *           *
 1911 KK     *   RITBAS  *      STORAGE
             *           *
             *************

 1913 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
1
                                                           RUNOFF SUMMARY
                                                   FLOW IN CUBIC FEET PER SECOND
                                                TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK  TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD  BASIN    MAXIMUM    TIME OF
         OPERATION     STATION     FLOW    PEAK                                       AREA     STAGE    MAX STAGE
+                                                    6-HOUR    24-HOUR    72-HOUR

         HYDROGRAPH AT
+                           P1      194.  12.67         25.          6.         2.      0.39

         DIVERSION TO
+                        DRPFW      118.  12.67         12.          3.         1.      0.39

         HYDROGRAPH AT
+                       DP1PFW       76.  12.67         13.          3.         1.      0.39

         ROUTED TO
+                         P1P2       49.  14.58         13.          3.         1.      0.39

         HYDROGRAPH AT
+                           P2      258.  12.75         38.         10.         3.      0.58

         2 COMBINED AT
+                         CPP2      258.  12.75         52.         13.         4.      0.96

         ROUTED TO
+                         P2P4      242.  13.00         52.         13.         4.      0.96

         HYDROGRAPH AT
+                           P4      459.  12.50         68.         21.         7.      0.50

         DIVERSION TO
+                        RETP4      459.  12.50         68.         21.         7.      0.50

         HYDROGRAPH AT
+                        DIVP4        0.   0.00          0.          0.         0.      0.50

         2 COMBINED AT
+                         CPP4      242.  13.00         52.         13.         4.      1.46

         ROUTED TO
+                         P4P6      220.  13.33         51.         13.         4.      1.46

         HYDROGRAPH AT
+                           P6      390.  12.67         68.         21.         7.      0.50

         DIVERSION TO
+                        RETP6      390.  12.67         68.         21.         7.      0.50
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          HYDROGRAPH AT
+                          DIVP6       0.   0.00          0.         0.         0.     0.50
          2 COMBINED AT
+                           CPP6     220.  13.33         51.        13.         4.     1.96
          ROUTED TO
+                          P6GM8     210.  13.50         50.        13.         4.     1.96
          ROUTED TO
+                         GM8G10     201.  13.67         50.        13.         4.     1.96
          HYDROGRAPH AT
+                          DRPFW     118.  12.67         12.         3.         1.     0.39
          ROUTED TO
+                          P1PFW      92.  12.83         12.         3.         1.     0.39
          HYDROGRAPH AT
+                             P3     191.  13.00         34.         8.         3.     0.52
          2 COMBINED AT
+                           CPP3     275.  12.92         45.        11.         4.     0.91
          ROUTED TO
+                           P3P5     271.  13.00         45.        11.         4.     0.91
          HYDROGRAPH AT
+                             P5     229.  12.50         35.        11.         4.     0.25
          DIVERSION TO
+                          RETP5     229.  12.50         33.         9.         3.     0.25
          HYDROGRAPH AT
+                          DIVP5      34.  13.25          6.         2.         1.     0.25
          2 COMBINED AT
+                           CPP5     271.  13.00         50.        13.         4.     1.16
          ROUTED TO
+                           P5P7     263.  13.08         50.        13.         4.     1.16
          HYDROGRAPH AT
+                             P7     419.  12.50         64.        19.         6.     0.43
          DIVERSION TO
+                          RETP7     419.  12.50         59.        16.         5.     0.43
          HYDROGRAPH AT
+                          DIVP7      60.  13.17         11.         4.         1.     0.43
          3 COMBINED AT
+                           CPP7     360.  13.58        106.        28.         9.     3.17
          ROUTED TO
+                         P7GM14     348.  13.83        105.        28.         9.     3.17
          HYDROGRAPH AT
+                            GM1     377.  12.42         44.        12.         4.     0.34
          HYDROGRAPH AT
+                            GM2     888.  12.33        113.        36.        12.     0.68
          HYDROGRAPH AT
+                            GM3     577.  12.08         60.        20.         7.     0.29
          3 COMBINED AT
+                         CPG123    1521.  12.17        217.        68.        23.     1.32
          DIVERSION TO
+                          RETG1    1521.  12.17        189.        51.        17.     1.32
          HYDROGRAPH AT
+                          DIVG1     354.  12.75         51.        16.         5.     1.32
          ROUTED TO
+                          GM1T5     223.  12.92         50.        16.         5.     1.32
          HYDROGRAPH AT
+                            GM5     310.  12.17         37.        12.         4.     0.18
          DIVERSION TO
+                          RETG5     310.  12.17         25.         7.         2.     0.18
          HYDROGRAPH AT
+                          DIVG5     218.  12.33         17.         5.         2.     0.18
          2 COMBINED AT
+                           CPG5     246.  12.92         65.        21.         7.     1.49
          ROUTED TO
+                          GM5T7     206.  13.25         63.        21.         7.     1.49
          HYDROGRAPH AT
+                            GM6     685.  12.17         63.        19.         6.     0.37
          DIVERSION TO
+                          RETG6     685.  12.17         50.        14.         5.     0.37
          HYDROGRAPH AT
+                          DIVG6     282.  12.33         19.         6.         2.     0.37
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          HYDROGRAPH AT
+                            GM7     249.  12.33         27.         8.         3.     0.22
          DIVERSION TO
+                          RETG7     249.  12.33         27.         7.         2.     0.22
          HYDROGRAPH AT
+                          DIVG7       2.  16.75          1.         0.         0.     0.22
          2 COMBINED AT
+                          CPG7A     282.  12.33         20.         6.         2.     0.58
          2 COMBINED AT
+                          CPG7B     236.  12.33         79.        26.         9.     2.08
          ROUTED TO
+                          GM7T9     200.  13.42         78.        26.         9.     2.08
          HYDROGRAPH AT
+                            GM8     692.  12.33         86.        28.         9.     0.56
          DIVERSION TO
+                          RETG8     692.  12.33         74.        20.         7.     0.56
          HYDROGRAPH AT
+                          DIVG8     192.  12.67         23.         7.         2.     0.56
          HYDROGRAPH AT
+                            GM9     153.  12.17         11.         3.         1.     0.09
          DIVERSION TO
+                          RETG9     153.  12.17         11.         3.         1.     0.09
          HYDROGRAPH AT
+                          DIVG9       0.  23.83          0.         0.         0.     0.09
          2 COMBINED AT
+                          CPG9A     192.  12.67         23.         7.         2.     0.65
          HYDROGRAPH AT
+                           GM10     357.  12.33         46.        14.         5.     0.28
          DIVERSION TO
+                         RETG10     357.  12.33         32.         9.         3.     0.28
          HYDROGRAPH AT
+                         DIVG10     236.  12.50         18.         5.         2.     0.28
          HYDROGRAPH AT
+                           GM11      91.  12.25          9.         3.         1.     0.08
          DIVERSION TO
+                         RETG11      91.  12.25          9.         3.         1.     0.08
          HYDROGRAPH AT
+                         DIVG11       1.  23.00          0.         0.         0.     0.08
          2 COMBINED AT
+                          CPG11     236.  12.50         18.         5.         2.     0.36
          3 COMBINED AT
+                          CPG9B     344.  12.75        114.        38.        13.     3.08
          ROUTED TO
+                         GM9T14     299.  12.92        112.        38.        13.     3.08
          HYDROGRAPH AT
+                           GM12     244.  12.08         26.         9.         3.     0.12
          DIVERSION TO
+                         RETG12     244.  12.08         16.         5.         2.     0.12
          HYDROGRAPH AT
+                         DIVG12     212.  12.17         13.         4.         1.     0.12
          ROUTED TO
+                         G12T13      82.  12.42         13.         4.         1.     0.12
          HYDROGRAPH AT
+                           GM13     519.  12.08         48.        16.         5.     0.29
          DIVERSION TO
+                         RETG13     519.  12.08         42.        11.         4.     0.29
          HYDROGRAPH AT
+                         DIVG13      75.  12.42         13.         4.         1.     0.29
          2 COMBINED AT
+                          CPG13     156.  12.42         26.         8.         3.     0.41
          ROUTED TO
+                         G13T14     132.  12.50         25.         8.         3.     0.41
          HYDROGRAPH AT
+                           GM14     591.  12.17         59.        19.         6.     0.35
          DIVERSION TO
+                         RETG14     591.  12.17         46.        13.         4.     0.35
          HYDROGRAPH AT
+                         DIVG14     254.  12.33         21.         7.         2.     0.35
          2 COMBINED AT
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+                     CPG14A      292.   12.33         46.        15.         5.       0.76
          2 COMBINED AT
+                     CPG14B      386.   12.92        151.        51.        17.       3.84
          2 COMBINED AT
+                     CPG14C      540.   13.83        236.        75.        25.       7.01
          ROUTED TO
+                     G14E26      537.   13.83        235.        75.        25.       7.01
          HYDROGRAPH AT
+                         E1      374.   12.83         57.        14.         5.       0.89
          DIVERSION TO
+                       DRE2      296.   12.83         42.        11.         4.       0.89
          HYDROGRAPH AT
+                       DE1S       77.   12.83         15.         4.         1.       0.89
          ROUTED TO
+                      E1E10       48.   14.83         15.         4.         1.       0.89
          HYDROGRAPH AT
+                        E10      326.   12.92         53.        13.         4.       0.82
          2 COMBINED AT
+                      CPE10      340.   12.92         67.        17.         6.       1.71
          ROUTED TO
+                     E10E17      308.   13.17         67.        17.         6.       1.71
          HYDROGRAPH AT
+                        E17      245.   12.50         35.        11.         4.       0.27
          DIVERSION TO
+                     RETE17      245.   12.50         34.         9.         3.       0.27
          HYDROGRAPH AT
+                     DIVE17       18.   13.50          5.         2.         1.       0.27
          2 COMBINED AT
+                      CPE17      308.   13.17         71.        18.         6.       1.98
          ROUTED TO
+                     E17E21      291.   13.33         70.        18.         6.       1.98
          HYDROGRAPH AT
+                        E21      291.   12.50         43.        13.         4.       0.31
          DIVERSION TO
+                     RETE21      291.   12.50         38.        10.         3.       0.31
          HYDROGRAPH AT
+                     DIVE21       63.   13.00          9.         3.         1.       0.31
          2 COMBINED AT
+                    CPE21A       319.   13.33         78.        21.         7.       2.29
          ROUTED TO
+                    E21G20       311.   13.42         78.        21.         7.       2.29
          HYDROGRAPH AT
+                       DRE2      296.   12.83         42.        11.         4.       0.89
          ROUTED TO
+                     RTE1E2      234.   13.25         42.        11.         4.       0.89
          HYDROGRAPH AT
+                         E2      325.   12.92         53.        13.         4.       0.78
          2 COMBINED AT
+                       CPE2      472.   13.00         94.        24.         8.       1.67
          DIVERSION TO
+                       DRE3      277.   13.00         39.        10.         3.       1.67
          HYDROGRAPH AT
+                       DE2S      195.   13.00         55.        14.         5.       1.67
          ROUTED TO
+                      E2E11      151.   15.92         54.        14.         5.       1.67
          HYDROGRAPH AT
+                        E11      251.   12.83         39.        10.         3.       0.60
          2 COMBINED AT
+                      CPE11      246.   12.83         83.        23.         8.       2.27
          ROUTED TO
+                     E11E18      173.   13.75         80.        23.         8.       2.27
          HYDROGRAPH AT
+                        E18      278.   12.33         31.         9.         3.       0.22
          DIVERSION TO
+                     RETE18        1.    4.50          1.         0.         0.       0.22
          HYDROGRAPH AT
+                     DIVE18      278.   12.33         31.         8.         3.       0.22
          2 COMBINED AT
+                      CPE18      274.   12.33         96.        31.        10.       2.49
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          ROUTED TO
+                     E18E21      247.   12.50         95.        31.        10.       2.49
          2 COMBINED AT
+                    CPE21B       417.   13.67        169.        52.        17.       3.90
          ROUTED TO
+                    G20G21       413.   13.75        168.        52.        17.       3.90
          HYDROGRAPH AT
+                       DRE3      277.   13.00         39.        10.         3.       1.67
          ROUTED TO
+                     RTE2E3      241.   13.42         39.        10.         3.       1.67
          HYDROGRAPH AT
+                         E3      748.   13.25        165.        41.        14.       2.23
          2 COMBINED AT
+                      E2SE3      938.   13.25        200.        50.        17.       3.90
          DIVERSION TO
+                      DRE4N      545.   13.25         81.        20.         7.       3.90
          HYDROGRAPH AT
+                       DE3S      394.   13.25        119.        30.        10.       3.90
          ROUTED TO
+                      E3E12      347.   14.50        119.        30.        10.       3.90
          HYDROGRAPH AT
+                        E12      256.   12.92         43.        11.         4.       0.57
          2 COMBINED AT
+                      CPE12      468.   12.92        160.        40.        13.       4.47
          ROUTED TO
+                     E12E19      416.   13.75        160.        40.        13.       4.47
          HYDROGRAPH AT
+                        E19      205.   12.25         19.         5.         2.       0.14
          2 COMBINED AT
+                      CPE19      418.   13.75        178.        45.        15.       4.61
          ROUTED TO
+                     E1922E      404.   14.08        178.        45.        15.       4.61
          HYDROGRAPH AT
+                        22E      130.   12.25         13.         3.         1.       0.09
          HYDROGRAPH AT
+                        E20      133.   12.50         16.         5.         2.       0.17
          ROUTED TO
+                     E2022E      107.   12.75         16.         5.         2.       0.17
          3 COMBINED AT
+                      CP22E      407.   14.08        205.        53.        18.       4.87
          ROUTED TO
+                     22EE22      402.   14.25        205.        53.        18.       4.87
          HYDROGRAPH AT
+                        E22      188.   12.67         28.         7.         2.       0.16
          3 COMBINED AT
+                      CPE22      756.   14.00        381.       108.        36.       7.25
          ROUTED TO
+                     E22G22      747.   14.17        377.       108.        36.       7.25
          HYDROGRAPH AT
+                       GM21      335.   12.25         45.        15.         5.       0.21
          DIVERSION TO
+                     RETG21      335.   12.25         31.         9.         3.       0.21
          HYDROGRAPH AT
+                     DIVG21      216.   12.42         21.         6.         2.       0.21
          ROUTED TO
+                     G21T22      180.   12.50         21.         6.         2.       0.21
          HYDROGRAPH AT
+                       GM22      184.   12.17         21.         7.         2.       0.09
          DIVERSION TO
+                     RETG22      176.   12.08         14.         4.         1.       0.09
          HYDROGRAPH AT
+                     DIVG22      143.   12.25         10.         3.         1.       0.09
          2 COMBINED AT
+                    CPG22A       210.   12.50         30.         9.         3.       0.31
          HYDROGRAPH AT
+                       GM16       79.   12.33         10.         3.         1.       0.07
          DIVERSION TO
+                     RETG16       79.   12.33          9.         2.         1.       0.07
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         HYDROGRAPH AT
+                    DIVG16      12.  12.83        2.       1.       0.     0.07
         ROUTED TO
+                    G16T19       7.  13.17        2.       1.       0.     0.07
         HYDROGRAPH AT
+                      GM18     238.  12.25       27.       9.       3.     0.17
         DIVERSION TO
+                    RETG18     238.  12.25       23.       6.       2.     0.17
         HYDROGRAPH AT
+                    DIVG18      62.  12.58        7.       2.       1.     0.17
         2 COMBINED AT
+                     CPG18      62.  12.58       10.       3.       1.     0.24
         HYDROGRAPH AT
+                      GM19     152.  12.17       12.       4.       1.     0.09
         DIVERSION TO
+                    RETG19     152.  12.17       11.       3.       1.     0.09
         HYDROGRAPH AT
+                    DIVG19      34.  12.42        3.       1.       0.     0.09
         2 COMBINED AT
+                    CPG19A      73.  12.58       12.       4.       1.     0.33
         HYDROGRAPH AT
+                      GM20     317.  12.17       34.      10.       3.     0.18
         DIVERSION TO
+                    RETG20     317.  12.17       27.       7.       2.     0.18
         HYDROGRAPH AT
+                    DIVG20     113.  12.42       10.       3.       1.     0.18
         2 COMBINED AT
+                    CPG19B     145.  12.42       22.       7.       2.     0.51
         3 COMBINED AT
+                    CPG22B     779.  14.17      417.     121.      40.     8.06
         ROUTED TO
+                    G22E26     751.  14.50      416.     121.      40.     8.06
         HYDROGRAPH AT
+                     DRE4N     545.  13.25       81.      20.       7.     3.90
         ROUTED TO
+                    RTE3E4     496.  13.50       81.      20.       7.     3.90
         HYDROGRAPH AT
+                       E4N     122.  12.92       20.       5.       2.     0.31
         2 COMBINED AT
+                     CPE4N     546.  13.42      100.      25.       8.     4.21
         DIVERSION TO
+                      DRE4     416.  13.42       69.      17.       6.     4.21
         HYDROGRAPH AT
+                     DE4NS     130.  13.42       31.       8.       3.     4.21
         ROUTED TO
+                    E4NE13     105.  15.17       31.       8.       3.     4.21
         HYDROGRAPH AT
+                       E13     231.  12.92       39.      10.       3.     0.48
         2 COMBINED AT
+                     CPE13     223.  12.92       68.      17.       6.     4.69
         ROUTED TO
+                    E13E24     154.  13.92       67.      17.       6.     4.69
         HYDROGRAPH AT
+                      DRE4     416.  13.42       69.      17.       6.     4.21
         ROUTED TO
+                    RTE4E4     312.  14.33       69.      17.       6.     4.21
         HYDROGRAPH AT
+                        E4     364.  13.25       80.      20.       7.     1.20
         2 COMBINED AT
+                      CPE4     385.  14.25      144.      36.      12.     5.41
         DIVERSION TO
+                      DRE5     372.  14.25      137.      34.      11.     5.41
         HYDROGRAPH AT
+                      DE4S      13.  14.25        7.       2.       1.     5.41
         ROUTED TO
+                    E4E14A      13.  15.33        7.       2.       1.     5.41
         HYDROGRAPH AT
+                      E14A     135.  12.83       20.       5.       2.     0.48
         HYDROGRAPH AT
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+                       E6A     646.  13.25      197.      65.      22.     0.58
         ROUTED TO
+                    E6AE5A     616.  13.50      197.      65.      22.     0.58
         HYDROGRAPH AT
+                      DRE5     372.  14.25      137.      34.      11.     5.41
         ROUTED TO
+                    RTE4E5     344.  14.58      137.      34.      11.     5.41
         HYDROGRAPH AT
+                       E5A     423.  13.25       92.      23.       8.     1.14
         2 COMBINED AT
+                    CPE5A1     606.  13.33      220.      55.      18.     6.55
         2 COMBINED AT
+                    CPE5A2    1166.  13.50      407.     118.      39.     7.13
         ROUTED TO
+                    E5A14A    1160.  13.58      407.     118.      39.     7.13
         3 COMBINED AT
+                    CPE14A    1176.  13.58      430.     123.      41.     7.61
         ROUTED TO
+                    E1424A    1173.  13.67      430.     123.      41.     7.61
         ROUTED TO
+                    E1424B    1168.  13.75      430.     123.      41.     7.61
         HYDROGRAPH AT
+                      E24A     710.  12.33       96.      32.      11.     0.53
         DIVERSION TO
+                    RET24A     710.  12.33       71.      20.       7.     0.53
         HYDROGRAPH AT
+                    DIV24A     432.  12.50       38.      12.       4.     0.53
         3 COMBINED AT
+                     CP24A    1335.  13.75      523.     149.      50.     8.62
         ROUTED TO
+                    E247A1    1329.  13.83      523.     149.      50.     8.62
         HYDROGRAPH AT
+                      E27A     568.  12.50      101.      32.      11.     0.54
         DIVERSION TO
+                    RET27A     568.  12.50       76.      21.       7.     0.54
         HYDROGRAPH AT
+                    DIV27A     310.  12.83       37.      11.       4.     0.54
         3 COMBINED AT
+                    CPE27A    1977.  13.92      931.     269.      90.    12.81
         ROUTED TO
+                    E247A2    1975.  13.92      931.     269.      90.    12.81
         ROUTED TO
+                    E2726A    1968.  14.08      929.     269.      90.    12.81
         HYDROGRAPH AT
+                      E26A     959.  12.50      158.      51.      17.     0.87
         DIVERSION TO
+                    RET26A     959.  12.50      120.      33.      11.     0.87
         HYDROGRAPH AT
+                    DIV26A     485.  12.83       57.      17.       6.     0.87
         2 COMBINED AT
+                    SR24EL    2002.  14.08      967.     282.      94.    13.68
         DIVERSION TO
+                    1650UP     352.  14.08       41.      10.       3.    13.68
         HYDROGRAPH AT
+                    802ELS    1650.  13.67      926.     271.      91.    13.68
         HYDROGRAPH AT
+                      GM17     150.  12.17       15.       5.       2.     0.10
         DIVERSION TO
+                    RETG17     150.  12.17       15.       5.       2.     0.10
         HYDROGRAPH AT
+                    DIVG17       0.   0.00        0.       0.       0.     0.10
         ROUTED TO
+                    G17E26       0.   0.00        0.       0.       0.     0.10
         3 COMBINED AT
+                    CPE26A    2035.  13.92     1077.     323.     108.    20.80
         ROUTED TO
+                    80233B    2031.  14.00     1075.     323.     108.    20.80
         HYDROGRAPH AT
+                        E7     702.  12.92      157.      49.      16.     1.12
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         DIVERSION TO
+                          RETE7      702.   12.92         156.         43.         14.       1.12

         HYDROGRAPH AT
+                          DIVE7       29.   15.17          17.          6.          2.       1.12

         ROUTED TO
+                         E7STOR        0.    0.00           0.          0.          0.       1.12

         ROUTED TO
+                           E7E6        0.    0.00           0.          0.          0.       1.12

         HYDROGRAPH AT
+                            E6B     1907.   12.58         350.        116.         39.       1.95

         DIVERSION TO
+                         RETE6B     1907.   12.58         325.         91.         30.       1.95

         HYDROGRAPH AT
+                         DIVE6B      213.   13.58          73.         25.          8.       1.95

         HYDROGRAPH AT
+                             E8      770.   12.75         155.         49.         16.       1.10

         DIVERSION TO
+                          RETE8      770.   12.75         148.         41.         14.       1.10

         HYDROGRAPH AT
+                          DIVE8       70.   14.08          25.          8.          3.       1.10

         ROUTED TO
+                           E8E6       43.   15.25          23.          8.          3.       1.10

         3 COMBINED AT
+                           CPE6      210.   13.67          87.         32.         11.       3.05

         DIVERSION TO
+                           DRE9        1.   13.67           0.          0.          0.       3.05

         HYDROGRAPH AT
+                           DE6S      209.   13.67          87.         32.         11.       3.05

         ROUTED TO
+                          E6E15      153.   14.25          85.         32.         11.       3.05

         HYDROGRAPH AT
+                            E15      955.   12.33         135.         45.         15.       0.78

         DIVERSION TO
+                         RETE15      955.   12.33         123.         34.         11.       0.78

         HYDROGRAPH AT
+                         DIVE15      120.   13.00          31.         11.          4.       0.78

         HYDROGRAPH AT
+                           DRE9        1.   13.67           0.          0.          0.       3.05

         ROUTED TO
+                         RTE6E9        1.   14.67           0.          0.          0.       3.05

         HYDROGRAPH AT
+                             E9      846.   12.42         128.         42.         14.       0.72

         DIVERSION TO
+                          RETE9      846.   12.42         119.         33.         11.       0.72

         HYDROGRAPH AT
+                          DIVE9      102.   13.17          28.          9.          3.       0.72

         2 COMBINED AT
+                           CPE9      102.   13.17          28.         10.          3.       0.72

         DIVERSION TO
+                           DRR5       13.   13.17           1.          0.          0.       0.72

         HYDROGRAPH AT
+                           DE9S       89.   13.17          28.          9.          3.       0.72

         ROUTED TO
+                          E9E16       59.   13.83          27.          9.          3.       0.72

         HYDROGRAPH AT
+                            E16      508.   12.33          69.         23.          8.       0.40

         DIVERSION TO
+                         RETE16      508.   12.33          64.         18.          6.       0.40

         HYDROGRAPH AT
+                         DIVE16       48.   13.08          15.          5.          2.       0.40

         2 COMBINED AT
+                          CPE16       81.   13.83          40.         14.          5.       1.12

         ROUTED TO
+                         E16E15       80.   14.08          40.         14.          5.       1.12

         3 COMBINED AT
+                          CPE15      252.   14.25         138.         53.         18.       4.95

         ROUTED TO
+                         E1524B      222.   14.75         138.         53.         18.       4.95
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         HYDROGRAPH AT
+                            E5B      387.   12.25          50.         17.          6.       0.29

         DIVERSION TO
+                         RETE5B      387.   12.25          45.         13.          4.       0.29

         HYDROGRAPH AT
+                         DIVE5B       41.   12.92          12.          4.          1.       0.29

         ROUTED TO
+                         E5E14B       27.   13.58          12.          4.          1.       0.29

         HYDROGRAPH AT
+                           E14B      774.   12.25          96.         32.         11.       0.53

         DIVERSION TO
+                         RET14B      774.   12.25          88.         24.          8.       0.53

         HYDROGRAPH AT
+                         DIV14B       74.   12.92          22.          7.          2.       0.53

         2 COMBINED AT
+                          CP14B       74.   12.92          33.         12.          4.       0.81

         ROUTED TO
+                         E14E24       63.   13.92          32.         12.          4.       0.81

         HYDROGRAPH AT
+                           E24B      695.   12.25          88.         28.          9.       0.46

         DIVERSION TO
+                         RET24B      695.   12.25          71.         20.          7.       0.46

         HYDROGRAPH AT
+                         DIV24B      238.   12.58          29.          9.          3.       0.46

         3 COMBINED AT
+                         CPE24B      252.   14.83         169.         69.         23.       6.23

         ROUTED TO
+                         E24E28      244.   15.25         168.         69.         23.       6.23

         HYDROGRAPH AT
+                           E28B      681.   12.42         101.         32.         11.       0.54

         DIVERSION TO
+                         RET28B      681.   12.42          77.         21.          7.       0.54

         HYDROGRAPH AT
+                         DIV28B      377.   12.67          36.         11.          4.       0.54

         2 COMBINED AT
+                         CPE28B      277.   12.75         177.         77.         26.       6.77

         ROUTED TO
+                         E28E31      246.   15.67         176.         77.         26.       6.77

         HYDROGRAPH AT
+                            E25      903.   12.50         161.         53.         18.       0.93

         DIVERSION TO
+                         RETE25      903.   12.50         161.         53.         18.       0.93

         HYDROGRAPH AT
+                         DIVE25        0.    0.00           0.          0.          0.       0.93

         ROUTED TO
+                         E25E29        0.    0.00           0.          0.          0.       0.93

         HYDROGRAPH AT
+                            E29     1079.   12.50         178.         58.         19.       1.00

         DIVERSION TO
+                         RETE29     1079.   12.50         134.         37.         12.       1.00

         HYDROGRAPH AT
+                         DIVE29      640.   12.75          68.         21.          7.       1.00

         2 COMBINED AT
+                          CPE29      577.   12.75          66.         20.          7.       1.93

         ROUTED TO
+                         E29E31      303.   13.17          64.         20.          7.       1.93

         HYDROGRAPH AT
+                            E32      351.   12.25          42.         14.          5.       0.25

         DIVERSION TO
+                         RETE32      351.   12.25          31.          9.          3.       0.25

         HYDROGRAPH AT
+                         DIVE32      192.   12.42          17.          5.          2.       0.25

         ROUTED TO
+                         E32E31       79.   12.83          16.          5.          2.       0.25

         HYDROGRAPH AT
+                            E31      838.   12.50         137.         45.         15.       0.81

         DIVERSION TO
+                         RETE31      838.   12.50         101.         28.          9.       0.81

         HYDROGRAPH AT
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+                  DIVE31      466.   12.75        55.        17.         6.      0.81
         4 COMBINED AT
+                   CPE31      521.   13.25       261.       109.        36.      9.76
         ROUTED TO
+                  E31E30      454.   13.75       254.       109.        36.      9.76
         HYDROGRAPH AT
+                    E30B      739.   12.83       162.        51.        17.      0.88
         DIVERSION TO
+                  RET30B      739.   12.83       123.        34.        11.      0.88
         HYDROGRAPH AT
+                  DIV30B      415.   13.25        57.        17.         6.      0.88
         2 COMBINED AT
+                   CPE30      605.   13.58       292.       121.        40.     10.64
         ROUTED TO
+                  E30E26      595.   13.67       289.       120.        40.     10.64
         HYDROGRAPH AT
+                    E26B      366.   12.33        49.        15.         5.      0.26
         DIVERSION TO
+                  RET26B      366.   12.33        37.        10.         3.      0.26
         HYDROGRAPH AT
+                  DIV26B      178.   12.58        17.         5.         2.      0.26
         2 COMBINED AT
+                   CPE26      603.   13.67       294.       124.        41.     10.90
         ROUTED TO
+                  E26E33      527.   14.25       285.       124.        41.     10.90
         HYDROGRAPH AT
+                    E33B     1148.   12.33       160.        52.        17.      0.85
         DIVERSION TO
+                  RET33B     1148.   12.33       121.        34.        11.      0.85
         HYDROGRAPH AT
+                  DIV33B      630.   12.58        59.        18.         6.      0.85
         3 COMBINED AT
+                  CPE33B     2247.   14.50      1200.       409.       137.     32.54
         ROUTED TO
+                  E33P9A     2238.   14.58      1197.       409.       137.     32.54
         ROUTED TO
+                  E33P9B     2226.   14.67      1191.       409.       137.     32.54
         HYDROGRAPH AT
+                      P9     1338.   12.42       236.        79.        26.      1.12
         DIVERSION TO
+                   RETP9      177.   11.75        54.        18.         6.      1.12
         HYDROGRAPH AT
+                   DIVP9     1338.   12.42       218.        61.        20.      1.12
         2 COMBINED AT
+                    CPP9     2271.   14.67      1295.       459.       154.     33.67
         ROUTED TO
+                 P9EMF1      2257.   14.75      1286.       459.       154.     33.67
         HYDROGRAPH AT
+                   EMF1B     1271.   12.42       205.        67.        22.      1.04
         DIVERSION TO
+                  REMF1B     1271.   12.42       153.        43.        14.      1.04
         HYDROGRAPH AT
+                  DEMF1B      681.   12.67        80.        24.         8.      1.04
         2 COMBINED AT
+                  CPEMF1     2289.   14.75      1331.       474.       159.     34.70
         ROUTED TO
+                  EM1EM2     2288.   14.83      1331.       474.       159.     34.70
         HYDROGRAPH AT
+                    EMF2     1409.   12.83       345.       114.        38.      1.85
         DIVERSION TO
+                  RETEM2     1331.   12.83       195.        49.        16.      1.85
         HYDROGRAPH AT
+                  DIVEM2      814.   13.33       149.        65.        22.      1.85
         2 COMBINED AT
+                  CPEMF2     2375.   14.75      1420.       513.       175.     36.55
         ROUTED TO
+                  EM2M3A     2371.   14.83      1416.       513.       175.     36.55
         ROUTED TO
+                  EM2M3B     2367.   14.92      1413.       513.       175.     36.55
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         HYDROGRAPH AT
+                    EMF3     1144.   12.75       241.        79.        26.      1.49
         DIVERSION TO
+                  RETEM3      801.   12.42       100.        30.        10.      1.49
         HYDROGRAPH AT
+                  DIVEM3     1144.   12.75       175.        50.        17.      1.49
         2 COMBINED AT
+                  CPEMF3     2407.   14.83      1541.       550.       188.     38.04
         ROUTED TO
+                  EMF3RB     2407.   14.92      1537.       550.       188.     38.04
         HYDROGRAPH AT
+                  RITBAS      610.   12.08        37.         9.         3.      0.29
         ROUTED TO
+                  RITBAS        1.   12.92         1.         1.         1.      0.29
         2 COMBINED AT
+                  CPRITB     2407.   14.92      1537.       551.       188.     38.33
         ROUTED TO
+                  RBEMF4     2392.   15.08      1516.       550.       188.     38.33
         HYDROGRAPH AT
+                      R2      519.   12.67        86.        25.         8.      0.68
         DIVERSION TO
+                   RETR2      383.   12.42        33.         9.         3.      0.68
         HYDROGRAPH AT
+                   DIVR2      519.   12.67        59.        16.         5.      0.68
         HYDROGRAPH AT
+                      R3      301.   12.58        47.        14.         5.      0.41
         DIVERSION TO
+                   RETR3      301.   12.58        29.         8.         3.      0.41
         HYDROGRAPH AT
+                   DIVR3      241.   12.75        21.         6.         2.      0.41
         2 COMBINED AT
+                  CPR2R3      718.   12.75        79.        21.         7.      1.09
         ROUTED TO
+                  R2R3R6      331.   14.33        74.        21.         7.      1.09
         HYDROGRAPH AT
+                      R6      342.   12.67        52.        15.         5.      0.50
         2 COMBINED AT
+                    CPR6      338.   12.67       119.        35.        12.      1.59
         ROUTED TO
+                    R6R9      305.   14.67       118.        35.        12.      1.59
         HYDROGRAPH AT
+                      R9      733.   12.33       108.        36.        12.      0.59
         DIVERSION TO
+                   RETR9      733.   12.33        98.        27.         9.      0.59
         HYDROGRAPH AT
+                   DIVR9      102.   13.00        27.         9.         3.      0.59
         2 COMBINED AT
+                    CPR9      337.   13.00       142.        44.        15.      2.19
         ROUTED TO
+                   R9R11      303.   15.17       140.        44.        15.      2.19
         HYDROGRAPH AT
+                     R11     1022.   12.50       160.        51.        17.      0.99
         DIVERSION TO
+                  RETR11     1022.   12.50       124.        34.        11.      0.99
         HYDROGRAPH AT
+                  DIVR11      460.   12.83        55.        17.         6.      0.99
         HYDROGRAPH AT
+                    DRR5       13.   13.17         1.         0.         0.      0.72
         HYDROGRAPH AT
+                      R5      465.   12.50        61.        18.         6.      0.50
         DIVERSION TO
+                   RETR5        3.    5.00         2.         1.         0.      0.50
         HYDROGRAPH AT
+                   DIVR5      465.   12.50        61.        17.         6.      0.50
         2 COMBINED AT
+                    CPR5      463.   12.50        62.        18.         6.      1.22
         ROUTED TO
+                    R5R8      392.   12.83        62.        18.         6.      1.22
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        HYDROGRAPH AT
+                    R8      647.   12.42        101.        34.        11.      0.55
        DIVERSION TO
+                 RETR8      647.   12.42         91.        25.         8.      0.55
        HYDROGRAPH AT
+                 DIVR8       91.   13.08         25.         9.         3.      0.55
        2 COMBINED AT
+                  CPR8      392.   12.83         84.        26.         9.      1.77
        ROUTED TO
+                 R8R11      357.   13.25         82.        26.         9.      1.77
        3 COMBINED AT
+                 CPR11      714.   12.83        265.        83.        28.      4.95
        ROUTED TO
+                R11R13      652.   13.75        262.        83.        28.      4.95
        HYDROGRAPH AT
+                   R13      612.   12.33         81.        27.         9.      0.50
        DIVERSION TO
+                RETR13      612.   12.33         60.        17.         6.      0.50
        HYDROGRAPH AT
+                DIVR13      362.   12.50         33.        10.         3.      0.50
        2 COMBINED AT
+                 CPR13      675.   13.75        285.        92.        31.      5.45
        ROUTED TO
+                R13R16      640.   14.25        282.        92.        31.      5.45
        HYDROGRAPH AT
+                   R16      666.   12.25         92.        31.        10.      0.50
        DIVERSION TO
+                RETR16      666.   12.25         66.        19.         6.      0.50
        HYDROGRAPH AT
+                DIVR16      368.   12.50         40.        12.         4.      0.50
        2 COMBINED AT
+                 CPR16      661.   14.25        311.       102.        34.      5.95
        ROUTED TO
+                R16R21      601.   15.25        306.       102.        34.      5.95
        HYDROGRAPH AT
+                   R21      649.   12.67        114.        35.        12.      0.84
        DIVERSION TO
+                RETR21      333.   12.25         30.         9.         3.      0.84
        HYDROGRAPH AT
+                DIVR21      649.   12.67         96.        26.         9.      0.84
        HYDROGRAPH AT
+                    R1     1164.   12.58        182.        56.        19.      1.45
        DIVERSION TO
+                 RETR1     1164.   12.58        182.        51.        17.      1.45
        HYDROGRAPH AT
+                 DIVR1       22.   15.08         17.         6.         2.      1.45
        ROUTED TO
+                  R1R4       18.   20.42         15.         6.         2.      1.45
        HYDROGRAPH AT
+                    R4      673.   12.58         86.        23.         8.      1.00
        2 COMBINED AT
+                  CPR4      660.   12.58         84.        27.         9.      2.45
        ROUTED TO
+                  R4R7      513.   13.08         84.        27.         9.      2.45
        HYDROGRAPH AT
+                    R7      823.   12.58        134.        42.        14.      1.00
        DIVERSION TO
+                 RETR7      823.   12.58         86.        24.         8.      1.00
        HYDROGRAPH AT
+                 DIVR7      624.   12.75         64.        18.         6.      1.00
        2 COMBINED AT
+                  CPR7      990.   12.75        142.        44.        15.      3.45
        ROUTED TO
+                 R7R10      853.   13.25        140.        44.        15.      3.45
        HYDROGRAPH AT
+                   R10      667.   12.83        139.        43.        14.      1.01
        DIVERSION TO
+                RETR10      667.   12.83        129.        35.        12.      1.01
        HYDROGRAPH AT
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+                DIVR10      110.   13.83         25.         8.         3.      1.01
        2 COMBINED AT
+                 CPR10      853.   13.25        160.        51.        17.      4.46
        ROUTED TO
+                R10R12      725.   13.67        156.        51.        17.      4.46
        HYDROGRAPH AT
+                   R12      828.   12.17        101.        35.        12.      0.49
        DIVERSION TO
+                RETR12      828.   12.17         71.        20.         7.      0.49
        HYDROGRAPH AT
+                DIVR12      550.   12.33         47.        14.         5.      0.49
        2 COMBINED AT
+                 CPR12      764.   13.67        196.        64.        22.      4.95
        ROUTED TO
+                R12R15      590.   14.67        188.        64.        22.      4.95
        HYDROGRAPH AT
+                   R15      528.   12.50         77.        24.         8.      0.56
        DIVERSION TO
+                RETR15      477.   12.42         41.        12.         4.      0.56
        HYDROGRAPH AT
+                DIVR15      528.   12.50         45.        13.         4.      0.56
        2 COMBINED AT
+                 CPR15      598.   14.67        220.        75.        25.      5.51
        ROUTED TO
+                R15R18      564.   15.08        214.        75.        25.      5.51
        HYDROGRAPH AT
+                   R18      560.   12.67        104.        32.        11.      0.80
        DIVERSION TO
+                RETR18      560.   12.67         94.        26.         9.      0.80
        HYDROGRAPH AT
+                DIVR18      108.   13.50         21.         7.         2.      0.80
        2 COMBINED AT
+                 CPR18      572.   15.08        225.        79.        27.      6.30
        ROUTED TO
+                R18R22      534.   15.58        221.        78.        27.      6.30
        HYDROGRAPH AT
+                   R22      689.   12.33         95.        31.        10.      0.57
        DIVERSION TO
+                RETR22      689.   12.33         67.        19.         6.      0.57
        HYDROGRAPH AT
+                DIVR22      432.   12.50         41.        12.         4.      0.57
        HYDROGRAPH AT
+                   R14      703.   12.25         88.        29.        10.      0.50
        DIVERSION TO
+                RETR14      703.   12.25         60.        17.         6.      0.50
        HYDROGRAPH AT
+                DIVR14      458.   12.42         41.        12.         4.      0.50
        ROUTED TO
+                R14R17      220.   12.83         40.        12.         4.      0.50
        HYDROGRAPH AT
+                   R17      427.   12.58         73.        23.         8.      0.49
        DIVERSION TO
+                RETR17      427.   12.58         55.        15.         5.      0.49
        HYDROGRAPH AT
+                DIVR17      219.   12.83         27.         8.         3.      0.49
        2 COMBINED AT
+                 CPR17      436.   12.83         66.        20.         7.      0.99
        ROUTED TO
+                R17R22      275.   13.25         63.        20.         7.      0.99
        3 COMBINED AT
+                 CPR22      575.   15.58        287.       105.        35.      7.87
        ROUTED TO
+                R22R21      550.   15.92        283.       104.        35.      7.87
        3 COMBINED AT
+                 CPR21      838.   15.58        571.       208.        70.     14.65
        ROUTED TO
+                R21R25      815.   15.83        559.       207.        70.     14.65
        HYDROGRAPH AT
+                   R25      378.   12.25         43.        14.         5.      0.28
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          DIVERSION TO
+                        RETR25      346.   12.17         25.          7.          2.      0.28

          HYDROGRAPH AT
+                        DIVR25      353.   12.33         23.          6.          2.      0.28

          HYDROGRAPH AT
+                           R20      482.   12.42         72.         24.          8.      0.50

          DIVERSION TO
+                        RETR20      482.   12.42         62.         17.          6.      0.50

          HYDROGRAPH AT
+                        DIVR20      103.   12.92         20.          6.          2.      0.50

          ROUTED TO
+                        R20R23       47.   13.75         18.          6.          2.      0.50

          HYDROGRAPH AT
+                           R23      608.   12.33         84.         28.          9.      0.50

          DIVERSION TO
+                        RETR23      608.   12.33         63.         18.          6.      0.50

          HYDROGRAPH AT
+                        DIVR23      309.   12.58         32.         10.          3.      0.50

          2 COMBINED AT
+                         CPR23      309.   12.58         49.         16.          5.      1.00

          ROUTED TO
+                        R23R25      135.   13.00         47.         16.          5.      1.00

          3 COMBINED AT
+                         CPR25      828.   15.83        590.        222.         75.     15.93

          ROUTED TO
+                        R25R24      827.   15.92        590.        222.         75.     15.93

          HYDROGRAPH AT
+                           R19     1566.   12.50        263.         88.         29.      1.53

          DIVERSION TO
+                        RETR19     1566.   12.50        194.         55.         18.      1.53

          HYDROGRAPH AT
+                        DIVR19      875.   12.75        110.         34.         11.      1.53

          DIVERSION TO
+                        DETR19      704.   12.75         36.          9.          3.      1.53

          HYDROGRAPH AT
+                        DIV19R      171.   12.67         74.         25.          8.      1.53

          ROUTED TO
+                        R19R24      160.   13.92         70.         25.          8.      1.53

          HYDROGRAPH AT
+                           R24      346.   12.33         48.         16.          5.      0.29

          DIVERSION TO
+                        RETR24      346.   12.33         36.         10.          3.      0.29

          HYDROGRAPH AT
+                        DIVR24      196.   12.58         19.          6.          2.      0.29

          3 COMBINED AT
+                         CPR24      865.   15.75        648.        245.         82.     17.75

          ROUTED TO
+                        R24EM4      860.   15.83        647.        245.         82.     17.75

          HYDROGRAPH AT
+                          EMF4      119.   12.08          7.          2.          1.      0.06

          3 COMBINED AT
+                        CPEMF4     2926.   15.17       1939.        721.        246.     55.93
1                                SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   E7STOR
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

     PLAN  1 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.55      0.00         12.        0.       0.00        0.00        0.00

     PLAN  2 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
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                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.52      0.00         12.        0.       0.00        0.00        0.00

     PLAN  3 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.41      0.00          9.        0.       0.00        0.00        0.00

     PLAN  4 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.28      0.00          6.        0.       0.00        0.00        0.00

     PLAN  5 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.10      0.00          2.        0.       0.00        0.00        0.00

     PLAN  6 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.01      0.00          0.        0.       0.00        0.00        0.00

     PLAN  7 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.00      0.00          0.        0.       0.00        0.00        0.00

     PLAN  8 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.00      0.00          0.        0.       0.00        0.00        0.00

     PLAN  9 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1566.00            1574.00          1574.00
                           STORAGE                 0.               607.             607.
                           OUTFLOW                 0.               104.             104.

                 RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF     TIME OF
                   OF     RESERVOIR     DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW   FAILURE
                  PMF      W.S.ELEV   OVER DAM     AC-FT       CFS       HOURS       HOURS       HOURS

                 1.00      1566.00      0.00          0.        0.       0.00        0.00        0.00
1                                SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   RITBAS
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

     PLAN  1 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION          1311.00            1318.00          1318.00
                           STORAGE                 0.               693.             693.
                           OUTFLOW                 0.                 7.               7.
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                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.84       0.00         18.         1.       0.00        12.92         0.00

PLAN  2 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.83       0.00         18.         1.       0.00        12.92         0.00

PLAN  3 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.81       0.00         18.         1.       0.00        12.92         0.00

PLAN  4 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.78       0.00         17.         1.       0.00        12.83         0.00

PLAN  5 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.74       0.00         16.         1.       0.00        12.75         0.00

PLAN  6 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.72       0.00         16.         1.       0.00        12.75         0.00

PLAN  7 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.71       0.00         16.         1.       0.00        12.75         0.00

PLAN  8 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.70       0.00         15.         1.       0.00        12.75         0.00

PLAN  9 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                           ELEVATION         1311.00             1318.00        1318.00
                           STORAGE                0.                 693.           693.
                           OUTFLOW                0.                   7.             7.
```

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                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF      TIME OF
                  OF     RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS        HOURS

                1.00      1311.69       0.00         15.         1.       0.00        12.75         0.00


 *** NORMAL END OF HEC-1 ***
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1***************************************                                        **************************************
 *                                      *                                       *                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                       *   U.S. ARMY CORPS OF ENGINEERS     *
 *              JUN   1998              *                                       *   HYDROLOGIC ENGINEERING CENTER    *
 *           VERSION 4.1                *                                       *         609 SECOND STREET          *
 *                                      *                                       *      DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   04JUL16  TIME  08:42:05  *                                       *          (916) 756-1104            *
 *                                      *                                       *                                    *
 ****************************************                                       **************************************



                                   X     X  XXXXXXX   XXXXX          X
                                   X     X  X        X     X        XX
                                   X     X  X        X               X
                                   XXXXXXX  XXXX     X       XXXXX   X
                                   X     X  X        X               X
                                   X     X  X        X     X         X
                                   X     X  XXXXXXX   XXXXX         XXX




           THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

           THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
           THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
           NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
           DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
           KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                         HEC-1 INPUT                                         PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1          ID        24INT100C  100-YEAR, 24-hr Interim Conditions   2016-03-02
             2          ID        Copy of 24INT100 assumng concrete-lined channel for the following routes
             3          ID        E5A14A, E1424A, E1424B, E247A1, E247A2 and E2726A.
             4          ID        by Parsons Corporation
             5          ID
             6          ID        2015-12-22 The model reflects interim drainage conditions for SR 24
             7          ID        and it is based on Mesa ADMPU with revisions reflecting development work
             8          ID        around the corridor.
             9          ID
            10          ID        2016-03-02 Modified to combine CPG19B to CPG22B as result of the Eastmark
            11          ID        Development. G19E26 was subsequently removed.
            12          ID
            13          ID        2016-07-04 Modified to include concrete lining for the SR 24 Channel.
            14          ID
            15          ID
            16          ID  **********************************************************************
            17          ID        FUTEMADMP24 20110519 - EMADMPU 24-hr Future Conditions 20110519
            18          ID        Flood Control District of Maricopa County
            19          ID        100 YEAR
            20          ID        24 Hour Storm
            21          ID        Unit Hydrograph: S-Graph
            22          ID        08/05/2011
            23          IT       5       0       0    2000
            24          IN      15
            25          IO       5
                        *DIAGRAM
                        *
            26          JD   3.579  0.0001
            27          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
            28          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
            29          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
            30          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
            31          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
            32          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
            33          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
            34          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
            35          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
            36          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
            37          JD   3.561     1.0
            38          JD   3.490     5.0
            39          JD   3.400    10.0
            40          JD   3.286    20.0
            41          JD   3.221    30.0
            42          JD   3.175    40.0
            43          JD   3.139    50.0
            44          JD   3.114    60.0
                        *
            45          KK      P1   BASIN
            46          KM
            47          KM     Used the unit hydrograph for undeveloped conditions
            48          KM     by Parsons Corporation 2015-11
            49          BA   0.387
            50          LG    0.35    0.35    3.95    0.47       0
            51          UI       0      29      29      99     134     162     189     226     301     369
1                                         HEC-1 INPUT                                         PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            52          UI     298     248     210     175     144     108      65      50      45      29
            53          UI      26       9       9       9       9       9       9       0       0       0
            54          UI       0       0       0       0       0       0       0       0       0       0
            55          UI       0       0       0       0       0       0       0       0       0       0
                        *
            56          KM  KK DIVP1  DIVERT
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 WARNING --- ROUTED OUTFLOW (    494.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    498.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    523.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    513.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    503.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    497.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    489.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    509.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    499.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    490.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (    491.) IS GREATER THAN MAXIMUM OUTFLOW (    487.) IN STORAGE-OUTFLOW TABLE
          WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
1
                                                      RUNOFF SUMMARY
                                                FLOW IN CUBIC FEET PER SECOND
                                             TIME IN HOURS,  AREA IN SQUARE MILES

                                       PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION      FLOW     PEAK                                             AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                             P1       244.    12.67          32.          8.          3.        0.39

          DIVERSION TO
+                          DRPFW       161.    12.67          17.          4.          1.        0.39

          HYDROGRAPH AT
+                         DP1PFW        83.    12.67          15.          4.          1.        0.39

          ROUTED TO
+                           P1P2        58.    14.50          15.          4.          1.        0.39

          HYDROGRAPH AT
+                             P2       326.    12.75          49.         12.          4.        0.58

          2 COMBINED AT
+                           CPP2       326.    12.75          65.         16.          5.        0.96

          ROUTED TO
+                           P2P4       310.    13.00          64.         16.          5.        0.96

          HYDROGRAPH AT
+                             P4       536.    12.50          79.         24.          8.        0.50

          DIVERSION TO
+                          RETP4       536.    12.50          79.         24.          8.        0.50

          HYDROGRAPH AT
+                          DIVP4         0.     0.00           0.          0.          0.        0.50

          2 COMBINED AT
+                           CPP4       310.    13.00          64.         16.          5.        1.46

          ROUTED TO
+                           P4P6       289.    13.25          64.         16.          5.        1.46

          HYDROGRAPH AT
+                             P6       456.    12.67          79.         24.          8.        0.50

          DIVERSION TO
+                          RETP6       456.    12.67          79.         24.          8.        0.50

          HYDROGRAPH AT
+                          DIVP6         0.     0.00           0.          0.          0.        0.50

          2 COMBINED AT
+                           CPP6       289.    13.25          64.         16.          5.        1.96

          ROUTED TO
+                          P6GM8       273.    13.42          63.         16.          5.        1.96

          ROUTED TO
+                         GM8G10       265.    13.58          63.         16.          5.        1.96

          HYDROGRAPH AT
+                          DRPFW       161.    12.67          17.          4.          1.        0.39

          ROUTED TO
+                          P1PFW       135.    12.83          17.          4.          1.        0.39

          HYDROGRAPH AT
+                             P3       242.    13.00          43.         11.          4.        0.52

          2 COMBINED AT
+                           CPP3       363.    12.92          60.         15.          5.        0.91
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          ROUTED TO
 +                       P3P5      358.   13.00         60.        15.         5.      0.91

          HYDROGRAPH AT
 +                         P5      268.   12.50         41.        12.         4.      0.25

          DIVERSION TO
 +                       RETP5     268.   12.50         33.         9.         3.      0.25

          HYDROGRAPH AT
 +                       DIVP5     121.   12.92         12.         4.         1.      0.25

          2 COMBINED AT
 +                        CPP5     463.   12.92         71.        19.         6.      1.16

          ROUTED TO
 +                        P5P7     447.   13.00         71.        19.         6.      1.16

          HYDROGRAPH AT
 +                          P7     485.   12.50         74.        22.         7.      0.43

          DIVERSION TO
 +                       RETP7     485.   12.50         58.        16.         5.      0.43

          HYDROGRAPH AT
 +                       DIVP7     212.   12.92         22.         6.         2.      0.43

          3 COMBINED AT
 +                        CPP7     586.   13.00        150.        40.        13.      3.17

          ROUTED TO
 +                      P7GM14     569.   13.25        149.        40.        13.      3.17

          HYDROGRAPH AT
 +                         GM1     435.   12.42         53.        14.         5.      0.34

          HYDROGRAPH AT
 +                         GM2    1023.   12.33        130.        42.        14.      0.68

          HYDROGRAPH AT
 +                         GM3     651.   12.08         69.        23.         8.      0.29

          3 COMBINED AT
 +                      CPG123    1747.   12.17        250.        78.        26.      1.32

          DIVERSION TO
 +                       RETG1    1747.   12.17        188.        51.        17.      1.32

          HYDROGRAPH AT
 +                       DIVG1     847.   12.58         89.        26.         9.      1.32

          ROUTED TO
 +                       GM1T5     640.   12.67         88.        26.         9.      1.32

          HYDROGRAPH AT
 +                         GM5     349.   12.17         42.        13.         4.      0.18

          DIVERSION TO
 +                       RETG5     325.   12.17         24.         7.         2.      0.18

          HYDROGRAPH AT
 +                       DIVG5     334.   12.25         23.         7.         2.      0.18

          2 COMBINED AT
 +                        CPG5     686.   12.67        109.        33.        11.      1.49

          ROUTED TO
 +                       GM5T7     571.   12.92        107.        33.        11.      1.49

          HYDROGRAPH AT
 +                         GM6     777.   12.17         73.        22.         7.      0.37

          DIVERSION TO
 +                       RETG6     777.   12.17         50.        14.         5.      0.37

          HYDROGRAPH AT
 +                       DIVG6     552.   12.25         30.         9.         3.      0.37

          HYDROGRAPH AT
 +                         GM7     290.   12.33         32.         9.         3.      0.22

          DIVERSION TO
 +                       RETG7     290.   12.33         28.         7.         2.      0.22

          HYDROGRAPH AT
 +                       DIVG7      71.   12.75          5.         2.         1.      0.22

          2 COMBINED AT
 +                       CPG7A     552.   12.25         36.        10.         3.      0.58

          2 COMBINED AT
 +                       CPG7B     633.   12.92        139.        42.        14.      2.08

          ROUTED TO
 +                       GM7T9     585.   13.00        137.        42.        14.      2.08

          HYDROGRAPH AT
 +                         GM8     798.   12.33        100.        32.        11.      0.56

          DIVERSION TO
 +                       RETG8     798.   12.33         73.        20.         7.      0.56

          HYDROGRAPH AT
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 +                       DIVG8     516.   12.50         38.        11.         4.      0.56

          HYDROGRAPH AT
 +                         GM9     177.   12.17         13.         4.         1.      0.09

          DIVERSION TO
 +                       RETG9     177.   12.17         13.         3.         1.      0.09

          HYDROGRAPH AT
 +                       DIVG9       5.   12.75          2.         1.         0.      0.09

          2 COMBINED AT
 +                       CPG9A     516.   12.50         40.        12.         4.      0.65

          HYDROGRAPH AT
 +                        GM10     409.   12.33         53.        16.         5.      0.28

          DIVERSION TO
 +                      RETG10     409.   12.33         32.         9.         3.      0.28

          HYDROGRAPH AT
 +                      DIVG10     329.   12.42         26.         7.         2.      0.28

          HYDROGRAPH AT
 +                        GM11     108.   12.25         10.         3.         1.      0.08

          DIVERSION TO
 +                      RETG11     108.   12.25         10.         3.         1.      0.08

          HYDROGRAPH AT
 +                      DIVG11       4.   13.33          1.         1.         0.      0.08

          2 COMBINED AT
 +                       CPG11     329.   12.42         28.         8.         3.      0.36

          3 COMBINED AT
 +                       CPG9B     946.   12.50        198.        60.        20.      3.08

          ROUTED TO
 +                      GM9T14     723.   12.75        195.        60.        20.      3.08

          HYDROGRAPH AT
 +                        GM12     275.   12.08         29.        10.         3.      0.12

          DIVERSION TO
 +                      RETG12     217.   12.00         16.         5.         2.      0.12

          HYDROGRAPH AT
 +                      DIVG12     255.   12.17         17.         5.         2.      0.12

          ROUTED TO
 +                      G12T13     130.   12.33         17.         5.         2.      0.12

          HYDROGRAPH AT
 +                        GM13     596.   12.08         55.        18.         6.      0.29

          DIVERSION TO
 +                      RETG13     596.   12.08         41.        11.         4.      0.29

          HYDROGRAPH AT
 +                      DIVG13     376.   12.25         21.         6.         2.      0.29

          2 COMBINED AT
 +                       CPG13     471.   12.25         38.        11.         4.      0.41

          ROUTED TO
 +                      G13T14     366.   12.33         38.        11.         4.      0.41

          HYDROGRAPH AT
 +                        GM14     678.   12.17         67.        22.         7.      0.35

          DIVERSION TO
 +                      RETG14     676.   12.17         46.        13.         4.      0.35

          HYDROGRAPH AT
 +                      DIVG14     546.   12.25         31.         9.         3.      0.35

          2 COMBINED AT
 +                      CPG14A     708.   12.25         69.        21.         7.      0.76

          2 COMBINED AT
 +                      CPG14B     849.   12.75        256.        80.        27.      3.84

          2 COMBINED AT
 +                      CPG14C    1156.   13.25        379.       113.        38.      7.01

          ROUTED TO
 +                      G14E26    1151.   13.25        379.       113.        38.      7.01

          HYDROGRAPH AT
 +                          E1     472.   12.83         73.        18.         6.      0.89

          DIVERSION TO
 +                        DRE2     383.   12.83         56.        14.         5.      0.89

          HYDROGRAPH AT
 +                        DE1S      88.   12.83         18.         4.         1.      0.89

          ROUTED TO
 +                       E1E10      55.   15.00         18.         4.         1.      0.89

          HYDROGRAPH AT
 +                         E10     411.   12.92         68.        17.         6.      0.82
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          2 COMBINED AT
+                       CPE10       435.  12.92         85.         21.          7.       1.71

          ROUTED TO
+                      E10E17       402.  13.08         84.         21.          7.       1.71

          HYDROGRAPH AT
+                         E17       287.  12.50         41.         13.          4.       0.27

          DIVERSION TO
+                      RETE17       287.  12.50         34.          9.          3.       0.27

          HYDROGRAPH AT
+                      DIVE17       123.  12.83         11.          3.          1.       0.27

          2 COMBINED AT
+                       CPE17       452.  13.08         95.         24.          8.       1.98

          ROUTED TO
+                      E17E21       433.  13.25         94.         24.          8.       1.98

          HYDROGRAPH AT
+                         E21       341.  12.50         51.         15.          5.       0.31

          DIVERSION TO
+                      RETE21       341.  12.50         38.         10.          3.       0.31

          HYDROGRAPH AT
+                      DIVE21       175.  12.83         17.          5.          2.       0.31

          2 COMBINED AT
+                      CPE21A       474.  13.25        110.         29.         10.       2.29

          ROUTED TO
+                      E21G20       465.  13.25        110.         29.         10.       2.29

          HYDROGRAPH AT
+                        DRE2       383.  12.83         56.         14.          5.       0.89

          ROUTED TO
+                      RTE1E2       316.  13.17         56.         14.          5.       0.89

          HYDROGRAPH AT
+                          E2       409.  12.92         68.         17.          6.       0.78

          2 COMBINED AT
+                        CPE2       627.  13.00        122.         31.         10.       1.67

          DIVERSION TO
+                        DRE3       408.  13.00         60.         15.          5.       1.67

          HYDROGRAPH AT
+                        DE2S       219.  13.00         62.         16.          5.       1.67

          ROUTED TO
+                       E2E11       173.  15.83         62.         16.          5.       1.67

          HYDROGRAPH AT
+                         E11       318.  12.83         50.         12.          4.       0.60

          2 COMBINED AT
+                       CPE11       311.  12.83        100.         28.          9.       2.27

          ROUTED TO
+                      E11E18       236.  13.58         97.         28.          9.       2.27

          HYDROGRAPH AT
+                         E18       320.  12.33         36.         10.          3.       0.22

          DIVERSION TO
+                      RETE18         1.   4.17          1.          0.          0.       0.22

          HYDROGRAPH AT
+                      DIVE18       320.  12.33         36.         10.          3.       0.22

          2 COMBINED AT
+                       CPE18       316.  12.33        118.         37.         12.       2.49

          ROUTED TO
+                      E18E21       287.  12.50        117.         37.         12.       2.49

          2 COMBINED AT
+                      CPE21B       576.  13.50        223.         66.         22.       3.90

          ROUTED TO
+                      G20G21       573.  13.58        221.         66.         22.       3.90

          HYDROGRAPH AT
+                        DRE3       408.  13.00         60.         15.          5.       1.67

          ROUTED TO
+                      RTE2E3       365.  13.33         60.         15.          5.       1.67

          HYDROGRAPH AT
+                          E3       935.  13.25        209.         52.         17.       2.23

          2 COMBINED AT
+                       E2SE3      1259.  13.25        264.         66.         22.       3.90

          DIVERSION TO
+                       DRE4N       804.  13.25        125.         31.         10.       3.90
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          HYDROGRAPH AT
+                        DE3S       455.  13.25        139.         35.         12.       3.90

          ROUTED TO
+                       E3E12       401.  14.50        139.         35.         12.       3.90

          HYDROGRAPH AT
+                         E12       318.  12.92         55.         14.          5.       0.57

          2 COMBINED AT
+                       CPE12       546.  12.92        191.         48.         16.       4.47

          ROUTED TO
+                      E12E19       486.  13.67        191.         48.         16.       4.47

          HYDROGRAPH AT
+                         E19       234.  12.25         23.          6.          2.       0.14

          2 COMBINED AT
+                       CPE19       488.  13.67        212.         54.         18.       4.61

          ROUTED TO
+                      E1922E       467.  14.00        212.         54.         18.       4.61

          HYDROGRAPH AT
+                         22E       149.  12.25         15.          4.          1.       0.09

          HYDROGRAPH AT
+                         E20       159.  12.50         20.          5.          2.       0.17

          ROUTED TO
+                      E2022E       129.  12.75         20.          5.          2.       0.17

          3 COMBINED AT
+                       CP22E       472.  14.00        245.         63.         21.       4.87

          ROUTED TO
+                      22EE22       465.  14.17        245.         63.         21.       4.87

          HYDROGRAPH AT
+                         E22       223.  12.67         33.          8.          3.       0.16

          3 COMBINED AT
+                       CPE22       940.  13.83        477.        133.         44.       7.25

          ROUTED TO
+                      E22G22       931.  14.00        473.        133.         44.       7.25

          HYDROGRAPH AT
+                        GM21       379.  12.25         50.         17.          6.       0.21

          DIVERSION TO
+                      RETG21       360.  12.17         30.          9.          3.       0.21

          HYDROGRAPH AT
+                      DIVG21       347.  12.33         28.          8.          3.       0.21

          ROUTED TO
+                      G21T22       298.  12.42         28.          8.          3.       0.21

          HYDROGRAPH AT
+                        GM22       208.  12.17         24.          8.          3.       0.09

          DIVERSION TO
+                      RETG22       199.  12.08         14.          4.          1.       0.09

          HYDROGRAPH AT
+                      DIVG22       177.  12.17         13.          4.          1.       0.09

          2 COMBINED AT
+                      CPG22A       347.  12.42         41.         12.          4.       0.31

          HYDROGRAPH AT
+                        GM16        93.  12.33         12.          4.          1.       0.07

          DIVERSION TO
+                      RETG16        93.  12.33          9.          2.          1.       0.07

          HYDROGRAPH AT
+                      DIVG16        42.  12.58          4.          1.          0.       0.07

          ROUTED TO
+                      G16T19        29.  12.75          4.          1.          0.       0.07

          HYDROGRAPH AT
+                        GM18       274.  12.25         31.         10.          3.       0.17

          DIVERSION TO
+                      RETG18       274.  12.25         23.          6.          2.       0.17

          HYDROGRAPH AT
+                      DIVG18       178.  12.42         12.          4.          1.       0.17

          2 COMBINED AT
+                       CPG18       178.  12.42         16.          5.          2.       0.24

          HYDROGRAPH AT
+                        GM19       174.  12.17         15.          4.          1.       0.09

          DIVERSION TO
+                      RETG19       174.  12.17         11.          3.          1.       0.09

          HYDROGRAPH AT
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+                     DIVG19       77.   12.33          5.        1.        0.      0.09
        2 COMBINED AT
+                     CPG19A      218.   12.42         21.        6.        2.      0.33
        HYDROGRAPH AT
+                       GM20      359.   12.17         39.       12.        4.      0.18
        DIVERSION TO
+                     RETG20      359.   12.17         27.        7.        2.      0.18
        HYDROGRAPH AT
+                     DIVG20      244.   12.33         16.        5.        2.      0.18
        2 COMBINED AT
+                     CPG19B      368.   12.42         37.       11.        4.      0.51
        3 COMBINED AT
+                     CPG22B      970.   14.00        536.      153.       51.      8.06
        ROUTED TO
+                     G22E26      940.   14.33        534.      153.       51.      8.06
        HYDROGRAPH AT
+                      DRE4N      804.   13.25        125.       31.       10.      3.90
        ROUTED TO
+                     RTE3E4      750.   13.42        125.       31.       10.      3.90
        HYDROGRAPH AT
+                        E4N      154.   12.92         25.        6.        2.      0.31
        2 COMBINED AT
+                      CPE4N      813.   13.42        149.       37.       12.      4.21
        DIVERSION TO
+                       DRE4      651.   13.42        110.       27.        9.      4.21
        HYDROGRAPH AT
+                      DE4NS      162.   13.42         40.       10.        3.      4.21
        ROUTED TO
+                    E4NE13       131.   15.33         40.       10.        3.      4.21
        HYDROGRAPH AT
+                        E13      284.   12.83         48.       12.        4.      0.48
        2 COMBINED AT
+                      CPE13      275.   12.83         86.       22.        7.      4.69
        ROUTED TO
+                     E13E24      190.   13.92         85.       22.        7.      4.69
        HYDROGRAPH AT
+                       DRE4      651.   13.42        110.       27.        9.      4.21
        ROUTED TO
+                     RTE4E4      515.   14.25        109.       27.        9.      4.21
        HYDROGRAPH AT
+                         E4      462.   13.25        103.       26.        9.      1.20
        2 COMBINED AT
+                       CPE4      645.   14.17        205.       51.       17.      5.41
        DIVERSION TO
+                       DRE5      630.   14.17        198.       49.       16.      5.41
        HYDROGRAPH AT
+                       DE4S       15.   14.17          8.        2.        1.      5.41
        ROUTED TO
+                     E4E14A       14.   15.17          8.        2.        1.      5.41
        HYDROGRAPH AT
+                       E14A      170.   12.75         26.        6.        2.      0.48
        HYDROGRAPH AT
+                        E6A      740.   13.25        226.       74.       25.      0.58
        ROUTED TO
+                     E6AE5A      709.   13.50        226.       74.       25.      0.58
        HYDROGRAPH AT
+                       DRE5      630.   14.17        198.       49.       16.      5.41
        ROUTED TO
+                     RTE4E5      583.   14.42        197.       49.       16.      5.41
        HYDROGRAPH AT
+                        E5A      537.   13.25        118.       29.       10.      1.14
        2 COMBINED AT
+                     CPE5A1      792.   13.33        303.       76.       25.      6.55
        2 COMBINED AT
+                     CPE5A2     1432.   13.42        516.      147.       49.      7.13
        ROUTED TO
+                     E5A14A     1424.   13.58        516.      147.       49.      7.13
        3 COMBINED AT
+                     CPE14A     1445.   13.58        545.      154.       52.      7.61
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        ROUTED TO
+                     E1424A     1440.   13.58        545.      154.       52.      7.61
        ROUTED TO
+                     E1424B     1440.   13.67        544.      154.       52.      7.61
        HYDROGRAPH AT
+                       E24A      812.   12.33        110.       36.       12.      0.53
        DIVERSION TO
+                     RET24A      807.   12.25         70.       20.        7.      0.53
        HYDROGRAPH AT
+                     DIV24A      704.   12.42         55.       16.        5.      0.53
        3 COMBINED AT
+                      CP24A     1637.   13.67        670.      188.       63.      8.62
        ROUTED TO
+                     E247A1     1630.   13.83        669.      188.       63.      8.62
        HYDROGRAPH AT
+                       E27A      647.   12.50        115.       37.       12.      0.54
        DIVERSION TO
+                     RET27A      647.   12.50         76.       21.        7.      0.54
        HYDROGRAPH AT
+                     DIV27A      478.   12.75         54.       16.        5.      0.54
        3 COMBINED AT
+                     CPE27A     2452.   13.83       1202.      342.      114.     12.81
        ROUTED TO
+                     E247A2     2448.   13.92       1201.      342.      114.     12.81
        ROUTED TO
+                     E2726A     2442.   14.00       1199.      342.      114.     12.81
        HYDROGRAPH AT
+                       E26A     1093.   12.50        181.       58.       19.      0.87
        DIVERSION TO
+                     RET26A     1093.   12.50        119.       33.       11.      0.87
        HYDROGRAPH AT
+                     DIV26A      843.   12.67         84.       24.        8.      0.87
        2 COMBINED AT
+                     SR24EL     2479.   14.00       1260.      360.      120.     13.68
        DIVERSION TO
+                     1650UP      829.   14.00        190.       47.       16.     13.68
        HYDROGRAPH AT
+                     802ELS     1650.   12.92       1070.      312.      104.     13.68
        HYDROGRAPH AT
+                       GM17      174.   12.17         18.        6.        2.      0.10
        DIVERSION TO
+                     RETG17      174.   12.17         18.        6.        2.      0.10
        HYDROGRAPH AT
+                     DIVG17        0.    0.00          0.        0.        0.      0.10
        ROUTED TO
+                     G17E26        0.    0.00          0.        0.        0.      0.10
        3 COMBINED AT
+                     CPE26A     2483.   13.42       1355.      403.      134.     20.80
        ROUTED TO
+                     80233B     2464.   13.50       1353.      402.      134.     20.80
        HYDROGRAPH AT
+                         E7      820.   12.92        182.       56.       19.      1.12
        DIVERSION TO
+                      RETE7      820.   12.92        159.       43.       14.      1.12
        HYDROGRAPH AT
+                      DIVE7      234.   13.67         43.       13.        4.      1.12
        ROUTED TO
+                     E7STOR        1.   25.67          1.        1.        0.      1.12
        ROUTED TO
+                       E7E6        1.   30.00          1.        1.        0.      1.12
        HYDROGRAPH AT
+                        E6B     2187.   12.58        400.      132.       44.      1.95
        DIVERSION TO
+                     RETE6B     2187.   12.58        326.       91.       30.      1.95
        HYDROGRAPH AT
+                     DIVE6B      897.   13.00        131.       41.       14.      1.95
        HYDROGRAPH AT
+                         E8      901.   12.75        180.       57.       19.      1.10
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           DIVERSION TO
+                         RETE8      901.   12.75        149.        41.        14.      1.10

           HYDROGRAPH AT
+                         DIVE8      378.   13.25         52.        16.         5.      1.10

           ROUTED TO
+                          E8E6      191.   14.00         50.        16.         5.      1.10

           3 COMBINED AT
+                          CPE6      897.   13.00        176.        57.        19.      3.05

           DIVERSION TO
+                          DRE9      104.   13.00          3.         1.         0.      3.05

           HYDROGRAPH AT
+                          DE6S      788.   13.00        169.        55.        18.      3.05

           ROUTED TO
+                         E6E15      497.   13.58        165.        55.        18.      3.05

           HYDROGRAPH AT
+                           E15     1096.   12.33        154.        51.        17.      0.78

           DIVERSION TO
+                        RETE15     1096.   12.33        122.        34.        11.      0.78

           HYDROGRAPH AT
+                        DIVE15      431.   12.67         54.        17.         6.      0.78

           HYDROGRAPH AT
+                          DRE9      104.   13.00          3.         1.         0.      3.05

           ROUTED TO
+                        RTE6E9       26.   13.42          3.         1.         0.      3.05

           HYDROGRAPH AT
+                            E9      968.   12.42        147.        48.        16.      0.72

           DIVERSION TO
+                         RETE9      968.   12.42        118.        33.        11.      0.72

           HYDROGRAPH AT
+                         DIVE9      372.   12.75         49.        15.         5.      0.72

           2 COMBINED AT
+                          CPE9      372.   12.75         52.        16.         5.      0.72

           DIVERSION TO
+                          DRR5      196.   12.75          9.         2.         1.      0.72

           HYDROGRAPH AT
+                          DE9S      177.   12.75         43.        14.         5.      0.72

           ROUTED TO
+                         E9E16      122.   13.25         42.        14.         5.      0.72

           HYDROGRAPH AT
+                           E16      582.   12.33         79.        26.         9.      0.40

           DIVERSION TO
+                        RETE16      582.   12.33         64.        18.         6.      0.40

           HYDROGRAPH AT
+                        DIVE16      213.   12.58         26.         8.         3.      0.40

           2 COMBINED AT
+                         CPE16      201.   12.58         66.        22.         7.      1.12

           ROUTED TO
+                        E16E15      189.   12.83         66.        22.         7.      1.12

           3 COMBINED AT
+                         CPE15      689.   13.58        263.        90.        30.      4.95

           ROUTED TO
+                        E1524B      621.   13.83        260.        90.        30.      4.95

           HYDROGRAPH AT
+                           E5B      447.   12.25         57.        19.         6.      0.29

           DIVERSION TO
+                        RETE5B      447.   12.25         45.        13.         4.      0.29

           HYDROGRAPH AT
+                        DIVE5B      204.   12.50         21.         7.         2.      0.29

           ROUTED TO
+                        E5E14B       89.   12.92         20.         7.         2.      0.29

           HYDROGRAPH AT
+                          E14B      884.   12.25        109.        36.        12.      0.53

           DIVERSION TO
+                        RET14B      884.   12.25         88.        24.         8.      0.53

           HYDROGRAPH AT
+                        DIV14B      372.   12.50         37.        12.         4.      0.53

           2 COMBINED AT
+                         CP14B      371.   12.50         57.        18.         6.      0.81

           ROUTED TO
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+                        E14E24      180.   13.00         55.        18.         6.      0.81

           HYDROGRAPH AT
+                          E24B      788.   12.25        100.        32.        11.      0.46

           DIVERSION TO
+                        RET24B      788.   12.25         70.        20.         7.      0.46

           HYDROGRAPH AT
+                        DIV24B      572.   12.42         43.        13.         4.      0.46

           3 COMBINED AT
+                        CPE24B      697.   13.83        328.       116.        39.      6.23

           ROUTED TO
+                        E24E28      660.   14.17        324.       116.        39.      6.23

           HYDROGRAPH AT
+                          E28B      773.   12.42        116.        37.        12.      0.54

           DIVERSION TO
+                        RET28B      773.   12.42         76.        21.         7.      0.54

           HYDROGRAPH AT
+                        DIV28B      555.   12.58         54.        16.         5.      0.54

           2 COMBINED AT
+                        CPE28B      676.   14.17        362.       129.        43.      6.77

           ROUTED TO
+                        E28E31      650.   14.42        356.       129.        43.      6.77

           HYDROGRAPH AT
+                           E25     1038.   12.50        184.        60.        20.      0.93

           DIVERSION TO
+                        RETE25     1038.   12.50        184.        56.        19.      0.93

           HYDROGRAPH AT
+                        DIVE25       23.   18.08         16.         4.         1.      0.93

           ROUTED TO
+                        E25E29       20.   19.75         16.         4.         1.      0.93

           HYDROGRAPH AT
+                           E29     1237.   12.50        203.        66.        22.      1.00

           DIVERSION TO
+                        RETE29     1237.   12.50        132.        37.        12.      1.00

           HYDROGRAPH AT
+                        DIVE29      906.   12.67         99.        29.        10.      1.00

           2 COMBINED AT
+                         CPE29      897.   12.67         96.        32.        11.      1.93

           ROUTED TO
+                        E29E31      573.   13.00         94.        32.        11.      1.93

           HYDROGRAPH AT
+                           E32      404.   12.25         48.        16.         5.      0.25

           DIVERSION TO
+                        RETE32      394.   12.17         30.         9.         3.      0.25

           HYDROGRAPH AT
+                        DIVE32      344.   12.33         25.         7.         2.      0.25

           ROUTED TO
+                        E32E31      155.   12.75         24.         7.         2.      0.25

           HYDROGRAPH AT
+                           E31      964.   12.42        157.        52.        17.      0.81

           DIVERSION TO
+                        RETE31      964.   12.42        100.        28.         9.      0.81

           HYDROGRAPH AT
+                        DIVE31      835.   12.58         79.        23.         8.      0.81

           4 COMBINED AT
+                         CPE31     1095.   13.00        501.       177.        59.      9.76

           ROUTED TO
+                        E31E30      963.   13.42        489.       177.        59.      9.76

           HYDROGRAPH AT
+                          E30B      844.   12.83        186.        58.        19.      0.88

           DIVERSION TO
+                        RET30B      844.   12.83        122.        34.        11.      0.88

           HYDROGRAPH AT
+                        DIV30B      619.   13.08         84.        24.         8.      0.88

           2 COMBINED AT
+                         CPE30     1307.   13.33        553.       195.        65.     10.64

           ROUTED TO
+                        E30E26     1282.   13.42        550.       195.        65.     10.64

           HYDROGRAPH AT
+                          E26B      415.   12.33         56.        18.         6.      0.26
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          DIVERSION TO
+                     RET26B     415.   12.33        37.       10.        3.      0.26

          HYDROGRAPH AT
+                     DIV26B     280.   12.50        26.        7.        2.      0.26

          2 COMBINED AT
+                      CPE26    1299.   13.42       556.      201.       67.     10.90

          ROUTED TO
+                     E26E33    1157.   13.83       546.      200.       67.     10.90

          HYDROGRAPH AT
+                       E33B    1304.   12.33       183.       59.       20.      0.85

          DIVERSION TO
+                     RET33B    1304.   12.33       120.       34.       11.      0.85

          HYDROGRAPH AT
+                     DIV33B     972.   12.50        86.       25.        8.      0.85

          3 COMBINED AT
+                     CPE33B    3181.   13.92      1742.      569.      191.     32.54

          ROUTED TO
+                     E33P9A    3156.   14.00      1737.      568.      191.     32.54

          ROUTED TO
+                     E33P9B    3112.   14.08      1731.      568.      191.     32.54

          HYDROGRAPH AT
+                         P9    1513.   12.42       268.       90.       30.      1.12

          DIVERSION TO
+                      RETP9     137.   11.50        53.       18.        6.      1.12

          HYDROGRAPH AT
+                      DIVP9    1513.   12.42       255.       72.       24.      1.12

          2 COMBINED AT
+                       CPP9    3183.   14.08      1857.      628.      210.     33.67

          ROUTED TO
+                     P9EMF1    3146.   14.25      1850.      628.      210.     33.67

          HYDROGRAPH AT
+                      EMF1B    1442.   12.42       233.       76.       25.      1.04

          DIVERSION TO
+                     REMF1B    1442.   12.42       152.       43.       14.      1.04

          HYDROGRAPH AT
+                     DEMF1B    1142.   12.58       114.       34.       11.      1.04

          2 COMBINED AT
+                     CPEMF1    3195.   14.25      1925.      651.      218.     34.70

          ROUTED TO
+                     EM1EM2    3194.   14.33      1924.      651.      218.     34.70

          HYDROGRAPH AT
+                       EMF2    1610.   12.83       393.      130.       43.      1.85

          DIVERSION TO
+                     RETEM2    1532.   12.83       195.       49.       16.      1.85

          HYDROGRAPH AT
+                     DIVEM2    1181.   13.17       198.       81.       27.      1.85

          2 COMBINED AT
+                     CPEMF2    3350.   14.33      2056.      704.      239.     36.55

          ROUTED TO
+                     EM2M3A    3338.   14.42      2053.      704.      239.     36.55

          ROUTED TO
+                     EM2M3B    3329.   14.42      2050.      704.      239.     36.55

          HYDROGRAPH AT
+                       EMF3    1324.   12.75       277.       91.       30.      1.49

          DIVERSION TO
+                     RETEM3     812.   12.33        98.       30.       10.      1.49

          HYDROGRAPH AT
+                     DIVEM3    1324.   12.75       218.       61.       20.      1.49

          2 COMBINED AT
+                     CPEMF3    3391.   14.42      2207.      751.      255.     38.04

          ROUTED TO
+                     EMF3RB    3388.   14.50      2204.      751.      255.     38.04

          HYDROGRAPH AT
+                     RITBAS     693.   12.08        44.       11.        4.      0.29

          ROUTED TO
+                     RITBAS       1.   12.92         1.        1.        1.      0.29

          2 COMBINED AT
+                     CPRITB    3388.   14.50      2204.      751.      256.     38.33
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          ROUTED TO
+                     RBEMF4    3352.   14.67      2179.      751.      255.     38.33

          HYDROGRAPH AT
+                         R2     612.   12.67       101.       29.       10.      0.68

          DIVERSION TO
+                      RETR2     398.   12.33        33.        9.        3.      0.68

          HYDROGRAPH AT
+                      DIVR2     612.   12.67        76.       20.        7.      0.68

          HYDROGRAPH AT
+                         R3     358.   12.58        55.       16.        5.      0.41

          DIVERSION TO
+                      RETR3     330.   12.50        29.        8.        3.      0.41

          HYDROGRAPH AT
+                      DIVR3     352.   12.67        30.        8.        3.      0.41

          2 COMBINED AT
+                     CPR2R3     962.   12.67       105.       28.        9.      1.09

          ROUTED TO
+                     R2R3R6     467.   14.17       100.       28.        9.      1.09

          HYDROGRAPH AT
+                         R6     409.   12.67        62.       18.        6.      0.50

          2 COMBINED AT
+                       CPR6     470.   14.25       155.       45.       15.      1.59

          ROUTED TO
+                       R6R9     434.   14.58       154.       45.       15.      1.59

          HYDROGRAPH AT
+                         R9     840.   12.33       123.       41.       14.      0.59

          DIVERSION TO
+                      RETR9     840.   12.33        97.       27.        9.      0.59

          HYDROGRAPH AT
+                      DIVR9     351.   12.67        45.       14.        5.      0.59

          2 COMBINED AT
+                       CPR9     609.   12.67       195.       58.       20.      2.19

          ROUTED TO
+                      R9R11     476.   13.25       194.       58.       20.      2.19

          HYDROGRAPH AT
+                        R11    1179.   12.50       184.       58.       19.      0.99

          DIVERSION TO
+                     RETR11    1179.   12.50       123.       34.       11.      0.99

          HYDROGRAPH AT
+                     DIVR11     859.   12.67        83.       24.        8.      0.99

          HYDROGRAPH AT
+                       DRR5     196.   12.75         9.        2.        1.      0.72

          HYDROGRAPH AT
+                         R5     546.   12.50        72.       21.        7.      0.50

          DIVERSION TO
+                      RETR5       4.    4.67         2.        1.        0.      0.50

          HYDROGRAPH AT
+                      DIVR5     546.   12.50        72.       21.        7.      0.50

          2 COMBINED AT
+                       CPR5     544.   12.50        81.       23.        8.      1.22

          ROUTED TO
+                       R5R8     470.   12.92        81.       23.        8.      1.22

          HYDROGRAPH AT
+                         R8     741.   12.42       115.       39.       13.      0.55

          DIVERSION TO
+                      RETR8     741.   12.42        91.       25.        8.      0.55

          HYDROGRAPH AT
+                      DIVR8     366.   12.67        42.       13.        4.      0.55

          2 COMBINED AT
+                       CPR8     721.   12.67       119.       35.       12.      1.77

          ROUTED TO
+                      R8R11     581.   13.33       118.       35.       12.      1.77

          3 COMBINED AT
+                      CPR11    1147.   13.25       379.      114.       38.      4.95

          ROUTED TO
+                     R11R13    1049.   13.75       376.      114.       38.      4.95

          HYDROGRAPH AT
+                        R13     708.   12.33        94.       31.       10.      0.50

          DIVERSION TO
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+                        RETR13      705.   12.25         60.         17.          6.       0.50
           HYDROGRAPH AT
+                        DIVR13      599.   12.42         48.         14.          5.       0.50
           2 COMBINED AT
+                         CPR13     1071.   13.75        412.        126.         42.       5.45
           ROUTED TO
+                        R13R16     1005.   14.25        409.        126.         42.       5.45
           HYDROGRAPH AT
+                           R16      765.   12.25        105.         35.         12.       0.50
           DIVERSION TO
+                        RETR16      765.   12.25         65.         19.          6.       0.50
           HYDROGRAPH AT
+                        DIVR16      604.   12.42         56.         17.          6.       0.50
           2 COMBINED AT
+                         CPR16     1024.   14.25        452.        141.         47.       5.95
           ROUTED TO
+                        R16R21      925.   15.33        445.        141.         47.       5.95
           HYDROGRAPH AT
+                           R21      757.   12.67        133.         41.         14.       0.84
           DIVERSION TO
+                        RETR21      305.   12.17         30.          9.          3.       0.84
           HYDROGRAPH AT
+                        DIVR21      757.   12.67        117.         32.         11.       0.84
           HYDROGRAPH AT
+                            R1     1372.   12.58        214.         66.         22.       1.45
           DIVERSION TO
+                         RETR1     1372.   12.58        187.         51.         17.       1.45
           HYDROGRAPH AT
+                         DIVR1      308.   13.08         48.         15.          5.       1.45
           ROUTED TO
+                          R1R4      108.   15.25         42.         15.          5.       1.45
           HYDROGRAPH AT
+                            R4      817.   12.58        106.         28.          9.       1.00
           2 COMBINED AT
+                          CPR4      802.   12.58        131.         41.         14.       2.45
           ROUTED TO
+                          R4R7      621.   13.08        130.         41.         14.       2.45
           HYDROGRAPH AT
+                            R7      965.   12.58        157.         49.         16.       1.00
           DIVERSION TO
+                         RETR7      938.   12.50         85.         24.          8.       1.00
           HYDROGRAPH AT
+                         DIVR7      890.   12.67         89.         25.          8.       1.00
           2 COMBINED AT
+                          CPR7     1259.   12.67        213.         65.         22.       3.45
           ROUTED TO
+                         R7R10     1040.   13.33        209.         65.         22.       3.45
           HYDROGRAPH AT
+                           R10      781.   12.83        161.         50.         17.       1.01
           DIVERSION TO
+                        RETR10      781.   12.83        129.         35.         12.       1.01
           HYDROGRAPH AT
+                        DIVR10      358.   13.33         50.         15.          5.       1.01
           2 COMBINED AT
+                         CPR10     1384.   13.33        252.         78.         26.       4.46
           ROUTED TO
+                        R10R12     1124.   13.67        247.         78.         26.       4.46
           HYDROGRAPH AT
+                           R12      939.   12.17        114.         39.         13.       0.49
           DIVERSION TO
+                        RETR12      850.   12.17         70.         20.          7.       0.49
           HYDROGRAPH AT
+                        DIVR12      887.   12.25         64.         19.          6.       0.49
           2 COMBINED AT
+                         CPR12     1165.   13.67        297.         96.         32.       4.95
           ROUTED TO
+                        R12R15      949.   14.58        284.         96.         32.       4.95
           HYDROGRAPH AT
+                           R15      616.   12.50         90.         28.          9.       0.56
```

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           DIVERSION TO
+                        RETR15      537.   12.33         40.         12.          4.       0.56
           HYDROGRAPH AT
+                        DIVR15      616.   12.50         60.         17.          6.       0.56
           2 COMBINED AT
+                         CPR15      953.   14.58        323.        111.         37.       5.51
           ROUTED TO
+                        R15R18      901.   15.00        315.        110.         37.       5.51
           HYDROGRAPH AT
+                           R18      661.   12.67        122.         38.         13.       0.80
           DIVERSION TO
+                        RETR18      661.   12.67         94.         26.          9.       0.80
           HYDROGRAPH AT
+                        DIVR18      354.   13.08         40.         12.          4.       0.80
           2 COMBINED AT
+                         CPR18      907.   15.00        344.        119.         40.       6.30
           ROUTED TO
+                        R18R22      852.   15.42        338.        119.         40.       6.30
           HYDROGRAPH AT
+                           R22      794.   12.33        109.         36.         12.       0.57
           DIVERSION TO
+                        RETR22      794.   12.33         67.         19.          6.       0.57
           HYDROGRAPH AT
+                        DIVR22      723.   12.42         58.         17.          6.       0.57
           HYDROGRAPH AT
+                           R14      806.   12.25        101.         34.         11.       0.50
           DIVERSION TO
+                        RETR14      751.   12.17         59.         17.          6.       0.50
           HYDROGRAPH AT
+                        DIVR14      746.   12.33         56.         17.          6.       0.50
           ROUTED TO
+                        R14R17      370.   12.75         55.         17.          6.       0.50
           HYDROGRAPH AT
+                           R17      497.   12.58         84.         27.          9.       0.49
           DIVERSION TO
+                        RETR17      497.   12.58         55.         15.          5.       0.49
           HYDROGRAPH AT
+                        DIVR17      360.   12.75         40.         12.          4.       0.49
           2 COMBINED AT
+                         CPR17      729.   12.75         94.         28.          9.       0.99
           ROUTED TO
+                        R17R22      519.   13.08         91.         28.          9.       0.99
           3 COMBINED AT
+                         CPR22      893.   15.42        444.        157.         53.       7.87
           ROUTED TO
+                        R22R21      857.   15.67        436.        156.         53.       7.87
           3 COMBINED AT
+                         CPR21     1519.   15.58        870.        299.        101.      14.65
           ROUTED TO
+                        R21R25     1466.   15.92        859.        298.        101.      14.65
           HYDROGRAPH AT
+                           R25      436.   12.25         49.         16.          5.       0.28
           DIVERSION TO
+                        RETR25      402.   12.17         25.          7.          2.       0.28
           HYDROGRAPH AT
+                        DIVR25      406.   12.33         30.          8.          3.       0.28
           HYDROGRAPH AT
+                           R20      562.   12.42         82.         27.          9.       0.50
           DIVERSION TO
+                        RETR20      562.   12.42         62.         17.          6.       0.50
           HYDROGRAPH AT
+                        DIVR20      296.   12.67         32.         10.          3.       0.50
           ROUTED TO
+                        R20R23      141.   13.17         30.         10.          3.       0.50
           HYDROGRAPH AT
+                           R23      700.   12.33         96.         32.         11.       0.50
           DIVERSION TO
+                        RETR23      700.   12.33         63.         18.          6.       0.50
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          HYDROGRAPH AT
+                         DIVR23      492.   12.50         47.         14.          5.       0.50

          2 COMBINED AT
+                          CPR23      492.   12.50         76.         24.          8.       1.00

          ROUTED TO
+                         R23R25      282.   12.75         73.         24.          8.       1.00

          3 COMBINED AT
+                          CPR25     1484.   15.92        912.        321.        108.      15.93

          ROUTED TO
+                         R25R24     1484.   15.92        912.        321.        108.      15.93

          HYDROGRAPH AT
+                            R19     1808.   12.42        302.        101.         34.       1.53

          DIVERSION TO
+                         RETR19     1808.   12.42        192.         55.         18.       1.53

          HYDROGRAPH AT
+                         DIVR19     1558.   12.58        156.         46.         15.       1.53

          DIVERSION TO
+                         DETR19     1387.   12.58         70.         18.          6.       1.53

          HYDROGRAPH AT
+                         DIV19R      229.   13.17         86.         29.         10.       1.53

          ROUTED TO
+                         R19R24      191.   13.83         82.         29.         10.       1.53

          HYDROGRAPH AT
+                            R24      400.   12.33         55.         18.          6.       0.29

          DIVERSION TO
+                         RETR24      400.   12.33         35.         10.          3.       0.29

          HYDROGRAPH AT
+                         DIVR24      305.   12.50         28.          8.          3.       0.29

          3 COMBINED AT
+                          CPR24     1526.   15.92        982.        349.        117.      17.75

          ROUTED TO
+                         R24EM4     1516.   16.00        980.        349.        117.      17.75

          HYDROGRAPH AT
+                           EMF4      135.   12.08          8.          2.          1.       0.06

          3 COMBINED AT
+                         CPEMF4     4083.   14.83       2880.       1015.        345.      55.93
1                                  SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   E7STOR
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


      PLAN  1 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1567.20       0.00        27.         1.      0.00       25.75         0.00

      PLAN  2 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1567.17       0.00        27.         1.      0.00       25.75         0.00

      PLAN  3 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1567.06       0.00        24.         0.      0.00       26.00         0.00

      PLAN  4 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
```

```
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.91       0.00        21.         0.      0.00        0.00         0.00


      PLAN  5 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.72       0.00        16.         0.      0.00        0.00         0.00

      PLAN  6 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.61       0.00        14.         0.      0.00        0.00         0.00

      PLAN  7 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.53       0.00        12.         0.      0.00        0.00         0.00

      PLAN  8 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.47       0.00        11.         0.      0.00        0.00         0.00

      PLAN  9 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1566.00            1574.00         1574.00
                            STORAGE                  0.               607.            607.
                            OUTFLOW                  0.               104.            104.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1566.43       0.00        10.         0.      0.00        0.00         0.00
1                                  SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION   RITBAS
                              (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


      PLAN  1 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1311.00            1318.00         1318.00
                            STORAGE                  0.               693.            693.
                            OUTFLOW                  0.                 7.              7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1311.98       0.00        22.         1.      0.00       13.00         0.00

      PLAN  2 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1311.00            1318.00         1318.00
                            STORAGE                  0.               693.            693.
                            OUTFLOW                  0.                 7.              7.


                RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM   DURATION     TIME OF      TIME OF
                 OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW   OVER TOP   MAX OUTFLOW    FAILURE
                 PMF      W.S.ELEV    OVER DAM     AC-FT       CFS      HOURS       HOURS        HOURS

                1.00      1311.98       0.00        21.         1.      0.00       13.00         0.00

      PLAN  3 ..............                 INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION           1311.00            1318.00         1318.00
                            STORAGE                  0.               693.            693.
                            OUTFLOW                  0.                 7.              7.
```

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                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.95       0.00        21.         1.       0.00        13.00        0.00

     PLAN  4 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.92       0.00        20.         1.       0.00        13.00        0.00

     PLAN  5 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.87       0.00        19.         1.       0.00        13.00        0.00

     PLAN  6 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.85       0.00        19.         1.       0.00        13.00        0.00

     PLAN  7 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.83       0.00        18.         1.       0.00        12.92        0.00

     PLAN  8 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.82       0.00        18.         1.       0.00        12.92        0.00

     PLAN  9 ..............               INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                             ELEVATION        1311.00            1318.00         1318.00
                             STORAGE               0.               693.            693.
                             OUTFLOW               0.                 7.              7.

                  RATIO     MAXIMUM      MAXIMUM    MAXIMUM    MAXIMUM    DURATION     TIME OF     TIME OF
                   OF      RESERVOIR      DEPTH     STORAGE    OUTFLOW    OVER TOP   MAX OUTFLOW   FAILURE
                   PMF      W.S.ELEV    OVER DAM     AC-FT       CFS       HOURS        HOURS       HOURS

                  1.00      1311.81       0.00        18.         1.       0.00        12.92        0.00


 *** NORMAL END OF HEC-1 ***
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APPENDIX E

OFF-SITE CHANNEL HYDRAULICS

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PARSONS

		Date
By:	F Braileanu	07/04/16
Checked:	A. Islam	07/19/16

SR 24 - Comparison of Hydrology (HEC-1 models) using Concrete-lined Channel Routing

INT(ERIM)C - SR 24 channel extending to Central Arizona Project (CAP) Canal; drainage condition assuming full interception of watershed runoff North of SR 24 under January 2016 development levels in Maricopa and Pinal Counties.

INT(ERIM) I(RONWOOD) - SR 24 channel extending to Ironwood Drive; interim phase II drainage condition assuming full interception of the watershed runoff north of SR 24 to Ironwood Drive only, under January 2016 development levels in Maricopa and Pinal Counties.

	100-YR, 24-HR								
Major Crossing	**2011 DCR (EXST. W/ PROJ) BASELINE**			**INT(ERIM)C**			**INT(ERIM) I(RONWOOD)**		
	NODE	**Q**	**Tp**	**NODE**	**Q**	**Tp**	**NODE**	**Q**	**Tp**
		(cfs)	**(hrs)**		**(cfs)**	**(hrs)**		**(cfs)**	**(hrs)**
Powerline Floodway	D79A1	1650	13.08	802ELS	1650	12.92	802ELS	1650	13.00
Ellsworth Road	C79A1	2513	14.58	SR24EL	2479	14.00	SR24EL	1788	13.00
Prop. Wlliams Field Road	C78E1A	2110	14.50	CPE27A	2452	13.83	CPE27A	1549	12.83
Crismon Road	C78E1	1461	14.33	E247A1	1630	13.83	E247A1	652	13.92
Signal Butte Road	C78D1	1421	14.17	CP24A	1637	13.67	CP24A	655	13.75
Mountain Road	R78F	1392	14.00	E1424A	1440	13.58	E1424A	451	13.58
Meridian Road	C78F	1436	14.00	CPE14A	1445	13.58	CPE14A	453	13.50
Ironwood Road	S78F2	338	13.75	CPE5A2	1432	13.42	DE5S	433	13.33

Required Retention/Detention Volume:
- 122 ac-ft of effective detention volume at Ellsworth Basin (Ellsworth Road and Powerline Floodway).

Existing Retention/Detention Volume:
- Approximately 100 ac-ft of detention volume is available (January 2016.) @ Ellsworth Basin (Ellsworth Road and Powerline Floodway) provided in SR 24 Interim Phase I

PARSONS

		Date
By:	F Braileanu	07/04/16
Checked:	A. Islam	07/19/16

SR 24 - Comparison of Hydrology (HEC-1 models) using Concrete-lined Channel Routing

INT(ERIM)C - SR 24 channel extending to Central Arizona Project (CAP) Canal; drainage condition assuming full interception of watershed runoff North of SR 24 under January 2016 development levels in Maricopa and Pinal Counties.

INT(ERIM) I(RONWOOD) - SR 24 channel extending to Ironwood Drive; interim phase II drainage condition assuming full interception of the watershed runoff north of SR 24 to Ironwood Drive only, under January 2016 development levels in Maricopa and Pinal Counties.

	50-YR, 24-HR								
Major Crossing	**2011 DCR (EXST. W/ PROJ) BASELINE**			**INT(ERIM)C**			**INT(ERIM) I(RONWOOD)**		
	NODE	**Q**	**Tp**	**NODE**	**Q**	**Tp**	**NODE**	**Q**	**Tp**
		(cfs)	**(hrs)**		**(cfs)**	**(hrs)**		**(cfs)**	**(hrs)**
Powerline Floodway	D79A1			802ELS	1650	13.67	802ELS	1348	13.25
Ellsworth Road	C79A1			SR24EL	2002	14.08	SR24EL	1348	13.25
Prop. Wlliams Field Road	C78E1A			CPE27A	1977	13.92	CPE27A	1244	13.00
Crismon Road	C78E1			E247A1	1329	13.83	E247A1	536	13.92
Signal Butte Road	C78D1			CP24A	1335	13.75	CP24A	538	13.75
Mountain Road	R78F			E1424A	1173	13.67	E1424A	367	13.58
Meridian Road	C78F			CPE14A	1176	13.58	CPE14A	369	13.50
Ironwood Road	S78F2			CPE5A2	1166	13.50	DE5S	354	13.33

Required Retention/Detention Volume:
- 122 ac-ft of effective detention volume at Ellsworth Basin (Ellsworth Road and Powerline Floodway).

Existing Retention/Detention Volume:
- Approximately 100 ac-ft of detention volume is available (January 2016.) @ Ellsworth Basin (Ellsworth Road and Powerline Floodway) provided in SR 24 Interim Phase I

Variables:

Q - Peak Flow
Tc - Time of Peak

PARSONS

Date
By: F Braileanu 7/4/16
Checked: A. Islam 7/19/16

SR 24 - Offsite Channel Options Based on INT Hydrology and ADOT Design Criteria (Concrete-Lined Channel and Gravel Channel)

Major Crossing	Ground Elev.	Reach Length	Ground Slope	Channel ROW (est. from DCR)	Design Event 50-yr, 24-hr (24INT50) HEC-1 NODE ID	HEC-1 Node Peak Flow (Qp50)	Rounded Qp50 (upward 50 cfs)	Channel Lining	Lining Thickness	Projected Lining (Horiz.)^{1}	Slope*	Bottom Width*	Side slope*	Required Depth*	Froude*	Velocity Head*^{2}
	(ft)	(ft)	(ft/ft)	(ft)	ID	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft)	(H:V)	(ft)		(ft)
Powerline Floodway	1382.50				802ELS	1650	1650									
		1585	0.00252	N/A				Gravel			0.0020	24	3	7.68	0.43	0.48
		1585	0.00252	N/A				Concrete	0.5	1.1	0.00069	20	2	7.78	0.55	0.81
Ellsworth Road	1386.50				SR24EL	2002	2050									
		6172	0.00194	128				Gravel			0.0020	24	4	7.23	0.43	0.43
		6172	0.00194	128				Concrete	0.5	1.1	0.0015	20	2	6.40	0.78	1.41
Prop. Wlliams Field Road	1398.50				CPE27A	1977	2000									
		1328	0.00264	120				Gravel			0.0020	12	3	7.60	0.42	0.40
		1328	0.00264	120				Concrete	0.5	1.1	0.0017	12	2	6.06	0.81	1.32
Crismon Road	1402.00				E247A1	1329	1350									
		5394	0.00399	120				Gravel			0.0037	12	3	6.61	0.56	0.64
		5394	0.00399	120				Concrete	0.5	1.1	0.0017	12	2	6.06	0.81	1.32
Signal Butte Road	1423.50				CP24A	1335	1350									
		2261	0.00442	110				Gravel			0.0040	12	3	6.15	0.58	0.64
		2261	0.00442	110				Concrete	0.5	1.1	0.0017	12	2	5.72	0.80	1.24
Mountain Road	1433.50				E1424A	1173	1200									
		2696	0.00501	105				Gravel			0.0045	12	3	5.99	0.61	0.69
		2696	0.00501	105				Concrete	0.5	1.1	0.0017	12	2	5.72	0.80	1.24
Meridian Road	1447.00				CPE14A	1176	1200									
		5929	0.00489	100				Gravel			0.0045	12	3	5.99	0.61	0.69
		5929	0.00489	100				Concrete	0.5	1.1	0.0017	12	2	5.72	0.80	1.24
Ironwood Road	1476.00				CPE5A2	1166	1200									

Note *: Data calculated using Flow Master

Note 1: Projected Lining (Horizontal), ft

$$T_P = T/\sin\left[\tan^{-1}(1/m)\right] \quad ,\text{where}$$

T – Lining Thickness, ft
m – Side Slope (Horizontal to Vertical), unitless

Note 2: Velocity Head, Velocity

$$\text{Velocity Head} = \frac{V^2}{2g}$$

$$V = \sqrt[2]{2g*\text{Velocity Head}}$$

where:
V – Mean Velocity, ft/s
g – Acceleration Due to Gravity, ft/sec^2
(g=32.2 ft/sec^2)

PARSONS

Date
By: F Braileanu 7/4/2016
Checked: A. Islam 7/19/2016

SR 24 - Offsite Channel Options Based on INT Hydrology and ADOT Design Criteria (Concrete-Lined Channel and Gravel Channel) (Continue)

Major Crossing	Velocity^{2}	Freeboard^{3}	Depth + Freeboard (Rounded to 6")^{3}	Effective Design Flow Depth	Top Width^{4}	Top Width^{4} + O&M^{5}	Sub-Reaches	Slope Diff. Depth^{6}	Max Width from Slope Diff. Depth^{6}	ROW Savings (North side)^{7}	Rounded Qp50 (up to 50 cfs)	Top of Channel Flow (Qmax)*	HEC-1 Node Peak Flow (Qp100)	Flow Capacity Within Freeboard	Estimated Channel Excavation Volume Concrete^{8}	Gravel^{9}
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(cfs)	(cfs)		(cfs)	(cu.yd)	(cu.yd)
Powerline Floodway											1,650		1,650			
	5.6	1.0	9.00	8.00	78.0	93	1	0.82	5.0	N/A		2,614		564		30,500
	7.2	1.0	9.00	8.00	56.0	71	1	2.90	11.7	N/A		2,670		620	27,500	
Ellsworth Road											2,050		2,479			
	5.3	1.0	8.50	7.50	92.0	107	1	0.37	3.0	18		2,649		649		124,700
	9.5	1.0	7.50	6.50	50.0	65	1	2.72	10.9	52.1		2,725		725	84,600	
Prop. Wlliams Field Road											2,000		2,452			
	5.1	1.0	9.00	8.00	66.0	81	1	0.85	5.1	33.9		1,851		501		20,100
	9.2	1.0	7.50	6.50	42.0	57	1	1.25	5.0	58		2,097		747	12,800	
Crismon Road											1,350		1,630			
	6.4	1.0	8.00	7.00	60.0	75	1	1.56	9.4	35.6		1,916		566		72,500
	9.2	1.0	7.50	6.50	42.0	57	6	2.06	8.3	54.7		2,097		747	55,900	
Signal Butte Road											1,350		1,637			
	6.4	1.0	7.50	6.50	57.0	72	1	0.95	5.7	32.3		1,718		518		26,000
	8.9	1.0	7.00	6.00	40.0	55	3	2.05	8.2	46.8		1,815		615	21,400	
Mountain Road											1,200		1,440			
	6.7	1.0	7.00	6.00	54.0	69	1	1.37	8.3	27.7		1,687		487		29,200
	8.9	1.0	7.00	6.00	40.0	55	4	2.23	9.0	41		1,815		615	25,900	
Meridian Road											1,200		1,445			
	6.7	1.0	7.00	6.00	54.0	69	1	2.31	13.9	17.1		1,687		487		70,500
	8.9	1.0	7.00	6.00	40.0	55	9	2.10	8.5	36.5		1,815		615	56,400	
Ironwood Road											1,200		1,432			
														TOTAL	**284,500**	**373,500**

Note 3: Freeboard

$$F = \begin{cases} 1 & \text{if } Fr < 0.86 \\ \max\left[1, 0.2*\left(Y + \frac{V^2}{2g}\right)\right] & Fr \geq 0.86 \end{cases}$$

where:
F – Freeboard, ft
Y – Required Depth of Flow, ft
Fr – Froude Number, unitless

Note 4: Total Depth, Top Width

$$Y' = Y + F$$

$$B = b+2*m*Y' \quad ,\text{where:}$$

Y' – Total Depth, ft
B – Top Width, ft,
b – Bottom Width, ft

Note 5: Operation and Maintenance Road
OM – O&M Road Width (15 ft)

Note 6: Maximum Width from Slope Difference Depth

$$W_s = 2*m*\text{abs}\left|S_G - S_C\right|*L$$

$$Y_S = W_S/2m \quad ,\text{where:}$$

W_s – Maximum Width from Slope Difference Depth, ft
S_G – Ground Slope, ft/ft
S_C – Channel Slope, ft/ft
L – Channel Length, ft
Y_S – Slope Difference Depth, ft

Note 7: Right-of-Way Savings

$$ROW_{SAVINGS} = ROW_{CHANNEL} - (B + OM)$$

Note 8: Estimated Concrete-lined Channel Excavation Volume, cu.yd.

$$V_{EXC} = V_{PRISM} + V_{TRAPEZOIDAL\ PYRAMID} + V_{TRIANGULAR\ PYRAMID}$$

where:

$$V_{PRISM} = \{0.5*[(B+2*T_P)+(b+2*T_P)]*(Y'+T)*L\}/27$$

$$V_{TRAPEZOIDAL\ PYRAMID} = \{0.5*[(B+W_s+2*T_P)+(B+2*T_P)]*Y_s*L/3\}/27$$

$$V_{TRIANGULAR\ PYRAMID} = (1/3)*\left\{0.5*m*Y_S*L*(B+2*T_P)*\sin\left[\cot^{-1}(m)\right]\right\}/27$$

Note 9: Estimated Earthen/Grass Channel Excavation Volume, cu.yd.
See Note 8, where T=Tp=0

PARSONS

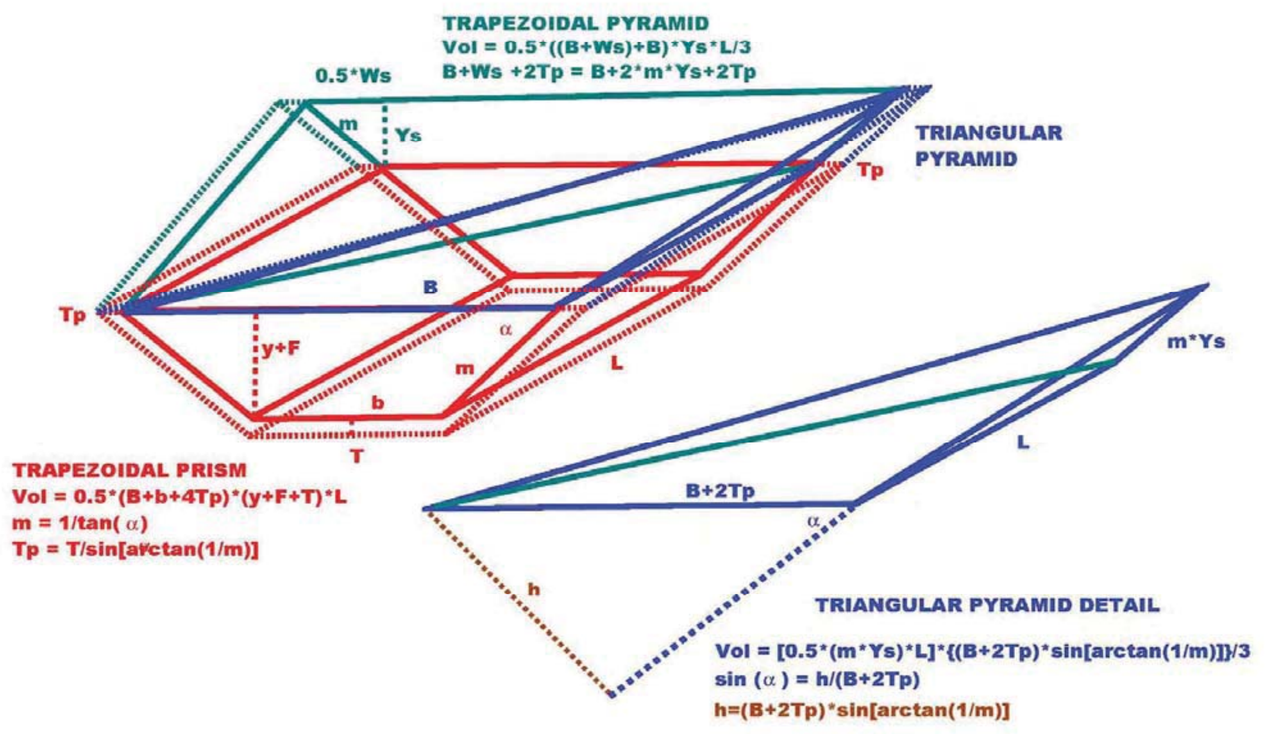
		Date
By:	F Braileanu	7/4/2016
Checked:	A. Islam	7/19/2016

SR 24 - Offsite Channel Right-of-Way Savings, Quantity and Cost of Channel Lining (Concrete Lined Channel)

		ROW Savings		
Major Crossing	**Reach Length**	**Savings (North side)**	**Concrete Channel**	**Gravel Channel**
	(ft)	(ft)	(ac)	(ac)
Powerline Floodway				
	1585	N/A		N/A
	1585	N/A	N/A	
Ellsworth Road				
	6172	18		2.55
	6172	52.1	7.38	
Prop. Wlliams Field Road				
	1328	33.9		1.03
	1328	58	1.77	
Crismon Road				
	5394	35.6		4.41
	5394	54.7	6.77	
Signal Butte Road				
	2261	32.3		1.68
	2261	46.8	2.43	
Mountain Road				
	2696	27.7		1.71
	2696	41	2.54	
Meridian Road				
	5929	17.1		2.33
	5929	36.5	4.97	
Ironwood Road				
	TOTAL		**25.86**	**11.16**

Major Crossing	Lining Surface	Additional Lining Surface (No Steps)	Additional Lining Surface (Steps)	Total Lining Surface (No Steps)	Total Lining Surface (Steps)	Total Lining Cost (No Steps)	Total Lining Cost (Steps)
	(sq.yd.)	(sq.yd.)	(sq.yd.)	(sq.yd.)	(sq.yd.)		
Powerline Floodway							
	10610.56	2284.45	2284.45	12,900	12,900	$645,000	$645,000
Ellsworth Road							
	36717.24	8328.70	8328.70	45,050	45,050	$2,252,500	$2,252,500
Prop. Wlliams Field Road							
	6719.83	823.75	823.75	7,540	7,540	$377,000	$377,000
Crismon Road							
	27294.25	33107.76	5517.96	60,400	32,810	$3,020,000	$1,640,500
Signal Butte Road							
	10879.17	6909.43	2303.14	17,790	13,180	$889,500	$659,000
Mountain Road							
	12972.24	11954.74	2988.69	24,930	15,960	$1,246,500	$798,000
Meridian Road							
	28528.34	55721.92	6191.32	84,250	34,720	$4,212,500	$1,736,000
Ironwood Road							
			TOTAL	**252,860**	**162,160**	**$12,643,000**	**$8,108,000**

Calculation Support - Geometric Breakdown of Channel Volume



Worksheet for Ellsworth-Powerline INT Gravel Sizing S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	24.00	ft
Discharge	2000	ft³/s

Results

Normal Depth	7.68	ft
Flow Area	361.30	ft²
Wetted Perimeter	72.58	ft
Hydraulic Radius	4.98	ft
Top Width	70.08	ft
Critical Depth	4.86	ft
Critical Slope	0.01219	ft/ft
Velocity	5.54	ft/s
Velocity Head	0.48	ft
Specific Energy	8.16	ft
Froude Number	0.43	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.68	ft
Critical Depth	4.86	ft
Channel Slope	0.002000	ft/ft

GVF Output Data

Critical Slope	0.01219	ft/ft

Worksheet for Ellsworth-Powerline INT Gravel Check S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Normal Depth	8.75	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	24.00	ft

Results

Discharge	2614	ft^3/s
Flow Area	439.69	ft^2
Wetted Perimeter	79.34	ft
Hydraulic Radius	5.54	ft
Top Width	76.50	ft
Critical Depth	5.64	ft
Critical Slope	0.01173	ft/ft
Velocity	5.95	ft/s
Velocity Head	0.55	ft
Specific Energy	9.30	ft
Froude Number	0.44	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.75	ft
Critical Depth	5.64	ft
Channel Slope	0.002000	ft/ft

GVF Output Data

Critical Slope	0.01173	ft/ft

Worksheet for Ellsworth-Powerline INT Concrete Sizing S=0.00069

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.000698	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	2000	ft³/s

Results

Normal Depth	7.78	ft
Flow Area	276.88	ft²
Wetted Perimeter	54.81	ft
Hydraulic Radius	5.05	ft
Top Width	51.14	ft
Critical Depth	5.58	ft
Critical Slope	0.00252	ft/ft
Velocity	7.22	ft/s
Velocity Head	0.81	ft
Specific Energy	8.60	ft
Froude Number	0.55	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.78	ft
Critical Depth	5.58	ft
Channel Slope	0.000698	ft/ft

GVF Output Data

Critical Slope	0.00252	ft/ft

Worksheet for Ellsworth-Powerline INT Concrete Check S=0.00069

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.000698	ft/ft
Normal Depth	9.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	20.00	ft

Results

Discharge	2670	ft³/s
Flow Area	342.00	ft²
Wetted Perimeter	60.25	ft
Hydraulic Radius	5.68	ft
Top Width	56.00	ft
Critical Depth	6.56	ft
Critical Slope	0.00243	ft/ft
Velocity	7.81	ft/s
Velocity Head	0.95	ft
Specific Energy	9.95	ft
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.00	ft
Critical Depth	6.56	ft
Channel Slope	0.000698	ft/ft

Worksheet for Ellsworth-Powerline INT Concrete Check S=0.00069

GVF Output Data

Critical Slope	0.00243	ft/ft

Worksheet for Wlliams Field-Ellsworth INT Gravel Sizing S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	24.00	ft
Discharge	2000	ft³/s

Results

Normal Depth	7.23	ft
Flow Area	382.31	ft²
Wetted Perimeter	83.59	ft
Hydraulic Radius	4.57	ft
Top Width	81.81	ft
Critical Depth	4.62	ft
Critical Slope	0.01239	ft/ft
Velocity	5.23	ft/s
Velocity Head	0.43	ft
Specific Energy	7.65	ft
Froude Number	0.43	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.23	ft
Critical Depth	4.62	ft
Channel Slope	0.002000	ft/ft

GVF Output Data

Critical Slope	0.01239	ft/ft

Worksheet for Wliams Field-Ellsworth INT Gravel Check S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Normal Depth	8.25	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	24.00	ft

Results

Discharge	2649	ft³/s
Flow Area	470.25	ft²
Wetted Perimeter	92.03	ft
Hydraulic Radius	5.11	ft
Top Width	90.00	ft
Critical Depth	5.37	ft
Critical Slope	0.01190	ft/ft
Velocity	5.63	ft/s
Velocity Head	0.49	ft
Specific Energy	8.74	ft
Froude Number	0.43	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.25	ft
Critical Depth	5.37	ft
Channel Slope	0.002000	ft/ft

Worksheet for Wliams Field-Ellsworth INT Gravel Check S=0.0020

GVF Output Data

Critical Slope	0.01190	ft/ft

Worksheet for Wliams Field-Ellsworth INT Concrete Sizing S=0.0015

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001500	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	2000	ft³/s

Results

Normal Depth	6.40	ft
Flow Area	209.77	ft²
Wetted Perimeter	48.61	ft
Hydraulic Radius	4.32	ft
Top Width	45.59	ft
Critical Depth	5.58	ft
Critical Slope	0.00252	ft/ft
Velocity	9.53	ft/s
Velocity Head	1.41	ft
Specific Energy	7.81	ft
Froude Number	0.78	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	ft
Critical Depth	5.58	ft
Channel Slope	0.001500	ft/ft

Worksheet for Wliams Field-Ellsworth INT Concrete Sizing S=0.0015

GVF Output Data

Critical Slope	0.00252	ft/ft

Worksheet for Wliams Field-Ellsworth INT Concrete Check S=0.0015

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001500	ft/ft
Normal Depth	7.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	20.00	ft

Results

Discharge	2725	ft^3/s
Flow Area	262.50	ft^2
Wetted Perimeter	53.54	ft
Hydraulic Radius	4.90	ft
Top Width	50.00	ft
Critical Depth	6.63	ft
Critical Slope	0.00242	ft/ft
Velocity	10.38	ft/s
Velocity Head	1.67	ft
Specific Energy	9.17	ft
Froude Number	0.80	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.50	ft
Critical Depth	6.63	ft
Channel Slope	0.001500	ft/ft

Worksheet for Wliams Field-Ellsworth INT Concrete Check S=0.0015

GVF Output Data

Critical Slope	0.00242	ft/ft

Worksheet for Crimson-Wlliams Field INT Gravel Sizing S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1350	ft³/s

Results

Normal Depth	7.60	ft
Flow Area	264.62	ft²
Wetted Perimeter	60.08	ft
Hydraulic Radius	4.40	ft
Top Width	57.61	ft
Critical Depth	4.96	ft
Critical Slope	0.01275	ft/ft
Velocity	5.10	ft/s
Velocity Head	0.40	ft
Specific Energy	8.01	ft
Froude Number	0.42	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.60	ft
Critical Depth	4.96	ft
Channel Slope	0.002000	ft/ft

Worksheet for Crimson-Wlliams Field INT Gravel Sizing S=0.0020

GVF Output Data

Critical Slope	0.01275	ft/ft

Worksheet for Crimson-Wlliams Field INT Gravel Check S=0.0020

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.002000	ft/ft
Normal Depth	8.75	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1851	ft³/s
Flow Area	334.69	ft²
Wetted Perimeter	67.34	ft
Hydraulic Radius	4.97	ft
Top Width	64.50	ft
Critical Depth	5.81	ft
Critical Slope	0.01222	ft/ft
Velocity	5.53	ft/s
Velocity Head	0.48	ft
Specific Energy	9.23	ft
Froude Number	0.43	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.75	ft
Critical Depth	5.81	ft
Channel Slope	0.002000	ft/ft

GVF Output Data

Critical Slope	0.01222	ft/ft

Worksheet for Crismon-Wlliams Field INT Concrete Sizing S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1350	ft³/s

Results

Normal Depth	6.06	ft
Flow Area	146.32	ft²
Wetted Perimeter	39.12	ft
Hydraulic Radius	3.74	ft
Top Width	36.26	ft
Critical Depth	5.43	ft
Critical Slope	0.00266	ft/ft
Velocity	9.23	ft/s
Velocity Head	1.32	ft
Specific Energy	7.39	ft
Froude Number	0.81	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.06	ft
Critical Depth	5.43	ft
Channel Slope	0.001700	ft/ft

Worksheet for Crismon-Wlliams Field INT Concrete Sizing S=0.0017

GVF Output Data

Critical Slope	0.00266	ft/ft

Worksheet for Crismon-Wlliams Field INT Concrete Check S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Normal Depth	7.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	2097	ft³/s
Flow Area	202.50	ft²
Wetted Perimeter	45.54	ft
Hydraulic Radius	4.45	ft
Top Width	42.00	ft
Critical Depth	6.83	ft
Critical Slope	0.00252	ft/ft
Velocity	10.35	ft/s
Velocity Head	1.67	ft
Specific Energy	9.17	ft
Froude Number	0.83	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.50	ft
Critical Depth	6.83	ft
Channel Slope	0.001700	ft/ft

GVF Output Data

Critical Slope	0.00252	ft/ft

Worksheet for Signal Butte-Crimson INT Gravel Sizing S=0.0037

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.003700	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1350	ft³/s

Results

Normal Depth	6.61	ft
Flow Area	210.56	ft²
Wetted Perimeter	53.83	ft
Hydraulic Radius	3.91	ft
Top Width	51.68	ft
Critical Depth	4.96	ft
Critical Slope	0.01275	ft/ft
Velocity	6.41	ft/s
Velocity Head	0.64	ft
Specific Energy	7.25	ft
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.61	ft
Critical Depth	4.96	ft
Channel Slope	0.003700	ft/ft

Worksheet for Signal Butte-Crimson INT Gravel Sizing S=0.0037

GVF Output Data

Critical Slope	0.01275	ft/ft

Worksheet for Signal Butte-Crimson INT Gravel Check S=0.0037

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.003700	ft/ft
Normal Depth	7.75	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1916	ft^3/s
Flow Area	273.19	ft^2
Wetted Perimeter	61.02	ft
Hydraulic Radius	4.48	ft
Top Width	58.50	ft
Critical Depth	5.91	ft
Critical Slope	0.01217	ft/ft
Velocity	7.02	ft/s
Velocity Head	0.76	ft
Specific Energy	8.51	ft
Froude Number	0.57	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.75	ft
Critical Depth	5.91	ft
Channel Slope	0.003700	ft/ft

Worksheet for Signal Butte-Crimson INT Gravel Check S=0.0037

GVF Output Data

Critical Slope	0.01217	ft/ft

Worksheet for Signal Butte-Crismon INT Concrete Sizing S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1350	ft³/s

Results

Normal Depth	6.06	ft
Flow Area	146.32	ft²
Wetted Perimeter	39.12	ft
Hydraulic Radius	3.74	ft
Top Width	36.26	ft
Critical Depth	5.43	ft
Critical Slope	0.00266	ft/ft
Velocity	9.23	ft/s
Velocity Head	1.32	ft
Specific Energy	7.39	ft
Froude Number	0.81	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.06	ft
Critical Depth	5.43	ft
Channel Slope	0.001700	ft/ft

Worksheet for Signal Butte-Crismon INT Concrete Sizing S=0.0017

GVF Output Data

Critical Slope	0.00266	ft/ft

Worksheet for Signal Butte-Crismon INT Concrete Check S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Normal Depth	7.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	2097	ft³/s
Flow Area	202.50	ft²
Wetted Perimeter	45.54	ft
Hydraulic Radius	4.45	ft
Top Width	42.00	ft
Critical Depth	6.83	ft
Critical Slope	0.00252	ft/ft
Velocity	10.35	ft/s
Velocity Head	1.67	ft
Specific Energy	9.17	ft
Froude Number	0.83	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.50	ft
Critical Depth	6.83	ft
Channel Slope	0.001700	ft/ft

Worksheet for Signal Butte-Crismon INT Concrete Check S=0.0017

GVF Output Data

Critical Slope	0.00252	ft/ft

Worksheet for Mountain-Signal Butte INT Gravel Sizing S=0.0040

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	6.15	ft
Flow Area	187.46	ft²
Wetted Perimeter	50.92	ft
Hydraulic Radius	3.68	ft
Top Width	48.92	ft
Critical Depth	4.67	ft
Critical Slope	0.01296	ft/ft
Velocity	6.40	ft/s
Velocity Head	0.64	ft
Specific Energy	6.79	ft
Froude Number	0.58	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.15	ft
Critical Depth	4.67	ft
Channel Slope	0.004000	ft/ft

Worksheet for Mountain-Signal Butte INT Gravel Sizing S=0.0040

GVF Output Data

Critical Slope	0.01296	ft/ft

Worksheet for Mountain-Signal Butte INT Gravel Check S=0.0040

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004000	ft/ft
Normal Depth	7.25	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1718	ft³/s
Flow Area	244.69	ft²
Wetted Perimeter	57.85	ft
Hydraulic Radius	4.23	ft
Top Width	55.50	ft
Critical Depth	5.60	ft
Critical Slope	0.01234	ft/ft
Velocity	7.02	ft/s
Velocity Head	0.77	ft
Specific Energy	8.02	ft
Froude Number	0.59	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.25	ft
Critical Depth	5.60	ft
Channel Slope	0.004000	ft/ft

Worksheet for Mountain-Signal Butte INT Gravel Check S=0.0040

GVF Output Data

Critical Slope	0.01234	ft/ft

Worksheet for Mountain-Signal Butte INT Concrete Sizing S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	5.72	ft
Flow Area	134.18	ft²
Wetted Perimeter	37.59	ft
Hydraulic Radius	3.57	ft
Top Width	34.89	ft
Critical Depth	5.10	ft
Critical Slope	0.00270	ft/ft
Velocity	8.94	ft/s
Velocity Head	1.24	ft
Specific Energy	6.97	ft
Froude Number	0.80	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.72	ft
Critical Depth	5.10	ft
Channel Slope	0.001700	ft/ft

Worksheet for Mountain-Signal Butte INT Concrete Sizing S=0.0017

GVF Output Data

Critical Slope	0.00270	ft/ft

Worksheet for Mountain-Signal Butte INT Concrete Check S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Normal Depth	7.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1815	ft³/s
Flow Area	182.00	ft²
Wetted Perimeter	43.30	ft
Hydraulic Radius	4.20	ft
Top Width	40.00	ft
Critical Depth	6.34	ft
Critical Slope	0.00256	ft/ft
Velocity	9.97	ft/s
Velocity Head	1.55	ft
Specific Energy	8.55	ft
Froude Number	0.82	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.00	ft
Critical Depth	6.34	ft
Channel Slope	0.001700	ft/ft

Worksheet for Mountain-Signal Butte INT Concrete Check S=0.0017

GVF Output Data

Critical Slope	0.00256	ft/ft

Worksheet for Meridian-Mountain INT Gravel Sizing S=0.0045

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	5.99	ft
Flow Area	179.45	ft²
Wetted Perimeter	49.87	ft
Hydraulic Radius	3.60	ft
Top Width	47.93	ft
Critical Depth	4.67	ft
Critical Slope	0.01296	ft/ft
Velocity	6.69	ft/s
Velocity Head	0.69	ft
Specific Energy	6.68	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.99	ft
Critical Depth	4.67	ft
Channel Slope	0.004500	ft/ft

Worksheet for Meridian-Mountain INT Gravel Sizing S=0.0045

GVF Output Data

Critical Slope	0.01296	ft/ft

Worksheet for Meridian-Mountain INT Gravel Check S=0.0045

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004500	ft/ft
Normal Depth	7.00	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1687	ft³/s
Flow Area	231.00	ft²
Wetted Perimeter	56.27	ft
Hydraulic Radius	4.11	ft
Top Width	54.00	ft
Critical Depth	5.54	ft
Critical Slope	0.01238	ft/ft
Velocity	7.30	ft/s
Velocity Head	0.83	ft
Specific Energy	7.83	ft
Froude Number	0.62	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.00	ft
Critical Depth	5.54	ft
Channel Slope	0.004500	ft/ft

Worksheet for Meridian-Mountain INT Gravel Check S=0.0045

GVF Output Data

Critical Slope	0.01238	ft/ft

Worksheet for Meridian-Mountain INT Concrete Sizing S=0.0017

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	5.72	ft
Flow Area	134.18	ft²
Wetted Perimeter	37.59	ft
Hydraulic Radius	3.57	ft
Top Width	34.89	ft
Critical Depth	5.10	ft
Critical Slope	0.00270	ft/ft
Velocity	8.94	ft/s
Velocity Head	1.24	ft
Specific Energy	6.97	ft
Froude Number	0.80	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.72	ft
Critical Depth	5.10	ft
Channel Slope	0.001700	ft/ft

Worksheet for Meridian-Mountain INT Concrete Sizing S=0.0017

GVF Output Data

Critical Slope	0.00270	ft/ft

Worksheet for Meridian-Mountain INT Concrete Check S=0.0017

Project Description

Friction Method	Manning Formula	
Solve For	Discharge	

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Normal Depth	7.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1815	ft³/s
Flow Area	182.00	ft²
Wetted Perimeter	43.30	ft
Hydraulic Radius	4.20	ft
Top Width	40.00	ft
Critical Depth	6.34	ft
Critical Slope	0.00256	ft/ft
Velocity	9.97	ft/s
Velocity Head	1.55	ft
Specific Energy	8.55	ft
Froude Number	0.82	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.00	ft
Critical Depth	6.34	ft
Channel Slope	0.001700	ft/ft

GVF Output Data

Critical Slope	0.00256	ft/ft

Worksheet for Ironwood-Meridian INT Gravel Sizing S=0.0045

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	5.99	ft
Flow Area	179.45	ft²
Wetted Perimeter	49.87	ft
Hydraulic Radius	3.60	ft
Top Width	47.93	ft
Critical Depth	4.67	ft
Critical Slope	0.01296	ft/ft
Velocity	6.69	ft/s
Velocity Head	0.69	ft
Specific Energy	6.68	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.99	ft
Critical Depth	4.67	ft
Channel Slope	0.004500	ft/ft

Worksheet for Ironwood-Meridian INT Gravel Sizing S=0.0045

GVF Output Data

Critical Slope	0.01296	ft/ft

Worksheet for Ironwood-Meridian INT Gravel Check S=0.0045

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.004500	ft/ft
Normal Depth	7.00	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1687	ft³/s
Flow Area	231.00	ft²
Wetted Perimeter	56.27	ft
Hydraulic Radius	4.11	ft
Top Width	54.00	ft
Critical Depth	5.54	ft
Critical Slope	0.01238	ft/ft
Velocity	7.30	ft/s
Velocity Head	0.83	ft
Specific Energy	7.83	ft
Froude Number	0.62	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.00	ft
Critical Depth	5.54	ft
Channel Slope	0.004500	ft/ft

GVF Output Data

Critical Slope	0.01238	ft/ft

Worksheet for Ironwood-Meridian INT Concrete Sizing S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft
Discharge	1200	ft³/s

Results

Normal Depth	5.72	ft
Flow Area	134.18	ft²
Wetted Perimeter	37.59	ft
Hydraulic Radius	3.57	ft
Top Width	34.89	ft
Critical Depth	5.10	ft
Critical Slope	0.00270	ft/ft
Velocity	8.94	ft/s
Velocity Head	1.24	ft
Specific Energy	6.97	ft
Froude Number	0.80	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.72	ft
Critical Depth	5.10	ft
Channel Slope	0.001700	ft/ft

GVF Output Data

Critical Slope	0.00270	ft/ft

Worksheet for Ironwood-Meridian INT Concrete Check S=0.0017

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.001700	ft/ft
Normal Depth	7.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	12.00	ft

Results

Discharge	1815	ft³/s
Flow Area	182.00	ft²
Wetted Perimeter	43.30	ft
Hydraulic Radius	4.20	ft
Top Width	40.00	ft
Critical Depth	6.34	ft
Critical Slope	0.00256	ft/ft
Velocity	9.97	ft/s
Velocity Head	1.55	ft
Specific Energy	8.55	ft
Froude Number	0.82	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.00	ft
Critical Depth	6.34	ft
Channel Slope	0.001700	ft/ft

Worksheet for Ironwood-Meridian INT Concrete Check S=0.0017

GVF Output Data

Critical Slope	0.00256	ft/ft

Worksheet for Powerline Floodway INT Concrete Sizing S=0.00456

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.00450	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	55.00	ft
Discharge	4400.00	ft³/s

Results

Normal Depth	4.50	ft
Flow Area	288.22	ft²
Wetted Perimeter	75.14	ft
Hydraulic Radius	3.84	ft
Top Width	73.01	ft
Critical Depth	5.45	ft
Critical Slope	0.00233	ft/ft
Velocity	15.27	ft/s
Velocity Head	3.62	ft
Specific Energy	8.12	ft
Froude Number	1.35	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.50	ft
Critical Depth	5.45	ft
Channel Slope	0.00450	ft/ft

Worksheet for Powerline Floodway INT Concrete Sizing S=0.00456

GVF Output Data

Critical Slope	0.00233	ft/ft

Worksheet for Powerline Floodway INT Concrete Check S=0.00456

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.00450	ft/ft
Normal Depth	8.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	55.00	ft

Results

Discharge	12015.57	ft^3/s
Flow Area	568.00	ft^2
Wetted Perimeter	90.78	ft
Hydraulic Radius	6.26	ft
Top Width	87.00	ft
Critical Depth	10.03	ft
Critical Slope	0.00200	ft/ft
Velocity	21.15	ft/s
Velocity Head	6.95	ft
Specific Energy	14.95	ft
Froude Number	1.46	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.00	ft
Critical Depth	10.03	ft
Channel Slope	0.00450	ft/ft

GVF Output Data

Critical Slope	0.00200	ft/ft

Rating Curve for Powerline Floodway INT Concrete Check S=0.00456

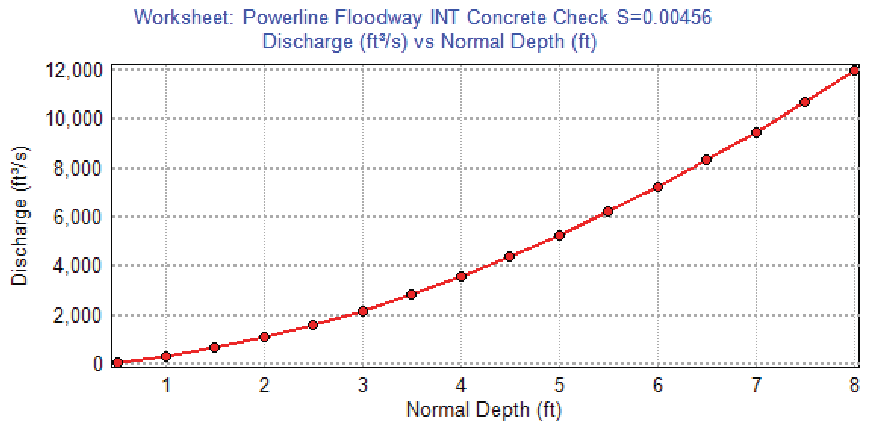
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.00450	ft/ft
Normal Depth	8.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	55.00	ft

Rating Curve Plot



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APPENDIX F

RETENTION BASIN CALCULATIONS

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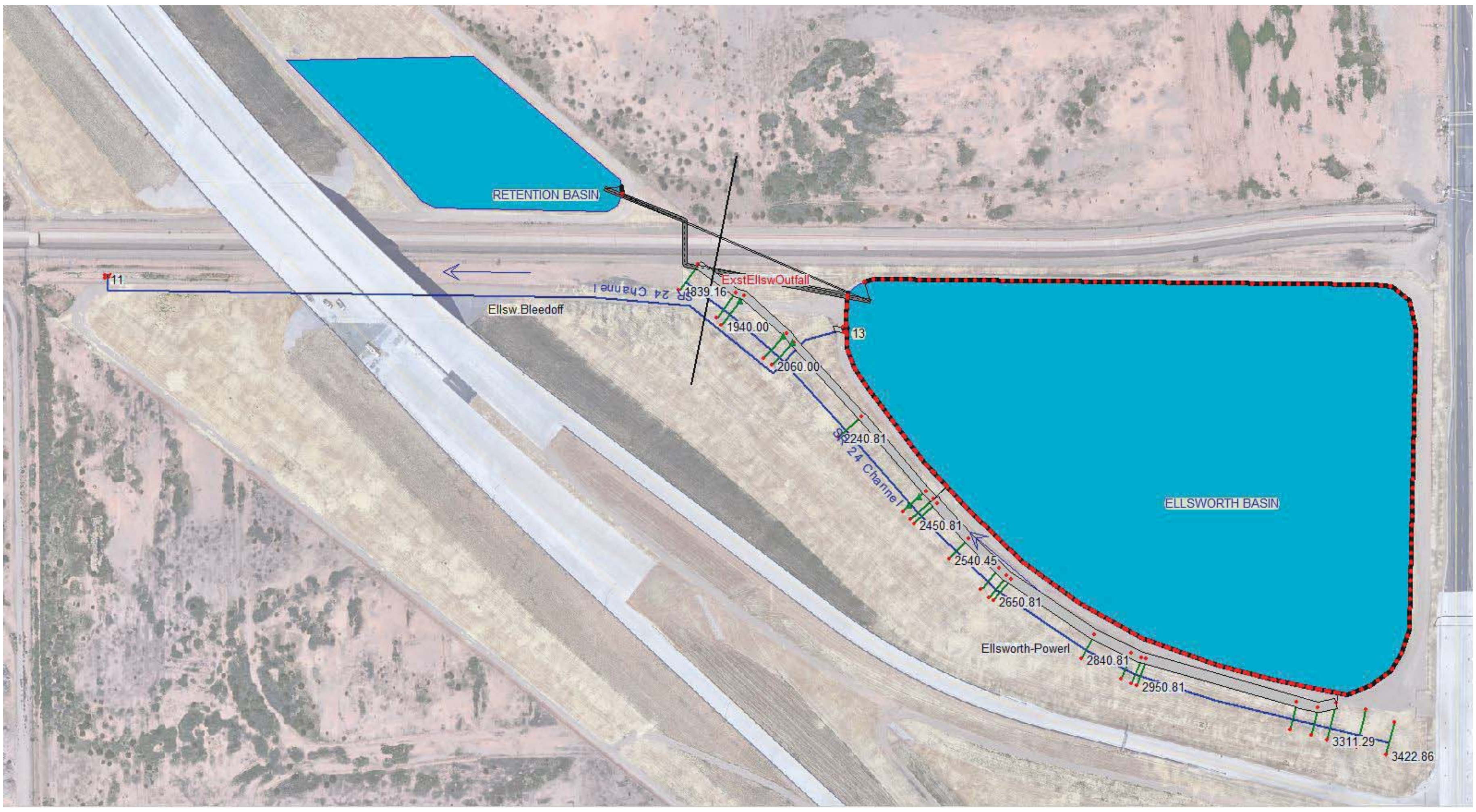
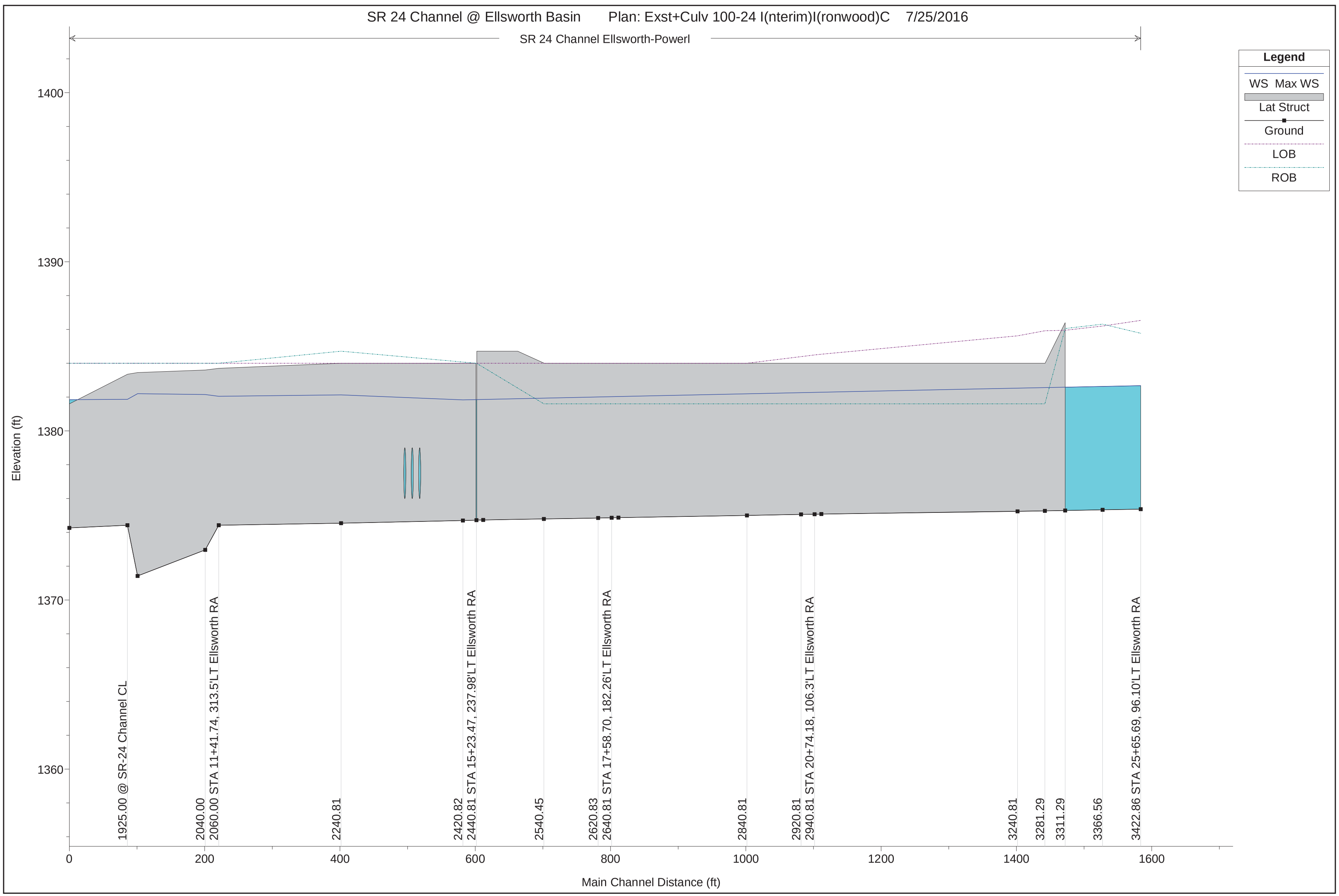
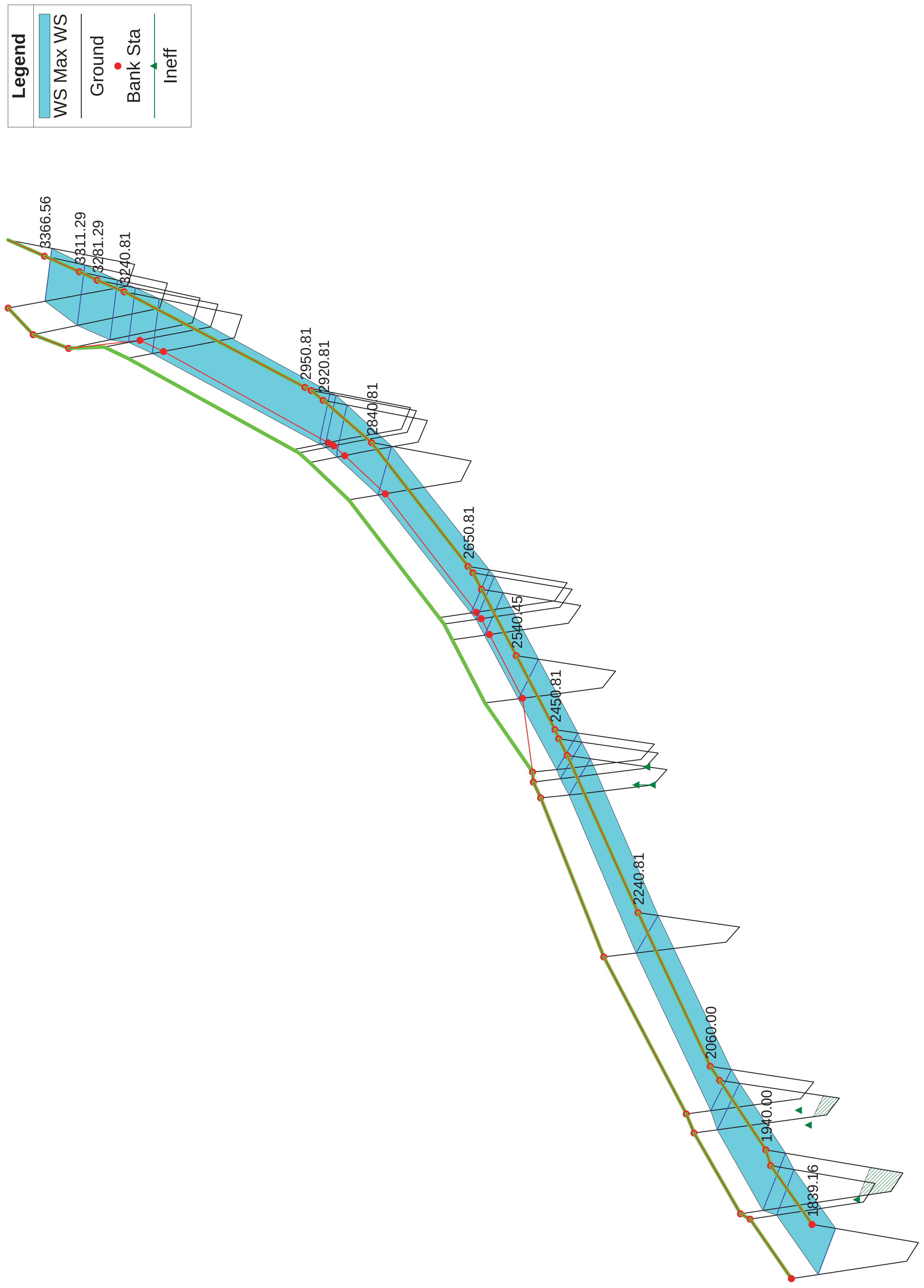
GEOMETRY LAYOUT: EXST Basin+Culvert+LowFlow





1 in Horiz. = 125 ft   1 in Vert. = 5 ft

SR 24 Channel @ Ellsworth Basin   Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C   7/25/2016



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Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Fr# Chl
Ellsw.Bleedoff	13	Max WS	39.06	1372.00	1377.53		1377.54	0.000016	0.84	46.74	8.92	0.06
Ellsw.Bleedoff	12	Max WS	39.06	1372.00	1377.53	1372.90	1377.54	0.000016	0.84	46.74	8.92	0.06
Ellsw.Bleedoff	12		Inl Struct									
Ellsw.Bleedoff	11	Max WS	20.07	1368.20	1372.71		1372.72	0.000008	0.53	37.55	8.64	0.05
Ellsw.Bleedoff	10	Max WS	6.07	1368.20	1372.70	1368.46	1372.70	0.000001	0.16	37.45	8.64	0.01
Ellsworth-Powerl	3423	Max WS	1752.00	1375.37	1382.67		1383.48	0.000767	7.21	243.00	48.41	0.57
Ellsworth-Powerl	3367	Max WS	1751.29	1375.33	1382.63		1383.44	0.000767	7.21	242.85	48.40	0.57
Ellsworth-Powerl	3311	Max WS	1750.72	1375.29	1382.59		1383.40	0.000767	7.21	242.80	48.39	0.57
Ellsworth-Powerl	3311		Lat Struct									
Ellsworth-Powerl	3281	Max WS	1750.83	1375.27	1382.56		1383.37	0.000737	7.25	242.37	48.36	0.56
Ellsworth-Powerl	3241	Max WS	1750.60	1375.24	1382.53		1383.35	0.000737	7.24	242.42	48.36	0.56
Ellsworth-Powerl	2951	Max WS	1749.88	1375.08	1382.28		1383.12	0.000781	7.36	238.16	48.01	0.57
Ellsworth-Powerl	2941	Max WS	1749.76	1375.07	1382.27		1383.11	0.000781	7.36	238.22	48.01	0.57
Ellsworth-Powerl	2921	Max WS	1749.81	1375.06	1382.26		1383.10	0.000783	7.36	238.01	47.99	0.58
Ellsworth-Powerl	2841	Max WS	1755.04	1375.00	1382.19		1383.04	0.000793	7.39	237.74	47.97	0.58
Ellsworth-Powerl	2651	Max WS	1754.72	1374.87	1382.03		1382.89	0.000812	7.43	236.31	47.85	0.58
Ellsworth-Powerl	2641	Max WS	1754.69	1374.86	1382.02		1382.88	0.000812	7.43	236.30	47.85	0.58
Ellsworth-Powerl	2621	Max WS	1754.75	1374.85	1382.01		1382.87	0.000816	7.44	236.00	47.85	0.59
Ellsworth-Powerl	2540	Max WS	1755.01	1374.79	1381.94		1382.80	0.000824	7.45	235.53	47.80	0.59
Ellsworth-Powerl	2451	Max WS	1755.01	1374.73	1381.86		1382.73	0.000849	7.48	234.52	47.70	0.60
Ellsworth-Powerl	2441	Max WS	1755.42	1374.72	1381.85		1382.72	0.000848	7.48	234.59	47.71	0.59
Ellsworth-Powerl	2440		Lat Struct									
Ellsworth-Powerl	2421	Max WS	1755.26	1374.70	1381.83		1382.70	0.000846	7.48	234.72	47.69	0.59
Ellsworth-Powerl	2241	Max WS	1527.89	1374.54	1382.13		1382.68	0.000501	5.95	256.59	49.43	0.46
Ellsworth-Powerl	2060	Max WS	1528.01	1374.42	1382.04		1382.59	0.000492	5.92	258.21	49.54	0.46
Ellsworth-Powerl	2040	Max WS	1527.99	1372.96	1382.15		1382.53	0.000315	4.95	308.83	55.02	0.37
Ellsworth-Powerl	1940	Max WS	1527.98	1371.42	1382.20		1382.47	0.000216	4.20	363.55	62.30	0.31
Ellsworth-Powerl	1925	Max WS	1528.00	1374.42	1381.86		1382.45	0.000540	6.12	249.88	48.97	0.48
Ellsworth-Powerl	1839	Max WS	1526.78	1374.26	1381.84	1379.23	1382.39	0.000500	5.95	256.76	49.53	0.46

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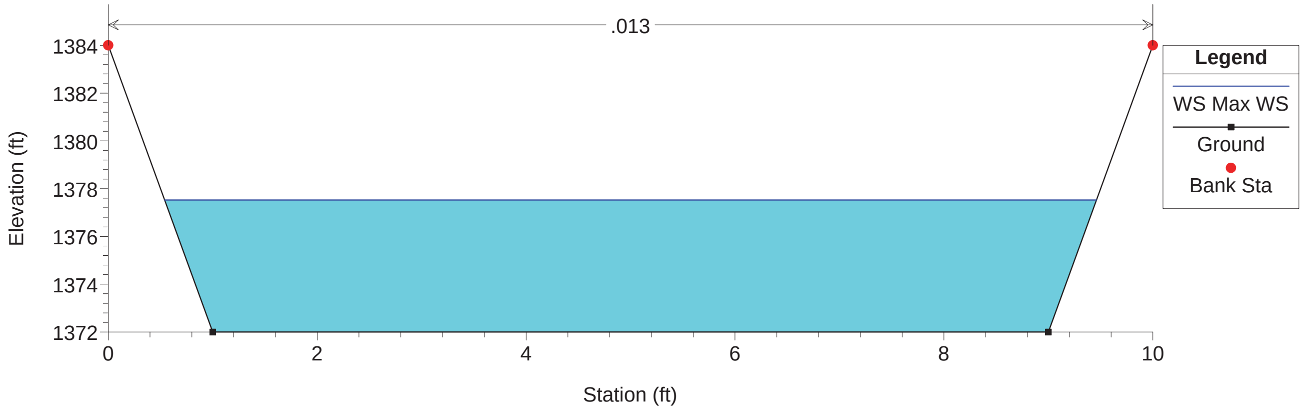
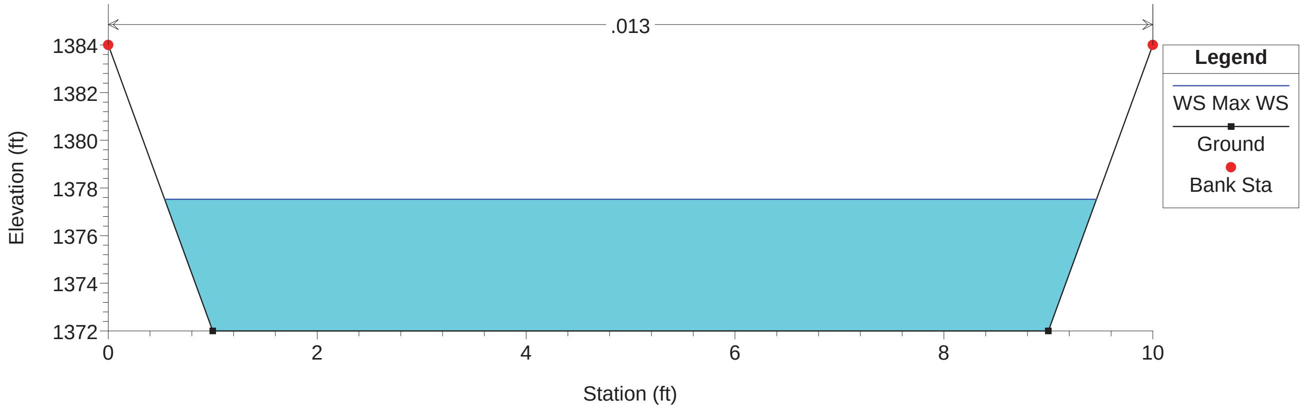
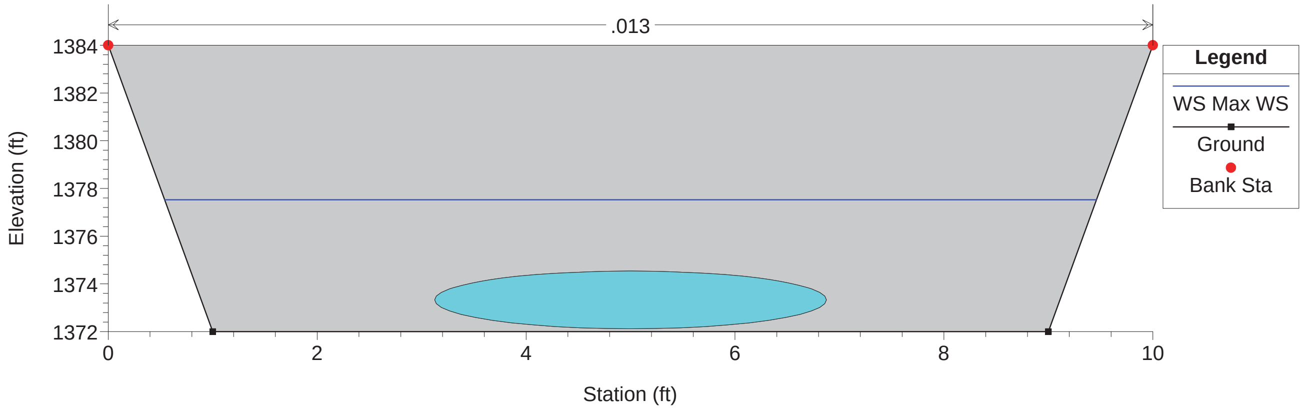


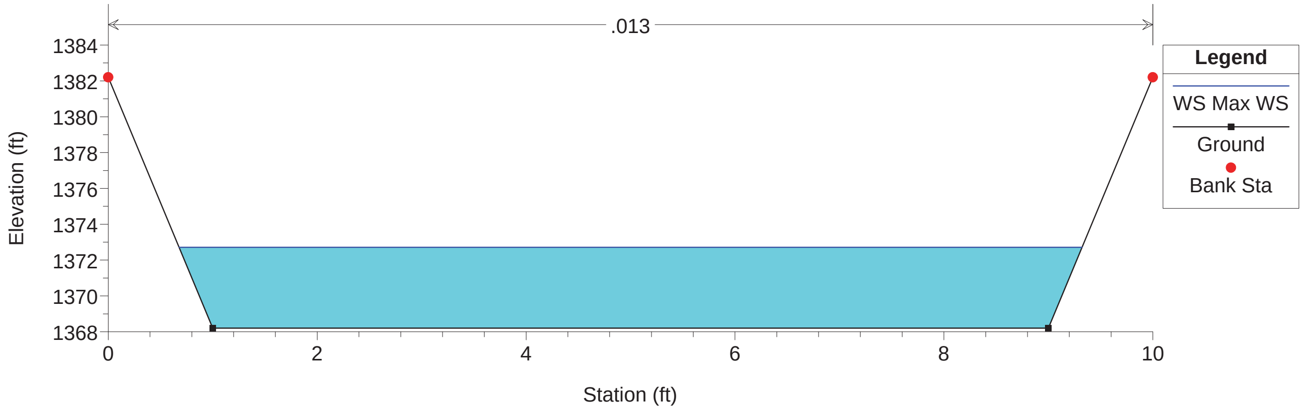
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 13 Dummy cross section to simulate the 36" bleedoff line outfall to



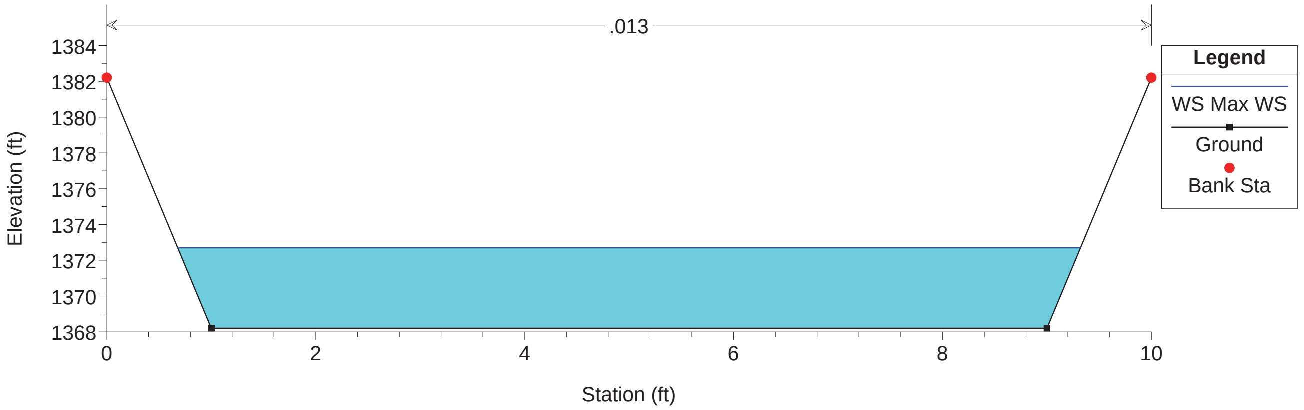
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 12 Dummy cross section to simulate the 36" bleedoff line outfall to



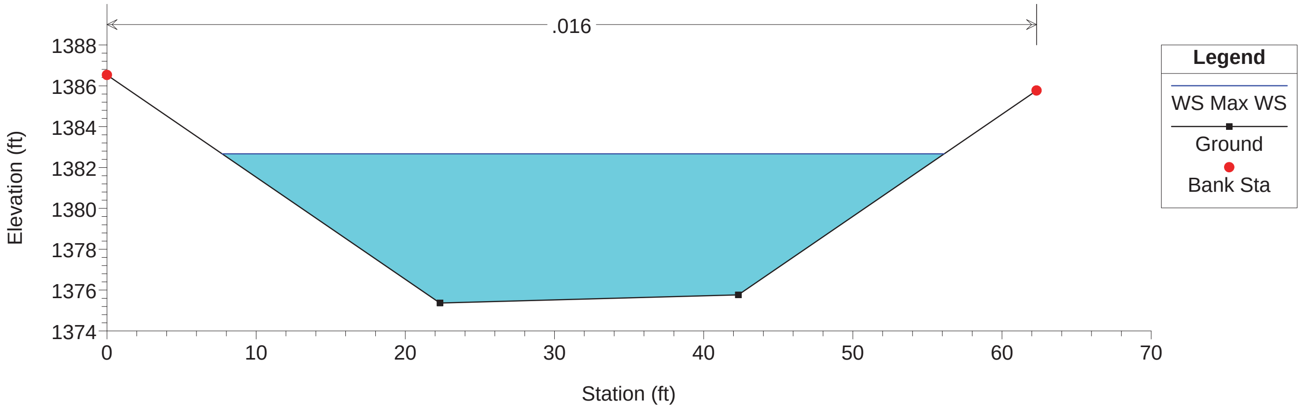
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 11.999 IS Proposed 36" RCP bleedoff pipe for the Ellsworth Basin that cros



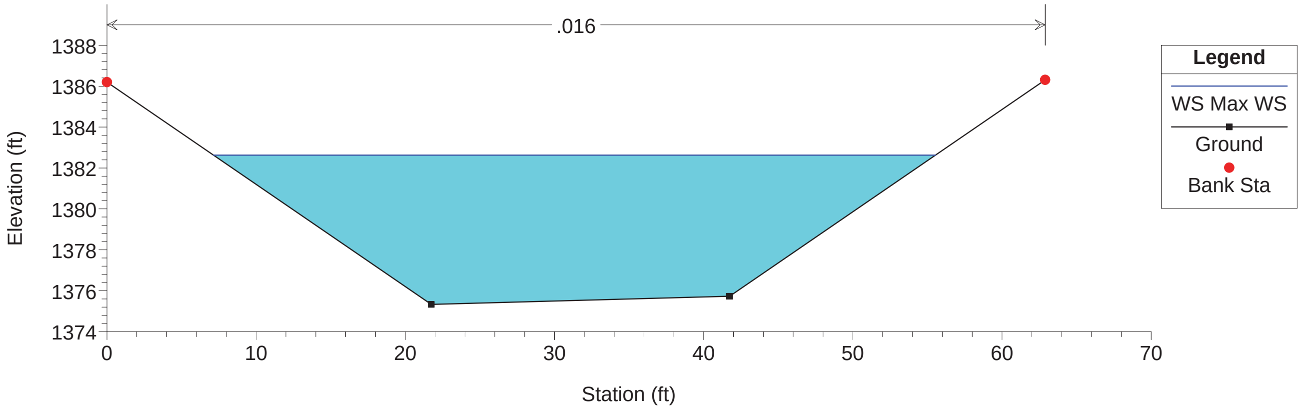
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 11 Dummy cross section to simulate the 36" bleedoff line outfall to



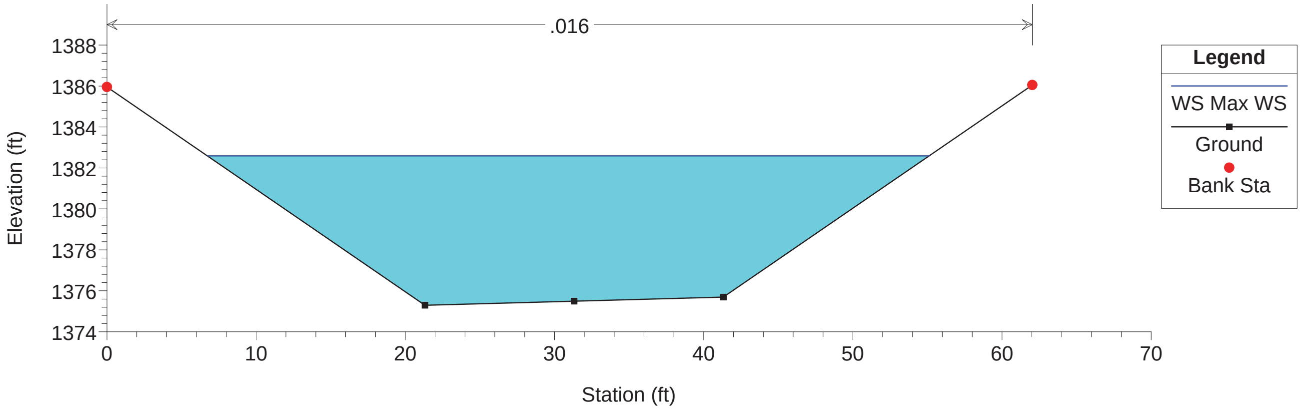
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 10 Dummy cross section to simulate the 36" bleedoff line outfall to



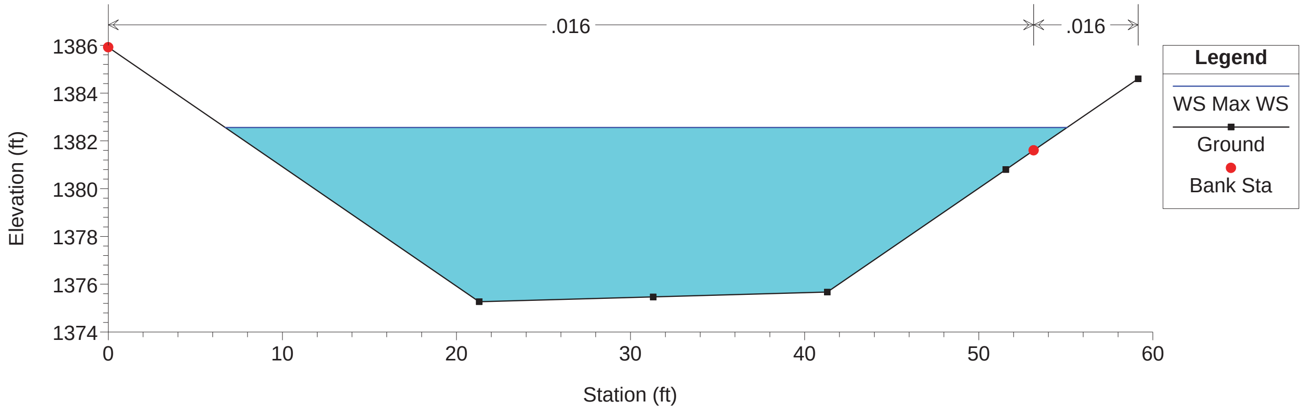
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3422.86 STA 25+65.69, 96.10'LT Ellsworth RA



SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3366.56



SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3311.29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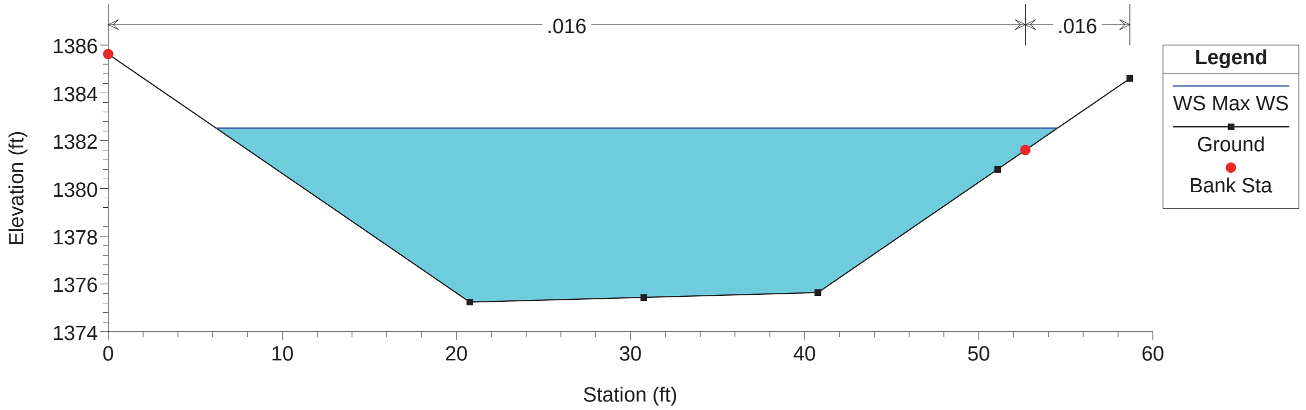
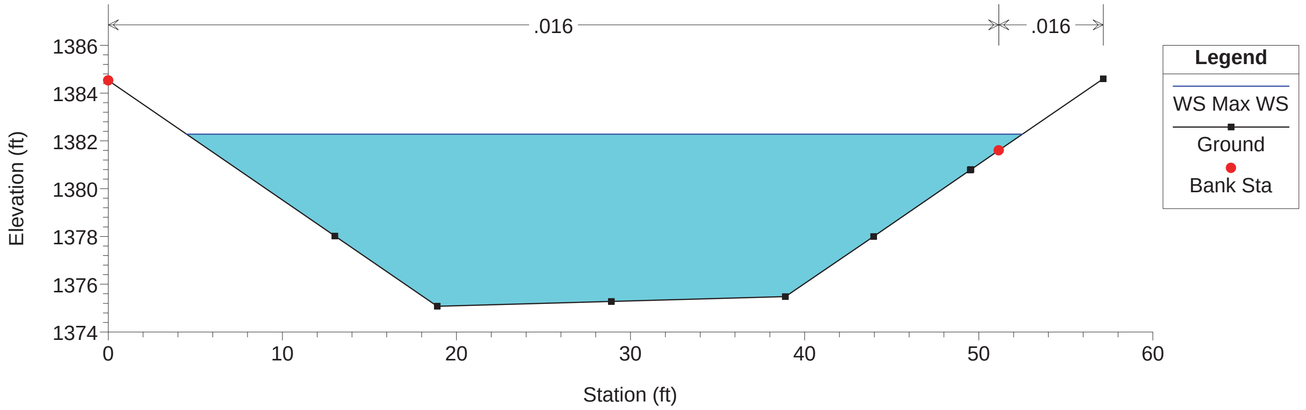
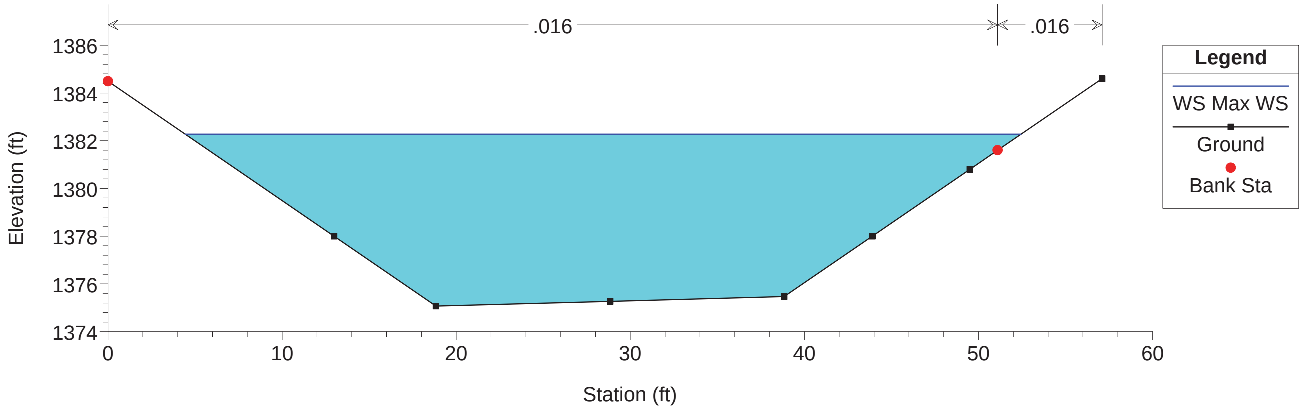
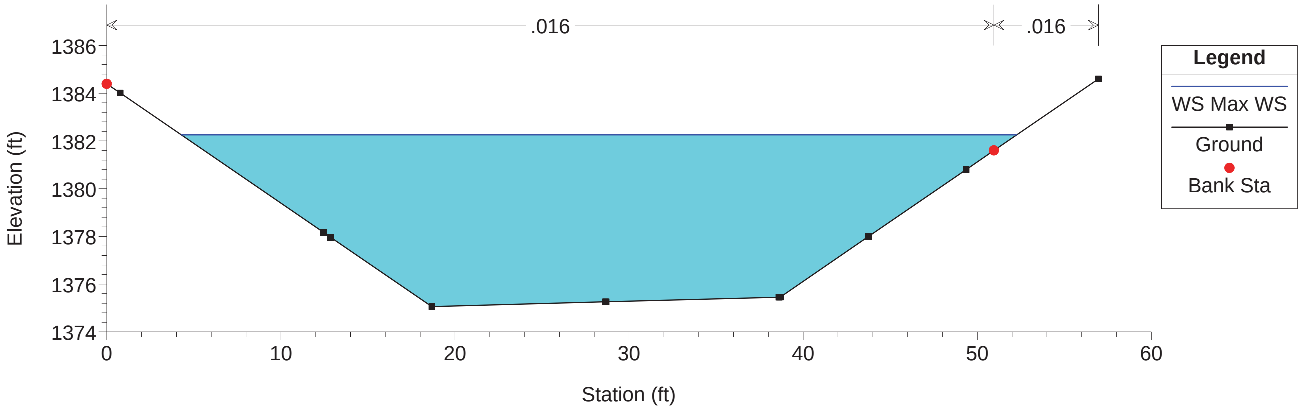
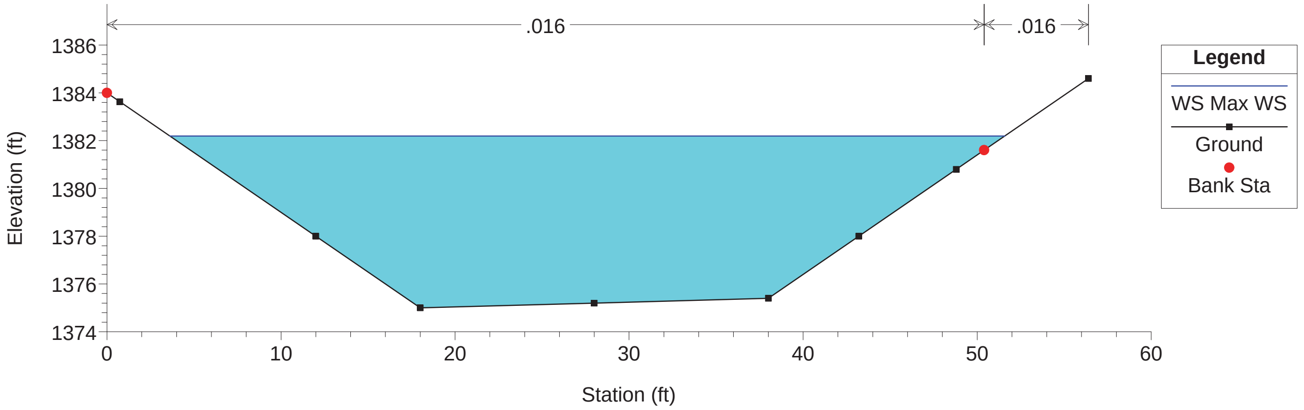
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3281.29

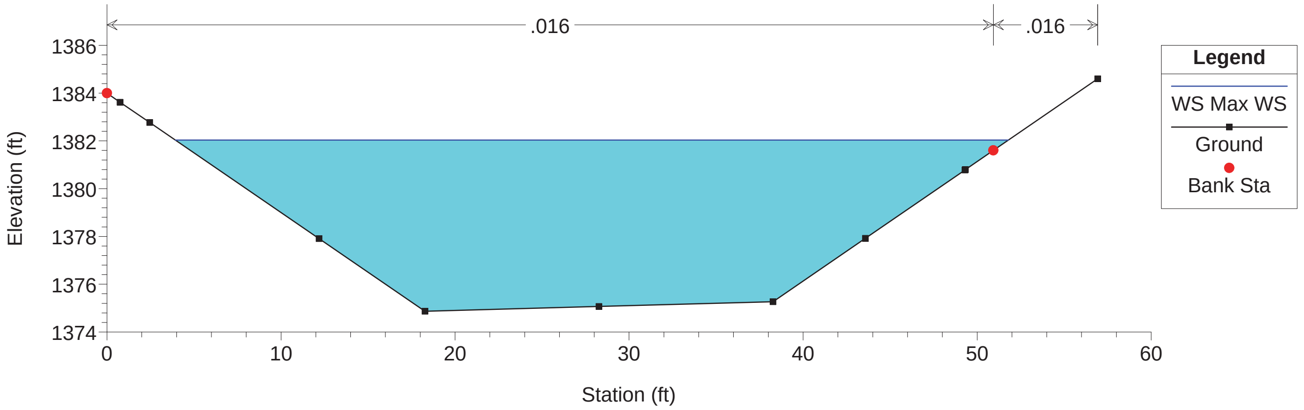

SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3240.81

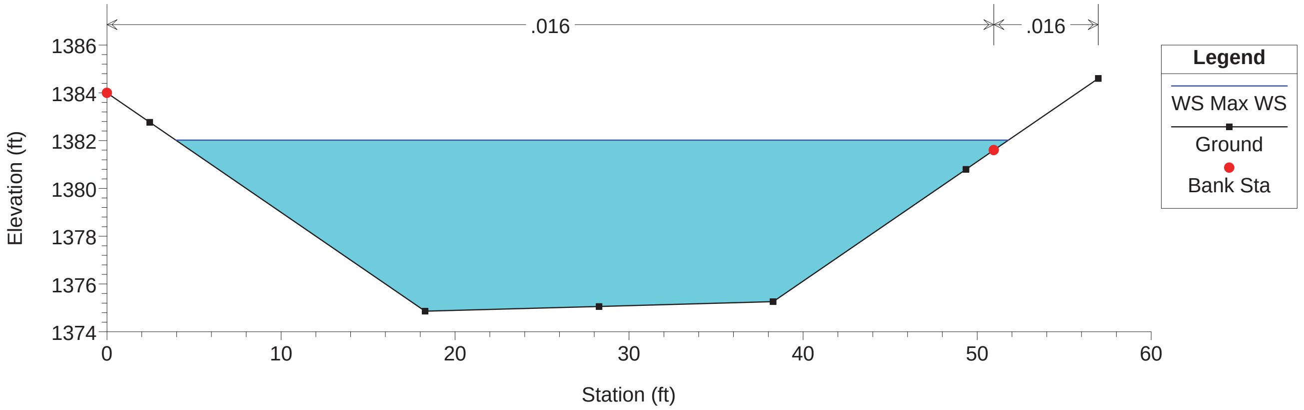

SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2950.81


SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2940.81 STA 20+74.18, 106.3'LT Ellsworth RA

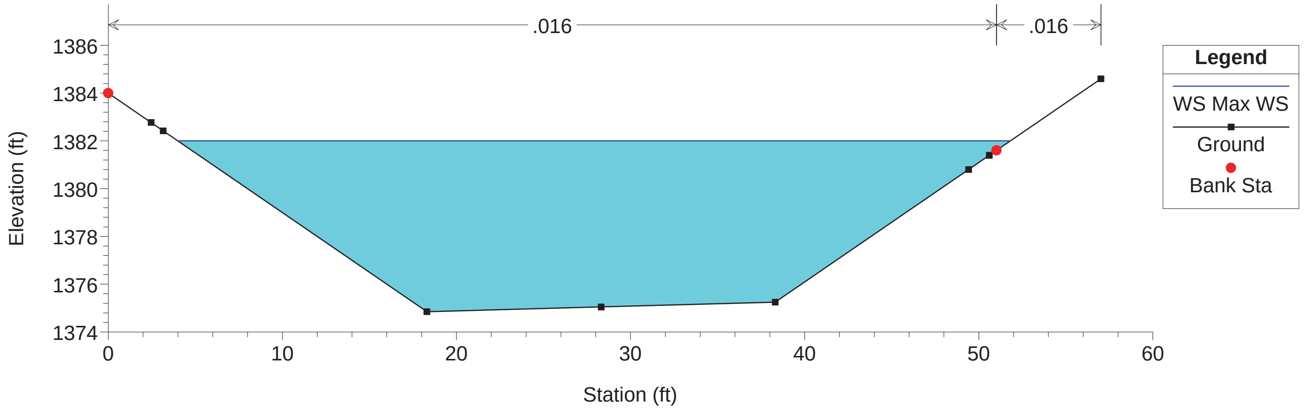

SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2920.81


SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2840.81

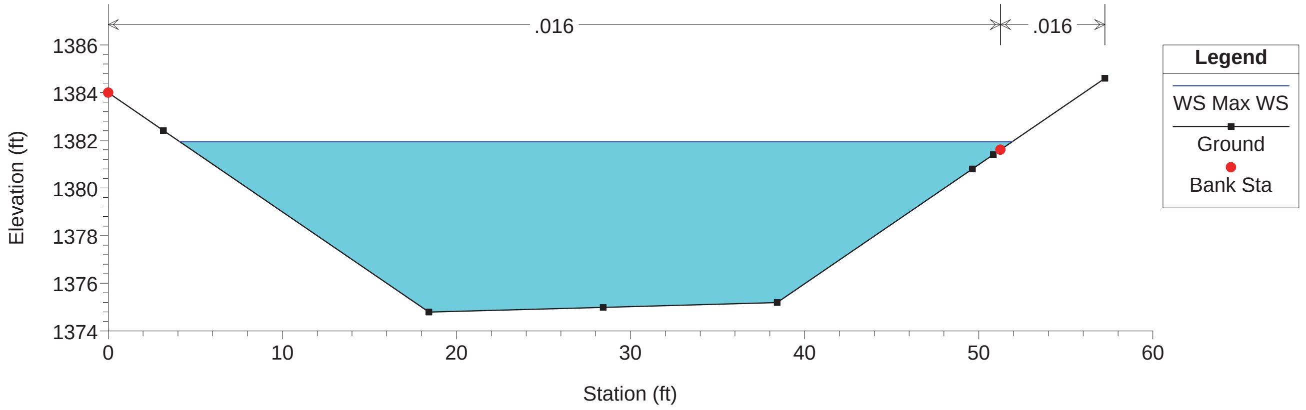

SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2650.81


SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2640.81 STA 17+58.70, 182.26'LT Ellsworth RA

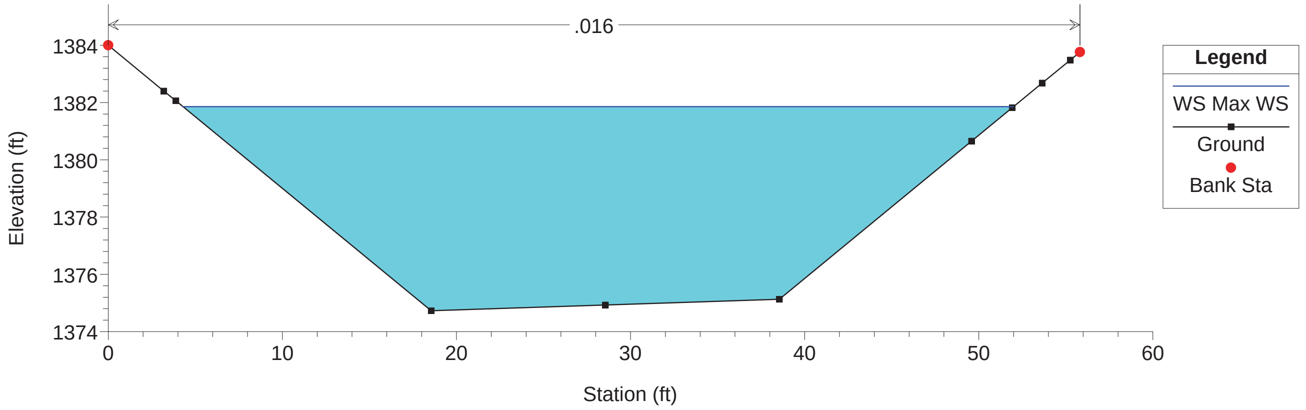
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2620.83



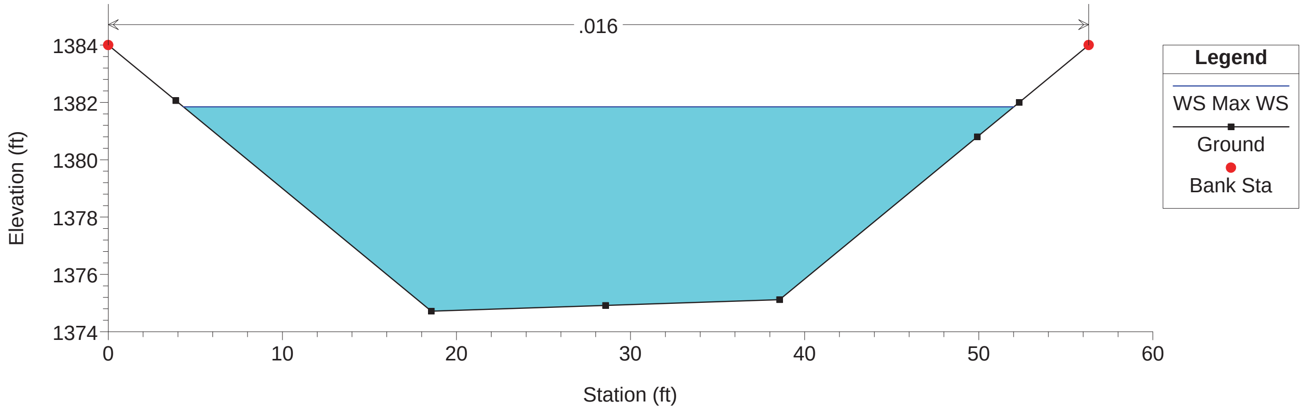
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2540.45



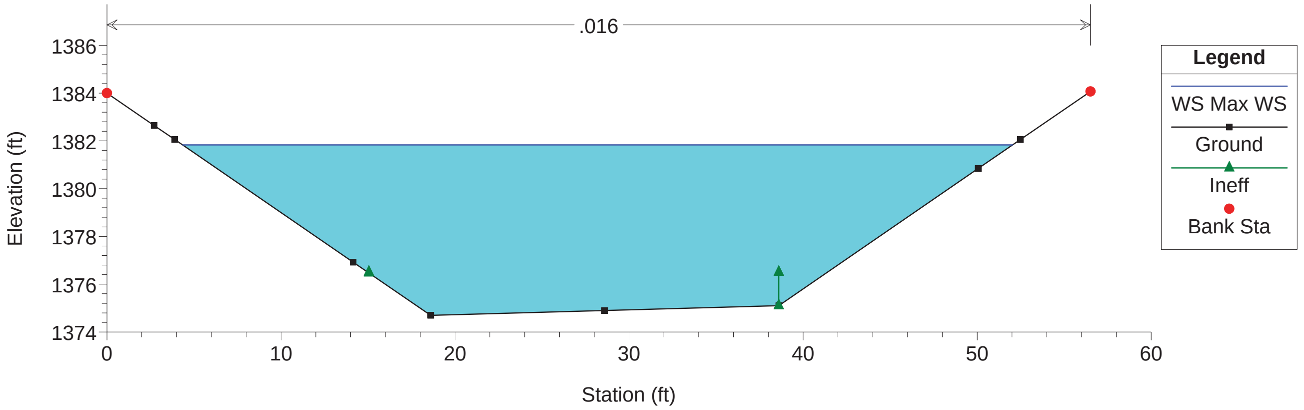
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2450.81



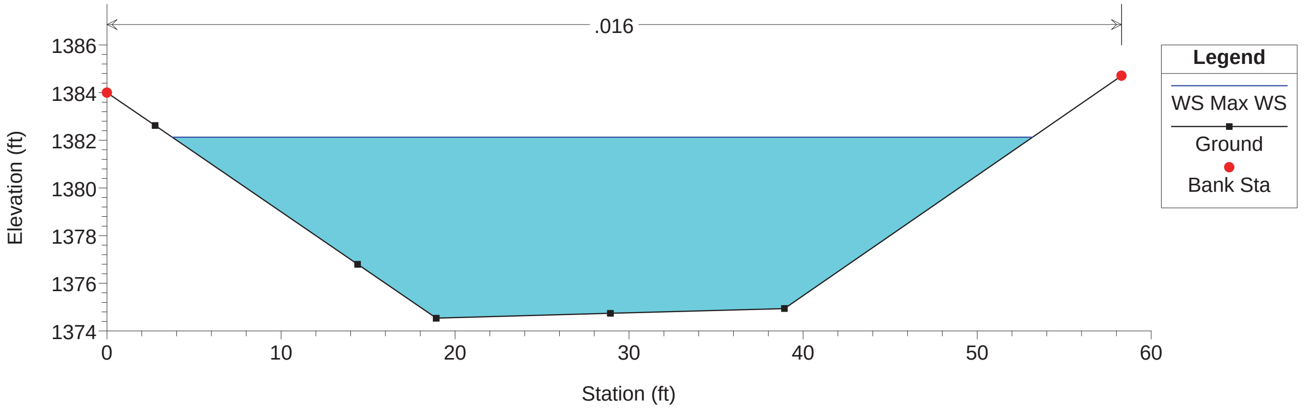
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2440.81 STA 15+23.47, 237.98'LT Ellsworth RA



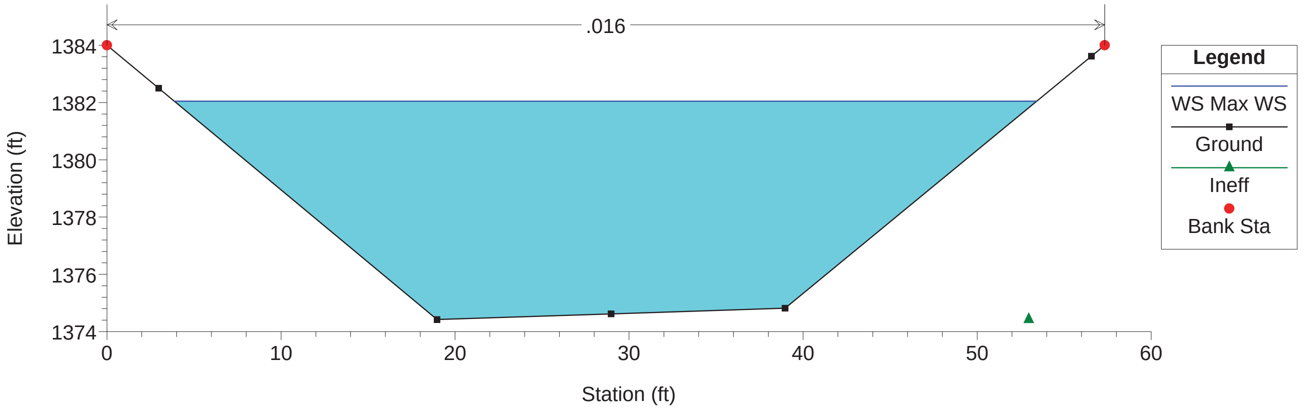
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2420.82



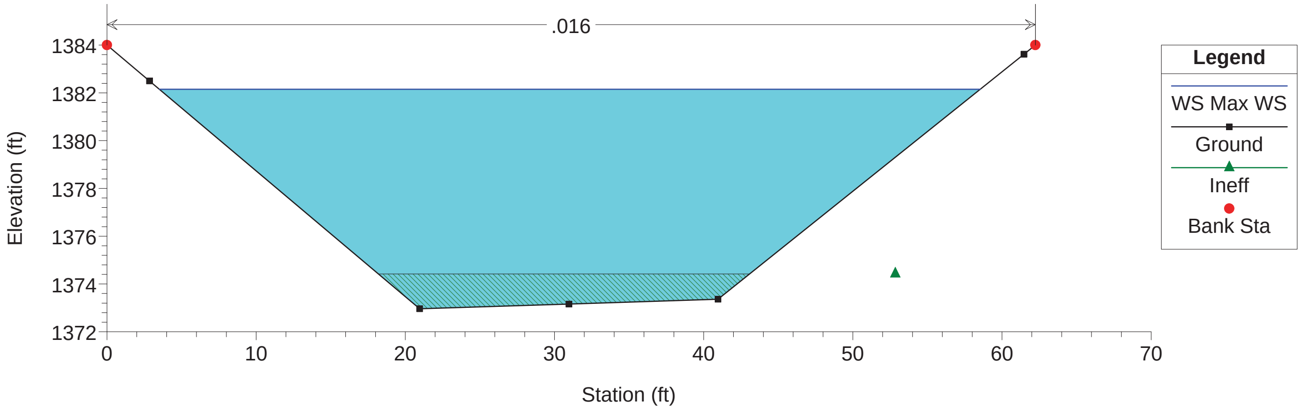
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2240.81



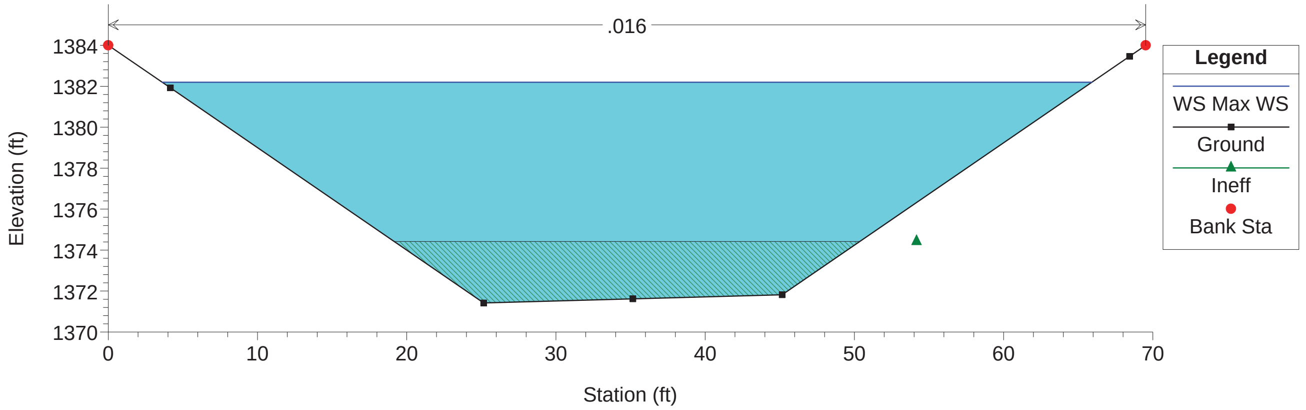
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2060.00 STA 11+41.74, 313.5'LT Ellsworth RA



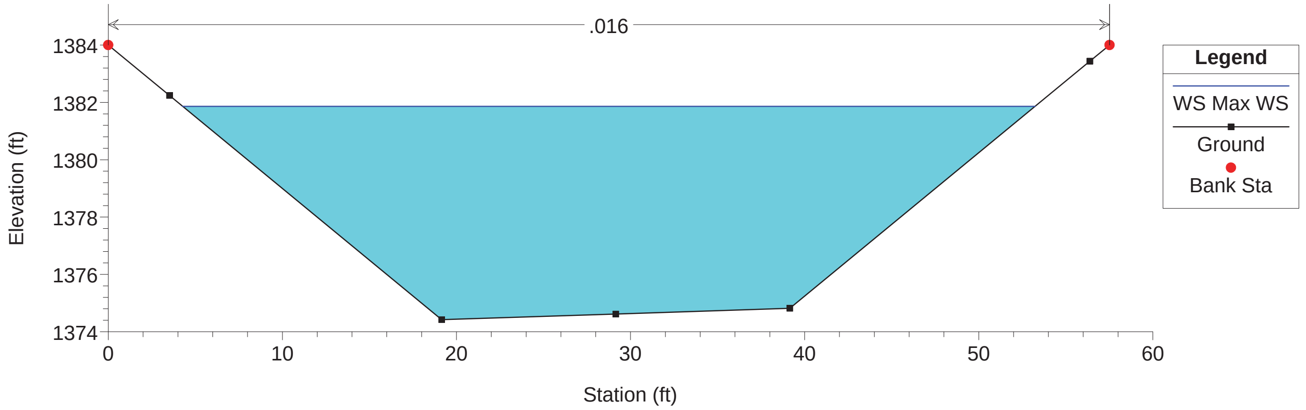
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2040.00



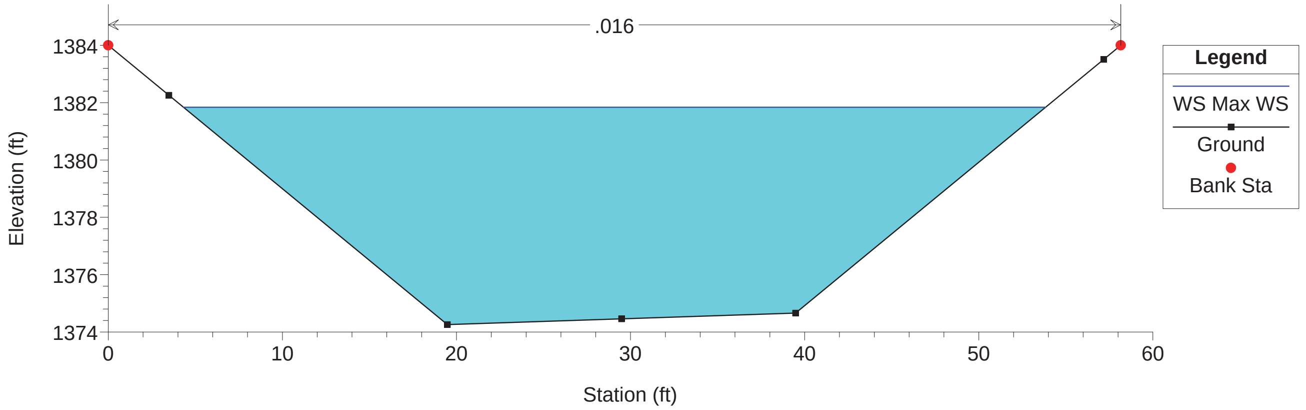
SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1940.00 @ SR-24 Channel CL



SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1925.00 @ SR-24 Channel CL



SR 24 Channel @ Ellsworth Basin Plan: Exst+Culv 100-24 I(nterim)I(ronwood)C 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1839.16 STA 9+21.21, 321.32'LT Ellsworth RA



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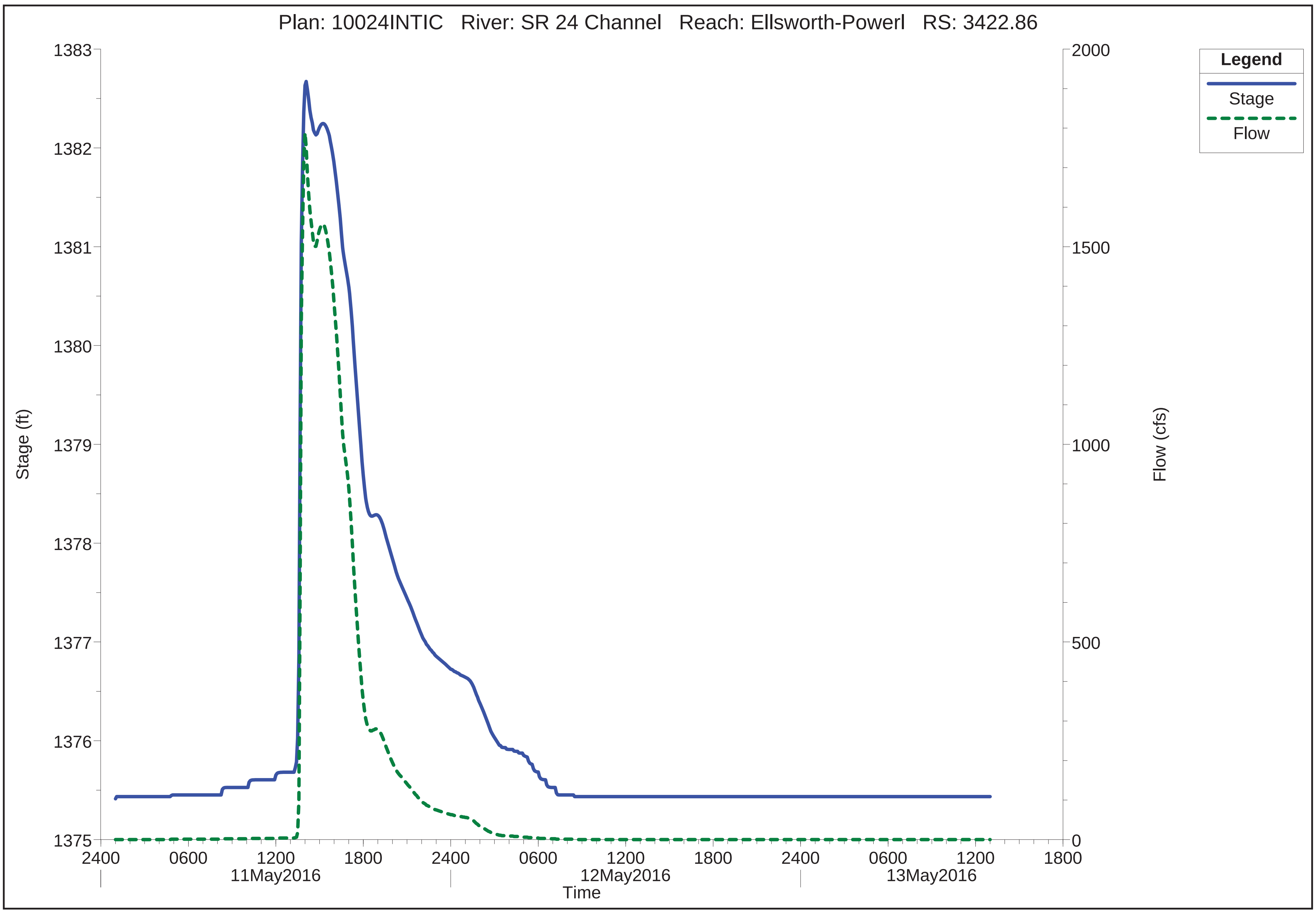
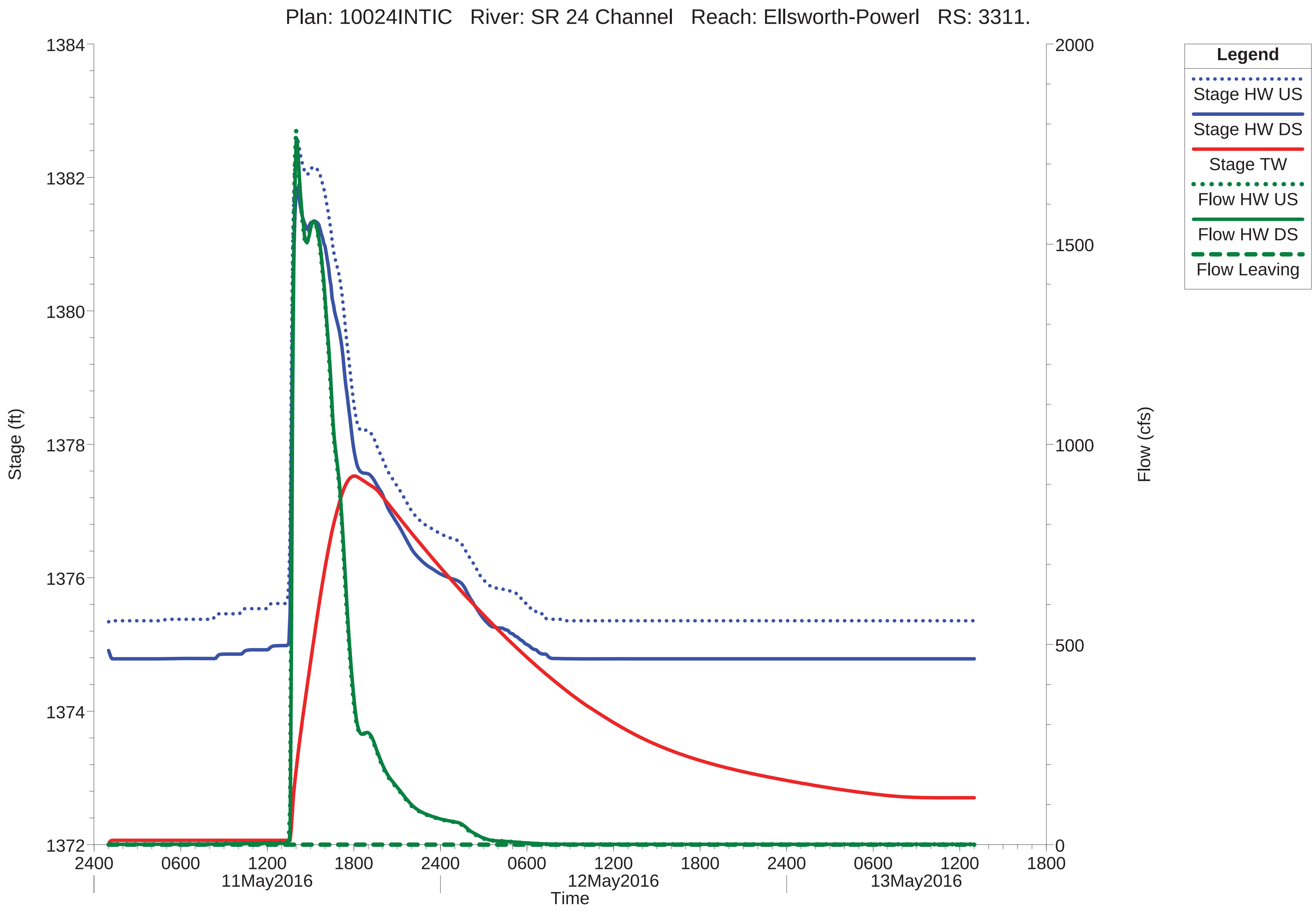
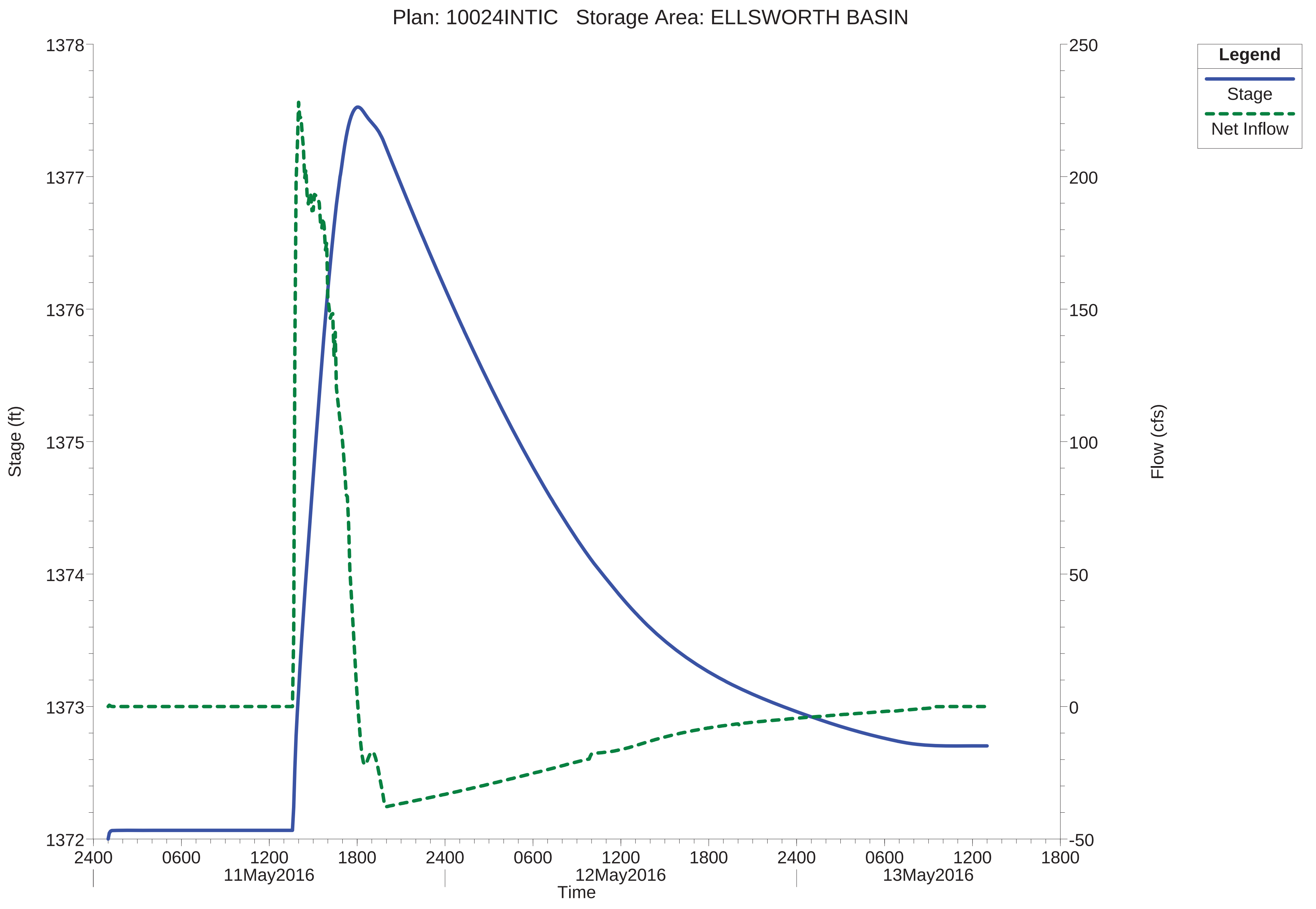
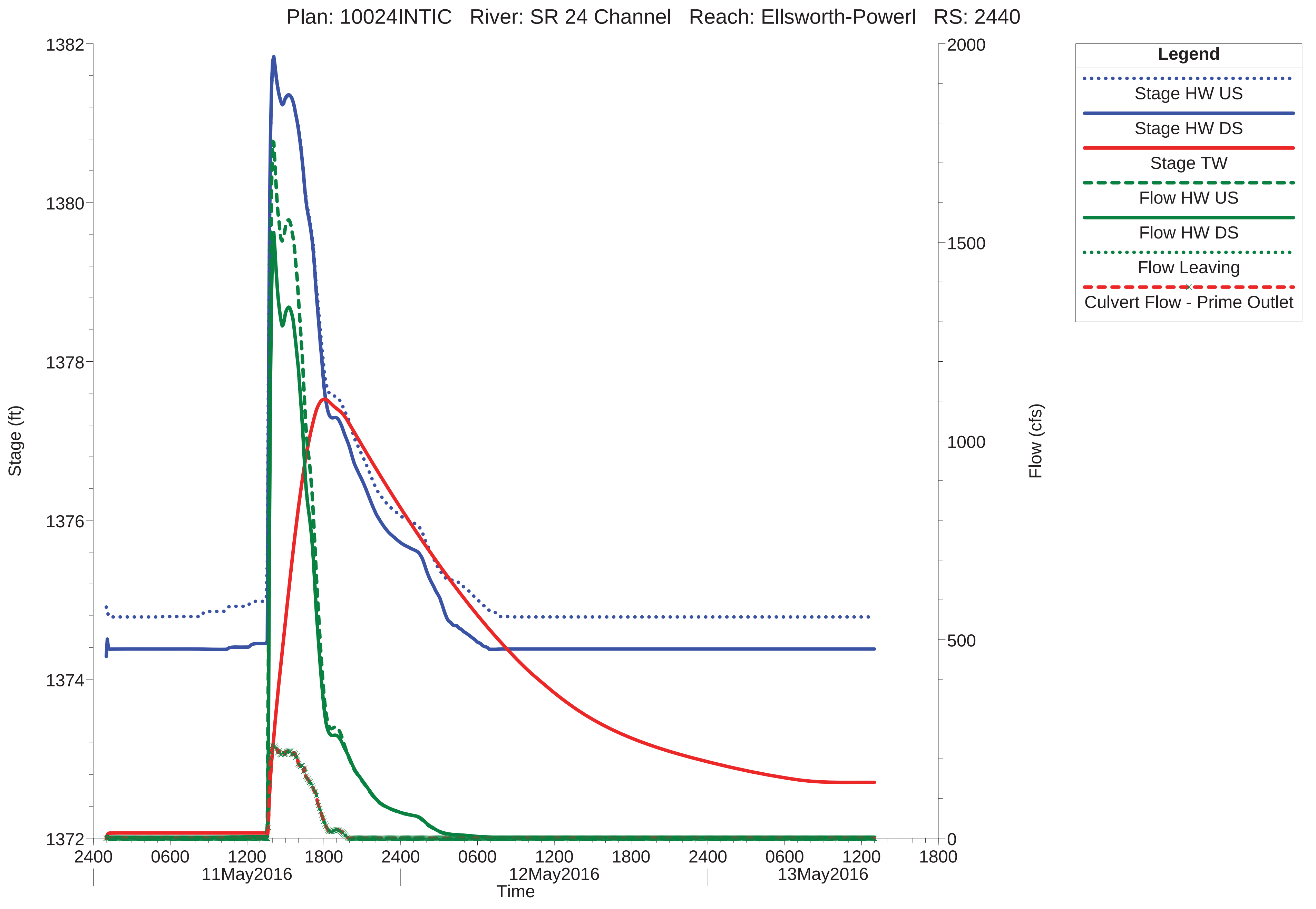
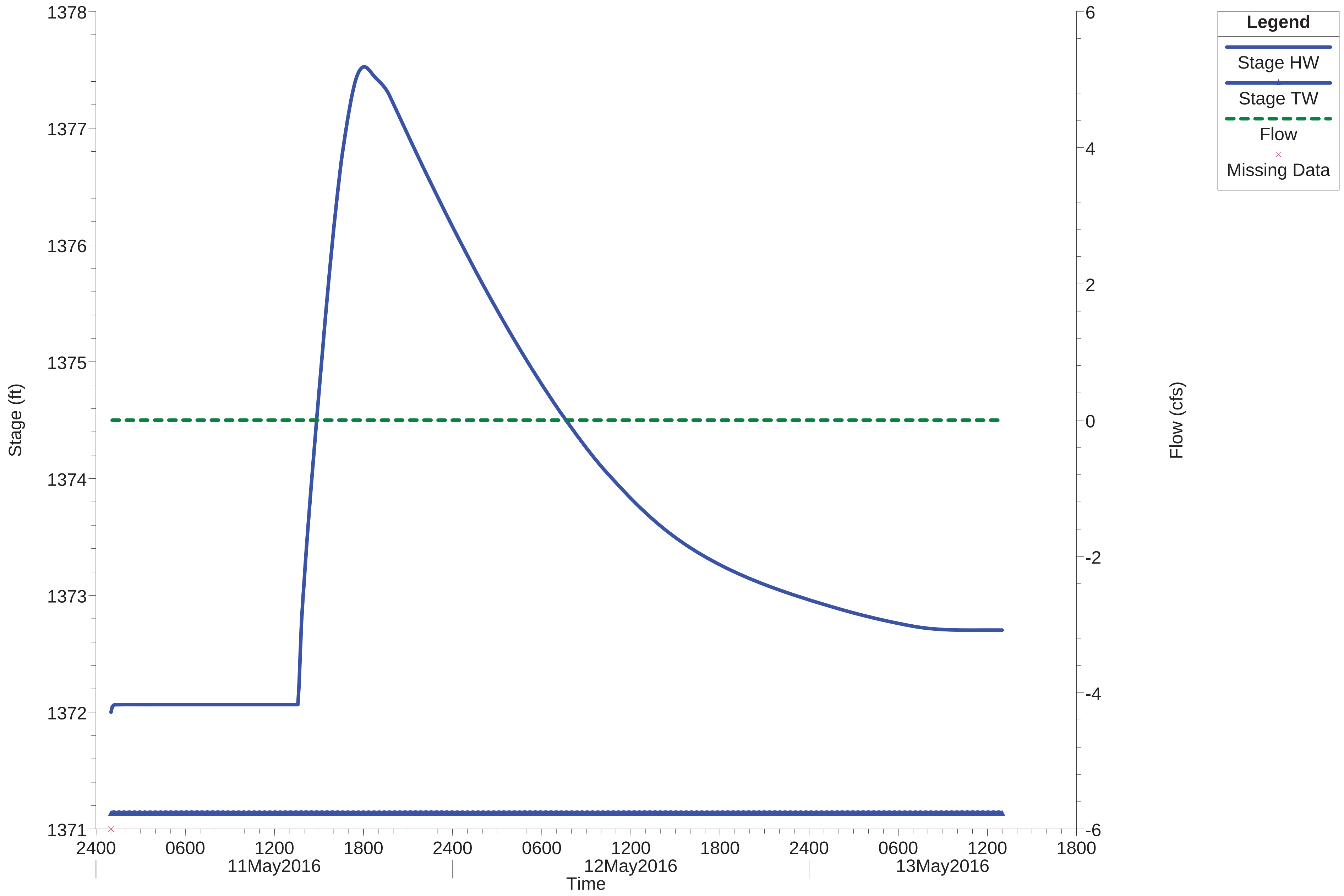

Plan: 10024INTIC River: SR 24 Channel Reach: Ellsworth-Powerl RS: 3422.86
Stage (ft)
1383
1382
1381
1380
1379
1378
1377
1376
1375
Flow (cfs)
2000
1500
1000
500
0
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage
Flow

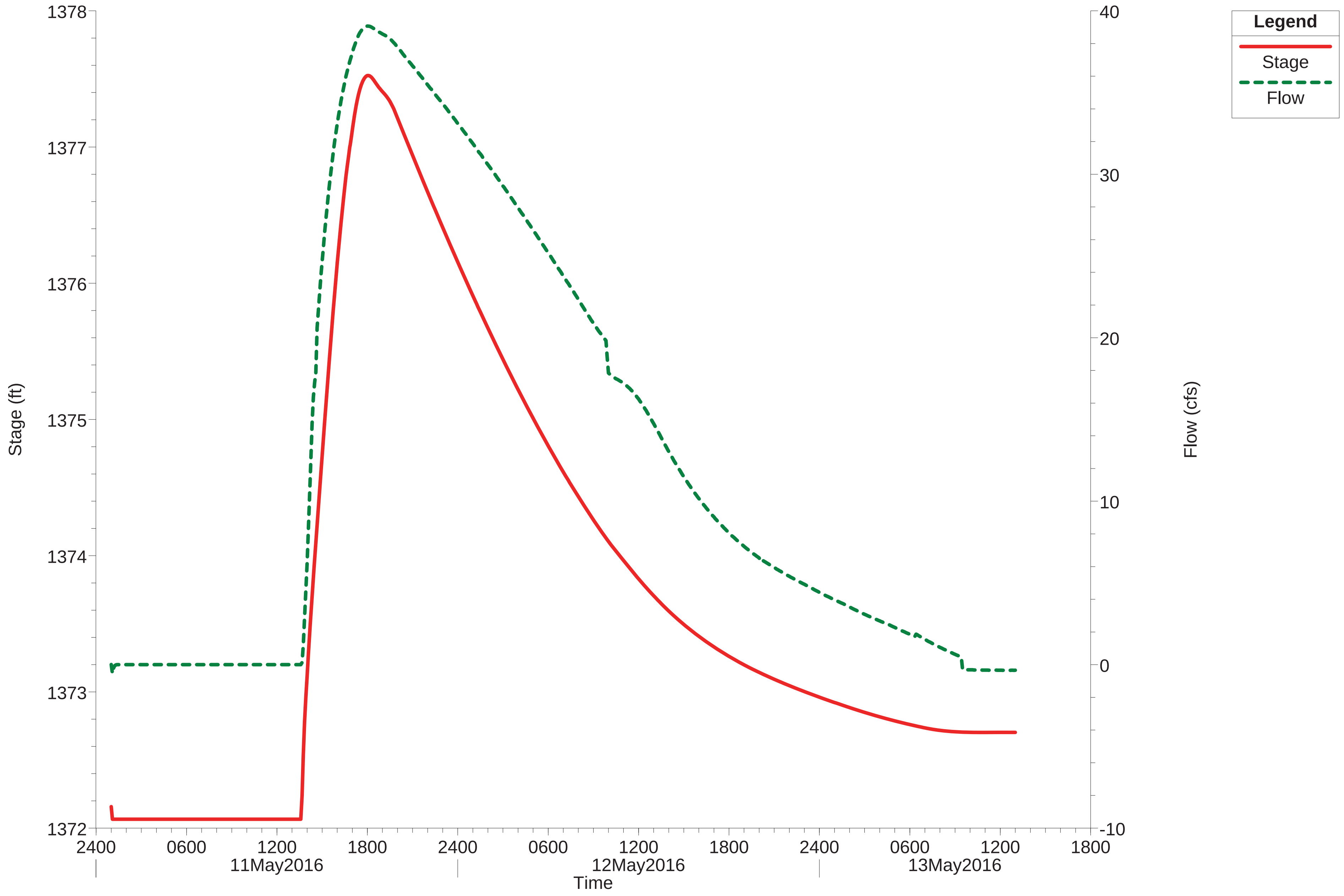

Plan: 10024INTIC River: SR 24 Channel Reach: Ellsworth-Powerl RS: 3311.
Stage (ft)
1384
1382
1380
1378
1376
1374
1372
Flow (cfs)
2000
1500
1000
500
0
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage HW US
Stage HW DS
Stage TW
Flow HW US
Flow HW DS
Flow Leaving


Plan: 10024INTIC   Storage Area: ELLSWORTH BASIN
Stage (ft)
1378
1377
1376
1375
1374
1373
1372
Flow (cfs)
250
200
150
100
50
0
-50
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage
Net Inflow


Plan: 10024INTIC   River: SR 24 Channel   Reach: Ellsworth-Powerl   RS: 2440
Stage (ft)
1382
1380
1378
1376
1374
1372
Flow (cfs)
2000
1500
1000
500
0
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage HW US
Stage HW DS
Stage TW
Flow HW US
Flow HW DS
Flow Leaving
Culvert Flow - Prime Outlet

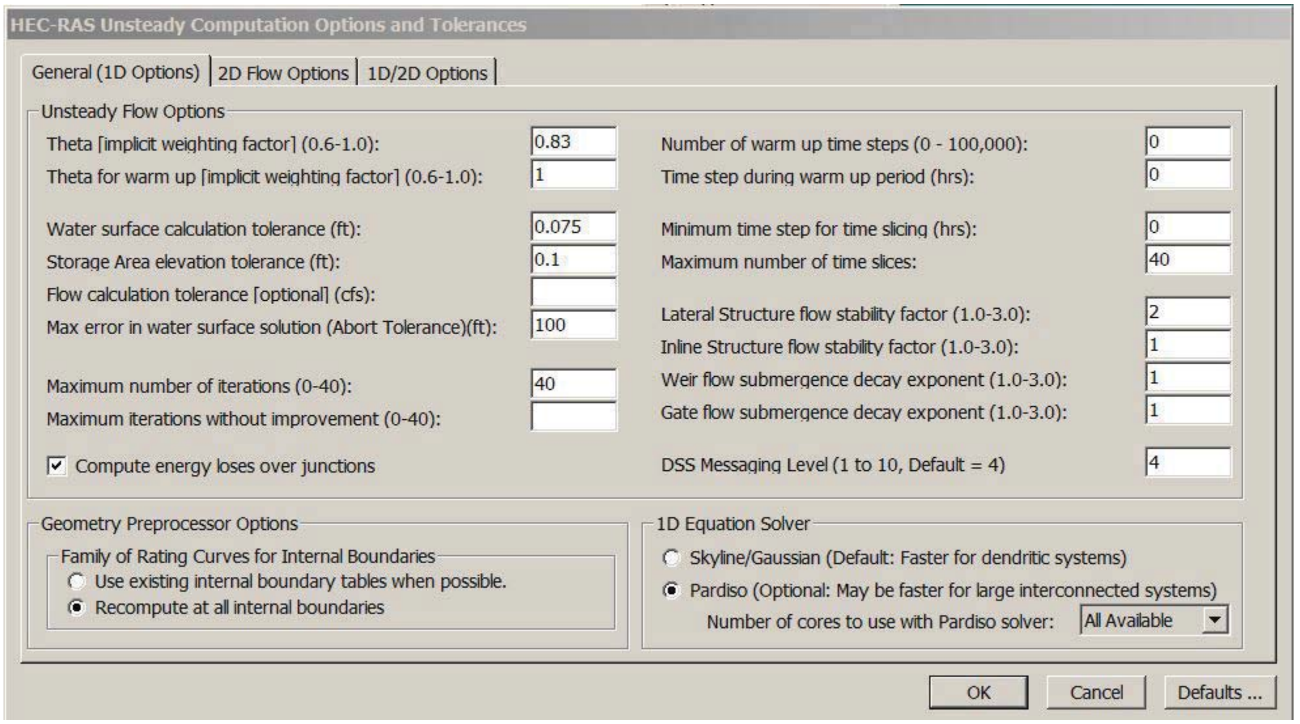


Plan: 10024INTIC   SA Connection: ExstEllswOutfall



Plan: 10024INTIC   River: SR 24 Channel   Reach: Ellsw.Bleedoff   RS: 13

COMPUTATION OPTIONS AND TOLERANCES



HEC-RAS Unsteady Computation Options and Tolerances

Unsteady Flow Options

Theta [implicit weighting factor] (0.6-1.0): 0.83
Theta for warm up [implicit weighting factor] (0.6-1.0): 1
Water surface calculation tolerance (ft): 0.075
Storage Area elevation tolerance (ft): 0.1
Flow calculation tolerance [optional] (cfs):
Max error in water surface solution (Abort Tolerance)(ft): 100
Maximum number of iterations (0-40): 40
Maximum iterations without improvement (0-40):
☑ Compute energy loses over junctions

Number of warm up time steps (0 - 100,000): 0
Time step during warm up period (hrs): 0
Minimum time step for time slicing (hrs): 0
Maximum number of time slices: 40
Lateral Structure flow stability factor (1.0-3.0): 2
Inline Structure flow stability factor (1.0-3.0): 1
Weir flow submergence decay exponent (1.0-3.0): 1
Gate flow submergence decay exponent (1.0-3.0): 1
DSS Messaging Level (1 to 10, Default = 4) 4

Geometry Preprocessor Options

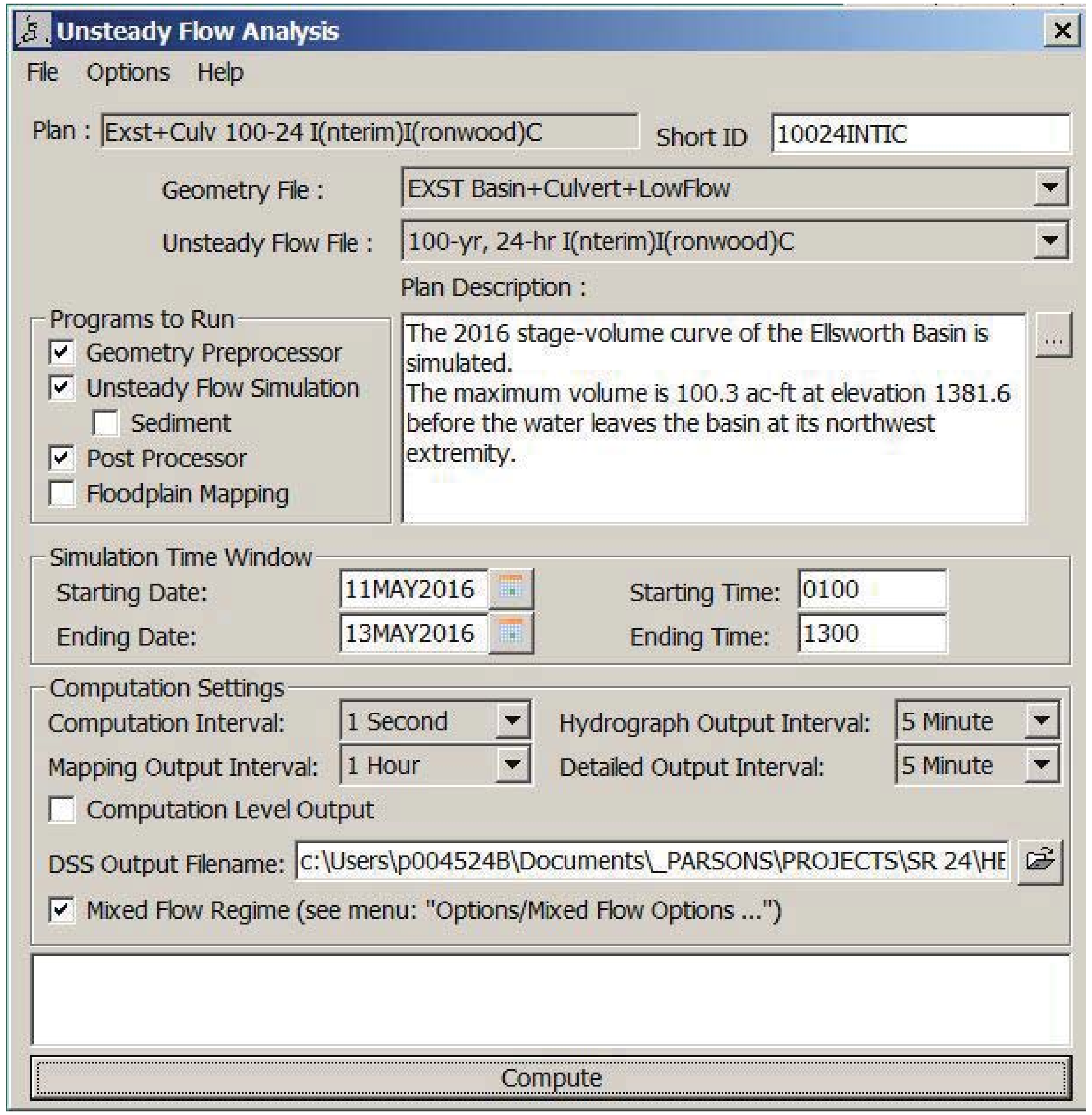
Family of Rating Curves for Internal Boundaries
○ Use existing internal boundary tables when possible.
● Recompute at all internal boundaries

1D Equation Solver

○ Skyline/Gaussian (Default: Faster for dendritic systems)
● Pardiso (Optional: May be faster for large interconnected systems)
Number of cores to use with Pardiso solver: All Available

UNSTEADY FLOW ANALYSIS SUMMARY (EXCERPT)

PLAN Exst+Culv 100-24 I(nterim)I(ronwood)C



Unsteady Flow Analysis

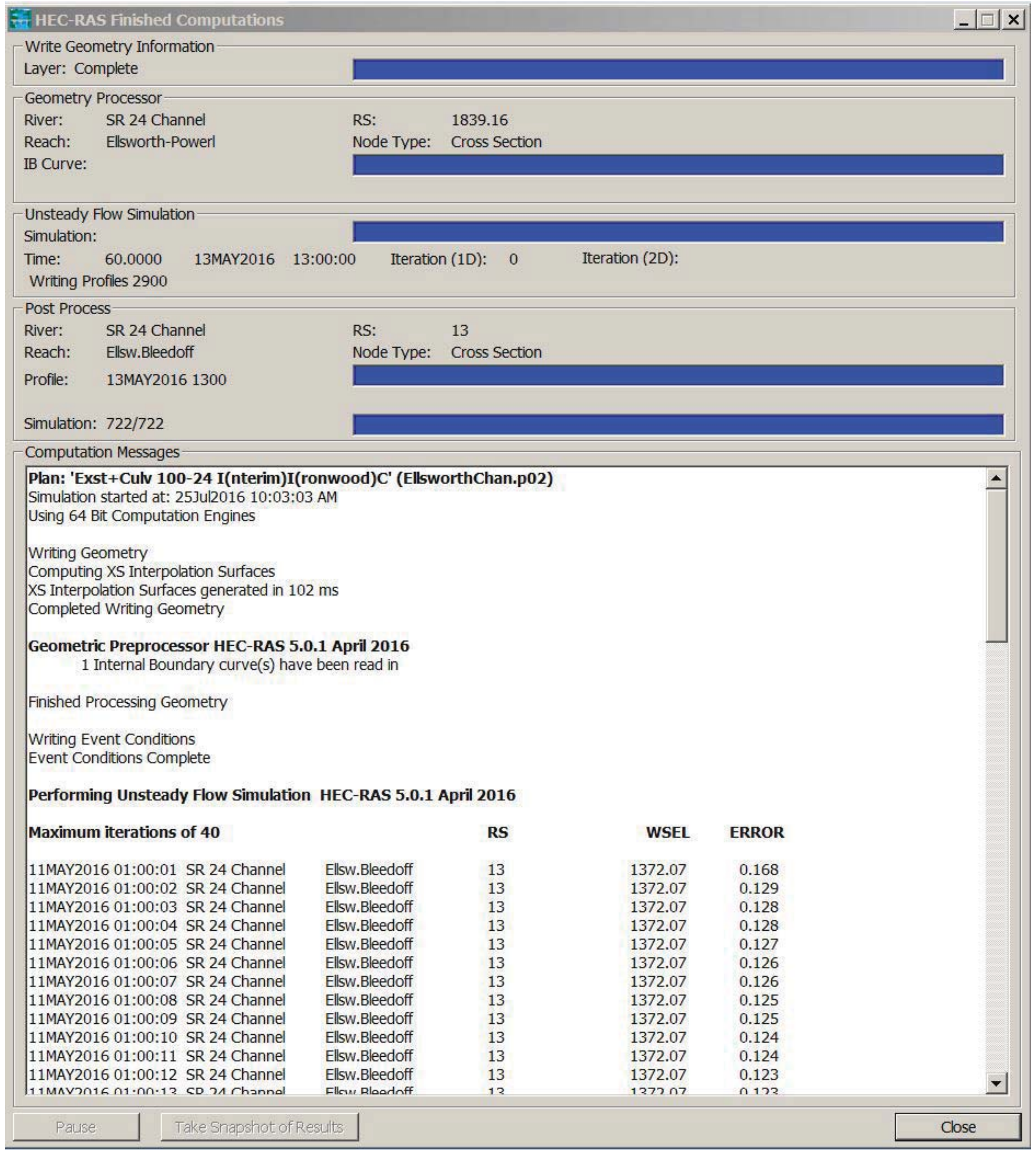
Plan : Exst+Culv 100-24 I(nterim)I(ronwood)C
Short ID 10024INTIC
Geometry File : EXST Basin+Culvert+LowFlow
Unsteady Flow File : 100-yr, 24-hr I(nterim)I(ronwood)C

Plan Description :
The 2016 stage-volume curve of the Ellsworth Basin is simulated.
The maximum volume is 100.3 ac-ft at elevation 1381.6 before the water leaves the basin at its northwest extremity.

Programs to Run
☑ Geometry Preprocessor
☑ Unsteady Flow Simulation
☐ Sediment
☑ Post Processor
☐ Floodplain Mapping

Simulation Time Window
Starting Date: 11MAY2016
Starting Time: 0100
Ending Date: 13MAY2016
Ending Time: 1300

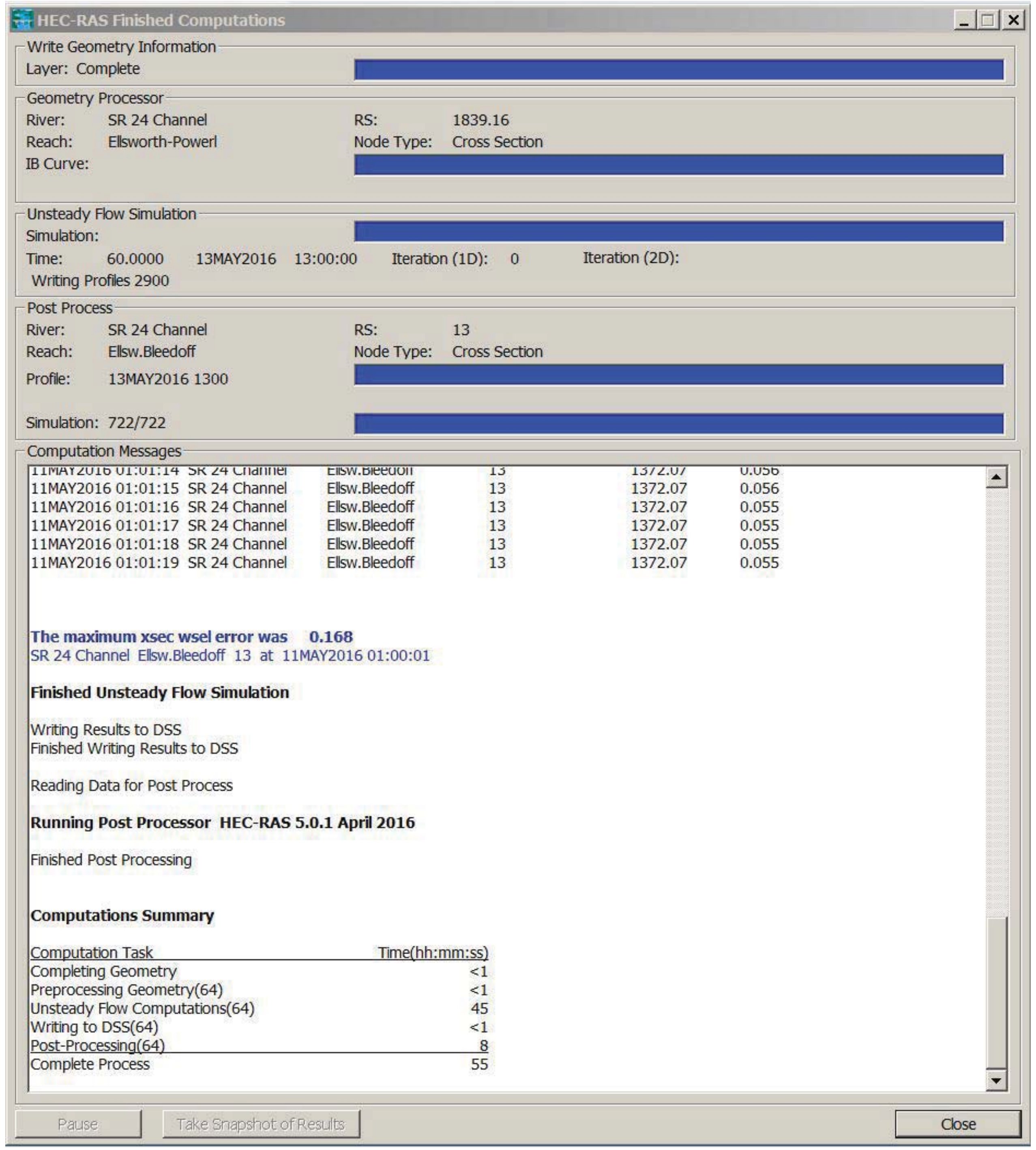
Computation Settings
Computation Interval: 1 Second
Hydrograph Output Interval: 5 Minute
Mapping Output Interval: 1 Hour
Detailed Output Interval: 5 Minute
☐ Computation Level Output
DSS Output Filename: c:\Users\p004524B\Documents_PARSONS\PROJECTS\SR 24\HE
☑ Mixed Flow Regime (see menu: "Options/Mixed Flow Options ...")



