



Maricopa County
Department of
Transportation
Planning Division

Property of
Flood Control District of Maricopa County
Please Return to
2801 W. Durango
Phoenix, AZ 85009

EL MIRAGE ROAD
BEARDSLEY ROAD TO LOOP 303
PROJECT NO. C-99-0786-18

#68995

FINAL

CANDIDATE ASSESSMENT REPORT

JANUARY, 1999



Prepared By:



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**FINAL
CANDIDATE ASSESSMENT REPORT**

FOR

**EL MIRAGE ROAD
BEARDSLEY ROAD TO LOOP 303**

PROJECT NO. C-99-0786-18

SEC. 13, 14, 23 & 24, T.4N. R.1W G&SRB&M

**MARICOPA COUNTY DEPARTMENT OF
TRANSPORTATION PLANNING DIVISION**

January, 1999

Project Name: El Mirage Road

Project Termini: Beardsley Road to Loop 303

Requested by: Sun City Home Owners Association

Improvement Requested: Widen a 2-lane roadway between Beardsley Road and Deer Valley Drive with drainage improvements. Construct a new road from Deer Valley Drive to the future Loop 303 with an intersection and drainage improvements.

PM₁₀ Area: Yes

Length: 3.219 Kilometers (2.00 Miles)

Summary Cost Estimated: \$8,067,122

EXECUTIVE SUMMARY

The purpose of the El Mirage Road – Beardsley Road to Loop 303 Candidate Assessment Report is to provide Maricopa County Department of Transportation (MCDOT) staff and Transportation Advisory Board with information necessary to evaluate the proposed improvement in relation to other candidate assessment projects. The project includes the widening of El Mirage Road from Beardsley Road to Deer Valley Drive from the existing 2-lane roadway section and the construction of a new roadway from Deer Valley Drive to Loop 303. Both 4-lane and 6-lane roadway sections were considered. The 4-lane and 6-lane alternatives meet MCDOT standards for a modified major urban arterial. The project includes a drainage evaluation and a traffic study of the future intersections at El Mirage Road – Deer Valley Drive and El Mirage Road – Loop 303.

The concepts developed for the study include two alternatives, Alternatives A and B, for the widening of El Mirage Road from Beardsley Road to Deer Valley Drive. Both a 4-lane and a 6-lane roadway section were considered for both alternatives. Alternative A utilizes the existing pavement to the greatest extent possible. The pavement has a one-way crown sloping east. This creates an adverse superelevation in some curves. Adverse superelevations are to be removed and replaced. Curb and gutter will be installed on the west edge of pavement in these sections to channel on site drainage flows. Alternative B is based on a complete removal of the existing pavement and construction of a new roadway section with a normal crown. The alternatives were evaluated based on drainage impacts, potential utility impacts, constructibility, traffic service, and cost. Both alternatives include construction of a full width roadway prism on the west side of the McMicken Dam Outlet Wash and corresponding excavation on the east side of the wash to maintain the hydraulic capacity of the wash. Design alternate drawings and typical cross sections are shown in the Appendix.

Four alternative alignments, Alternatives 1 through 4, were evaluated for the new roadway section of El Mirage Road from Deer Valley Drive to Loop 303. Both 4-lane and a 6-lane roadway sections were considered for all four alignments. The first alignment crosses the McMicken Dam Outlet Wash just south of proposed Loop 303. This requires a 9 barrel box culvert. The second alignment is located west of the McMicken Dam Outlet Wash to eliminate the wash crossing south of proposed Loop 303. The crossing will be required north of Loop 303 as El Mirage Road is extended to the north. The third alignment closely follows the existing curve from El Mirage Road to Deer Valley Drive. It then curves north approximately one-half mile west of El Mirage Road to intersect with Loop 303 along the midsection line. The fourth alignment is located between the second and third alternatives. Alternative four also intersects Loop 303 at the midsection line. The alternatives were evaluated based on drainage impacts, potential utility impacts, constructibility, traffic service, and cost. All alternatives include traffic signals at the intersections of El Mirage Road with Deer Valley Drive and Loop 303 and culvert crossings of the channel north of Deer Valley Drive. Alternatives 1, 2 and 4 include realignment of the McMicken Dam Outlet Wash north of Deer Valley Drive. Design alternate drawings and typical cross sections are shown in the Appendix.

Based on the evaluation, Alternative A, 4-lane section, is the recommended alternative between Beardsley Road and Deer Valley Drive. The recommended alternative meets the projected ADT in 2020, provides the necessary drainage requirements, is highly constructable and the estimated cost is reasonable for the benefits provided. Alternative 2, 4-lane is recommended from Deer Valley Drive to Loop 303.

The estimated total cost of the recommended alternatives is \$8,067,122 which includes \$5,394,476 for construction, \$647,338 for design, \$809,171 for construction management, \$369,000 for right-of-way, \$40,800 for utility relocation, \$132,000 for 404 mitigation and \$647,338 for administration. See the Cost Estimate Section of this report for the assumptions used in developing the construction cost estimate.

A field meeting was held at the project site. Results of the field meeting have been summarized and are included in the Appendix.

PROJECT BACKGROUND INFORMATION

Project Name:

El Mirage Road from Beardsley Road to Loop 303 (See next page for Vicinity Map).

General Description and Location of the Project Area:

El Mirage Road from Beardsley Road to Loop 303 is located in the north central part of Maricopa County as shown in the Vicinity Map. The map shows the proximity of the project to the Agua Fria River, the Cities of Peoria and Surprise. The entire portion of the proposed project resides within Maricopa County. Sun City West, a retirement community, is currently the major traffic generator along El Mirage Road from Beardsley Road to Deer Valley Drive. Future residential development north and west of the project location has the potential to add a significant amount of traffic to the study area. The Bodine Property, located north of Deer Valley Drive and west of El Mirage Road anticipates developing 2,300 units. Lakeview, located north of proposed Loop 303 is planning to develop 9,000 units. Since these subdivisions are in the initial stages of development, their impact is not considered in the analysis conducted for this report. The intersection of El Mirage Road and the proposed Loop 303 is initially planned as an at-grade intersection with a future traffic interchange. Lake Pleasant, a regional park, is located approximately 21 Kilometers (13 Miles) north of the study area.

Available information on the Existing Roadway Surface and Shoulder Areas:

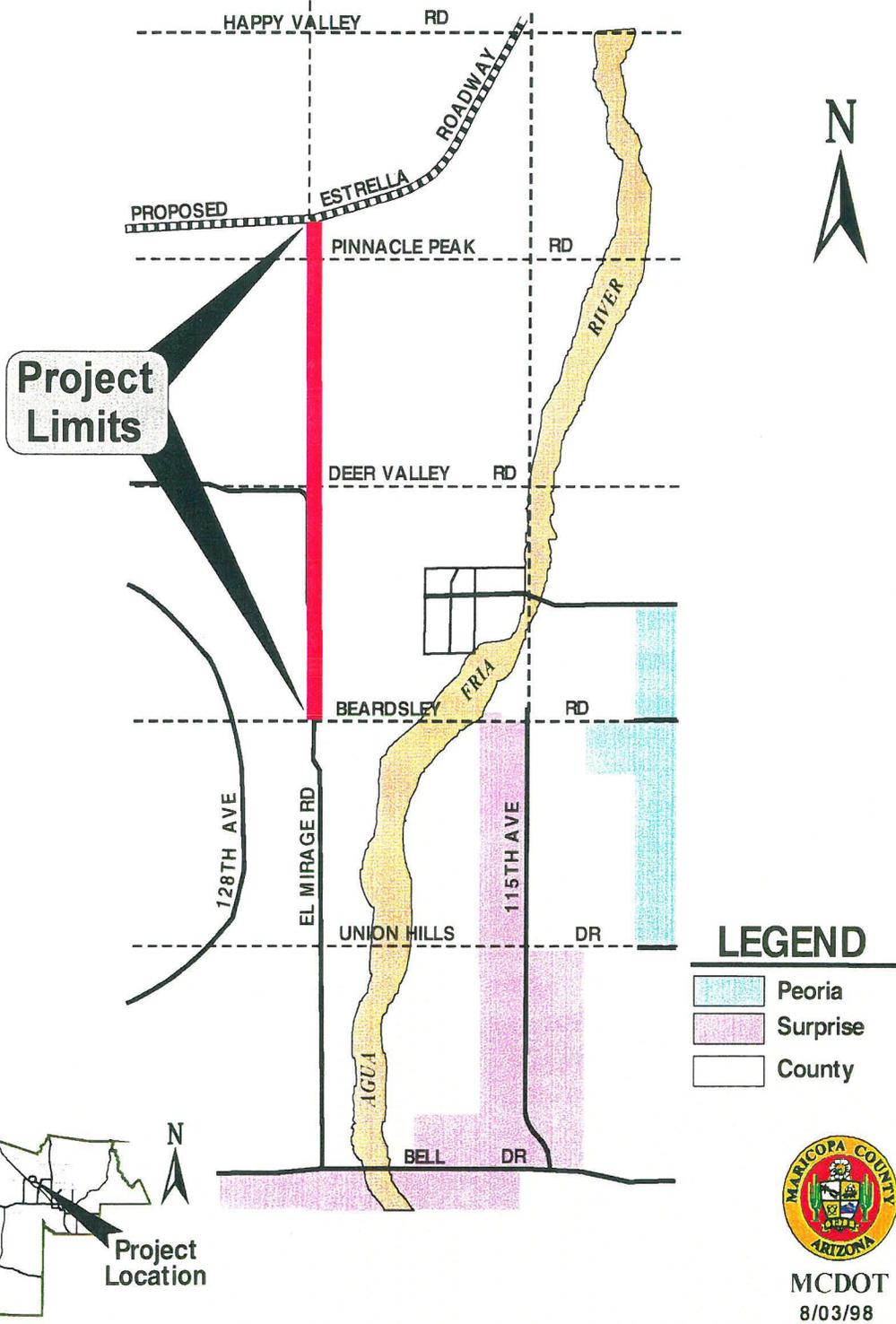
El Mirage Road from Beardsley Road to Deer Valley Drive was paved in June, 1984 with 50mm (2 inches) of asphaltic concrete on a 200mm (8-inch) aggregate base course. The last improvement was a 50mm (2-inch) rubberized overlay applied in November 1997. Pavement corings taken in November 1998 indicate pavement thicknesses of 75mm (3 inches) to 100mm (4 inches) and an aggregate base course of 76mm (3 inches) to 180mm (7 inches). The existing roadway is 8.5m (28 feet) wide. The pavement is striped for two-way traffic. The entire pavement appears to be in good condition with a Pavement Condition Rating (PCR) of 95, an International Roughness Index (IRI) rating of 91.14 and a SUFFICIENCY rating of 74. El Mirage Road from Deer Valley Drive to Loop 303 currently does not exist.