```
Write Geometry Information
Layer:  Complete

Geometry Processor
River:     SR 24 Channel              RS:          1839.16
Reach:     Ellsworth-Powerl           Node Type:   Cross Section
IB Curve:

Unsteady Flow Simulation
Simulation:
Time:     60.0000    13MAY2016   13:00:00     Iteration (1D):   0          Iteration (2D):
 Writing Profiles 2900

Post Process
River:     SR 24 Channel              RS:          13
Reach:     Ellsw.Bleedoff             Node Type:   Cross Section
Profile:   13MAY2016 1300

Simulation:  722/722
```

Computation Messages

```
Plan: 'Exst+Culv 100-24 I(nterim)I(ronwood)C' (EllsworthChan.p02)
Simulation started at: 25Jul2016 10:03:03 AM
Using 64 Bit Computation Engines

Writing Geometry
Computing XS Interpolation Surfaces
XS Interpolation Surfaces generated in 102 ms
Completed Writing Geometry

Geometric Preprocessor HEC-RAS 5.0.1 April 2016
        1 Internal Boundary curve(s) have been read in

Finished Processing Geometry

Writing Event Conditions
Event Conditions Complete

Performing Unsteady Flow Simulation  HEC-RAS 5.0.1 April 2016

Maximum iterations of 40                          RS                WSEL    ERROR

11MAY2016 01:00:01  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.168
11MAY2016 01:00:02  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.129
11MAY2016 01:00:03  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.128
11MAY2016 01:00:04  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.128
11MAY2016 01:00:05  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.127
11MAY2016 01:00:06  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.126
11MAY2016 01:00:07  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.126
11MAY2016 01:00:08  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.125
11MAY2016 01:00:09  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.125
11MAY2016 01:00:10  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.124
11MAY2016 01:00:11  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.124
11MAY2016 01:00:12  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.123
11MAY2016 01:00:13  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.123
```

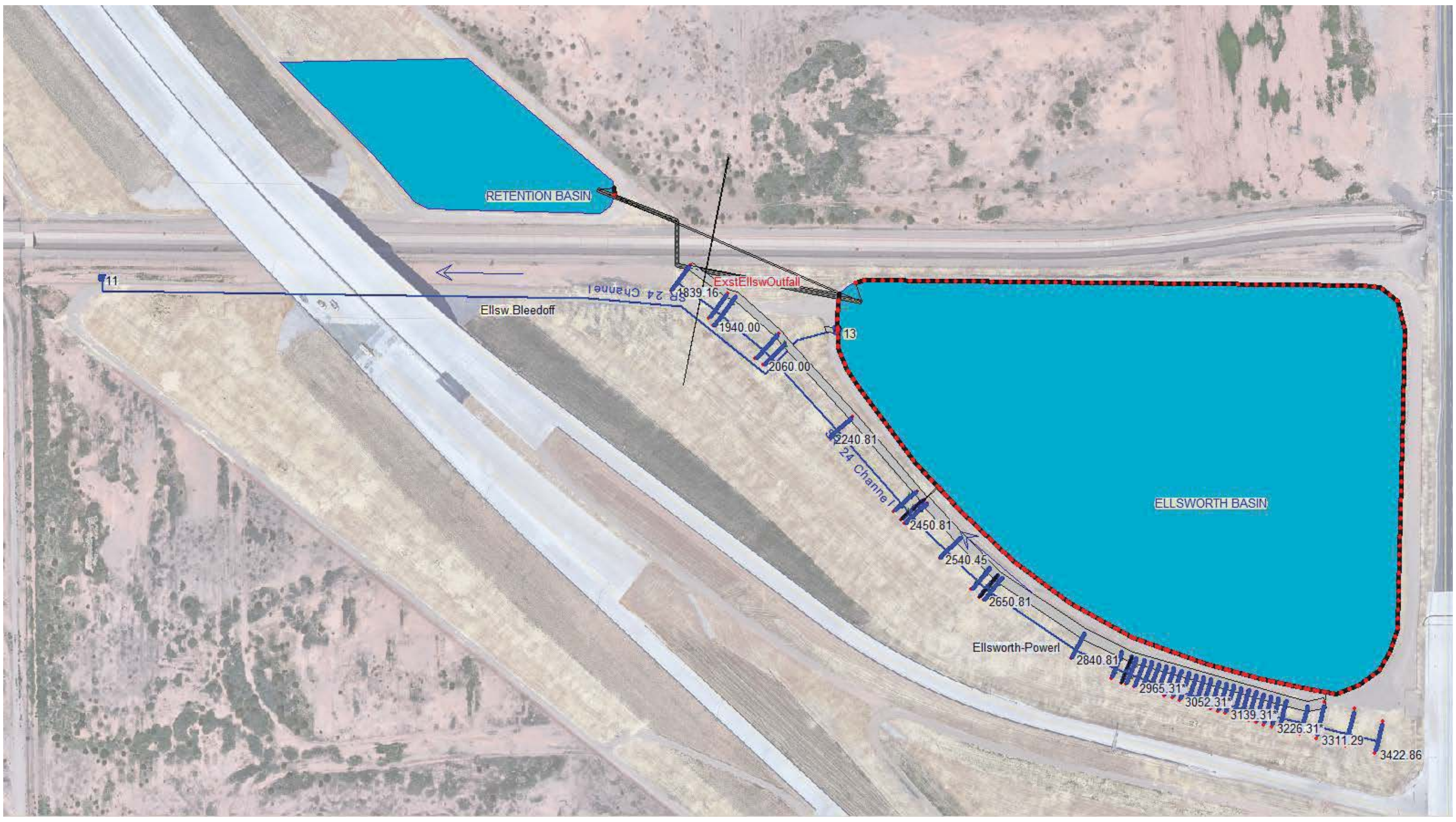


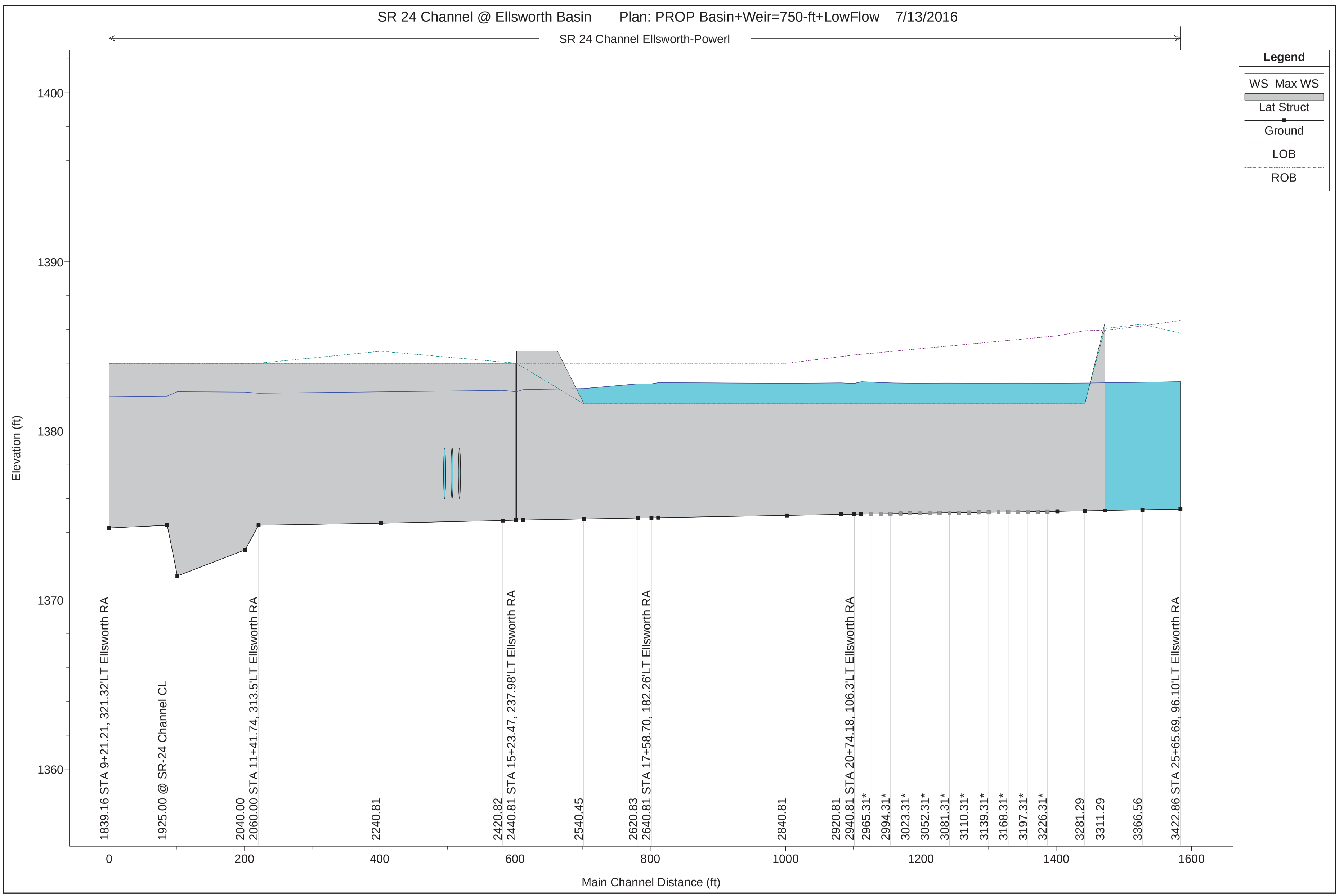
```
Write Geometry Information
Layer:  Complete

Geometry Processor
River:     SR 24 Channel              RS:          1839.16
Reach:     Ellsworth-Powerl           Node Type:   Cross Section
IB Curve:

Unsteady Flow Simulation
Simulation:
Time:     60.0000    13MAY2016   13:00:00     Iteration (1D):   0          Iteration (2D):
 Writing Profiles 2900

Post Process
River:     SR 24 Channel              RS:          13
Reach:     Ellsw.Bleedoff             Node Type:   Cross Section
Profile:   13MAY2016 1300

Simulation:  722/722
```

Computation Messages

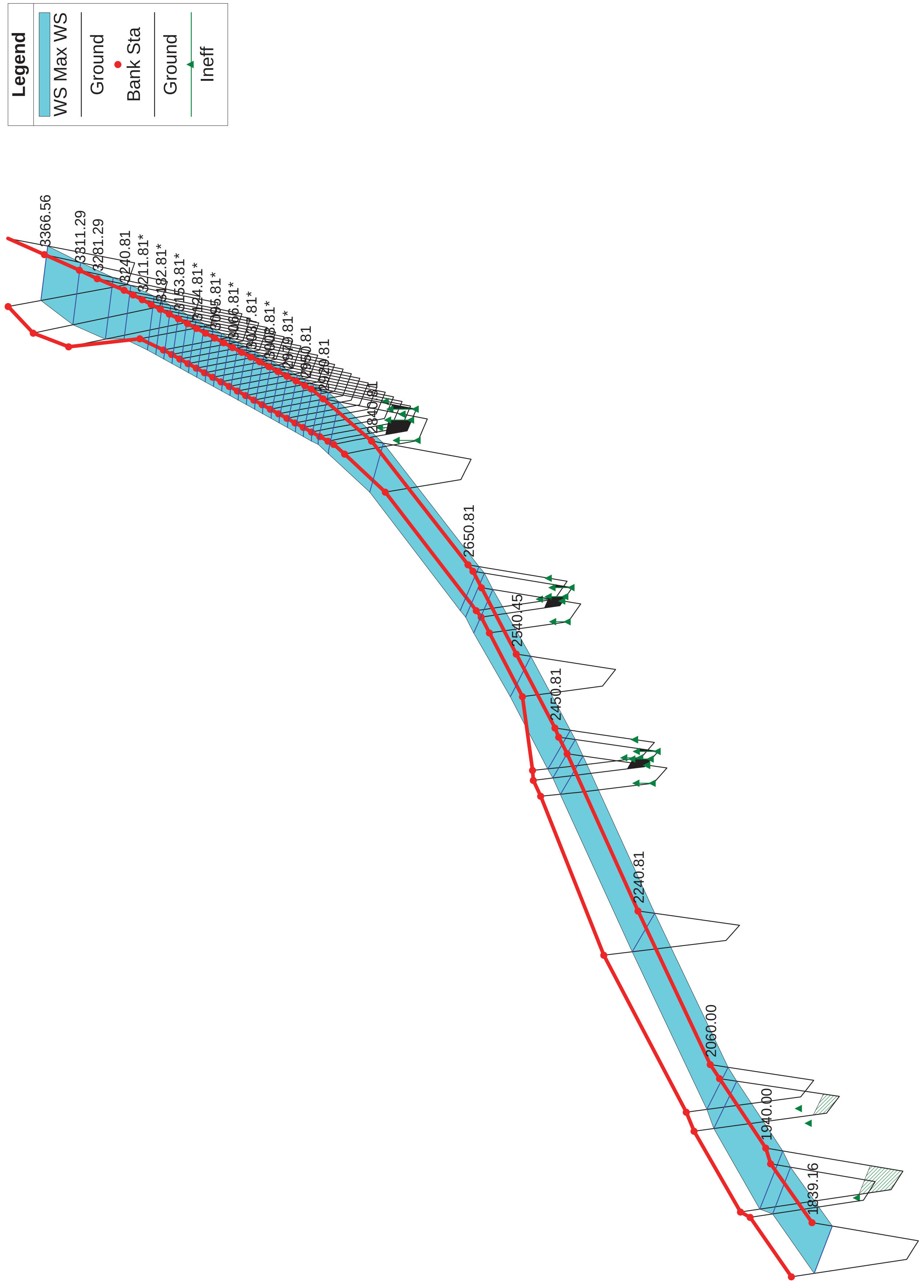
```
11MAY2016 01:01:14  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.056
11MAY2016 01:01:15  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.056
11MAY2016 01:01:16  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.055
11MAY2016 01:01:17  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.055
11MAY2016 01:01:18  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.055
11MAY2016 01:01:19  SR 24 Channel    Ellsw.Bleedoff   13              1372.07    0.055



The maximum xsec wsel error was    0.168
SR 24 Channel  Ellsw.Bleedoff  13  at  11MAY2016 01:00:01

Finished Unsteady Flow Simulation

Writing Results to DSS
Finished Writing Results to DSS

Reading Data for Post Process

Running Post Processor  HEC-RAS 5.0.1 April 2016

Finished Post Processing


Computations Summary

Computation Task                       Time(hh:mm:ss)
Completing Geometry                                <1
Preprocessing Geometry(64)                         <1
Unsteady Flow Computations(64)                     45
Writing to DSS(64)                                 <1
Post-Processing(64)                                 8
Complete Process                                   55
```

GEOMETRY LAYOUT: PROP Basin+Weir=750-ft+LowFlow





1 in Horiz. = 125 ft 1 in Vert. = 5 ft



SR 24 Channel @ Ellsworth Basin   Plan: PROP Basin+Weir=750-ft+LowFlow   7/25/2016

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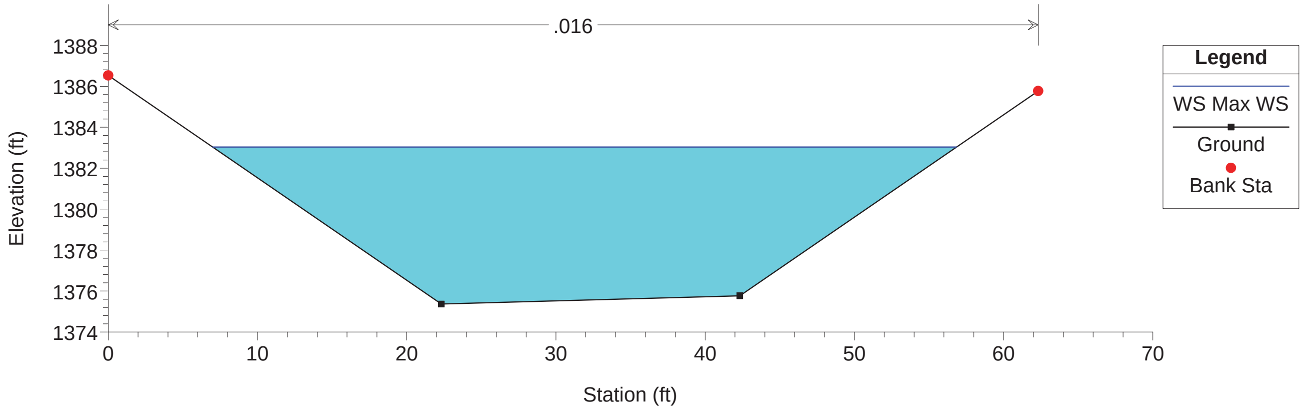
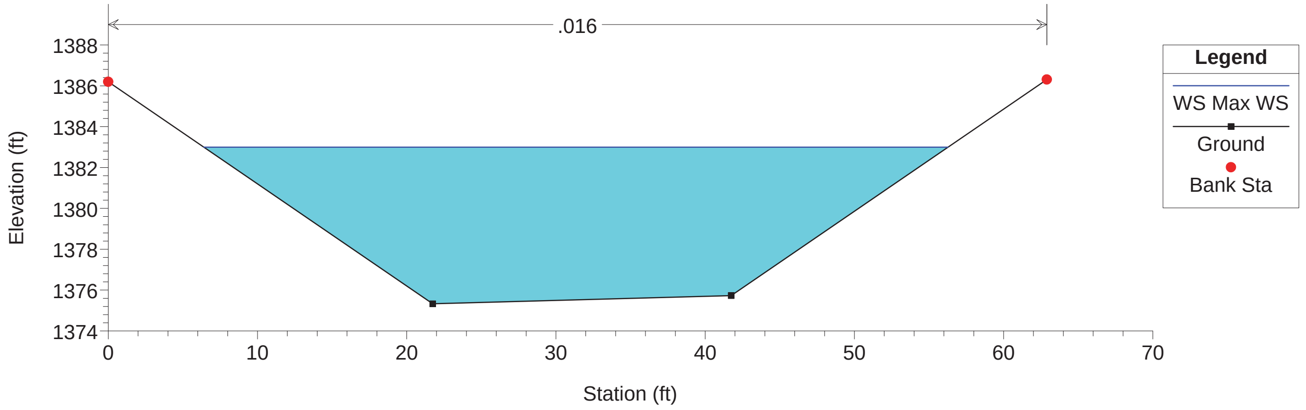
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Fr# Chl
Ellsworth-Powerl	3423	Max WS	1665.50	1375.37	1382.91		1383.57	0.000611	6.55	254.43	49.34	0.51
Ellsworth-Powerl	3367	Max WS	1659.00	1375.33	1382.88		1383.53	0.000603	6.51	254.88	49.38	0.51
Ellsworth-Powerl	3311	Max WS	1651.19	1375.29	1382.84		1383.49	0.000594	6.47	255.32	49.42	0.50
Ellsworth-Powerl	3311		Lat Struct									
Ellsworth-Powerl	3281	Max WS	1636.86	1375.27	1382.83		1383.47	0.000572	6.45	253.92	46.97	0.49
Ellsworth-Powerl	3241	Max WS	1622.50	1375.24	1382.83		1383.45	0.000554	6.35	255.35	47.09	0.48
Ellsworth-Powerl	3226.31*	Max WS	1620.16	1375.23	1382.82		1383.45	0.000550	6.34	255.68	47.11	0.48
Ellsworth-Powerl	3211.81*	Max WS	1615.91	1375.22	1382.83		1383.44	0.000544	6.30	256.32	47.16	0.48
Ellsworth-Powerl	3197.31*	Max WS	1608.87	1375.22	1382.82		1383.44	0.000539	6.28	256.39	47.18	0.47
Ellsworth-Powerl	3182.81*	Max WS	1602.68	1375.21	1382.82		1383.43	0.000532	6.24	256.84	47.21	0.47
Ellsworth-Powerl	3168.31*	Max WS	1596.74	1375.20	1382.82		1383.42	0.000526	6.21	257.26	47.25	0.47
Ellsworth-Powerl	3153.81*	Max WS	1586.92	1375.19	1382.82		1383.41	0.000516	6.15	257.83	47.29	0.46
Ellsworth-Powerl	3139.31*	Max WS	1585.49	1375.18	1382.83		1383.41	0.000513	6.14	258.28	47.31	0.46
Ellsworth-Powerl	3124.81*	Max WS	1577.41	1375.18	1382.82		1383.40	0.000507	6.10	258.42	47.35	0.46
Ellsworth-Powerl	3110.31*	Max WS	1574.11	1375.17	1382.82		1383.40	0.000502	6.08	258.85	47.38	0.46
Ellsworth-Powerl	3095.81*	Max WS	1570.51	1375.16	1382.82		1383.39	0.000497	6.05	259.39	47.43	0.46
Ellsworth-Powerl	3081.31*	Max WS	1562.19	1375.15	1382.82		1383.39	0.000490	6.01	259.77	47.45	0.45
Ellsworth-Powerl	3066.81*	Max WS	1562.99	1375.14	1382.83		1383.39	0.000488	6.01	260.28	47.47	0.45
Ellsworth-Powerl	3052.31*	Max WS	1556.77	1375.14	1382.82		1383.38	0.000484	5.98	260.37	47.51	0.45
Ellsworth-Powerl	3037.81*	Max WS	1555.86	1375.13	1382.82		1383.38	0.000480	5.96	260.97	47.54	0.45
Ellsworth-Powerl	3023.31*	Max WS	1544.96	1375.12	1382.83		1383.37	0.000471	5.91	261.41	47.58	0.44
Ellsworth-Powerl	3008.81*	Max WS	1542.83	1375.11	1382.82		1383.36	0.000468	5.89	261.73	47.61	0.44
Ellsworth-Powerl	2994.31*	Max WS	1534.51	1375.10	1382.83		1383.36	0.000458	5.84	262.67	47.66	0.44
Ellsworth-Powerl	2979.81*	Max WS	1517.50	1375.10	1382.85		1383.37	0.000442	5.75	263.91	47.73	0.43
Ellsworth-Powerl	2965.31*	Max WS	1497.19	1375.09	1382.88		1383.38	0.000422	5.63	265.82	47.84	0.42
Ellsworth-Powerl	2951	Max WS	1463.10	1375.08	1382.90		1383.38	0.000413	5.54	263.96	47.89	0.42
Ellsworth-Powerl	2941	Max WS	1423.13	1375.07	1382.81		1383.37	0.000609	6.02	236.26	47.73	0.48
Ellsworth-Powerl	2921	Max WS	1451.39	1375.06	1382.84		1383.30	0.000400	5.48	265.00	47.84	0.41
Ellsworth-Powerl	2841	Max WS	1389.33	1375.00	1382.81		1383.23	0.000360	5.21	266.78	48.03	0.39
Ellsworth-Powerl	2651	Max WS	1322.27	1374.87	1382.85		1383.21	0.000305	4.83	273.62	48.62	0.36
Ellsworth-Powerl	2641	Max WS	1337.98	1374.86	1382.78		1383.21	0.000420	5.26	254.46	48.51	0.40

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Fr# Chl
Ellsworth-Powerl	2621	Max WS	1379.98	1374.85	1382.78		1383.18	0.000334	5.05	273.03	48.59	0.38
Ellsworth-Powerl	2540	Max WS	1589.05	1374.79	1382.50		1383.07	0.000498	6.06	262.27	48.26	0.46
Ellsworth-Powerl	2451	Max WS	1602.69	1374.73	1382.43		1383.02	0.000530	6.14	260.93	50.03	0.47
Ellsworth-Powerl	2441	Max WS	1602.69	1374.72	1382.31		1383.02	0.000765	6.75	237.28	49.56	0.54
Ellsworth-Powerl	2440		Lat Struct									
Ellsworth-Powerl	2421	Max WS	1602.68	1374.70	1382.39		1382.98	0.000520	6.11	262.20	49.96	0.47
Ellsworth-Powerl	2241	Max WS	1602.59	1374.54	1382.31		1382.88	0.000502	6.03	265.59	50.16	0.46
Ellsworth-Powerl	2060	Max WS	1602.55	1374.42	1382.22		1382.78	0.000494	6.00	267.10	50.25	0.46
Ellsworth-Powerl	2040	Max WS	1602.64	1372.96	1382.29		1382.69	0.000324	5.06	316.51	55.56	0.37
Ellsworth-Powerl	1940	Max WS	1602.60	1371.42	1382.32		1382.61	0.000224	4.32	371.05	62.78	0.31
Ellsworth-Powerl	1925	Max WS	1602.59	1374.42	1382.06		1382.65	0.000536	6.18	259.40	49.74	0.48
Ellsworth-Powerl	1839	Max WS	1602.55	1374.26	1382.03	1379.38	1382.59	0.000501	6.03	265.84	50.26	0.46

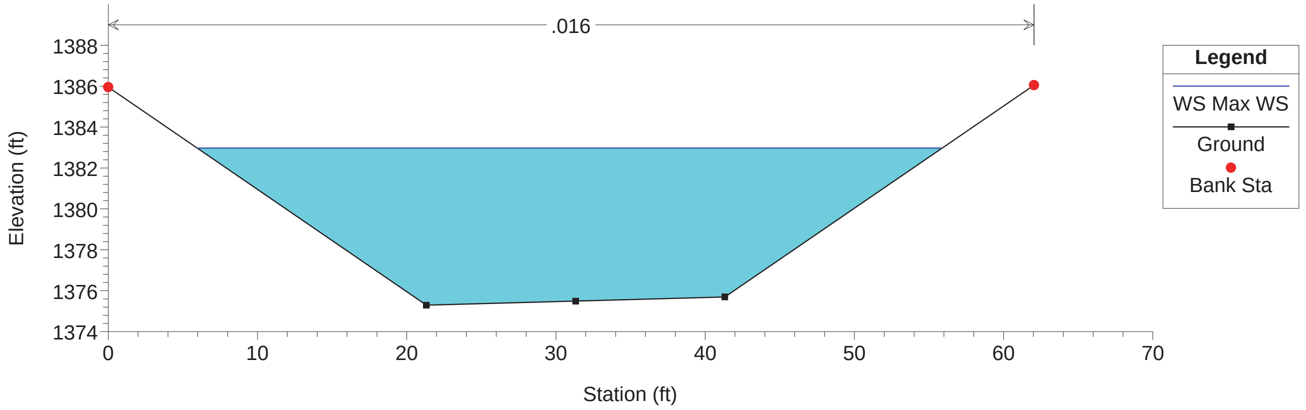
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3422.86 STA 25+65.69, 96.10'LT Ellsworth RA



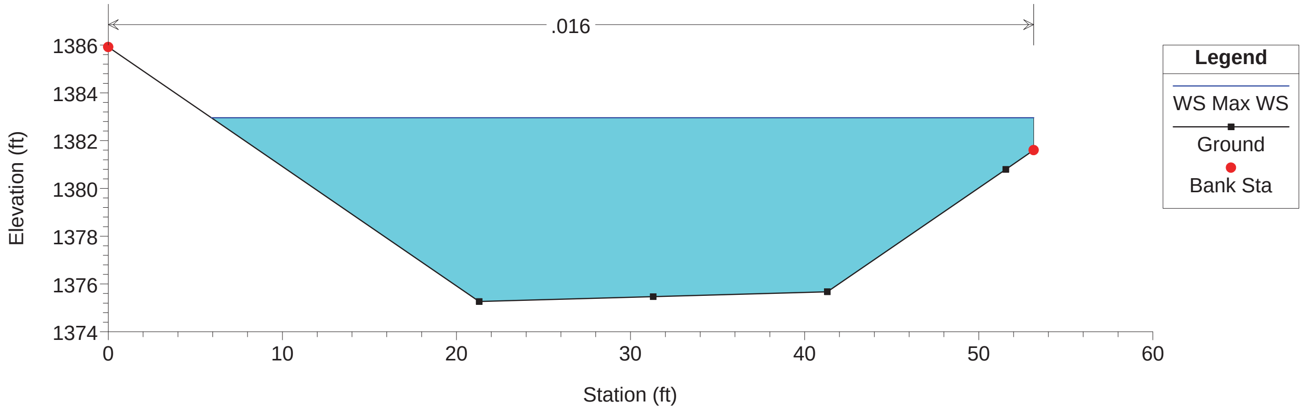
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3366.56



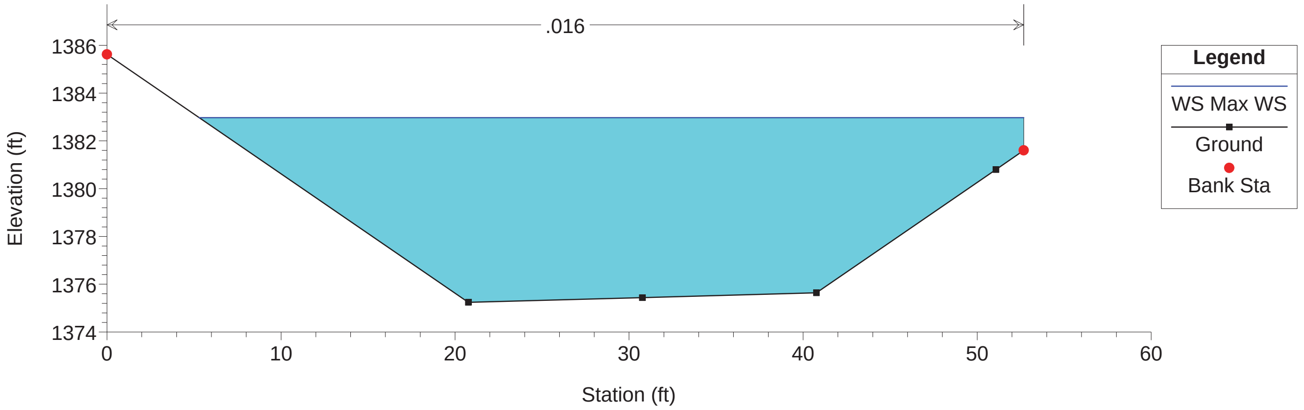
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3311.29



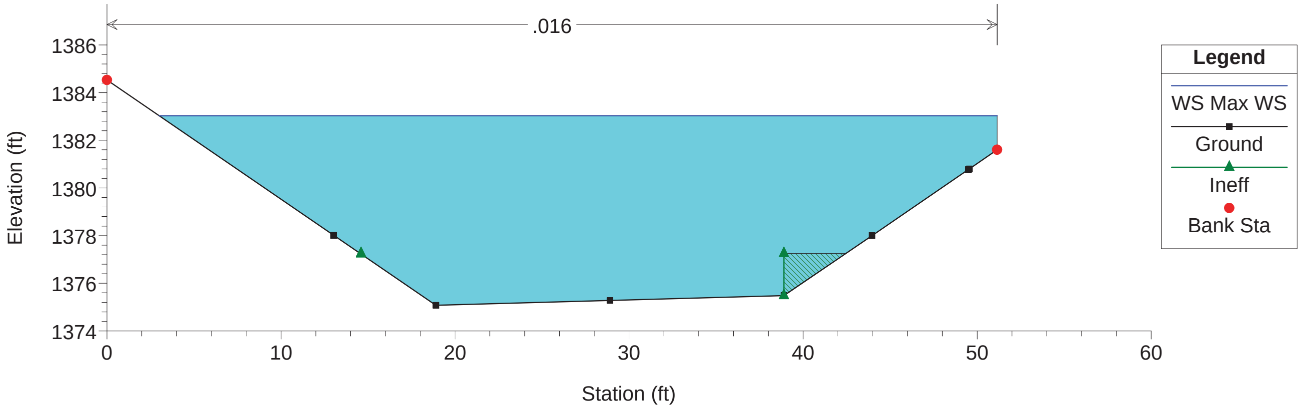
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3281.29



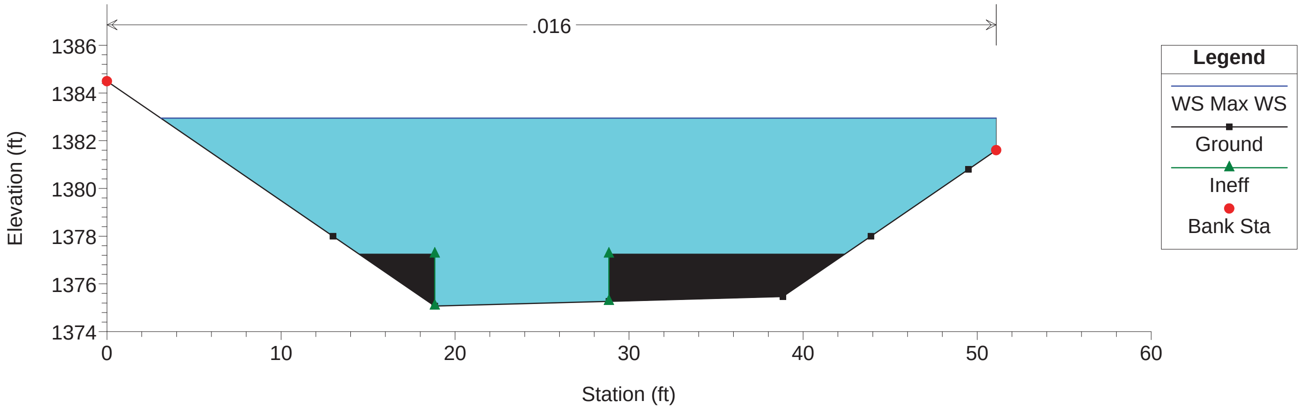
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 3240.81



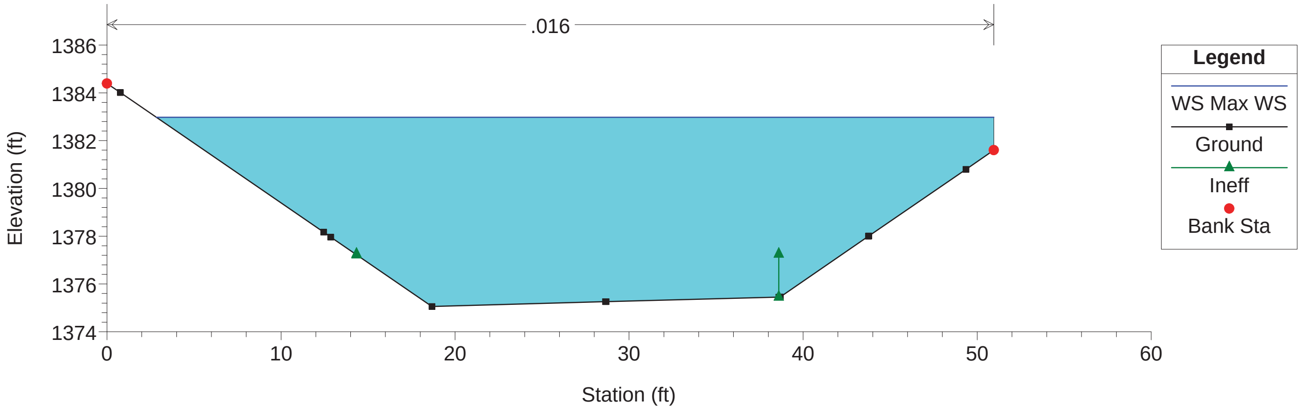
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2950.81

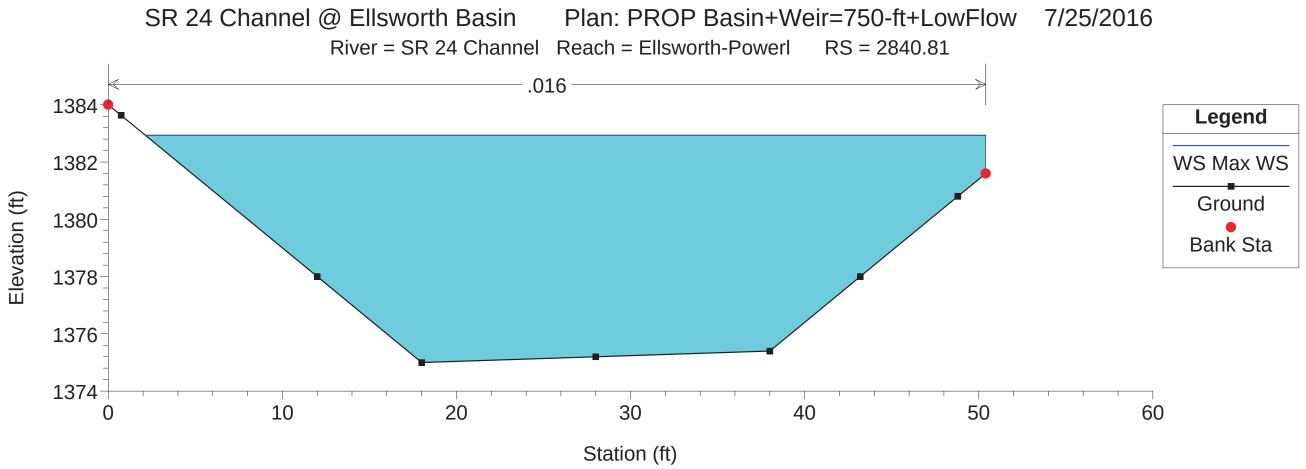


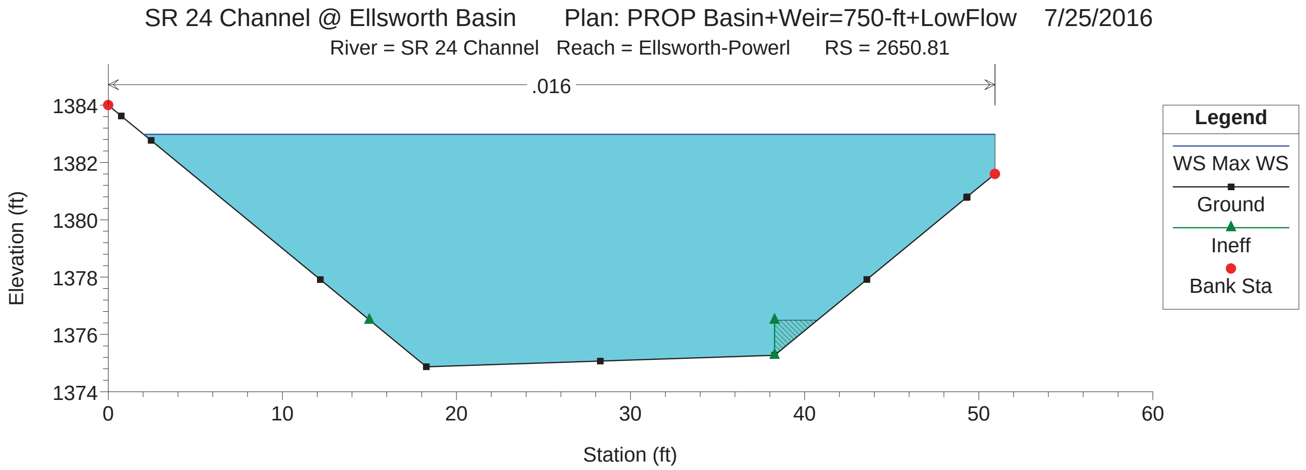
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2940.81 STA 20+74.18, 106.3'LT Ellsworth RA

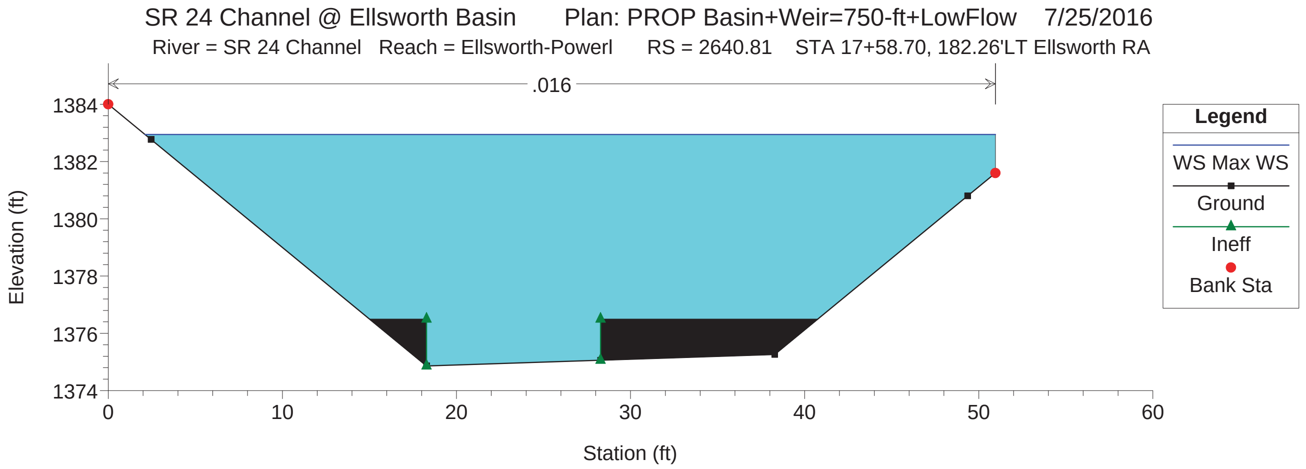


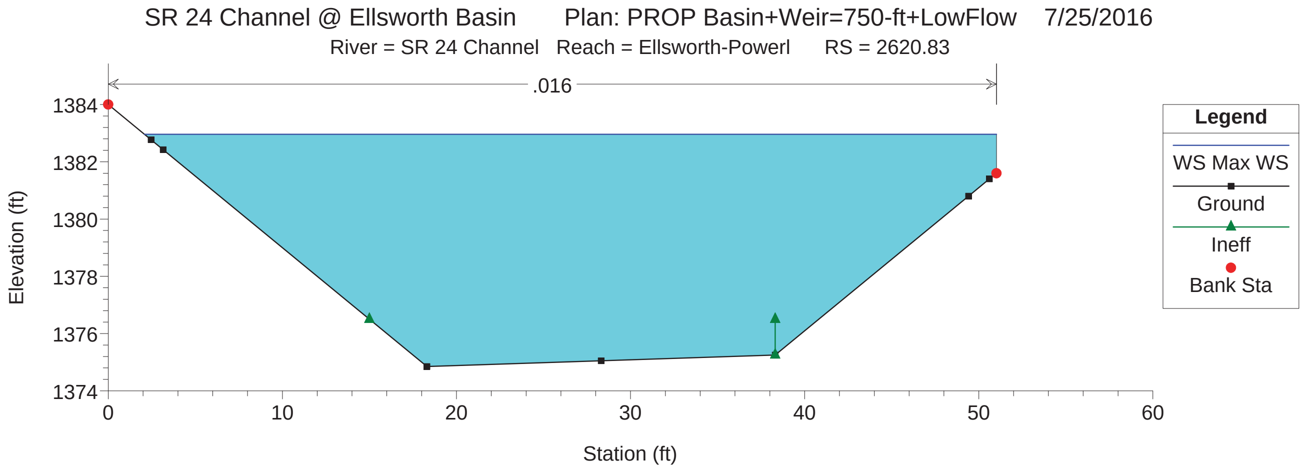
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2920.81

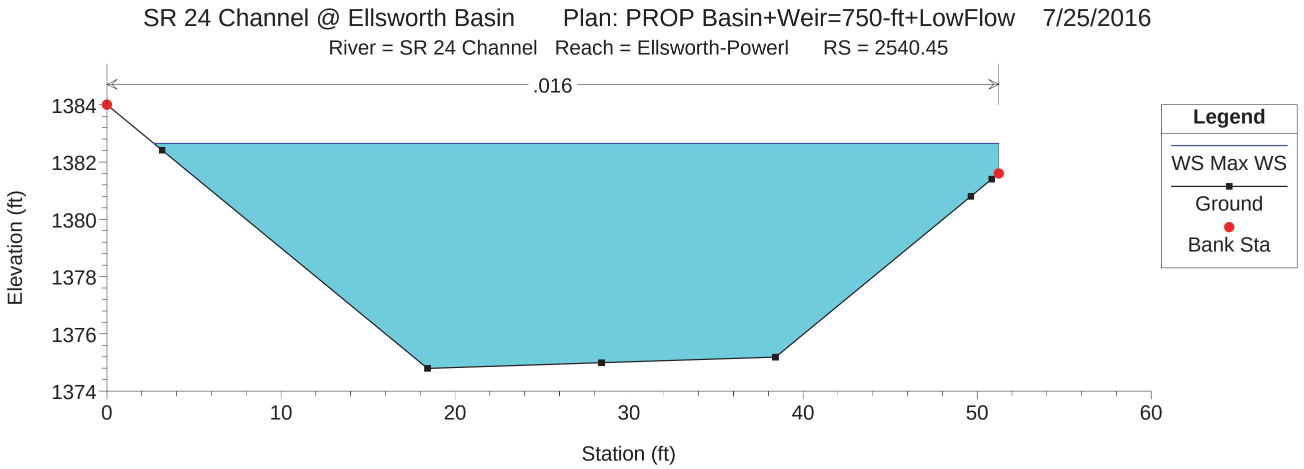


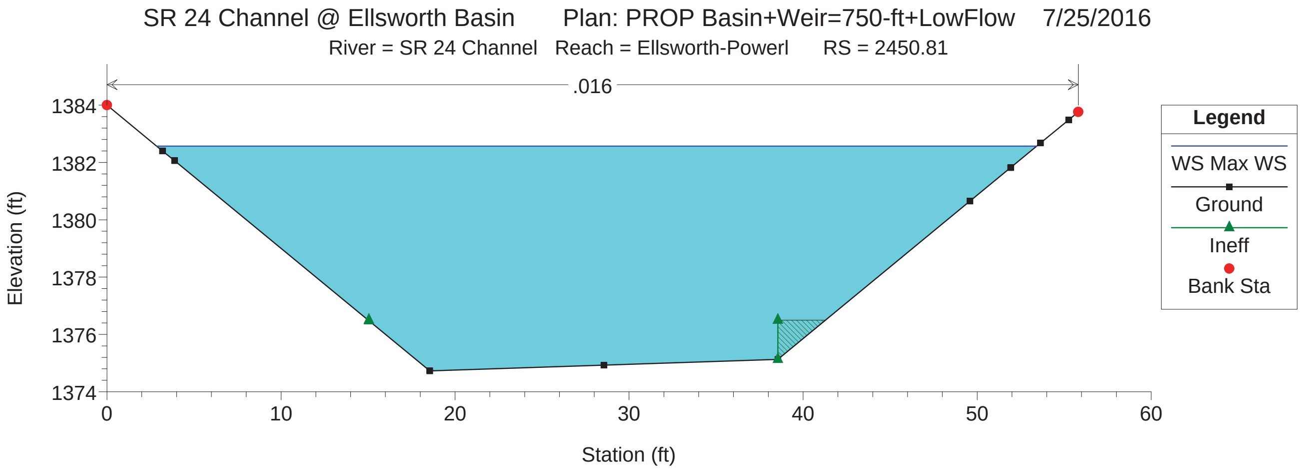

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2840.81
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Bank Sta

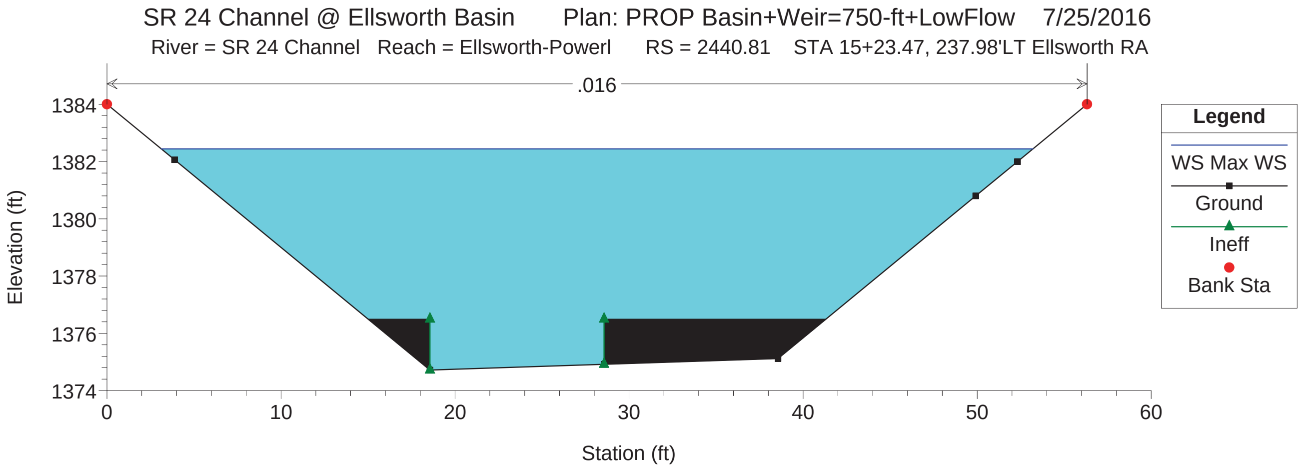

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2650.81
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

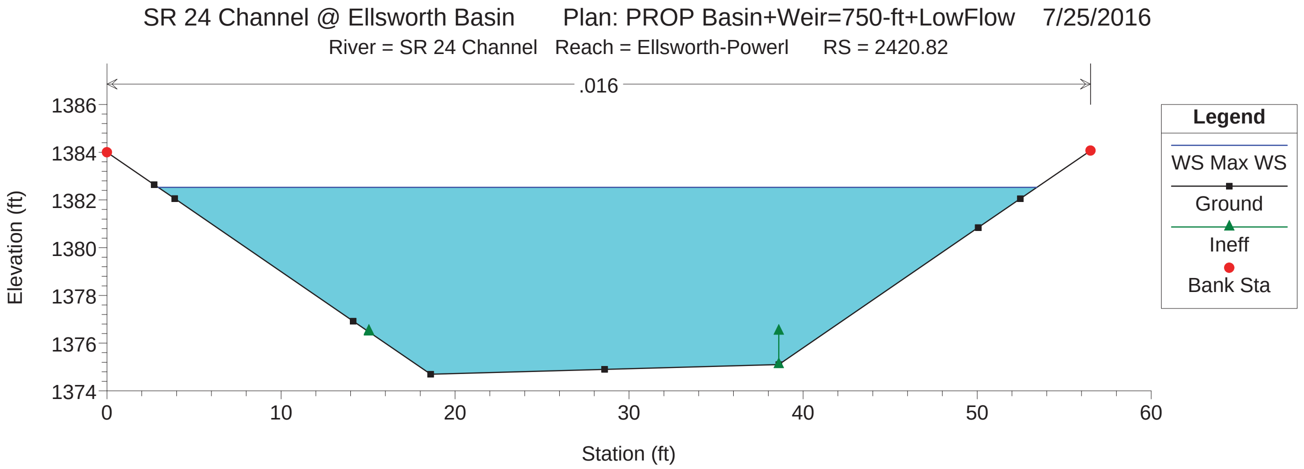

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2640.81 STA 17+58.70, 182.26'LT Ellsworth RA
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

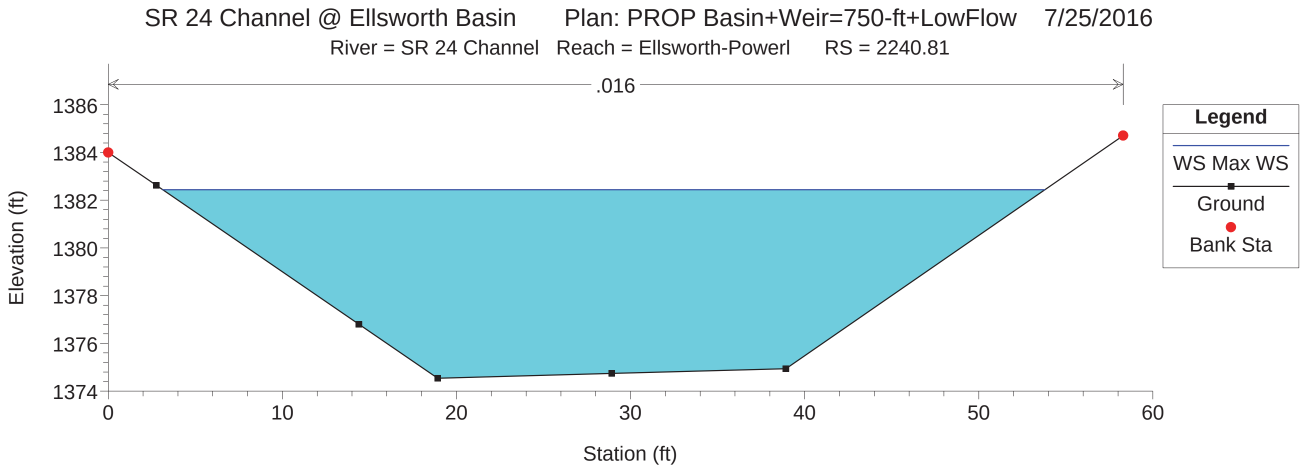

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2620.83
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

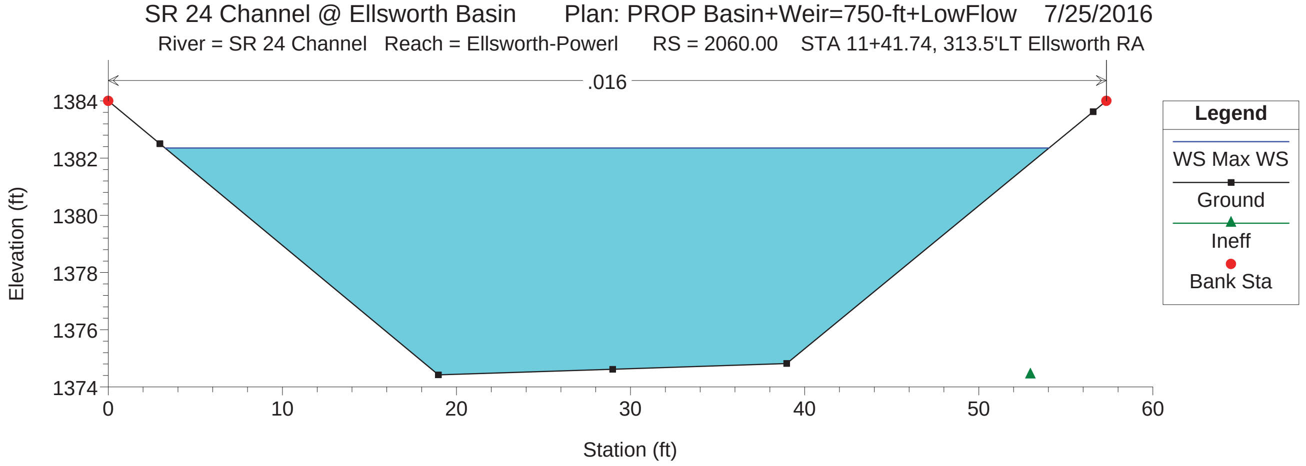

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2540.45
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Bank Sta

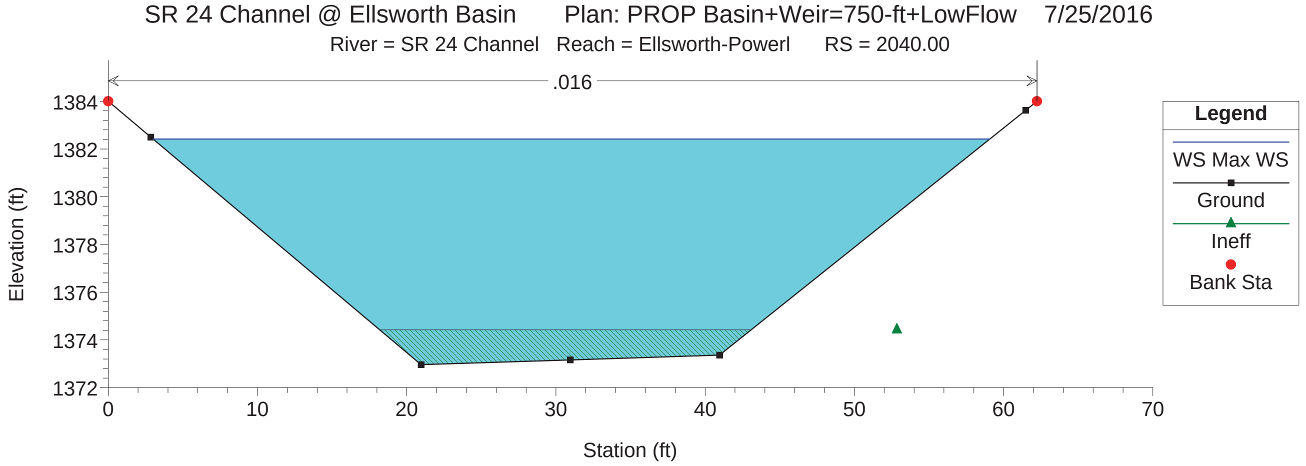

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2450.81
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

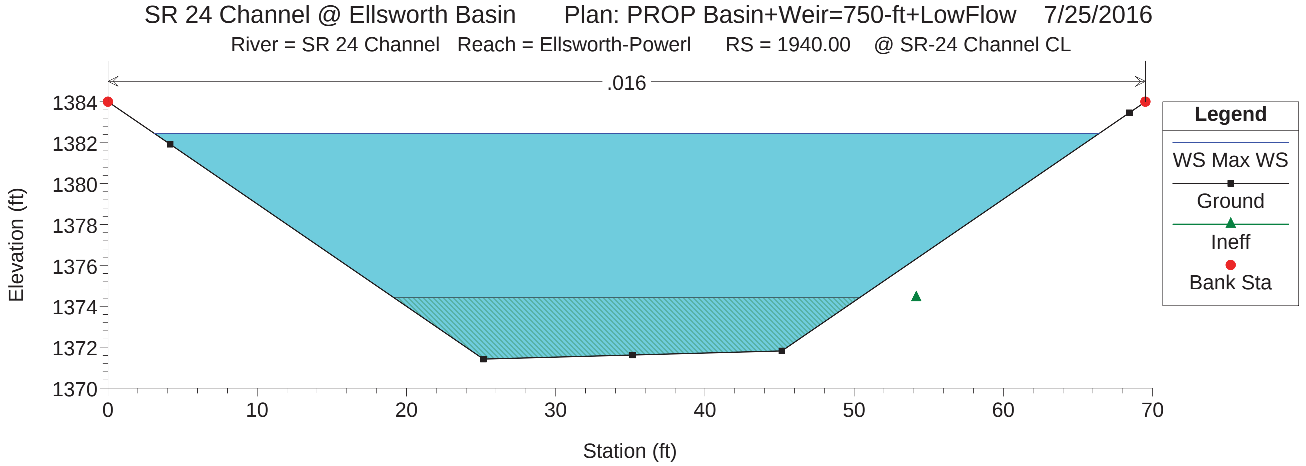

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2440.81 STA 15+23.47, 237.98'LT Ellsworth RA
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

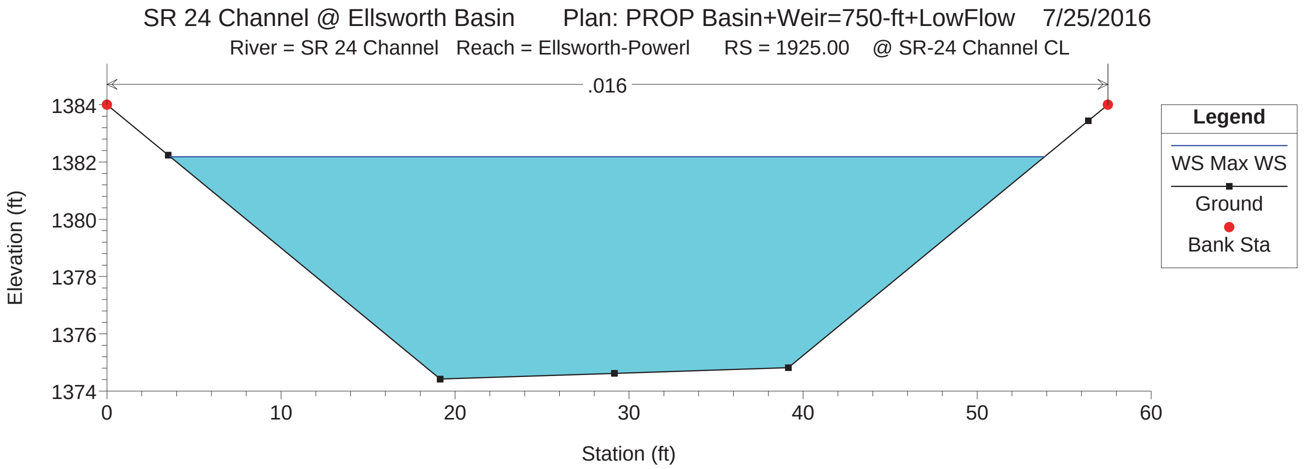

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2420.82
.016
Elevation (ft)
1374
1376
1378
1380
1382
1384
1386
Station (ft)
0
10
20
30
40
50
60
Legend
WS Max WS
Ground
Ineff
Bank Sta

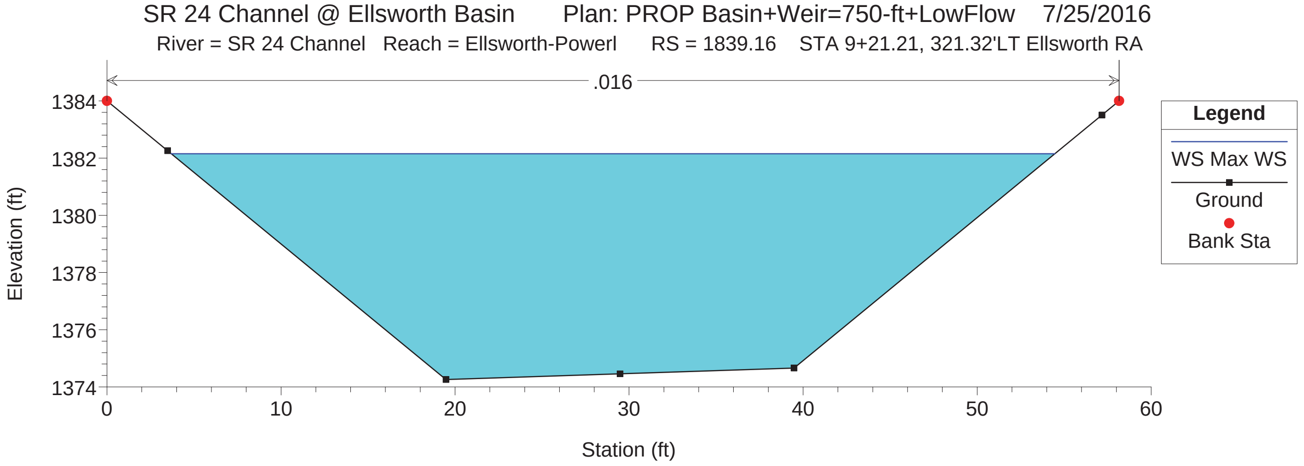

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2240.81
.016
Elevation (ft)
1386
1384
1382
1380
1378
1376
1374
0
10
20
30
40
50
60
Station (ft)
Legend
WS Max WS
Ground
Bank Sta

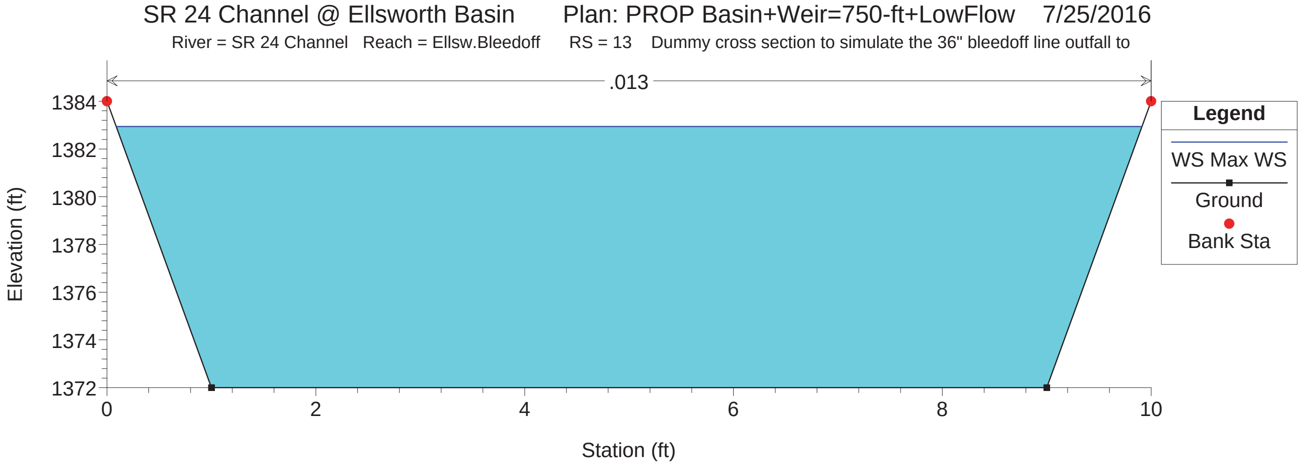

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2060.00 STA 11+41.74, 313.5'LT Ellsworth RA
.016
Elevation (ft)
1384
1382
1380
1378
1376
1374
0
10
20
30
40
50
60
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

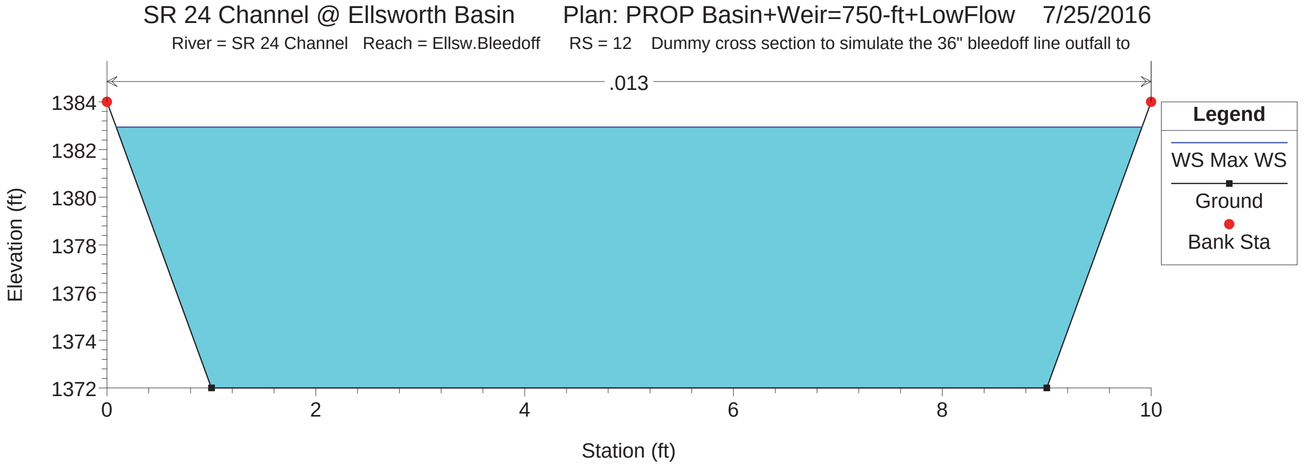

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 2040.00
.016
Elevation (ft)
1384
1382
1380
1378
1376
1374
1372
0
10
20
30
40
50
60
70
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta


SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1940.00 @ SR-24 Channel CL
.016
Elevation (ft)
1384
1382
1380
1378
1376
1374
1372
1370
0
10
20
30
40
50
60
70
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

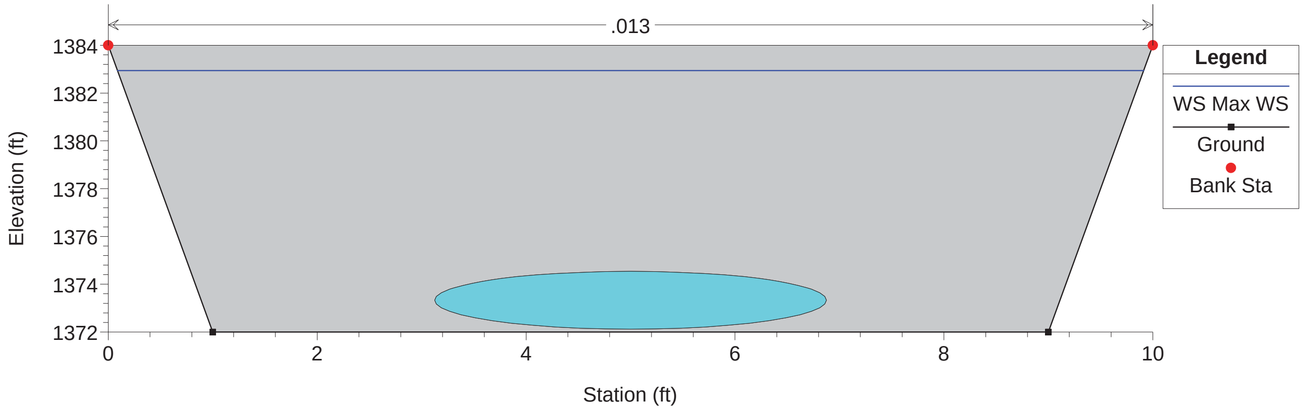

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1925.00 @ SR-24 Channel CL
.016
Elevation (ft)
1384
1382
1380
1378
1376
1374
0
10
20
30
40
50
60
Station (ft)
Legend
WS Max WS
Ground
Bank Sta


SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsworth-Powerl RS = 1839.16 STA 9+21.21, 321.32'LT Ellsworth RA
.016
Elevation (ft)
1384
1382
1380
1378
1376
1374
0
10
20
30
40
50
60
Station (ft)
Legend
WS Max WS
Ground
Bank Sta

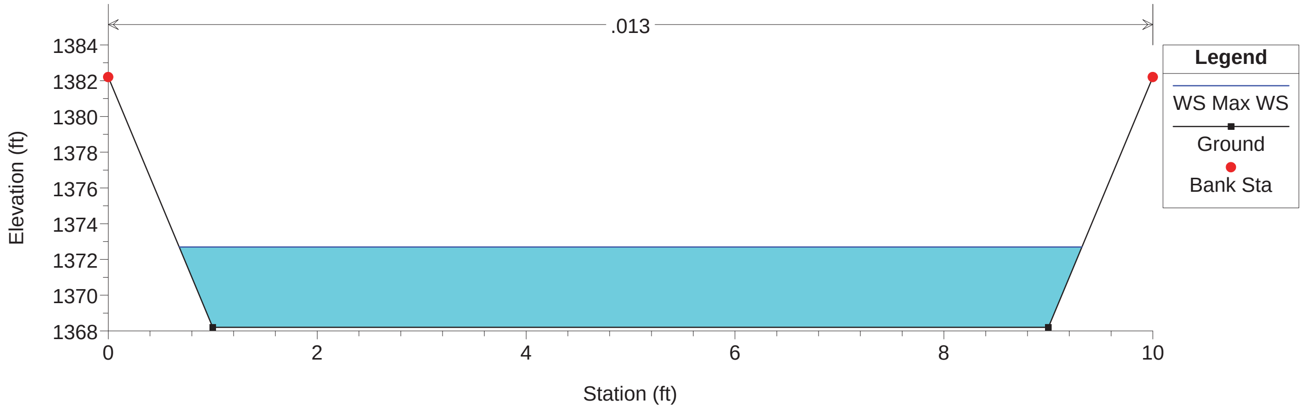

SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 13 Dummy cross section to simulate the 36" bleedoff line outfall to
.013
Elevation (ft)
1384
1382
1380
1378
1376
1374
1372
0
2
4
6
8
10
Station (ft)
Legend
WS Max WS
Ground
Bank Sta


SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 12 Dummy cross section to simulate the 36" bleedoff line outfall to
.013
Elevation (ft)
1384
1382
1380
1378
1376
1374
1372
0
2
4
6
8
10
Station (ft)
Legend
WS Max WS
Ground
Bank Sta

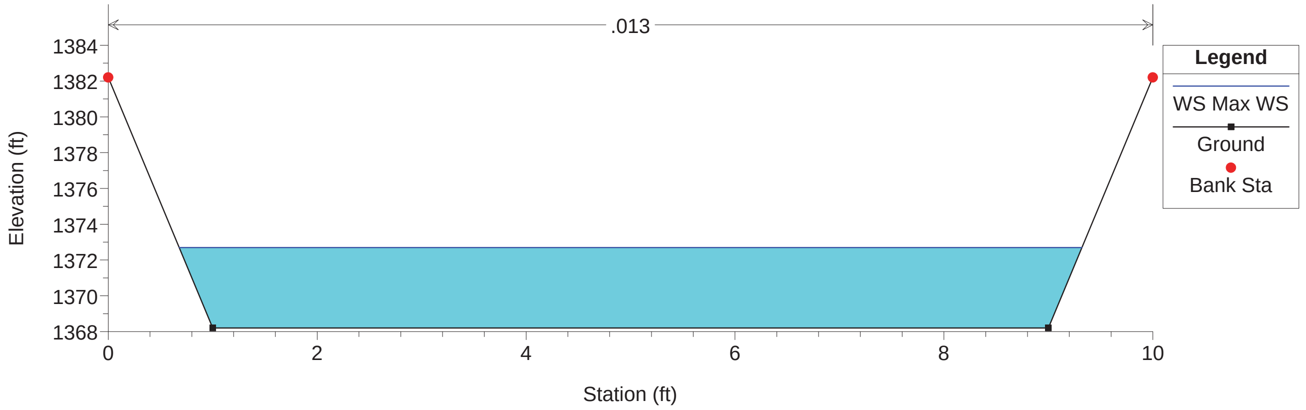
SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 11.999 IS Proposed 36" RCP bleedoff pipe for the Ellsworth Basin that cros



SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 11 Dummy cross section to simulate the 36" bleedoff line outfall to



SR 24 Channel @ Ellsworth Basin Plan: PROP Basin+Weir=750-ft+LowFlow 7/25/2016
River = SR 24 Channel Reach = Ellsw.Bleedoff RS = 10 Dummy cross section to simulate the 36" bleedoff line outfall to



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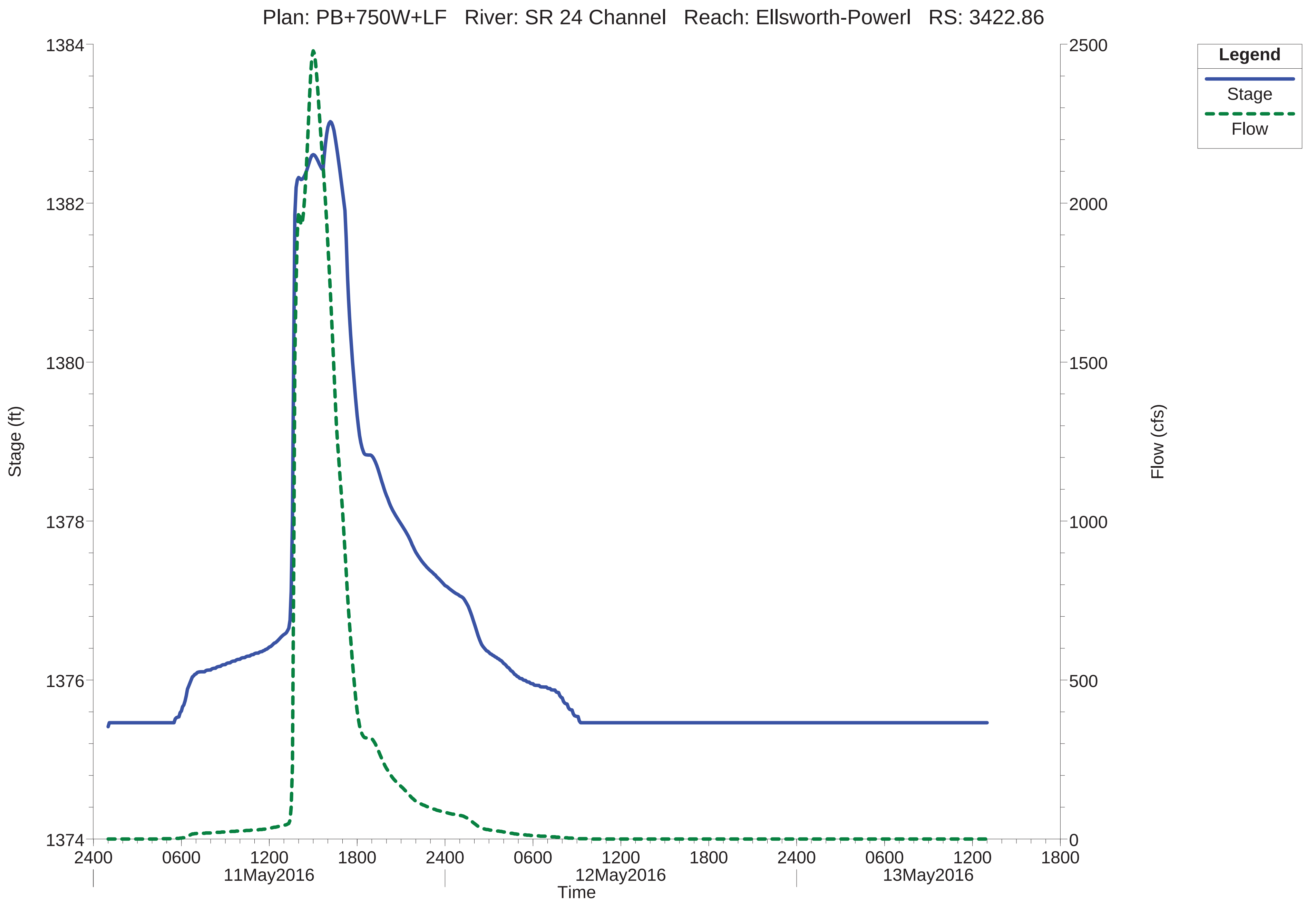
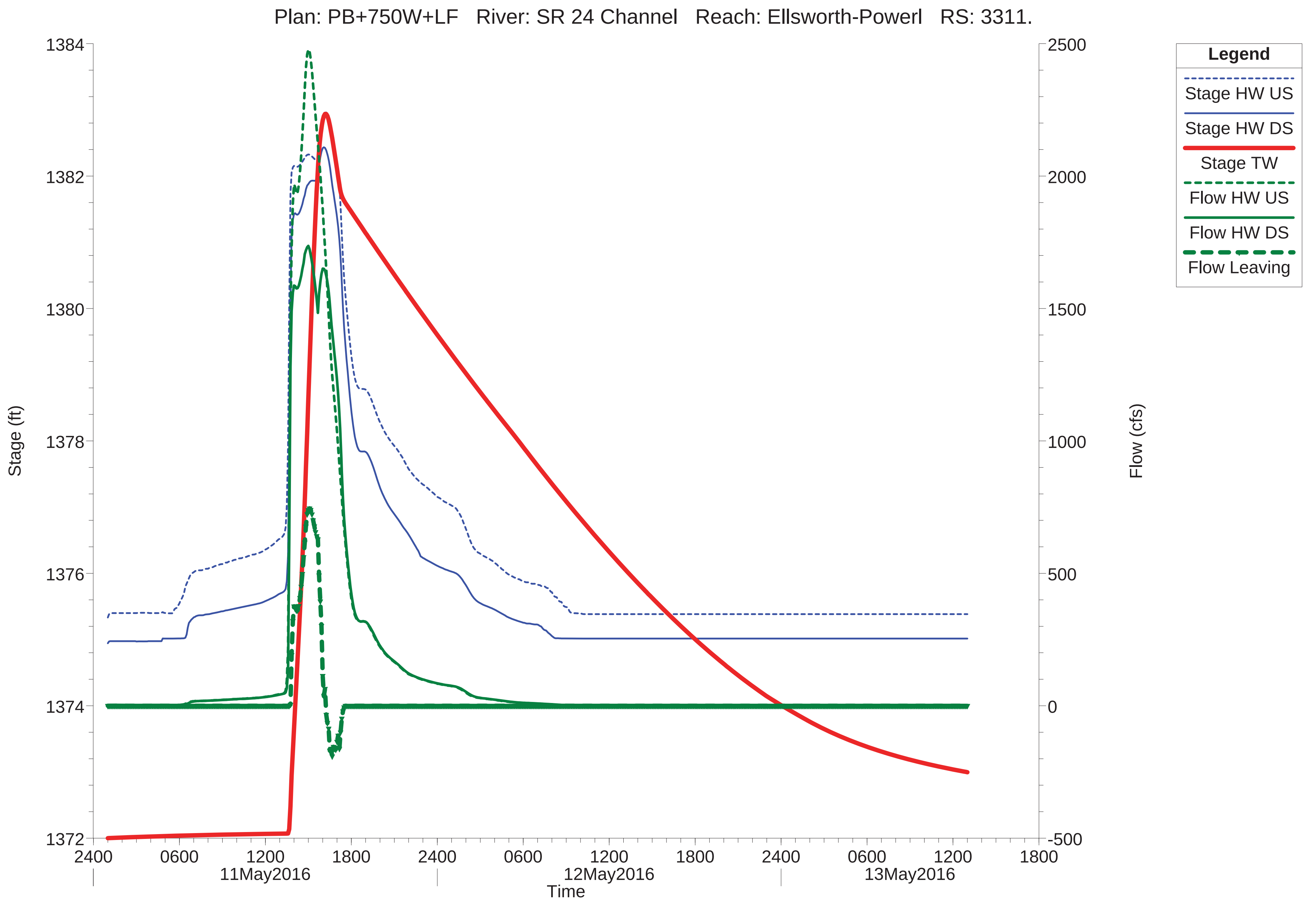
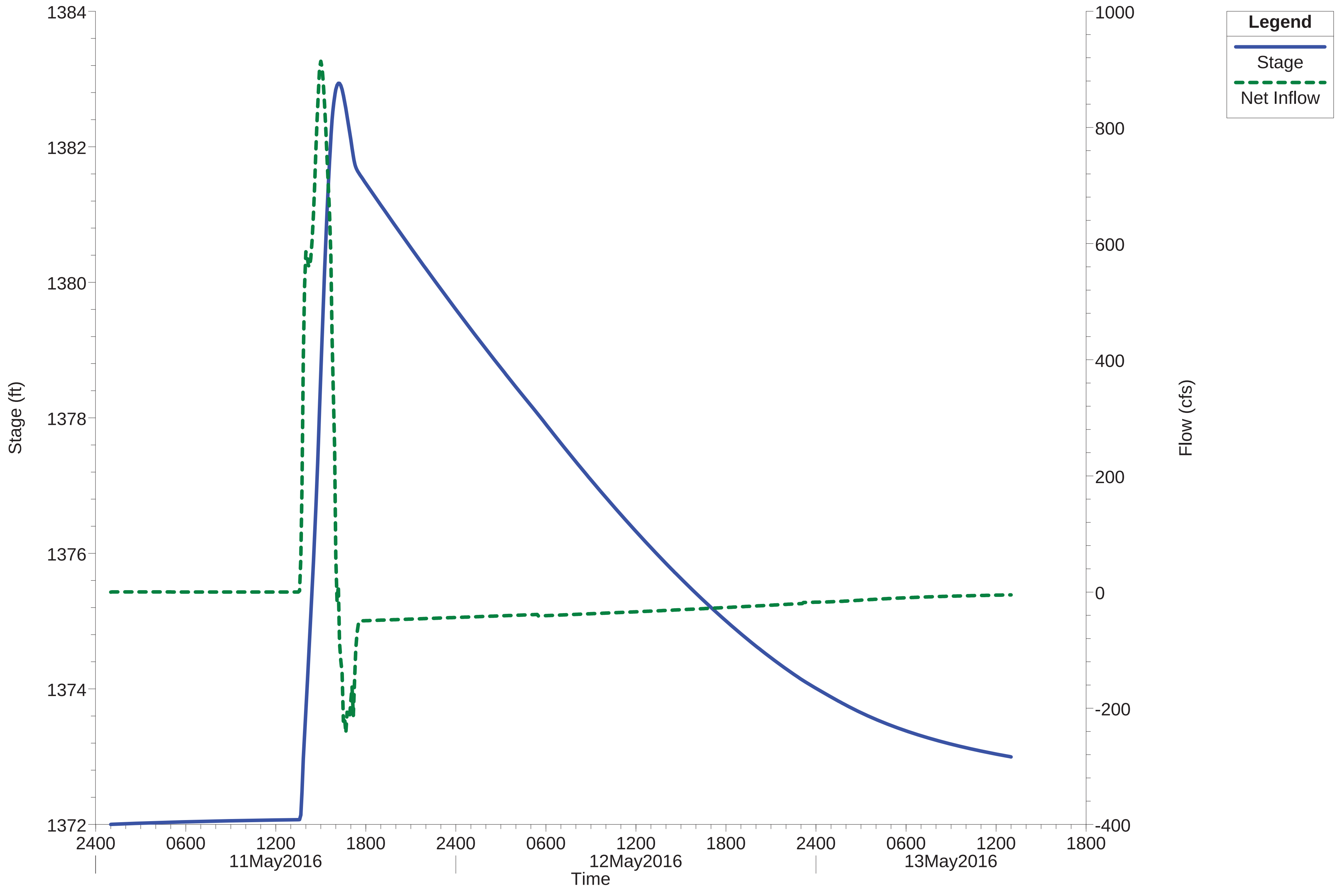
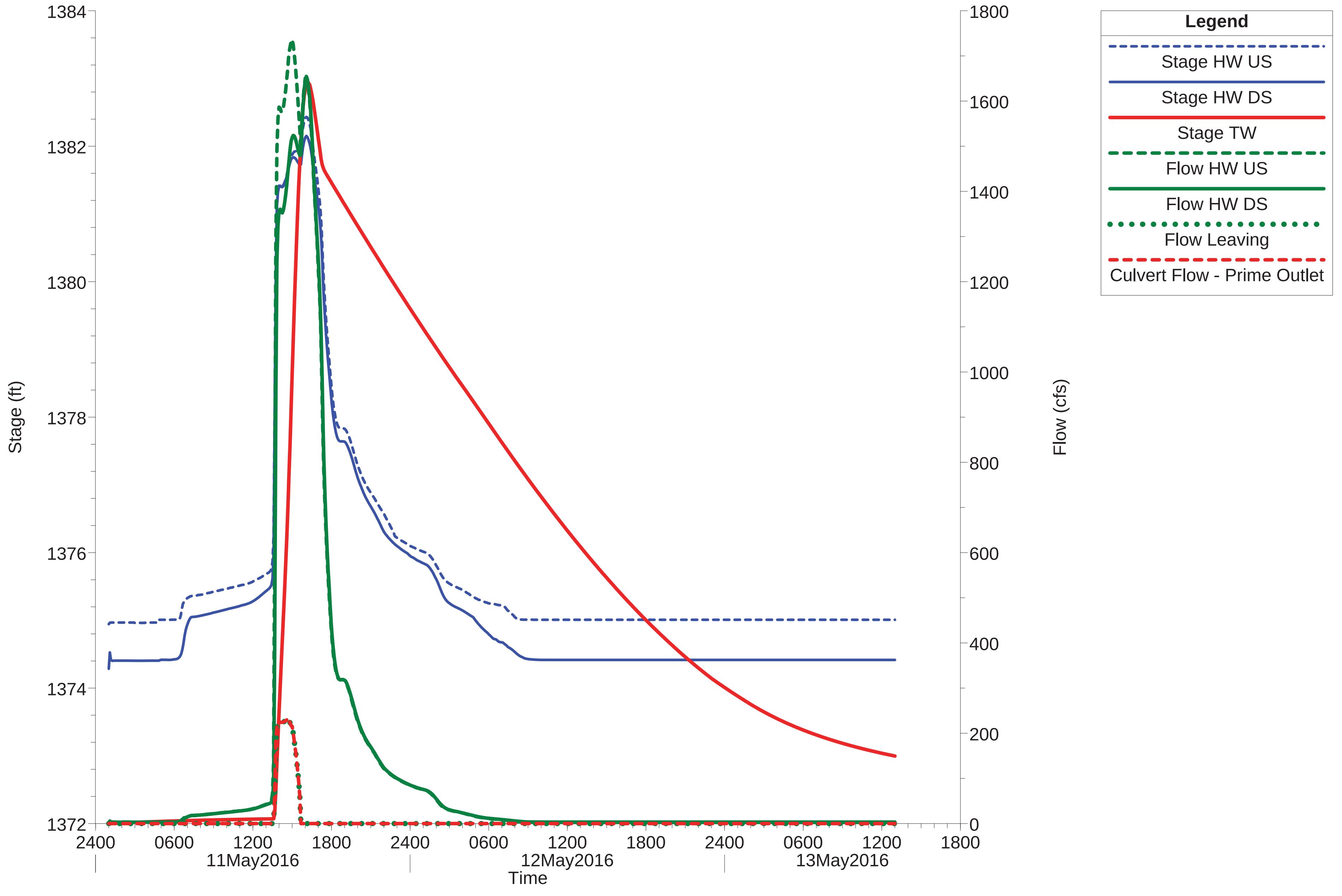

Plan: PB+750W+LF River: SR 24 Channel Reach: Ellsworth-Powerl RS: 3422.86
Stage (ft)
1384
1382
1380
1378
1376
1374
Flow (cfs)
2500
2000
1500
1000
500
0
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage
Flow

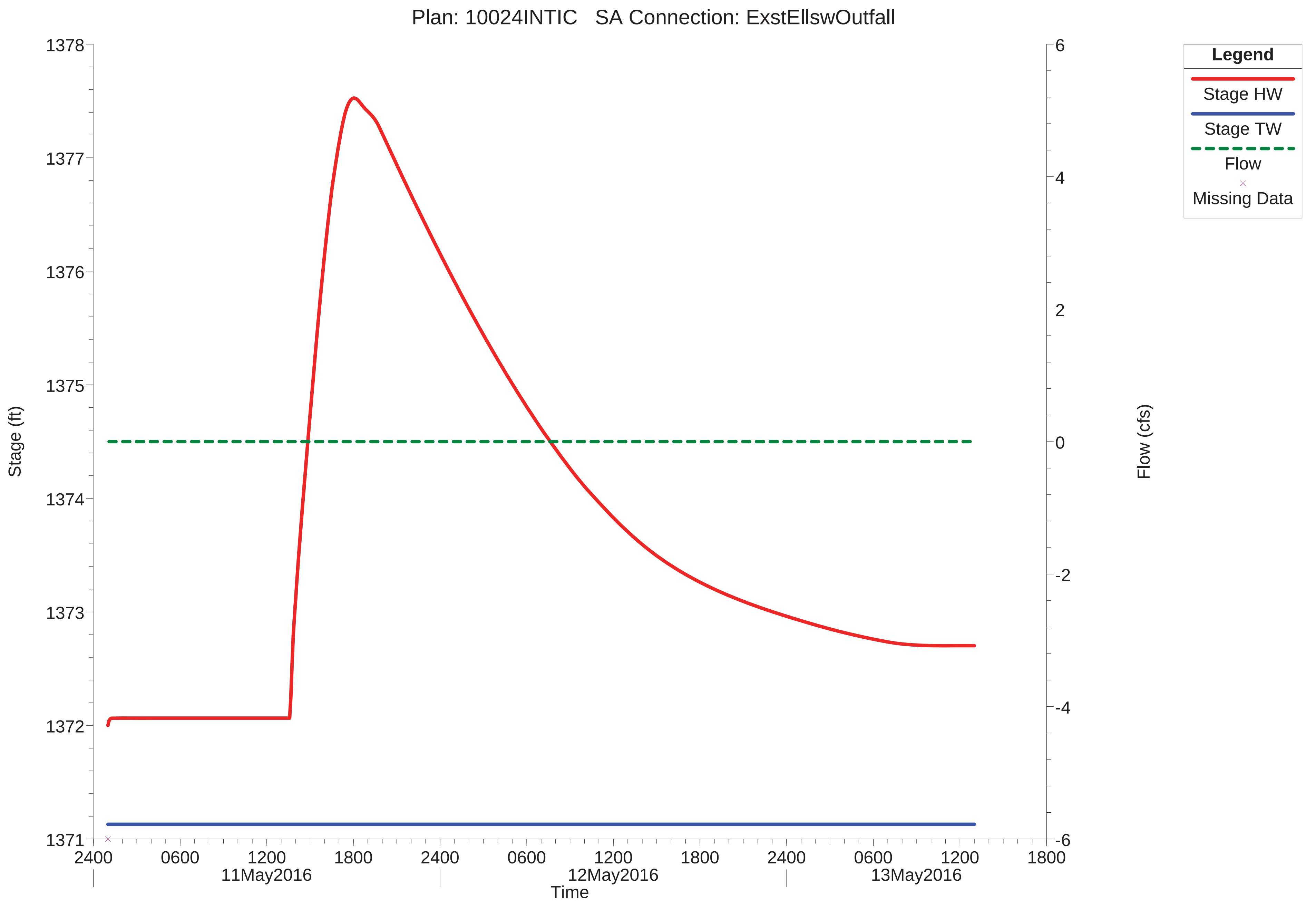

Plan: PB+750W+LF River: SR 24 Channel Reach: Ellsworth-Powerl RS: 3311.
Stage (ft)
1384
1382
1380
1378
1376
1374
1372
Flow (cfs)
2500
2000
1500
1000
500
0
-500
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time
Legend
Stage HW US
Stage HW DS
Stage TW
Flow HW US
Flow HW DS
Flow Leaving

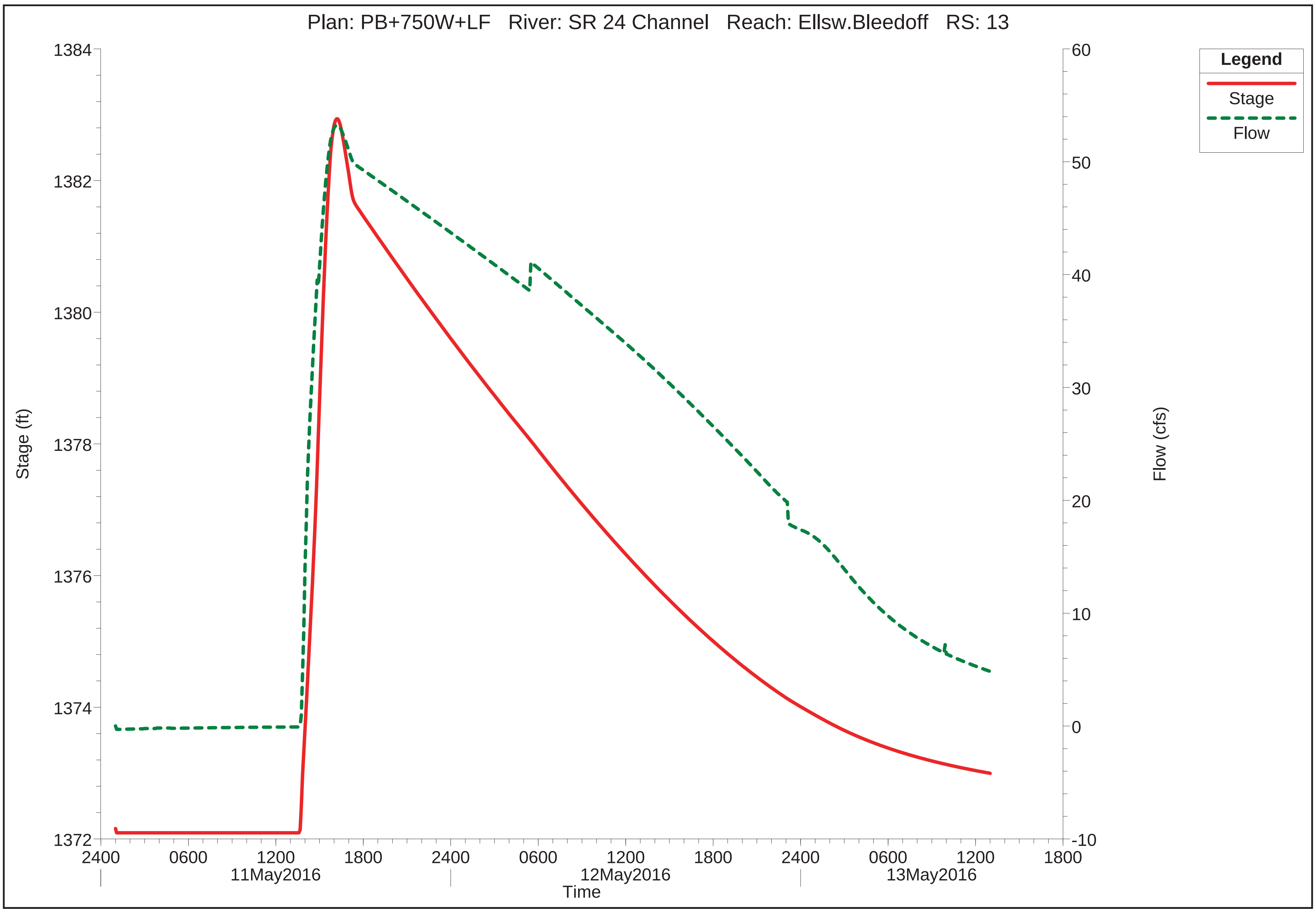


Plan: PB+750W+LF   Storage Area: ELLSWORTH BASIN

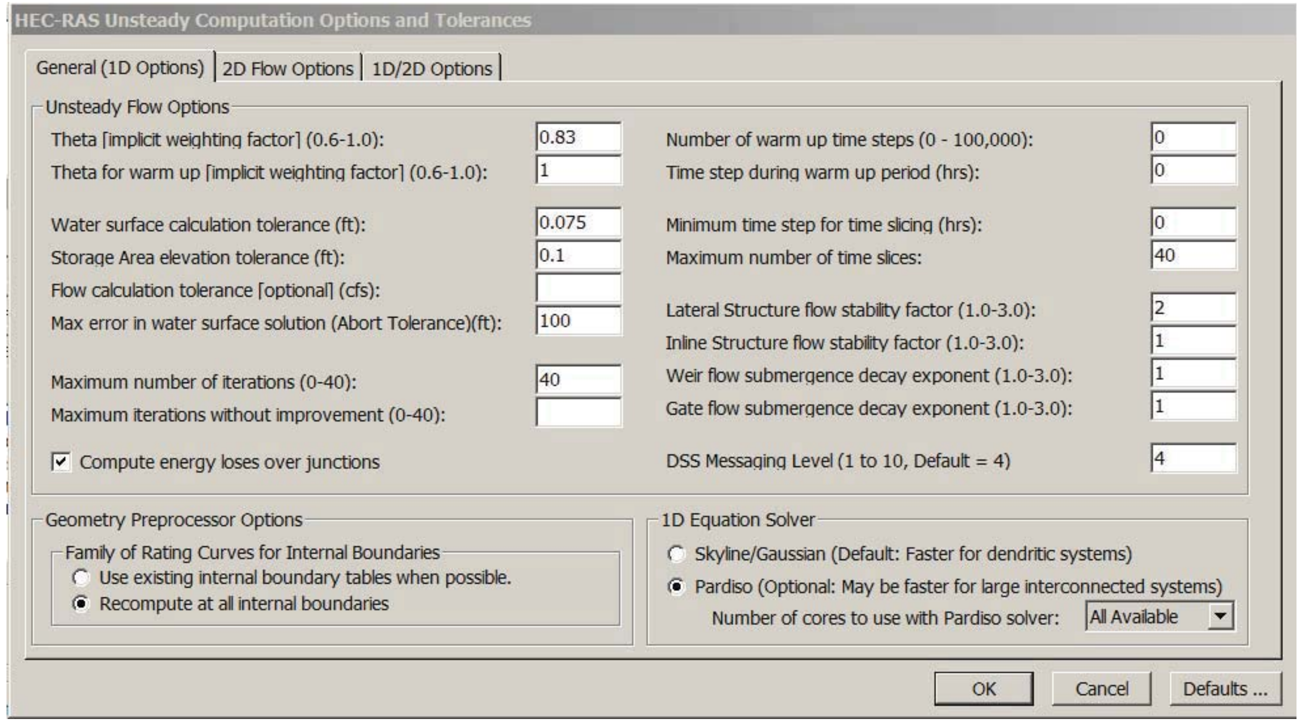


Plan: PB+750W+LF   River: SR 24 Channel   Reach: Ellsworth-Powerl   RS: 2440


Plan: 10024INTIC   SA Connection: ExstEllswOutfall
Legend
Stage HW
Stage TW
Flow
Missing Data
Stage (ft)
1378
1377
1376
1375
1374
1373
1372
1371
Flow (cfs)
6
4
2
0
-2
-4
-6
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time


Plan: PB+750W+LF   River: SR 24 Channel   Reach: Ellsw.Bleedoff   RS: 13
Legend
Stage
Flow
Stage (ft)
1384
1382
1380
1378
1376
1374
1372
Flow (cfs)
60
50
40
30
20
10
0
-10
2400
0600
1200
1800
2400
0600
1200
1800
2400
0600
1200
1800
11May2016
12May2016
13May2016
Time

COMPUTATION OPTIONS AND TOLERANCES



Unsteady Flow Options

Theta [implicit weighting factor] (0.6-1.0): 0.83
Theta for warm up [implicit weighting factor] (0.6-1.0): 1
Water surface calculation tolerance (ft): 0.075
Storage Area elevation tolerance (ft): 0.1
Flow calculation tolerance [optional] (cfs):
Max error in water surface solution (Abort Tolerance)(ft): 100
Maximum number of iterations (0-40): 40
Maximum iterations without improvement (0-40):
☑ Compute energy loses over junctions

Number of warm up time steps (0 - 100,000): 0
Time step during warm up period (hrs): 0
Minimum time step for time slicing (hrs): 0
Maximum number of time slices: 40
Lateral Structure flow stability factor (1.0-3.0): 2
Inline Structure flow stability factor (1.0-3.0): 1
Weir flow submergence decay exponent (1.0-3.0): 1
Gate flow submergence decay exponent (1.0-3.0): 1
DSS Messaging Level (1 to 10, Default = 4): 4

Geometry Preprocessor Options

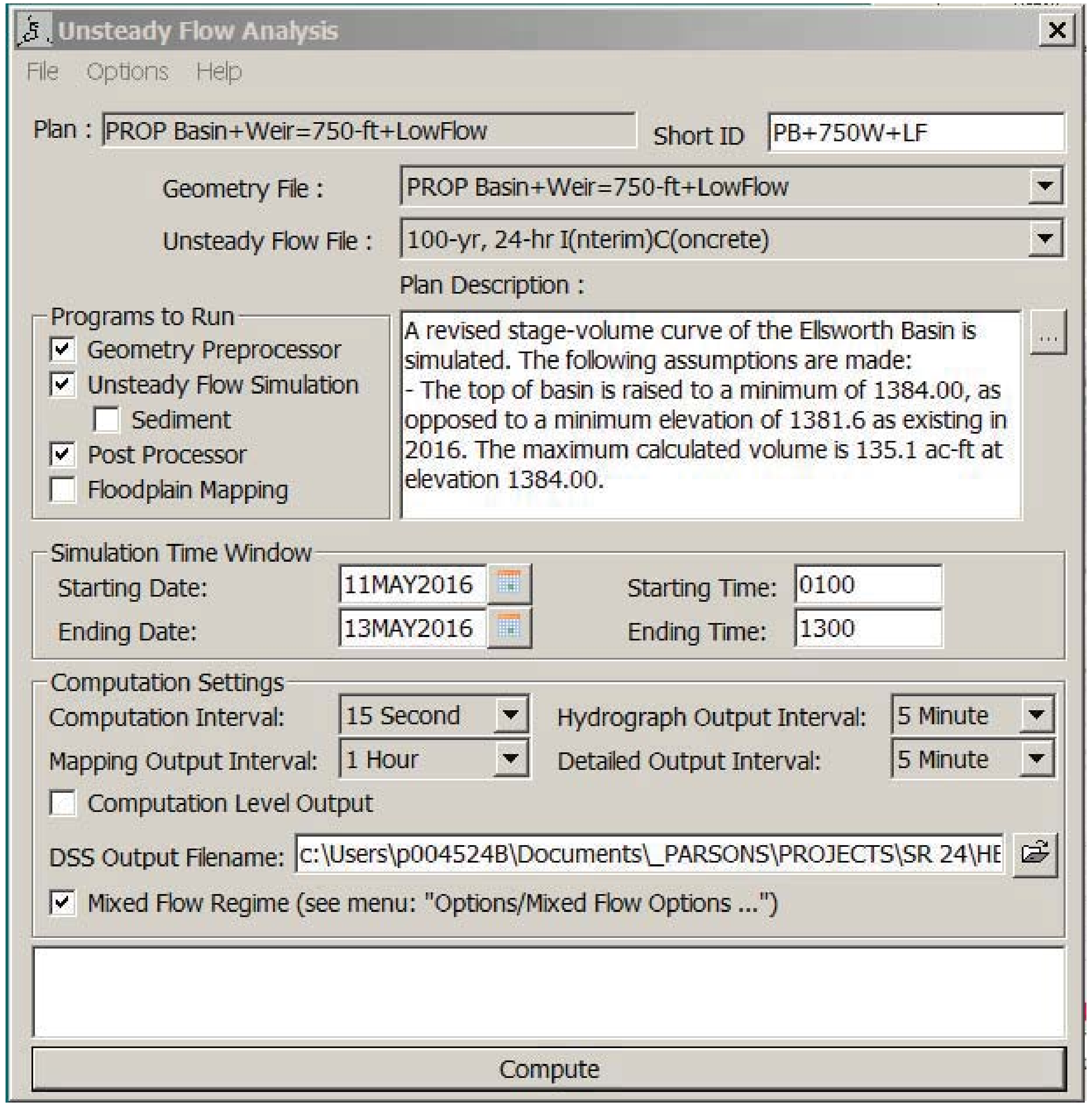
Family of Rating Curves for Internal Boundaries
○ Use existing internal boundary tables when possible.
● Recompute at all internal boundaries

1D Equation Solver

○ Skyline/Gaussian (Default: Faster for dendritic systems)
● Pardiso (Optional: May be faster for large interconnected systems)
Number of cores to use with Pardiso solver: All Available

UNSTEADY FLOW ANALYSIS SUMMARY (EXCERPT)

PLAN PROP Basin+Weir=750-ft+LowFlow



Plan : PROP Basin+Weir=750-ft+LowFlow
Short ID: PB+750W+LF
Geometry File : PROP Basin+Weir=750-ft+LowFlow
Unsteady Flow File : 100-yr, 24-hr I(nterim)C(oncrete)

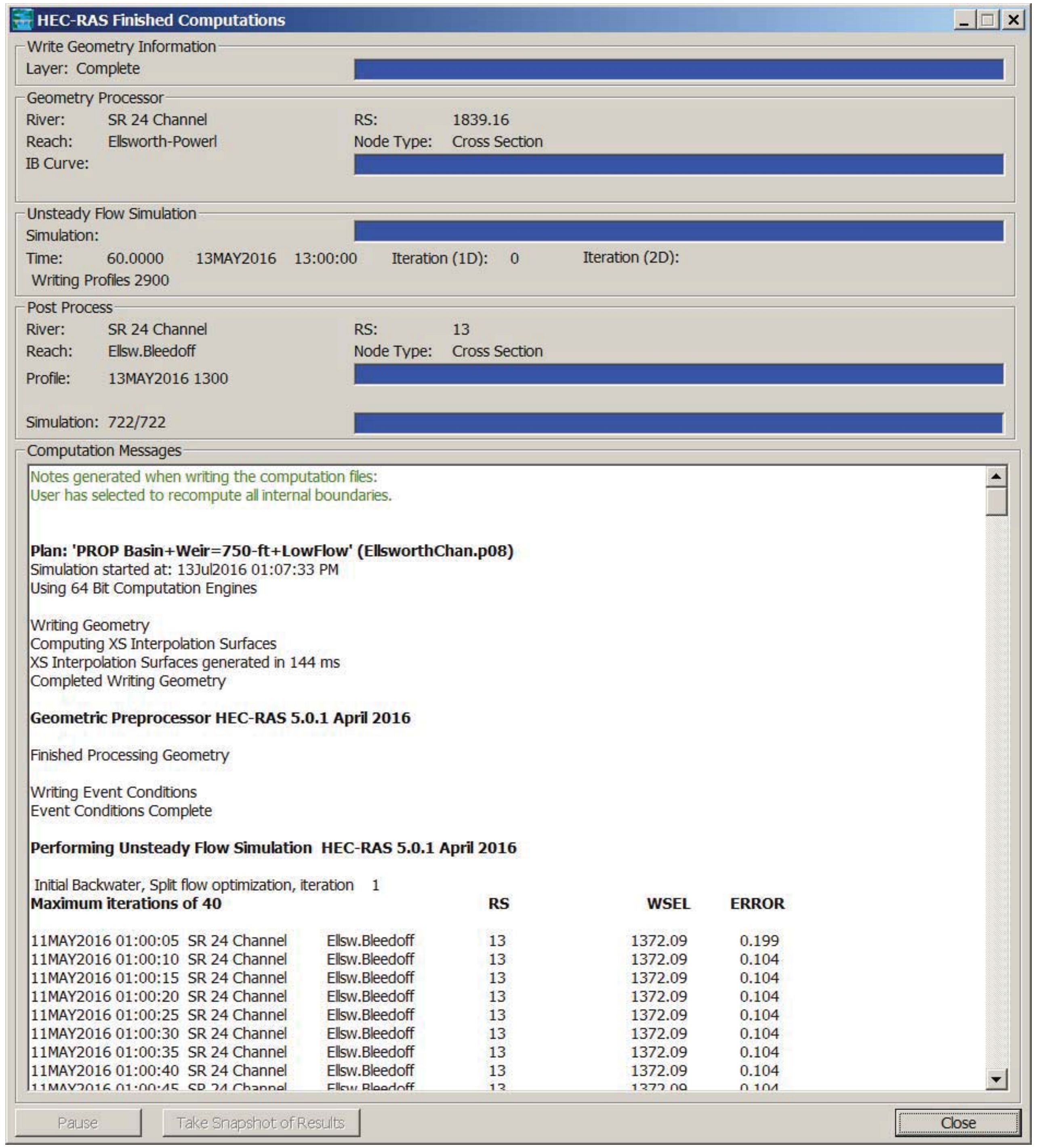
Programs to Run
☑ Geometry Preprocessor
☑ Unsteady Flow Simulation
☐ Sediment
☑ Post Processor
☐ Floodplain Mapping

Plan Description :

A revised stage-volume curve of the Ellsworth Basin is simulated. The following assumptions are made:
- The top of basin is raised to a minimum of 1384.00, as opposed to a minimum elevation of 1381.6 as existing in 2016. The maximum calculated volume is 135.1 ac-ft at elevation 1384.00.

Simulation Time Window
Starting Date: 11MAY2016
Starting Time: 0100
Ending Date: 13MAY2016
Ending Time: 1300

Computation Settings
Computation Interval: 15 Second
Hydrograph Output Interval: 5 Minute
Mapping Output Interval: 1 Hour
Detailed Output Interval: 5 Minute
☐ Computation Level Output
DSS Output Filename: c:\Users\p004524B\Documents_PARSONS\PROJECTS\SR 24\HE
☑ Mixed Flow Regime (see menu: "Options/Mixed Flow Options ...")



Write Geometry Information
Layer: Complete

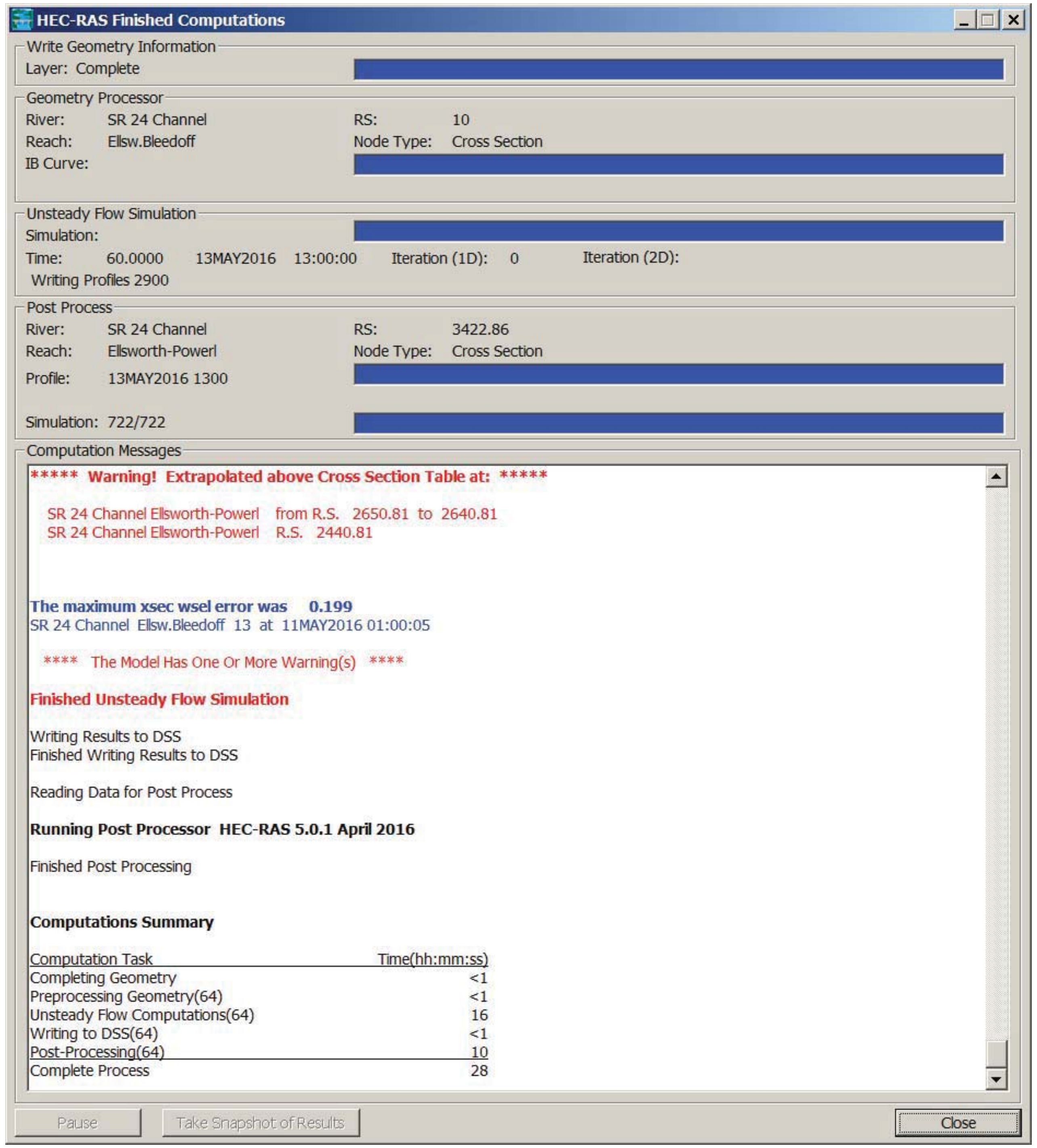
Geometry Processor
River: SR 24 Channel
RS: 1839.16
Reach: Ellsworth-Powerl
Node Type: Cross Section
IB Curve:

Unsteady Flow Simulation
Simulation:
Time: 60.0000 13MAY2016 13:00:00 Iteration (1D): 0 Iteration (2D):
Writing Profiles 2900

Post Process
River: SR 24 Channel
RS: 13
Reach: Ellsw.Bleedoff
Node Type: Cross Section
Profile: 13MAY2016 1300
Simulation: 722/722

Computation Messages

```
Notes generated when writing the computation files:
User has selected to recompute all internal boundaries.