TRAFFIC INFORMATION

Introduction:

The purpose of this study is to analyze the existing (1998) and future (2001, 2010, and 2020) operation of El Mirage Road between the intersections with Beardsley Road, Deer Valley Drive and the future Loop 303. El Mirage Road is a 2-lane asphalt rural highway northwest of the Phoenix metropolitan area. The roadway primarily serves the community of Sun City West today. The road is bounded by Sun City West on the west, and McMicken Dam Outlet Wash on the east. The posted speed limit is 80km/h (50mph). There is a 55km/h (35mph) speed advisory at the corner where El Mirage Road turns west and becomes Deer Valley Drive. Advisory speeds for the other curves are 65km/h (40mph). The terrain is level. The only cross streets which intersect El Mirage Road are Beardsley Road and Deer Valley Drive. The intersection with Beardsley Road is stop sign controlled, with stop signs on all 3 approaches. There is no development north and east of the road at this time.

CANDIDATE ASSESSMENT PROJECT EL MIRAGE ROAD BEARDSLEY TO ESTRELLA



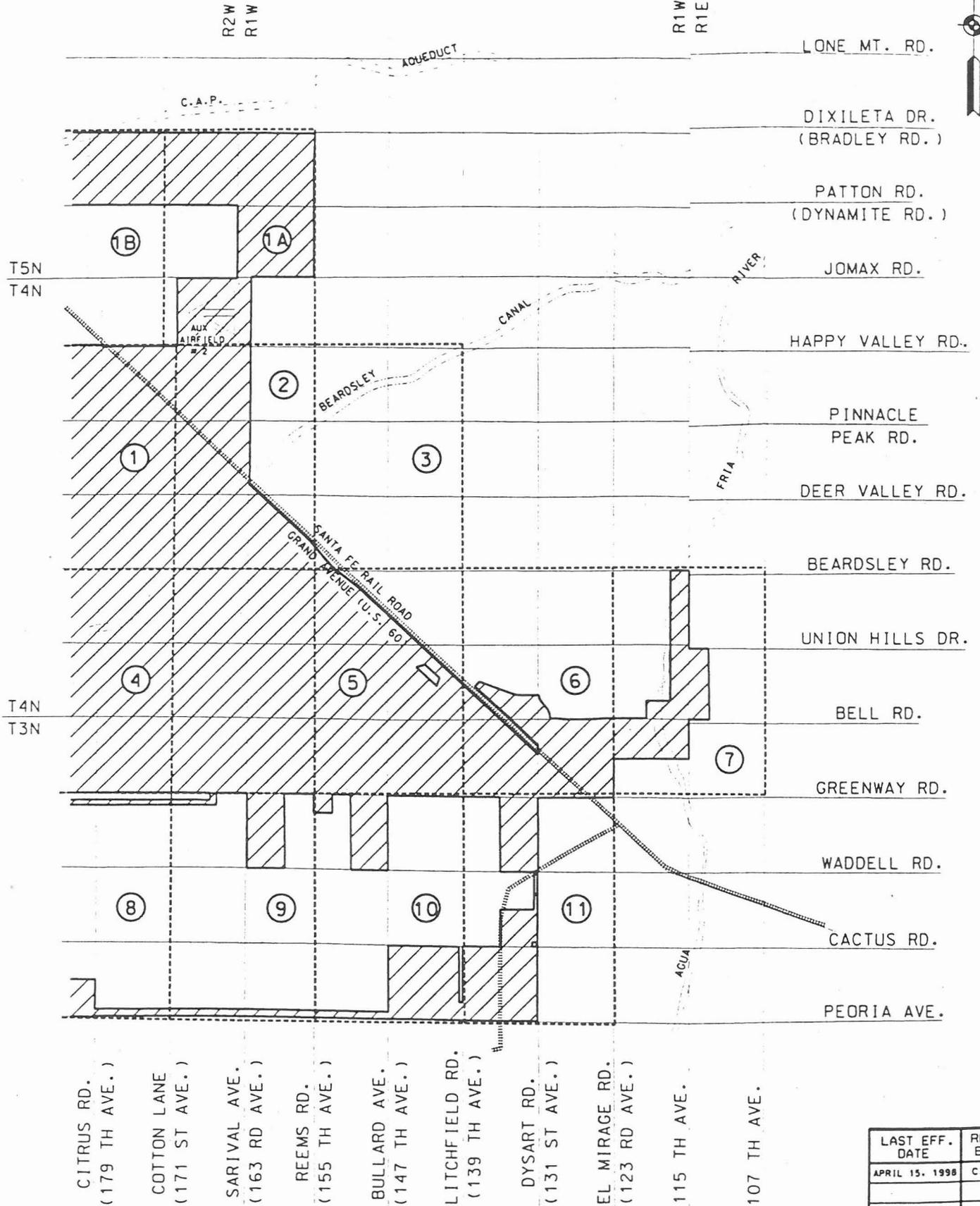
LEGEND

-  Peoria
-  Surprise
-  County



MCDOT
8/03/98

SURPRISE INDEX SHEET I

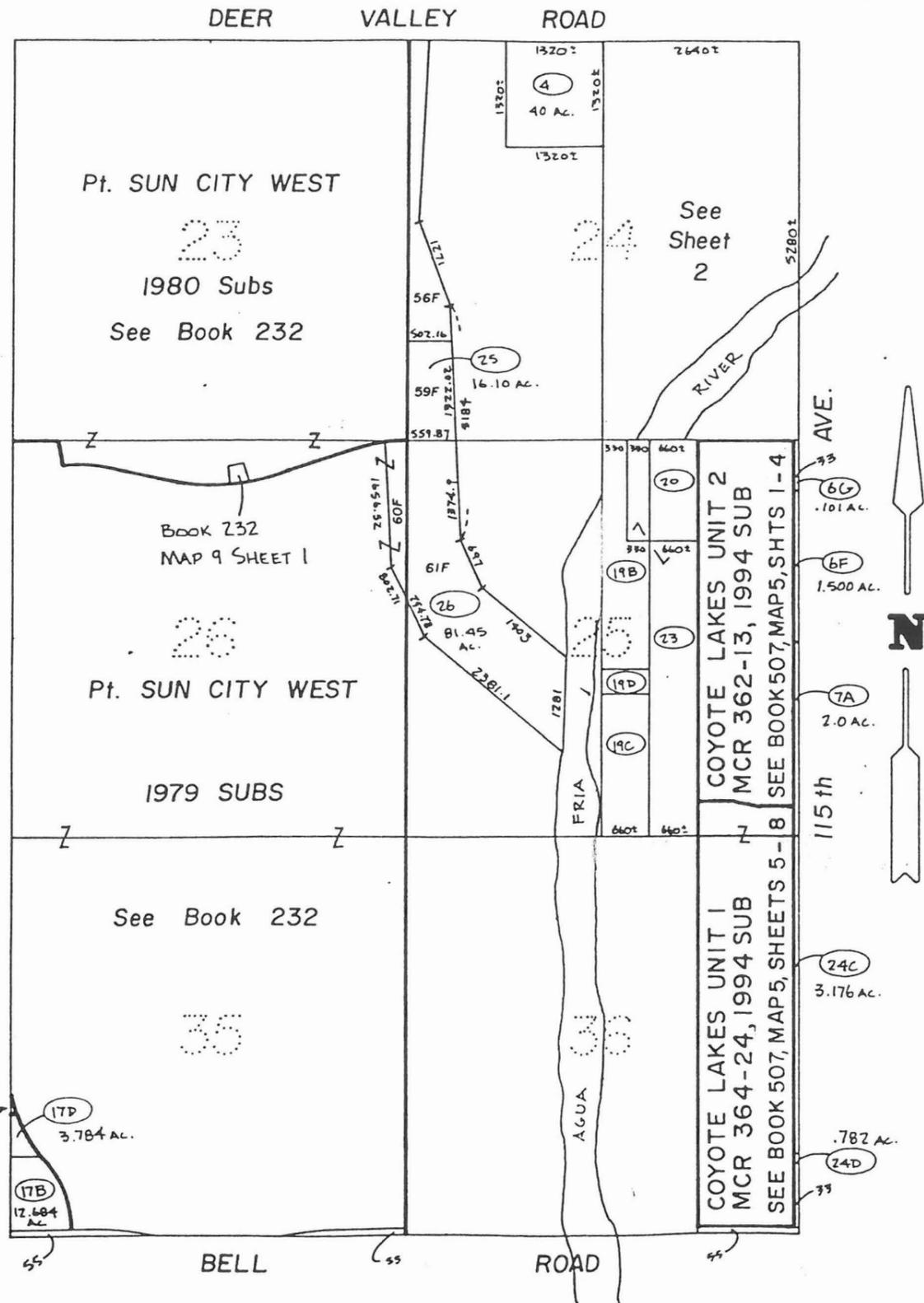


THIS CITY LIMIT SHEET IS TO BE USED AS A GUIDE ONLY! MARICOPA COUNTY WILL NOT BE RESPONSIBLE FOR ERRORS OR OMISSIONS THAT MIGHT OCCUR.

INCORPORATED AREA

| LAST EFF. DATE | REV BY |
|----------------|--------|
| APRIL 15, 1998 | C.L. |
| | |
| | |
| | |
| | |
| | |

Secs. 23-26, 35 & 36-T4N R1W



Pt. SUN CITY WEST UNIT 22
MCR 275-17, 1985 SUB
Bk. 232 Map 15 Shts. 4-9

| MARICOPA COUNTY ASSESSORS OFFICE | | | | | | |
|----------------------------------|---------------------------|----------|-----------|-------|-------|---------|
| SCALE 1" = 2,000' | | | | | | |
| REVISIONS | | | | | | |
| Date | Was | Is | By | Check | Drawn | Checked |
| 7/19/10 | -0- | 25, 26 | 89-475019 | JWC | N.D. | 2072 |
| 11/5/12 | MAP REDRAWN | | | RHP | | |
| 11/5/12 | 50, 65, 6F, 6G, 6E, 7, 7A | | | MCR | RHP | |