Plan: 'PROP Basin+Weir=750-ft+LowFlow' (EllsworthChan.p08)
Simulation started at: 13Jul2016 01:07:33 PM
Using 64 Bit Computation Engines

Writing Geometry
Computing XS Interpolation Surfaces
XS Interpolation Surfaces generated in 144 ms
Completed Writing Geometry

Geometric Preprocessor HEC-RAS 5.0.1 April 2016

Finished Processing Geometry

Writing Event Conditions
Event Conditions Complete

Performing Unsteady Flow Simulation  HEC-RAS 5.0.1 April 2016

 Initial Backwater, Split flow optimization, iteration    1
Maximum iterations of 40                            RS                WSEL      ERROR

11MAY2016 01:00:05  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.199
11MAY2016 01:00:10  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:15  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:20  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:25  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:30  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:35  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:40  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
11MAY2016 01:00:45  SR 24 Channel     Ellsw.Bleedoff        13               1372.09      0.104
```



Write Geometry Information
Layer: Complete

Geometry Processor
River: SR 24 Channel
RS: 10
Reach: Ellsw.Bleedoff
Node Type: Cross Section
IB Curve:

Unsteady Flow Simulation
Simulation:
Time: 60.0000 13MAY2016 13:00:00 Iteration (1D): 0 Iteration (2D):
Writing Profiles 2900

Post Process
River: SR 24 Channel
RS: 3422.86
Reach: Ellsworth-Powerl
Node Type: Cross Section
Profile: 13MAY2016 1300
Simulation: 722/722

Computation Messages

```
*****  Warning!  Extrapolated above Cross Section Table at:  *****

   SR 24 Channel Ellsworth-Powerl   from R.S.   2650.81  to  2640.81
   SR 24 Channel Ellsworth-Powerl   R.S.   2440.81



The maximum xsec wsel error was     0.199
SR 24 Channel  Ellsw.Bleedoff  13  at  11MAY2016 01:00:05

  ****   The Model Has One Or More Warning(s)   ****

Finished Unsteady Flow Simulation

Writing Results to DSS
Finished Writing Results to DSS

Reading Data for Post Process

Running Post Processor  HEC-RAS 5.0.1 April 2016

Finished Post Processing


Computations Summary

Computation Task                          Time(hh:mm:ss)
Completing Geometry                                   <1
Preprocessing Geometry(64)                            <1
Unsteady Flow Computations(64)                        16
Writing to DSS(64)                                    <1
Post-Processing(64)                                   10
Complete Process                                      28
```

Worksheet for New Bleedoff Line at Ellsworth Basin (Surcharged)

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Pressure 1	10.50	feet H2O
Pressure 2	4.50	feet H2O
Elevation 1	1372.12	ft
Elevation 2	1368.72	ft
Length	1500.00	ft
Roughness Coefficient	0.013	
Diameter	36.00	in

Results

Discharge	52.80	ft^3/s
Headloss	9.40	ft
Energy Grade 1	1383.49	ft
Energy Grade 2	1374.09	ft
Hydraulic Grade 1	1382.62	ft
Hydraulic Grade 2	1373.22	ft
Flow Area	7.07	ft^2
Wetted Perimeter	9.42	ft
Velocity	7.47	ft/s
Velocity Head	0.87	ft
Friction Slope	0.00627	ft/ft

Worksheet for New Bleedoff Line at Ellsworth Basin (Gravity)

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00130	ft/ft
Normal Depth	3.00	ft
Diameter	36.00	in
Discharge	24.05	ft^3/s

Results

Discharge	24.05	ft^3/s
Normal Depth	3.00	ft
Flow Area	7.07	ft^2
Wetted Perimeter	9.42	ft
Hydraulic Radius	0.75	ft
Top Width	0.00	ft
Critical Depth	1.58	ft
Percent Full	100.0	%
Critical Slope	0.00436	ft/ft
Velocity	3.40	ft/s
Velocity Head	0.18	ft
Specific Energy	3.18	ft
Froude Number	0.00	
Maximum Discharge	25.87	ft^3/s
Discharge Full	24.05	ft^3/s
Slope Full	0.00130	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for New Bleedoff Line at Ellsworth Basin (Gravity)

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.00	ft
Critical Depth	1.58	ft
Channel Slope	0.00130	ft/ft
Critical Slope	0.00436	ft/ft

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APPENDIX G

DRAFT INITIAL DCR REVIEW COMMENTS AND RESOLUTIONS

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Draft IDCR Comment Response Document

ADOT Project Manager: Ronald McCally
Consultant: PARSONS

INDEX OF COMMENTS RECEIVED

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
			JOHN WENNES, ADOT ENVIRONMENTAL			
1	1	Pg. 1-1 Draft IDCR	*MITIGATION MEASURES* – Replace paragraph with the following text: “No updates at this time. As part of the Environmental Assessment Re-evaluation currently being prepared for this study, Mitigation Measures will be updated.”.	A	A	Will revise
2	2	Pg. 1-4 Draft IDCR	*Section 1.3.3, Second paragraph, second row* – include “of” after “the area north”	A	A	Will revise
3	3	Pg. 4-2 Draft IDCR	*Section 4.4.1,First paragraph, second row* – include “roads” after “planned”.	A	A	Will revise
4	4	Pg. 8-1 Draft IDCR	*Section 8, First paragraph* – replace all text with “Updates for the current study are in process.”	A	A	Will revise
			TED LEHMAN, JE FULLER - HYDROLOGY			
5	1	App. D, Draft Initial Drain. Report	Sub-basin E6A appears to have been left developed, while the report suggests it should have been reverted to undeveloped conditions	A	A	Will revise. The basin unit hydrograph was revised to reflect undeveloped conditions, but tests indicate further revisions are needed to simulate that condition appropriately

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6	2	App. D, Draft Initial Drain. Report	Sub-basins GM16-GM20 are combined downstream of the SR24 channel and detention basin. Review of the development plans, topography, and discussions between the Premier (working on the Ellsworth Channel realignment) and Parsons team members suggest that any outflow from these sub-basins is more likely to be collected by the new SR24 channel, probably near its intersection with Crismon Road.	A	A	Model has been revised
			TAMMY MIVSHEK, ADOT TRAFFIC ENGINEERING			
7	1	IDCR 4-4	4.4.2 Ellsworth Road Interim TI, it states "The traffic operational analysis indicates the intersections will operate at adequate capacity for the Interim Design Year 2025." In the Traffic Analysis Report on page 17, Table 5 It shows that the overall operation of the NB and WB approach the overall LOS for AM and PM Peak hours are at F(E) for NB and F(F) for WB for the SR 24/Ellsworth WB Ramp under Option A. Under Option B, the LOS during AM and PM Peak Hours is F(F) for the NB approach and F(F) for the WB approach at the WB Ramp per Table 7 on Page 19 of the Traffic Analysis Report. At present the intersection is operating under acceptable conditions with some delays in the turning movement.	B	A	The overall level of service is acceptable with the mitigated lane configurations shown in figures 6 and 7 of the report.

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8	2	IDCR 4-8	4.12 Freeway Signing and Pavement Marking, it states "A signing concept plan was developed to ensure an effective signing plan should be developed for the Preferred Interim Alternative." The Interim concept appears to be directed at the Ultimate condition and not the Interim. It doesn't make sense to sign for roads that don't exist yet. Also, would we want to have sign structures sitting out there without signs on them and to be sitting there for however long in between the interim and ultimate? What if during the Ultimate Design the structures are in the way of future sound walls, etc.	B	D	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian.
9	3	IDCR 4-8	4.12 Freeway Signing and Pavement Marking. These are going to be at-grade intersections but I don't see any signing pertaining to the x-roads at the TIs. Only Ellsworth, Mountain and Ironwood are open but there is nothing showing what will be used in order to guide or control traffic on these roadways. The other roads for the x-roads may be used as turn around points for the Interim condition but again there is no traffic control or guide signing. For the roads that lead to nowhere it would also be a good idea for barricades to be placed at the end of the roadway.	B	D	We are updating the original DCR. The traffic plans were at the same level of detail. Intersections to be signalized except Meridian Road

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SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

TRACS No. H8915 01L/02L
Federal Project No. 024 A (200)

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
10	4	IDCR 4-8	4.13 Lighting and Traffic Signals. There were no comments made pertaining to the Interim condition. Is there lighting going to be placed on the Interim condition. It appears that the mainline will be divided without barrier put in place but lighting is not going to be placed on the ramps? Also, no mention of any signals in the Interim. The Ellsworth signal would need to be updated because of the new ramps. The end of roadway, whether it be Signal Butte, if that option is selected and the roadway built, or Ironwood, will lead into a roadway that will have traffic on it. Will traffic control be set up utilizing a signal light at that location? What about Mountain Road. What type of traffic control will be used on this roadway, a stop condition or a signal light. SR 24 will not be able to move freely through these locations.	A	A	We are adding Signals and Lighting. All cross roads will have signals with the ramps for the interim condition except for Meridian.
11	5	IDCR 4-8	4.14 Construction Phasing and Traffic Control. It may be advisable that an Emergency Management Plan be put into effect as well with the traffic control in order for emergency vehicles and personnel to enter into the construction area since there will be limited points in which to enter in case of an emergency. It probably would be helpful for emergency personnel to know where the access points would be to the project if something were to happen during construction of SR 24.	D	A	This appears to be a final design issue. Text will be included indicating an Emergency Management Plan needs to be prepared during final design.

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12	6	IDCR, App. C T-1.01	The raised pavement markers should all be Type C since there are median islands separating the traffic lanes on the x-roads. Type C should be used on all the lane lines. The spacing for the RPM's on the broken white should be at 40 ft. spacing and not 20 ft. spacing and on the turn lane lines they should be spaced at 20 ft. Also, Type D RPMs should also be used on the median island noses as per Std. Dwg. M-1 as well as the yellow paint.	A	A	Will revise.
13	7	IDCR, App. C T-1.01 - T-1.10	Ellsworth Rd Ramp "A" Connector is listed as "Future" per C-3.01. As far as the DCR is concerned all of the work will be done on the East of Ellsworth Rd. Why is there new sign panels and sign structure being placed for Ramp A depicting two lanes for WB L202 and one lane for NB L202. There is nothing in the DCR that states that this ramp will be widened to two lanes for WB direction during the Interim.	A	D	The connector ramp will not be constructed with interim project
14	8	IDCR, App. C T-1.01	Per the 1st paragraph under 4.4.2 Ellsworth Road Interim TI on Page 4-4 of the DCR it states, "For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound." This 3rd lane in the NB direction was also depicted in Appendix C on sheet C-4.01 but is not shown on the pavement marking sheet T-1.01.	B	A	Discussion needed based on Traffic Operations at Ellsworth Road. The project team will meet with the City of Mesa to discuss the third left turn lane. The results of this meeting will impact the report. Meeting resulted in 2 Lt turn lanes at this location based on operations and maintenance preferred by the City of Mesa. Updates will reflect this.

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15	9	IDCR, App. C T-1.01 - T-1.10	Again many of the signs on here are more representative of the Ultimate condition and not of the Interim condition. We shouldn't be signing for roadways that do not exist at this time nor should we have signing such as "Right Lane Exit Only" signs in the interim. Some of the signs on these pages do not comply with the 2009 MUTCD or the current MOAS as shown.	A	A	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian
16	10	IDCR, App. C T-1.01 - T-1.10	On the x-roads there is no signing shown or barriers for end of roadway conditions on the non-existent roads. On all of the x-roads, with the exception of Meridian Rd, it shows that the striping will match existing striping regardless of whether the road exists or not. At Meridian no striping is shown on T-1.08 even though on C-4.06 it shows a portion of the x-road will be built. In the interim the only roads in existence will be Ellsworth, Mountain, and Ironwood. The x-road sheets should be more representative of the conditions that will exist when the Interim project is completed. If the Interim conditions do include x-roads around SR 24 even though the roadways are not in place is beneficial to traffic who can use them to make turn around. It does not show on the x-roads if it will be free flow through them, stop condition, or signal light.	B	A	Even though some of the roads do not exist today, we are assuming they will be there at time of construction or soon after. For the DCR we will depict the striping as if the roads existing other than at Meridian. At the time of final design it will be determined which cross roads will be developed. We will add a discussion to the DCR.
17	11	IDCR, App. C T-1.01 - T-1.10	Why isn't there a W10-2 Expressway Ends XX Miles located on EB SR 24 before Ironwood?	B	A	Warning and regulatory signs will be freeway size and not expressway size.

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18	12	Traffic Analysis Report	On Page 6, 1st Paragraph under Existing Intersection Configuration it states that the NB approach on Ellsworth consists of four through lanes at the EB off-ramp. Technically there are four lanes going through this intersection but in reality there are only two through lanes. The other two lanes are actually two left turn storage lanes for the WB on-ramp.	A	A	The text of the report will be updated to clarify that two left turn lanes are queue storage for the northbound left turn lanes at the intersection of Ellsworth Road and SR 24 EB Ramps.
19	13	Traffic Analysis Report	On Page 8 the left turn arrow in Figure 1A is missing.	A	A	The figure will be corrected.
20	14	Traffic Analysis Report	On Page 9, it appears that the data in Table 2 is backwards for 1A and 1B.	A	A	The figure will be corrected.
21	15	Traffic Analysis Report	On Page 9 in the first sentence of the 2nd paragraph under Crash Analysis it states, " identified a one-year total of 24 crashes (without any fatalities) on 24 from Loop 202 . . ." Should it not say " identified a one-year total of 24 crashes (without any fatalities on SR 24 from Loop 202. . ."	A	A	The table will be corrected.
22	16	Traffic Analysis Report	On Page 11 under Projected Segment Traffic Volumes, it states an "end of freeway" condition. Ellsworth is the "end of freeway" condition and Signal Butte in Option B or Ironwood in Option A would be an "end of expressway" condition. Per the ADOT Roadway Design Guide (2012), "Full access control gives preference to through traffic by providing access only through selected public roads and by prohibiting at-grade crossings or direct access from abutting property. Partial access control still gives preference to through traffic but permits some crossings at grade	B	A	The report will be updated to state that Ellsworth Road is an end of expressway condition in Option A.

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			and some private driveway connections." The 2009 MUTCD defines a Freeway as a divided highway with full access control and an Expressway as a divided highway with partial control of access. "End of freeway" exists at Ellsworth Rd with the at-grade signalized intersection. In the Interim SR 24 could only be labeled as an Expressway with the at-grade intersections with partial controlled access from Ellsworth Rd to Signal Butte Rd/Ironwood Rd, depending on the Option selected.			
23	17	Traffic Analysis Report	On Page 4-4 of the DCR, 1st paragraph under 4.4.2 Ellsworth Road Interim TI it states, "For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound." The DCR does not state that the third lane would be opened to traffic but is shown as a possibility in Appendix C C-4.01. The projected traffic volumes do not show any projections with the possibility of this third NB through lane	B	A	The project team will evaluate the recommended intersection geometry at the intersection of Ellsworth Road and SR 24 WB Ramp due to the impact to the SR 24 EB on ramps and Ellsworth Road. Pavement widening on Ellsworth Road is to accommodate the 12-foot lane shift of the existing NB through lanes. The additional pavement width will be used for the third northbound left turn lane.
24	18	Traffic Analysis Report	Currently Signal Butte Rd does not exist in the area of SR 24. From what I understand in the DCR under Option A that this road will not be built by 2025. Under Option B it would become the logical terminus but would still have to be built. Why is it under Option A that you are showing through movements NB and SB through the intersections to a nonexistent road?	B	D	Signal Butte Road is expected to be built at time of construction or soon after. We are showing the ultimate striping, Final Designer will provide appropriate striping at time of construction. City of Mesa is planning to construct Signal Butte Road from Ray Road to Pecos Road.
25	19	Traffic Analysis Report	In Figure 4 and Figure 5, on the diagram you are showing Meridian Rd as Moeur Rd.	A	A	Will change

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26	20	Traffic Analysis Report	On Page 18, 20, Figure 6, and Figure 7 for the Mitigated intersections, adding a third left turn lane for the WB on ramp at Ellsworth would improve the level of service for Option A and Option B but there are other factors that also need to be considered. By adding the third left turn lane this would mean widening Ellsworth Rd with another lane on top of the third NB through lane. Also, the WB on-ramp would need to be widened to three lanes from the existing two in order to accommodate the third left turn lane. By adding the third lane on the ramp there would need to be enough room in order to merge that third lane prior to Ramp A or leaving the third lane as the Ramp A lane from the Ellsworth intersection.	B	A	The project team will evaluate the recommended intersection geometry at the intersection of Ellsworth Road and SR 24 WB Ramp due to the impact to the SR 24 EB on ramps and Ellsworth Road. Pavement widening on Ellsworth Road is to accommodate the 12-foot lane shift of the existing NB through lanes. The additional pavement width will be used for the third northbound left turn lane. Ellsworth Road will not be widened to three through lanes. The WB on ramp would need to be widened to add an additional lane.
27	21	Traffic Analysis Report	Figure 7, the proposed lane configuration diagrams label 3A and 3B as Ironwood Dr when they should be Signal Butte Rd.	A	A	The figure will be corrected.
28	22	Traffic Analysis Report	Page 26 under 2025 Option A Scenario, 1st paragraph Ironwood Rd would not be an "end of freeway" but an "end of expressway" condition. Also it states that Mountain Rd would be "grade separated" over SR 24 but in the next paragraph it states, "Grade separation of interchanges is not recommended in the 2025 Option A scenario." Maybe it should be re-stated that all other interchanges besides Mountain Rd will not be grade separated.	D	A	Mountain Road will not be an interchange. It will just be a grade separated crossing. It will not have direct access to SR-24 The text will be clarified to better explain why Mountain Road isn't a TI.
29	23	Traffic Analysis Report	Page 27, third paragraph under 2025 Option A Mitigated Analysis, third line states, . . ."ramp through movement During AM both peak hour." Please clarify.	A	A	The report will be updated to state that the northbound left turn turning movement conflicts with the westbound ramp movements. The word "through" will be deleted.

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30	24	Traffic Analysis Report	Page 27 under 2025 Option B Scenario, 1st paragraph, Signal Butte would be "end of expressway" condition and not "end of freeway."	B/C	A	The report will be updated to designate that Signal Butte Road will be an "end of expressway" condition.
			EUNICE CHAN, FHWA			
31	1	Pg 3, Traffic Analysis Report	2025 Opt A Mitigated Analysis references expected delays for the NB left turn movement at the intersection of Ellsworth Rd and WB SR24 Ramps and no further mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. Appendix H seems to indicate that even with the mitigation measures, there will be a 76.8 s/veh delay for the NBL movement on Ellsworth and SR 24 WB Ramps, and a 102.9 s/veh delay for the EBT movement on Ellsworth Rd and SR 24 EB Ramps.	B	A	The predicted overall level of service for the 2025 Option A mitigated condition is level of service D or better. The predicted delay for northbound left turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.
32	2	Pg 4, Traffic Analysis Report	2035 Horizon Year – mentions that vehicles are expected to queue on the westbound on ramp and northbound left turn lane at the intersection of Meridian Rd and SR 24 WB Ramps and no mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. For example, Appendix K indicates LOS F during peak hours for the NBL in 2035, but the delay is only 58.1 s/veh.	B	A	The predicted overall level of service for the 2035 horizon yea s level of service D or better. The predicted delay for northbound and westbound turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.

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33	3	Pg 6, Traffic Analysis Report	Existing Roadway Network – Include sentence on posted speed limit for Meridian Road.	A	A	The report will be updated.
34	4	Pg 11, Traffic Analysis Report	Design Concept Report Alternatives and Projected Segment Traffic Volumes discussions appear to be the same?	A	A	The report will be updated.
35	5	Pg 17, Traffic Analysis Report	Table 5: a. Clarify "recommended lane configurations" in the first sentence. Figure 6 only labels the "Mitigated" configurations. Are the recommended lane configurations the ones that are unlabeled? b. Include discussion of the severity of unmitigated peak hour delays (Appendix G). For example, not incorporating the recommended mitigation would result in LOS F with a delay of 1373.2 s/veh for the NBL and 564.1 veh/s for WBT at the intersection of Ellsworth Rd and SR 24 WB Ramps.	A B	A A	a. Table 5 refers to the unmitigated lane configurations. The text and figures will be updated. b. Table 5 refers to the unmitigated lane configurations. An alternative analysis is shown in Table 6 with the mitigated levels of service. Discussion referring to Table 6 and the mitigated analysis will be added to this section.
36	6	Pg 18, Traffic Analysis Report	Table 6 – See comment 1. Table shows LOS C for EB through movements at Ellsworth Rd and EB SR 24 Ramps. But Appendix H shows LOS F?	A	A	Table will be updated.
37	7	Pg 19, Traffic Analysis Report	Table 7 – See comment 5.a.	A	A	Table 7 refers to the unmitigated lane configurations. The text and figures will be updated.

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38	8	Pg 21, Traffic Analysis Report	Table 9 – See comment 2.a.	A	A	Table 9 refers to the unmitigated lane configurations. The text and figures will be updated.
39	9	Traffic Analysis Report	Figure 6 - Didn't see a difference between the original and the mitigated configuration for 3A or 3B? What was the mitigation?	A	A	The mitigated lane configuration at Signal Butte Road and SR 24 WB off ramps is three (3) northbound left turn lanes. The figure will be updated.
40	10	Traffic Analysis Report	Figure 8 – Reason for calling out the lane configurations on Meridian Rd and not for the other crossroads?	D	D	The lane configuration was shown on Meridian Road to clarify a six lane cross section north of SR 24 and a four lane cross section south of SR 24.
41	11	Pg. 3-1, Draft IDCR	a. Provide description of Tier 1 analysis and background on why it was not used for evaluating the four alternatives. b. Section 3.3.2 Description of Alternatives should reference or include typical sections of each alternative.	D A	D A	a. Tier 1 analysis was used for determining the SR 24 Corridor Alignment in the original DCR. b. Will include typical sections of each
42	12	Pg. 3-2, Draft IDCR	a. Was Alternative B removed from consideration for reasons other than the feasibility of the traffic operation analysis? b. Clarify last sentence under subheading, "Compatibility with Ultimate."	D A	D A	a. That and the compatibility with the ultimate. b. Will clarify

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43	13	Pg 3-3, Draft IDCR	a. Traffic Analysis – All alternatives would operate at a similar Level of Service, which is -? Provide additional discussion. b. Suggest including a table that shows how each of the four alternatives quantitatively addresses the primary objectives of the evaluation criteria as part of the Tier 2 evaluation process. While this is generally discussed per alternative, it is not presented in a way that allows comparison of similarities and differences between the alternatives and the extent to which they meet (or don't meet) the primary objectives. c. Second sentence under "Development Impacts" should include "of" between "amount" and "area" d. Under "Estimated Construction Cost" subheading, the Alternatives in the second paragraph should be capitalized for uniformity (see also para 4.5 on pg 4-5). • What were the costs for each alternative? It appears that only the estimated cost for the preferred alternative is given (pg. 5-1).	D A A A B	D A A A D	a. Our scope was to update the existing DCR therefore was structured to provide a traffic analysis on the selected alternative. b. Will add table c. Will revise d. Will revise • Our scope was to update the existing DCR therefore was structured to provide a traffic analysis on the selected alternative.
44	14	Pg 4-2, Draft IDCR	Include discussion of number of GP lanes in the WB direction under subheading, "SR 24 Interim Westbound Mainline."	A	A	Will add two GP lanes

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45	15	Pg. 4-4, Draft IDCR	4.4.5 Signal Butte Road Full Diamond TI 1. General note: in order for Signal Butte to be the logical terminus, City of Mesa needs to include improvements in the STIP (to the north and south) to ensure Signal Butte can handle the end of freeway traffic	A	A	Text will be added to denote the City of Mesa needs to include inprovements.
46	16	Pg. 4-7, Draft IDCR	Section 4.8.4 Noise Walls notes no updates. Verify if any updates/additional mitigation measures are needed to reflect the change from a depressed freeway to an at grade or above grade freeway between Williams Field Rd and Ironwood and the change from at grade to above grade bridges at Crimson and Mountain.	B	C	Decision from FHWA pending. Depending on outcome ADOT would prepare a Hot Spot or noise wall Analysis if needed.
47	17	Pg. 5-2, Draft IDCR	a. Does the project wide erosion control (1%) cover permanent erosion control measures or just BMPs during construction? Verify whether permanent seeding for all disturbed areas is included within this 1% or include a line item in the cost estimate as there will be no landscaping under the interim condition. b. Ensure all existing pedestrian features within the interim scope of work/project limits are upgraded, if needed, and any new features designed to meet ADA/PROWAG.	B A	A A	a. Will add seeding item b. Will add a statement regarding upgrading existing facilities to meet ADA/Prowag

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			KEN AKOH-ARREY, ADOT DRAINAGE			
48	1	App. D, Draft Initial Drain. Report	Existing condition HEC-1 Schematic is not matching the input in HEC-1 output. Sub-basin labels such as P1, P2, etc., are not on the schematic. Is there another schematic which should have been included? In fact, the labels on this schematic map are only of the E-series.	A	A	The ADMPU schematic will be included for reference. The project Schematic represents only the watershed pertaining to SR 24, which was revised for the project (see Section 4.4, Draft Initial Drainage Report). The Hydrologic model includes the entire East Mesa ADMPU area, incorporating E, P and R sub-basin groups. The ADMPU model was maintained intact in its coverage to ensure that the revised information is available to FCDMC and City of Mesa for further updates as a comprehensive regional tool.
49	2	Pgs 21-22, Draft Initial Drain. Report	The Interim option – the Baseline option, modeled with existing condition will convey more flow than any of the three ultimate condition options that were eliminated from consideration. However, Figure 6 is not showing a pump station as shown for those three options. Will this option get by without a pump station? How so? What is different?	A	A	The interim and revised ultimate roadway profiles are fully above ground and the pump station is not needed in any of the options that were analyzed. The reference to a pump station in the exhibits is incorrect and it was removed.
50	3	Pg 27, Draft Initial Drain. Report	Section 4.6 - This section should include discussion on the pump station as a conceptual design appurtenant that supplements the performance of the channel, if there is going to be one.	D	D	The pump station is not needed.
51	4	Pg 27, Draft Initial Drain. Report	Section 4.6 - The second bullet states that flow from PPGN (Wood Patel, 2014) in excess of the 100-year, 24-hr storm would flow across Ellsworth Rd. to the Ellsworth Retention Basin and fill it up limiting the flow that can be clipped from the channel's hydrograph for attenuation. Is this a potential problem? What is the recommended solution so that more discharge is not sent downstream than is being intended?	D	D	Note that the statement refers to "flows in excess of the 100-year, 24-hour event", which is a condition in excess of the design and is applicable for extreme events only. At the moment this is an assumption, as the PPGN development is in very early stages of planning and a detailed grading plan is not available to indicate the location where emergency flows would leave the development.

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			MIKE DUNCAN, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
52	1	App. D - Draft Initial Drain. Report	HEC-1 model output, for run of 01DEC15 14:28 The flows from the SR24 channel and the Ellsworth Basin area are: “802ELS”, “G19E26”, and “G17E26”, which are 1,876 cfs + 182 cfs + 0 cfs = 2,058 cfs, which exceeds the 1,650 cfs criteria of Section 4.6, page 27 of the report.	A	A	The analysis in the Draft Initial Drainage Report was done for a detention volume of 96 ac-ft. Approximately 109 ac-ft of detention volume is needed to attenuate the peak flow to 1,650 cfs. An area suitable for detention has been identified at Ellsworth Rd, Ramp C, which could provide the additional volume.
53	2	App. D - Draft Initial Drain. Report	Line 1242, page 29, of the HEC-1 output has: DT 1650UP 96.0 0.0 Which means that the diversion is limited to 96 acre-feet, but section 4.6 of the report mentions 100 acre-feet.	A	A	See response to Comment 52/1
54	3	Draft Initial Drain. Report	The report does not address or show that the Powerline Floodway (and downstream East Maricopa Floodway) is not negatively impacted by the drainage system that encompasses the SR24 channel and the Ellsworth Basin.	B	A	The impact is being assessed based on the hydrology and the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 hydrology.
55	4	App. D - Draft Initial Drain. Report	HEC-1 Schematic - At the upper left there are two concentration points shown with the same label CPE26A	A	A	Duplicate label was deleted
56	5	Sht. D-1.03, Plans	The bottom width for the proposed, modified Powerline Floodway channel is 55 feet. What is the design basis for this?	B	A	The impact is being assessed based on the hydrology and the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 hydrology.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

57	6	Sht. C-4.07, Plans	The box culvert under Ironwood Dr is shown as 2 @ 8’ x 6’. This should be 3 @ 8’ x 8’ to match the same culvert shown on sht. C-3.35.	A	A	Will adjust
58	7	Sht. D-1.01, Plans	Are there any supporting analyses to show that the approx. 750 ft. long lateral weir and 4 barrel box culvert will function as expected to meet the overall peak outflow criteria?	B	A	Analysis is in progress and will be made available with the Initial Drainage Report. Analysis included in drainage report.
59	8	Sht. D-1.02, Plans	The typical section uses B for top width while the table below uses T.	A	A	Will adjust
60	9	All sheets, Plans	Refer to Ironwood Road but it should be Ironwood Drive.	A	A	Will adjust
61	10	Sht. D-1.03	The channel side slopes are shown as 1.5:1. For the subject major re-construction of the Powerline Floodway, side slopes of 2:1 would be the steepest allowed by FCDMC.	A	A	Will adjust

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			JEFF SHELTON, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
62	1	App. D, Draft Initial Drain. Report	HEC-1 model 24INT100C.dat. Comparison of EMADMPU hydrology to SR-24 hydrology and the effect on the EMF. The hydrograph at CPEMF1 from model 24INT100C.dat was added to a hydrograph from PVR with peak of 600 cfs. This was then input into an unsteady EMF HEC-RAS model that was developed by the FCD to evaluate the levee status of the channel. The hydrographs for CPEMF1 and PVR were added together for the existing and future EMADMPU models and input into the unsteady EMF model for comparison to 24INT100C.dat. The results indicate that your current plan would produce water surfaces 1.37 feet higher than the future EMADMPU model in the EMF at the Powerline Floodway. Average increases of approximately 0.5 feet occur for miles up and down stream of the confluence. The results also indicate that your current plan would produce water surfaces 0.16 feet higher than the existing EMADMPU model in the EMF at the Powerline Floodway. Your model also produces reductions in the water surface for miles downstream of the confluence (see attached spreadsheets). The EMF HEC-RAS model and other supporting calculations will be provided upon request.	A	A	FCDMC provided the regional model. The material will be referenced and the effects of the added SR 24 flows described in the Initial Drainage Report.
63	2	App. D, Draft Initial Drain. Report	HEC-1 model 24INT100C.dat. Function of basin at Ellsworth Road and SR-24. The calculations in HEC-1 (802ELS) that represent the offline basin at Ellsworth are so basic that they might not adequately give a rough estimation of the effect the SR-24 drainage system has on the Powerline Floodway and EMF.	B	A	The level of hydraulic modeling involved is complex and is dependent of an advanced design stage that was not scoped for the IDCR phase of the project. The detention basin operation is being refined, but at a simplified level.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			MARIA DEEB, CITY OF MESA			
64	1	Pg. 1-1 Draft IDCR	*Programming, Paragraph two* - Define acronym: Regional Transportation Plan Freeway Program	A	A	Will define
65	2	Pg. 1-1 Draft IDCR	*Mitigation Measures, Paragraph one* – I will suggest not using the words: "no updates" The mitigation language currently used by ADOT has changed since 2010. Also, the concept includes updated locations for drainage structures, therefore related mitigations be required? these might affect level of impact and impact locations. And have the noise and air quality conformity runs been completed? HPT completed? Will updates only occur during design and not at this DCR stage? Suggest text with clarification if not updates are to be done at this time but will during the design phase.	A	A	Will provide updates if available at time of final DCR submittal or provide statement regarding the update to the Environmental Evaluation and mitigations
66	3	Pg. 1-3 Draft IDCR	Provide a color label that explains the pink vs. blue colors.	A	A	Will add
67	4	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph one* - Within Mesa: per the Mesa 2040 Transportation Master Plan (page 81) it is a 6L arterial separated by raised medians from Southern Avenue to Pecos Road, then a 4L with raised medians to Germann Road (medians page 77)	A	A	Will update to further extents
68	5	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph two* - Within Mesa: per the Mesa 2040 Transportation Master Plan (page 81) it is a 6L arterial separated by raised medians from Ellsworth Road to Crismon, then a 4L with raised medians to Meridian Road (medians page 77)	A	A	Will update to further extents

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

69	6	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph three* - 4 lane per the 2040 plan	A	A	Will adjust Crismon Rd to 4 lanes with raised median
70	7	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph four* - medians are required on all legs of arterials to arterials, raised medians are proposed for SB from north of Williams Field to Pecos Roads	A	A	Will update to further extents (Comment 67)
71	8	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph six* - classified as 6L except in segment from south of Guadalupe Road to Williams Field Road where it is a 4L	A	A	Will update to further extents (Comment 67)
72	9	Pg. 1-4 Draft IDCR	*Section 1.3.1, Paragraph six* - medians are required on all legs of arterials to arterials, raised medians are proposed for Meridian from north of Williams Field to Pecos Roads	A	A	Will update to further extents (Comment 67)
73	10	Pg. 1-5 Draft IDCR	*Section 1.3.6, Drainage* - suggest including comment: "see detailed drainage report".	A	A	Will add
74	11	Pg. 4-1 Draft IDCR	*Section 4.2, Table 1* - typo	A	A	Will fix spelling of Clearance
75	12	Pg. 4-1 Draft IDCR	*Section 4.2, Table 2* - typo	A	A	Will fix spelling of Clearance
76	13	Pg. 4-2 Draft IDCR	*Section 4.3, SR 24 Interim Freeway Concept* - Can we add language in the introduction section that references: The interim concept will include accommodation for a trail; the City may open it prior to the freeway's ultimate construction.	A	A	Will add

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Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

77	14	Pg. 4-8 Draft IDCR	*Section 4.11.3, Landscaping* - The interim landscape should support the construction of a shared use pathway.	B/C	A	We will reference seeding on the trail
78	15	Pg. 4-9 Draft IDCR	*Section 4.15.1, FMS Communications and Trunk Line* - Should the foundation/infrastructure be constructed with interim and at ultimate pull wire, etc. as desired/needed?	D	A	DISCUSSION NEEDED We received comment from ADOT Central Phoenix Construction District during our CRA meeting to not include FMS infrastructure as it gets damaged prior to fiber being pulled. Text to be added to DCR Update to reflect that conduit should be included along the corridor for signal use.
79	16	Pg. 4-9 Draft IDCR	*Section 4.15.1, FMS Communications and Trunk Line* - Per Avery R. If signals are to be operated by COM we desire to get fiber to them sooner rather than later. I would recommend that conduit be added to any bridge structures; If the freeway crosses any canals, drainage areas, etc. it would be a good idea to get a conduit crossing in those structures if they are built now. COM wants to know which traffic signals we were going to have in this interim condition so we recommend some conduit that could help us right away	B/C	A	DISCUSSION NEEDED Text to be added to DCR Update to reflect that conduit should be included along the corridor for signal use.
			ERIK GUDERIAN, CITY OF MESA			
80	1	Pg. 4-4 Draft IDCR	*Section 4.4.3, Paragraph one* - It should be assumed that Williams Field could be open during the interim condition. Most likely not at opening day, but at some point.	A	A	Will assume it is open.

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

81	2	Pg. 4-4 Draft IDCR	*Section 4.4.6, Paragraph one* - Has this been proposed to Fuji in previous meetings with them? There is a new development plan for the north section of their property.	D	D	Yes, we have provided our design and have met with Fuji Film on 3/3/16. There are benefits to Fuji Film as well by reducing the R/W impacts along SR-24

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			MARC AHLSTROM, CITY OF MESA			
82	1	Pg. 1-5 Draft IDCR	*Table 1, Ellsworth Cross Street* - There is also a 20" water line in Ellsworth. Both water lines are DIP.	A	A	Will add
83	2	Pg. 4-4 Draft IDCR	*Section 4.4.4, Crismon Road Grade Separation* - This should be included in the cost of the freeway.	A	A	Portion inside ADOT R/W to be included in the ultimate SR 24 project.
			AL ZUBI, CITY OF MESA			
84	1	Pg. 4-4 Draft IDCR	*Section 4.4.4, Crismon Road Grade Separation* - Same comment on the economic impact on adjacent properties as Mountain Rd.	A	A	Portion inside ADOT R/W to be included in the ultimate SR 24 project.
85	2	Pg. 4-4 Draft IDCR	*Section 4.4.4, Paragraph one* - How will that be funded if not by the SR24 project?	A	A	It will be funded by SR-24 just not the interim project.
86	3	Pg. 4-4 Draft IDCR	*Section 4.4.6, Mountain Road Grade Separation* - Raising Mountain Rd will also have an economic impact on the other three corners/properties, by limiting access. Would ADOT take that in consideration, and not just discuss the impact with just Fuji, but the other property owners?	A	A	A statement will be added to the document about ADOT R/W acquisition process and Final Design.
87	4	Pg. 4-4 Draft IDCR	*Section 4.4.6, Paragraph one* – Remove reference to 2011 DCR as the nature of the grade separation changed *(Parsons interpretation of the highlighted text)*	A	A	It will be removed.

A-Will Comply
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			CHAUN HILL, MARICOPA ASSOCIATION OF GOVERNMENTS			
88	1	General, Draft IDCR	Please correct references to read “SR-24”	A	A	Will update
89	2	Pg. 1-1 Draft IDCR	*Executive Summary* - When referencing “Group 3” of the RTPFP, should this be “Phase 3”?	D	D	Latest RTPFP describes “Groups” rather than “Phases”
90	3	Pg. 1-1 Draft IDCR	*Section 1.3.3, Paragraph two* – “City of Mesa has requested that the new right-of-way accommodate a future multi-use path that may follow the SR-24 alignment.” Is this request accommodated within the currently identified right-of-way footprint, or will additional right-of way be necessary?	A	A	The proposed R/W accommodates the trail.
91	4	Pg. 3-1 Draft IDCR	*Section 3.3, Paragraph one* – “Connectivity of Mountain Road between Williams Field Road and Pecos Road must not be removed in the interim alternatives.” This again brings up the concern of interim and ultimate access. If interim access is provided at Mountain Road, does this provide the expectation that access will be provided in the ultimate condition? Is this the intent of the ultimate project?	A	A	Will clarify, Mountain Road is only a Grade Separated Crossing; it is not an interchange and will not have direct access to SR-24. Intent was to not cut off Mountain road with SR 24 (ie a grade separation is needed)
			QUINN CASTRO, MARICOPA ASSOCIATION OF GOVERNMENTS			
92	5	Pg. 5-1 Draft IDCR	*Section 5.0,* – Present this section as the total corridor costs only, with a breakout of a combined segment 1 and 2 together (all within Maricopa County) and only one separate segment from Meridian to Ironwood (because it’s within Pinal County). This seems to	A	A	The reason for the breakout into 3 segments was if the project was only constructed to Signal Butte (based on funding) then the costs are broken out. If funding allows project to be constructed to Ironwood, then the Signal Butte to Meridian Road estimate was

A-Will Comply
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			continuously provide data that leads the reader to believe this is a multiple choice project. The distinction (if really relevant) between the counties truly only represents the difference in funding sources. It’s good to have the segment data BUT, this document should clearly show a continuous recommended interim roadway from Ellsworth to Ironwood. This estimate should align with the Interim Phase 2 Ellsworth Road to Ironwood Road implementation plan on page 6-1.			the remaining portion within Maricopa County. We can combine the estimates.
93	6	Pg. 6-1 Draft IDCR	*Section 6.2,* – The last paragraph needs to be revised to reflect the changes above related to the estimate.	A	A	It will be revised.
			CHUCK CHRISTIANSEN, PREMIER ENGINEERING CORP FOR PHX-MESA GATEWAY AIRPORT			
94	1	General	The PMGAA led Ellsworth Channel Relocation project recently completed a coordinated effort to obtain existing condition (without future SR-24 extension) hydrology and future condition (with future SR-24 extension) hydrology models. The results show an increase of approximately 1200 cfs in the Powerline Floodway in the future conditions model with the future SR-24 extension constructed. The increased flows affect the channel relocation. Please provide a coordinated solution to the increase with project stakeholders and/or mitigate the increase.	C	D	The interim condition will collect flows only to Ironwood Road. However, the peak flow will be in excess of the 1,200 cfs. Attenuation can not happen without an additional detention basin. The original DCR regulated the outflow to the Powerline Floodway to 1,650 cfs. The current project follows the same conditions.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			LANCE WEBB, CITY OF MESA			
95	1	App. E - Draft Initial Drain. Report	For the offsite channel options, Parsons has only provided adequate freeboard for the Powerline Floodway for the dirt lined, not concrete lined. The concrete lined channel will require a greater freeboard since the hydraulics of the channel at this location is supercritical and 1-ft of freeboard is not adequate. This alternative needs to be modified to meet hydraulics requirements for channel design.	B	A	Powerline Floodway widening was not tabulated in Appendix E of the Draft Initial Drainage Report, but only the SR-24 offsite channel. Powerline Floodway was not included in the Draft document because the cross section and profile are being assessed and coordinated with the conceptual design work for the Ellsworth Channel Relocation, which followed the SR 24 submittal. The analysis will be included with the Initial Drainage Report.
96	2	App. F - Draft Initial Drain. Report	Should the concrete lined option be pursued, more volume will be required to attenuate flows within the outfall basin prior to passing under the existing (already constructed)crossing under the SR 24	B	A	That is correct The concrete lined option is the most likely to be pursued for the channel. Hence, the additional detention volume was evaluated, a new location for the extra volume was identified and a practical diversion solution is being devised.
97	3	App. D - Draft Initial Drain. Report	(PARSONS Note - Repeat of Comment 93/1 by Chuck Christiansen): The PMGAA project for the relocation of the Ellsworth Channel project has been coordinating with ADOT as far as the flows to expect. The results from this report for the future conditions (with future SR-24 extension) show an increase of ~1200 CFS in the Powerline Floodway for future conditions with future SR -24 extension constructed. The increased flows for the model affect how the channel can and will be relocated. Please provide a coordinated solution to mitigate this increase in flows by likely upsizing the outfall basin to accommodate this additional flow	C	D	The interim condition will collect flows only to Ironwood Road. However, the peak flow will be in excess of the 1,200 cfs. Attenuation can not happen without an additional detention basin. The original DCR regulated the outflow to the Powerline Floodway to 1,650 cfs. The current project follows the same conditions.

A-Will Comply
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C-ADOT To Evaluate
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Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

			GLENN GAELICK, ADOT ROADWAY DESIGN SUPPORT			
98	1	G-2.06	Why is there 17.5 outside lane widths here vs 17' on previous crossroads?	B	D	This was from the Original DCR, no change was made to the section widths.
99	2	G-2.07	Please clarify the need for 18.5' outside lane width vs previous 17' dimension for same on other crossroads.	B	D	This was from the Original DCR, no change was made to the section widths.
100	3	C-1.01	1) Tangent Length for Curve Ref No. 800 seems excessive. Please check. 2) POT's 49 & 50 for Exst Ellsworth Cst CL do not show up on Geometric layout sheets although they seem to be called out as Pt. No's 20899 & 20909. Please clarify. 3) L & T shown for curve Ref No. 813 do not substantiate data shown on Geo Layout sheet C-2.01. Please check.	A A A	A A A	1) Will Revise to 1396.32' 2) Will revise Point numbers to match the layout sheets. 3) Will revise the Geo layout sheets
101	4	C-1.03	POT 2094 (Signal Butte) seems to be shown as 20943 of Sht C-2.06. Please clarify.	A	A	Number should be 20943
102	5	C-2.03	Suggest value in showing SR24 Med. Cst CL Sta where Section 27's south section line crosses.	A	A	Will Add

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

103	6	C-3.01	1) Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Ellsworth. 2) Suggest some investigation as to feasibility of either false work or soffit fill for construction of the SR24 overpass structure. Downside of soffit fill could be differential settlement of the exst. PCCP. False work construction would need to be accommodated in proposed clearance over Ellsworth. 3) Proximity of proposed retaining wall adjacent to Ellsworth Ramp D Lt could pose construction problems. Please investigate.	C B B	A D D	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We are showing the “Full Access Control” limits in the plans per ADOT R/W request. Ellsworth Rd will require a variance at the NE Quadrant, based on approved Development Plat Plans for Cadence Parkway. 2) Soffit Fill will probably not be feasible here because the interim interchange will need to remain open. False work should work, but will confirm clearances 3) Retaining wall is approx 15' at its closest point.
104	7	C-3.05	Based on plans data there may be an excessive grade difference across the gore nose at Ellsworth Ramp D. Please check.	B	A	Profile to be revised.
105	8	C-3.07	Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Williams Field.	B	A	Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A
106	9	C-3.09 & C-03.10	Beginning profile grade seems to be missing for Ramps A & B.	A	A	Will add
107	10	C-3.11	Ramp terminus station seems to be at odds with callouts on Sht C-3.13. Please check.	A	A	Will revise

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Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

108	11	C-3.13	Would there be value in extending access control north and south of Crismon per RDG due to the likelihood that the approach embankments would limit access anyway?	B/C	A	Will show access control
109	12	C-3.19	1) Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Signal Butte. 2) Based on plans data there may be an excessive grade difference across the gore nose at Signal Butte Ramp C. Please check.	C B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A 2) Profile to be revised.
110	13	C-3.23	Recommend acquisition of access control per ADOT RDG Fig 506A on both ends of Mountain to encompass embankment prism and to limit access to points far enough away from the crest VC to provide reasonable decision sight distance.	B/C	A	Will show access control
111	14	C-3.24	Mainline VC data is obscured on Rt end.	A	A	Will revise
112	15	C-3.27	1) Recommend extending access ctrl to comply with ADOT RDG Fig 506A on both ends of Meridian. 2) Do proposed clearances over Meridian provided by mainline profile accommodate false work construction for the SR24 overpass structure?	C B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A. 2) Will confirm
113	16	C-3.31	Graphic location of Ironwood Ramp B Gore is at odds with Gore Ctrl Point callout. Please check.	A	A	Will update the plan call out.

Client Project Manager: Ronald McCally
Consultant: PARSONS

114	17	C-4.07	1) Recommend extending access ctrl to comply with ADOT RDG Fig 506A. 2) Do proposed clearances over Ironwood provided by mainline profile accommodate false work construction for the SR24 overpass structure?	A B	A A	1) Discussion has occurred on this subject with ADOT R/W. Some development planning has occurred based on the pre-2014 RDG Access Control Requirements. We will show Access Control (Full & Right in Right Out per the RDG Fig 506A. 2) Will revise.
115	18	General	Juxtaposition of interim ramps and mainline with future mainline and/or crossroad structures raises questions about construction compatibility. Cross sections would be of value in determining any serious conflicts.	B/C	D	The interim design will allow for the future ultimate construction to be compatible.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

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FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

APPENDIX E – TRAFFIC ANALYSIS REPORT

SR-24
Design Concept Report

Traffic Analysis Report

SR-24: Ellsworth Road to
Ironwood Road - ADOT Central District

December 2016
Project No. 14-670A

Prepared For:

Parsons Corporation
222 South Mill Avenue, Suite 220
Tempe, AZ 85208

For Submittal to:

Arizona Department of Transportation

Prepared By:

CivTech

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SR 24 INTERIM PHASE II DCR
TRAFFIC ANALYSIS REPORT

SR 24: Ellsworth Road to Ironwood Road
ADOT Central District

Prepared for:

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Registered Professional Engineer (Civil)
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Date Signed 12/19/16
ARIZONA, U.S.A.
Expires 12-31-16

December 2016

CivTech Project # 14-670A

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EXECUTIVE SUMMARY

State Route (SR) 24 is currently a 1.3-mile freeway segment connecting Loop 202 to Ellsworth Road. The Arizona Department of Transportation (ADOT) has retained Parsons Transportation Group (Parsons) to complete an Interim Phase II Design Concept Report (DCR) and Environmental Evaluation to evaluate the interim and buildout alternatives of SR 24. CivTech Inc. has been retained by Parsons to evaluate the operation of the existing conditions and the proposed alternatives detailed in the Interim Phase II DCR.

CivTech evaluated two interim alternatives for SR 24 in 2025. Option A proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Ironwood Road. Mountain Road would be “grade separated” over SR 24. Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road. In 2035, SR 24 is considered to be a controlled access freeway extending the existing freeway from Ellsworth Road to Ironwood Drive. Freeway interchanges will be provided at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road, and Ironwood Drive.

This report documents the traffic analysis and recommendations of the alternatives provided in the SR 24 Interim Phase II DCR. The specific objectives of the study are:

1. To determine existing level of service for the SR 24 interchange at Ellsworth Road.
2. To evaluate the crash experience and patterns at the existing SR 24 interchange at Ellsworth Road.
3. To determine future Levels of Service (LOS) for all proposed interchanges and study alternatives within the study area.
4. To determine necessary lane configurations at all proposed traffic interchanges and freeway segments within the study area.

The following findings, conclusions, and recommendations have been documented in this study:

Existing Conditions

- All existing intersection approaches operate at an acceptable level of service (LOS D) with the existing lane configurations and stop control except for select turning movements during the AM and PM peak hours. The northbound left turn movement experiences delays in the AM peak hour due to a combination of the high left turn volume and southbound volumes and the limited green time for the northbound left turn movement. The eastbound right turn movement experiences delay in the PM peak hour due to the limited green time for the eastbound approach as a result of the high demand of vehicles on Ellsworth Road.

- The segment of SR 24 from Loop 202 to Ellsworth Road experienced 24 crashes in 2014 and 2015. The data provided does not seem to indicate any unusual crash pattern.

- The intersections of SR 24 at Ellsworth Road experienced 27 crashes in 2014 and 2015. The data provided does not seem to indicate any unusual crash patterns.

2025 Option A Scenario

- Option A proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Ironwood Road. Mountain Road would be “grade separated” over SR 24.

- Grade separation of interchanges is not recommended in the 2025 Option A scenario.

- The 2025 Option A intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 6**.

- The results of the intersection capacity analysis in **Table 5** indicate that the SR 24 intersections at Ellsworth Road and Signal Butte Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.
    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour. An alternate mitigation analysis is also included in this report.
    - The intersection of ***Signal Butte Road and WB SR 24 Ramps*** is predicted to experience delays in the AM peak hour. The high volumes of

    through vehicles on westbound SR 24 conflict with the NB left turning vehicles travelling to westbound SR 24. An alternate mitigation analysis is also included in this report.

    - The intersection of ***Signal Butte Road and EB SR 24 Ramps*** is predicted to experience delays in the PM peak hour. The high volumes of through vehicles on eastbound SR 24 conflict with the SB left turning vehicles travelling to eastbound SR 24. An alternate mitigation analysis is also included in this report.

2025 Option A Mitigated Analysis

- A mitigation analysis was performed for the 2025 Option A scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 6** to improve levels of service.

- The results of the intersection capacity analysis in **Table 6** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM peak hour. The demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement.
    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour.

2025 Option B Scenario

- Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road.

- Grade separation of interchanges is not recommended in the 2025 Option B scenario.

- The 2025 Option B intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 7.**

- The results of the intersection capacity analysis in **Table 7** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.

    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. An alternate mitigation analysis is also included in this report..

2025 Option B Mitigated Analysis

- A mitigation analysis was performed for the 2025 Option B scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 7** to improve levels of service.

- The results of the intersection capacity analysis in **Table 8** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours. The proposed mitigation measures are not predicted to improve the level of service at the intersections of Ellsworth Road and SR 24 in 2025.

2035 Horizon Year

- In 2035, SR 24 is considered to be a controlled access freeway, extending the existing freeway from Ellsworth Road to Ironwood Drive. Freeway interchanges will be provided at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road, and Ironwood Drive.

- The 2035 intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 8.**

- The results of the intersection capacity analysis indicate that all study intersection approaches and movements are predicted to operate at LOS D or better during the peak hours except for select movements at the intersection of ***Meridian Road and SR 24 WB Ramps***.

- The northbound left turning vehicles and westbound left turning vehicles conflict at the intersection of ***Meridian Road and SR 24 WB Ramps*** and are expected to experience delays in the AM peak hour. Vehicles are expected to queue on the westbound on ramp and northbound left turn lane. It is not uncommon for heavy turning movements at freeway interchanges to experience delays in the peak hour. No mitigation is recommended.

INTRODUCTION

State Route (SR) 24 is currently a 1.3-mile freeway segment connecting Loop 202 to Ellsworth Road. The Arizona Department of Transportation (ADOT) has retained Parsons Transportation Group (Parsons) to complete an Interim Phase II Design Concept Report (DCR) and Environmental Evaluation to evaluate the interim and buildout alternatives of SR 24. CivTech Inc. has been retained by Parsons to evaluate the operation of the existing conditions and the proposed alternatives detailed in the Interim Phase II DCR.

ADOT previously completed a DCR for SR 24 between SR 202L and Ironwood Road in April 2011. Since then MAG authorized a study “SR 24 Williams Gateway Freeway, Ellsworth Road – Ironwood Road Interim Phase II Feasibility Study (600-0110-14)” to be completed by Parsons. As a result of the Feasibility Study, ADOT has decided that an interim condition for SR 24 between Ellsworth Road and Ironwood Drive should be evaluated and has requested Parsons to complete an Interim Phase II DCR and Environmental Evaluation of the project limits. The DCR will evaluate several interim condition alternatives and provide a recommended interim alternative.

Study Area

The study area includes the proposed interim and final configuration of SR 24 in 2025 and 2035. The following intersections were analyzed in this study:

- Ellsworth Road/SR 24 EB Ramps
- Ellsworth Road/SR 24 WB Ramps
- Williams Field Road/SR 24 EB Ramps
- Williams Field Road/SR 24 WB Ramps
- Signal Butte Road/SR 24 EB Ramps
- Signal Butte Road/SR 24 WB Ramps
- Meridian Road/SR 24 EB Ramps
- Meridian Road/SR 24 WB Ramps
- Ironwood Drive/SR 24 EB Ramps
- Ironwood Drive/SR 24 WB Ramps

Horizon Years

CivTech evaluated two interim alternatives for SR 24 in 2025. Option A proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Ironwood Road. Mountain Road would be “grade separated” over SR 24. Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road. In 2035, SR 24 is considered to be a controlled access freeway extending the existing freeway from Ellsworth Road to Ironwood Drive. Freeway interchanges will be provided at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road, and Ironwood Drive.

EXISTING CONDITIONS

EXISTING ROADWAY NETWORK

The existing roadway network within the study area includes State Route (SR) 24, Ellsworth Road, Williams Field Road, Crismon Road, Signal Butte Road, Meridian Road, and Ironwood Drive.

SR 24 is a freeway segment connecting Loop 202 to Ellsworth Road. It consists of two (2) lanes in each direction of travel. SR 24 was opened on May 4, 2014. It currently does not have a posted speed limit.

Ellsworth Road is a north-south five-lane arterial roadway with two (2) lanes in the northbound movement and three (3) lanes in the southbound movement. Ellsworth Road begins just south of Empire Boulevard, continuing north for about 18 miles before terminating at McDowell Road. Within the vicinity of the study area, the posted speed limit on Ellsworth Road is 50 miles per hour (mph).

Williams Field Road is an east-west two-lane roadway with one (1) lane in each direction of travel. Within the vicinity of the site, Williams Field Road begins to the east at Meridian Road and continues west for about 1.25 miles terminating at 222nd Street. The posted speed limit on Williams Field Road is 35 mph.

Crismon Road would be a north-south section line roadway. Currently it is an unimproved dirt road serving farm fields in the area.

Signal Butte Road is a north-south section line roadway. It begins to the north at Jensen Street, continuing south for about 8.4 miles before terminating just south of Ray Road. It provides as least one (1) lane in each direction and in some locations two (2) lanes in each direction. The posted speed limit on Signal Butte Road is 45-mph.

Meridian Road is a north-south 2-lane roadway with one (1) lane in the northbound movement and one (1) lane in the southbound movement. Meridian Road begins approximately ½ mile north of Elliot Road and continues south for about 2.5-miles before terminating at Ray Road. The posted speed limit on Meridian Road is 35-mph.

Ironwood Drive is a north-south 4-lane divided roadway with two (2) lanes in each direction separated by a median. Ironwood Drive begins to the north at McDowell Boulevard, continuing south for about 21.1 miles before terminating at Bella Vista Road. The posted speed limit on Ironwood Drive is 45-mph.

EXISTING INTERSECTION CONFIGURATION

The intersection of **Ellsworth Road and Eastbound SR 24 Off-Ramp** operates as a three-legged signalized intersection with protective/permissive right-turn phasing in the eastbound approach. The northbound approach consists of four (4) lanes – two (2) through lanes and two (2) left turn storage lanes. The southbound approach consists of three (3) through lanes. The eastbound approach consists of dual left-turn lanes as well as dual right-turn lanes.

The intersection of **Ellsworth Road and Westbound SR 24 On-Ramp** operates as a three-legged signalized intersection with protective left-turn phasing in the northbound approach. The northbound approach consists of dual left-turn lanes and two (2) through lanes. The southbound approach consists of three (3) through lanes and a dedicated right-turn lane.

Figure 1 depicts existing lane geometry and traffic controls for the project study area.

EXISTING TRAFFIC VOLUMES

Field Data Services of Arizona (FDS) conducted turning movement counts at the intersection of Ellsworth Road and State Route 24 between 7:00 AM and 9:00 AM and 4:00 PM and 6:00 PM on January 5, 2016. Existing peak hour traffic count data is shown on **Figure 1** and provided within **Appendix B**.

EXISTING LEVELS OF SERVICE ANALYSIS

Peak hour capacity analyses have been conducted for the study intersections based on existing conditions and traffic volumes. All intersections have been analyzed using the methodologies presented in the *Highway Capacity Manual (HCM), Special Report 209,* Updated 2010 and using Synchro Software version 9.0 under the HCM 2010 methodology.

The concept of level-of-service (LOS) uses qualitative measures that characterize operational conditions within the traffic stream. The individual levels-of-service are described by factors that include speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations A through F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions. **Table 1** lists the level of service criteria for signalized intersections.

Table 1 – Level-of-Service Criteria for Signalized Intersections

Level-of-Service	Signalized Control Delay (sec/veh)
A	≤ 10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

Source: Exhibit 18-4 Highway Capacity Manual 2010

Results of the existing level-of-service analyses are shown in **Table 2** for both the AM and PM peak hours. Analysis worksheets for the existing conditions have been included in **Appendix C**. The traffic signals to the EB and WB Loop 202 ramps at Ellsworth Road were analyzed using a 120-second traffic cycle length.

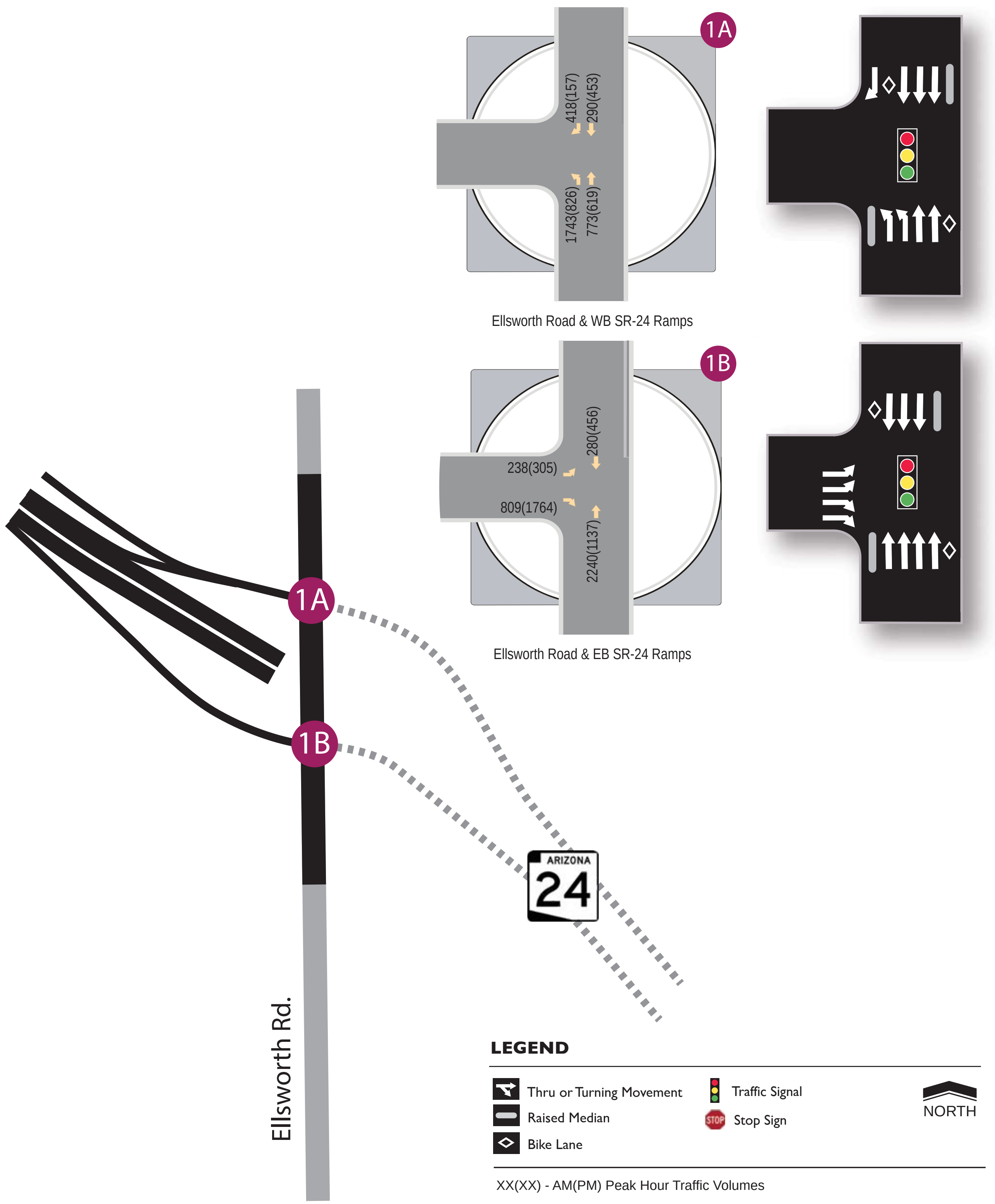

Figure 1: Existing Lane Configurations and Traffic Volumes

Table 2 – Existing Level of Service Summary

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	Thru	Right	Overall
1A	Ellsworth Road & WB SR 24 Ramps	Signalized	NB	F(D)	A(A)	--(--)	D(C)
			SB	--(--)	C(A)	D(B)	C(B)
			Overall	**D(C)**			
1B	Ellsworth Road & EB SR 24 Ramps	Signalized	NB	--(--)	C(D)	--(--)	C(D)
			SB	--(--)	A(C)	--(--)	A(C)
			EB	C(A)	--(--)	D(F)	C(E)
			Overall	**C(E)**			

All existing intersection approaches operate at an acceptable level of service (LOS D) with the existing lane configurations and stop control except for select turning movements during the AM and PM peak hours. The northbound left turn movement experiences delays in the AM peak hour due to a combination of the high left turn volume and southbound volumes and the limited green time for the northbound left turn movement. The eastbound right turn movement experiences delay in the PM peak hour due to the limited green time for the eastbound approach as a result of the high demand of vehicles on Ellsworth Road.

CRASH ANALYSIS

The following crash analysis was developed from historical data obtained by CivTech from the Arizona Department of Transportation. Construction on SR 24 was completed in May 2014. The Arizona Department of Transportation collects crash data annually, reporting the data in July. Therefore, the crash history data represents the periods available, May 2014 through July 2015.[1] For the purposes of this analysis, CivTech has organized the data in intervals by calendar year 2014, reporting from May 2014 to December 2014, and calendar year 2015, representing January 2015 through July 2015.

CivTech identified a one-year total of 24 crashes (without any fatalities) on SR 24 from Loop 202 to Ellsworth Road and 27 crashes (without any fatalities on SR 24 from Loop 202) at the intersection of SR 24 and Ellsworth Road. The results are summarized in **Table 3** and **Table 4,** respectively. The crash data provided by the Arizona Department of Transportation can be found in **Appendix D**.

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[1] ADOT is charged by statute with the responsibility of tracking all incidents involving motor vehicles occurring, reported, and investigated in the State. ADOT has neither the mandate nor the staff to fulfill requests for crash data for specific locations (as they generously had in previous years), only providing crash data for the entire State on an annual basis.

Table 3 - Crash Experience on SR 24 from Loop 202 to Ellsworth Road

Crash Severity	2014	2015	*Total*
Fatality Crashes	-	-	*-*
Injury Crashes	1	1	*2*
Non-Injury, Property Damage Only	10	12	*22*
TOTAL	11	13	*24*
Crash Type	**2014**	**2015**	***Total***
Rear End	10	11	*21*
Sideswipe Same Direction	-	2	*2*
Other	1	-	*1*
TOTAL	11	13	*24*

The segment of SR 24 from Loop 202 to Ellsworth Road experienced 24 crashes in 2014 and 2015. Of these crashes, 2 (8%) caused injuries (no fatalities) and the remaining did not cause any injuries. Regarding crash types, 21 (88%) were rear end, 2 (8%) were sideswipe, and 1 (4%) was classified as “other”. The data provided does not seem to indicate any unusual crash patterns.

Table 4 - Crash Experience at the Intersection of SR 24 and Ellsworth Road

Crash Severity	2014	2015	*TOTAL*
Fatality Crashes	-	-	*-*
Injury Crashes	2	1	*3*
Non-Injury, Property Damage Only	13	11	*24*
TOTAL	**15**	**12**	*27*
Crash Type	**2014**	**2015**	***TOTAL***
Angle	-	2	*2*
Head On	-	1	*1*
Left Turn	2	1	*3*
Rear End	4	5	*9*
Sideswipe Same Direction	7	2	*9*
Other	2	1	*3*
TOTAL	**15**	**12**	*27*

The intersections of SR 24 at Ellsworth Road experienced 27 crashes in 2014 and 2015. Of these crashes, 3 (11%) caused injuries (no fatalities) and the remaining did not cause any injuries. Regarding crash types, 9 (33%) were rear end, 9 (33%) were sideswipe (same direction), 3 (11%) were left-turn, 2 (7%) were angle, 1 (4%) was head on, and the remaining 3 (11%) were classified as “other”. The data provided does not seem to indicate any unusual crash patterns.

FUTURE PROJECTED TRAFFIC VOLUMES

DESIGN CONCEPT REPORT ALTERNATIVES

The DCR evaluates SR 24 in the interim condition in 2025 and as a controlled access freeway in 2035. Two interim alternatives for SR 24 are evaluated in 2025. Option A proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Ironwood Road. Mountain Road would be “grade separated” over SR 24. Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road.

In 2035, SR 24 is considered to be a controlled access freeway, extending the existing freeway from Ellsworth Road to Ironwood Drive. Freeway interchanges will be provided at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road, and Ironwood Drive.

PROJECTED SEGMENT TRAFFIC VOLUMES

CivTech received information from the Maricopa Association of Governments (MAG) Travel Demand Model on January 13, 2016 for the 2025 and 2035 horizon years. CivTech proposed two interim traffic scenarios for the 2025 horizon year. The first scenario, referred to as Option A, proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Ironwood Road. Mountain Road would be “grade separated” over SR 24. Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road.

The 2035 analysis studied the construction of SR 24 from Ellsworth Road to Ironwood Drive with full access interchanges at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road and Ironwood Drive. The requested MAG regional travel demand model data is included in **Appendix E**.

PROJECTED TURNING MOVEMENT VOLUMES

CivTech developed the turning movements for all of the study intersections based on the total average daily volumes from the MAG Travel Demand Model. NCHRP methodologies were evaluated but found to produce abnormal results due the smaller volume from the daily ramp volumes compared to the large through volumes predicted by the MAG model.

A smoothing technique was utilized to better distribute the ramp volumes during the peak hour and develop turning movements for each intersection. Peak hour values of eight percent (8%) and nine percent (9%) were applied to the daily volumes to calculate the AM and PM peak hour volumes, respectively. North-south directional splits were determined from the existing traffic counts. These volumes indicated a prevailing travel pattern to the north and west in the AM peak hour and south and east in the PM peak hour. Initial directional assumptions were assumed and then adjusted to balance the approach and departure volumes at each interchange. Turning percentages were initially assumed and adjusted to balance the calculated directional departure volume against the resulting sum of the appropriate turning volumes assigning vehicles to that departure.

Calculations used to determine the AM and PM peak hour turning movement volumes at each study location are included in **Appendix F**.

The 2025 Option A turning movements are shown in **Figure 2**, the 2025 Option B turning movements are shown in **Figure 3** and the 2035 turning movements are shown in **Figure 4.** Average Annual Daily Traffic Volumes are depicted in **Figure 5** for 2025 Option A, 2025 Option B and 2035.

TRAFFIC AND IMPROVEMENT ANALYSIS

Peak hour capacity analyses have been conducted for the study intersections. All intersections have been analyzed using the methodologies as described previously and presented in the *Highway Capacity Manual (HCM), Special Report 209,* updated 2010 and using Synchro Software version 9.0 under the HCM 2010 methodology.

Results of the analysis for the 2025 Option A and 2025 Option B scenarios, and the 2035 horizon year conditions have been included in **Appendices G, I and K** respectively.

A mitigation analysis was performed for the 2025 Option A and B scenarios at intersections that are predicted to experience delays in the AM and PM peak hours. Results of the 2025 Option A Mitigated Analysis and 2025 Option B Mitigated Analysis have been included in **Appendices H and J** respectively.

2025 OPTION A INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2025 Option A intersection capacity analysis was performed using the unmitigated lane configurations and stop control as shown in **Figure 6**. The resulting intersection movement level of service is shown in **Table 5.** An alternate mitigated intersection movement level of service analysis is shown in **Table 6.**

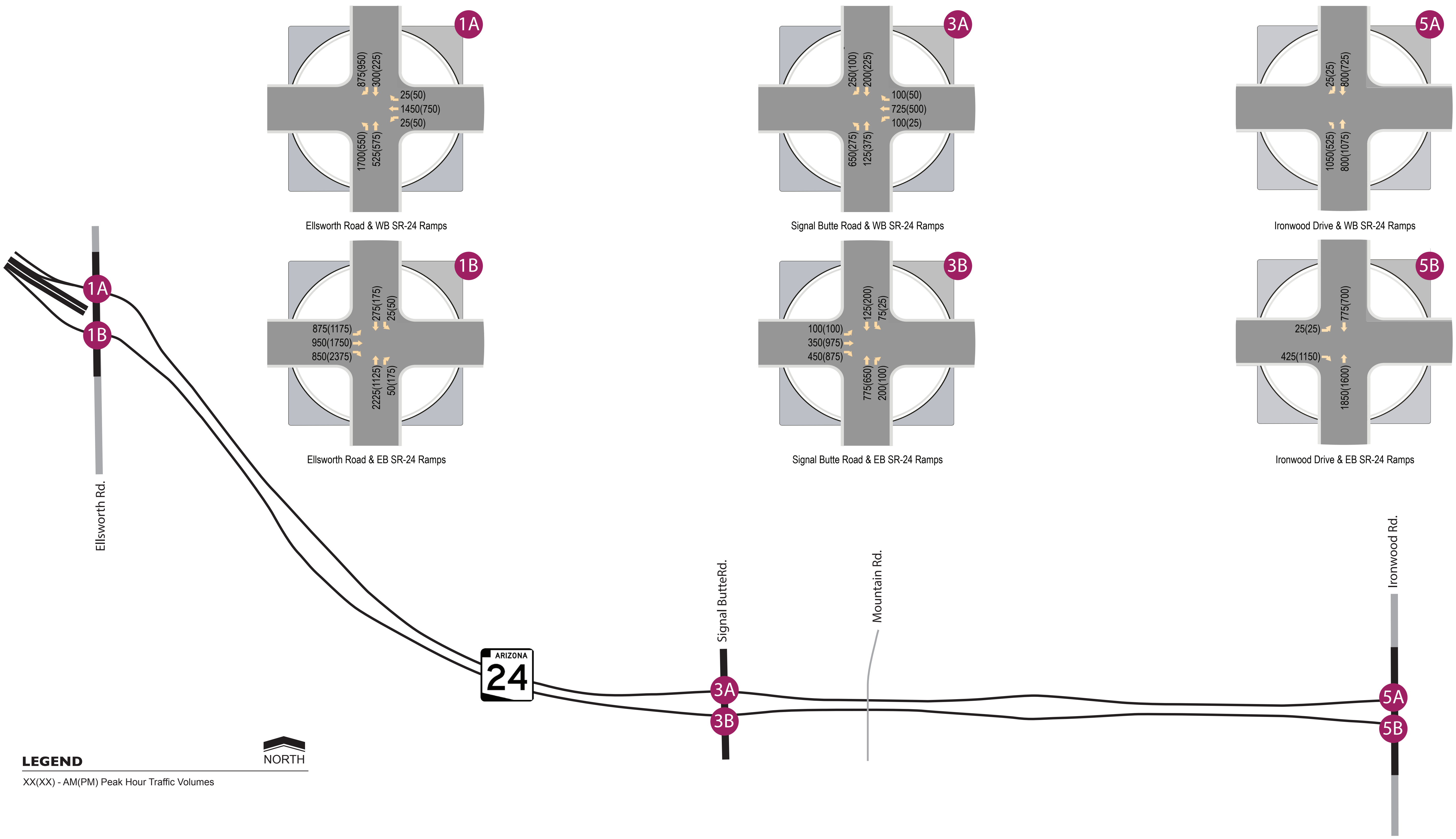


Figure 2: 2025 Option A - Peak Hour Volumes

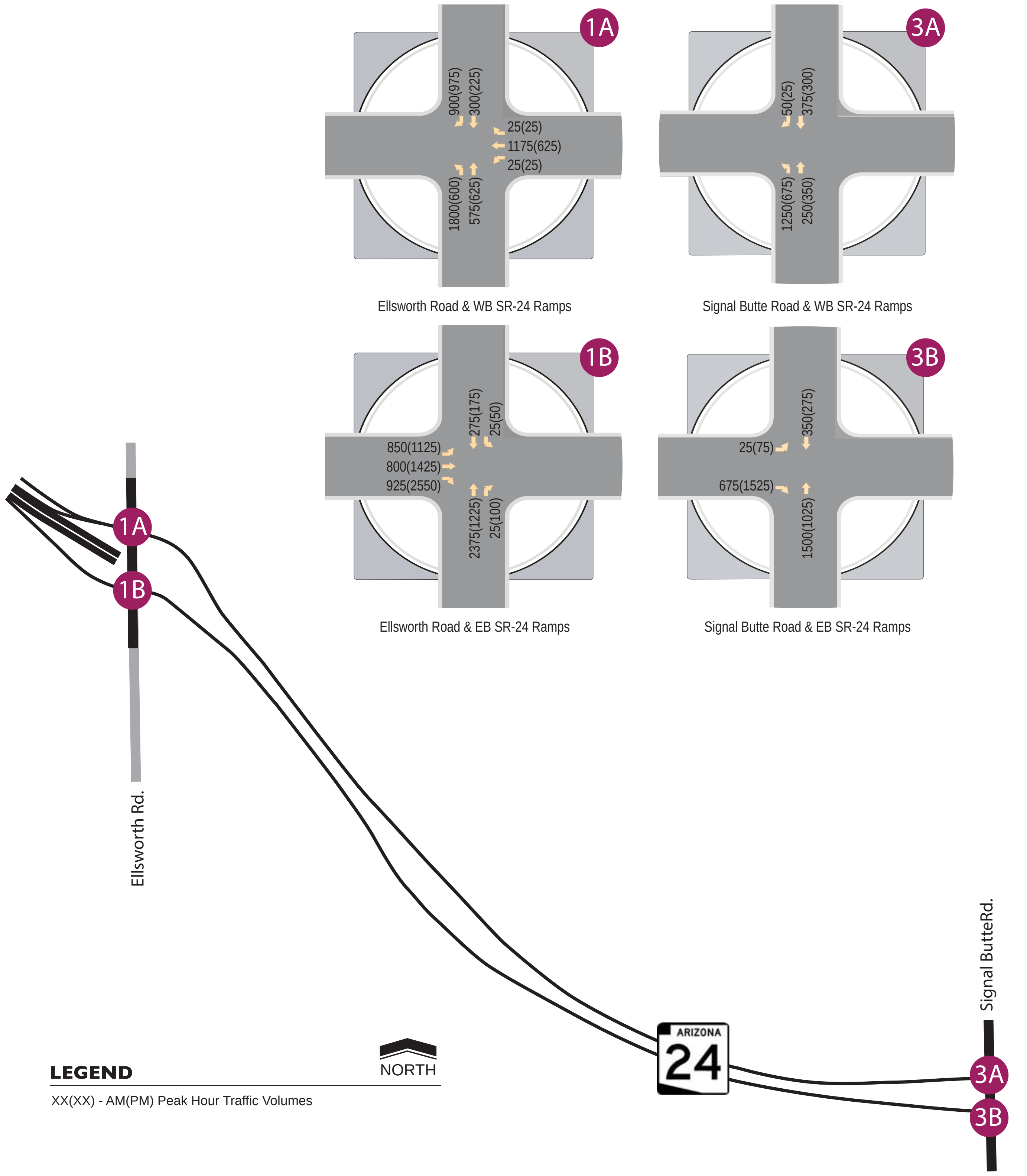


Figure 3: 2025 Option B - Peak Hour Volumes

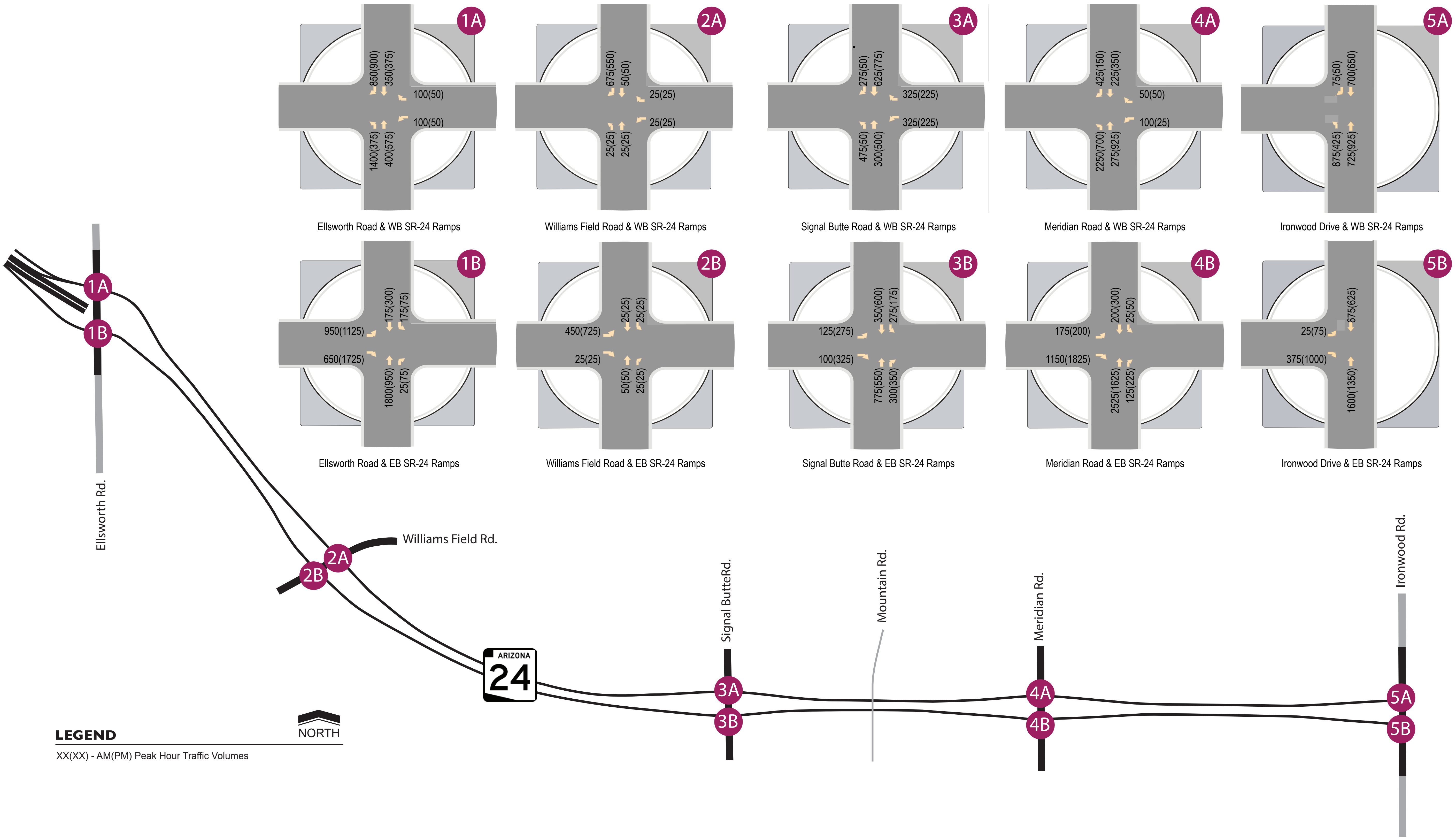


Figure 4: 2035 Peak Hour Volumes

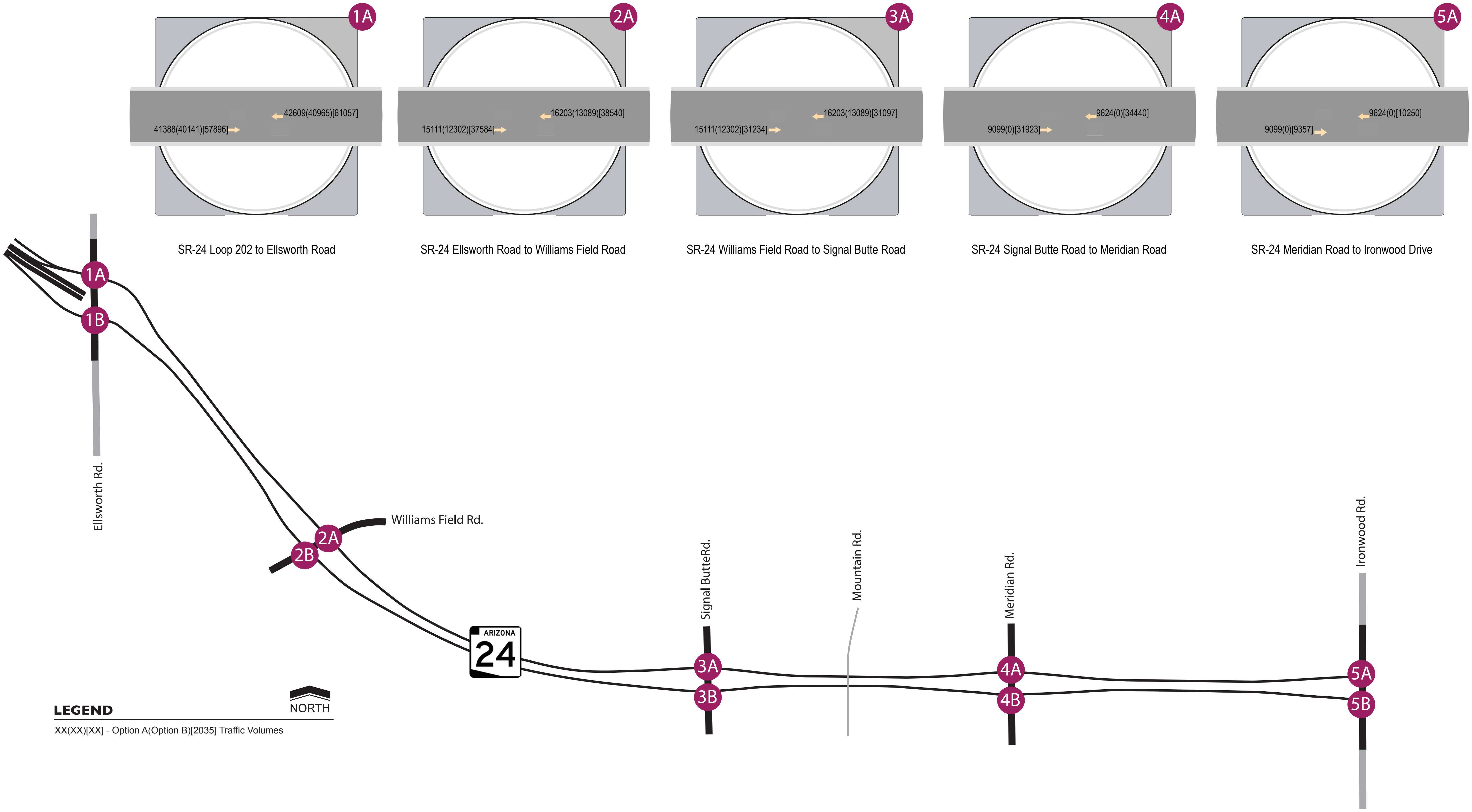


Figure 5: 2025 and 2035 AADT Volumes

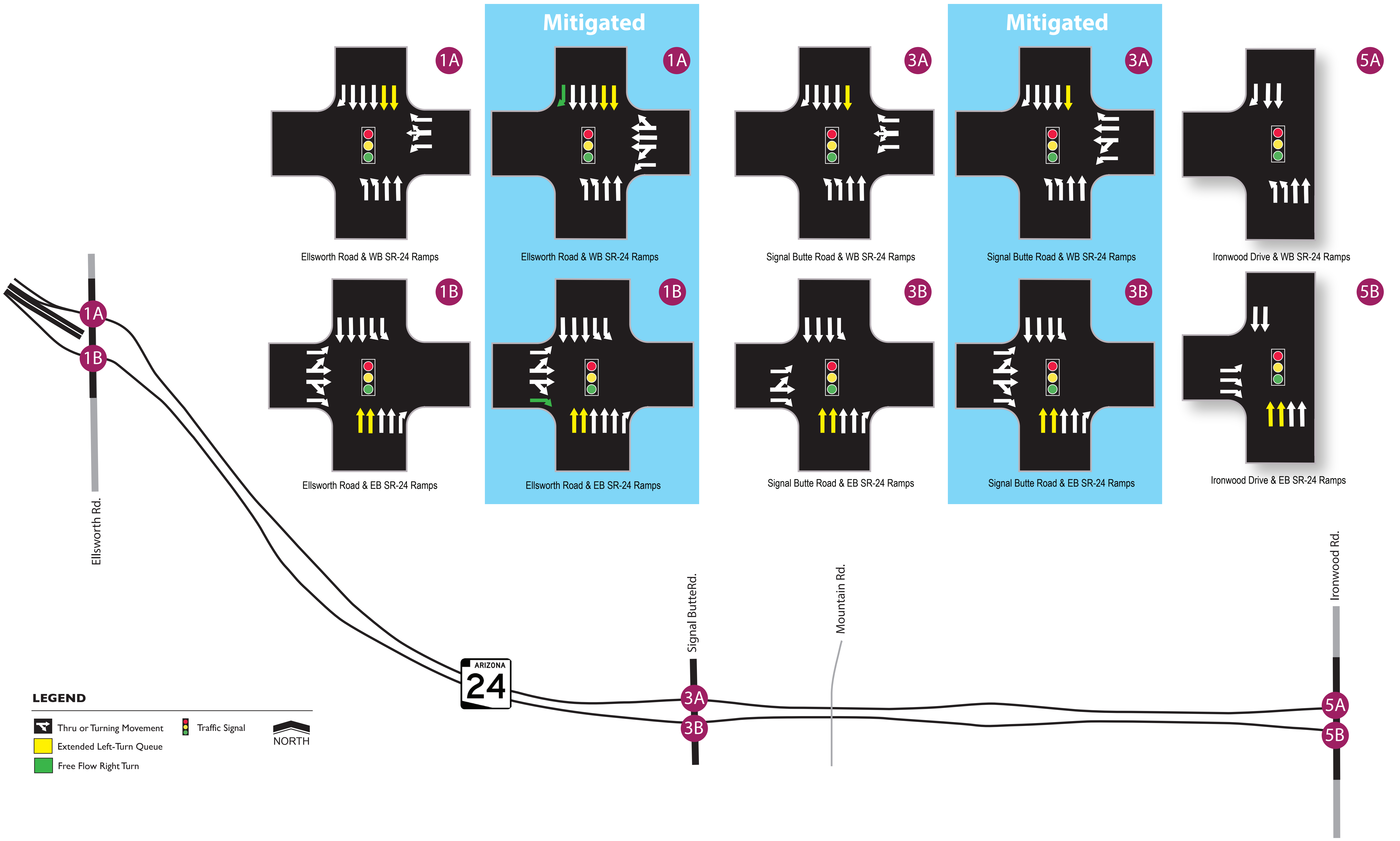


Figure 6: 2025 Option A - Proposed Lane Configurations and Stop Controls

Table 5 – 2025 Option A Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	Thru	Right	Overall
1A	Ellsworth Road & WB SR 24 Ramps(1)	Signalized	NB	F(F)	A(A)	--(--)	F(E)
			SB	--(--)	D(B)	A(A)	D(B)
			WB	C(D)	F(F)	C(D)	F(F)
			Overall	**F(F)**			
1B	Ellsworth Road & EB SR 24 Ramps(1)	Signalized	NB	--(--)	F(D)	C(D)	F(D)
			SB	D(D)	A(B)	--(--)	A(C)
			EB	D(C)	D(F)	A(A)	D(F)
			Overall	**F(E)**			
3A	Signal Butte Road & WB SR 24 Ramps(1)	Signalized	NB	C(D)	A(A)	--(--)	C(C)
			SB	--(--)	C(C)	D(D)	C(C)
			WB	C(B)	F(C)	C(B)	E(C)
			Overall	**F(C)**			
3B	Signal Butte Road & EB SR 24 Ramps(1)	Signalized	NB	--(--)	D(D)	D(D)	D(D)
			SB	D(D)	A(B)	--(--)	C(B)
			EB	B(B)	C(F)	C(F)	C(E)
			Overall	**C(E)**			
5A	Ironwood Drive & WB SR 24 Ramps	Signalized	NB	A(A)	A(A)	--(--)	A(A)
			SB	--(--)	C(B)	C(B)	C(B)
			Overall	**B(A)**			
5B	Ironwood Drive & EB SR 24 Ramps	Signalized	NB	--(--)	C(D)	--(--)	B(D)
			SB	--(--)	A(B)	--(--)	A(B)
			EB	C(B)	--(--)	A(A)	C(B)
			Overall	**B(C)**			

(1) An alternate mitigation analysis has been performed for the intersections of the SR 24 Ramps and Ellsworth Road and the intersections of the SR 24 Ramps and Signal Butte Road and included in this report.

The results of the intersection capacity analysis in **Table 5** indicate that the SR 24 intersections at Ellsworth Road and Signal Butte Road are expected to experience delays during the peak hours.

The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.

The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour. An alternate mitigation analysis is also included in this report.

The intersection of ***Signal Butte Road and WB SR 24 Ramps*** is predicted to experience delays in the AM peak hour. The high volumes of through vehicles on westbound SR 24 conflict with the NB left turning vehicles travelling to westbound SR 24. An alternate mitigation analysis is also included in this report.

The intersection of ***Signal Butte Road and EB SR 24 Ramps*** is predicted to experience delays in the PM peak hour. The high volumes of through vehicles on eastbound SR 24 conflict with the SB left turning vehicles travelling to eastbound SR 24. An alternate mitigation analysis is also included in this report.

2025 OPTION A MITIGATED INTERSECTION LEVEL OF SERVICE ANALYSIS

A mitigation analysis was performed for the 2025 Option A scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 6** to improve levels of service. The resulting intersection movement level of service is shown in **Table 6.** Grade separation of interchanges is not recommended in the 2025 Option A Mitigated Scenario**.**

Table 6 – 2025 Option A Mitigated Analysis Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	Thru	Right	Overall
1A	Ellsworth Road & WB SR 24 Ramps	Signalized	NB	F(F)	A(A)	--(--)	F(E)
			SB	--(--)	D(B)	A(A)	D(B)
			WB	C(D)	D(D)	D(D)	D(D)
			Overall	**F(D)**			
1B	Ellsworth Road & EB SR 24 Ramps	Signalized	NB	--(--)	F(D)	C(D)	F(D)
			SB	D(D)	A(B)	--(--)	A(C)
			EB	D(C)	D(F)	A(A)	D(F)
			Overall	**F(E)**			
3A	Signal Butte Road & WB SR 24 Ramps	Signalized	NB	C(D)	A(A)	--(--)	C(C)
			SB	--(--)	C(C)	D(D)	D(C)
			WB	C(B)	D(C)	C(B)	D(C)
			Overall	**D(C)**			
3B	Signal Butte Road & EB SR 24 Ramps	Signalized	NB	--(--)	D(D)	D(D)	D(D)
			SB	D(D)	A(B)	--(--)	C(B)
			EB	B(B)	C(C)	C(C)	C(C)
			Overall	**C(C)**			

The results of the intersection capacity analysis in **Table 6** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.

The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM peak hour. The demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement.

The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour.

2025 OPTION B INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2025 Option B mitigated intersection capacity analysis was performed using the unmitigated lane configurations and stop control as shown in **Figure 7**. The resulting intersection movement level of service is shown in **Table 7.** An alternate mitigated intersection movement level of service analysis is shown in **Table 8**.

Table 7 – 2025 Option B Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	Thru	Right	Overall
1A	Ellsworth Road & WB SR 24 Ramps[(1)]	Signalized	NB	F(F)	A(A)	--(--)	F(F)
			SB	--(--)	D(C)	A(A)	D(C)
			WB	C(C)	D(C)	D(C)	D(C)
			Overall	**F(E)**			
1B	Ellsworth Road & EB SR 24 Ramps[(1)]	Signalized	NB	--(--)	F(D)	C(D)	F(D)
			SB	D(D)	A(B)	--(--)	A(C)
			EB	C(C)	C(D)	A(A)	C(D)
			Overall	**E(D)**			
3A	Signal Butte Road & WB SR 24 Ramps	Signalized	NB	B(A)	A(A)	--(--)	A(A)
			SB	--(--)	B(C)	B(C)	B(C)
			Overall	**B(A)**			
3B	Signal Butte Road & EB SR 24 Ramps	Signalized	NB	--(--)	C(D)	--(--)	C(D)
			SB	--(--)	A(C)	--(--)	A(C)
			EB	B(A)	--(--)	A(A)	B(A)
			Overall	**C(D)**			

(1) An alternate mitigation analysis has been performed for the intersections of the SR 24 Ramps and Ellsworth Road and included in this report.

The results of the intersection capacity analysis in **Table 7** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.

The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.

The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. An alternate mitigation analysis is also included in this report.

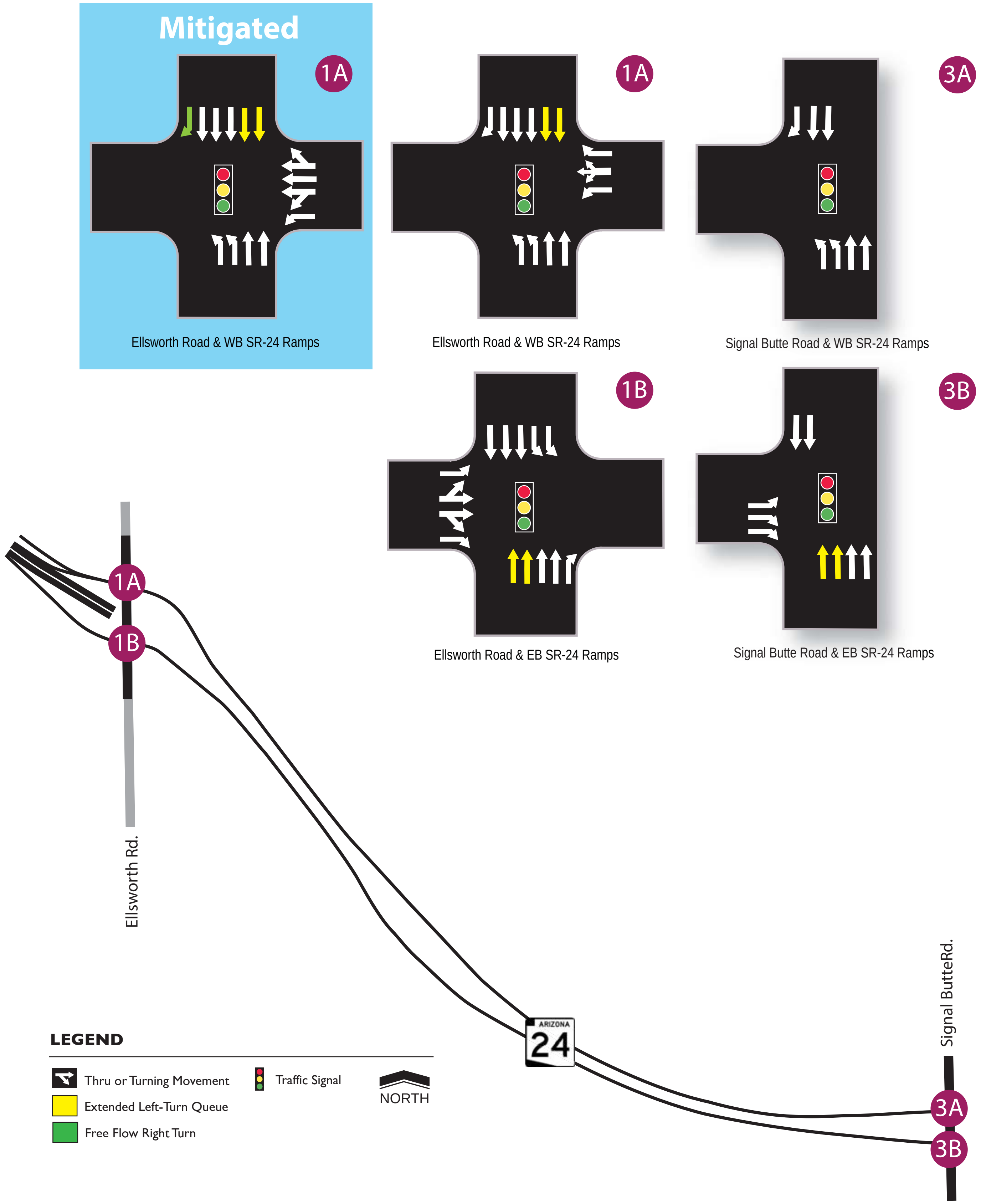


Figure 7: 2025 Option B - Proposed Lane Configurations and Stop Controls

2025 OPTION B MITIGATED INTERSECTION LEVEL OF SERVICE ANALYSIS

A mitigation analysis was performed for the 2025 Option B scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 7** to improve levels of service. Grade separation of interchanges is not recommended in the 2025 Option B Mitigated Scenario.

The 2025 Option B mitigated intersection capacity analysis was performed using the recommended lane configurations as shown in **Figure 7**. The resulting intersection movement level of service is shown in **Table 8.**

Table 8 – 2025 Option B Mitigated Analysis Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	**Thru**	**Right**	**Overall**
1A	Ellsworth Road & WB SR 24 Ramps	Signalized	NB	F(F)	A(A)	--(--)	F(F)
			SB	--(--)	D(C)	A(A)	D(C)
			WB	C(C)	D(C)	D(C)	D(C)
			Overall	**F(E)**			
1B	Ellsworth Road & EB SR 24 Ramps	Signalized	NB	--(--)	F(D)	C(D)	F(D)
			SB	D(D)	A(B)	--(--)	A(C)
			EB	C(C)	C(D)	A(A)	C(D)
			Overall	**E(D)**			

The results of the intersection capacity analysis in **Table 8** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours. The proposed mitigation measures are not predicted to improve the level of service at the intersections of Ellsworth Road and SR 24 in 2025.

2035 INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2035 intersection capacity analysis was performed using the recommended lane configurations as shown in **Figure 8**. The resulting intersection movement level of service is shown in **Table 9.**

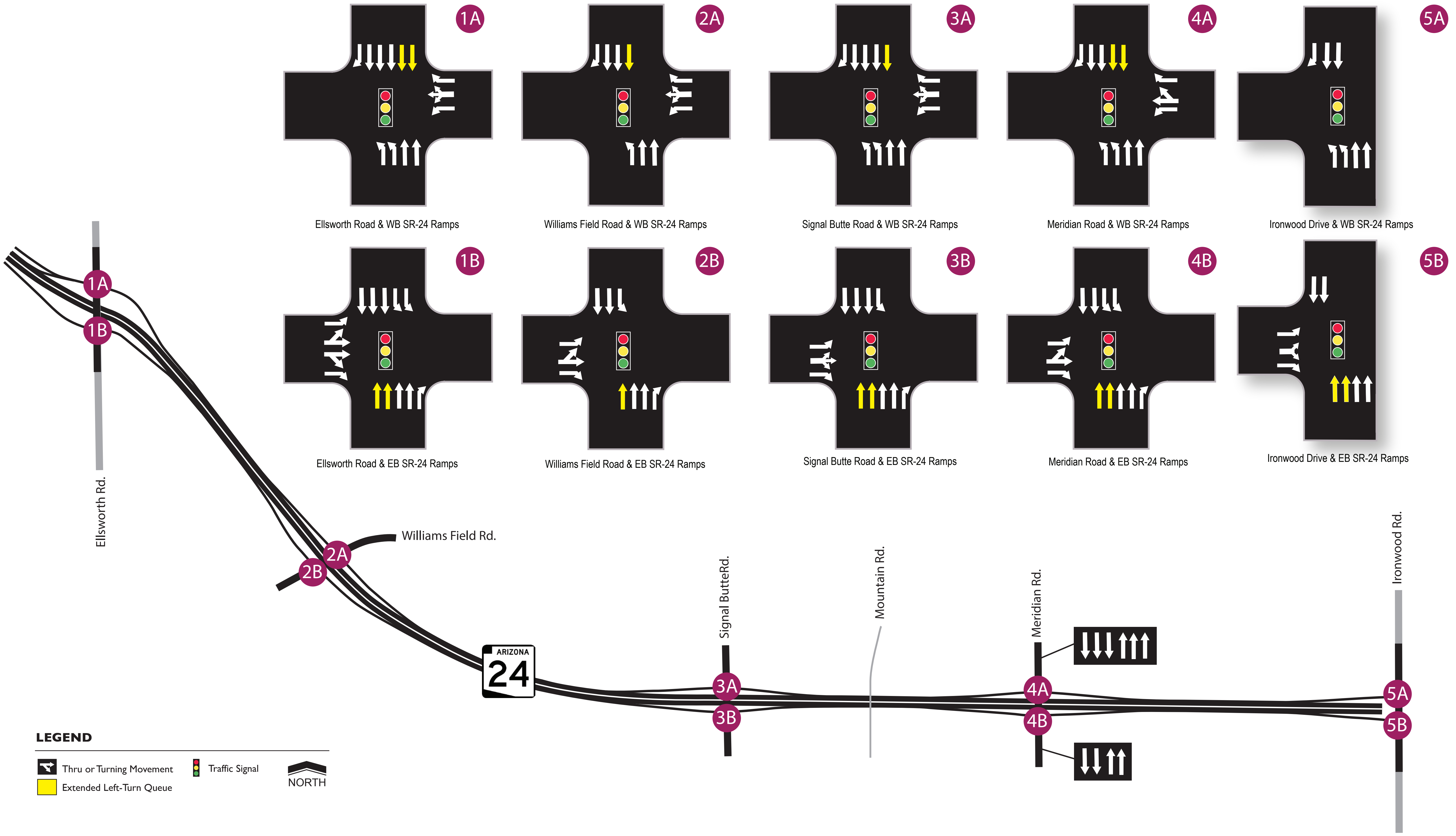


Figure 8: 2035 Proposed Lane Configurations and Stop Controls

Table 9 – 2035 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	AM (PM) Peak Hour			
				Left	Thru	Right	Overall
1A	Ellsworth Road & WB SR 24 Ramps	Signalized	NB	C(D)	A(A)	--(--)	C(B)
			SB	--(--)	D(B)	A(A)	D(B)
			WB	D(C)	--(--)	D(C)	D(C)
			Overall	**C(C)**			
1B	Ellsworth Road & EB SR 24 Ramps	Signalized	NB	--(--)	D(D)	C(D)	D(D)
			SB	D(D)	A(A)	--(--)	C(B)
			EB	D(C)	--(--)	A(A)	D(C)
			Overall	**C(C)**			
2A	Williams Field Road & WB SR 24 Ramps	Signalized	NB	B(B)	A(A)	--(--)	A(A)
			SB	--(--)	B(B)	C(C)	C(C)
			EB	C(C)	--(--)	C(C)	C(C)
			Overall	**C(C)**			
2B	Williams Field Road & EB SR 24 Ramps	Signalized	NB	--(--)	C(C)	C(C)	C(C)
			SB	C(C)	A(A)	--(--)	B(B)
			WB	B(B)	--(--)	B(B)	B(B)
			Overall	**C(C)**			
3A	Signal Butte Road & WB SR 24 Ramps	Signalized	NB	B(D)	A(A)	--(--)	A(A)
			SB	--(--)	D(C)	D(C)	D(C)
			EB	D(C)	--(--)	D(C)	D(C)
			Overall	**C(B)**			
3B	Signal Butte Road & EB SR 24 Ramps	Signalized	NB	--(--)	C(C)	D(C)	C(C)
			SB	C(D)	A(A)	--(--)	B(A)
			WB	D(D)	--(--)	D(D)	D(D)
			Overall	**C(C)**			
4A	Meridian Road & WB SR 24 Ramps	Signalized	NB	F(A)	A(A)	--(--)	D(A)
			SB	--(--)	D(D)	A(A)	D(D)
			WB	E(D)	--(--)	D(D)	D(D)
			Overall	**D(B)**			
4B	Meridian Road & EB SR 24 Ramps	Signalized	NB	--(--)	D(D)	C(C)	D(D)
			SB	C(C)	A(A)	--(--)	A(A)
			EB	D(C)	--(--)	A(A)	D(C)
			Overall	**D(C)**			
5A	Ironwood Drive & WB SR 24 Ramps	Signalized	NB	A(A)	A(A)	--(--)	A(A)
			SB	--(--)	C(B)	B(A)	C(B)
			Overall	**A(A)**			
5B	Ironwood Drive & EB SR 24 Ramps	Signalized	NB	--(--)	B(D)	--(--)	B(D)
			SB	--(--)	A(B)	--(--)	A(B)
			EB	C(B)	--(--)	C(B)	C(B)
			Overall	**B(C)**			

The results of the intersection capacity analysis indicate that all study intersection approaches and movements are predicted to operate at LOS D or better during the peak hours except for select movements at the intersection of ***Meridian Road and SR 24 WB Ramps***.

The northbound left turning vehicles and westbound left turning vehicles conflict at the intersection of ***Meridian Road and SR 24 WB Ramps*** and are expected to experience delays in the AM peak hour. Vehicles are expected to queue on the westbound on ramp and northbound left turn lane. It is not uncommon for heavy turning movements at freeway interchanges to experience delays in the peak hour. No mitigation is recommended.

INTERSECTION AND FREEWAY SEGMENT LANE REQUIREMENTS

As a result of the intersection capacity analyses and the projected AADT's, the proposed intersection approach lane configurations are depicted in **Figure 6, Figure 7** and **Figure 8** for the 2025 Option A, 2025 Option B and 2035 scenarios.

CONCLUSIONS AND RECOMMENDATIONS

The following findings, conclusions, and recommendations have been documented in this study:

Existing Conditions

- All existing intersection approaches operate at an acceptable level of service (LOS D) with the existing lane configurations and stop control except for select turning movements during the AM and PM peak hours. The northbound left turn movement experiences delays in the AM peak hour due to a combination of the high left turn volume and southbound volumes and the limited green time for the northbound left turn movement. The eastbound right turn movement experiences delay in the PM peak hour due to the limited green time for the eastbound approach as a result of the high demand of vehicles on Ellsworth Road.
- The segment of SR 24 from Loop 202 to Ellsworth Road experienced 24 crashes in 2014 and 2015. The data provided does not seem to indicate any unusual crash pattern.
- The intersections of SR 24 at Ellsworth Road experienced 27 crashes in 2014 and 2015. The data provided does not seem to indicate any unusual crash patterns.

2025 Option A Scenario

- Option A proposes extending SR 24 from Ellsworth Road to Ironwood Drive as an at grade arterial roadway with an at grade intersection at Signal Butte Road. The existing at grade intersection with Ellsworth Road would remain if possible and an "end of expressway" condition would occur at Ironwood Road. Mountain Road would be "grade separated" over SR 24.
- Grade separation of interchanges is not recommended in the 2025 Option A scenario.
- The 2025 Option A intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 6**.

- The results of the intersection capacity analysis in **Table 5** indicate that the SR 24 intersections at Ellsworth Road and Signal Butte Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.
    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour. An alternate mitigation analysis is also included in this report.
    - The intersection of ***Signal Butte Road and WB SR 24 Ramps*** is predicted to experience delays in the AM peak hour. The high volumes of through vehicles on westbound SR 24 conflict with the NB left turning vehicles travelling to westbound SR 24. An alternate mitigation analysis is also included in this report.
    - The intersection of ***Signal Butte Road and EB SR 24 Ramps*** is predicted to experience delays in the PM peak hour. The high volumes of through vehicles on eastbound SR 24 conflict with the SB left turning vehicles travelling to eastbound SR 24. An alternate mitigation analysis is also included in this report.

2025 Option A Mitigated Analysis

- A mitigation analysis was performed for the 2025 Option A scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 6** to improve levels of service.

- The results of the intersection capacity analysis in **Table 6** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM peak hour. The demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement.

    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. During the PM peak hour, the heavy through volumes on the SR 24 eastbound off ramp conflict with southbound traffic on Ellsworth Road. Southbound left turning vehicles and the eastbound ramp approach vehicles are expected to experience delays during the PM peak hour.

2025 Option B Scenario

- Option B is an at grade arterial roadway extension from Ellsworth Road to Signal Butte Road with no additional access. The existing at grade intersection with Ellsworth Road would remain if possible and an “end of expressway” condition would occur at Signal Butte Road.

- Grade separation of interchanges is not recommended in the 2025 Option B scenario.

- The 2025 Option B intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 7.**

- The results of the intersection capacity analysis in **Table 7** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours.
    - The intersection of ***Ellsworth Road and WB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During both peak hours, the demand of northbound left turning movement conflicts with the demand of the westbound off ramp through movement. Vehicles are expected to experience delays for the westbound approach movements and northbound left turning movement. An alternate mitigation analysis is included in this report.

    - The intersection of ***Ellsworth Road and EB SR 24 Ramps*** is predicted to experience delays during the AM and PM peak hours. During the AM peak hour, the heavy northbound through volumes on Ellsworth Road require the majority of green time which minimizes the green time available for other movements. An alternate mitigation analysis is also included in this report..

2025 Option B Mitigated Analysis

- A mitigation analysis was performed for the 2025 Option B scenario at intersections that experience delays in the AM and PM peak hours. ADOT may consider the mitigated lane configurations shown in **Figure 7** to improve levels of service.

- The results of the intersection capacity analysis in **Table 8** indicate that the SR 24 intersections at Ellsworth Road are expected to experience delays during the peak hours. The proposed mitigation measures are not predicted to improve the level of service at the intersections of Ellsworth Road and SR 24 in 2025.

2035 Horizon Year

- In 2035, SR 24 is considered to be a controlled access freeway, extending the existing freeway from Ellsworth Road to Ironwood Drive. Freeway interchanges will be provided at Ellsworth Road, Williams Field Road, Signal Butte Road, Meridian Road, and Ironwood Drive.
- The 2035 intersection capacity analysis was performed using the recommended lane configurations and stop control as shown in **Figure 8.**
- The results of the intersection capacity analysis indicate that all study intersection approaches and movements are predicted to operate at LOS D or better during the peak hours except for select movements at the intersection of ***Meridian Road and SR 24 WB Ramps***.
- The northbound left turning vehicles and westbound left turning vehicles conflict at the intersection of ***Meridian Road and SR 24 WB Ramps*** and are expected to experience delays in the AM peak hour. Vehicles are expected to queue on the westbound on ramp and northbound left turn lane. It is not uncommon for heavy turning movements at freeway interchanges to experience delays in the peak hour. No mitigation is recommended.

LIST OF REFERENCES

A Policy on Geometric Design (Green Book). American Association of State and Highway Transportation Officials, Washington D.C., 2011.

Highway Capacity Manual. Transportation Research Board, National Research Council, Washington D.C., 2010.

Manual of Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highways Administration, Washington D.C., 2009.

Maricopa Association of Governments Regional Demand Model

Arizona Department of Transportation Traffic Safety Crash Data (2014 and 2015)

NCHRP Report 765, National Cooperative Highway Research Program, 2014

TECHNICAL APPENDIX

APPENDIX A:	ADOT REVIEW COMMENTS
APPENDIX B:	EXISTING PEAK HOUR TRAFFIC COUNTS
APPENDIX C:	EXISTING PEAK HOUR ANALYSIS
APPENDIX D:	ADOT 2014 AND 2015 CRASH DATA
APPENDIX E:	MAG TRAVEL DEMAND MODEL DATA
APPENDIX F:	PEAK HOUR TURNING MOVEMENT CALCULATIONS
APPENDIX G:	2025 OPTION A PEAK HOUR ANALYSIS
APPENDIX H:	2025 OPTION A MITIGATED PEAK HOUR ANALYSIS
APPENDIX I:	2025 OPTION B PEAK HOUR ANALYSIS
APPENDIX J:	2025 OPTION B MITIGATED PEAK HOUR ANALYSIS
APPENDIX K:	2035 PEAK HOUR ANALYSIS

APPENDIX A

ADOT REVIEW COMMENTS

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
18	12	Traffic Analysis Report	On Page 6, 1st Paragraph under Existing Intersection Configuration it states that the NB approach on Ellsworth consists of four through lanes at the EB off-ramp. Technically there are four lanes going through this intersection but in reality there are only two through lanes. The other two lanes are actually two left turn storage lanes for the WB on-ramp.	A		The text of the report will be updated to clarify that two left turn lanes are queue storage for the northbound left turn lanes at the intersection of Ellsworth Road and SR 24 EB Ramps.
19	13	Traffic Analysis Report	On Page 8 the left turn arrow in Figure 1A is missing.	A		The figure will be corrected.
20	14	Traffic Analysis Report	On Page 9, it appears that the data in Table 2 is backwards for 1A and 1B.	A		