| | 24A, B | 24C, 24D | | | | |
| 8/30/13 | SHEET NUMBER CHANGE | | | R.C. | | 3123 |
| 11/6/13 | SHEET NUMBER CHANGE | | | R.C. | | 3123 |
| 11/8/13 | 93SUB | 94SUB | | MCR | R.C. | 3123 |

Traffic Information and Analysis:

Current and historical counts were provided by Maricopa County, and are tabulated below. These are two-way, 24 hour counts. Traffic Research and Analysis, Incorporated (TRA) took the 1998 counts in September.

Existing Counts

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>1998</i> | <i>1997</i> | <i>1995</i> | <i>1994</i> |
|-------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| El Mirage Road | North Leg | Beardsley Road | 3110 | 3787 | 3196 | 3692 |
| El Mirage Road | South Leg | Beardsley Road | 7765 | | | |
| Beardsley Road | West Leg | El Mirage Road | 5074 | 5239 | | |
| Deer Valley Drive | West Leg | El Mirage Road | | | 3200 | |

TRA also conducted turning movement counts at the intersections of El Mirage Road with Beardsley Road. These counts were also taken in September, and were used to determine the intersection level of service, and project future turning movements. The morning and evening peak hour counts along with the future turning movement projections are shown in the Appendix with the level of service calculations.

Future traffic projections were made with the Maricopa Association of Governments (MAG) transportation planning model. Model volume plots were provided by MCDOT. Volumes on the proposed segment of El Mirage Road between Deer Valley Drive and Loop 303 were interpolated from the 2020 model volumes and the existing volumes on the section of El Mirage Road south of Deer Valley Drive. If any of the new developments planned in the area are finalized, they should be incorporated in the regional traffic model, and the volumes re-run. Additional traffic from the north could make a large impact on the El Mirage volumes. These traffic projections represent 2-way ADT's and are shown in the following table.