21	15	Traffic Analysis Report	On Page 9 in the first sentence of the 2nd paragraph under Crash Analysis it states, " identified a one-year total of 24 crashes (without any fatalities) on 24 from Loop 202 . . .” Should it not say " identified a one-year total of 24 crashes (without any fatalities on SR 24 from Loop 202. . ."	A		The table will be corrected.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
22	16	Traffic Analysis Report	On Page 11 under Projected Segment Traffic Volumes, it states an "end of freeway" condition. Ellsworth is the "end of freeway" condition and Signal Butte in Option B or Ironwood in Option A would be an "end of expressway" condition. Per the ADOT Roadway Design Guide (2012), "Full access control gives preference to through traffic by providing access only through selected public roads and by prohibiting at-grade crossings or direct access from abutting property. Partial access control still gives preference to through traffic but permits some crossings at grade and some private driveway connections." The 2009 MUTCD defines a Freeway as a divided highway with full access control and an Expressway as a divided highway with partial control of access. "End of freeway" exists at Ellsworth Rd with the at-grade signalized intersection. In the Interim SR 24 could only be labeled as an Expressway with the at-grade intersections with partial controlled access from Ellsworth Rd to Signal Butte Rd/Ironwood Rd, depending on the Option selected.	B	A	The report will be updated to state that Ellsworth Road is an end of expressway condition in Option A.
23	17	Traffic Analysis Report	On Page 4-4 of the DCR, 1st paragraph under 4.4.2 Ellsworth Road Interim TI it states, "For the interim condition, NB Ellsworth Road will be widened to add additional pavement for the future third through lane northbound." The DCR does not state that the third lane would be opened to traffic but is shown as a possibility in Appendix C C-4.01. The projected traffic volumes do not show any projections with the possibility of this third NB through lane	B	A	Pavement widening on Ellsworth Road is to accommodate the 12-foot lane shift of the existing NB through lanes. The additional pavement width will be used for the third northbound left turn lane.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
24	18	Traffic Analysis Report	Currently Signal Butte Rd does not exist in the area of SR 24. From what I understand in the DCR under Option A that this road will not be built by 2025. Under Option B it would become the logical terminus but would still have to be built. Why is it under Option A that you are showing through movements NB and SB through the intersections to a nonexistent road?	B	D	City of Mesa is planning to construct Signal Butte Road from Ray Road to Pecos Road.
25	19	Traffic Analysis Report	In Figure 4 and Figure 5, on the diagram you are showing Meridian Rd as Moeur Rd.	A	A	Will change
26	20	Traffic Analysis Report	On Page 18, 20, Figure 6, and Figure 7 for the Mitigated intersections, adding a third left turn lane for the WB on ramp at Ellsworth would improve the level of service for Option A and Option B but there are other factors that also need to be considered. By adding the third left turn lane this would mean widening Ellsworth Rd with another lane on top of the third NB through lane. Also, the WB on-ramp would need to be widened to three lanes from the existing two in order to accommodate the third left turn lane. By adding the third lane on the ramp there would need to be enough room in order to merge that third lane prior to Ramp A or leaving the third lane as the Ramp A lane from the Ellsworth intersection.	B	D	The third left turn lane has been deleted.
27	21	Traffic Analysis Report	Figure 7, the proposed lane configuration diagrams label 3A and 3B as Ironwood Dr when they should be Signal Butte Rd.	A		The figure will be corrected.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
28	22	Traffic Analysis Report	Page 26 under 2025 Option A Scenario, 1st paragraph Ironwood Rd would not be an "end of freeway" but an "end of expressway" condition. Also it states that Mountain Rd would be "grade separated" over SR 24 but in the next paragraph it states, "Grade separation of interchanges is not recommended in the 2025 Option A scenario." Maybe it should be re-stated that all other interchanges besides Mountain Rd will not be grade separated.	D	D	Mountain Road will not be an interchange. It will just be a grade separated crossing. It will not have direct access to SR-24.
29	23	Traffic Analysis Report	Page 27, third paragraph under 2025 Option A Mitigated Analysis, third line states, . . ."ramp through movement During AM both peak hour." Please clarify.	A	A	The report will be updated to state that the northbound left turn turning movement conflicts with the westbound ramp movements. The word "through" will be deleted.
30	24	Traffic Analysis Report	Page 27 under 2025 Option B Scenario, 1st paragraph, Signal Butte would be "end of expressway" condition and not "end of freeway."	B/C	A	The report will be updated to designate that Signal Butte Road will be an "end of expressway" condition.
			EUNICE CHAN, FHWA			

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

SR 24 (Gateway Freeway) Ellsworth Road to Ironwood Road
in Maricopa County and Pinal County, Arizona

Draft IDCR Comment Response Document

Client Project Manager: Ronald McCally
Consultant: PARSONS

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
31	1	Pg 3, Traffic Analysis Report	2025 Opt A Mitigated Analysis references expected delays for the NB left turn movement at the intersection of Ellsworth Rd and WB SR24 Ramps and no further mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. Appendix H seems to indicate that even with the mitigation measures, there will be a 76.8 s/veh delay for the NBL movement on Ellsworth and SR 24 WB Ramps, and a 102.9 s/veh delay for the EBT movement on Ellsworth Rd and SR 24 EB Ramps.	B	A	The predicted overall level of service for the 2025 Option A mitigated condition is level of service D or better. The predicted delay for northbound left turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.
32	2	Pg 4, Traffic Analysis Report	2035 Horizon Year – mentions that vehicles are expected to queue on the westbound on ramp and northbound left turn lane at the intersection of Meridian Rd and SR 24 WB Ramps and no mitigation is recommended. a. Include discussion of the severity of the impact to justify the recommendation for no mitigation. For example, Appendix K indicates LOS F during peak hours for the NBL in 2035, but the delay is only 58.1 s/veh.	B	A	The predicted overall level of service for the 2035 horizon yea s level of service D or better. The predicted delay for northbound and westbound turning vehicles is in the AM peak hour only. For intersection with heavy through movements, turning movement delays in the peak hour are not uncommon.
33	3	Pg 6, Traffic Analysis Report	Existing Roadway Network – Include sentence on posted speed limit for Meridian Road.	A	A	
34	4	Pg 11, Traffic Analysis Report	Design Concept Report Alternatives and Projected Segment Traffic Volumes discussions appear to be the same?	A	A	The report will be updated.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
35	5	Pg 17, Traffic Analysis Report	Table 5: a. Clarify “recommended lane configurations” in the first sentence. Figure 6 only labels the “Mitigated” configurations. Are the recommended lane configurations the ones that are unlabeled? b. Include discussion of the severity of unmitigated peak hour delays (Appendix G). For example, not incorporating the recommended mitigation would result in LOS F with a delay of 1373.2 s/veh for the NBL and 564.1 veh/s for WBT at the intersection of Ellsworth Rd and SR 24 WB Ramps.	A B	A A	a. Table 5 refers to the unmitigated lane configurations. The text and figures will be updated. b. Table 5 refers to the unmitigated lane configurations. An alternative analysis is shown in Table 6 with the mitigated levels of service. Discussion referring to Table 6 and the mitigated analysis will be added to this section.
36	6	Pg 18, Traffic Analysis Report	Table 6 – See comment 1. Table shows LOS C for EB through movements at Ellsworth Rd and EB SR 24 Ramps. But Appendix H shows LOS F?	A		Table will be updated.
37	7	Pg 19, Traffic Analysis Report	Table 7 – See comment 5.a.	A		Table 7 refers to the unmitigated lane configurations. The text and figures will be updated.
38	8	Pg 21, Traffic Analysis Report	Table 9 – See comment 2.a.	A		Table 9 refers to the unmitigated lane configurations. The text and figures will be updated.
39	9	Traffic Analysis Report	Figure 6 - Didn’t see a difference between the original and the mitigated configuration for 3A or 3B? What was the mitigation?	A		An additional lane was added to the WB and EB approaches of the off ramp intersections.

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

OVERALL COMMENT NO.	REVIEW-ER COMMENT NO.	DWG, SHT, PAGE NO.	COMMENT	INITIAL CODE	FINAL CODE	DESIGNER RESPONSE
40	10	Traffic Analysis Report	Figure 8 – Reason for calling out the lane configurations on Meridian Rd and not for the other crossroads?	D		The lane configuration was shown on Meridian Road to clarify a six lane cross section north of SR 24 and a four lane cross section south of SR 24.
41	11	Pg. 3-1, Draft IDCR	a. Provide description of Tier 1 analysis and background on why it was not used for evaluating the four alternatives. b. Section 3.3.2 Description of Alternatives should reference or include typical sections of each alternative.	D A		a. Tier 1 analysis was used for determining the SR 24 Corridor Alignment in the original DCR. b. Will include typical sections of each
42	12	Pg. 3-2, Draft IDCR	a. Was Alternative B removed from consideration for reasons other than the feasibility of the traffic operation analysis? b. Clarify last sentence under subheading, “Compatibility with Ultimate.”	D A		a. That and the compatibility with the ultimate. b. Will clarify

A-Will Comply
B-Consultant To Evaluate
C-ADOT To Evaluate
D-No Further Action Required

APPENDIX B

EXISTING PEAK HOUR TRAFFIC COUNTS

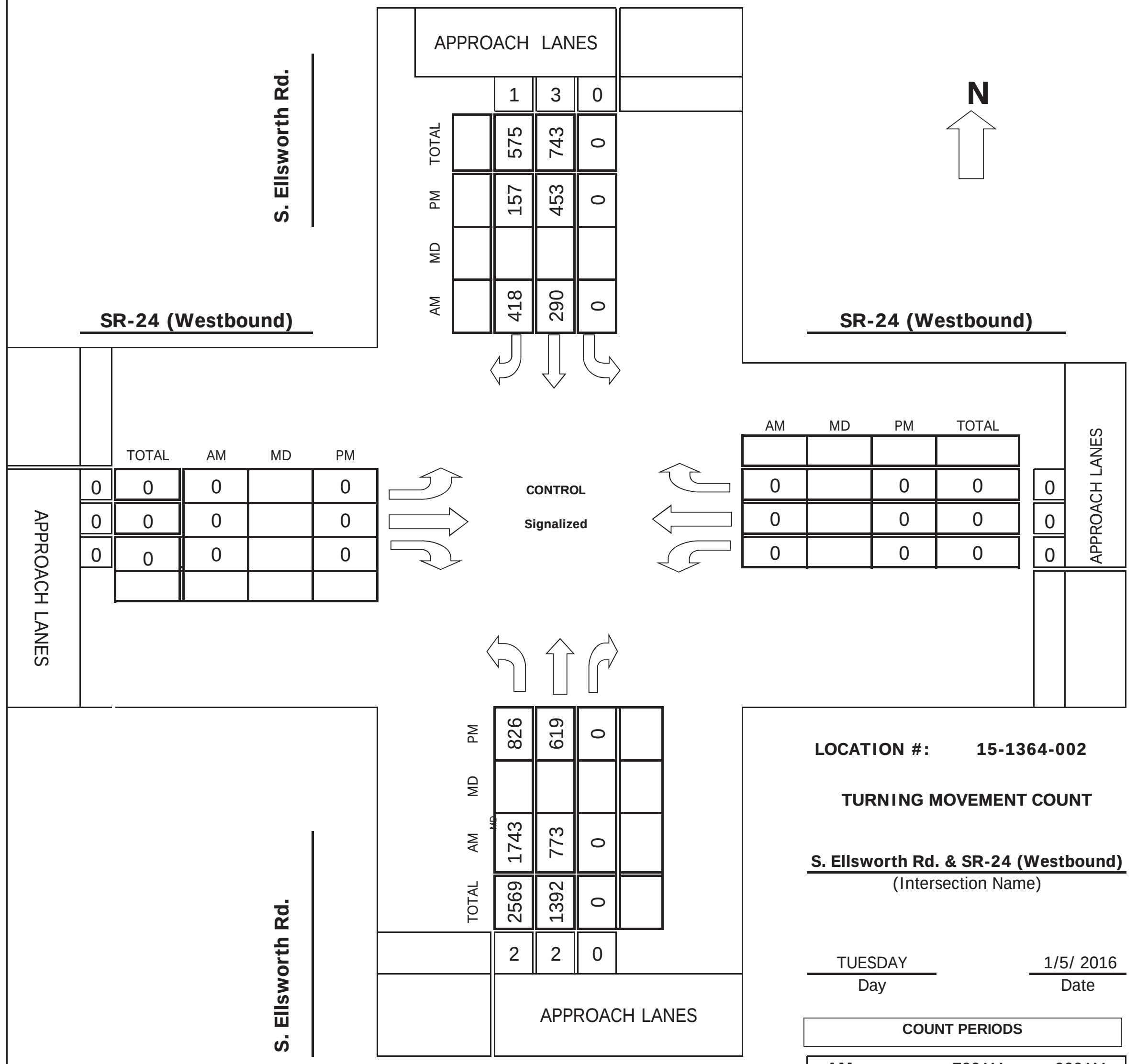
CivTech

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

Project #: 15-1364-002

TMC SUMMARY OF S. Ellsworth Rd. & SR-24 (Westbound)



S. Ellsworth Rd. (north approach)

APPROACH LANES	1	3	0
TOTAL	575	743	0
PM	157	453	0
MD			
AM	418	290	0

SR-24 (Westbound) (west approach)

APPROACH LANES	TOTAL	AM	MD	PM
0	0	0		0
0	0	0		0
0	0	0		0

SR-24 (Westbound) (east approach)

AM	MD	PM	TOTAL	APPROACH LANES
0		0	0	0
0		0	0	0
0		0	0	0

S. Ellsworth Rd. (south approach)

PM	826	619	0
MD			
AM	1743	773	0
TOTAL	2569	1392	0
APPROACH LANES	2	2	0

LOCATION #: 15-1364-002

TURNING MOVEMENT COUNT

S. Ellsworth Rd. & SR-24 (Westbound)
(Intersection Name)

TUESDAY	1/5/ 2016
Day	Date

COUNT PERIODS

AM	700AM	-	900AM
NOON		-	
PM	400PM	-	600PM

AM PEAK HOUR	700 AM
NOON PEAK HOUR	
PM PEAK HOUR	415 PM

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: S. Ellsworth Rd.
DATE: 1/5/ 2016
LOCATION: Mesa
E-W STREET: SR-24 (Westbound)
DAY: TUESDAY
PROJECT# 15-1364-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	2	0	0	3	1	0	0	0	0	0	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	451	226	0	0	56	132	0	0	0	0	0	0	865
7:15 AM	444	161	0	0	88	91	0	0	0	0	0	0	784
7:30 AM	445	189	0	0	64	97	0	0	0	0	0	0	795
7:45 AM	403	197	0	0	82	98	0	0	0	0	0	0	780
8:00 AM	454	159	0	0	71	69	0	0	0	0	0	0	753
8:15 AM	368	180	0	0	52	44	0	0	0	0	0	0	644
8:30 AM	366	162	0	0	58	48	0	0	0	0	0	0	634
8:45 AM	286	108	0	0	51	45	0	0	0	0	0	0	490
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	3217	1382	0	0	522	624	0	0	0	0	0	0	5745
Approach %	69.95	30.05	0.00	0.00	45.55	54.45	####	####	####	####	####	####	
App/Depart	4599	/	1382	1146	/	522	0	/	0	0	/	3841	

AM Peak Hr Begins at: 700 AM

PEAK													
Volumes	1743	773	0	0	290	418	0	0	0	0	0	0	3224
Approach %	69.28	30.72	0.00	0.00	40.96	59.04	####	####	####	####	####	####	
PEAK HR. FACTOR:	0.929			0.941			0.000			0.000			0.932

CONTROL: Signalized
COMMENT 1:
GPS: 33.318251, -111.635702

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: S. Ellsworth Rd.
DATE: 1/5/ 2016
LOCATION: Mesa
E-W STREET: SR-24 (Westbound)
DAY: TUESDAY
PROJECT# 15-1364-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	2	0	0	3	1	0	0	0	0	0	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	237	163	0	0	89	57	0	0	0	0	0	0	546
4:15 PM	219	141	0	0	114	25	0	0	0	0	0	0	499
4:30 PM	183	159	0	0	100	54	0	0	0	0	0	0	496
4:45 PM	195	146	0	0	120	31	0	0	0	0	0	0	492
5:00 PM	229	173	0	0	119	47	0	0	0	0	0	0	568
5:15 PM	189	124	0	0	99	30	0	0	0	0	0	0	442
5:30 PM	188	147	0	0	97	36	0	0	0	0	0	0	468
5:45 PM	174	140	0	0	55	42	0	0	0	0	0	0	411
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	1614	1193	0	0	793	322	0	0	0	0	0	0	3922
Approach %	57.50	42.50	0.00	0.00	71.12	28.88	####	####	####	####	####	####	
App/Depart	2807	/	1193	1115	/	793	0	/	0	0	/	1936	

PM Peak Hr Begins at: 415 PM

PEAK													
Volumes	826	619	0	0	453	157	0	0	0	0	0	0	2055
Approach %	57.16	42.84	0.00	0.00	74.26	25.74	####	####	####	####	####	####	
PEAK HR. FACTOR:	0.899			0.919			0.000			0.000			0.904

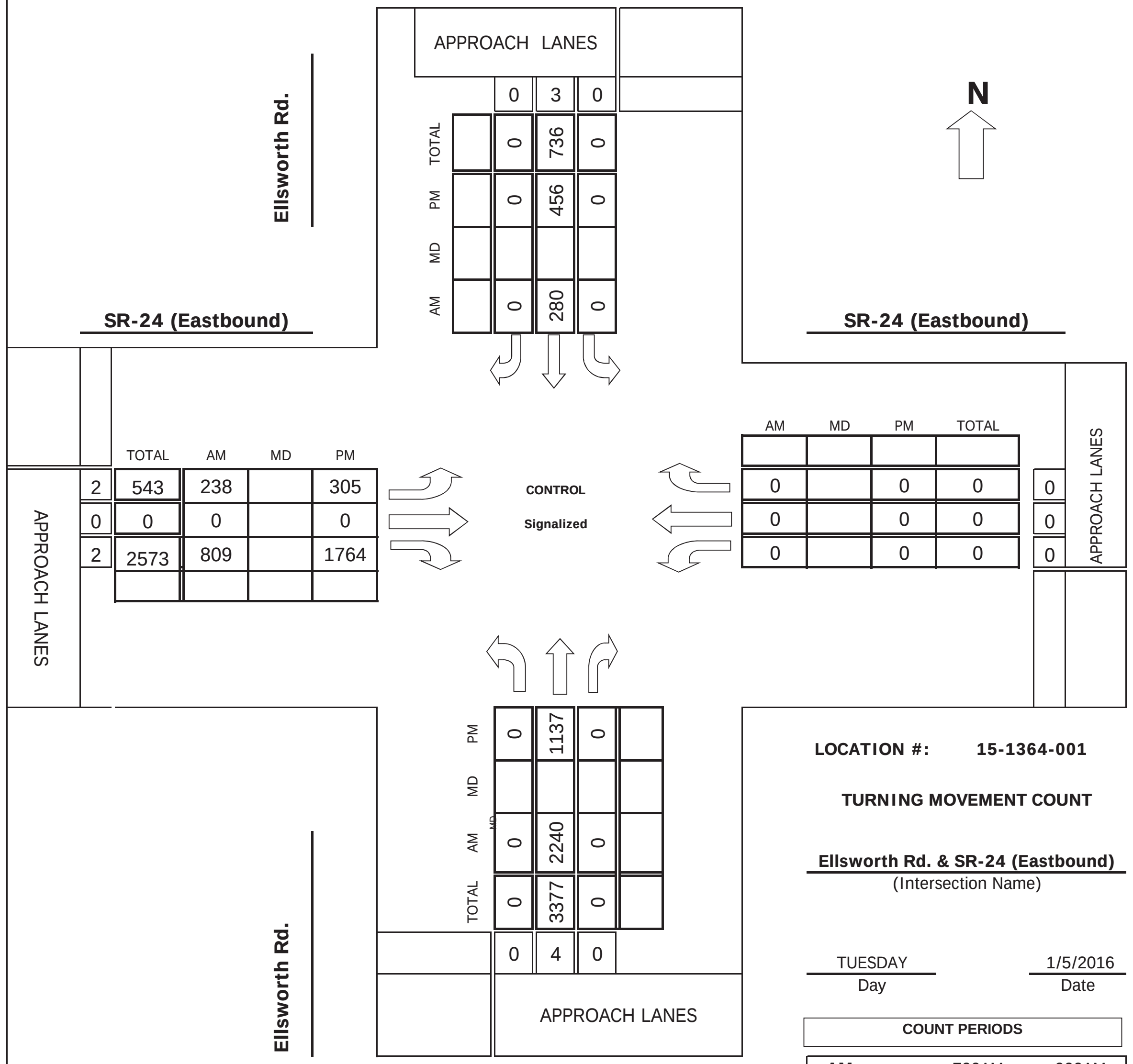
CONTROL: Signalized
COMMENT 1: 0
GPS: 33.318251, -111.635702

Intersection Turning Movement
Prepared by:

Field Data Services of Arizona, Inc.
520.316.6745

Project #: 15-1364-001

TMC SUMMARY OF Ellsworth Rd. & SR-24 (Eastbound)



LOCATION #: **15-1364-001**

TURNING MOVEMENT COUNT

Ellsworth Rd. & SR-24 (Eastbound)
(Intersection Name)

TUESDAY — Day
1/5/2016 — Date

COUNT PERIODS

AM	700AM	-	900AM
NOON		-	
PM	400PM	-	600PM

AM PEAK HOUR 700 AM

NOON PEAK HOUR

PM PEAK HOUR 430 PM

Intersection Turning Movement
Prepared by:

Field Data Services of Arizona, Inc.
520.316.6745
veracitytrafficgroup

N-S STREET: Ellsworth Rd.
DATE: 1/5/2016
LOCATION: Mesa
E-W STREET: SR-24 (Eastbound)
DAY: TUESDAY
PROJECT# 15-1364-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	4	0	0	3	0	2	0	2	0	0	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	569	0	0	57	0	102	0	193	0	0	0	921
7:15 AM	0	569	0	0	76	0	33	0	192	0	0	0	870
7:30 AM	0	557	0	0	68	0	55	0	240	0	0	0	920
7:45 AM	0	545	0	0	79	0	48	0	184	0	0	0	856
8:00 AM	0	527	0	0	89	0	37	0	181	0	0	0	834
8:15 AM	0	555	0	0	46	0	29	0	153	0	0	0	783
8:30 AM	0	506	0	0	62	0	53	0	147	0	0	0	768
8:45 AM	0	392	0	0	46	0	34	0	143	0	0	0	615
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	4220	0	0	523	0	391	0	1433	0	0	0	6567
Approach %	0.00	100.00	0.00	0.00	100.00	0.00	21.44	0.00	78.56	####	####	####	
App/Depart	4220	/	4611	523	/	1956	1824	/	0	0	/	0	

AM Peak Hr Begins at: 700 AM

PEAK													
Volumes	0	2240	0	0	280	0	238	0	809	0	0	0	3567
Approach %	0.00	100.00	0.00	0.00	100.00	0.00	22.73	0.00	77.27	####	####	####	

PEAK HR. FACTOR:	NORTHBOUND	SOUTHBOUND	EASTBOUND	WESTBOUND	TOTAL
	0.984	0.886	0.887	0.000	0.968

CONTROL: Signalized
COMMENT 1:
GPS: 33.316576, -111.635321

Intersection Turning Movement

Field Data Services of Arizona, Inc.
520.316.6745

veracitytrafficgroup

N-S STREET: Ellsworth Rd.
E-W STREET: SR-24 (Eastbound)
DATE: 1/5/2016
DAY: TUESDAY
LOCATION: Mesa
PROJECT# 15-1364-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	4	0	0	3	0	2	0	2	0	0	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	348	0	0	85	0	83	0	396	0	0	0	912
4:15 PM	0	292	0	0	106	0	68	0	439	0	0	0	905
4:30 PM	0	291	0	0	118	0	79	0	451	0	0	0	939
4:45 PM	0	242	0	0	110	0	66	0	439	0	0	0	857
5:00 PM	0	286	0	0	108	0	93	0	433	0	0	0	920
5:15 PM	0	318	0	0	120	0	67	0	441	0	0	0	946
5:30 PM	0	220	0	0	85	0	79	0	419	0	0	0	803
5:45 PM	0	196	0	0	67	0	83	0	358	0	0	0	704
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	2193	0	0	799	0	618	0	3376	0	0	0	6986
Approach %	0.00	100.00	0.00	0.00	100.00	0.00	15.47	0.00	84.53	####	####	####	
App/Depart	2193	/	2811	799	/	4175	3994	/	0	0	/	0	

PM Peak Hr Begins at: 430 PM

PEAK													
Volumes	0	1137	0	0	456	0	305	0	1764	0	0	0	3662
Approach %	0.00	100.00	0.00	0.00	100.00	0.00	14.74	0.00	85.26	####	####	####	

PEAK HR. FACTOR:	0.894	0.950	0.976	0.000	0.968

CONTROL: Signalized
COMMENT 1: 0
GPS: 33.316576, -111.635321

APPENDIX C

EXISTING PEAK HOUR ANALYSIS

CivTech

HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

1/20/2016

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↰	↱↱		↑↑↑↑	↑↑↑	
Volume (veh/h)	238	809	0	2240	280	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	0	1810	1810	0
Adj Flow Rate, veh/h	264	899	0	2489	311	0
Adj No. of Lanes	2	2	0	4	3	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	0	5	5	0
Cap, veh/h	1393	1128	0	3009	2388	0
Arrive On Green	0.42	0.42	0.00	0.48	0.97	0.00
Sat Flow, veh/h	3343	2707	0	6731	5266	0
Grp Volume(v), veh/h	264	899	0	2489	311	0
Grp Sat Flow(s),veh/h/ln	1672	1354	0	1556	1647	0
Q Serve(g_s), s	6.0	34.8	0.0	41.3	0.3	0.0
Cycle Q Clear(g_c), s	6.0	34.8	0.0	41.3	0.3	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1393	1128	0	3009	2388	0
V/C Ratio(X)	0.19	0.80	0.00	0.83	0.13	0.00
Avail Cap(c_a), veh/h	1393	1128	0	3009	2388	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.2	30.6	0.0	26.7	1.0	0.0
Incr Delay (d2), s/veh	0.3	5.9	0.0	2.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	13.9	0.0	18.2	0.1	0.0
LnGrp Delay(d),s/veh	22.5	36.5	0.0	29.5	1.2	0.0
LnGrp LOS	C	D		C	A	
Approach Vol, veh/h	1163			2489	311	
Approach Delay, s/veh	33.3			29.5	1.2	
Approach LOS	C			C	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		64.0		56.0		64.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		58.0		50.0		58.0		
Max Q Clear Time (g_c+I1), s		2.3		36.8		43.3		
Green Ext Time (p_c), s		40.4		4.2		13.2		

Intersection Summary	
HCM 2010 Ctrl Delay	28.4
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

1/20/2016

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑↑	↱
Volume (veh/h)	0	0	1743	773	290	418
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1810	1810	1810	1810
Adj Flow Rate, veh/h			1937	859	322	464
Adj No. of Lanes			2	2	3	1
Peak Hour Factor			0.90	0.90	0.90	0.90
Percent Heavy Veh, %			5	5	5	5
Cap, veh/h			1672	3266	1976	615
Arrive On Green			1.00	1.00	0.40	0.40
Sat Flow, veh/h			3343	3529	5103	1538
Grp Volume(v), veh/h			1937	859	322	464
Grp Sat Flow(s),veh/h/ln			1672	1719	1647	1538
Q Serve(g_s), s			0.0	0.0	5.0	31.1
Cycle Q Clear(g_c), s			0.0	0.0	5.0	31.1
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1672	3266	1976	615
V/C Ratio(X)			1.16	0.26	0.16	0.75
Avail Cap(c_a), veh/h			1672	3266	1976	615
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			0.0	0.0	23.1	30.9
Incr Delay (d2), s/veh			78.6	0.2	0.2	8.3
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			18.2	0.1	2.3	14.6
LnGrp Delay(d),s/veh			78.6	0.2	23.3	39.3
LnGrp LOS			F	A	C	D
Approach Vol, veh/h				2796	786	
Approach Delay, s/veh				54.5	32.7	
Approach LOS				D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			66.0	54.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			60.0	48.0		
Max Q Clear Time (g_c+I1), s		2.0			2.0	33.1		
Green Ext Time (p_c), s		33.7			28.0	3.2		

Intersection Summary	
HCM 2010 Ctrl Delay	49.7
HCM 2010 LOS	D

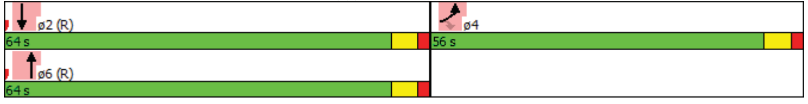
Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

1/20/2016

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	64	56	64
Maximum Split (%)	53.3%	46.7%	53.3%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	64	0
End Time (s)	64	0	64
Yield/Force Off (s)	58	114	58
Yield/Force Off 170(s)	33	89	33
Local Start Time (s)	0	64	0
Local Yield (s)	58	114	58
Local Yield 170(s)	33	89	33

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)



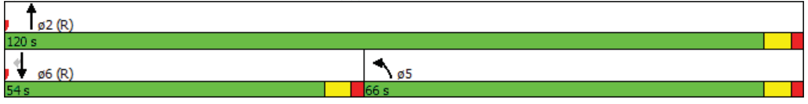
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

1/20/2016

Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	66	54
Maximum Split (%)	100.0%	55.0%	45.0%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	54	0
End Time (s)	0	0	54
Yield/Force Off (s)	114	114	48
Yield/Force Off 170(s)	89	114	23
Local Start Time (s)	0	54	0
Local Yield (s)	114	114	48
Local Yield 170(s)	89	114	23

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

1/20/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↰	↱↱		↑↑↑↑	↑↑↑	
Volume (veh/h)	305	1764	0	1137	456	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	0	1810	1810	0
Adj Flow Rate, veh/h	339	1960	0	1263	507	0
Adj No. of Lanes	2	2	0	4	3	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	0	5	5	0
Cap, veh/h	2173	1760	0	1556	1235	0
Arrive On Green	0.65	0.65	0.00	0.25	0.50	0.00
Sat Flow, veh/h	3343	2707	0	6731	5266	0
Grp Volume(v), veh/h	339	1960	0	1263	507	0
Grp Sat Flow(s),veh/h/ln	1672	1354	0	1556	1647	0
Q Serve(g_s), s	4.7	78.0	0.0	22.9	7.7	0.0
Cycle Q Clear(g_c), s	4.7	78.0	0.0	22.9	7.7	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	2173	1760	0	1556	1235	0
V/C Ratio(X)	0.16	1.11	0.00	0.81	0.41	0.00
Avail Cap(c_a), veh/h	2173	1760	0	1556	1235	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.2	21.0	0.0	42.3	24.4	0.0
Incr Delay (d2), s/veh	0.2	59.8	0.0	4.7	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	43.5	0.0	10.3	3.6	0.0
LnGrp Delay(d),s/veh	8.3	80.8	0.0	47.1	25.4	0.0
LnGrp LOS	A	F		D	C	
Approach Vol, veh/h	2299			1263	507	
Approach Delay, s/veh	70.1			47.1	25.4	
Approach LOS	E			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.0		84.0		36.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		30.0		78.0		30.0		
Max Q Clear Time (g_c+I1), s		9.7		80.0		24.9		
Green Ext Time (p_c), s		11.7		0.0		4.0		

Intersection Summary	
HCM 2010 Ctrl Delay	57.4
HCM 2010 LOS	E

HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

1/20/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑↑	↱
Volume (veh/h)	0	0	826	619	453	157
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1810	1810	1810	1810
Adj Flow Rate, veh/h			918	688	503	174
Adj No. of Lanes			2	2	3	1
Peak Hour Factor			0.90	0.90	0.90	0.90
Percent Heavy Veh, %			5	5	5	5
Cap, veh/h			947	3266	3046	948
Arrive On Green			0.57	1.00	0.62	0.62
Sat Flow, veh/h			3343	3529	5103	1538
Grp Volume(v), veh/h			918	688	503	174
Grp Sat Flow(s),veh/h/ln			1672	1719	1647	1538
Q Serve(g_s), s			31.7	0.0	5.2	5.9
Cycle Q Clear(g_c), s			31.7	0.0	5.2	5.9
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			947	3266	3046	948
V/C Ratio(X)			0.97	0.21	0.17	0.18
Avail Cap(c_a), veh/h			947	3266	3046	948
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			25.5	0.0	9.8	9.9
Incr Delay (d2), s/veh			22.7	0.1	0.1	0.4
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			17.3	0.1	2.4	2.6
LnGrp Delay(d),s/veh			48.2	0.1	9.9	10.4
LnGrp LOS			D	A	A	B
Approach Vol, veh/h				1606	677	
Approach Delay, s/veh				27.6	10.0	
Approach LOS				C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			40.0	80.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			34.0	74.0		
Max Q Clear Time (g_c+I1), s		2.0			33.7	7.9		
Green Ext Time (p_c), s		10.6			0.3	4.1		

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C

Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

1/20/2016

	↓	↗	↑
Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	36	84	36
Maximum Split (%)	30.0%	70.0%	30.0%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	36	0
End Time (s)	36	0	36
Yield/Force Off (s)	30	114	30
Yield/Force Off 170(s)	5	89	5
Local Start Time (s)	0	36	0
Local Yield (s)	30	114	30
Local Yield 170(s)	5	89	5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	140

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)

Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

1/20/2016

	↑	↖	↓
Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	40	80
Maximum Split (%)	100.0%	33.3%	66.7%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	80	0
End Time (s)	0	0	80
Yield/Force Off (s)	114	114	74
Yield/Force Off 170(s)	89	114	49
Local Start Time (s)	0	80	0
Local Yield (s)	114	114	74
Local Yield 170(s)	89	114	49

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)

APPENDIX D

ADOT 2014 AND 2015 CRASH DATA

Arizona Department of Transportation
Traffic Records Section
Standard Detailed Report

IncidentDateTime	IncidentOnroad	IncidentCrossingFeature	IncidentOffset	IncidentInjurySeverityDesc	IncidentFirstHarmfulDesc	IncidentCollisionMannerDesc	IncidentLightConditionDesc	IncidentIntersectionTypeDesc	PersonViolationDesc1
4/1/2015 19:48	S 024	M000	0.13	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	FAILED_TO_YIELD_RIGHT_OF_WAY
6/20/2014 10:54	S 024	M000	0.55	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
12/3/2014 11:54	S 024	M000	0.97	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	UNKNOWN
7/28/2014 17:15	S 024	M001	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/28/2014 16:30	S 024	M001	0.19	NO_INJURY	OTHER_NON_FIXED_OBJECT	OTHER	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/26/2014 16:34	S 024	M001	0.4	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	SPEED_TO_FAST_FOR_CONDITIONS
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
5/9/2015 15:24	S 024	M001	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/8/2015 16:56	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
8/19/2014 17:39	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
11/17/2014 16:35	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	Not Reported	SPEED_TO_FAST_FOR_CONDITIONS
11/24/2014 13:36	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	UNKNOWN
3/16/2015 16:36	S 024	M001	0.33	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
10/15/2014 19:16	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
6/17/2015 18:37	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/24/2015 17:22	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/28/2014 17:15	S 024	M001	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/28/2014 16:30	S 024	M001	0.19	NO_INJURY	OTHER_NON_FIXED_OBJECT	OTHER	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/26/2014 16:34	S 024	M001	0.4	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	SPEED_TO_FAST_FOR_CONDITIONS
8/19/2014 17:39	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	UNKNOWN
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
3/16/2015 16:36	S 024	M001	0.33	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
4/3/2015 16:17	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
4/7/2015 18:13	S 024	M001	0.18	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
4/7/2015 18:13	S 024	M001	0.18	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
3/30/2015 16:34	S 024	M001	0.38	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	FOLLOWED_TOO_CLOSELY
3/30/2015 16:34	S 024	M001	0.38	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	FOLLOWED_TOO_CLOSELY
3/19/2015 14:10	S 024	M001	0.35	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
3/19/2015 14:10	S 024	M001	0.35	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
5/9/2015 15:24	S 024	M001	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/8/2015 16:56	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
6/17/2015 18:37	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
6/22/2015 11:31	S 024	07 ELLSWORTH RD	0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
5/30/2014 11:51	07 ELLSWORTH RD	S 024	0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	FOUR_WAY_INTERSECTION	UNSAFE_LANE_CHANGE
6/20/2014 10:54	S 024	M000	0.55	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS

Arizona Department of Transportation
Traffic Records Section
Standard Detailed Report

IncidentDateTime	IncidentOnroad	IncidentCrossingFeature	IncidentOffset	IncidentInjurySeverityDesc	IncidentFirstHarmfulDesc	IncidentCollisionMannerDesc	IncidentLightConditionDesc	IncidentIntersectionTypeDesc	PersonViolationDesc1
6/27/2014 5:36	07 ELLSWORTH RD	S 024	-0.0057	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	INATTENTION_DISTRACTION
6/6/2014 7:44	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	MADE_IMPROPER_TURN
6/14/2014 12:25	07 ELLSWORTH RD	S 024	-0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	UNSAFE_LANE_CHANGE
6/1/2014 20:12	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DARK_LIGHTED	T_INTESECTION	MADE_IMPROPER_TURN
8/12/2014 11:17	07 ELLSWORTH RD	S 024	0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	UNSAFE_LANE_CHANGE
8/30/2014 15:05	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	MADE_IMPROPER_TURN
10/14/2014 15:24	07 ELLSWORTH RD	S 024	0	INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DAYLIGHT	FOUR_WAY_INTERSECTION	OTHER
11/8/2014 4:32	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	UNKNOWN
10/15/2014 19:16	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
11/17/2014 16:35	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	Not Reported	SPEED_TO_FAST_FOR_CONDITIONS
11/24/2014 13:36	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
12/3/2014 11:54	S 024	M000	0.97	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	UNKNOWN
10/23/2014 18:44	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	INTERSECTION_AS_PART_OF_INTERCHANGE	FAILED_TO_KEEP_IN_PROPER_LANE
11/7/2014 16:01	07 ELLSWORTH RD	S 024	-0.0076	NON_INCAPACITATING_INJURY	FENCE	SINGLE VEHICLE	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
12/23/2014 17:04	07 ELLSWORTH RD	S 024	0	NO_INJURY	CURB	SINGLE VEHICLE	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
2/17/2015 11:54	07 ELLSWORTH RD	S 024	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	UNKNOWN
10/26/2014 18:27	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	FOUR_WAY_INTERSECTION	UNKNOWN
11/14/2014 6:38	07 ELLSWORTH RD	S 024	-0.0057	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	SPEED_TO_FAST_FOR_CONDITIONS
2/3/2015 19:55	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	FOUR_WAY_INTERSECTION	UNSAFE_LANE_CHANGE
4/3/2015 16:17	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
3/31/2015 2:02	07 ELLSWORTH RD	S 024	0	NO_INJURY	FENCE	SINGLE VEHICLE	DARK_LIGHTED	INTERSECTION_AS_PART_OF_INTERCHANGE	DROVE_RODE_IN_OPPOSING_TRAFFIC_LANE
4/1/2015 19:48	S 024	M000	0.13	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	FAILED_TO_YIELD_RIGHT_OF_WAY
4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
5/27/2015 9:46	07 ELLSWORTH RD	S 024	-0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	HEAD_ON	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
6/22/2015 11:31	S 024	07 ELLSWORTH RD	0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
5/12/2015 17:24	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	FOUR_WAY_INTERSECTION	INATTENTION_DISTRACTION
7/15/2015 19:05	S 024	M001	0.38	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/15/2015 19:05	S 024	M001	0.38	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/24/2015 17:22	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	SPEED_TO_FAST_FOR_CONDITIONS
6/7/2015 7:51	07 ELLSWORTH RD	S 024	-0.0047	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	UNKNOWN
6/9/2015 11:22	07 ELLSWORTH RD	S 024	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	MADE_IMPROPER_TURN
7/3/2015 6:06	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/4/2015 7:40	07 ELLSWORTH RD	S 024	0.0095	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	SPEED_TO_FAST_FOR_CONDITIONS
7/21/2015 17:27	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	FOLLOWED_TOO_CLOSELY
7/21/2015 17:27	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	FOLLOWED_TOO_CLOSELY
7/21/2015 17:27	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
7/21/2015 17:27	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
7/4/2015 7:40	07 ELLSWORTH RD	S 024	0.0095	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
7/3/2015 6:06	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION

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IncidentDateTime	IncidentOnroad	IncidentCrossingFeature	IncidentOffset	IncidentInjurySeverityDesc	IncidentFirstHarmfulDesc	IncidentCollisionMannerDesc	IncidentLightConditionDesc	IncidentIntersectionTypeDesc	PersonViolationDesc1
6/9/2015 11:22	07 ELLSWORTH RD	S 024	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
6/7/2015 7:51	07 ELLSWORTH RD	S 024	-0.0047	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	UNKNOWN
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/24/2015 17:22	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/22/2015 11:31	S 024	07 ELLSWORTH RD	0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/22/2015 11:31	S 024	07 ELLSWORTH RD	0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
5/12/2015 17:24	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	FOUR_WAY_INTERSECTION	UNKNOWN
7/15/2015 19:05	S 024	M001	0.38	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/15/2015 19:05	S 024	M001	0.38	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
5/27/2015 9:46	07 ELLSWORTH RD	S 024	-0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	HEAD_ON	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
4/1/2015 19:48	S 024	M000	0.13	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	NO_IMPROPER_ACTION
4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
2/3/2015 19:55	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
4/3/2015 16:17	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
11/14/2014 6:38	07 ELLSWORTH RD	S 024	-0.0057	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
2/17/2015 11:54	07 ELLSWORTH RD	S 024	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	UNKNOWN
10/23/2014 18:44	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
10/26/2014 18:27	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	FOUR_WAY_INTERSECTION	UNKNOWN
12/3/2014 11:54	S 024	M000	0.97	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
11/24/2014 13:36	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
11/17/2014 16:35	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	Not Reported	NO_IMPROPER_ACTION
10/15/2014 19:16	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
10/14/2014 15:24	07 ELLSWORTH RD	S 024	0	INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
11/8/2014 4:32	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	UNKNOWN
8/30/2014 15:05	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/1/2014 20:12	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	LEFT_TURN	DARK_LIGHTED	T_INTESECTION	NO_IMPROPER_ACTION
8/12/2014 11:17	07 ELLSWORTH RD	S 024	0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
6/14/2014 12:25	07 ELLSWORTH RD	S 024	-0.0095	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
6/27/2014 5:36	07 ELLSWORTH RD	S 024	-0.0057	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/6/2014 7:44	07 ELLSWORTH RD	S 024	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/20/2014 10:54	S 024	M000	0.55	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
5/30/2014 11:51	07 ELLSWORTH RD	S 024	0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
5/9/2015 15:24	S 024	M001	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/8/2015 16:56	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/17/2015 18:37	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
4/3/2015 16:17	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	FOUR_WAY_INTERSECTION	NO_IMPROPER_ACTION
3/30/2015 16:34	S 024	M001	0.38	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
3/30/2015 16:34	S 024	M001	0.38	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION

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4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
4/7/2015 18:13	S 024	M001	0.18	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
4/7/2015 18:13	S 024	M001	0.18	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
3/16/2015 16:36	S 024	M001	0.33	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
3/19/2015 14:10	S 024	M001	0.35	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
3/19/2015 14:10	S 024	M001	0.35	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
8/19/2014 17:39	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
7/28/2014 16:30	S 024	M001	0.19	NO_INJURY	OTHER_NON_FIXED_OBJECT	OTHER	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/26/2014 16:34	S 024	M001	0.4	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/28/2014 17:15	S 024	M001	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
7/24/2015 17:22	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
11/17/2014 16:35	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	Not Reported	NO_IMPROPER_ACTION
3/16/2015 16:36	S 024	M001	0.33	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/17/2015 18:37	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
11/24/2014 13:36	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
10/15/2014 19:16	S 024	07 ELLSWORTH RD	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
10/30/2014 7:37	S 024	M001	0.39	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
8/19/2014 17:39	S 024	M001	0.4	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
4/1/2015 19:48	S 024	M000	0.13	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	SIDESWIPE_SAME_DIRECTION	DARK_LIGHTED	T_INTESECTION	NO_IMPROPER_ACTION
6/26/2014 16:34	S 024	M001	0.4	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	INTERSECTION_AS_PART_OF_INTERCHANGE	NO_IMPROPER_ACTION
6/8/2015 16:56	S 024	M001	0	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
5/9/2015 15:24	S 024	M001	0	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/28/2014 16:30	S 024	M001	0.19	NO_INJURY	OTHER_NON_FIXED_OBJECT	OTHER	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/28/2014 17:15	S 024	M001	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
12/3/2014 11:54	S 024	M000	0.97	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
6/20/2014 10:54	S 024	M000	0.55	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
1/7/2015 17:38	S 024	M001	0.01	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
12/29/2014 18:23	S 024	M001	0.19	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DARK_LIGHTED	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
5/27/2015 9:46	07 ELLSWORTH RD	S 024	-0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	HEAD_ON	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
4/8/2015 6:35	S 024	07 ELLSWORTH RD	0.1894	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION
7/10/2015 17:58	S 024	M001	0.3	POSSIBLE_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	REAR_END	DAYLIGHT	NOT_AT_AN_INTERSECTION	NO_IMPROPER_ACTION

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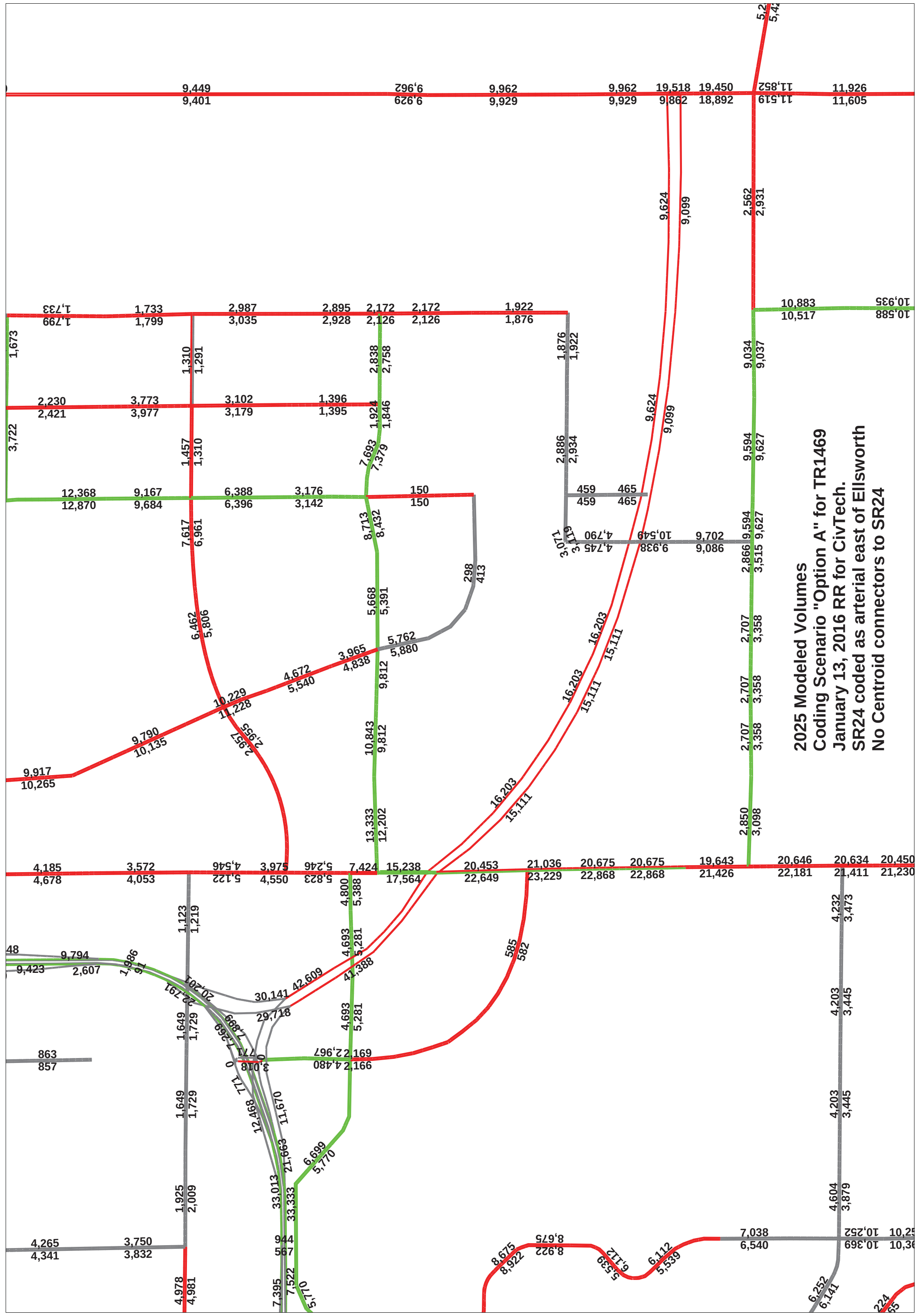
IncidentDateTime	IncidentOnroad	IncidentCrossingFeature	IncidentOffset	IncidentInjurySeverityDesc	IncidentFirstHarmfulDesc	IncidentCollisionMannerDesc	IncidentLightConditionDesc	IncidentIntersectionTypeDesc	PersonViolationDesc1
5/27/2015 9:46	07 ELLSWORTH RD	S 024	-0.0047	NO_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	HEAD_ON	DAYLIGHT	T_INTESECTION	NO_IMPROPER_ACTION
6/13/2011 13:50	07 FRYE RD	GALLERIA WAY	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	UNKNOWN	DISREGARDED_TRAFFIC_SIGNAL
6/13/2011 13:50	07 FRYE RD	GALLERIA WAY	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	UNKNOWN	NO_IMPROPER_ACTION
6/13/2011 13:50	07 FRYE RD	GALLERIA WAY	0	NON_INCAPACITATING_INJURY	MOTOR_VEHICLE_IN_TRANSPORT	ANGLE (front to side)(other than left turn)	DAYLIGHT	UNKNOWN	NO_IMPROPER_ACTION

Report Generated on:
Report ID: 06d8db8a-
Incident Date Betweer
Route : 'State Route 2
PersonTypeDesc : 'DR

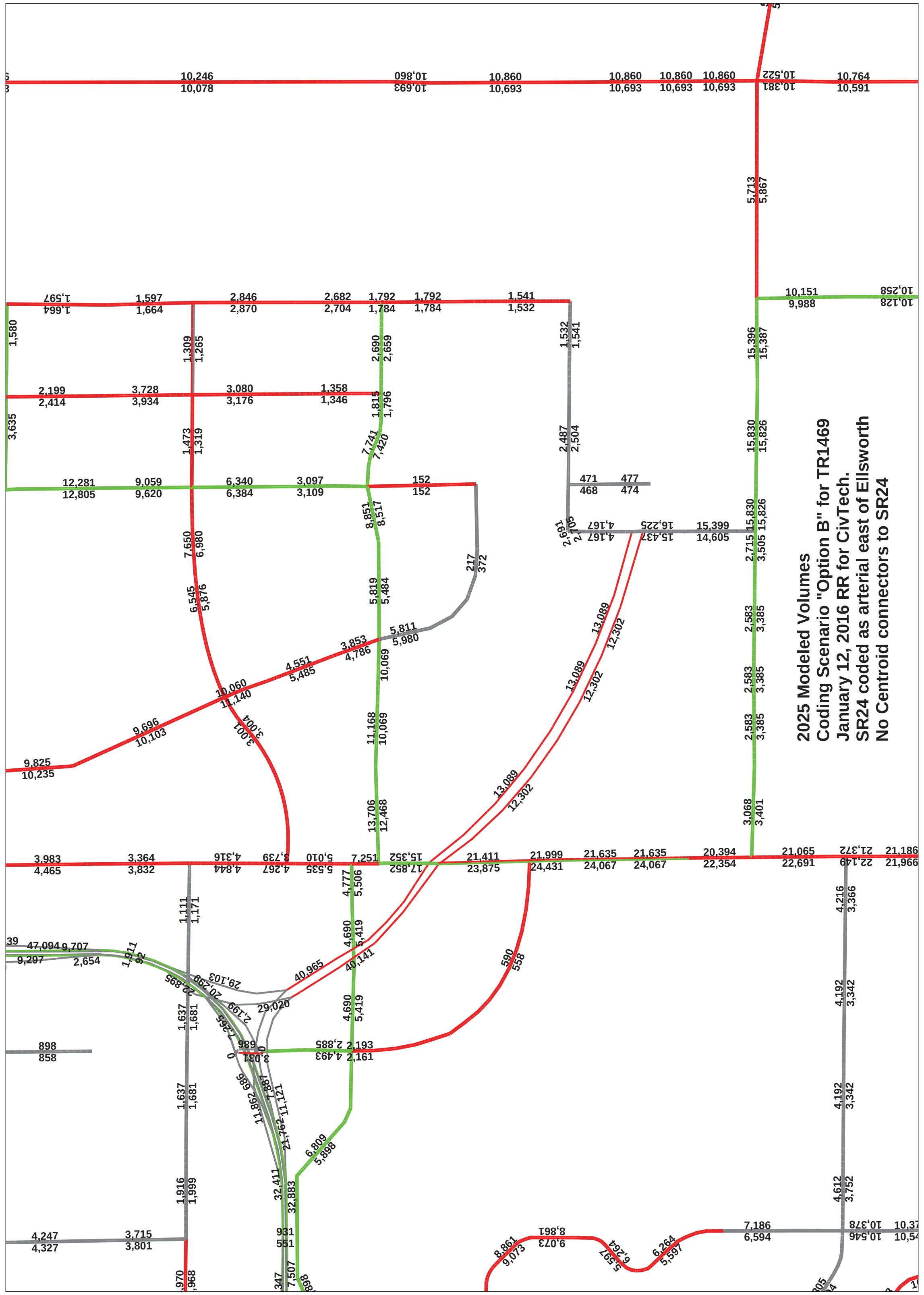
APPENDIX E

MAG TRAVEL DEMAND MODEL DATA

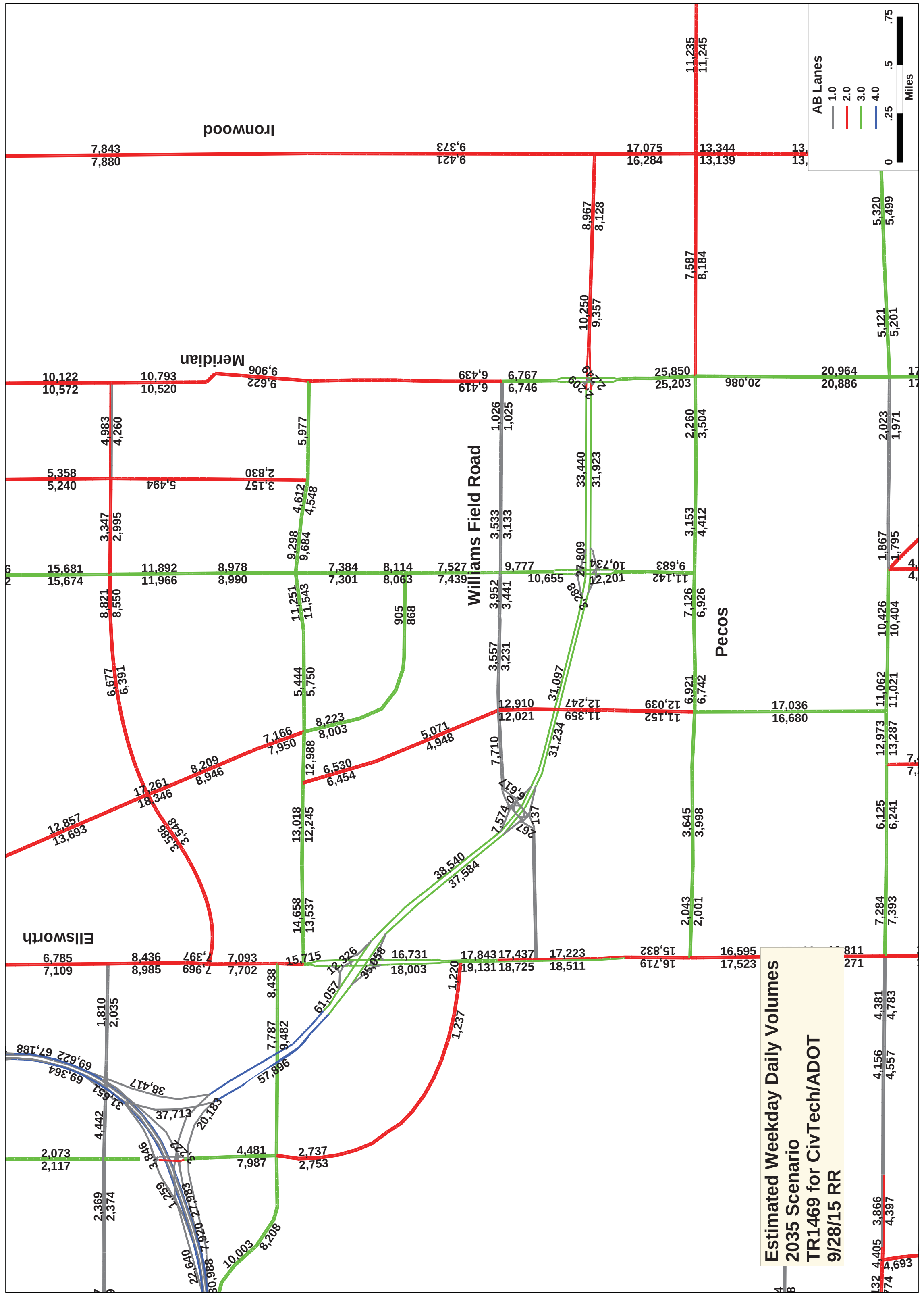
CivTech



2025 Modeled Volumes
Coding Scenario "Option A" for TR1469
January 13, 2016 RR for CivTech.
SR24 coded as arterial east of Ellsworth
No Centroid connectors to SR24



2025 Modeled Volumes
Coding Scenario "Option B" for TR1469
January 12, 2016 RR for CivTech.
SR24 coded as arterial east of Ellsworth
No Centroid connectors to SR24



Estimated Weekday Daily Volumes
2035 Scenario
TR1469 for CivTech/ADOT
9/28/15 RR

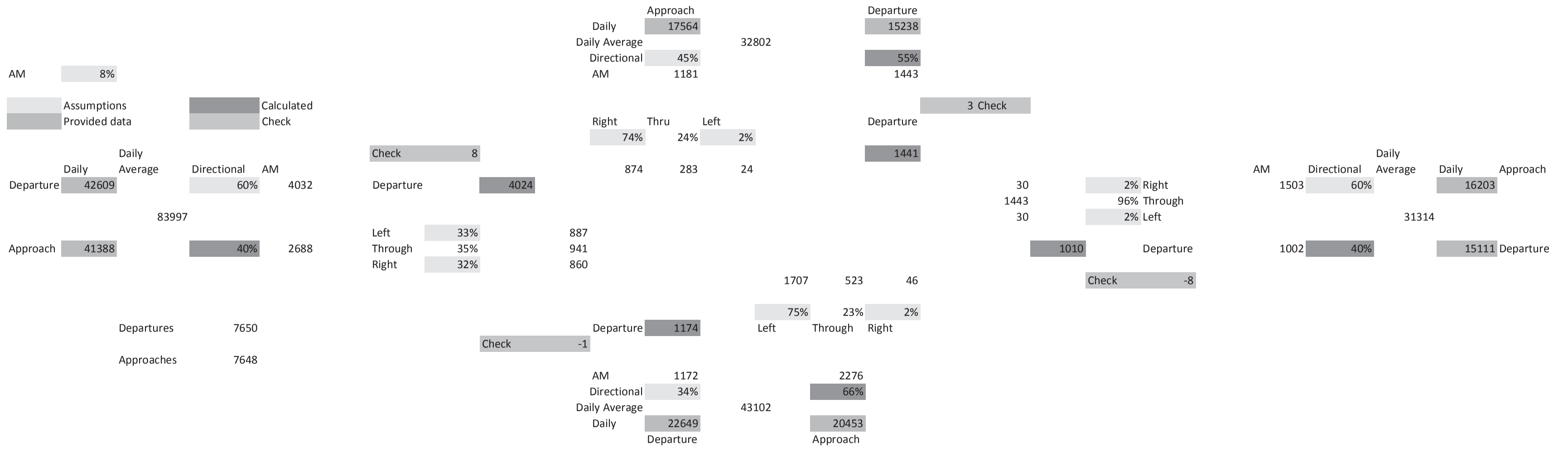
APPENDIX F

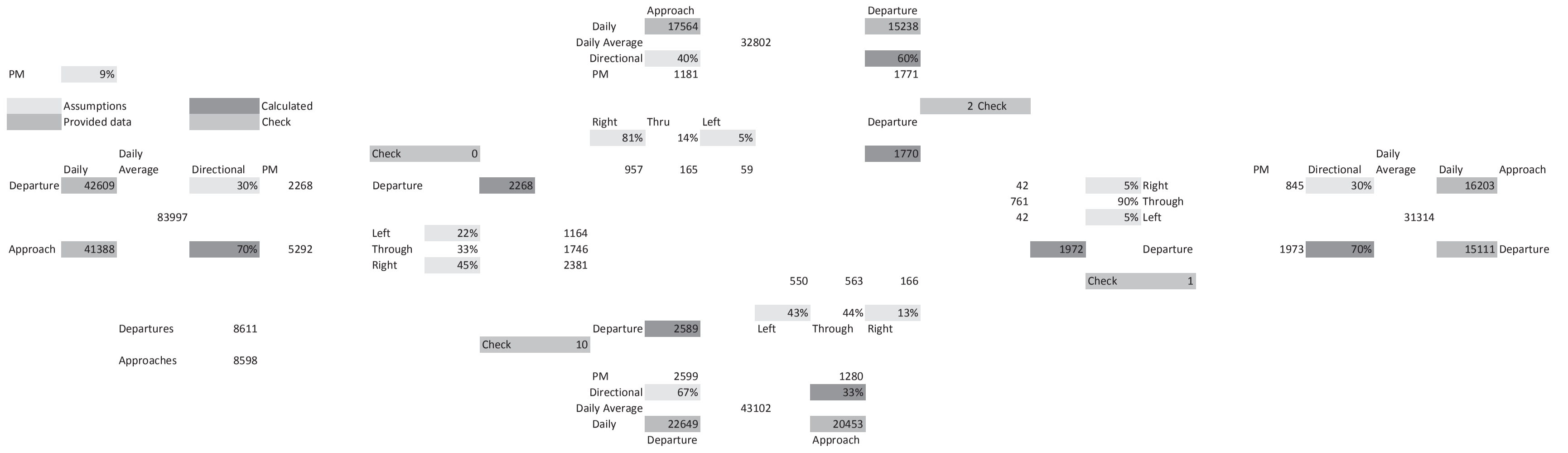
PEAK HOUR TURNING MOVEMENT CALCULATIONS

Intersection
Ellsworth Road and SR 24 Ramps

Turning Movement Calcualtions

2025 Option A





Intersection
Signal Butte Road and SR 24 Ramps

Turning Movement Calcualtions

2025 Option A

Approach Departure
Daily 4745 4790
Daily Average 9535
Directional 60% 40%
AM 8% AM 458 305
Assumptions Calculated 2 Check
Provided data Check Right Thru Left Departure
55% 30% 15%
Daily Average Check 10 303 Daily Average
Daily Directional AM 252 137 69 AM Directional Daily Approach
Departure 16203 65% 1628 Departure 1619 90 10% Right 899 60% 9624
719 80% Through
31314 90 10% Left 18723
Left 10% 88
Approach 15111 35% 877 Through 39% 342 604 Departure 599 40% 9099 Departure
Right 51% 447
648 126 193 Check -5
67% 13% 20%
Departures 3205 Departure 674 Left Through Right
Check -2
Approaches 3200
AM 672 967
Directional 41% 59%
Daily Average 20487
Daily 9938 10549
Departure Approach

Approach Departure
Daily 4745 4790
Daily Average 9535
Directional 40% 60%
PM 9% PM 343 515
Assumptions Calculated -10 Check
Provided data Check Right Thru Left Departure
30% 60% 10%
Daily Average Check -11 525 Daily Average
Daily Directional PM 103 206 34 PM Directional Daily Approach
Departure 16203 31% 874 Departure 885 59 10% Right 590 35% 9624
501 85% Through
31314 29 5% Left 18723
Left 5% 97
Approach 15111 69% 1945 Through 50% 972 1095 Departure 1095 65% 9099 Departure
Right 45% 875
280 369 89 Check 0
38% 50% 12%
Departures 3590 Departure 1111 Left Through Right
Check -4
Approaches 3615
PM 1106 738
Directional 60% 40%
Daily Average 20487
Daily 9938 10549
Departure Approach

CivTech

Intersection
Ironwood Drive and SR 24 Ramps

Turning Movement Calcualtions

2025 Option A

Approach Departure
Daily 9929 9962
Daily Average 19891
Directional 50% 50%
AM 8% AM 796 796
Assumptions Calculated -14 Check
Provided data Check Right Thru Left Departure
3% 97% 0%
Daily Average Check -24 809 Daily Average
Daily Directional AM 24 772 0 AM Directional Daily Approach
Departure 9624 70% 1048 Departure 1073 0 2% Right 0 60% 0
0 96% Through
18723 0 2% Left 0
Left 4% 18
Approach 9099 30% 449 Through 0% 0 0 Departure 0 40% 0 Departure
Right 96% 431
1049 791 0 Check 0
57% 43% 0%
Departures 3071 Departure 1203 Left Through Right
Check 24
Approaches 3085
AM 1227 1840
Directional 40% 60%
Daily Average 38342
Daily 18892 19450
Departure Approach

Approach Departure
Daily 9929 9962
Daily Average 19891
Directional 40% 60%
PM 9% PM 716 1074
Assumptions Calculated -25 Check
Provided data Check Right Thru Left Departure
3% 97% 0%
Daily Average Check -40 1099 Daily Average
Daily Directional PM 21 695 0 PM Directional Daily Approach
Departure 9624 30% 506 Departure 545 0 5% Right 0 30% 0
0 90% Through
18723 0 5% Left 0
Left 3% 35
Approach 9099 70% 1180 Through 0% 0 0 Departure 0 70% 0 Departure
Right 97% 1144
524 1064 0 Check 0
33% 67% 0%
Departures 3443 Departure 1839 Left Through Right
Check 25
Approaches 3483
PM 1863 1587
Directional 54% 46%
Daily Average 38342
Daily 18892 19450
Departure Approach

CivTech

Intersection
Ellsworth Road and SR 24 Ramps

Turning Movement Calculations

2025 Option B

Approach Departure
Daily 17852 15352
Daily Average 33204
Directional 45% 55%
AM 8%
AM 1195 1461
Assumptions Calculated
6 Check
Provided data Check
Right Thru Left Departure
76% 23% 1%
Check 21
1455
Daily Average
Daily Directional AM
908 275 12
AM Directional
Daily Average
Daily Approach
Departure 40965 60% 3893
Departure 3872
24 2% Right
1219 60% 13089
81106
1170 96% Through
24 2% Left
25391
Left 33% 856
Approach 40141 40% 2595
Through 31% 805
840 Departure
813 40% 12302 Departure
Right 36% 934
1793 574 24
Check -28
75% 24% 1%
Departures 7398
Departure 1234
Left Through Right
Check -2
Approaches 7401
AM 1232 2391
Directional 34% 66%
Daily Average 45286
Daily 23875 21411
Departure Approach

Approach Departure
Daily 17852 15352
Daily Average 33204
Directional 40% 60%
PM 9%
PM 1195 1793
Assumptions Calculated
2 Check
Provided data Check
Right Thru Left Departure
81% 14% 5%
Check -1
1791
Daily Average
Daily Directional PM
968 167 60
PM Directional
Daily Average
Daily Approach
Departure 40965 30% 2190
Departure 2190
34 5% Right
686 30% 13089
81106
617 90% Through
34 5% Left
25391
Left 22% 1124
Approach 40141 70% 5110
Through 28% 1431
1598 Departure
1600 70% 12302 Departure
Right 50% 2555
605 632 108
Check 2
45% 47% 8%
Departures 8313
Departure 2756
Left Through Right
Check -26
Approaches 8336
PM 2731 1345
Directional 67% 33%
Daily Average 45286
Daily 23875 21411
Departure Approach

CivTech

Approach Departure
Daily 4167 4167
Daily Average 8334
Directional 60% 40%
AM 8%
AM 400 267
Assumptions Calculated
-20 Check
Provided data Check
Right Thru Left Departure
15% 85% 0%
Check -1
287
Daily Average
Daily Directional AM
60 340 0
AM Directional
Daily Average
Daily Approach
Departure 13089 65% 1320
Departure 1321
0 2% Right
0 60% 0
25391
0 96% Through
0 2% Left
0
Left 4% 28
Approach 12302 35% 711
Through 0% 0
0 Departure
0 40% 0 Departure
Right 96% 683
1261 258 0
Check 0
83% 17% 0%
Departures 2600
Departure 1023
Left Through Right
Check -9
Approaches 2631
AM 1013 1520
Directional 40% 60%
Daily Average 31662
Daily 15437 16225
Departure Approach

Approach Departure
Daily 4167 4167
Daily Average 8334
Directional 40% 60%
PM 9%
PM 300 450
Assumptions Calculated
11 Check
Provided data Check
Right Thru Left Departure
10% 90% 0%
Check -11
439
Daily Average
Daily Directional PM
30 270 0
PM Directional
Daily Average
Daily Approach
Departure 13089 30% 686
Departure 697
0 5% Right
0 30% 0
25391
0 90% Through
0 5% Left
0
Left 5% 80
Approach 12302 70% 1600
Through 0% 0
0 Departure
0 70% 0 Departure
Right 95% 1520
667 359 0
Check 0
65% 35% 0%
Departures 2959
Departure 1790
Left Through Right
Check 34
Approaches 2926
PM 1824 1026
Directional 64% 36%
Daily Average 31662
Daily 15437 16225
Departure Approach

CivTech

Intersection
Ellsworth Road and SR 24 Ramps

Turning Movement Calculations

2035

Approach Departure
Daily 18000 15715
Daily Average 33715
Directional 45% 55%
AM 8% AM 1214 1483

Assumptions Calculated 18 Check
Provided data Check Right Thru Left Departure
70% 15% 15%
Check 19 1465
Daily Average Daily
Daily Directional AM 850 182 182 AM Directional Average Daily Approach
Departure 61057 60% 5710 Departure 5690 110 3% Right 3667 60% 38540
3447 94% Through
118953 110 3% Left 76394
Left 25% 952
Approach 57896 40% 3806 Through 58% 2208 2427 Departure 2445 40% 37854 Departure
Right 17% 647
1394 403 37 Check 18
76% 22% 2%
Departures 10583 Departure 939 Left Through Right
132629 Check 6
Approaches 10521
131167 AM 945 1834
1462 Directional 34% 66%
Daily Average 34734
Daily 18003 16731
Departure Approach

Approach Departure
Daily 18000 15715
Daily Average 33715
Directional 42% 58%
PM 9% PM 1274 1760

Assumptions Calculated 7 Check
Provided data Check Right Thru Left Departure
70% 24% 6%
Check -1 1753
Daily Average Daily
Daily Directional PM 892 306 76 PM Directional Average Daily Approach
Departure 61057 30% 3212 Departure 3213 62 3% Right 2063 30% 38540
1939 94% Through
118953 62 3% Left 76394
Left 15% 1124
Approach 57896 70% 7494 Through 62% 4646 4805 Departure 4813 70% 37854 Departure
Right 23% 1724
382 567 83 Check 8
37% 55% 8%
Departures 11879 Departure 2091 Left Through Right
Check 3
Approaches 11863
PM 2094 1032
Directional 67% 33%
Daily Average 34734
Daily 18003 16731
Departure Approach

CivTech

Appendix E

Intersection
Williams Field Road and SR 24 Ramps

Turning Movement Calculations

2035

Approach Departure
Daily 7710 6617
Daily Average 14327
Directional 60% 40%
AM 8% AM 688 458

Assumptions Calculated 1 Check
Provided data Check Right Thru Left Departure
98% 1% 1%
Check 7 457
Daily Average Daily
Daily Directional AM 674 7 7 AM Directional Average Daily Approach
Departure 38450 60% 3650 Departure 3643 15 0.50% Right 2992 60% 31097
2962 99% Through
76034 15 0.50% Left 62331
Left 18% 438
Approach 37584 40% 2433 Through 82% 1983 1994 Departure 1995 40% 31234 Departure
Right 0.50% 12
7 5 5 Check 0
44% 28% 28%
Departures 6119 Departure 34 Left Through Right
76568 Check -18
Approaches 6129
76528 AM 16 16
40 Directional 50% 50%
Daily Average 404
Daily 267 137
Departure Approach

Approach Departure
Daily 7710 6617
Daily Average 14327
Directional 44% 56%
PM 9% PM 567 722

Assumptions Calculated -20 Check
Provided data Check Right Thru Left Departure
98% 1% 1%
Check -7 742
Daily Average Daily
Daily Directional PM 556 6 6 PM Directional Average Daily Approach
Departure 38450 34% 2327 Departure 2334 9 0.50% Right 1795 32% 31097
1777 99% Through
76034 9 0.50% Left 62331
Left 16% 723
Approach 37584 66% 4516 Through 84% 3771 3784 Departure 3815 68% 31234 Departure
Right 0.50% 23
0 11 7 Check 31
2% 58% 40%
Departures 6882 Departure 37 Left Through Right
Check -19
Approaches 6897
PM 18 18
Directional 50% 50%
Daily Average 404
Daily 267 137
Departure Approach

CivTech

Appendix E

Intersection
Signal Butte Road and SR 24 Ramps

Turning Movement Calculations

2035

Approach Departure
Daily 10655 9777
Daily Average 20432
Directional 55% 45%
AM 8% AM 899 736

Assumptions Calculated -3 Check
Provided data Check Right Thru Left Departure
30% 39% 31%
Daily Check -15 739 Daily
Daily Average Directional AM 270 351 279 AM Directional Average Daily Approach
Departure 31097 65% 3241 Departure 3256 314 10% Right 3137 60% 33440
2510 80% Through
62331 314 10% Left 65363
Left 7% 122
Approach 31234 35% 1745 Through 87% 1518 2100 Departure 2092 40% 31923 Departure
Right 6% 105
476 303 303 Check -9
44% 28% 28%
Departures 6821 Departure 769 Left Through Right
84998 Check -17
Approaches 6864
86063 AM 752 1083
-1065 Directional 41% 59%
Daily Average 22935
Daily 12201 10734
Departure Approach

Approach Departure
Daily 10655 9777
Daily Average 20432
Directional 46% 54%
PM 9% PM 846 993

Assumptions Calculated -11 Check
Provided data Check Right Thru Left Departure
7% 71% 22%
Daily Check 9 1003 Daily
Daily Average Directional PM 59 601 186 PM Directional Average Daily Approach
Departure 31097 30% 1683 Departure 1674 220 11% Right 2000 34% 33440
1560 78% Through
62331 220 11% Left 65363
Left 7% 275
Approach 31234 70% 3927 Through 85% 3338 3869 Departure 3883 66% 31923 Departure
Right 8% 314
54 509 345 Check 14
6% 56% 38%
Departures 7714 Departure 1135 Left Through Right
Check 21
Approaches 7681
PM 1156 908
Directional 56% 44%
Daily Average 22935
Daily 12201 10734
Departure Approach

CivTech

Appendix E

Intersection
Meridian Road and SR 24 Ramps

Turning Movement Calculations

2035

Approach Departure
Daily 6746 6767
Daily Average 13513
Directional 60% 40%
AM 8% AM 649 432

Assumptions Calculated -58 Check
Provided data Check Right Thru Left Departure
65% 30% 5%
Daily Check -27 490 Daily
Daily Average Directional AM 422 195 32 AM Directional Average Daily Approach
Departure 33440 66% 3451 Departure 3478 47 5% Right 941 60% 10250
800 85% Through
65363 94 10% Left 19607
Left 10% 178
Approach 31923 34% 1778 Through 25% 444 610 Departure 627 40% 9357 Departure
Right 65% 1156
2257 265 133 Check 18
85% 10% 5%
Departures 5940 Departure 1444 Left Through Right
Check -15
Approaches 6022
AM 1429 2655
Directional 35% 65%
Daily Average 51053
Daily 25203 25850
Departure Approach

Approach Departure
Daily 6746 6767
Daily Average 13513
Directional 40% 60%
PM 9% PM 486 730

Assumptions Calculated -454 Check
Provided data Check Right Thru Left Departure
30% 60% 10%
Daily Check 454 1184 Daily
Daily Average Directional PM 146 292 49 PM Directional Average Daily Approach
Departure 33440 31% 1824 Departure 1369 62 10% Right 618 35% 10250
525 85% Through
65363 31 5% Left 19607
Left 5% 203
Approach 31923 69% 4059 Through 50% 2030 2299 Departure 1147 65% 9357 Departure
Right 45% 1827
698 919 221 Check -1152
38% 50% 12%
Departures 6457 Departure 2149 Left Through Right
Check 608
Approaches 7001
PM 2757 1838
Directional 60% 40%
Daily Average 51053
Daily 25203 25850
Departure Approach

CivTech

Appendix E

Intersection
Ironwood Drive and SR 24 Ramps

Turning Movement Calculations

2035

Approach   Departure
Daily 9421   9373
Daily Average 18794
Directional 50%   50%
AM 8%   AM 752   752

▨ Assumptions   ▨ Calculated   2 Check
▨ Provided data   ▨ Check   Right Thru Left   Departure
10% 90% 0%
Daily   Check 1   749   Daily
Daily Average Directional AM   75 677 0   AM Directional Average Daily Approach
Departure 8967   70% 957   Departure 956   0 2% Right   0 60%   0
0 96% Through
17095   Left 7% 29   0 2% Left   0
Approach 8128   30% 410   Through 0% 0   0 Departure   0 40%   0 Departure
Right 93% 382
881 721 0   Check 0
55% 45% 0%
Departures 2777   Departure 1058   Left Through Right
34624   Check 9
Approaches 2763
34624   AM 1067   1601
Directional 40%   60%
Daily Average 33359
Daily 16284   17075
Departure   Approach

Approach   Departure
Daily 9421   9373
Daily Average 18794
Directional 40%   60%
PM 9%   PM 677   1015

▨ Assumptions   ▨ Calculated   7 Check
▨ Provided data   ▨ Check   Right Thru Left   Departure
6% 94% 0%
Daily   Check 2   1008   Daily
Daily Average Directional PM   41 636 0   PM Directional Average Daily Approach
Departure 8967   30% 462   Departure 459   0 5% Right   0 30%   0
0 90% Through
17095   Left 7% 75   0 5% Left   0
Approach 8128   70% 1077   Through 0% 0   0 Departure   0 70%   0 Departure
Right 93% 1002
419 932 0   Check 0
31% 69% 0%
Departures 3128   Departure 1638   Left Through Right
Check 14
Approaches 3105
PM 1651   1351
Directional 55%   45%
Daily Average 33359
Daily 16284   17075
Departure   Approach

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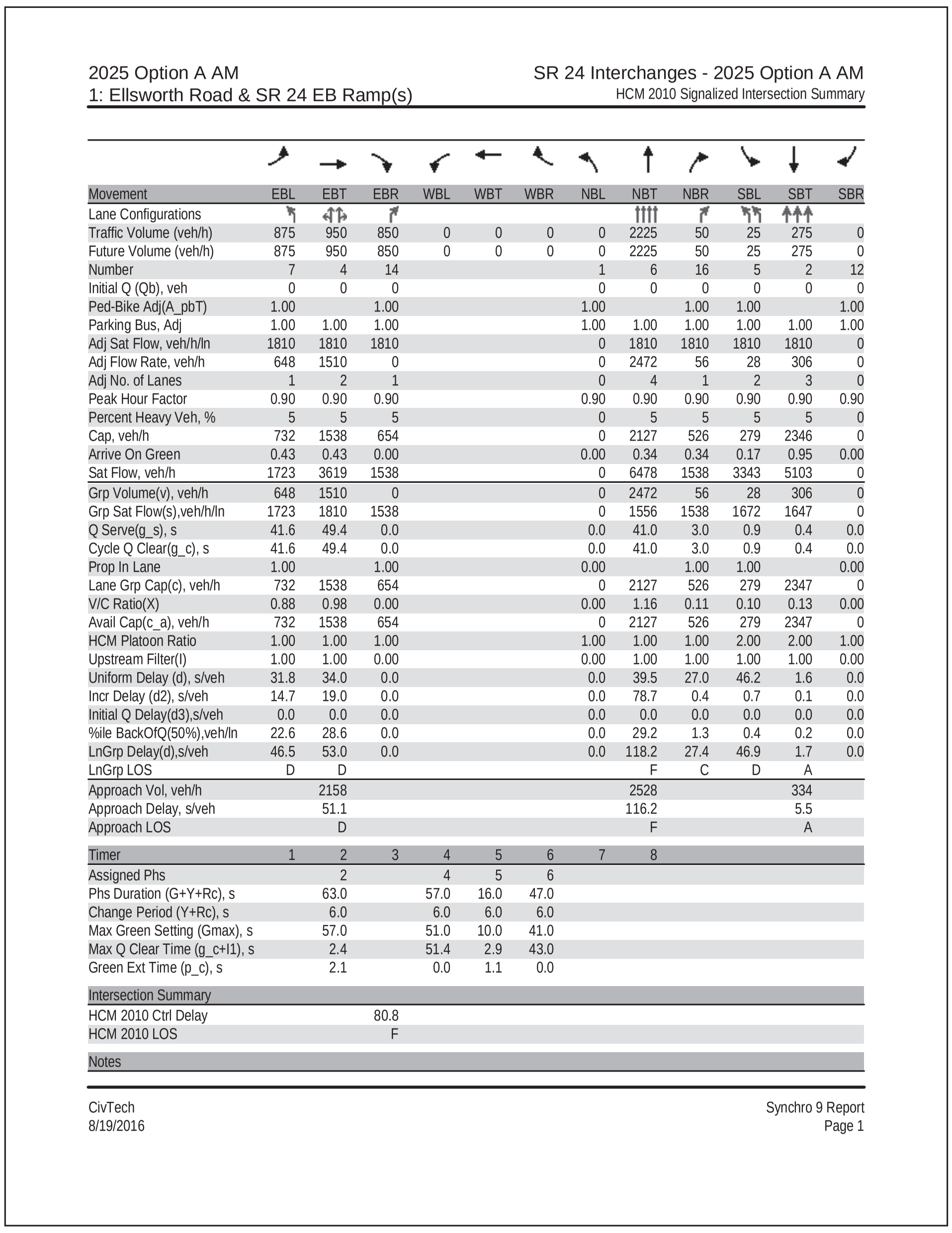
APPENDIX G

2025 OPTION A PEAK HOUR ANALYSIS



2025 Option A AM
1: Ellsworth Road & SR 24 EB Ramp(s)

SR 24 Interchanges - 2025 Option A AM
HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	875	950	850	0	0	0	0	2225	50	25	275	0
Future Volume (veh/h)	875	950	850	0	0	0	0	2225	50	25	275	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810				0	1810	1810	1810	1810	0
Adj Flow Rate, veh/h	648	1510	0				0	2472	56	28	306	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	732	1538	654				0	2127	526	279	2346	0
Arrive On Green	0.43	0.43	0.00				0.00	0.34	0.34	0.17	0.95	0.00
Sat Flow, veh/h	1723	3619	1538				0	6478	1538	3343	5103	0
Grp Volume(v), veh/h	648	1510	0				0	2472	56	28	306	0
Grp Sat Flow(s),veh/h/ln	1723	1810	1538				0	1556	1538	1672	1647	0
Q Serve(g_s), s	41.6	49.4	0.0				0.0	41.0	3.0	0.9	0.4	0.0
Cycle Q Clear(g_c), s	41.6	49.4	0.0				0.0	41.0	3.0	0.9	0.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	732	1538	654				0	2127	526	279	2347	0
V/C Ratio(X)	0.88	0.98	0.00				0.00	1.16	0.11	0.10	0.13	0.00
Avail Cap(c_a), veh/h	732	1538	654				0	2127	526	279	2347	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.8	34.0	0.0				0.0	39.5	27.0	46.2	1.6	0.0
Incr Delay (d2), s/veh	14.7	19.0	0.0				0.0	78.7	0.4	0.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.6	28.6	0.0				0.0	29.2	1.3	0.4	0.2	0.0
LnGrp Delay(d),s/veh	46.5	53.0	0.0				0.0	118.2	27.4	46.9	1.7	0.0
LnGrp LOS	D	D						F	C	D	A	
Approach Vol, veh/h		2158						2528			334	
Approach Delay, s/veh		51.1						116.2			5.5	
Approach LOS		D						F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		63.0		57.0	16.0	47.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		57.0		51.0	10.0	41.0		
Max Q Clear Time (g_c+I1), s		2.4		51.4	2.9	43.0		
Green Ext Time (p_c), s		2.1		0.0	1.1	0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	80.8
HCM 2010 LOS	F

Notes

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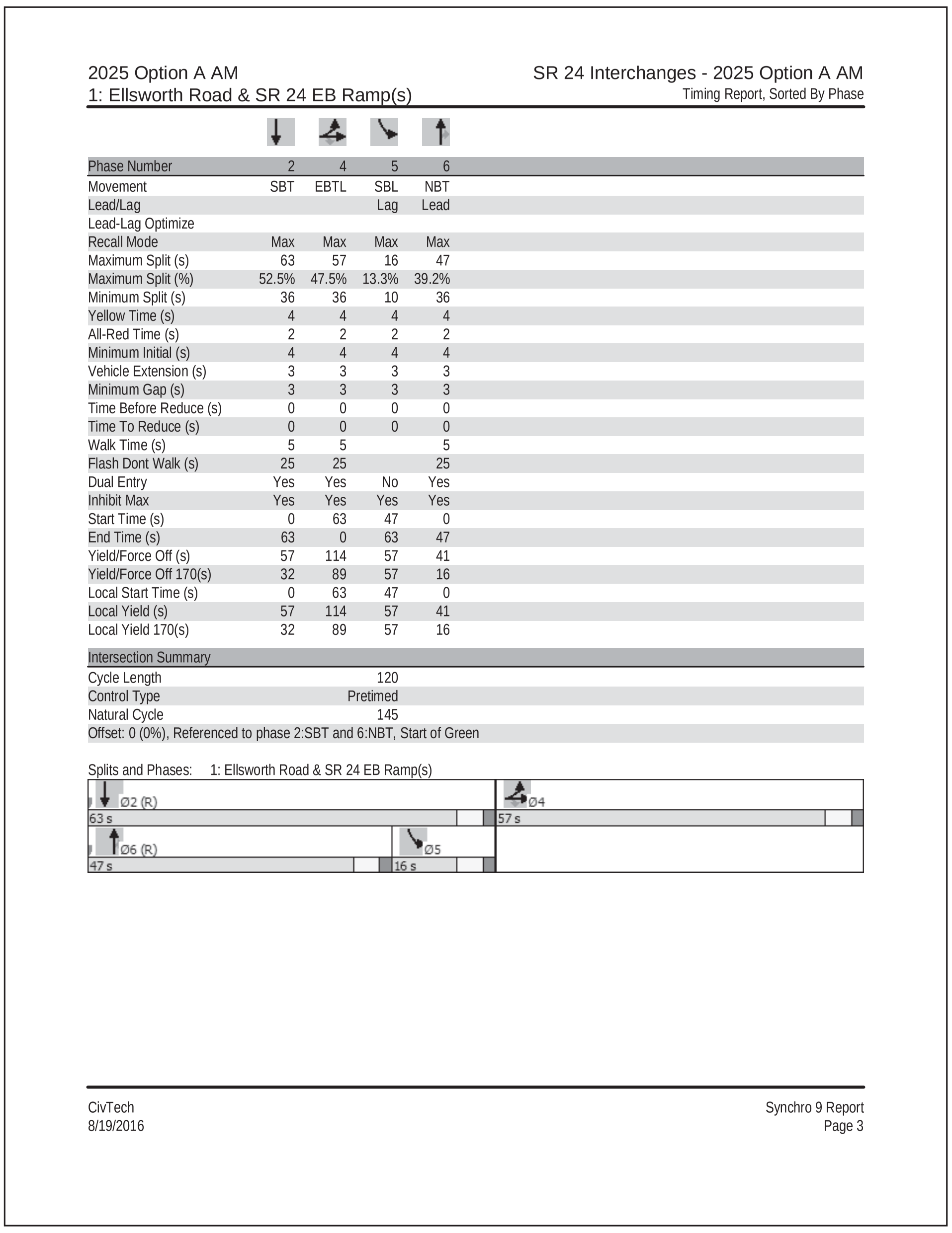
Synchro 9 Report
Page 1



2025 Option A AM
1: Ellsworth Road & SR 24 EB Ramp(s)

SR 24 Interchanges - 2025 Option A AM
Timing Report, Sorted By Phase

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	63	57	16	47
Maximum Split (%)	52.5%	47.5%	13.3%	39.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	63	47	0
End Time (s)	63	0	63	47
Yield/Force Off (s)	57	114	57	41
Yield/Force Off 170(s)	32	89	57	16
Local Start Time (s)	0	63	47	0
Local Yield (s)	57	114	57	41
Local Yield 170(s)	32	89	57	16

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)

Ø2 (R)
63 s
Ø4
57 s
Ø6 (R)
47 s
Ø5
16 s

CivTech
8/19/2016

Synchro 9 Report
Page 3

2: Ellsworth Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	1450	25	1700	525	0	0	300	875
Future Volume (veh/h)	0	0	0	25	1450	25	1700	525	0	0	300	875
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1810	1810	1810	1810	1810	0	0	1810	1810
Adj Flow Rate, veh/h				28	1611	28	1889	583	0	0	333	0
Adj No. of Lanes				1	1	1	2	2	0	0	5	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				618	648	551	1226	1862	0	0	916	192
Arrive On Green				0.36	0.36	0.36	0.73	1.00	0.00	0.00	0.13	0.00
Sat Flow, veh/h				1723	1810	1538	3343	3529	0	0	7672	1538
Grp Volume(v), veh/h				28	1611	28	1889	583	0	0	333	0
Grp Sat Flow(s),veh/h/ln				1723	1810	1538	1672	1719	0	0	1466	1538
Q Serve(g_s), s				1.3	43.0	1.4	44.0	0.0	0.0	0.0	5.0	0.0
Cycle Q Clear(g_c), s				1.3	43.0	1.4	44.0	0.0	0.0	0.0	5.0	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				618	648	551	1226	1862	0	0	916	192
V/C Ratio(X)				0.05	2.48	0.05	1.54	0.31	0.00	0.00	0.36	0.00
Avail Cap(c_a), veh/h				618	648	551	1226	1862	0	0	916	192
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.1	38.5	25.2	16.0	0.0	0.0	0.0	48.1	0.0
Incr Delay (d2), s/veh				0.1	672.7	0.2	247.5	0.4	0.0	0.0	1.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.6	142.6	0.6	61.6	0.1	0.0	0.0	2.1	0.0
LnGrp Delay(d),s/veh				25.3	711.2	25.3	263.5	0.4	0.0	0.0	49.2	0.0
LnGrp LOS				C	F	C	F	A			D	
Approach Vol, veh/h					1667			2472			333	
Approach Delay, s/veh					688.1			201.5			49.2	
Approach LOS					F			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		71.0			50.0	21.0		49.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		65.0			44.0	15.0		43.0
Max Q Clear Time (g_c+I1), s		2.0			46.0	7.0		45.0
Green Ext Time (p_c), s		22.0			0.0	1.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	371.5
HCM 2010 LOS	F

Notes

2: Ellsworth Road & SR 24 WB Ramp(s)

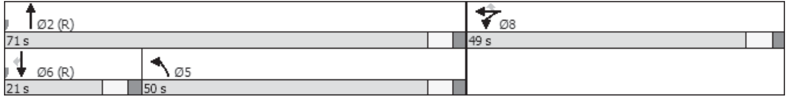
Timing Report, Sorted By Phase

	↑	↖	↓	↲
Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	71	50	21	49
Maximum Split (%)	59.2%	41.7%	17.5%	40.8%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	71	50	1
End Time (s)	1	1	71	50
Yield/Force Off (s)	115	115	65	44
Yield/Force Off 170(s)	90	115	40	19
Local Start Time (s)	0	21	0	71
Local Yield (s)	65	65	15	114
Local Yield 170(s)	40	65	110	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



7: Signal Butte Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱					↑↑↑↑	↱	↰	↑↑↑	
Traffic Volume (veh/h)	100	350	450	0	0	0	0	775	200	75	125	0
Future Volume (veh/h)	100	350	450	0	0	0	0	775	200	75	125	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810				0	1810	1810	1810	1810	0
Adj Flow Rate, veh/h	111	389	500				0	861	222	83	139	0
Adj No. of Lanes	1	1	1				0	4	1	1	3	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	819	860	731				0	1712	423	172	2100	0
Arrive On Green	0.47	0.47	0.47				0.00	0.28	0.28	0.20	0.85	0.00
Sat Flow, veh/h	1723	1810	1538				0	6478	1538	1723	5103	0
Grp Volume(v), veh/h	111	389	500				0	861	222	83	139	0
Grp Sat Flow(s),veh/h/ln	1723	1810	1538				0	1556	1538	1723	1647	0
Q Serve(g_s), s	4.3	17.3	30.3				0.0	14.0	14.7	5.1	0.5	0.0
Cycle Q Clear(g_c), s	4.3	17.3	30.3				0.0	14.0	14.7	5.1	0.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	819	860	731				0	1712	423	172	2100	0
V/C Ratio(X)	0.14	0.45	0.68				0.00	0.50	0.52	0.48	0.07	0.00
Avail Cap(c_a), veh/h	819	860	731				0	1712	423	172	2100	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.7	21.1	24.5				0.0	36.6	36.9	45.2	5.2	0.0
Incr Delay (d2), s/veh	0.3	1.7	5.2				0.0	1.1	4.6	9.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	8.9	26.3				0.0	6.1	6.8	2.9	0.2	0.0
LnGrp Delay(d),s/veh	18.0	22.8	29.7				0.0	37.7	41.5	54.6	5.3	0.0
LnGrp LOS	B	C	C					D	D	D	A	
Approach Vol, veh/h		1000						1083			222	
Approach Delay, s/veh		25.7						38.4			23.7	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		57.0		63.0	18.0	39.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		51.0		57.0	12.0	33.0		
Max Q Clear Time (g_c+I1), s		2.5		32.3	7.1	16.7		
Green Ext Time (p_c), s		1.1		4.5	0.4	5.7		

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Notes

7: Signal Butte Road & SR 24 EB Ramp(s)

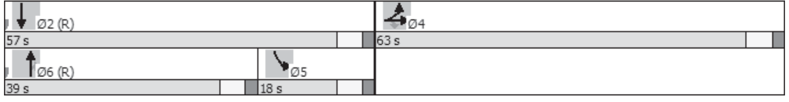
Timing Report, Sorted By Phase

	↓	⬏	↘	↑
Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	57	63	18	39
Maximum Split (%)	47.5%	52.5%	15.0%	32.5%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	57	39	0
End Time (s)	57	0	57	39
Yield/Force Off (s)	51	114	51	33
Yield/Force Off 170(s)	26	89	51	8
Local Start Time (s)	0	57	39	0
Local Yield (s)	51	114	51	33
Local Yield 170(s)	26	89	51	8

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



8: Signal Butte Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✣	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	100	725	100	650	125	0	0	200	250
Future Volume (veh/h)	0	0	0	100	725	100	650	125	0	0	200	250
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1810	1810	1810	1810	1810	0	0	1810	1810
Adj Flow Rate, veh/h				111	806	111	722	139	0	0	222	278
Adj No. of Lanes				1	1	1	2	2	0	0	4	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				517	543	461	892	2063	0	0	1764	436
Arrive On Green				0.30	0.30	0.30	0.53	1.00	0.00	0.00	0.28	0.28
Sat Flow, veh/h				1723	1810	1538	3343	3529	0	0	6478	1538
Grp Volume(v), veh/h				111	806	111	722	139	0	0	222	278
Grp Sat Flow(s),veh/h/ln				1723	1810	1538	1672	1719	0	0	1556	1538
Q Serve(g_s), s				5.8	36.0	6.5	21.3	0.0	0.0	0.0	3.2	19.0
Cycle Q Clear(g_c), s				5.8	36.0	6.5	21.3	0.0	0.0	0.0	3.2	19.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				517	543	461	892	2063	0	0	1764	436
V/C Ratio(X)				0.21	1.48	0.24	0.81	0.07	0.00	0.00	0.13	0.64
Avail Cap(c_a), veh/h				517	543	461	892	2063	0	0	1764	436
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				31.4	42.0	31.7	25.5	0.0	0.0	0.0	32.0	37.6
Incr Delay (d2), s/veh				0.9	227.9	1.2	7.9	0.1	0.0	0.0	0.1	7.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.9	52.3	2.9	10.6	0.0	0.0	0.0	1.4	8.9
LnGrp Delay(d),s/veh				32.4	269.9	32.9	33.4	0.1	0.0	0.0	32.1	44.6
LnGrp LOS				C	F	C	C	A			C	D
Approach Vol, veh/h					1028			861			500	
Approach Delay, s/veh					218.6			28.0			39.0	
Approach LOS					F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		78.0			38.0	40.0		42.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		72.0			32.0	34.0		36.0
Max Q Clear Time (g_c+I1), s		2.0			23.3	21.0		38.0
Green Ext Time (p_c), s		3.7			2.5	1.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	112.3
HCM 2010 LOS	F

Notes

8: Signal Butte Road & SR 24 WB Ramp(s)

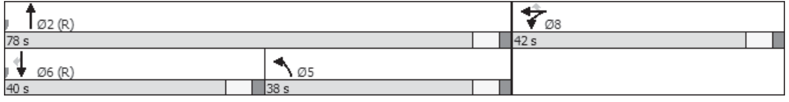
Timing Report, Sorted By Phase

	↑	↖	↓	↙
Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	78	38	40	42
Maximum Split (%)	65.0%	31.7%	33.3%	35.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	40	0	78
End Time (s)	78	78	40	0
Yield/Force Off (s)	72	72	34	114
Yield/Force Off 170(s)	47	72	9	89
Local Start Time (s)	0	40	0	78
Local Yield (s)	72	72	34	114
Local Yield 170(s)	47	72	9	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



11: Ironwood Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	25	425	0	1850	775	0
Future Volume (veh/h)	25	425	0	1850	775	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	0	1810	1810	0
Adj Flow Rate, veh/h	28	0	0	2056	861	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	0	5	5	0
Cap, veh/h	704	1105	0	3061	1690	0
Arrive On Green	0.41	0.00	0.00	0.49	0.98	0.00
Sat Flow, veh/h	1723	2707	0	6731	3619	0
Grp Volume(v), veh/h	28	0	0	2056	861	0
Grp Sat Flow(s),veh/h/ln	1723	1354	0	1556	1719	0
Q Serve(g_s), s	1.2	0.0	0.0	30.1	1.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	0.0	30.1	1.0	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	704	1105	0	3061	1690	0
V/C Ratio(X)	0.04	0.00	0.00	0.67	0.51	0.00
Avail Cap(c_a), veh/h	704	1105	0	3061	1690	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.4	0.0	0.0	23.2	0.5	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	1.2	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	13.1	0.5	0.0
LnGrp Delay(d),s/veh	21.5	0.0	0.0	24.3	1.6	0.0
LnGrp LOS	C			C	A	
Approach Vol, veh/h	28			2056	861	
Approach Delay, s/veh	21.5			24.3	1.6	
Approach LOS	C			C	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		65.0		55.0		65.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		59.0		49.0		59.0		
Max Q Clear Time (g_c+I1), s		3.0		3.2		32.1		
Green Ext Time (p_c), s		39.9		0.1		22.5		

Intersection Summary	
HCM 2010 Ctrl Delay	17.7
HCM 2010 LOS	B

11: Ironwood Road & SR 24 EB Ramp(s)

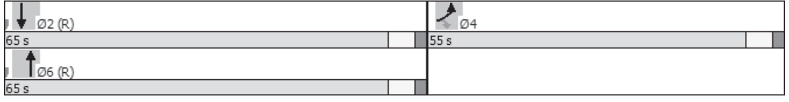
Timing Report, Sorted By Phase

	↓	↗	↑
Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	65	55	65
Maximum Split (%)	54.2%	45.8%	54.2%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	65	0
End Time (s)	65	0	65
Yield/Force Off (s)	59	114	59
Yield/Force Off 170(s)	34	89	34
Local Start Time (s)	0	65	0
Local Yield (s)	59	114	59
Local Yield 170(s)	34	89	34

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 11: Ironwood Road & SR 24 EB Ramp(s)



12: Ironwood Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑	↱
Traffic Volume (veh/h)	0	0	1050	800	800	25
Future Volume (veh/h)	0	0	1050	800	800	25
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1810	1810	1810	1810
Adj Flow Rate, veh/h			1167	889	889	28
Adj No. of Lanes			2	2	2	1
Peak Hour Factor			0.90	0.90	0.90	0.90
Percent Heavy Veh, %			5	5	5	5
Cap, veh/h			1644	3266	1404	628
Arrive On Green			0.98	1.00	0.41	0.41
Sat Flow, veh/h			3343	3529	3529	1538
Grp Volume(v), veh/h			1167	889	889	28
Grp Sat Flow(s),veh/h/ln			1672	1719	1719	1538
Q Serve(g_s), s			2.3	0.0	24.8	1.3
Cycle Q Clear(g_c), s			2.3	0.0	24.8	1.3
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1644	3266	1404	628
V/C Ratio(X)			0.71	0.27	0.63	0.04
Avail Cap(c_a), veh/h			1644	3266	1404	628
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			0.5	0.0	28.3	21.4
Incr Delay (d2), s/veh			2.6	0.2	2.2	0.1
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.9	0.1	12.2	0.6
LnGrp Delay(d),s/veh			3.2	0.2	30.5	21.5
LnGrp LOS			A	A	C	C
Approach Vol, veh/h				2056	917	
Approach Delay, s/veh				1.9	30.2	
Approach LOS				A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			65.0	55.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			59.0	49.0		
Max Q Clear Time (g_c+I1), s		2.0			4.3	26.8		
Green Ext Time (p_c), s		17.0			16.0	6.0		

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

12: Ironwood Road & SR 24 WB Ramp(s)

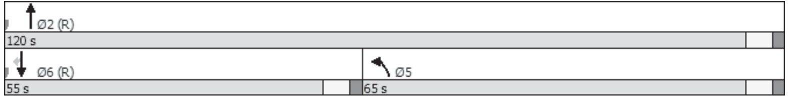
Timing Report, Sorted By Phase

Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	65	55
Maximum Split (%)	100.0%	54.2%	45.8%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	55	0
End Time (s)	0	0	55
Yield/Force Off (s)	114	114	49
Yield/Force Off 170(s)	89	114	24
Local Start Time (s)	0	55	0
Local Yield (s)	114	114	49
Local Yield 170(s)	89	114	24

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	65

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 12: Ironwood Road & SR 24 WB Ramp(s)



1: Ellsworth Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	1175	1750	2375	0	0	0	0	1125	175	50	175	0
Future Volume (veh/h)	1175	1750	2375	0	0	0	0	1125	175	50	175	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	833	2445	0				0	1197	186	53	186	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1005	2111	897				0	1388	343	229	1695	0
Arrive On Green	0.57	0.57	0.00				0.00	0.22	0.22	0.13	0.67	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	833	2445	0				0	1197	186	53	186	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	46.0	68.0	0.0				0.0	21.6	12.5	1.7	1.6	0.0
Cycle Q Clear(g_c), s	46.0	68.0	0.0				0.0	21.6	12.5	1.7	1.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1005	2111	897				0	1388	343	229	1695	0
V/C Ratio(X)	0.83	1.16	0.00				0.00	0.86	0.54	0.23	0.11	0.00
Avail Cap(c_a), veh/h	1005	2111	897				0	1388	343	229	1695	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.2	26.0	0.0				0.0	45.3	41.7	49.2	13.6	0.0
Incr Delay (d2), s/veh	7.9	76.9	0.0				0.0	7.3	6.0	2.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.6	57.2	0.0				0.0	10.3	6.1	0.9	0.7	0.0
LnGrp Delay(d),s/veh	29.1	102.9	0.0				0.0	52.5	47.8	51.6	13.7	0.0
LnGrp LOS	C	F						D	D	D	B	
Approach Vol, veh/h		3278						1383			239	
Approach Delay, s/veh		84.2						51.9			22.1	
Approach LOS		F						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		46.0		74.0	14.0	32.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		40.0		68.0	8.0	26.0		
Max Q Clear Time (g_c+I1), s		3.6		70.0	3.7	23.6		
Green Ext Time (p_c), s		1.3		0.0	0.4	1.7		

Intersection Summary	
HCM 2010 Ctrl Delay	72.0
HCM 2010 LOS	E

Notes

1: Ellsworth Road & SR 24 EB Ramp(s)

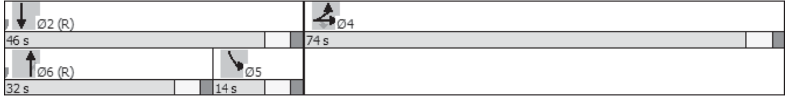
Timing Report, Sorted By Phase

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	46	74	14	32
Maximum Split (%)	38.3%	61.7%	11.7%	26.7%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	46	32	0
End Time (s)	46	0	46	32
Yield/Force Off (s)	40	114	40	26
Yield/Force Off 170(s)	15	89	40	1
Local Start Time (s)	0	46	32	0
Local Yield (s)	40	114	40	26
Local Yield 170(s)	15	89	40	1

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)



2: Ellsworth Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	50	750	50	550	575	0	0	225	950
Future Volume (veh/h)	0	0	0	50	750	50	550	575	0	0	225	950
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				53	798	53	585	612	0	0	239	0
Adj No. of Lanes				1	1	1	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				444	466	396	516	2300	0	0	3395	712
Arrive On Green				0.25	0.25	0.25	0.30	1.00	0.00	0.00	0.45	0.00
Sat Flow, veh/h				1774	1863	1583	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				53	798	53	585	612	0	0	239	0
Grp Sat Flow(s),veh/h/ln				1774	1863	1583	1721	1770	0	0	1509	1583
Q Serve(g_s), s				2.8	30.0	3.1	18.0	0.0	0.0	0.0	2.2	0.0
Cycle Q Clear(g_c), s				2.8	30.0	3.1	18.0	0.0	0.0	0.0	2.2	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				444	466	396	516	2300	0	0	3395	712
V/C Ratio(X)				0.12	1.71	0.13	1.13	0.27	0.00	0.00	0.07	0.00
Avail Cap(c_a), veh/h				444	466	396	516	2300	0	0	3395	712
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				34.8	45.0	34.9	42.0	0.0	0.0	0.0	18.7	0.0
Incr Delay (d2), s/veh				0.6	330.1	0.7	81.7	0.3	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.4	58.1	1.4	14.3	0.1	0.0	0.0	0.9	0.0
LnGrp Delay(d),s/veh				35.3	375.1	35.6	123.7	0.3	0.0	0.0	18.8	0.0
LnGrp LOS				D	F	D	F	A			B	
Approach Vol, veh/h					904			1197			239	
Approach Delay, s/veh					335.3			60.6			18.8	
Approach LOS					F			E			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			24.0	60.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			18.0	54.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			20.0	4.2		32.0
Green Ext Time (p_c), s		7.0			0.0	1.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	162.5
HCM 2010 LOS	F

Notes

2: Ellsworth Road & SR 24 WB Ramp(s)

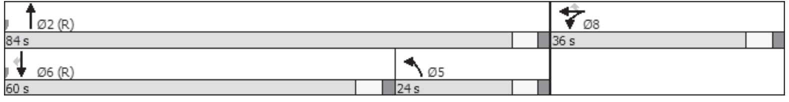
Timing Report, Sorted By Phase

	↑	↖	↓	↙
Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	24	60	36
Maximum Split (%)	70.0%	20.0%	50.0%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	110	50	14
End Time (s)	14	14	110	50
Yield/Force Off (s)	8	8	104	44
Yield/Force Off 170(s)	103	8	79	19
Local Start Time (s)	0	60	0	84
Local Yield (s)	78	78	54	114
Local Yield 170(s)	53	78	29	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



7: Signal Butte Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱					↑↑↑↑	↱	↰	↑↑↑	
Traffic Volume (veh/h)	100	975	875	0	0	0	0	650	100	25	200	0
Future Volume (veh/h)	100	975	875	0	0	0	0	650	100	25	200	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	106	1037	931				0	691	106	27	213	0
Adj No. of Lanes	1	1	1				0	4	1	1	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	961	1009	858				0	1549	383	118	1822	0
Arrive On Green	0.54	0.54	0.54				0.00	0.24	0.24	0.13	0.72	0.00
Sat Flow, veh/h	1774	1863	1583				0	6669	1583	1774	5253	0
Grp Volume(v), veh/h	106	1037	931				0	691	106	27	213	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1774	1695	0
Q Serve(g_s), s	3.5	65.0	65.0				0.0	11.0	6.5	1.6	1.6	0.0
Cycle Q Clear(g_c), s	3.5	65.0	65.0				0.0	11.0	6.5	1.6	1.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	961	1009	858				0	1549	383	118	1822	0
V/C Ratio(X)	0.11	1.03	1.09				0.00	0.45	0.28	0.23	0.12	0.00
Avail Cap(c_a), veh/h	961	1009	858				0	1549	383	118	1822	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.4	27.5	27.5				0.0	38.7	37.0	49.2	11.1	0.0
Incr Delay (d2), s/veh	0.2	35.6	56.6				0.0	0.9	1.8	4.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	43.1	54.9				0.0	4.9	3.0	0.9	0.7	0.0
LnGrp Delay(d),s/veh	13.6	63.1	84.1				0.0	39.6	38.8	53.7	11.3	0.0
LnGrp LOS	B	F	F					D	D	D	B	
Approach Vol, veh/h		2074						797			240	
Approach Delay, s/veh		70.0						39.5			16.0	
Approach LOS		E						D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		49.0		71.0	14.0	35.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		43.0		65.0	8.0	29.0		
Max Q Clear Time (g_c+I1), s		3.6		67.0	3.6	13.0		
Green Ext Time (p_c), s		1.4		0.0	0.5	4.2		

Intersection Summary	
HCM 2010 Ctrl Delay	58.0
HCM 2010 LOS	E

Notes

7: Signal Butte Road & SR 24 EB Ramp(s)

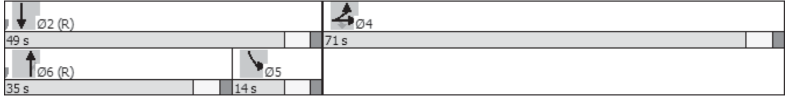
Timing Report, Sorted By Phase

	↓	↗	↘	↑
Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	49	71	14	35
Maximum Split (%)	40.8%	59.2%	11.7%	29.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	49	35	0
End Time (s)	49	0	49	35
Yield/Force Off (s)	43	114	43	29
Yield/Force Off 170(s)	18	89	43	4
Local Start Time (s)	0	49	35	0
Local Yield (s)	43	114	43	29
Local Yield 170(s)	18	89	43	4

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	125

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



8: Signal Butte Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↱	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	500	50	275	375	0	0	225	100
Future Volume (veh/h)	0	0	0	25	500	50	275	375	0	0	225	100
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	532	53	293	399	0	0	239	106
Adj No. of Lanes				1	1	1	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				798	838	712	459	1593	0	0	1709	422
Arrive On Green				0.45	0.45	0.45	0.27	0.90	0.00	0.00	0.27	0.27
Sat Flow, veh/h				1774	1863	1583	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				27	532	53	293	399	0	0	239	106
Grp Sat Flow(s),veh/h/ln				1774	1863	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				1.0	26.4	2.3	9.0	1.7	0.0	0.0	3.4	6.3
Cycle Q Clear(g_c), s				1.0	26.4	2.3	9.0	1.7	0.0	0.0	3.4	6.3
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				798	838	712	459	1593	0	0	1709	422
V/C Ratio(X)				0.03	0.63	0.07	0.64	0.25	0.00	0.00	0.14	0.25
Avail Cap(c_a), veh/h				798	838	712	459	1593	0	0	1709	422
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				18.4	25.4	18.8	41.4	3.4	0.0	0.0	33.5	34.6
Incr Delay (d2), s/veh				0.1	3.6	0.2	6.7	0.4	0.0	0.0	0.2	1.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.5	14.3	1.0	4.7	0.9	0.0	0.0	1.5	2.9
LnGrp Delay(d),s/veh				18.5	29.1	19.0	48.1	3.8	0.0	0.0	33.7	36.0
LnGrp LOS				B	C	B	D	A			C	D
Approach Vol, veh/h					612			692			345	
Approach Delay, s/veh					27.7			22.5			34.4	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		60.0			22.0	38.0		60.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		54.0			16.0	32.0		54.0
Max Q Clear Time (g_c+I1), s		3.7			11.0	8.3		28.4
Green Ext Time (p_c), s		3.7			1.6	1.7		3.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.9
HCM 2010 LOS	C

Notes

8: Signal Butte Road & SR 24 WB Ramp(s)

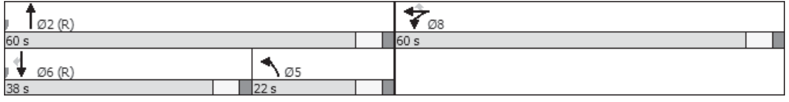
Timing Report, Sorted By Phase

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	60	22	38	60
Maximum Split (%)	50.0%	18.3%	31.7%	50.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	38	0	60
End Time (s)	60	60	38	0
Yield/Force Off (s)	54	54	32	114
Yield/Force Off 170(s)	29	54	7	89
Local Start Time (s)	0	38	0	60
Local Yield (s)	54	54	32	114
Local Yield 170(s)	29	54	7	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



11: Ironwood Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	25	1150	0	1600	700	0
Future Volume (veh/h)	25	1150	0	1600	700	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0
Adj Flow Rate, veh/h	27	0	0	1702	745	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.94	0.94	0.90	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	991	1556	0	2189	1209	0
Arrive On Green	0.56	0.00	0.00	0.34	0.68	0.00
Sat Flow, veh/h	1774	2787	0	6929	3725	0
Grp Volume(v), veh/h	27	0	0	1702	745	0
Grp Sat Flow(s),veh/h/ln	1774	1393	0	1602	1770	0
Q Serve(g_s), s	0.8	0.0	0.0	28.6	13.8	0.0
Cycle Q Clear(g_c), s	0.8	0.0	0.0	28.6	13.8	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	991	1556	0	2189	1209	0
V/C Ratio(X)	0.03	0.00	0.00	0.78	0.62	0.00
Avail Cap(c_a), veh/h	991	1556	0	2189	1209	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.9	0.0	0.0	35.4	14.7	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	2.8	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	13.1	7.0	0.0
LnGrp Delay(d),s/veh	11.9	0.0	0.0	38.2	17.1	0.0
LnGrp LOS	B			D	B	
Approach Vol, veh/h	27			1702	745	
Approach Delay, s/veh	11.9			38.2	17.1	
Approach LOS	B			D	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		47.0		73.0		47.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		41.0		67.0		41.0		
Max Q Clear Time (g_c+I1), s		15.8		2.8		30.6		
Green Ext Time (p_c), s		18.5		0.1		8.9		

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

11: Ironwood Road & SR 24 EB Ramp(s)

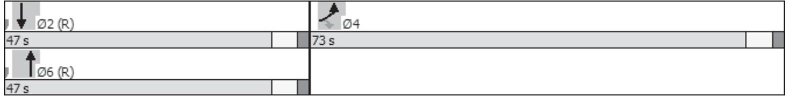
Timing Report, Sorted By Phase

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	47	73	47
Maximum Split (%)	39.2%	60.8%	39.2%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	47	0
End Time (s)	47	0	47
Yield/Force Off (s)	41	114	41
Yield/Force Off 170(s)	16	89	16
Local Start Time (s)	0	47	0
Local Yield (s)	41	114	41
Local Yield 170(s)	16	89	16

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 11: Ironwood Road & SR 24 EB Ramp(s)



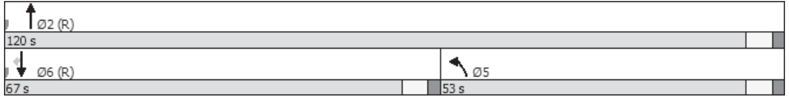
	↗	↘	↖	↑	↓	↙		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations			↰↰	↑↑	↑↑	↱		
Traffic Volume (veh/h)	0	0	525	1075	725	25		
Future Volume (veh/h)	0	0	525	1075	725	25		
Number			5	2	6	16		
Initial Q (Qb), veh			0	0	0	0		
Ped-Bike Adj(A_pbT)			1.00			1.00		
Parking Bus, Adj			1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln			1863	1863	1863	1863		
Adj Flow Rate, veh/h			559	1144	771	27		
Adj No. of Lanes			2	2	2	1		
Peak Hour Factor			0.94	0.94	0.94	0.94		
Percent Heavy Veh, %			2	2	2	2		
Cap, veh/h			1348	3362	1799	805		
Arrive On Green			0.78	1.00	0.51	0.51		
Sat Flow, veh/h			3442	3632	3632	1583		
Grp Volume(v), veh/h			559	1144	771	27		
Grp Sat Flow(s),veh/h/ln			1721	1770	1770	1583		
Q Serve(g_s), s			6.3	0.0	16.4	1.0		
Cycle Q Clear(g_c), s			6.3	0.0	16.4	1.0		
Prop In Lane			1.00			1.00		
Lane Grp Cap(c), veh/h			1348	3362	1799	805		
V/C Ratio(X)			0.41	0.34	0.43	0.03		
Avail Cap(c_a), veh/h			1348	3362	1799	805		
HCM Platoon Ratio			2.00	2.00	1.00	1.00		
Upstream Filter(I)			1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh			8.6	0.0	18.5	14.8		
Incr Delay (d2), s/veh			0.9	0.3	0.7	0.1		
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln			3.0	0.1	8.2	0.5		
LnGrp Delay(d),s/veh			9.5	0.3	19.3	14.8		
LnGrp LOS			A	A	B	B		
Approach Vol, veh/h				1703	798			
Approach Delay, s/veh				3.3	19.1			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			53.0	67.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			47.0	61.0		
Max Q Clear Time (g_c+I1), s		2.0			8.3	18.4		
Green Ext Time (p_c), s		14.6			13.0	5.7		
Intersection Summary								
HCM 2010 Ctrl Delay			8.4					
HCM 2010 LOS			A					

	↑	↖	↓
Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	53	67
Maximum Split (%)	100.0%	44.2%	55.8%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	67	0
End Time (s)	0	0	67
Yield/Force Off (s)	114	114	61
Yield/Force Off 170(s)	89	114	36
Local Start Time (s)	0	67	0
Local Yield (s)	114	114	61
Local Yield 170(s)	89	114	36

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 12: Ironwood Road & SR 24 WB Ramp(s)



APPENDIX H

2025 OPTION A MITIGATED PEAK HOUR ANALYSIS

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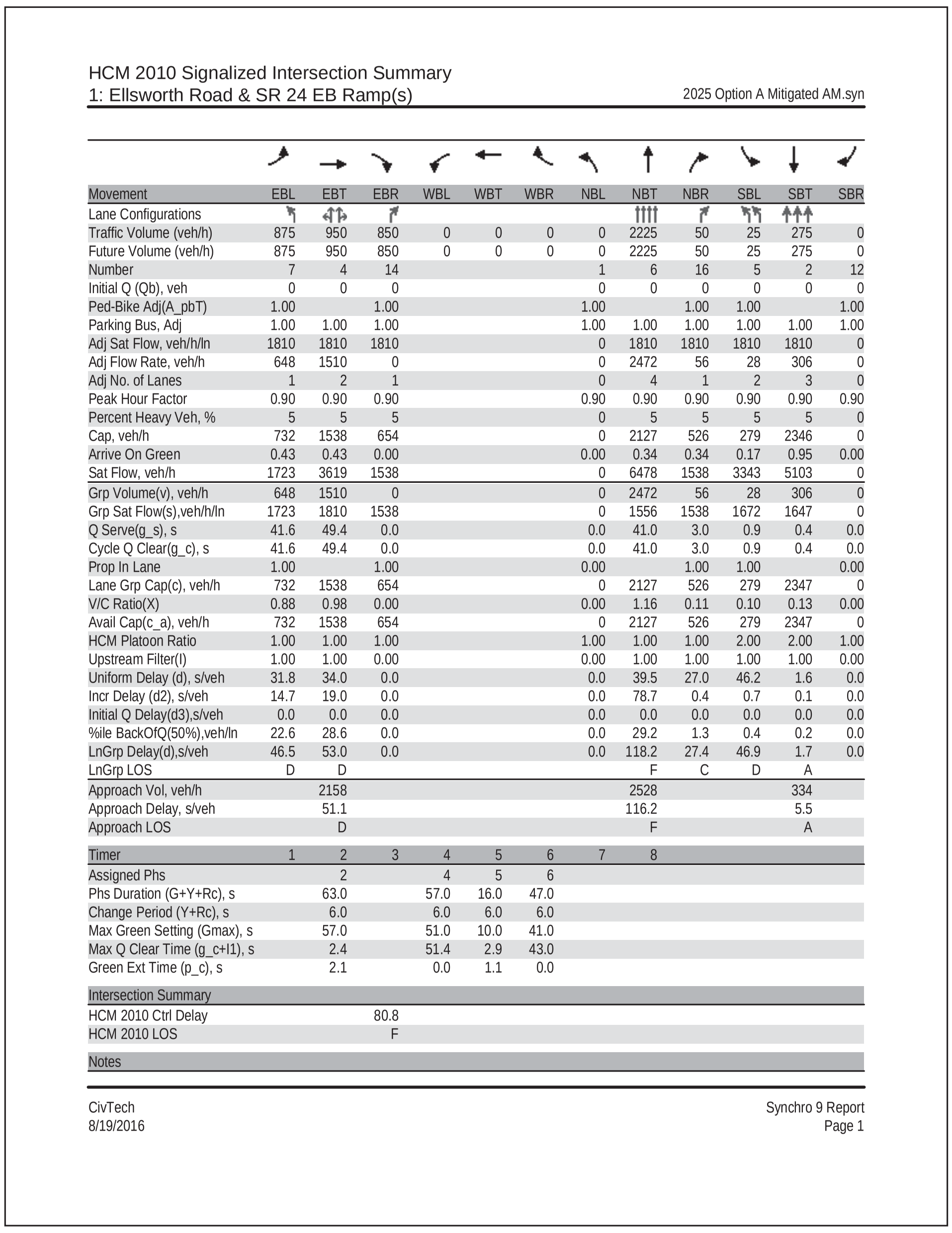

HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

2025 Option A Mitigated AM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	875	950	850	0	0	0	0	2225	50	25	275	0
Future Volume (veh/h)	875	950	850	0	0	0	0	2225	50	25	275	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810				0	1810	1810	1810	1810	0
Adj Flow Rate, veh/h	648	1510	0				0	2472	56	28	306	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	732	1538	654				0	2127	526	279	2346	0
Arrive On Green	0.43	0.43	0.00				0.00	0.34	0.34	0.17	0.95	0.00
Sat Flow, veh/h	1723	3619	1538				0	6478	1538	3343	5103	0
Grp Volume(v), veh/h	648	1510	0				0	2472	56	28	306	0
Grp Sat Flow(s),veh/h/ln	1723	1810	1538				0	1556	1538	1672	1647	0
Q Serve(g_s), s	41.6	49.4	0.0				0.0	41.0	3.0	0.9	0.4	0.0
Cycle Q Clear(g_c), s	41.6	49.4	0.0				0.0	41.0	3.0	0.9	0.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	732	1538	654				0	2127	526	279	2347	0
V/C Ratio(X)	0.88	0.98	0.00				0.00	1.16	0.11	0.10	0.13	0.00
Avail Cap(c_a), veh/h	732	1538	654				0	2127	526	279	2347	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.8	34.0	0.0				0.0	39.5	27.0	46.2	1.6	0.0
Incr Delay (d2), s/veh	14.7	19.0	0.0				0.0	78.7	0.4	0.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.6	28.6	0.0				0.0	29.2	1.3	0.4	0.2	0.0
LnGrp Delay(d),s/veh	46.5	53.0	0.0				0.0	118.2	27.4	46.9	1.7	0.0
LnGrp LOS	D	D						F	C	D	A	
Approach Vol, veh/h		2158						2528			334	
Approach Delay, s/veh		51.1						116.2			5.5	
Approach LOS		D						F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		63.0		57.0	16.0	47.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		57.0		51.0	10.0	41.0		
Max Q Clear Time (g_c+I1), s		2.4		51.4	2.9	43.0		
Green Ext Time (p_c), s		2.1		0.0	1.1	0.0		

Intersection Summary		
HCM 2010 Ctrl Delay		80.8
HCM 2010 LOS		F

Notes

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Synchro 9 Report
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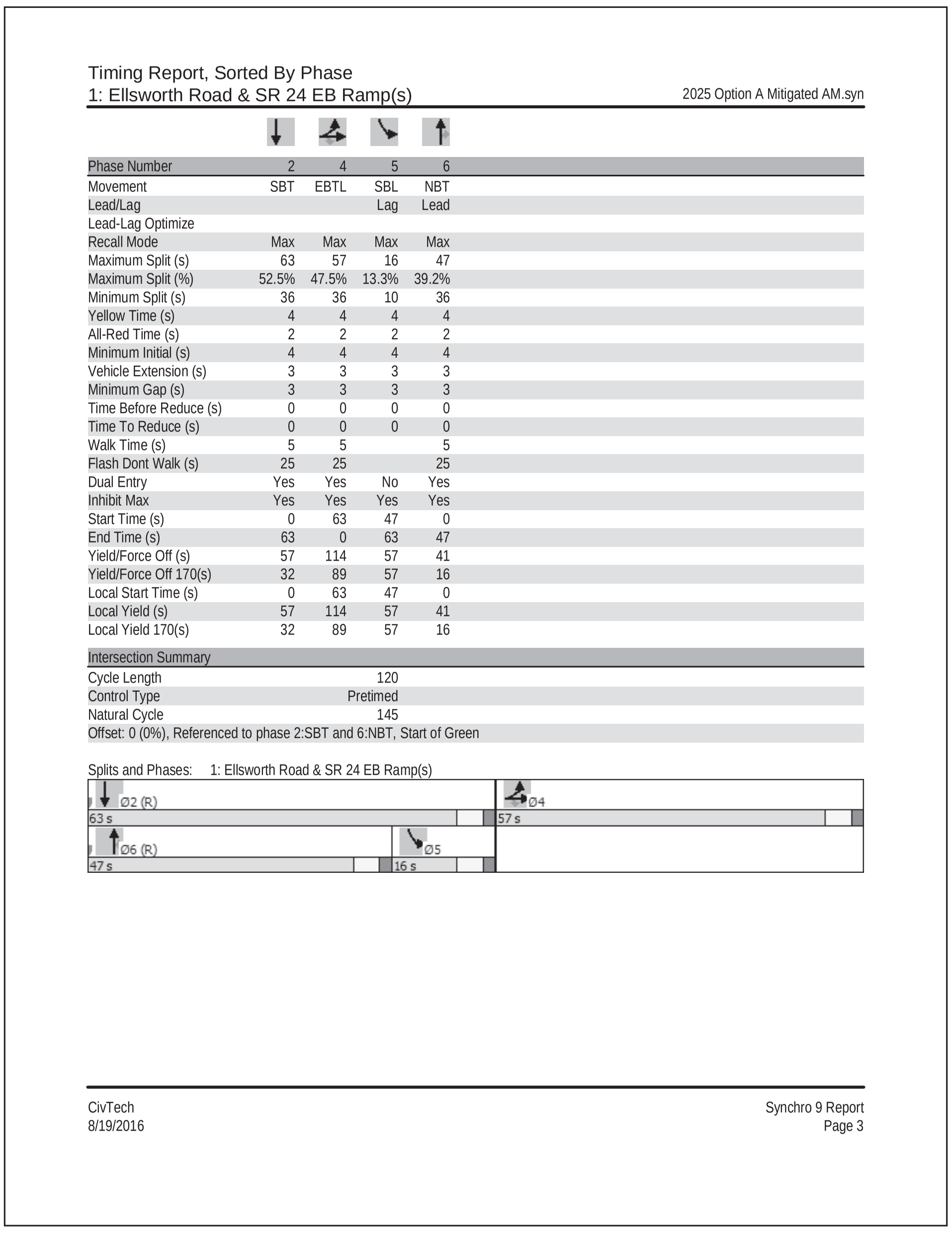

Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

2025 Option A Mitigated AM.syn

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	63	57	16	47
Maximum Split (%)	52.5%	47.5%	13.3%	39.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	63	47	0
End Time (s)	63	0	63	47
Yield/Force Off (s)	57	114	57	41
Yield/Force Off 170(s)	32	89	57	16
Local Start Time (s)	0	63	47	0
Local Yield (s)	57	114	57	41
Local Yield 170(s)	32	89	57	16

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)

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Synchro 9 Report
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HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↑↱		↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	1450	25	1700	525	0	0	300	875
Future Volume (veh/h)	0	0	0	25	1450	25	1700	525	0	0	300	875
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1810	1810	1900	1810	1810	0	0	1810	1810
Adj Flow Rate, veh/h				28	1611	28	1889	583	0	0	333	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				618	1906	33	1226	1862	0	0	916	192
Arrive On Green				0.36	0.36	0.36	0.73	1.00	0.00	0.00	0.13	0.00
Sat Flow, veh/h				1723	5320	92	3343	3529	0	0	7672	1538
Grp Volume(v), veh/h				28	1096	543	1889	583	0	0	333	0
Grp Sat Flow(s),veh/h/ln				1723	1810	1793	1672	1719	0	0	1466	1538
Q Serve(g_s), s				1.3	33.4	33.5	44.0	0.0	0.0	0.0	5.0	0.0
Cycle Q Clear(g_c), s				1.3	33.4	33.5	44.0	0.0	0.0	0.0	5.0	0.0
Prop In Lane				1.00		0.05	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				618	1297	643	1226	1862	0	0	916	192
V/C Ratio(X)				0.05	0.85	0.85	1.54	0.31	0.00	0.00	0.36	0.00
Avail Cap(c_a), veh/h				618	1297	643	1226	1862	0	0	916	192
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.1	35.4	35.4	16.0	0.0	0.0	0.0	48.1	0.0
Incr Delay (d2), s/veh				0.1	6.9	12.9	247.5	0.4	0.0	0.0	1.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.6	18.0	18.9	61.6	0.1	0.0	0.0	2.1	0.0
LnGrp Delay(d),s/veh				25.3	42.3	48.3	263.5	0.4	0.0	0.0	49.2	0.0
LnGrp LOS				C	D	D	F	A			D	
Approach Vol, veh/h					1667			2472			333	
Approach Delay, s/veh					44.0			201.5			49.2	
Approach LOS					D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		71.0			50.0	21.0		49.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		65.0			44.0	15.0		43.0
Max Q Clear Time (g_c+I1), s		2.0			46.0	7.0		35.5
Green Ext Time (p_c), s		22.0			0.0	1.2		5.4

Intersection Summary	
HCM 2010 Ctrl Delay	131.4
HCM 2010 LOS	F

Notes

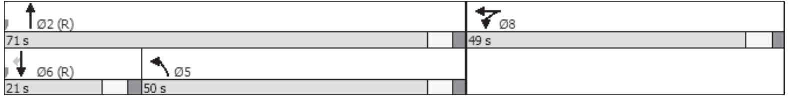
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	71	50	21	49
Maximum Split (%)	59.2%	41.7%	17.5%	40.8%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	71	50	1
End Time (s)	1	1	71	50
Yield/Force Off (s)	115	115	65	44
Yield/Force Off 170(s)	90	115	40	19
Local Start Time (s)	0	21	0	71
Local Yield (s)	65	65	15	114
Local Yield 170(s)	40	65	110	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
7: Signal Butte Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰	↑↑↑	
Traffic Volume (veh/h)	100	350	450	0	0	0	0	775	200	75	125	0
Future Volume (veh/h)	100	350	450	0	0	0	0	775	200	75	125	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810				0	1810	1810	1810	1810	0
Adj Flow Rate, veh/h	111	639	333				0	861	222	83	139	0
Adj No. of Lanes	1	2	1				0	4	1	1	3	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	819	1719	731				0	1712	423	172	2100	0
Arrive On Green	0.47	0.47	0.47				0.00	0.28	0.28	0.20	0.85	0.00
Sat Flow, veh/h	1723	3619	1538				0	6478	1538	1723	5103	0
Grp Volume(v), veh/h	111	639	333				0	861	222	83	139	0
Grp Sat Flow(s),veh/h/ln	1723	1810	1538				0	1556	1538	1723	1647	0
Q Serve(g_s), s	4.3	13.5	17.4				0.0	14.0	14.7	5.1	0.5	0.0
Cycle Q Clear(g_c), s	4.3	13.5	17.4				0.0	14.0	14.7	5.1	0.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	819	1719	731				0	1712	423	172	2100	0
V/C Ratio(X)	0.14	0.37	0.46				0.00	0.50	0.52	0.48	0.07	0.00
Avail Cap(c_a), veh/h	819	1719	731				0	1712	423	172	2100	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.7	20.1	21.1				0.0	36.6	36.9	45.2	5.2	0.0
Incr Delay (d2), s/veh	0.3	0.6	2.0				0.0	1.1	4.6	9.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	6.9	17.3				0.0	6.1	6.8	2.9	0.2	0.0
LnGrp Delay(d),s/veh	18.0	20.7	23.2				0.0	37.7	41.5	54.6	5.3	0.0
LnGrp LOS	B	C	C					D	D	D	A	
Approach Vol, veh/h		1083						1083			222	
Approach Delay, s/veh		21.2						38.4			23.7	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		57.0		63.0	18.0	39.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		51.0		57.0	12.0	33.0		
Max Q Clear Time (g_c+I1), s		2.5		19.4	7.1	16.7		
Green Ext Time (p_c), s		1.1		6.2	0.4	5.7		

Intersection Summary	
HCM 2010 Ctrl Delay	29.2
HCM 2010 LOS	C

Notes

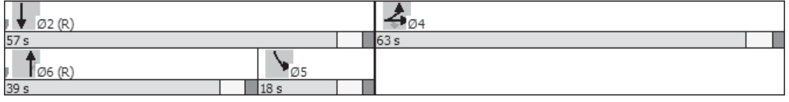
Timing Report, Sorted By Phase
7: Signal Butte Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	57	63	18	39
Maximum Split (%)	47.5%	52.5%	15.0%	32.5%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	57	39	0
End Time (s)	57	0	57	39
Yield/Force Off (s)	51	114	51	33
Yield/Force Off 170(s)	26	89	51	8
Local Start Time (s)	0	57	39	0
Local Yield (s)	51	114	51	33
Local Yield 170(s)	26	89	51	8

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
8: Signal Butte Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	100	725	100	650	125	0	0	200	250
Future Volume (veh/h)	0	0	0	100	725	100	650	125	0	0	200	250
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1810	1810	1810	1810	1810	0	0	1810	1810
Adj Flow Rate, veh/h				111	806	111	722	139	0	0	222	278
Adj No. of Lanes				1	2	1	2	2	0	0	4	1
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				517	1086	461	892	2063	0	0	1764	436
Arrive On Green				0.30	0.30	0.30	0.53	1.00	0.00	0.00	0.28	0.28
Sat Flow, veh/h				1723	3619	1538	3343	3529	0	0	6478	1538
Grp Volume(v), veh/h				111	806	111	722	139	0	0	222	278
Grp Sat Flow(s),veh/h/ln				1723	1810	1538	1672	1719	0	0	1556	1538
Q Serve(g_s), s				5.8	24.1	6.5	21.3	0.0	0.0	0.0	3.2	19.0
Cycle Q Clear(g_c), s				5.8	24.1	6.5	21.3	0.0	0.0	0.0	3.2	19.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				517	1086	461	892	2063	0	0	1764	436
V/C Ratio(X)				0.21	0.74	0.24	0.81	0.07	0.00	0.00	0.13	0.64
Avail Cap(c_a), veh/h				517	1086	461	892	2063	0	0	1764	436
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				31.4	37.8	31.7	25.5	0.0	0.0	0.0	32.0	37.6
Incr Delay (d2), s/veh				0.9	4.6	1.2	7.9	0.1	0.0	0.0	0.1	7.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.9	12.7	2.9	10.6	0.0	0.0	0.0	1.4	8.9
LnGrp Delay(d),s/veh				32.4	42.4	32.9	33.4	0.1	0.0	0.0	32.1	44.6
LnGrp LOS				C	D	C	C	A			C	D
Approach Vol, veh/h					1028			861			500	
Approach Delay, s/veh					40.3			28.0			39.0	
Approach LOS					D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		78.0			38.0	40.0		42.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		72.0			32.0	34.0		36.0
Max Q Clear Time (g_c+I1), s		2.0			23.3	21.0		26.1
Green Ext Time (p_c), s		3.7			2.5	1.9		4.1

Intersection Summary	
HCM 2010 Ctrl Delay	35.6
HCM 2010 LOS	D

Notes

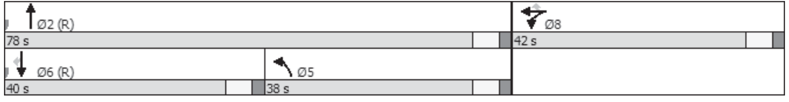
Timing Report, Sorted By Phase
8: Signal Butte Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	78	38	40	42
Maximum Split (%)	65.0%	31.7%	33.3%	35.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	40	0	78
End Time (s)	78	78	40	0
Yield/Force Off (s)	72	72	34	114
Yield/Force Off 170(s)	47	72	9	89
Local Start Time (s)	0	40	0	78
Local Yield (s)	72	72	34	114
Local Yield 170(s)	47	72	9	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	95

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	1175	1750	2375	0	0	0	0	1125	175	50	175	0
Future Volume (veh/h)	1175	1750	2375	0	0	0	0	1125	175	50	175	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	833	2445	0				0	1197	186	53	186	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1005	2111	897				0	1388	343	229	1695	0
Arrive On Green	0.57	0.57	0.00				0.00	0.22	0.22	0.13	0.67	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	833	2445	0				0	1197	186	53	186	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	46.0	68.0	0.0				0.0	21.6	12.5	1.7	1.6	0.0
Cycle Q Clear(g_c), s	46.0	68.0	0.0				0.0	21.6	12.5	1.7	1.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1005	2111	897				0	1388	343	229	1695	0
V/C Ratio(X)	0.83	1.16	0.00				0.00	0.86	0.54	0.23	0.11	0.00
Avail Cap(c_a), veh/h	1005	2111	897				0	1388	343	229	1695	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.2	26.0	0.0				0.0	45.3	41.7	49.2	13.6	0.0
Incr Delay (d2), s/veh	7.9	76.9	0.0				0.0	7.3	6.0	2.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.6	57.2	0.0				0.0	10.3	6.1	0.9	0.7	0.0
LnGrp Delay(d),s/veh	29.1	102.9	0.0				0.0	52.5	47.8	51.6	13.7	0.0
LnGrp LOS	C	F						D	D	D	B	
Approach Vol, veh/h		3278						1383			239	
Approach Delay, s/veh		84.2						51.9			22.1	
Approach LOS		F						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		46.0		74.0	14.0	32.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		40.0		68.0	8.0	26.0		
Max Q Clear Time (g_c+I1), s		3.6		70.0	3.7	23.6		
Green Ext Time (p_c), s		1.3		0.0	0.4	1.7		

Intersection Summary	
HCM 2010 Ctrl Delay	72.0
HCM 2010 LOS	E

Notes

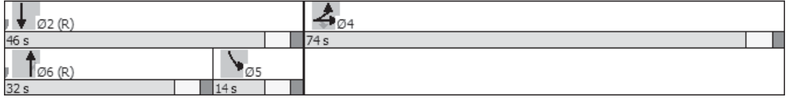
Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	46	74	14	32
Maximum Split (%)	38.3%	61.7%	11.7%	26.7%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	46	32	0
End Time (s)	46	0	46	32
Yield/Force Off (s)	40	114	40	26
Yield/Force Off 170(s)	15	89	40	1
Local Start Time (s)	0	46	32	0
Local Yield (s)	40	114	40	26
Local Yield 170(s)	15	89	40	1

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	50	750	50	550	575	0	0	225	950
Future Volume (veh/h)	0	0	0	50	750	50	550	575	0	0	225	950
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1900	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				53	798	53	585	612	0	0	239	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				444	1296	86	516	2300	0	0	3395	712
Arrive On Green				0.25	0.25	0.25	0.30	1.00	0.00	0.00	0.45	0.00
Sat Flow, veh/h				1774	5185	343	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				53	572	279	585	612	0	0	239	0
Grp Sat Flow(s),veh/h/ln				1774	1863	1802	1721	1770	0	0	1509	1583
Q Serve(g_s), s				2.8	16.3	16.5	18.0	0.0	0.0	0.0	2.2	0.0
Cycle Q Clear(g_c), s				2.8	16.3	16.5	18.0	0.0	0.0	0.0	2.2	0.0
Prop In Lane				1.00		0.19	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				444	931	451	516	2300	0	0	3395	712
V/C Ratio(X)				0.12	0.61	0.62	1.13	0.27	0.00	0.00	0.07	0.00
Avail Cap(c_a), veh/h				444	931	451	516	2300	0	0	3395	712
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				34.8	39.9	39.9	42.0	0.0	0.0	0.0	18.7	0.0
Incr Delay (d2), s/veh				0.6	3.0	6.2	81.7	0.3	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.4	8.8	9.0	14.3	0.1	0.0	0.0	0.9	0.0
LnGrp Delay(d),s/veh				35.3	42.9	46.2	123.7	0.3	0.0	0.0	18.8	0.0
LnGrp LOS				D	D	D	F	A			B	
Approach Vol, veh/h					904			1197			239	
Approach Delay, s/veh					43.5			60.6			18.8	
Approach LOS					D			E			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			24.0	60.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			18.0	54.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			20.0	4.2		18.5
Green Ext Time (p_c), s		7.0			0.0	1.5		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.7
HCM 2010 LOS	D

Notes

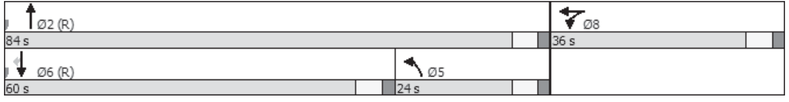
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	24	60	36
Maximum Split (%)	70.0%	20.0%	50.0%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	110	50	14