Future Volumes

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> |
|-------------------|-----------------|-------------------|-------------|-------------|-------------|
| El Mirage Road | South Leg | Beardsley Road | 22564 | 12392 | 10561 |
| El Mirage Road | North Leg | Beardsley Road | 22352 | 4702 | 3110 |
| El Mirage Road | North Leg | Deer Valley Drive | 16133 | 10213 | 4886 |
| El Mirage Road | North Leg | Loop 303 | 4303 | 3761 | 3273 |
| Beardsley Road | West Leg | El Mirage Road | 13256 | 9489 | 9620 |
| Deer Valley Drive | West Leg | El Mirage Road | 9032 | 3793 | 3200 |
| Loop 303 | West Leg | El Mirage Road | 23368 | 13529 | 5022 |
| Loop 303 | East Leg | El Mirage Road | 35654 | 13137 | 5022 |

Vehicle classification counts were obtained from 'Traffic On Arizona Highways, 1992'. A count on US 60 south of the project was the closest count to the study area. The data and average are shown below. SU stands for single unit, TT stands for tractor-trailer.

Vehicle Classification (In Percent)

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>Motorcycles</i> | <i>Cars</i> | <i>RVs</i> | <i>Buses</i> | <i>SU Trucks</i> | <i>TT Trucks</i> |
|-----------|-----------------|-----------|--------------------|-------------|------------|--------------|------------------|------------------|
| US60 | ATR 24 | | 0.34 | 94.05 | 0.00 | 0.07 | 4.18 | 1.36 |

The Level Of Service (LOS) was determined using Highway Capacity Software (HCS), version 2.1g. The procedure for 2-lane rural highways was used for the existing segment between Beardsley Road and Deer Valley Drive. The multi-lane highway procedure was used for the proposed extension of El Mirage Road north to Loop 303 and the proposed improved sections. The peak hour volume for the existing segment was provided by MCDOT from their annual counts. The AM and PM peak hours were compared, and the higher peak hour volume used. K factors were between 9 and 10 percent, with an average of 9.44%. The K factor is the ratio of the peak hour traffic to the ADT. This average K factor was used to derive peak hours for the future extension of El Mirage Road north of Deer Valley Drive. The average directional split was 60/40 as measured in the counts.

LOS is a measure of the quality of operation of the road as perceived by motorists. LOS A is the best, and LOS F is the worst. LOS E represents the roadway operating at its maximum capacity (volume to capacity ratio of 1), although most drivers would regard the quality of service unacceptable at this level. At LOS F, the road is over capacity, with flow breaking down into stop and go traffic, and considerable delay experienced by motorists. LOS C is used as a target for the ultimate roadway conditions. The output from HCS is in Appendix C, and the results shown in the following table:

Level of Service: No Build Alternative

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> | <i>1998</i> |
|------------------------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| El Mirage Road | North Leg | Beardsley Road | F | B | B | B |
| Volume/Capacity Ratio (V/C) | | | 1.04 | 0.22 | 0.15 | 0.15 |

The LOS becomes unacceptable in 2020. Alternatives were examined to assess their impact on the future LOS. The first alternative was to widen the road to a 4-lane urban minor arterial. The multilane highway module of HCS was used to evaluate the alternative. The LOS anticipated with this improvement is as follows:

Level of Service: 4-Lane Alternative

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> |
|----------------|-----------------|-------------------|-------------|-------------|-------------|
| El Mirage Road | North Leg | Beardsley Road | B | A | A |
| El Mirage Road | North Leg | Deer Valley Drive | A | A | A |

LOS with the 4-lane alternative becomes acceptable. A 6-lane alternative was also examined. This alternative would widen the road to 3 lanes in each direction, and add a raised median (Urban Principal Arterial). Below are the calculated LOS's for the 6-lane alternative:

Level of Service: 6-Lane Alternative

| <i>On</i> | <i>Location</i> | <i>At</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> | <i>1996</i> |
|----------------|-----------------|-------------------|-------------|-------------|-------------|-------------|
| El Mirage Road | North Leg | Beardsley Road | A | A | A | A |
| El Mirage Road | North Leg | Deer Valley Drive | A | A | A | A |

The year signalization will be required was evaluated using the unsignalized intersection module of HCS.

Intersection Level of Service: No Build Alternative

| <i>Intersection</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> | <i>1998</i> |
|---------------------------------------|-------------|-------------|-------------|-------------|
| El Mirage Road/Beardsley Road (AM/PM) | F/F | C/C | B/C | A/A |
| Volume/Capacity Ratio (V/C) | > 1/> 1 | 0.53/0.58 | 0.46/0.52 | 0.31/0.35 |

The intersection reaches capacity in 2001. The intersection was then evaluated with El Mirage Road improved to a 4-lane minor arterial. Left turn bays were assumed to be provided on both El Mirage Road and Beardsley Road. The assumed lane configurations are shown in Appendix C.

Intersection Level of Service: 4-Lane Alternative

| <i>Intersection</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> | <i>1998</i> |
|---------------------------------------|-------------|-------------|-------------|-------------|
| El Mirage Road/Beardsley Road (AM/PM) | F/F | B/B | A/B | A/A |
| Volume/Capacity Ratio (V/C) | > 1/> 1 | 0.40/0.43 | 0.35/0.38 | 0.24/0.26 |

The 6-lane alternative was not evaluated since an extra through lane would not make any difference to the critical movements (Left Turns). The intersection will require signalization by the year 2020. The volumes go up substantially in the model in 2020. The intersection was then evaluated with the HCS signalized intersection module, using the planning method. The results are shown below. Since the planning method does not calculate a LOS, it was reported as either under, near, or over capacity. The target here is under capacity.