End Time (s)	14	14	110	50
Yield/Force Off (s)	8	8	104	44
Yield/Force Off 170(s)	103	8	79	19
Local Start Time (s)	0	60	0	84
Local Yield (s)	78	78	54	114
Local Yield 170(s)	53	78	29	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
7: Signal Butte Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	975	875	0	0	0	0	650	100	25	200	0
Future Volume (veh/h)	100	975	875	0	0	0	0	650	100	25	200	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	106	1503	621				0	691	106	27	213	0
Adj No. of Lanes	1	2	1				0	4	1	1	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	961	2018	858				0	1549	383	118	1822	0
Arrive On Green	0.54	0.54	0.54				0.00	0.24	0.24	0.13	0.72	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	1774	5253	0
Grp Volume(v), veh/h	106	1503	621				0	691	106	27	213	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1774	1695	0
Q Serve(g_s), s	3.5	37.2	35.5				0.0	11.0	6.5	1.6	1.6	0.0
Cycle Q Clear(g_c), s	3.5	37.2	35.5				0.0	11.0	6.5	1.6	1.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	961	2018	858				0	1549	383	118	1822	0
V/C Ratio(X)	0.11	0.74	0.72				0.00	0.45	0.28	0.23	0.12	0.00
Avail Cap(c_a), veh/h	961	2018	858				0	1549	383	118	1822	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.4	21.1	20.7				0.0	38.7	37.0	49.2	11.1	0.0
Incr Delay (d2), s/veh	0.2	2.5	5.3				0.0	0.9	1.8	4.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	19.7	31.3				0.0	4.9	3.0	0.9	0.7	0.0
LnGrp Delay(d),s/veh	13.6	23.7	26.0				0.0	39.6	38.8	53.7	11.3	0.0
LnGrp LOS	B	C	C					D	D	D	B	
Approach Vol, veh/h		2230						797			240	
Approach Delay, s/veh		23.9						39.5			16.0	
Approach LOS		C						D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		49.0		71.0	14.0	35.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		43.0		65.0	8.0	29.0		
Max Q Clear Time (g_c+I1), s		3.6		39.2	3.6	13.0		
Green Ext Time (p_c), s		1.4		15.8	0.5	4.2		

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C

Notes

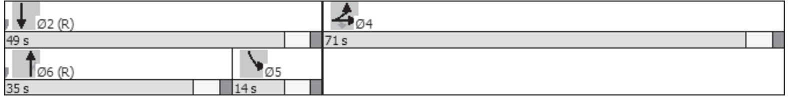
Timing Report, Sorted By Phase
7: Signal Butte Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	49	71	14	35
Maximum Split (%)	40.8%	59.2%	11.7%	29.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	49	35	0
End Time (s)	49	0	49	35
Yield/Force Off (s)	43	114	43	29
Yield/Force Off 170(s)	18	89	43	4
Local Start Time (s)	0	49	35	0
Local Yield (s)	43	114	43	29
Local Yield 170(s)	18	89	43	4

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
8: Signal Butte Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	500	50	275	375	0	0	225	100
Future Volume (veh/h)	0	0	0	25	500	50	275	375	0	0	225	100
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	532	53	293	399	0	0	239	106
Adj No. of Lanes				1	2	1	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				798	1676	712	459	1593	0	0	1709	422
Arrive On Green				0.45	0.45	0.45	0.27	0.90	0.00	0.00	0.27	0.27
Sat Flow, veh/h				1774	3725	1583	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				27	532	53	293	399	0	0	239	106
Grp Sat Flow(s),veh/h/ln				1774	1863	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				1.0	11.0	2.3	9.0	1.7	0.0	0.0	3.4	6.3
Cycle Q Clear(g_c), s				1.0	11.0	2.3	9.0	1.7	0.0	0.0	3.4	6.3
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				798	1676	712	459	1593	0	0	1709	422
V/C Ratio(X)				0.03	0.32	0.07	0.64	0.25	0.00	0.00	0.14	0.25
Avail Cap(c_a), veh/h				798	1676	712	459	1593	0	0	1709	422
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				18.4	21.2	18.8	41.4	3.4	0.0	0.0	33.5	34.6
Incr Delay (d2), s/veh				0.1	0.5	0.2	6.7	0.4	0.0	0.0	0.2	1.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.5	5.7	1.0	4.7	0.9	0.0	0.0	1.5	2.9
LnGrp Delay(d),s/veh				18.5	21.7	19.0	48.1	3.8	0.0	0.0	33.7	36.0
LnGrp LOS				B	C	B	D	A			C	D
Approach Vol, veh/h					612			692			345	
Approach Delay, s/veh					21.3			22.5			34.4	
Approach LOS					C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		60.0			22.0	38.0		60.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		54.0			16.0	32.0		54.0
Max Q Clear Time (g_c+I1), s		3.7			11.0	8.3		13.0
Green Ext Time (p_c), s		3.7			1.6	1.7		3.8

Intersection Summary	
HCM 2010 Ctrl Delay	24.6
HCM 2010 LOS	C

Notes

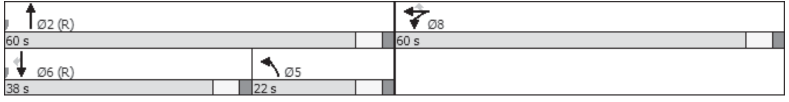
Timing Report, Sorted By Phase
8: Signal Butte Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	60	22	38	60
Maximum Split (%)	50.0%	18.3%	31.7%	50.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	38	0	60
End Time (s)	60	60	38	0
Yield/Force Off (s)	54	54	32	114
Yield/Force Off 170(s)	29	54	7	89
Local Start Time (s)	0	38	0	60
Local Yield (s)	54	54	32	114
Local Yield 170(s)	29	54	7	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



APPENDIX I

2025 OPTION B PEAK HOUR ANALYSIS

2025 Option B AM
1: Ellsworth Road & SR 24 EB Ramp(s)

SR 24 Interchanges - 2025 Option B AM
HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	850	800	925	0	0	0	0	2375	25	25	275	0
Future Volume (veh/h)	850	800	925	0	0	0	0	2375	25	25	275	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	603	1273	0				0	2527	27	27	293	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	813	1708	726				0	2189	541	172	2246	0
Arrive On Green	0.46	0.46	0.00				0.00	0.34	0.34	0.10	0.88	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	603	1273	0				0	2527	27	27	293	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	33.5	33.7	0.0				0.0	41.0	1.4	0.9	0.9	0.0
Cycle Q Clear(g_c), s	33.5	33.7	0.0				0.0	41.0	1.4	0.9	0.9	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	813	1708	726				0	2189	541	172	2246	0
V/C Ratio(X)	0.74	0.75	0.00				0.00	1.15	0.05	0.16	0.13	0.00
Avail Cap(c_a), veh/h	813	1708	726				0	2189	541	172	2246	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.7	26.7	0.0				0.0	39.5	26.5	51.7	4.0	0.0
Incr Delay (d2), s/veh	6.0	3.0	0.0				0.0	75.1	0.2	1.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.6	18.0	0.0				0.0	29.5	0.6	0.5	0.4	0.0
LnGrp Delay(d),s/veh	32.7	29.8	0.0				0.0	114.6	26.6	53.6	4.1	0.0
LnGrp LOS	C	C						F	C	D	A	
Approach Vol, veh/h		1876						2554			320	
Approach Delay, s/veh		30.7						113.7			8.3	
Approach LOS		C						F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		59.0		61.0	12.0	47.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		53.0		55.0	6.0	41.0		
Max Q Clear Time (g_c+I1), s		2.9		35.7	2.9	43.0		
Green Ext Time (p_c), s		2.0		10.7	0.5	0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	73.8
HCM 2010 LOS	E

Notes

2025 Option B AM
1: Ellsworth Road & SR 24 EB Ramp(s)

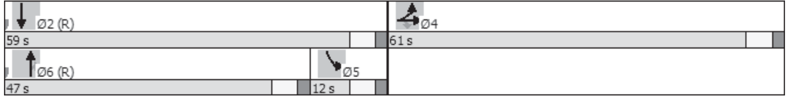
SR 24 Interchanges - 2025 Option B AM
Timing Report, Sorted By Phase

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	59	61	12	47
Maximum Split (%)	49.2%	50.8%	10.0%	39.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	59	47	0
End Time (s)	59	0	59	47
Yield/Force Off (s)	53	114	53	41
Yield/Force Off 170(s)	28	89	53	16
Local Start Time (s)	0	59	47	0
Local Yield (s)	53	114	53	41
Local Yield 170(s)	28	89	53	16

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	135

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)



2: Ellsworth Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑↱		↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	1175	25	1800	575	0	0	300	900
Future Volume (veh/h)	0	0	0	25	1175	25	1800	575	0	0	300	900
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1900	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	1250	27	1915	612	0	0	319	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				517	1494	32	1319	2153	0	0	1320	277
Arrive On Green				0.29	0.29	0.29	0.77	1.00	0.00	0.00	0.17	0.00
Sat Flow, veh/h				1774	5123	111	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				27	827	450	1915	612	0	0	319	0
Grp Sat Flow(s),veh/h/ln				1774	1695	1843	1721	1770	0	0	1509	1583
Q Serve(g_s), s				1.3	27.4	27.4	46.0	0.0	0.0	0.0	4.4	0.0
Cycle Q Clear(g_c), s				1.3	27.4	27.4	46.0	0.0	0.0	0.0	4.4	0.0
Prop In Lane				1.00		0.06	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				517	989	538	1319	2153	0	0	1320	277
V/C Ratio(X)				0.05	0.84	0.84	1.45	0.28	0.00	0.00	0.24	0.00
Avail Cap(c_a), veh/h				517	989	538	1319	2153	0	0	1320	277
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				30.6	39.8	39.8	14.0	0.0	0.0	0.0	42.6	0.0
Incr Delay (d2), s/veh				0.2	8.4	14.4	207.5	0.3	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.7	14.0	16.1	58.5	0.1	0.0	0.0	1.9	0.0
LnGrp Delay(d),s/veh				30.8	48.2	54.2	221.5	0.3	0.0	0.0	43.1	0.0
LnGrp LOS				C	D	D	F	A			D	
Approach Vol, veh/h					1304			2527			319	
Approach Delay, s/veh					49.9			167.9			43.1	
Approach LOS					D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		79.0			52.0	27.0		41.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		73.0			46.0	21.0		35.0
Max Q Clear Time (g_c+I1), s		2.0			48.0	6.4		29.4
Green Ext Time (p_c), s		23.6			0.0	1.6		3.4

Intersection Summary	
HCM 2010 Ctrl Delay	121.2
HCM 2010 LOS	F

Notes

2: Ellsworth Road & SR 24 WB Ramp(s)

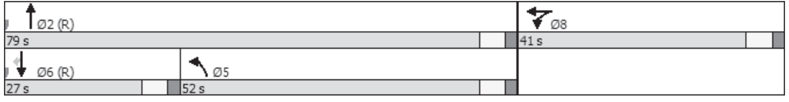
Timing Report, Sorted By Phase

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	79	52	27	41
Maximum Split (%)	65.8%	43.3%	22.5%	34.2%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	77	50	9
End Time (s)	9	9	77	50
Yield/Force Off (s)	3	3	71	44
Yield/Force Off 170(s)	98	3	46	19
Local Start Time (s)	0	27	0	79
Local Yield (s)	73	73	21	114
Local Yield 170(s)	48	73	116	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



7: Signal Butte Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	25	675	0	1500	350	0
Future Volume (veh/h)	25	675	0	1500	350	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0
Adj Flow Rate, veh/h	27	0	0	1596	372	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.94	0.94	0.90	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	828	1300	0	2777	1534	0
Arrive On Green	0.47	0.00	0.00	0.43	0.87	0.00
Sat Flow, veh/h	1774	2787	0	6929	3725	0
Grp Volume(v), veh/h	27	0	0	1596	372	0
Grp Sat Flow(s),veh/h/ln	1774	1393	0	1602	1770	0
Q Serve(g_s), s	1.0	0.0	0.0	22.6	2.1	0.0
Cycle Q Clear(g_c), s	1.0	0.0	0.0	22.6	2.1	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	828	1300	0	2777	1534	0
V/C Ratio(X)	0.03	0.00	0.00	0.57	0.24	0.00
Avail Cap(c_a), veh/h	828	1300	0	2777	1534	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.3	0.0	0.0	25.7	4.7	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.9	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.0	10.1	1.0	0.0
LnGrp Delay(d),s/veh	17.4	0.0	0.0	26.5	5.1	0.0
LnGrp LOS	B			C	A	
Approach Vol, veh/h	27			1596	372	
Approach Delay, s/veh	17.4			26.5	5.1	
Approach LOS	B			C	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		58.0		62.0		58.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		52.0		56.0		52.0		
Max Q Clear Time (g_c+I1), s		4.1		3.0		24.6		
Green Ext Time (p_c), s		20.9		0.1		15.9		

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C

7: Signal Butte Road & SR 24 EB Ramp(s)

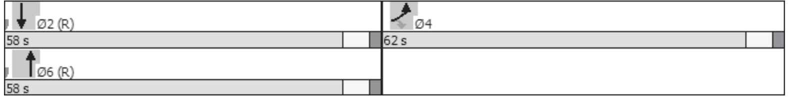
Timing Report, Sorted By Phase

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	58	62	58
Maximum Split (%)	48.3%	51.7%	48.3%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	58	0
End Time (s)	58	0	58
Yield/Force Off (s)	52	114	52
Yield/Force Off 170(s)	27	89	27
Local Start Time (s)	0	58	0
Local Yield (s)	52	114	52
Local Yield 170(s)	27	89	27

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



2025 Option B AM
8: Signal Butte Road & SR 24 WB Ramp(s)

SR 24 Interchanges - 2025 Option B AM
HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑	↱
Traffic Volume (veh/h)	0	0	1250	250	375	50
Future Volume (veh/h)	0	0	1250	250	375	50
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1863	1863	1863	1863
Adj Flow Rate, veh/h			1330	266	399	53
Adj No. of Lanes			2	2	2	1
Peak Hour Factor			0.94	0.94	0.94	0.94
Percent Heavy Veh, %			2	2	2	2
Cap, veh/h			1514	3256	1416	633
Arrive On Green			0.88	1.00	0.40	0.40
Sat Flow, veh/h			3442	3632	3632	1583
Grp Volume(v), veh/h			1330	266	399	53
Grp Sat Flow(s),veh/h/ln			1721	1770	1770	1583
Q Serve(g_s), s			15.3	0.0	5.7	1.6
Cycle Q Clear(g_c), s			15.3	0.0	5.7	1.6
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1514	3256	1416	633
V/C Ratio(X)			0.88	0.08	0.28	0.08
Avail Cap(c_a), veh/h			1514	3256	1416	633
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			3.4	0.0	15.2	14.0
Incr Delay (d2), s/veh			7.5	0.0	0.5	0.3
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			7.3	0.0	2.9	0.7
LnGrp Delay(d),s/veh			11.0	0.0	15.7	14.2
LnGrp LOS			B	A	B	B
Approach Vol, veh/h				1596	452	
Approach Delay, s/veh				9.2	15.5	
Approach LOS				A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		75.0			39.0	36.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		69.0			33.0	30.0		
Max Q Clear Time (g_c+I1), s		2.0			17.3	7.7		
Green Ext Time (p_c), s		9.0			6.6	2.5		

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

2025 Option B AM
8: Signal Butte Road & SR 24 WB Ramp(s)

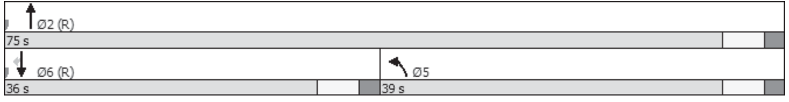
SR 24 Interchanges - 2025 Option B AM
Timing Report, Sorted By Phase

Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	75	39	36
Maximum Split (%)	100.0%	52.0%	48.0%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	36	0
End Time (s)	0	0	36
Yield/Force Off (s)	69	69	30
Yield/Force Off 170(s)	44	69	5
Local Start Time (s)	0	36	0
Local Yield (s)	69	69	30
Local Yield 170(s)	44	69	5

Intersection Summary	
Cycle Length	75
Control Type	Pretimed
Natural Cycle	70

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



2025 Option B PM
1: Ellseorth Road & SR 24 EB Ramp(s)

SR 24 Interchanges - 2025 Option B PM
HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	1125	1425	2550	0	0	0	0	1225	100	50	175	0
Future Volume (veh/h)	1125	1425	2550	0	0	0	0	1225	100	50	175	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	798	2074	0				0	1303	106	53	186	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	991	2080	884				0	1495	369	201	1737	0
Arrive On Green	0.56	0.56	0.00				0.00	0.23	0.23	0.12	0.68	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	798	2074	0				0	1303	106	53	186	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	43.3	66.6	0.0				0.0	23.5	6.6	1.7	1.5	0.0
Cycle Q Clear(g_c), s	43.3	66.6	0.0				0.0	23.5	6.6	1.7	1.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	991	2080	884				0	1495	369	201	1737	0
V/C Ratio(X)	0.81	1.00	0.00				0.00	0.87	0.29	0.26	0.11	0.00
Avail Cap(c_a), veh/h	991	2080	884				0	1495	369	201	1737	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.3	26.4	0.0				0.0	44.3	37.8	50.7	12.7	0.0
Incr Delay (d2), s/veh	7.0	19.1	0.0				0.0	7.3	1.9	3.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	23.0	39.5	0.0				0.0	11.2	3.1	0.9	0.7	0.0
LnGrp Delay(d),s/veh	28.2	45.5	0.0				0.0	51.5	39.7	53.8	12.9	0.0
LnGrp LOS	C	D						D	D	D	B	
Approach Vol, veh/h		2872						1409			239	
Approach Delay, s/veh		40.7						50.6			22.0	
Approach LOS		D						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.0		73.0	13.0	34.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		41.0		67.0	7.0	28.0		
Max Q Clear Time (g_c+I1), s		3.5		68.6	3.7	25.5		
Green Ext Time (p_c), s		1.3		0.0	0.4	1.8		

Intersection Summary	
HCM 2010 Ctrl Delay	42.8
HCM 2010 LOS	D

Notes

2025 Option B PM
1: Ellseorth Road & SR 24 EB Ramp(s)

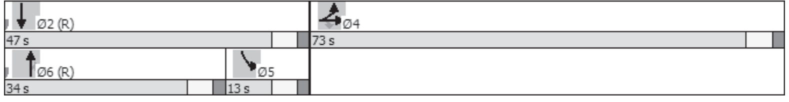
SR 24 Interchanges - 2025 Option B PM
Timing Report, Sorted By Phase

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	47	73	13	34
Maximum Split (%)	39.2%	60.8%	10.8%	28.3%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	47	34	0
End Time (s)	47	0	47	34
Yield/Force Off (s)	41	114	41	28
Yield/Force Off 170(s)	16	89	41	3
Local Start Time (s)	0	47	34	0
Local Yield (s)	41	114	41	28
Local Yield 170(s)	16	89	41	3

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellseorth Road & SR 24 EB Ramp(s)



2: Ellseorth Road & SR 24 WB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑↱		↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	625	25	600	625	0	0	225	975
Future Volume (veh/h)	0	0	0	25	625	25	600	625	0	0	225	975
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1900	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	665	27	638	665	0	0	239	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				606	1713	69	516	1976	0	0	2703	567
Arrive On Green				0.34	0.34	0.34	0.30	1.00	0.00	0.00	0.36	0.00
Sat Flow, veh/h				1774	5014	203	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				27	449	243	638	665	0	0	239	0
Grp Sat Flow(s),veh/h/ln				1774	1695	1827	1721	1770	0	0	1509	1583
Q Serve(g_s), s				1.2	12.1	12.1	18.0	0.0	0.0	0.0	2.5	0.0
Cycle Q Clear(g_c), s				1.2	12.1	12.1	18.0	0.0	0.0	0.0	2.5	0.0
Prop In Lane				1.00		0.11	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				606	1158	624	516	1976	0	0	2703	567
V/C Ratio(X)				0.04	0.39	0.39	1.24	0.34	0.00	0.00	0.09	0.00
Avail Cap(c_a), veh/h				606	1158	624	516	1976	0	0	2703	567
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	30.0	30.0	42.0	0.0	0.0	0.0	25.5	0.0
Incr Delay (d2), s/veh				0.1	1.0	1.8	122.0	0.5	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.6	5.8	6.4	17.2	0.1	0.0	0.0	1.1	0.0
LnGrp Delay(d),s/veh				26.5	31.0	31.8	164.0	0.5	0.0	0.0	25.6	0.0
LnGrp LOS				C	C	C	F	A			C	
Approach Vol, veh/h					719			1303			239	
Approach Delay, s/veh					31.1			80.5			25.6	
Approach LOS					C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		73.0			24.0	49.0		47.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		67.0			18.0	43.0		41.0
Max Q Clear Time (g_c+I1), s		2.0			20.0	4.5		14.1
Green Ext Time (p_c), s		7.9			0.0	1.5		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	59.0
HCM 2010 LOS	E

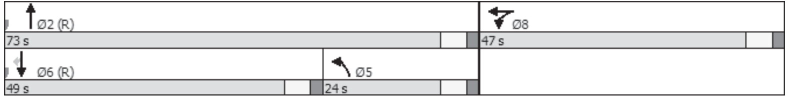
2: Ellseorth Road & SR 24 WB Ramp(s)

Timing Report, Sorted By Phase

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	73	24	49	47
Maximum Split (%)	60.8%	20.0%	40.8%	39.2%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	99	50	3
End Time (s)	3	3	99	50
Yield/Force Off (s)	117	117	93	44
Yield/Force Off 170(s)	92	117	68	19
Local Start Time (s)	0	49	0	73
Local Yield (s)	67	67	43	114
Local Yield 170(s)	42	67	18	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145
Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 2: Ellseorth Road & SR 24 WB Ramp(s)



7: Signal Butte Road & SR 24 EB Ramp(s)

HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	75	1525	0	1025	275	0
Future Volume (veh/h)	75	1525	0	1025	275	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0
Adj Flow Rate, veh/h	80	0	0	1090	293	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.94	0.94	0.90	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	1153	1811	0	1602	885	0
Arrive On Green	0.65	0.00	0.00	0.25	0.50	0.00
Sat Flow, veh/h	1774	2787	0	6929	3725	0
Grp Volume(v), veh/h	80	0	0	1090	293	0
Grp Sat Flow(s),veh/h/ln	1774	1393	0	1602	1770	0
Q Serve(g_s), s	2.0	0.0	0.0	18.4	6.0	0.0
Cycle Q Clear(g_c), s	2.0	0.0	0.0	18.4	6.0	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1153	1811	0	1602	885	0
V/C Ratio(X)	0.07	0.00	0.00	0.68	0.33	0.00
Avail Cap(c_a), veh/h	1153	1811	0	1602	885	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.7	0.0	0.0	40.7	24.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	2.4	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	8.4	3.0	0.0
LnGrp Delay(d),s/veh	7.8	0.0	0.0	43.0	25.0	0.0
LnGrp LOS	A			D	C	
Approach Vol, veh/h	80			1090	293	
Approach Delay, s/veh	7.8			43.0	25.0	
Approach LOS	A			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.0		84.0		36.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		30.0		78.0		30.0		
Max Q Clear Time (g_c+I1), s		8.0		4.0		20.4		
Green Ext Time (p_c), s		9.4		0.2		5.6		

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

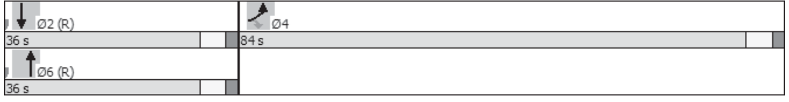
7: Signal Butte Road & SR 24 EB Ramp(s)

Timing Report, Sorted By Phase

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	36	84	36
Maximum Split (%)	30.0%	70.0%	30.0%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	36	0
End Time (s)	36	0	36
Yield/Force Off (s)	30	114	30
Yield/Force Off 170(s)	5	89	5
Local Start Time (s)	0	36	0
Local Yield (s)	30	114	30
Local Yield 170(s)	5	89	5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



2025 Option B PM
8: Signal Butte Road & SR 24 WB Ramp(s)

SR 24 Interchanges - 2025 Option B PM
HCM 2010 Signalized Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑	↱
Traffic Volume (veh/h)	0	0	675	350	300	25
Future Volume (veh/h)	0	0	675	350	300	25
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1863	1863	1863	1863
Adj Flow Rate, veh/h			718	372	319	27
Adj No. of Lanes			2	2	2	1
Peak Hour Factor			0.94	0.94	0.94	0.94
Percent Heavy Veh, %			2	2	2	2
Cap, veh/h			1836	3362	1298	581
Arrive On Green			1.00	1.00	0.37	0.37
Sat Flow, veh/h			3442	3632	3632	1583
Grp Volume(v), veh/h			718	372	319	27
Grp Sat Flow(s),veh/h/ln			1721	1770	1770	1583
Q Serve(g_s), s			0.0	0.0	7.5	1.3
Cycle Q Clear(g_c), s			0.0	0.0	7.5	1.3
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1836	3362	1298	581
V/C Ratio(X)			0.39	0.11	0.25	0.05
Avail Cap(c_a), veh/h			1836	3362	1298	581
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			0.0	0.0	26.5	24.5
Incr Delay (d2), s/veh			0.6	0.1	0.5	0.2
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.2	0.0	3.8	0.6
LnGrp Delay(d),s/veh			0.6	0.1	26.9	24.6
LnGrp LOS			A	A	C	C
Approach Vol, veh/h				1090	346	
Approach Delay, s/veh				0.4	26.7	
Approach LOS				A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			70.0	50.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			64.0	44.0		
Max Q Clear Time (g_c+I1), s		2.0			2.0	9.5		
Green Ext Time (p_c), s		5.5			5.5	2.0		

Intersection Summary	
HCM 2010 Ctrl Delay	6.8
HCM 2010 LOS	A

2025 Option B PM
8: Signal Butte Road & SR 24 WB Ramp(s)

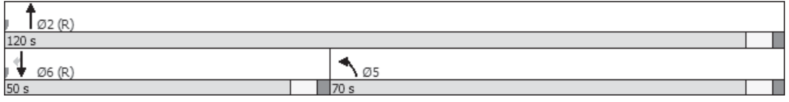
SR 24 Interchanges - 2025 Option B PM
Timing Report, Sorted By Phase

Phase Number	2	5	6
Movement	NBT	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	70	50
Maximum Split (%)	100.0%	58.3%	41.7%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	50	0
End Time (s)	0	0	50
Yield/Force Off (s)	114	114	44
Yield/Force Off 170(s)	89	114	19
Local Start Time (s)	0	50	0
Local Yield (s)	114	114	44
Local Yield 170(s)	89	114	19

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	55

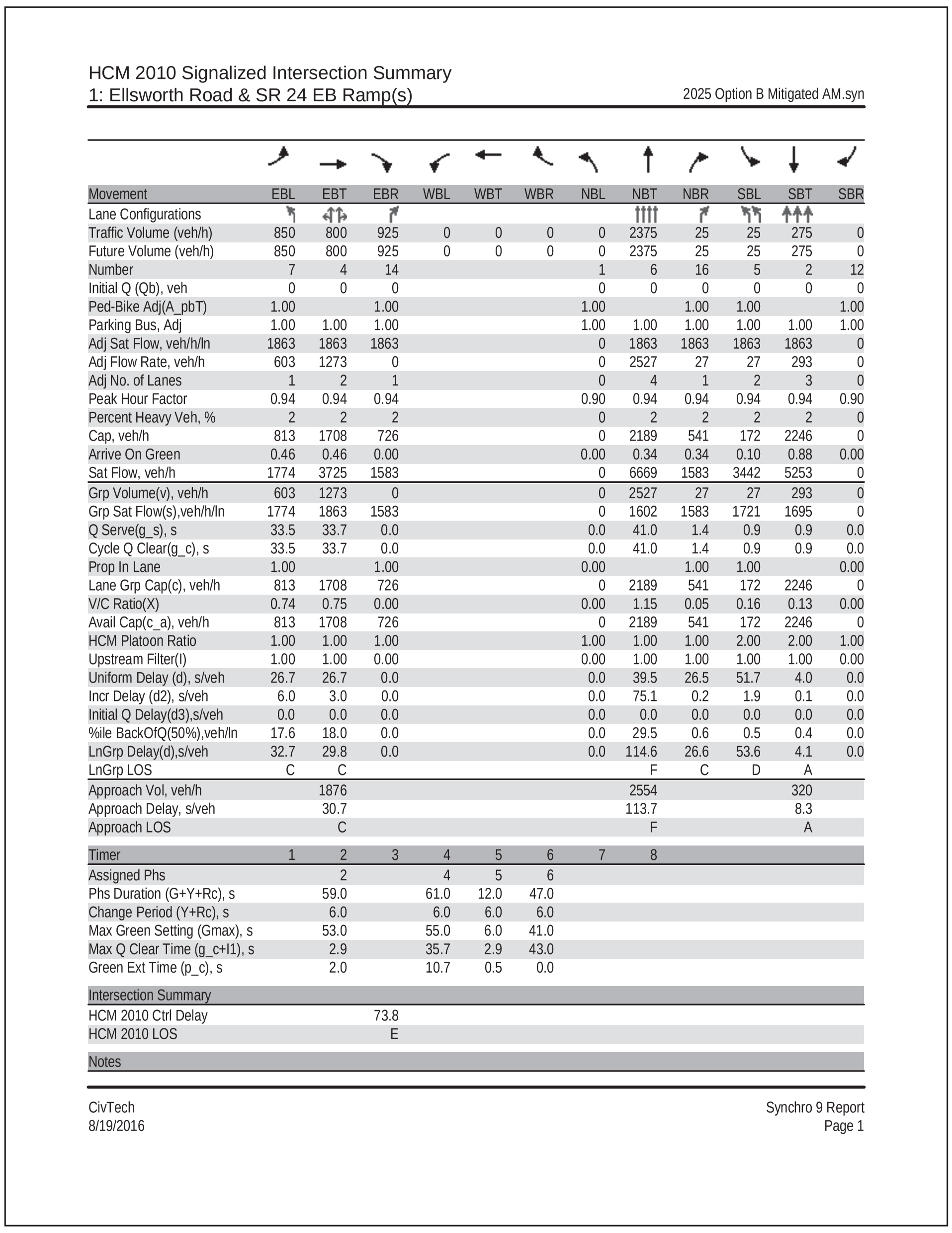
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



APPENDIX J

2025 OPTION B MITIGATED PEAK HOUR ANALYSIS



HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

2025 Option B Mitigated AM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	850	800	925	0	0	0	0	2375	25	25	275	0
Future Volume (veh/h)	850	800	925	0	0	0	0	2375	25	25	275	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	603	1273	0				0	2527	27	27	293	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	813	1708	726				0	2189	541	172	2246	0
Arrive On Green	0.46	0.46	0.00				0.00	0.34	0.34	0.10	0.88	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	603	1273	0				0	2527	27	27	293	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	33.5	33.7	0.0				0.0	41.0	1.4	0.9	0.9	0.0
Cycle Q Clear(g_c), s	33.5	33.7	0.0				0.0	41.0	1.4	0.9	0.9	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	813	1708	726				0	2189	541	172	2246	0
V/C Ratio(X)	0.74	0.75	0.00				0.00	1.15	0.05	0.16	0.13	0.00
Avail Cap(c_a), veh/h	813	1708	726				0	2189	541	172	2246	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.7	26.7	0.0				0.0	39.5	26.5	51.7	4.0	0.0
Incr Delay (d2), s/veh	6.0	3.0	0.0				0.0	75.1	0.2	1.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.6	18.0	0.0				0.0	29.5	0.6	0.5	0.4	0.0
LnGrp Delay(d),s/veh	32.7	29.8	0.0				0.0	114.6	26.6	53.6	4.1	0.0
LnGrp LOS	C	C						F	C	D	A	
Approach Vol, veh/h		1876						2554			320	
Approach Delay, s/veh		30.7						113.7			8.3	
Approach LOS		C						F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		59.0		61.0	12.0	47.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		53.0		55.0	6.0	41.0		
Max Q Clear Time (g_c+I1), s		2.9		35.7	2.9	43.0		
Green Ext Time (p_c), s		2.0		10.7	0.5	0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	73.8
HCM 2010 LOS	E

Notes

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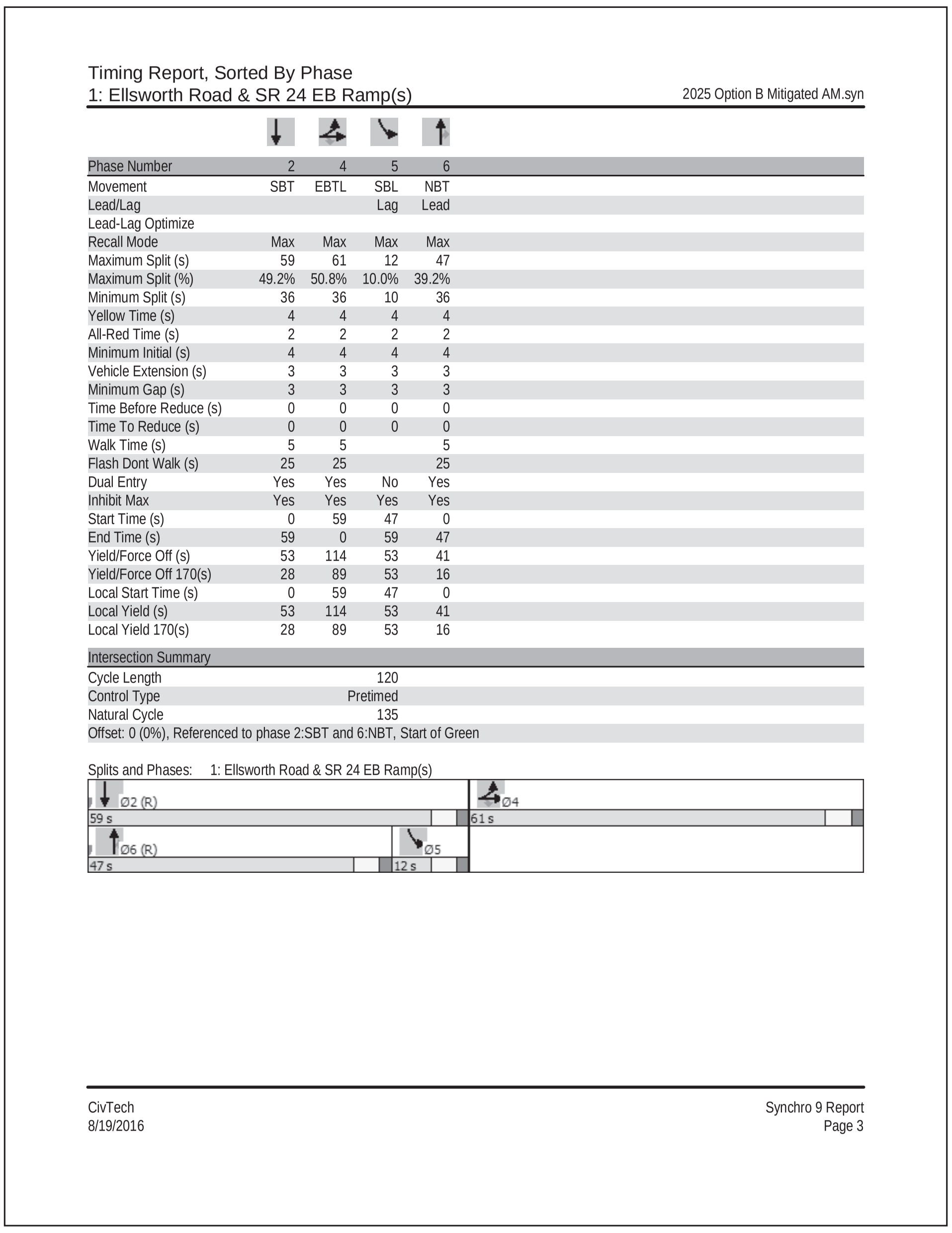

Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

2025 Option B Mitigated AM.syn

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	59	61	12	47
Maximum Split (%)	49.2%	50.8%	10.0%	39.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	59	47	0
End Time (s)	59	0	59	47
Yield/Force Off (s)	53	114	53	41
Yield/Force Off 170(s)	28	89	53	16
Local Start Time (s)	0	59	47	0
Local Yield (s)	53	114	53	41
Local Yield 170(s)	28	89	53	16

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	135
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)

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HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

2025 Option B Mitigated AM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	25	1175	25	1800	575	0	0	300	900
Future Volume (veh/h)	0	0	0	25	1175	25	1800	575	0	0	300	900
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1900	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	1250	27	1915	612	0	0	319	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				517	1590	34	1319	2153	0	0	1320	277
Arrive On Green				0.29	0.29	0.29	0.77	1.00	0.00	0.00	0.17	0.00
Sat Flow, veh/h				1774	5450	118	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				27	854	423	1915	612	0	0	319	0
Grp Sat Flow(s),veh/h/ln				1774	1863	1842	1721	1770	0	0	1509	1583
Q Serve(g_s), s				1.3	25.3	25.3	46.0	0.0	0.0	0.0	4.4	0.0
Cycle Q Clear(g_c), s				1.3	25.3	25.3	46.0	0.0	0.0	0.0	4.4	0.0
Prop In Lane				1.00		0.06	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				517	1087	537	1319	2153	0	0	1320	277
V/C Ratio(X)				0.05	0.79	0.79	1.45	0.28	0.00	0.00	0.24	0.00
Avail Cap(c_a), veh/h				517	1087	537	1319	2153	0	0	1320	277
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				30.6	39.1	39.1	14.0	0.0	0.0	0.0	42.6	0.0
Incr Delay (d2), s/veh				0.2	5.8	11.1	207.5	0.3	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.7	13.8	14.6	58.5	0.1	0.0	0.0	1.9	0.0
LnGrp Delay(d),s/veh				30.8	44.8	50.1	221.5	0.3	0.0	0.0	43.1	0.0
LnGrp LOS				C	D	D	F	A			D	
Approach Vol, veh/h					1304			2527			319	
Approach Delay, s/veh					46.2			167.9			43.1	
Approach LOS					D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		79.0			52.0	27.0		41.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		73.0			46.0	21.0		35.0
Max Q Clear Time (g_c+I1), s		2.0			48.0	6.4		27.3
Green Ext Time (p_c), s		23.6			0.0	1.6		4.5

Intersection Summary	
HCM 2010 Ctrl Delay	120.1
HCM 2010 LOS	F

Notes

Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

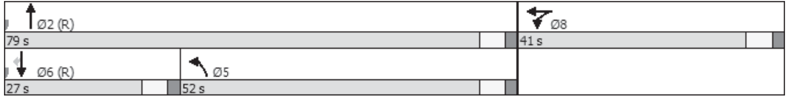
2025 Option B Mitigated AM.syn

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	79	52	27	41
Maximum Split (%)	65.8%	43.3%	22.5%	34.2%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	77	50	9
End Time (s)	9	9	77	50
Yield/Force Off (s)	3	3	71	44
Yield/Force Off 170(s)	98	3	46	19
Local Start Time (s)	0	27	0	79
Local Yield (s)	73	73	21	114
Local Yield 170(s)	48	73	116	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
1: Ellseorth Road & SR 24 EB Ramp(s)

2025 Option B Mitigated PM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1125	1425	2550	0	0	0	0	1225	100	50	175	0
Future Volume (veh/h)	1125	1425	2550	0	0	0	0	1225	100	50	175	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	798	2074	0				0	1303	106	53	186	0
Adj No. of Lanes	1	2	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	991	2080	884				0	1495	369	201	1737	0
Arrive On Green	0.56	0.56	0.00				0.00	0.23	0.23	0.12	0.68	0.00
Sat Flow, veh/h	1774	3725	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	798	2074	0				0	1303	106	53	186	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	43.3	66.6	0.0				0.0	23.5	6.6	1.7	1.5	0.0
Cycle Q Clear(g_c), s	43.3	66.6	0.0				0.0	23.5	6.6	1.7	1.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	991	2080	884				0	1495	369	201	1737	0
V/C Ratio(X)	0.81	1.00	0.00				0.00	0.87	0.29	0.26	0.11	0.00
Avail Cap(c_a), veh/h	991	2080	884				0	1495	369	201	1737	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.3	26.4	0.0				0.0	44.3	37.8	50.7	12.7	0.0
Incr Delay (d2), s/veh	7.0	19.1	0.0				0.0	7.3	1.9	3.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	23.0	39.5	0.0				0.0	11.2	3.1	0.9	0.7	0.0
LnGrp Delay(d),s/veh	28.2	45.5	0.0				0.0	51.5	39.7	53.8	12.9	0.0
LnGrp LOS	C	D						D	D	D	B	
Approach Vol, veh/h		2872						1409			239	
Approach Delay, s/veh		40.7						50.6			22.0	
Approach LOS		D						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.0		73.0	13.0	34.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		41.0		67.0	7.0	28.0		
Max Q Clear Time (g_c+I1), s		3.5		68.6	3.7	25.5		
Green Ext Time (p_c), s		1.3		0.0	0.4	1.8		

Intersection Summary	
HCM 2010 Ctrl Delay	42.8
HCM 2010 LOS	D

Notes

Timing Report, Sorted By Phase
1: Ellseorth Road & SR 24 EB Ramp(s)

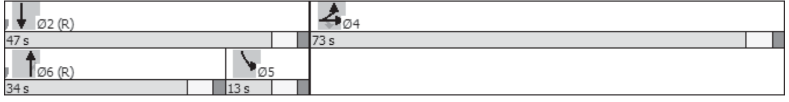
2025 Option B Mitigated PM.syn

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	47	73	13	34
Maximum Split (%)	39.2%	60.8%	10.8%	28.3%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	47	34	0
End Time (s)	47	0	47	34
Yield/Force Off (s)	41	114	41	28
Yield/Force Off 170(s)	16	89	41	3
Local Start Time (s)	0	47	34	0
Local Yield (s)	41	114	41	28
Local Yield 170(s)	16	89	41	3

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellseorth Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↱		↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	625	25	600	625	0	0	225	975
Future Volume (veh/h)	0	0	0	25	625	25	600	625	0	0	225	975
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1900	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	665	27	638	665	0	0	239	0
Adj No. of Lanes				1	3	0	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				606	1823	74	516	1976	0	0	2703	567
Arrive On Green				0.34	0.34	0.34	0.30	1.00	0.00	0.00	0.36	0.00
Sat Flow, veh/h				1774	5334	216	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				27	464	228	638	665	0	0	239	0
Grp Sat Flow(s),veh/h/ln				1774	1863	1825	1721	1770	0	0	1509	1583
Q Serve(g_s), s				1.2	11.2	11.3	18.0	0.0	0.0	0.0	2.5	0.0
Cycle Q Clear(g_c), s				1.2	11.2	11.3	18.0	0.0	0.0	0.0	2.5	0.0
Prop In Lane				1.00		0.12	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				606	1273	623	516	1976	0	0	2703	567
V/C Ratio(X)				0.04	0.36	0.37	1.24	0.34	0.00	0.00	0.09	0.00
Avail Cap(c_a), veh/h				606	1273	623	516	1976	0	0	2703	567
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	29.7	29.7	42.0	0.0	0.0	0.0	25.5	0.0
Incr Delay (d2), s/veh				0.1	0.8	1.7	122.0	0.5	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.6	5.9	6.0	17.2	0.1	0.0	0.0	1.1	0.0
LnGrp Delay(d),s/veh				26.5	30.5	31.4	164.0	0.5	0.0	0.0	25.6	0.0
LnGrp LOS				C	C	C	F	A			C	
Approach Vol, veh/h					719			1303			239	
Approach Delay, s/veh					30.6			80.5			25.6	
Approach LOS					C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		73.0			24.0	49.0		47.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		67.0			18.0	43.0		41.0
Max Q Clear Time (g_c+I1), s		2.0			20.0	4.5		13.3
Green Ext Time (p_c), s		7.9			0.0	1.5		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	58.9
HCM 2010 LOS	E

Notes

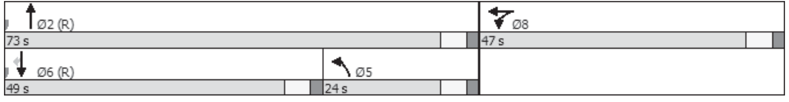
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	73	24	49	47
Maximum Split (%)	60.8%	20.0%	40.8%	39.2%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	99	50	3
End Time (s)	3	3	99	50
Yield/Force Off (s)	117	117	93	44
Yield/Force Off 170(s)	92	117	68	19
Local Start Time (s)	0	49	0	73
Local Yield (s)	67	67	43	114
Local Yield 170(s)	42	67	18	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

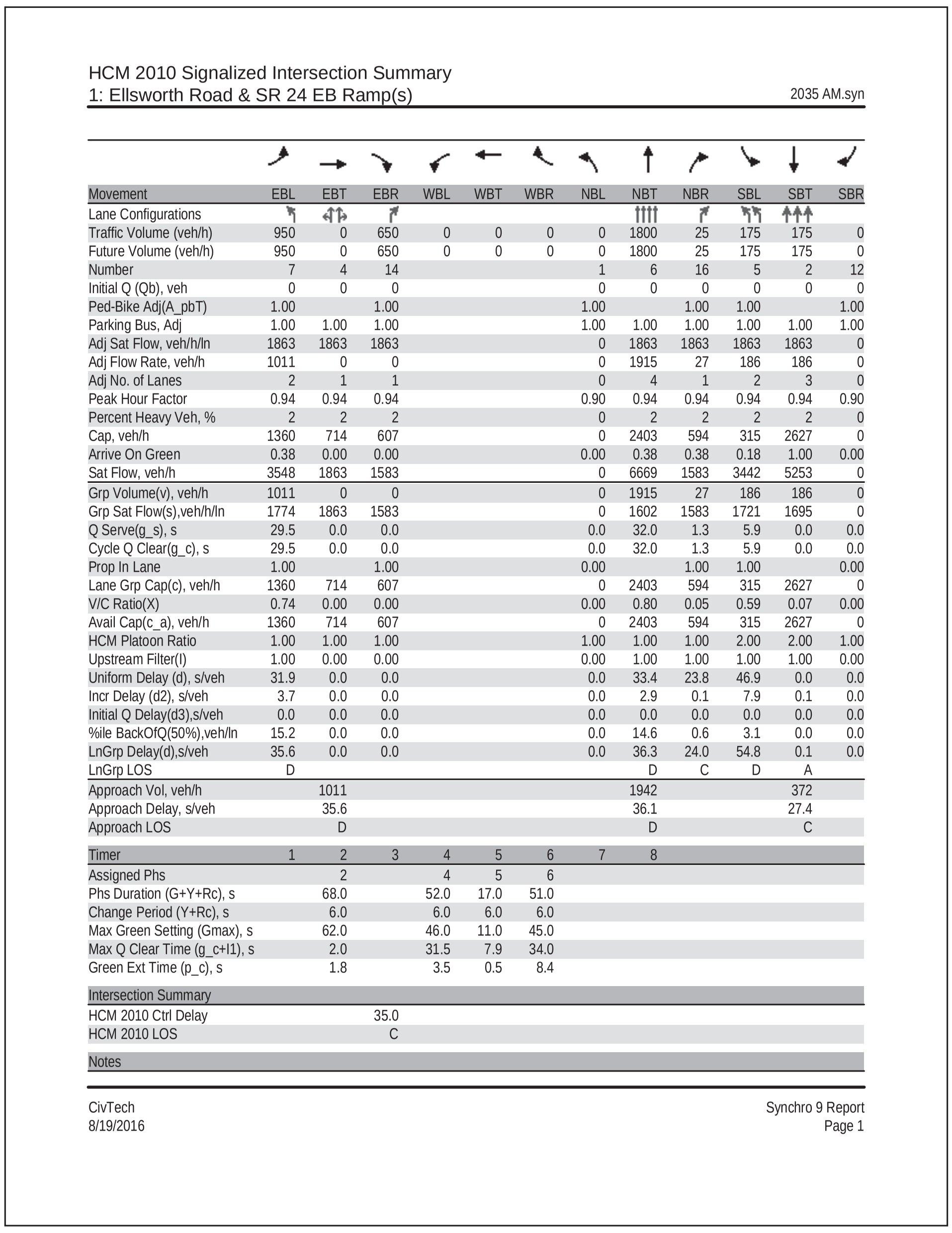
Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



APPENDIX K

2035 PEAK HOUR ANALYSIS

CivTech



HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

2035 AM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	950	0	650	0	0	0	0	1800	25	175	175	0
Future Volume (veh/h)	950	0	650	0	0	0	0	1800	25	175	175	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	1011	0	0				0	1915	27	186	186	0
Adj No. of Lanes	2	1	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1360	714	607				0	2403	594	315	2627	0
Arrive On Green	0.38	0.00	0.00				0.00	0.38	0.38	0.18	1.00	0.00
Sat Flow, veh/h	3548	1863	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	1011	0	0				0	1915	27	186	186	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	29.5	0.0	0.0				0.0	32.0	1.3	5.9	0.0	0.0
Cycle Q Clear(g_c), s	29.5	0.0	0.0				0.0	32.0	1.3	5.9	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1360	714	607				0	2403	594	315	2627	0
V/C Ratio(X)	0.74	0.00	0.00				0.00	0.80	0.05	0.59	0.07	0.00
Avail Cap(c_a), veh/h	1360	714	607				0	2403	594	315	2627	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.9	0.0	0.0				0.0	33.4	23.8	46.9	0.0	0.0
Incr Delay (d2), s/veh	3.7	0.0	0.0				0.0	2.9	0.1	7.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.2	0.0	0.0				0.0	14.6	0.6	3.1	0.0	0.0
LnGrp Delay(d),s/veh	35.6	0.0	0.0				0.0	36.3	24.0	54.8	0.1	0.0
LnGrp LOS	D							D	C	D	A	
Approach Vol, veh/h		1011						1942			372	
Approach Delay, s/veh		35.6						36.1			27.4	
Approach LOS		D						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		68.0		52.0	17.0	51.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		62.0		46.0	11.0	45.0		
Max Q Clear Time (g_c+I1), s		2.0		31.5	7.9	34.0		
Green Ext Time (p_c), s		1.8		3.5	0.5	8.4		

Intersection Summary		
HCM 2010 Ctrl Delay		35.0
HCM 2010 LOS		C

Notes

CivTech
8/19/2016

Synchro 9 Report
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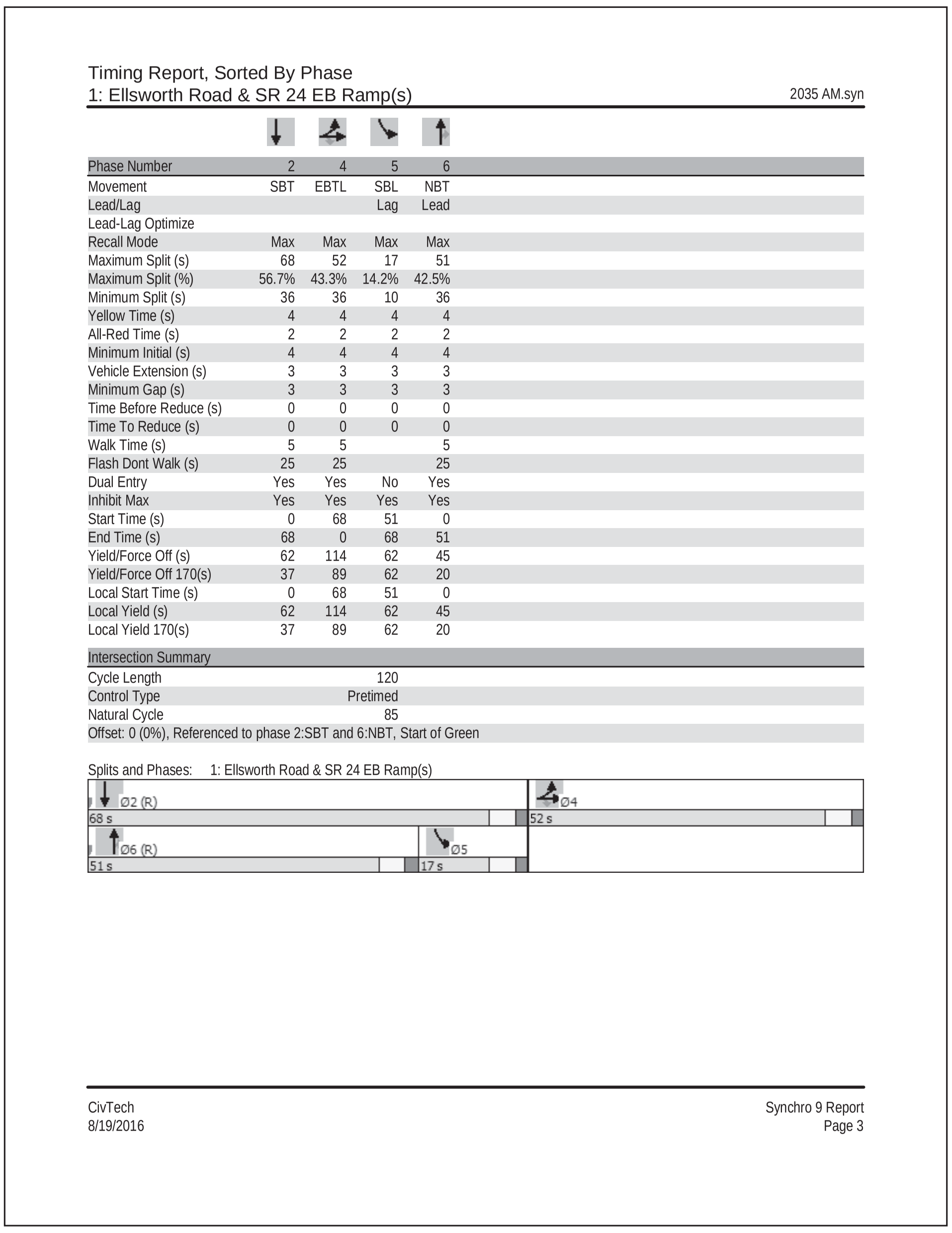

Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

2035 AM.syn

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	68	52	17	51
Maximum Split (%)	56.7%	43.3%	14.2%	42.5%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	68	51	0
End Time (s)	68	0	68	51
Yield/Force Off (s)	62	114	62	45
Yield/Force Off 170(s)	37	89	62	20
Local Start Time (s)	0	68	51	0
Local Yield (s)	62	114	62	45
Local Yield 170(s)	37	89	62	20

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)

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Synchro 9 Report
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HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	100	0	100	1400	400	0	0	350	850
Future Volume (veh/h)	0	0	0	100	0	100	1400	400	0	0	350	850
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				139	0	71	1489	426	0	0	372	0
Adj No. of Lanes				2	0	1	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				734	0	328	1495	2514	0	0	1769	371
Arrive On Green				0.21	0.00	0.21	0.87	1.00	0.00	0.00	0.23	0.00
Sat Flow, veh/h				3548	0	1583	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				139	0	71	1489	426	0	0	372	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1509	1583
Q Serve(g_s), s				4.7	0.0	5.4	61.0	0.0	0.0	0.0	5.8	0.0
Cycle Q Clear(g_c), s				4.7	0.0	5.4	61.0	0.0	0.0	0.0	5.8	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				734	0	328	1495	2514	0	0	1769	371
V/C Ratio(X)				0.19	0.00	0.22	1.00	0.17	0.00	0.00	0.21	0.00
Avail Cap(c_a), veh/h				734	0	328	1495	2514	0	0	1769	371
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				47.5	0.0	47.7	9.4	0.0	0.0	0.0	44.7	0.0
Incr Delay (d2), s/veh				0.6	0.0	1.5	22.3	0.1	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.4	0.0	2.5	30.9	0.1	0.0	0.0	2.4	0.0
LnGrp Delay(d),s/veh				48.0	0.0	49.3	31.7	0.1	0.0	0.0	45.0	0.0
LnGrp LOS				D		D	C	A			D	
Approach Vol, veh/h					210			1915			372	
Approach Delay, s/veh					48.4			24.7			45.0	
Approach LOS					D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		109.0			69.0	40.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		103.0			63.0	34.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			63.0	7.8		7.4
Green Ext Time (p_c), s		13.0			0.0	2.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	29.7
HCM 2010 LOS	C

Notes

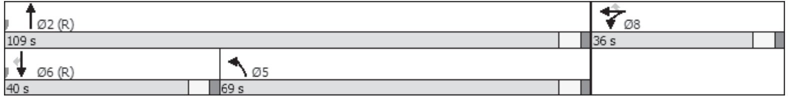
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	109	69	40	36
Maximum Split (%)	75.2%	47.6%	27.6%	24.8%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	40	0	109
End Time (s)	109	109	40	0
Yield/Force Off (s)	103	103	34	139
Yield/Force Off 170(s)	78	103	9	114
Local Start Time (s)	0	40	0	109
Local Yield (s)	103	103	34	139
Local Yield 170(s)	78	103	9	114

Intersection Summary	
Cycle Length	145
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
3: Williams Field Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↱					↑↑↑	↱	↰	↑↑	
Traffic Volume (veh/h)	450	0	25	0	0	0	0	50	25	25	25	0
Future Volume (veh/h)	450	0	25	0	0	0	0	50	25	25	25	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	479	0	27				0	53	27	27	27	0
Adj No. of Lanes	2	0	1				0	3	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1685	0	752				0	1483	462	559	1504	0
Arrive On Green	0.47	0.00	0.47				0.00	0.29	0.29	0.17	0.85	0.00
Sat Flow, veh/h	3548	0	1583				0	5253	1583	1774	3632	0
Grp Volume(v), veh/h	479	0	27				0	53	27	27	27	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1695	1583	1774	1770	0
Q Serve(g_s), s	9.8	0.0	1.1				0.0	0.9	1.5	0.0	0.1	0.0
Cycle Q Clear(g_c), s	9.8	0.0	1.1				0.0	0.9	1.5	0.0	0.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1685	0	752				0	1483	462	559	1504	0
V/C Ratio(X)	0.28	0.00	0.04				0.00	0.04	0.06	0.05	0.02	0.00
Avail Cap(c_a), veh/h	1685	0	752				0	1483	462	559	1504	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.1	0.0	16.8				0.0	30.4	30.6	23.4	5.2	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.1				0.0	0.0	0.2	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	1.4				0.0	0.4	0.7	0.6	0.1	0.0
LnGrp Delay(d),s/veh	19.5	0.0	16.9				0.0	30.5	30.9	23.6	5.2	0.0
LnGrp LOS	B		B					C	C	C	A	
Approach Vol, veh/h		506						80			54	
Approach Delay, s/veh		19.4						30.6			14.4	
Approach LOS		B						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		57.0		63.0	16.0	41.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		51.0		57.0	10.0	35.0		
Max Q Clear Time (g_c+I1), s		2.1		11.8	2.0	3.5		
Green Ext Time (p_c), s		0.2		1.8	0.1	0.3		

Intersection Summary	
HCM 2010 Ctrl Delay	20.4
HCM 2010 LOS	C

Notes

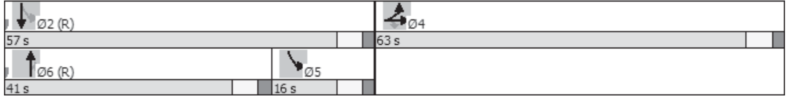
Timing Report, Sorted By Phase
3: Williams Field Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBTL	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	57	63	16	41
Maximum Split (%)	47.5%	52.5%	13.3%	34.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	57	41	0
End Time (s)	57	0	57	41
Yield/Force Off (s)	51	114	51	35
Yield/Force Off 170(s)	26	89	51	10
Local Start Time (s)	0	57	41	0
Local Yield (s)	51	114	51	35
Local Yield 170(s)	26	89	51	10

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Splits and Phases: 3: Williams Field Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
4: Williams Field Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰↰	✣	↱	↰	↑↑			↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	0	25	25	25	0	0	50	675
Future Volume (veh/h)	0	0	0	25	0	25	25	25	0	0	50	675
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1833	1810	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				35	0	18	27	27	0	0	53	718
Adj No. of Lanes				2	0	1	1	2	0	0	3	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	5	2	2	0	0	2	2
Cap, veh/h				887	0	385	498	2300	0	0	2882	897
Arrive On Green				0.25	0.00	0.25	0.07	1.00	0.00	0.00	0.57	0.57
Sat Flow, veh/h				3548	0	1538	1774	3632	0	0	5253	1583
Grp Volume(v), veh/h				35	0	18	27	27	0	0	53	718
Grp Sat Flow(s),veh/h/ln				1774	0	1538	1774	1770	0	0	1695	1583
Q Serve(g_s), s				0.9	0.0	1.1	0.0	0.0	0.0	0.0	0.5	43.1
Cycle Q Clear(g_c), s				0.9	0.0	1.1	0.0	0.0	0.0	0.0	0.5	43.1
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				887	0	385	498	2300	0	0	2882	897
V/C Ratio(X)				0.04	0.00	0.05	0.05	0.01	0.00	0.00	0.02	0.80
Avail Cap(c_a), veh/h				887	0	385	498	2300	0	0	2882	897
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				34.1	0.0	34.1	10.7	0.0	0.0	0.0	11.4	20.6
Incr Delay (d2), s/veh				0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.0	7.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.4	0.0	0.5	0.4	0.0	0.0	0.0	0.3	20.6
LnGrp Delay(d),s/veh				34.2	0.0	34.4	10.9	0.0	0.0	0.0	11.4	28.0
LnGrp LOS				C		C	B	A			B	C
Approach Vol, veh/h					53			54			771	
Approach Delay, s/veh					34.2			5.4			26.9	
Approach LOS					C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			10.0	74.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			4.0	68.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			2.0	45.1		3.1
Green Ext Time (p_c), s		0.2			0.0	3.2		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

Notes

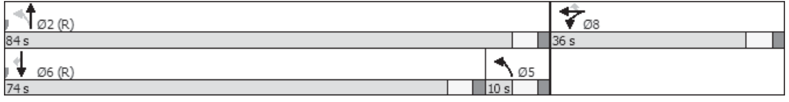
Timing Report, Sorted By Phase
4: Williams Field Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBTL	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	10	74	36
Maximum Split (%)	70.0%	8.3%	61.7%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	74	0	84
End Time (s)	84	84	74	0
Yield/Force Off (s)	78	78	68	114
Yield/Force Off 170(s)	53	78	43	89
Local Start Time (s)	0	74	0	84
Local Yield (s)	78	78	68	114
Local Yield 170(s)	53	78	43	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Splits and Phases: 4: Williams Field Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
7: Signal Butte Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	✣	↱					↑↑↑↑	↱	↰	↑↑↑	
Traffic Volume (veh/h)	125	0	100	0	0	0	0	775	300	275	350	0
Future Volume (veh/h)	125	0	100	0	0	0	0	775	300	275	350	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	166	0	71				0	824	319	293	372	0
Adj No. of Lanes	2	0	1				0	4	1	1	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	887	0	396				0	2136	528	473	3305	0
Arrive On Green	0.25	0.00	0.25				0.00	0.33	0.33	0.53	1.00	0.00
Sat Flow, veh/h	3548	0	1583				0	6669	1583	1774	5253	0
Grp Volume(v), veh/h	166	0	71				0	824	319	293	372	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1602	1583	1774	1695	0
Q Serve(g_s), s	4.4	0.0	4.2				0.0	11.8	20.2	13.8	0.0	0.0
Cycle Q Clear(g_c), s	4.4	0.0	4.2				0.0	11.8	20.2	13.8	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	887	0	396				0	2136	528	473	3305	0
V/C Ratio(X)	0.19	0.00	0.18				0.00	0.39	0.60	0.62	0.11	0.00
Avail Cap(c_a), veh/h	887	0	396				0	2136	528	473	3305	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.4	0.0	35.3				0.0	30.6	33.4	23.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	1.0				0.0	0.5	5.1	6.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	4.2				0.0	5.3	9.5	7.5	0.0	0.0
LnGrp Delay(d),s/veh	35.9	0.0	36.3				0.0	31.1	38.5	29.7	0.1	0.0
LnGrp LOS	D		D					C	D	C	A	
Approach Vol, veh/h		237						1143			665	
Approach Delay, s/veh		36.0						33.2			13.1	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		84.0		36.0	38.0	46.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		78.0		30.0	32.0	40.0		
Max Q Clear Time (g_c+I1), s		2.0		6.4	15.8	22.2		
Green Ext Time (p_c), s		3.3		0.7	2.8	6.1		

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Notes

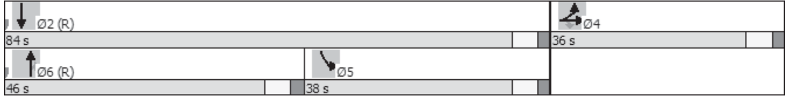
Timing Report, Sorted By Phase
7: Signal Butte Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	36	38	46
Maximum Split (%)	70.0%	30.0%	31.7%	38.3%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	84	46	0
End Time (s)	84	0	84	46
Yield/Force Off (s)	78	114	78	40
Yield/Force Off 170(s)	53	89	78	15
Local Start Time (s)	0	84	46	0
Local Yield (s)	78	114	78	40
Local Yield 170(s)	53	89	78	15

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
8: Signal Butte Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	325	0	325	475	300	0	0	625	275
Future Volume (veh/h)	0	0	0	325	0	325	475	300	0	0	625	275
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				454	0	231	505	319	0	0	665	293
Adj No. of Lanes				2	0	1	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				887	0	396	1176	2300	0	0	1655	409
Arrive On Green				0.25	0.00	0.25	0.68	1.00	0.00	0.00	0.26	0.26
Sat Flow, veh/h				3548	0	1583	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				454	0	231	505	319	0	0	665	293
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				13.2	0.0	15.4	7.9	0.0	0.0	0.0	10.3	20.2
Cycle Q Clear(g_c), s				13.2	0.0	15.4	7.9	0.0	0.0	0.0	10.3	20.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				887	0	396	1176	2300	0	0	1655	409
V/C Ratio(X)				0.51	0.00	0.58	0.43	0.14	0.00	0.00	0.40	0.72
Avail Cap(c_a), veh/h				887	0	396	1176	2300	0	0	1655	409
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				38.7	0.0	39.5	13.8	0.0	0.0	0.0	36.8	40.5
Incr Delay (d2), s/veh				2.1	0.0	6.2	1.1	0.1	0.0	0.0	0.7	10.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.8	0.0	7.4	3.8	0.0	0.0	0.0	4.7	10.0
LnGrp Delay(d),s/veh				40.8	0.0	45.7	14.9	0.1	0.0	0.0	37.6	50.8
LnGrp LOS				D		D	B	A			D	D
Approach Vol, veh/h					685			824			958	
Approach Delay, s/veh					42.5			9.2			41.6	
Approach LOS					D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			47.0	37.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			41.0	31.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			9.9	22.2		17.4
Green Ext Time (p_c), s		4.0			3.9	3.4		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	31.0
HCM 2010 LOS	C

Notes

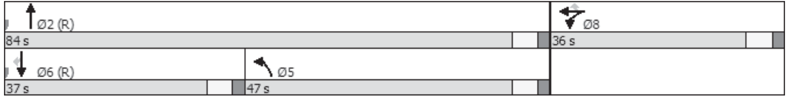
Timing Report, Sorted By Phase
8: Signal Butte Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	47	37	36
Maximum Split (%)	70.0%	39.2%	30.8%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	37	0	84
End Time (s)	84	84	37	0
Yield/Force Off (s)	78	78	31	114
Yield/Force Off 170(s)	53	78	6	89
Local Start Time (s)	0	37	0	84
Local Yield (s)	78	78	31	114
Local Yield 170(s)	53	78	6	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
9: Meridian Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱					↑↑↑↑	↱	↰↰	↑↑	
Traffic Volume (veh/h)	175	0	1150	0	0	0	0	2525	125	25	200	0
Future Volume (veh/h)	175	0	1150	0	0	0	0	2525	125	25	200	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	186	0	0				0	2686	133	27	213	0
Adj No. of Lanes	2	0	1				0	4	1	2	2	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	887	0	396				0	2830	699	669	2300	0
Arrive On Green	0.25	0.00	0.00				0.00	0.44	0.44	0.32	1.00	0.00
Sat Flow, veh/h	3548	0	1583				0	6669	1583	3442	3632	0
Grp Volume(v), veh/h	186	0	0				0	2686	133	27	213	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1602	1583	1721	1770	0
Q Serve(g_s), s	5.0	0.0	0.0				0.0	48.4	6.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.0	0.0	0.0				0.0	48.4	6.1	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	887	0	396				0	2830	699	669	2300	0
V/C Ratio(X)	0.21	0.00	0.00				0.00	0.95	0.19	0.04	0.09	0.00
Avail Cap(c_a), veh/h	887	0	396				0	2830	699	669	2300	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.6	0.0	0.0				0.0	32.2	20.4	34.3	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0				0.0	8.6	0.6	0.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.0				0.0	23.0	2.8	0.3	0.0	0.0
LnGrp Delay(d),s/veh	36.2	0.0	0.0				0.0	40.8	21.0	34.4	0.1	0.0
LnGrp LOS	D							D	C	C	A	
Approach Vol, veh/h		186						2819			240	
Approach Delay, s/veh		36.2						39.9			3.9	
Approach LOS		D						D			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		84.0		36.0	25.0	59.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		78.0		30.0	19.0	53.0		
Max Q Clear Time (g_c+I1), s		2.0		7.0	2.0	50.4		
Green Ext Time (p_c), s		1.4		0.6	1.1	2.6		

Intersection Summary	
HCM 2010 Ctrl Delay	37.0
HCM 2010 LOS	D

Notes

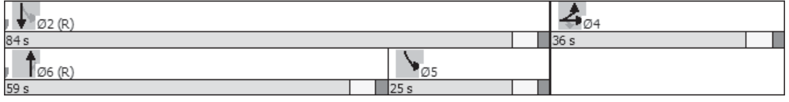
Timing Report, Sorted By Phase
9: Meridian Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBTL	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	36	25	59
Maximum Split (%)	70.0%	30.0%	20.8%	49.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	84	59	0
End Time (s)	84	0	84	59
Yield/Force Off (s)	78	114	78	53
Yield/Force Off 170(s)	53	89	78	28
Local Start Time (s)	0	84	59	0
Local Yield (s)	78	114	78	53
Local Yield 170(s)	53	89	78	28

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Splits and Phases: 9: Meridian Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
10: Meridian Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↱	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	100	0	50	2250	275	0	0	225	425
Future Volume (veh/h)	0	0	0	100	0	50	2250	275	0	0	225	425
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				106	0	53	2394	293	0	0	239	0
Adj No. of Lanes				1	0	2	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				222	0	396	2151	2743	0	0	641	158
Arrive On Green				0.13	0.00	0.13	1.00	1.00	0.00	0.00	0.10	0.00
Sat Flow, veh/h				1774	0	3167	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				106	0	53	2394	293	0	0	239	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				6.7	0.0	1.8	75.0	0.0	0.0	0.0	4.2	0.0
Cycle Q Clear(g_c), s				6.7	0.0	1.8	75.0	0.0	0.0	0.0	4.2	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				222	0	396	2151	2743	0	0	641	158
V/C Ratio(X)				0.48	0.00	0.13	1.11	0.11	0.00	0.00	0.37	0.00
Avail Cap(c_a), veh/h				222	0	396	2151	2743	0	0	641	158
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				48.9	0.0	46.7	0.0	0.0	0.0	0.0	50.5	0.0
Incr Delay (d2), s/veh				7.2	0.0	0.7	58.1	0.1	0.0	0.0	1.7	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.7	0.0	0.8	17.3	0.0	0.0	0.0	1.9	0.0
LnGrp Delay(d),s/veh				56.1	0.0	47.4	58.1	0.1	0.0	0.0	52.1	0.0
LnGrp LOS				E		D	F	A			D	
Approach Vol, veh/h					159			2687			239	
Approach Delay, s/veh					53.2			51.7			52.1	
Approach LOS					D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		99.0			81.0	18.0		21.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		93.0			75.0	12.0		15.0
Max Q Clear Time (g_c+I1), s		2.0			77.0	6.2		8.7
Green Ext Time (p_c), s		29.8			0.0	0.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	51.8
HCM 2010 LOS	D

Notes

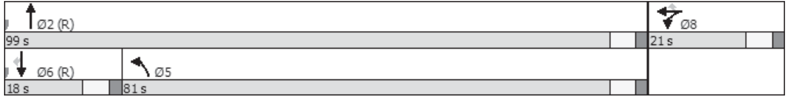
Timing Report, Sorted By Phase
10: Meridian Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	99	81	18	21
Maximum Split (%)	82.5%	67.5%	15.0%	17.5%
Minimum Split (s)	36	10	27	13
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	
Flash Dont Walk (s)	15		15	
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	18	0	99
End Time (s)	99	99	18	0
Yield/Force Off (s)	93	93	12	114
Yield/Force Off 170(s)	78	93	117	114
Local Start Time (s)	0	18	0	99
Local Yield (s)	93	93	12	114
Local Yield 170(s)	78	93	117	114

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	150

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 10: Meridian Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
11: Ironwood Road & SR 24 EB Ramp(s)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↱	↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	25	375	0	1600	675	0
Future Volume (veh/h)	25	375	0	1600	675	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0
Adj Flow Rate, veh/h	27	399	0	1702	718	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.94	0.94	0.90	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	680	1214	0	3311	1829	0
Arrive On Green	0.38	0.38	0.00	0.52	1.00	0.00
Sat Flow, veh/h	1774	3167	0	6929	3725	0
Grp Volume(v), veh/h	27	399	0	1702	718	0
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1602	1770	0
Q Serve(g_s), s	1.1	10.7	0.0	21.0	0.0	0.0
Cycle Q Clear(g_c), s	1.1	10.7	0.0	21.0	0.0	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	680	1214	0	3311	1829	0
V/C Ratio(X)	0.04	0.33	0.00	0.51	0.39	0.00
Avail Cap(c_a), veh/h	680	1214	0	3311	1829	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.2	26.1	0.0	19.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.7	0.0	0.6	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	4.8	0.0	9.4	0.2	0.0
LnGrp Delay(d),s/veh	23.3	26.8	0.0	19.7	0.6	0.0
LnGrp LOS	C	C		B	A	
Approach Vol, veh/h	426			1702	718	
Approach Delay, s/veh	26.6			19.7	0.6	
Approach LOS	C			B	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		68.0		52.0		68.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		62.0		46.0		62.0		
Max Q Clear Time (g_c+I1), s		2.0		12.7		23.0		
Green Ext Time (p_c), s		31.5		1.7		24.8		

Intersection Summary	
HCM 2010 Ctrl Delay	15.9
HCM 2010 LOS	B

Notes

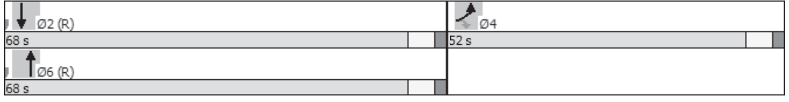
Timing Report, Sorted By Phase
11: Ironwood Road & SR 24 EB Ramp(s)

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	68	52	68
Maximum Split (%)	56.7%	43.3%	56.7%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	68	0
End Time (s)	68	0	68
Yield/Force Off (s)	62	114	62
Yield/Force Off 170(s)	37	89	37
Local Start Time (s)	0	68	0
Local Yield (s)	62	114	62
Local Yield 170(s)	37	89	37

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 11: Ironwood Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
12: Ironwood Road & SR 24 WB Ramp(s)

2035 AM.syn

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑	↱
Traffic Volume (veh/h)	0	0	875	725	700	75
Future Volume (veh/h)	0	0	875	725	700	75
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1863	1863	1863	1863
Adj Flow Rate, veh/h			931	771	745	80
Adj No. of Lanes			2	2	2	1
Peak Hour Factor			0.94	0.94	0.94	0.94
Percent Heavy Veh, %			2	2	2	2
Cap, veh/h			1991	3362	1681	752
Arrive On Green			0.85	1.00	0.47	0.47
Sat Flow, veh/h			3442	3632	3632	1583
Grp Volume(v), veh/h			931	771	745	80
Grp Sat Flow(s),veh/h/ln			1721	1770	1770	1583
Q Serve(g_s), s			0.0	0.0	16.8	3.4
Cycle Q Clear(g_c), s			0.0	0.0	16.8	3.4
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1991	3362	1681	752
V/C Ratio(X)			0.47	0.23	0.44	0.11
Avail Cap(c_a), veh/h			1991	3362	1681	752
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			1.3	0.0	20.9	17.4
Incr Delay (d2), s/veh			0.8	0.2	0.8	0.3
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			1.5	0.1	8.4	1.5
LnGrp Delay(d),s/veh			2.1	0.2	21.8	17.7
LnGrp LOS			A	A	C	B
Approach Vol, veh/h				1702	825	
Approach Delay, s/veh				1.2	21.4	
Approach LOS				A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			57.0	63.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			51.0	57.0		
Max Q Clear Time (g_c+I1), s		2.0			2.0	18.8		
Green Ext Time (p_c), s		11.8			11.4	5.6		

Intersection Summary		
HCM 2010 Ctrl Delay		7.8
HCM 2010 LOS		A

Timing Report, Sorted By Phase
12: Ironwood Road & SR 24 WB Ramp(s)

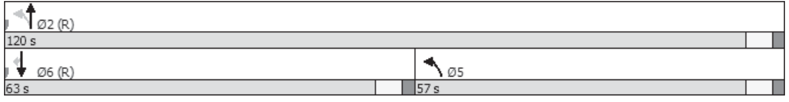
2035 AM.syn

Phase Number	2	5	6
Movement	NBTL	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	57	63
Maximum Split (%)	100.0%	47.5%	52.5%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	63	0
End Time (s)	0	0	63
Yield/Force Off (s)	114	114	57
Yield/Force Off 170(s)	89	114	32
Local Start Time (s)	0	63	0
Local Yield (s)	114	114	57
Local Yield 170(s)	89	114	32

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	50

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Splits and Phases: 12: Ironwood Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
1: Ellsworth Road & SR 24 EB Ramp(s)

2035 PM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑↱	↱					↑↑↑↑	↱	↰↰	↑↑↑	
Traffic Volume (veh/h)	1125	0	1725	0	0	0	0	950	75	75	300	0
Future Volume (veh/h)	1125	0	1725	0	0	0	0	950	75	75	300	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	1197	0	0				0	1011	80	80	319	0
Adj No. of Lanes	2	1	1				0	4	1	2	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1863	978	831				0	1602	396	258	1907	0
Arrive On Green	0.52	0.00	0.00				0.00	0.25	0.25	0.15	0.75	0.00
Sat Flow, veh/h	3548	1863	1583				0	6669	1583	3442	5253	0
Grp Volume(v), veh/h	1197	0	0				0	1011	80	80	319	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1602	1583	1721	1695	0
Q Serve(g_s), s	29.0	0.0	0.0				0.0	16.9	4.8	2.5	2.2	0.0
Cycle Q Clear(g_c), s	29.0	0.0	0.0				0.0	16.9	4.8	2.5	2.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1863	978	831				0	1602	396	258	1907	0
V/C Ratio(X)	0.64	0.00	0.00				0.00	0.63	0.20	0.31	0.17	0.00
Avail Cap(c_a), veh/h	1863	978	831				0	1602	396	258	1907	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.4	0.0	0.0				0.0	40.1	35.5	48.2	9.6	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.0				0.0	1.9	1.1	3.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.6	0.0	0.0				0.0	7.7	2.2	1.3	1.0	0.0
LnGrp Delay(d),s/veh	22.1	0.0	0.0				0.0	42.0	36.7	51.3	9.8	0.0
LnGrp LOS	C							D	D	D	A	
Approach Vol, veh/h		1197						1091			399	
Approach Delay, s/veh		22.1						41.6			18.2	
Approach LOS		C						D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		51.0		69.0	15.0	36.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		45.0		63.0	9.0	30.0		
Max Q Clear Time (g_c+I1), s		4.2		31.0	4.5	18.9		
Green Ext Time (p_c), s		2.3		5.3	0.9	5.0		

Intersection Summary		
HCM 2010 Ctrl Delay		29.4
HCM 2010 LOS		C

Notes

Timing Report, Sorted By Phase
1: Ellsworth Road & SR 24 EB Ramp(s)

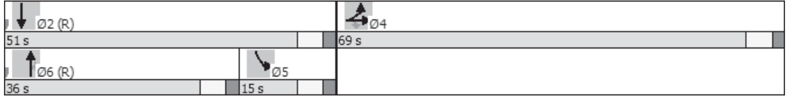
2035 PM.syn

Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	51	69	15	36
Maximum Split (%)	42.5%	57.5%	12.5%	30.0%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	51	36	0
End Time (s)	51	0	51	36
Yield/Force Off (s)	45	114	45	30
Yield/Force Off 170(s)	20	89	45	5
Local Start Time (s)	0	51	36	0
Local Yield (s)	45	114	45	30
Local Yield 170(s)	20	89	45	5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	135

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 1: Ellsworth Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
2: Ellsworth Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	50	0	50	375	575	0	0	375	900
Future Volume (veh/h)	0	0	0	50	0	50	375	575	0	0	375	900
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				69	0	35	399	612	0	0	399	0
Adj No. of Lanes				2	0	1	2	2	0	0	5	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				887	0	396	545	2300	0	0	3332	699
Arrive On Green				0.25	0.00	0.25	0.32	1.00	0.00	0.00	0.44	0.00
Sat Flow, veh/h				3548	0	1583	3442	3632	0	0	7898	1583
Grp Volume(v), veh/h				69	0	35	399	612	0	0	399	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1509	1583
Q Serve(g_s), s				1.8	0.0	2.0	12.4	0.0	0.0	0.0	3.7	0.0
Cycle Q Clear(g_c), s				1.8	0.0	2.0	12.4	0.0	0.0	0.0	3.7	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				887	0	396	545	2300	0	0	3332	699
V/C Ratio(X)				0.08	0.00	0.09	0.73	0.27	0.00	0.00	0.12	0.00
Avail Cap(c_a), veh/h				887	0	396	545	2300	0	0	3332	699
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				34.4	0.0	34.5	38.7	0.0	0.0	0.0	19.7	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.4	8.4	0.3	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.9	0.0	0.9	6.5	0.1	0.0	0.0	1.6	0.0
LnGrp Delay(d),s/veh				34.6	0.0	35.0	47.2	0.3	0.0	0.0	19.8	0.0
LnGrp LOS				C		C	D	A			B	
Approach Vol, veh/h					104			1011			399	
Approach Delay, s/veh					34.7			18.8			19.8	
Approach LOS					C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			25.0	59.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			19.0	53.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			14.4	5.7		4.0
Green Ext Time (p_c), s		6.0			2.2	2.7		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Notes

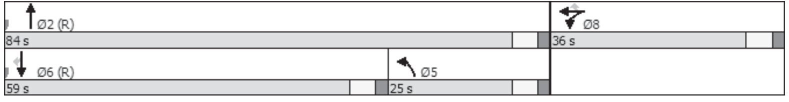
Timing Report, Sorted By Phase
2: Ellsworth Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	25	59	36
Maximum Split (%)	70.0%	20.8%	49.2%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	50	109	50	14
End Time (s)	14	14	109	50
Yield/Force Off (s)	8	8	103	44
Yield/Force Off 170(s)	103	8	78	19
Local Start Time (s)	0	59	0	84
Local Yield (s)	78	78	53	114
Local Yield 170(s)	53	78	28	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 50 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 2: Ellsworth Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
3: Williams Field Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↱					↑↑↑	↱	↰	↑↑	
Traffic Volume (veh/h)	725	0	25	0	0	0	0	50	25	25	25	0
Future Volume (veh/h)	725	0	25	0	0	0	0	50	25	25	25	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	771	0	27				0	53	27	27	27	0
Adj No. of Lanes	2	0	1				0	3	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1804	0	805				0	1398	435	507	1386	0
Arrive On Green	0.51	0.00	0.51				0.00	0.28	0.28	0.13	0.78	0.00
Sat Flow, veh/h	3548	0	1583				0	5253	1583	1774	3632	0
Grp Volume(v), veh/h	771	0	27				0	53	27	27	27	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1695	1583	1774	1770	0
Q Serve(g_s), s	16.4	0.0	1.0				0.0	0.9	1.5	0.0	0.2	0.0
Cycle Q Clear(g_c), s	16.4	0.0	1.0				0.0	0.9	1.5	0.0	0.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1804	0	805				0	1398	435	507	1386	0
V/C Ratio(X)	0.43	0.00	0.03				0.00	0.04	0.06	0.05	0.02	0.00
Avail Cap(c_a), veh/h	1804	0	805				0	1398	435	507	1386	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.5	0.0	14.8				0.0	31.9	32.1	26.5	7.9	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.1				0.0	0.1	0.3	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.0	1.4				0.0	0.4	0.7	0.6	0.1	0.0
LnGrp Delay(d),s/veh	19.3	0.0	14.8				0.0	31.9	32.4	26.7	8.0	0.0
LnGrp LOS	B		B					C	C	C	A	
Approach Vol, veh/h		798						80			54	
Approach Delay, s/veh		19.1						32.1			17.3	
Approach LOS		B						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		53.0		67.0	14.0	39.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		47.0		61.0	8.0	33.0		
Max Q Clear Time (g_c+I1), s		2.2		18.4	2.0	3.5		
Green Ext Time (p_c), s		0.2		3.1	0.1	0.3		

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Notes

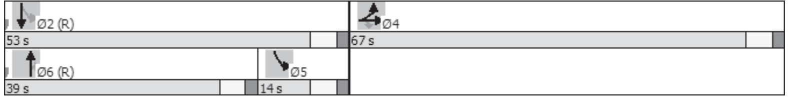
Timing Report, Sorted By Phase
3: Williams Field Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBTL	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	53	67	14	39
Maximum Split (%)	44.2%	55.8%	11.7%	32.5%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	53	39	0
End Time (s)	53	0	53	39
Yield/Force Off (s)	47	114	47	33
Yield/Force Off 170(s)	22	89	47	8
Local Start Time (s)	0	53	39	0
Local Yield (s)	47	114	47	33
Local Yield 170(s)	22	89	47	8

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Splits and Phases: 3: Williams Field Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
4: Williams Field Road & SR 24 WB Ramp(s)

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰	↑↑			↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	0	25	25	25	0	0	50	550
Future Volume (veh/h)	0	0	0	25	0	25	25	25	0	0	50	550
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1833	1810	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				35	0	18	27	27	0	0	53	585
Adj No. of Lanes				2	0	1	1	2	0	0	3	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	5	2	2	0	0	2	2
Cap, veh/h				887	0	385	548	2300	0	0	2882	897
Arrive On Green				0.25	0.00	0.25	0.07	1.00	0.00	0.00	0.57	0.57
Sat Flow, veh/h				3548	0	1538	1774	3632	0	0	5253	1583
Grp Volume(v), veh/h				35	0	18	27	27	0	0	53	585
Grp Sat Flow(s),veh/h/ln				1774	0	1538	1774	1770	0	0	1695	1583
Q Serve(g_s), s				0.9	0.0	1.1	0.0	0.0	0.0	0.0	0.5	30.5
Cycle Q Clear(g_c), s				0.9	0.0	1.1	0.0	0.0	0.0	0.0	0.5	30.5
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				887	0	385	548	2300	0	0	2882	897
V/C Ratio(X)				0.04	0.00	0.05	0.05	0.01	0.00	0.00	0.02	0.65
Avail Cap(c_a), veh/h				887	0	385	548	2300	0	0	2882	897
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				34.1	0.0	34.1	10.6	0.0	0.0	0.0	11.4	17.9
Incr Delay (d2), s/veh				0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.0	3.7
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.4	0.0	0.5	0.4	0.0	0.0	0.0	0.3	14.1
LnGrp Delay(d),s/veh				34.2	0.0	34.4	10.8	0.0	0.0	0.0	11.4	21.5
LnGrp LOS				C		C	B	A			B	C
Approach Vol, veh/h					53			54			638	
Approach Delay, s/veh					34.2			5.4			20.7	
Approach LOS					C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		84.0			10.0	74.0		36.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		78.0			4.0	68.0		30.0
Max Q Clear Time (g_c+I1), s		2.0			2.0	32.5		3.1
Green Ext Time (p_c), s		0.2			0.0	2.6		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C

Notes

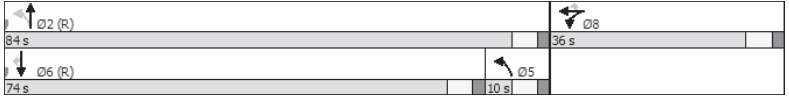
Timing Report, Sorted By Phase
4: Williams Field Road & SR 24 WB Ramp(s)

	↑	↖	↓	↙
Phase Number	2	5	6	8
Movement	NBTL	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	84	10	74	36
Maximum Split (%)	70.0%	8.3%	61.7%	30.0%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	74	0	84
End Time (s)	84	84	74	0
Yield/Force Off (s)	78	78	68	114
Yield/Force Off 170(s)	53	78	43	89
Local Start Time (s)	0	74	0	84
Local Yield (s)	78	78	68	114
Local Yield 170(s)	53	78	43	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Splits and Phases: 4: Williams Field Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
7: Signal Butte Road & SR 24 EB Ramp(s)

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	✥	↱					↑↑↑↑	↱	↰	↑↑↑	
Traffic Volume (veh/h)	275	0	325	0	0	0	0	550	350	175	600	0
Future Volume (veh/h)	275	0	325	0	0	0	0	550	350	175	600	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	409	0	222				0	585	372	186	638	0
Adj No. of Lanes	2	0	1				0	4	1	1	3	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	946	0	422				0	2510	620	340	3221	0
Arrive On Green	0.27	0.00	0.27				0.00	0.39	0.39	0.38	1.00	0.00
Sat Flow, veh/h	3548	0	1583				0	6669	1583	1774	5253	0
Grp Volume(v), veh/h	409	0	222				0	585	372	186	638	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1602	1583	1774	1695	0
Q Serve(g_s), s	11.5	0.0	14.4				0.0	7.3	22.4	9.8	0.0	0.0
Cycle Q Clear(g_c), s	11.5	0.0	14.4				0.0	7.3	22.4	9.8	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	946	0	422				0	2510	620	340	3221	0
V/C Ratio(X)	0.43	0.00	0.53				0.00	0.23	0.60	0.55	0.20	0.00
Avail Cap(c_a), veh/h	946	0	422				0	2510	620	340	3221	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.5	0.0	37.5				0.0	24.4	29.0	32.9	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	4.6				0.0	0.2	4.3	6.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	0.0	13.3				0.0	3.3	10.5	5.3	0.0	0.0
LnGrp Delay(d),s/veh	37.9	0.0	42.2				0.0	24.7	33.3	39.1	0.1	0.0
LnGrp LOS	D		D					C	C	D	A	
Approach Vol, veh/h		631						957			824	
Approach Delay, s/veh		39.4						28.0			8.9	
Approach LOS		D						C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		82.0		38.0	29.0	53.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		76.0		32.0	23.0	47.0		
Max Q Clear Time (g_c+I1), s		2.0		16.4	11.8	24.4		
Green Ext Time (p_c), s		5.1		2.0	3.4	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	24.5
HCM 2010 LOS	C

Notes

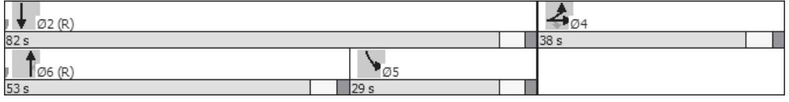
Timing Report, Sorted By Phase
7: Signal Butte Road & SR 24 EB Ramp(s)

	↓	↗	↘	↑
Phase Number	2	4	5	6
Movement	SBT	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	82	38	29	53
Maximum Split (%)	68.3%	31.7%	24.2%	44.2%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	82	53	0
End Time (s)	82	0	82	53
Yield/Force Off (s)	76	114	76	47
Yield/Force Off 170(s)	51	89	76	22
Local Start Time (s)	0	82	53	0
Local Yield (s)	76	114	76	47
Local Yield 170(s)	51	89	76	22

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 7: Signal Butte Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
8: Signal Butte Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	225	0	225	50	500	0	0	775	50
Future Volume (veh/h)	0	0	0	225	0	225	50	500	0	0	775	50
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				313	0	159	53	532	0	0	824	53
Adj No. of Lanes				2	0	1	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				1331	0	594	315	1858	0	0	2456	607
Arrive On Green				0.38	0.00	0.38	0.18	1.00	0.00	0.00	0.38	0.38
Sat Flow, veh/h				3548	0	1583	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				313	0	159	53	532	0	0	824	53
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				7.3	0.0	8.4	1.6	0.0	0.0	0.0	10.9	2.6
Cycle Q Clear(g_c), s				7.3	0.0	8.4	1.6	0.0	0.0	0.0	10.9	2.6
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				1331	0	594	315	1858	0	0	2456	607
V/C Ratio(X)				0.24	0.00	0.27	0.17	0.29	0.00	0.00	0.34	0.09
Avail Cap(c_a), veh/h				1331	0	594	315	1858	0	0	2456	607
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				25.7	0.0	26.1	45.1	0.0	0.0	0.0	26.2	23.6
Incr Delay (d2), s/veh				0.4	0.0	1.1	1.1	0.4	0.0	0.0	0.4	0.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.6	0.0	3.8	0.8	0.1	0.0	0.0	4.9	1.2
LnGrp Delay(d),s/veh				26.1	0.0	27.2	46.3	0.4	0.0	0.0	26.6	23.9
LnGrp LOS				C		C	D	A			C	C
Approach Vol, veh/h					472			585			877	
Approach Delay, s/veh					26.5			4.5			26.4	
Approach LOS					C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		69.0			17.0	52.0		51.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		63.0			11.0	46.0		45.0
Max Q Clear Time (g_c+I1), s		2.0			3.6	12.9		10.4
Green Ext Time (p_c), s		3.8			2.0	6.1		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.8
HCM 2010 LOS	B

Notes

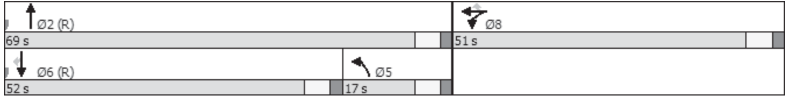
Timing Report, Sorted By Phase
8: Signal Butte Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	69	17	52	51
Maximum Split (%)	57.5%	14.2%	43.3%	42.5%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	52	0	69
End Time (s)	69	69	52	0
Yield/Force Off (s)	63	63	46	114
Yield/Force Off 170(s)	38	63	21	89
Local Start Time (s)	0	52	0	69
Local Yield (s)	63	63	46	114
Local Yield 170(s)	38	63	21	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	85

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 8: Signal Butte Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
9: Meridian Road & SR 24 EB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↱					↑↑↑↑	↱	↰↰	↑↑	
Traffic Volume (veh/h)	200	0	1825	0	0	0	0	1625	225	50	300	0
Future Volume (veh/h)	200	0	1825	0	0	0	0	1625	225	50	300	0
Number	7	4	14				1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	0
Adj Flow Rate, veh/h	213	0	0				0	1729	239	53	319	0
Adj No. of Lanes	2	0	1				0	4	1	2	2	0
Peak Hour Factor	0.94	0.94	0.94				0.90	0.94	0.94	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	0
Cap, veh/h	1301	0	581				0	2296	567	595	1888	0
Arrive On Green	0.37	0.00	0.00				0.00	0.36	0.36	0.25	1.00	0.00
Sat Flow, veh/h	3548	0	1583				0	6669	1583	3442	3632	0
Grp Volume(v), veh/h	213	0	0				0	1729	239	53	319	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583				0	1602	1583	1721	1770	0
Q Serve(g_s), s	4.9	0.0	0.0				0.0	28.5	13.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.9	0.0	0.0				0.0	28.5	13.7	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1301	0	581				0	2296	567	595	1888	0
V/C Ratio(X)	0.16	0.00	0.00				0.00	0.75	0.42	0.09	0.17	0.00
Avail Cap(c_a), veh/h	1301	0	581				0	2296	567	595	1888	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	0.0				0.0	33.8	29.1	34.1	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0				0.0	2.3	2.3	0.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.0				0.0	13.0	6.3	0.7	0.1	0.0
LnGrp Delay(d),s/veh	25.9	0.0	0.0				0.0	36.2	31.4	34.4	0.2	0.0
LnGrp LOS	C							D	C	C	A	
Approach Vol, veh/h		213						1968			372	
Approach Delay, s/veh		25.9						35.6			5.1	
Approach LOS		C						D			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		70.0		50.0	21.0	49.0		
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0		
Max Green Setting (Gmax), s		64.0		44.0	15.0	43.0		
Max Q Clear Time (g_c+I1), s		2.0		6.9	2.0	30.5		
Green Ext Time (p_c), s		2.2		0.7	1.6	9.0		

Intersection Summary	
HCM 2010 Ctrl Delay	30.3
HCM 2010 LOS	C

Notes

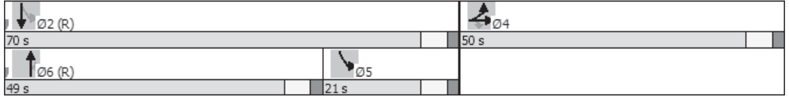
Timing Report, Sorted By Phase
9: Meridian Road & SR 24 EB Ramp(s)

Phase Number	2	4	5	6
Movement	SBTL	EBTL	SBL	NBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	70	50	21	49
Maximum Split (%)	58.3%	41.7%	17.5%	40.8%
Minimum Split (s)	36	36	10	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5		5
Flash Dont Walk (s)	25	25		25
Dual Entry	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	70	49	0
End Time (s)	70	0	70	49
Yield/Force Off (s)	64	114	64	43
Yield/Force Off 170(s)	39	89	64	18
Local Start Time (s)	0	70	49	0
Local Yield (s)	64	114	64	43
Local Yield 170(s)	39	89	64	18

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	145

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Splits and Phases: 9: Meridian Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
10: Meridian Road & SR 24 WB Ramp(s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↱	↱	↰↰	↑↑			↑↑↑↑	↱
Traffic Volume (veh/h)	0	0	0	25	0	50	700	925	0	0	350	150
Future Volume (veh/h)	0	0	0	25	0	50	700	925	0	0	350	150
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	0	0	1863	1863
Adj Flow Rate, veh/h				27	0	53	745	984	0	0	372	0
Adj No. of Lanes				1	0	2	2	2	0	0	4	1
Peak Hour Factor				0.94	0.94	0.94	0.94	0.94	0.90	0.90	0.94	0.94
Percent Heavy Veh, %				2	2	2	2	2	0	0	2	2
Cap, veh/h				384	0	686	1463	2418	0	0	1335	330
Arrive On Green				0.22	0.00	0.22	0.85	1.00	0.00	0.00	0.21	0.00
Sat Flow, veh/h				1774	0	3167	3442	3632	0	0	6669	1583
Grp Volume(v), veh/h				27	0	53	745	984	0	0	372	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1721	1770	0	0	1602	1583
Q Serve(g_s), s				1.5	0.0	1.6	6.9	0.0	0.0	0.0	5.9	0.0
Cycle Q Clear(g_c), s				1.5	0.0	1.6	6.9	0.0	0.0	0.0	5.9	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				384	0	686	1463	2418	0	0	1335	330
V/C Ratio(X)				0.07	0.00	0.08	0.51	0.41	0.00	0.00	0.28	0.00
Avail Cap(c_a), veh/h				384	0	686	1463	2418	0	0	1335	330
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				37.4	0.0	37.4	5.7	0.0	0.0	0.0	39.9	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.2	1.3	0.5	0.0	0.0	0.5	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.7	3.4	0.2	0.0	0.0	2.6	0.0
LnGrp Delay(d),s/veh				37.7	0.0	37.7	7.0	0.5	0.0	0.0	40.4	0.0
LnGrp LOS				D		D	A	A			D	
Approach Vol, veh/h					80			1729			372	
Approach Delay, s/veh					37.7			3.3			40.4	
Approach LOS					D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		88.0			57.0	31.0		32.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		82.0			51.0	25.0		26.0
Max Q Clear Time (g_c+I1), s		2.0			8.9	7.9		3.6
Green Ext Time (p_c), s		13.4			12.5	2.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.9
HCM 2010 LOS	B

Notes

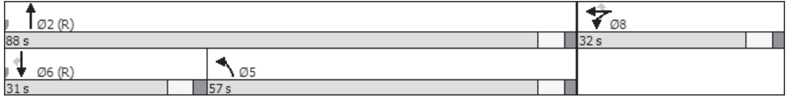
Timing Report, Sorted By Phase
10: Meridian Road & SR 24 WB Ramp(s)

Phase Number	2	5	6	8
Movement	NBT	NBL	SBT	WBTL
Lead/Lag		Lag	Lead	
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	88	57	31	32
Maximum Split (%)	73.3%	47.5%	25.8%	26.7%
Minimum Split (s)	36	10	36	36
Yellow Time (s)	4	4	4	4
All-Red Time (s)	2	2	2	2
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5		5	5
Flash Dont Walk (s)	25		25	25
Dual Entry	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	31	0	88
End Time (s)	88	88	31	0
Yield/Force Off (s)	82	82	25	114
Yield/Force Off 170(s)	57	82	0	89
Local Start Time (s)	0	31	0	88
Local Yield (s)	82	82	25	114
Local Yield 170(s)	57	82	0	89

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	95

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Splits and Phases: 10: Meridian Road & SR 24 WB Ramp(s)



HCM 2010 Signalized Intersection Summary
11: Ironwood Road & SR 24 EB Ramp(s)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↰	↱		↑↑↑↑	↑↑	
Traffic Volume (veh/h)	75	1000	0	1350	625	0
Future Volume (veh/h)	75	1000	0	1350	625	0
Number	7	14	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0
Adj Flow Rate, veh/h	80	1064	0	1436	665	0
Adj No. of Lanes	1	2	0	4	2	0
Peak Hour Factor	0.94	0.94	0.90	0.94	0.94	0.90
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	1020	1821	0	2083	1150	0
Arrive On Green	0.57	0.57	0.00	0.32	0.65	0.00
Sat Flow, veh/h	1774	3167	0	6929	3725	0
Grp Volume(v), veh/h	80	1064	0	1436	665	0
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1602	1770	0
Q Serve(g_s), s	2.4	25.8	0.0	23.4	12.6	0.0
Cycle Q Clear(g_c), s	2.4	25.8	0.0	23.4	12.6	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	1020	1821	0	2083	1150	0
V/C Ratio(X)	0.08	0.58	0.00	0.69	0.58	0.00
Avail Cap(c_a), veh/h	1020	1821	0	2083	1150	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.3	16.3	0.0	35.2	16.4	0.0
Incr Delay (d2), s/veh	0.2	1.4	0.0	1.9	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	11.6	0.0	10.6	6.4	0.0
LnGrp Delay(d),s/veh	11.5	17.7	0.0	37.1	18.5	0.0
LnGrp LOS	B	B		D	B	
Approach Vol, veh/h	1144			1436	665	
Approach Delay, s/veh	17.3			37.1	18.5	
Approach LOS	B			D	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		45.0		75.0		45.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		39.0		69.0		39.0		
Max Q Clear Time (g_c+I1), s		14.6		27.8		25.4		
Green Ext Time (p_c), s		15.6		5.5		10.2		

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Notes

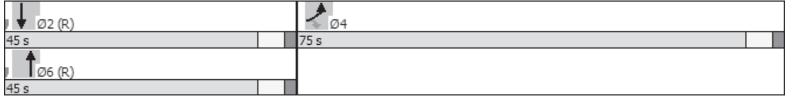
Timing Report, Sorted By Phase
11: Ironwood Road & SR 24 EB Ramp(s)

Phase Number	2	4	6
Movement	SBT	EBL	NBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	45	75	45
Maximum Split (%)	37.5%	62.5%	37.5%
Minimum Split (s)	36	36	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	25	25	25
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	45	0
End Time (s)	45	0	45
Yield/Force Off (s)	39	114	39
Yield/Force Off 170(s)	14	89	14
Local Start Time (s)	0	45	0
Local Yield (s)	39	114	39
Local Yield 170(s)	14	89	14

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Splits and Phases: 11: Ironwood Road & SR 24 EB Ramp(s)



HCM 2010 Signalized Intersection Summary
12: Ironwood Road & SR 24 WB Ramp(s)

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations			↰↰	↑↑	↑↑	↱
Traffic Volume (veh/h)	0	0	425	925	650	50
Future Volume (veh/h)	0	0	425	925	650	50
Number			5	2	6	16
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)			1.00			1.00
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1863	1863	1863	1863
Adj Flow Rate, veh/h			452	984	691	53
Adj No. of Lanes			2	2	2	1
Peak Hour Factor			0.94	0.94	0.94	0.94
Percent Heavy Veh, %			2	2	2	2
Cap, veh/h			1797	3362	2183	976
Arrive On Green			0.57	1.00	0.62	0.62
Sat Flow, veh/h			3442	3632	3632	1583
Grp Volume(v), veh/h			452	984	691	53
Grp Sat Flow(s),veh/h/ln			1721	1770	1770	1583
Q Serve(g_s), s			0.0	0.0	11.2	1.6
Cycle Q Clear(g_c), s			0.0	0.0	11.2	1.6
Prop In Lane			1.00			1.00
Lane Grp Cap(c), veh/h			1797	3362	2183	976
V/C Ratio(X)			0.25	0.29	0.32	0.05
Avail Cap(c_a), veh/h			1797	3362	2183	976
HCM Platoon Ratio			2.00	2.00	1.00	1.00
Upstream Filter(I)			1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh			2.0	0.0	11.0	9.1
Incr Delay (d2), s/veh			0.3	0.2	0.4	0.1
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			1.3	0.1	5.5	0.7
LnGrp Delay(d),s/veh			2.3	0.2	11.3	9.2
LnGrp LOS			A	A	B	A
Approach Vol, veh/h				1436	744	
Approach Delay, s/veh				0.9	11.2	
Approach LOS				A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		
Phs Duration (G+Y+Rc), s		120.0			40.0	80.0		
Change Period (Y+Rc), s		6.0			6.0	6.0		
Max Green Setting (Gmax), s		114.0			34.0	74.0		
Max Q Clear Time (g_c+I1), s		2.0			2.0	13.2		
Green Ext Time (p_c), s		10.8			9.7	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	4.4
HCM 2010 LOS	A

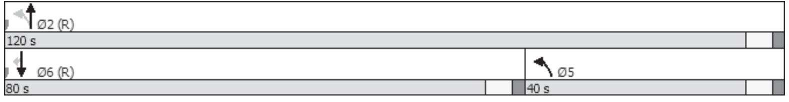
Timing Report, Sorted By Phase
12: Ironwood Road & SR 24 WB Ramp(s)

	↰↑	↖	↓
Phase Number	2	5	6
Movement	NBTL	NBL	SBT
Lead/Lag		Lag	Lead
Lead-Lag Optimize			
Recall Mode	Max	Max	Max
Maximum Split (s)	120	40	80
Maximum Split (%)	100.0%	33.3%	66.7%
Minimum Split (s)	36	10	36
Yellow Time (s)	4	4	4
All-Red Time (s)	2	2	2
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5		5
Flash Dont Walk (s)	25		25
Dual Entry	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	80	0
End Time (s)	0	0	80
Yield/Force Off (s)	114	114	74
Yield/Force Off 170(s)	89	114	49
Local Start Time (s)	0	80	0
Local Yield (s)	114	114	74
Local Yield 170(s)	89	114	49

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	50

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Splits and Phases: 12: Ironwood Road & SR 24 WB Ramp(s)



FINAL DESIGN CONCEPT REPORT
SR-24, Ellsworth Road to Ironwood Drive
Interim Phase II

APPENDIX F – PAVEMENT MEMO

PARSONS

MEMORANDUM

TO: Sam Elters, Parsons

DATE: 02/09/16

FROM: Sohila Bemanian, Parsons

PHONE: (775) 297-6515

SUBJECT: **State Route 24 Interim- Pavement Design –Rev.1**

This intent of this memorandum is to provide recommendations on the selection of the preferred alternative based on the life cycle cost analysis (LCCA) for State Route (SR) 24 Interim Project.

1) Introduction

The pavement design for SR 24 Interim Project used the following information for the analysis:

- Final Design Concept Report (DCR) Vol. 1 (April 2011)
- Traffic Analysis Report dated January 2016 provided by CivTech
- ADOT's Preliminary Engineering and Design Manual (Third Edition 1989)
- Development of a Traffic Data Input System in Arizona for the MEPDG (October 2013)
- The American Association of State Highway and Transportation Officials (AASHTO) 93 Design Guide
- DARWin 3.1 Software

2) Pavement Design

The design inputs used to calculate pavement thicknesses are presented in Table1.

Table 1: Pavement Design Inputs for DARWin 3.1

Design Input	Flexible Pavement	Rigid Pavement
Initial Serviceability	4.2	4.2
Terminal Serviceability	2.8	2.8
Reliability	99%	99%
Overall Standard Deviation	0.35	0.25
Roadbed Resilient Modulus	13,000 psi	-
Structural Coefficients and Moduli	HMA- 0.44 (450,000 psi) AB- 0.14 (28,000 psi)	-
Drainage Coefficient	1.00	1.1
28-day Mean PCC Modulus of Rupture	-	670 psi
28-day Mean Elastic Modulus of Slab	-	4,000,000 psi
Mean Effective k-value	-	613 psi/in
Load Transfer Coefficient, J	-	2.8

3) Subgrade

Based on the review of DCR report, the subgrade materials along the project alignment generally consist of predominantly finer-grained, moderately firm to hard, lenticular alluvial deposits containing varying proportions of sand, silt, clay, and gravel. The finer grained silty and clayey deposits vary from low to medium in plasticity whereas the cleaner sand with gravel layers is typically non-plastic.

It is assumed that an average of 24" of embankment fill will be used throughout the project. The embankment fill is assumed to be classified as Soil A7-6 with modulus value of 13,000 psi.

4) Traffic Loading-18-kip Equivalent Single Axle Loading (ESALs)

The traffic information provided by CivTech is presented in Table 2. Since Option A has higher traffic than Option B, this option was used to calculate the 10-year, 20-year, and 30-year ESALs.

The design ESALs was based on traffic from SR 24 Ellsworth Road to Signal Butte Road.

		2025 Option A		
ID	SR 24 Segment	EB AADT	WB AADT	Total ADT
1	SR 24 Loop 202 to Ellsworth Road	41388	42609	
2	SR 24 Ellsworth Road to Williams Field Road	15111	16203	31,314
3	SR 24 Williams Field Road to Signal Butte Road	15111	16203	31,314
4	SR 24 Signal Butte Road to Meridian Road	9099	9624	18,723
5	SR 24 Meridian Road to Ironwood Drive	9099	9624	18,723

The following assumptions were used to calculate the 10-yr., 20-yr., and 30-yr. ESALs.

Parameters	Value	Additional Input
Growth Factor	4.60%	
%Truck	7%	
Light Truck	5%	0.8 (ESAL/ Truck)
Heavy Truck	2%	1.2 (ESAL/ Truck)

The calculated 10, 20, and 30 year ESALs are 4,394,712, 11,38349, and 21,583,996 respectively. See Attachment A for ESALs Calculations.

5) New Pavement Thickness Design

The following alternatives were analyzed for the project and life-cycle cost analysis (LCCA).

- 10-year Flexible Pavement followed by 30-yr. JPCP for the Ultimate Configurations
- 20-year Flexible Pavement followed by 30-yr. JPCP for the Ultimate Configurations
- 30-year Rigid Pavement

Pavement sections were designed using DARWin software and design input values from Table 1 (See Attachment A for design outputs). Table 3 present the calculated thicknesses.

Table 3: Pavement Thickness for Alternatives

	Alternative I	Alternative II	Alternative III
	10-year Flexible	20-year Flexible	30-year Rigid
Pavement Structural Section	1.0” AR-ACFC 6” HMA 8” AB	1.0” AR-ACFC 7.5” HMA 9” AB	1” AR-ACFC 11” JPCP 4” AB

AR-ACFC (Asphalt rubber –asphalt friction course)
HMA-Hotmix asphalt
AB-Aggregate Base-Class II

6) Life Cycle Cost Analysis

A LCCA was conducted to determine the preferred pavement alternative based on the lowest LCCA. The LCCA analyses are in Attachment B. A summary of LCCA results are presented in Table 4.

Table 4: Summary of Pavement Alternative Initial Costs and LCCA

	Initial Cost (per lane-mile)	LCCA (per lane-mile)	Preferred Option based on LCCA
Option1: 30-year JPCP	$337,660.55	$386,179.40	#1
Option 2: 10-year HMA	$243,078.99	$497,622.20	#3
Option 3: 20-year HMA	$289,833.59	$494,909.50	#2

A ten year flexible pavement section provides the lowest initial construction cost, however it has the highest LCCA. The 30-year JPCP provides the lowest LCCA and has the highest initial cost.

7) Recommendations

Due to uncertainty about the construction timing of Ultimate Configurations, it is recommended to use a 30-year JPCP that will optimize available agency resources, while minimizing user cost.

The following considerations are suggested to reduce initial cost to allow for use of 30-yr. JPCP:

1) Use MEPDG for pavement design analysis to reduce JPCP thickness design. Based on our experience with running this program, the proposed thickness can be reduced by 1.5” to 2”.
2) Place reduced HMA shoulder for the interim project
3) Use reduced HMA for cross roads and ramps
4) Consider not using AR-ACFC on the HMA section

Attachment A: Design Output

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product
Parsons

Flexible Structural Design Module SR

24 from Ellsworth to Signal Butte Road -10 Year Design

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	4,684,105
Initial Serviceability	4.2
Terminal Serviceability	2.8
Reliability Level	99 %
Overall Standard Deviation	0.35
Roadbed Soil Resilient Modulus	13,000 psi
Stage Construction	1
Calculated Design Structural Number	4.16 in

Simple ESAL Calculation

Performance Period (years)	10
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	- %
Average Initial Truck Factor (ESALs/truck)	-
Annual Truck Factor Growth Rate	- %
Annual Truck Volume Growth Rate	- %
Growth	Simple
Total Calculated Cumulative ESALs	- *

*Note: This value is not represented by the inputs or an error occurred in calculation.

Rigorous ESAL Calculation

Performance Period (years)	10
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
1	93	4.6	0.0008	1	53,827

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
5	5	4.6	0.8	1	2,893,924
7	2	4.6	1.2	1	1,736,354
Total	100	-	-	-	4,684,105

Growth	Simple
Total Calculated Cumulative ESALs	4,684,105

Layered Thickness Design

Thickness precision	Nearest 0.5 in

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Spec Thickness (Di)(in)	Min Thickness (Di)(in)	Elastic Modulus (psi)	Width (ft)	Calculated Thickness (in)	Calculated SN (in)
1	HMA	0.44	1	-	-	400,000	-	7.00	3.08
2	GBC	0.14	1	-	-	28,000	-	8.00	1.12
Total	-	-	-	-	-	-	-	15.00	4.20

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Parsons

Flexible Structural Design Module

SR 24 from Ellsworth to Signal Butte Road -20 Year Design

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	11,765,226
Initial Serviceability	4.2
Terminal Serviceability	2.8
Reliability Level	99 %
Overall Standard Deviation	0.35
Roadbed Soil Resilient Modulus	13,000 psi
Stage Construction	1
Calculated Design Structural Number	4.82 in

Simple ESAL Calculation

Performance Period (years)	20
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	- %
Average Initial Truck Factor (ESALs/truck)	-
Annual Truck Factor Growth Rate	- %
Annual Truck Volume Growth Rate	- %
Growth	Simple
Total Calculated Cumulative ESALs	- *

*Note: This value is not represented by the inputs or an error occurred in calculation.

Rigorous ESAL Calculation

Performance Period (years)	20
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
1	93	4.6	0.0008	1	135,199

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
5	5	4.6	0.8	1	7,268,767
7	2	4.6	1.2	1	4,361,260
Total	100	-	-	-	11,765,226

Growth	Simple
Total Calculated Cumulative ESALs	11,765,226

Layered Thickness Design

Thickness precision	Nearest 0.5 in

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Spec Thickness (Di)(in)	Min Thickness (Di)(in)	Elastic Modulus (psi)	Width (ft)	Calculated Thickness (in)	Calculated SN (in)
1	HMA	0.44	1	-	-	400,000	-	8.50	3.74
2	GBC	0.14	1	-	-	28,000	-	9.00	1.26
Total	-	-	-	-	-	-	-	17.50	5.00

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Parsons

Rigid Structural Design Module

SR-24 from Ellsworth to Signal Butte Road 30-yr. Design

Rigid Structural Design

Pavement Type	JPCP
18-kip ESALs Over Initial Performance Period	21,583,996
Initial Serviceability	4.2
Terminal Serviceability	2.8
28-day Mean PCC Modulus of Rupture	670 psi
28-day Mean Elastic Modulus of Slab	4,000,000 psi
Mean Effective k-value	613 psi/in
Reliability Level	99 %
Overall Standard Deviation	0.25
Load Transfer Coefficient, J	2.8
Overall Drainage Coefficient, Cd	1
Calculated Design Thickness	10.67 in

Effective Modulus of Subgrade Reaction

Period	Description	Roadbed Soil Resilient Modulus (psi)	Base Elastic Modulus (psi)
1	-	13,000	28,000

Base Type	Agg.Base
Base Thickness	4 in
Depth to Bedrock	20 ft
Projected Slab Thickness	9 in
Loss of Support Category	0
Effective Modulus of Subgrade Reaction	613 psi/in

Simple ESAL Calculation

Performance Period (years)	30
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	- %
Average Initial Truck Factor (ESALs/truck)	-
Annual Truck Factor Growth Rate	- %
Annual Truck Volume Growth Rate	- %

Growth	Simple
Total Calculated Cumulative ESALs	- *

*Note: This value is not represented by the inputs or an error occurred in calculation.

Rigorous ESAL Calculation

Performance Period (years)	30
Two-Way Traffic (ADT)	31,314
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
1	93	4.6	0.0008	1	248,031
5	5	4.6	0.8	1	13,334,978
9	2	4.6	1.2	1	8,000,987
Total	100	-	-	-	21,583,996

Growth	Simple
Total Calculated Cumulative ESALs	21,583,996

Attachment B: Life Cycle Cost Analysis

PAVEMENT STRUCTURE COST ESTIMATE
SR 24 – SR 202L to Ellsworth Road
TRACS No. MA 024 000 H6867 01C

ITEM NO	ITEM DESCRIPTION	UNIT MEASURE	UNIT PRICE
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	$4.00
2020081	REMOVAL OF BITUMOUS PAVEMENT (MILLING)(1")	SQ.YD.	$2.00
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	$23.00
4010010	PORTLAND CEMENT CONCRETE PAVEMENT(10")	SQ.YD.	$39.00
4010011	PORTLAND CEMENT CONCRETE PAVEMENT(11")	SQ.YD.	$40.00
4010013	PORTLAND CEMENT CONCRETE PAVEMENT(13")	SQ.YD.	$43.00
4010040	PORTLAND CEMENT CONCRETE PAVEMENT (REINFORCED) (10")	SQ.YD	$100.00
4040111	BITUMINOUS TACK COAT	TON	$500.00
4040116	APPLY BITUMINOUS TACK COAT	HOUR	$160.00
4040125	FOG COAT	TON	$600.00
4040163	BLOTTER MATERIAL	TON	$21.00
4040262	ASPHALT BINDER (PG64-16)	TON	$600.00
4060021	ASPHALTIC CONCRETE (BASEMIX)	TON	$35.00
4060027	MINERAL ADMIXTURE (FOR BASEMIX)	TON	$90.00
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTRAL – SPECIAL MIX)	TON	$65.00
4140040	ASPHALT CONCRETE FRICTION COURSE (ASPHALT-RUBBER)	TON	$35.00
4140042	ASPHALT RUBBER MATERIAL (FOR AR-ACFC)	TON	$740.00
4140044	MINERAL ADMIXTURE (FOR AR-ACFC)	TON	$90.00

6.6% and 1.6 % were derived from amec cost estimate

0.065574	$39.34
0.016393	$1.48

Total Base Mix Unit Price
$75.82

Total ACFC Unit Price
$102.46

0.090063	$66.65
0.009034	$0.81

9% and 0.9% of AR-ACFC anf mineral Admixture were derived from

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1 Cubic yard	1.9	Tons.
LCCA done for One lane Mile	7040	SQ.YD.
Discount rate	4	%

		Option 1 - 10-yrs. (HMA with Agg. Base)		
Years	Discount Rate	ITEM DESCRIPTION	COST	PW COST
		1.0" AR-ACFC	$38,069.44	
		6" Asphalt Concrete (Base Mix) (Includes binder & mineral filler)	$169,027.32	
		8.0" Aggregate Base, Class 2	$35,982.22	
0	1.0000	*Total*	$243,078.99	**$243,078.99**
10	0.6756	Remove existing HMA	$28,160.00	**$19,023.89**
10	0.6756	Reconst. with New JPCP	$319,669.44	**$215,957.22**
15	0.5553			
15	0.5553			
15	0.5553			
20	0.4564			
20	0.4564			
20	0.4564			
25	0.3751	1" Mill AR-ACFC	$14,080.00	**$5,281.64**
25	0.3751	1" Placement AR-ACFC	$38,069.44	**$14,280.49**
25	0.3751			
30	0.3083			
		Net Present Worth (NPW)		**$497,622.2**

Strategy	Initial Cost	LCCA	Prefered Option
Option 1	$243,079	$497,622	#2
Option 2	$289,834	$494,910	#3
Option 3	$337,661	$386,179	#1

1) Use Option 3 - lowest Life cycle cost

1 Cubic yard	1.9	Tons.
LCCA done for One lane Mile	7040	SQ.YD.
Discount rate	4	%

		Option 2 - 20yrs. (HMA with Agg. Base)		
Years	Discount Rate	ITEM DESCRIPTION	COST	PW COST
		1.0" AR-ACFC	$38,069.44	
		7.5" Asphalt Concrete (Base Mix) (Includes binder & mineral filler)	$211,284.15	
		9.0" Aggregate Base, Class 2	$40,480.00	
0	1.0000	*Total*	$289,833.59	**$289,833.59**
10	0.6756			
10	0.6756			
15	0.5553			
15	0.5553	1" Mill AR-ACFC	$14,080.00	**$7,818.12**
15	0.5553	1" Placement AR-ACFC	$38,069.44	**$21,138.61**
20	0.4564	Remove existing HMA	$28,160.00	**$12,851.86**
20	0.4564	Reconst. with New JPCP	$319,669.44	**$145,892.96**
20	0.4564	1" Placement AR-ACFC	$38,069.44	**$17,374.40**
25	0.3751			
25	0.3751			
25	0.3751			
30	0.3083			
		Net Present Worth (NPW)		**$494,909.5**

Strategy	Initial Cost
Option 1	$243,079
Option 2	$289,834
Option 3	$337,661

1) Use Option 3 - lowest Life cycle cost

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1 Cubic yard	1.9	Tons.
LCCA done for One lane Mile	7040	SQ.YD.
Discount rate	4	%

		Option 3 - 30yrs. (JPCP with Agg. Base)		
Years	Discount Rate	ITEM DESCRIPTION	COST	PW COST
		1.0" AR-ACFC	$38,069.44	
		11" JPCP	$281,600.00	
		4.0" Aggregate Base, Class 2	$17,991.11	
0	1.0000	*Total*	$337,660.55	**$337,660.55**
10	0.6756			
10	0.6756			
15	0.5553	1" Mill AR-ACFC	$14,080.00	**$7,818.12**
15	0.5553	1" Placement AR-ACFC	$38,069.44	**$21,138.61**
15	0.5553			
20	0.4564			
20	0.4564			
20	0.4564			
25	0.3751	1" Mill AR-ACFC	$14,080.00	**$5,281.64**
25	0.3751	1" Placement AR-ACFC	$38,069.44	**$14,280.49**
25	0.3751			
30	0.3083			
		Net Present Worth (NPW)		**$386,179.4**

Strategy	Initial Cost
Option 1	$243,079
Option 2	$289,834
Option 3	$337,661

1) Use Option 3 - lowest Life cycle cost