Signalized Intersection Capacity Analysis: No Build Alternative

| <i>Intersection</i> | <i>2020</i> | <i>2010</i> | <i>2001</i> |
|---------------------------------------|-------------|--------------|-------------|
| El Mirage Road/Beardsley Road (AM/PM) | Near/Under | Under/ Under | Under/Under |
| Volume/Capacity Ratio (V/C) | 0.86/0.81 | 0.54/0.44 | 0.35/0.41 |

Since the intersection is near capacity in 2020, it was re-evaluated with the 4-lane El Mirage Road:

Signalized Intersection Capacity Analysis: 4-Lane Alternative

| <i>Intersection</i> | <i>2020</i> |
|---------------------------------------|-------------|
| El Mirage Road/Beardsley Road (AM/PM) | Under/Under |
| Volume/Capacity Ratio (V/C) | 0.58/0.67 |

The intersection performs adequately with the 4-lane section.

The intersection of El Mirage Road and Deer Valley Drive was also evaluated. However, here there were no existing turning movements on which to estimate future turns when El Mirage Road is extended north. Based on the MCDOT ADT signalization warrant (10,000 ADT on the major street, and 3,000 ADT on the minor street), this intersection will require signalization in the year 2010. Lane configuration was estimated by comparing 15% of the directional peak hour traffic to the maximum of approximately 250 vehicles per hour that a single turn lane can accommodate. Using this criterion, single left and right turn lanes were provided on all approaches, with dual right turn lanes for eastbound Deer Valley Drive (when signalized).

At El Mirage Road and Loop 303, the signalization warrant is also met in 2010. Lane configuration should be separate left and right turn lanes for all approaches, and dual left turn lanes for east and westbound Loop 303 (dual left turn lanes require signalization).

Accident Information and Analysis:

Accident data was obtained from Maricopa County from January 1995 through December 1997 (3 years total). The accidents are summarized by type of accident.

Accidents on El Mirage Road: Beardsley Road to Deer Valley Drive

| <i>Incident</i> | <i>Accidents</i> | <i>Severity</i> | <i>Accidents</i> | <i>Light</i> | <i>Accidents</i> |
|-----------------|------------------|----------------------|------------------|--------------|------------------|
| Right Angle | 0 | No Injury | 2 | Daylight | 0 |
| Left Turning | 0 | Injury - Unknown | 0 | Darkness | 2 |
| Rear End | 0 | Possible Injury | 0 | Dawn | 0 |
| Side Swipe | 2 | Non - Incapacitating | 0 | Dusk | 0 |
| Single Vehicle | 0 | Incapacitating | 0 | | |
| Other | 0 | Fatal | 0 | | |
| Total | 2 | Total | 2 | Total | 2 |

This comes out to an average of 1 accident per year. Only 1 of the 2 accidents was intersection related. This is not an excessive number of accidents, and there were no patterns of accidents that suggested a design deficiency. The complete accident records are in the Appendix.

Conclusions and Recommendations:

Alternative A, 4-lane configuration is recommended between Beardsley Road and Deer Valley Drive. Alignment Alternative 2 4-lane section is recommended from Deer Valley Drive to Proposed Loop 303. Widening El Mirage Road to 4-lanes will give it an acceptable level of service into the year 2020 and beyond. El Mirage Road and Deer Valley Drive will require signalization along with the proposed improvements. Separate left and right turn lanes should be provided on eastbound Deer Valley Drive. Signalization will be also be necessary at the El

Mirage Road/Loop 303 intersection. Signalization should be implemented with dual left turns on Loop 303 and protected left turn phasing. Single lefts should be adequate for the El Mirage Road approaches through the next 20 years. Separate right turn lanes should be provided on all approaches.

Construction Traffic Management Evaluation and Recommendation:

Currently, no commercial, industrial or residential properties are accessed from El Mirage Road between Beardsley Road and Loop 303. The McMicken Dam Outlet Wash to the east and a fully developed Sun City West to the west preclude access to El Mirage Road between Beardsley Road and Deer Valley Drive. Land along the McMicken Dam Outlet Wash was purchased to prevent development within the floodway. The Bodine Property, north of Deer Valley Drive and west of the wash may develop in the future. This development will request access to El Mirage Road from the west between Proposed Loop 303 and Deer Valley Drive. A second development, Lakeview, will require access to El Mirage Road north of the proposed Loop 303.

The recommended 4-lane roadway between Beardsley Road and Deer Valley Drive is constructed by maintaining traffic on the roadway while the new northbound lanes are constructed. The roadway will be widened by placing fill east of the existing roadway in the McMicken Dam Outlet Wash. The wash will be widened by excavating the east bank to maintain the hydraulic capacity of the wash. It is recommended that sufficient roadway embankment be constructed to accommodate the ultimate 6-lane configuration as part of the initial widening. The improvements at the Deer Valley Drive - El Mirage Road intersection will be built with traffic maintained in reduced lane widths or with a reduction in the number of available lanes. El Mirage Road does not exist between Deer Valley Drive and Loop 303, therefore, no traffic management will be required to construct this section.

DESIGN CRITERIA

| | |
|---------------------------------|--------------------------|
| Functional classification | Urban Principal Arterial |
| Level of service | C |
| Design year | 2010 and 2020 |
| Design vehicle | WB-50 |
| Design speed | 100 km/h (60mph) |
| Posted speed | 70km/h (45mph) |
| Maximum super-elevation | 0.06m/m |
| Minimum radii | 410m (1350 feet) |
| Lane widths | 3.6m (12 feet) |
| Shoulder width | N/A |
| Median | 4.2m (14 feet) |
| Roadway cross-slope | 0.02m/m |
| Shoulder cross-slope | N/A |
| Embankment cut/fill slopes | 1:4 max |
| Clear zone | 9.1m (30 feet) |
| Minimum stopping sight distance | 160m (525 feet) |
| Minimum passing sight distance | 640m (2,100 feet) |
| Sidewalks | 1.4m (5 feet) |
| Maximum longitudinal grade | 5.00% |

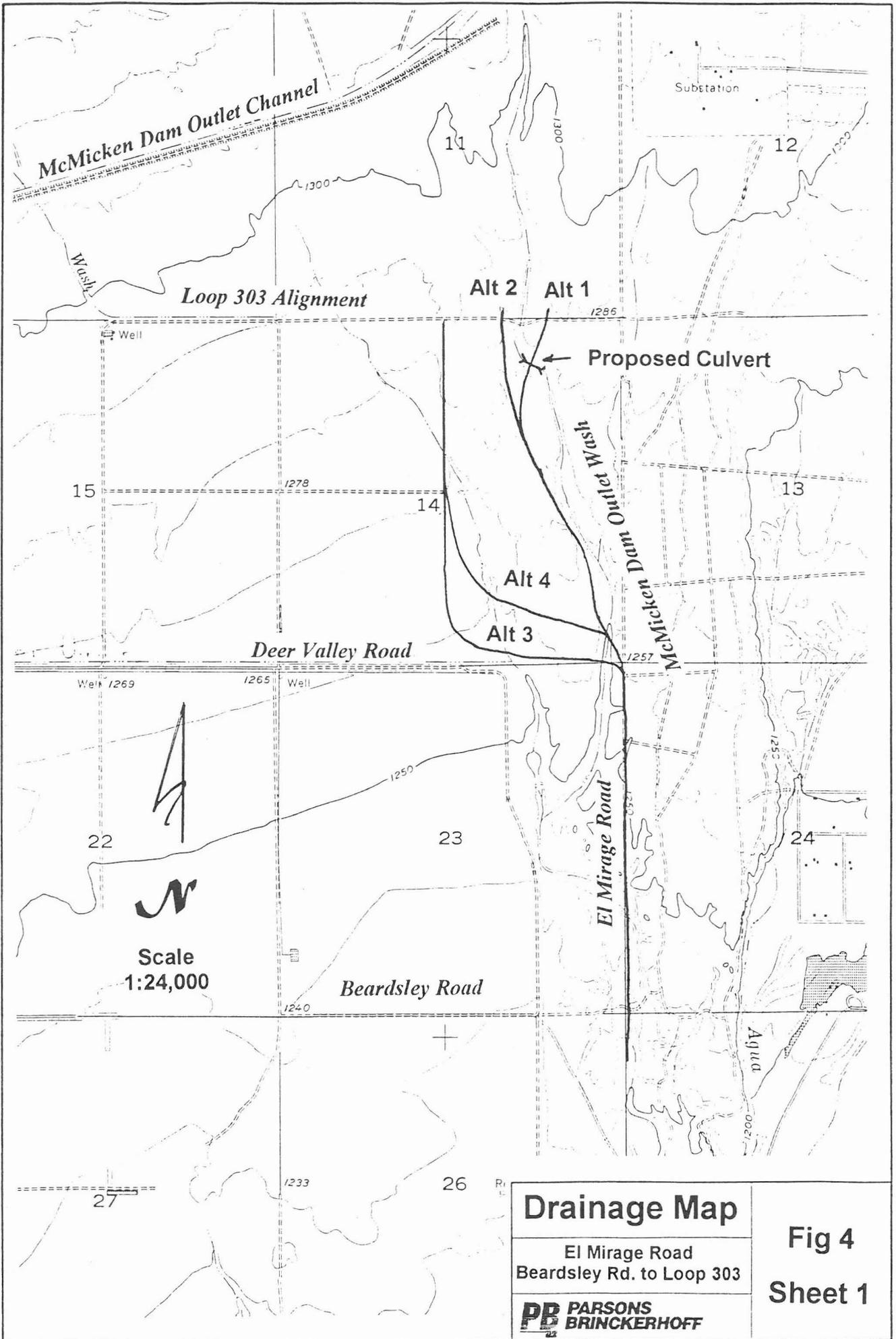
| | |
|---------------------------------------|---|
| Minimum longitudinal grade | 0.25% |
| Minimum K-factors for vertical curves | dependent on vertical geometry |
| Curb and gutter types | MCDOT 2030, MAG 220 type A |
| Curb return radii | 10.5m (35 feet) |
| Tapers | $L=WS$, where W=offset, S=design speed, L=Taper length |
| Traffic Signals | required |
| Pavement markings | required |
| Signing plans | required |
| Guardrails | N/A |
| Vertical clearance | N/A |
| Pavement design life | dependent on geotech report |
| Drainage criteria | 100, 50, and 10-year peak flows Use 50-year storm for sizing culverts and bridges Use 10-year storm for sizing storm drain improvements and road side channels |

DRAINAGE INFORMATION

Existing Conditions

Existing El Mirage Road is constructed along the west side of the McMicken Dam Outlet Wash from Beardsley Road to Deer Valley Drive. Figure 4, Sheet 1 shows the topography of the area before the construction of Sun City West. The principal discharge to the wash comes from the McMicken Dam Outlet Channel, approximately 3 kilometers (1.8 miles) north of Deer Valley Drive. The Outlet Channel drains the McMicken Dam. The dam is a flood control structure designed to divert the Standard Project Flood (SPF). The peak flow for the SPF is approximately 396 cms (14,000 cfs) while the 100-year peak flow is 177 cms (6,270 cfs). The dam is capable of diverting the SPF, so provisions have to be made to accommodate the flow. Structures do not have to be designed to pass the SPF, but the effect of the structure during the SPF must be evaluated. Currently, the Flood Control District of Maricopa County owns the land inundated by the SPF between the Outlet Channel to the north and the Agua Fria River. The land was purchased to prevent development within the floodplain.

The McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410m (1,350 feet) south of Beardsley Road, where the wash makes a ninety-degree turn to the east, toward the Agua Fria River. Existing concrete hardbank helps keep the ninety-degree bend from washing out. A portion of the hardbank is adjacent to the roadway. The wash has been delineated and recorded as a FEMA floodplain. The section of wash adjacent to existing El Mirage Road is delineated as a Flood Hazard Area AE (base flood elevations determined) on Flood Insurance Rate Map (FIRM) No. 04013C1165 G, Maricopa County, Arizona and Incorporated Areas, September 30, 1995. Figure 4, Sheet 2 shows the relevant portion of the FIRM. Existing El Mirage Road is above the floodplain delineated on the FIRM. Benchmark references in the FIRM appear to match as-built plan elevations for El Mirage Road. An exact bench mark tie-in is not available at this time, but the plans appear to be within 0.3m (1 foot) of the map references.

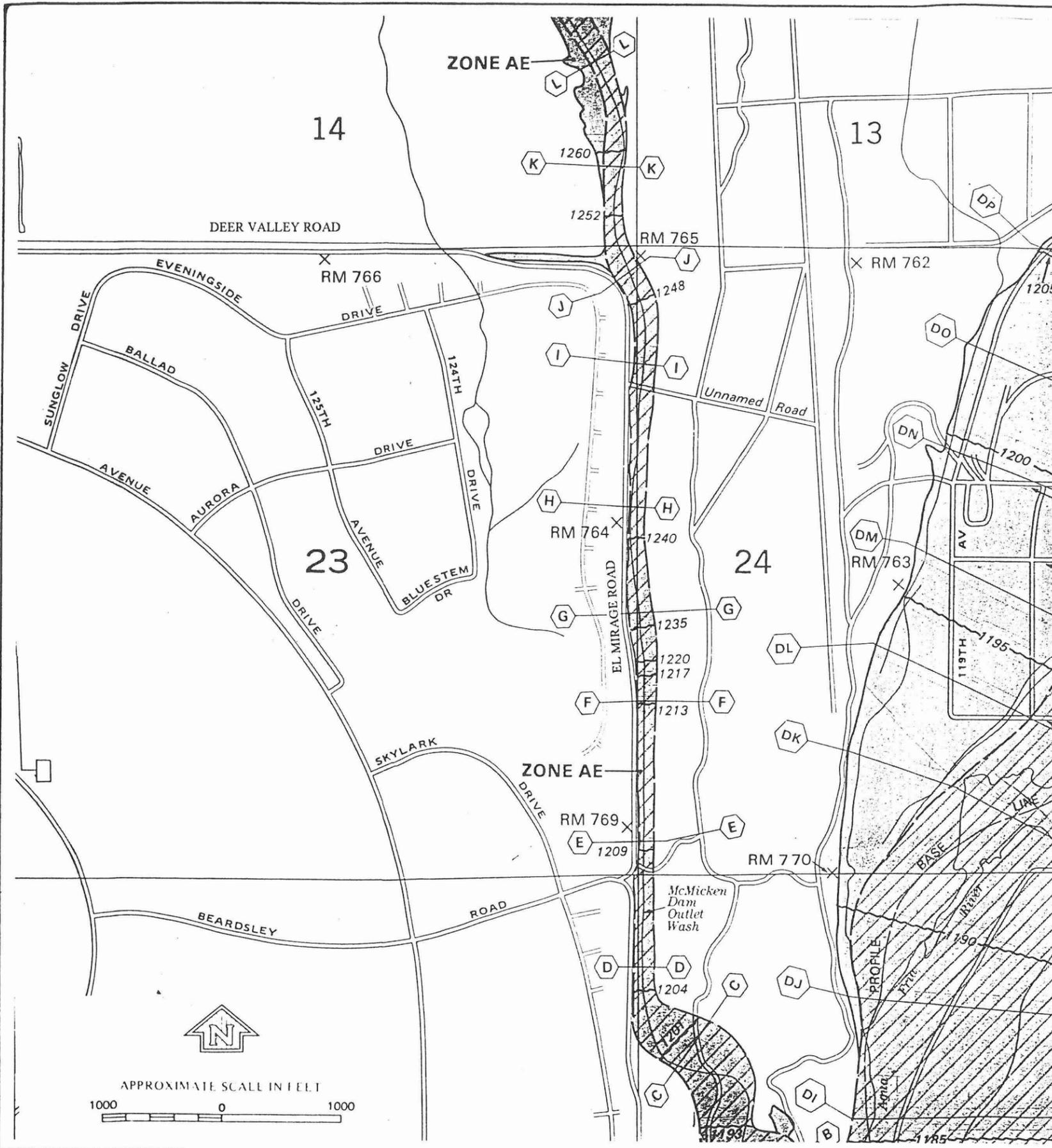


Drainage Map

El Mirage Road
Beardsley Rd. to Loop 303



Fig 4
Sheet 1



LEGEND

- SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.
- FLOODWAY AREAS IN ZONE AE
- OTHER FLOOD AREAS
- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
- OTHER AREAS
- ZONE X** Areas determined to be outside 500-year flood plain.
- ZONE D** Areas in which flood hazards are undetermined.
- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line; Elevation in Feet*
- Cross Section Line
- Base Flood Elevation In Feet Where Uniform Within Zone*
- Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline. Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1165 OF 4350

CONTAINS

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---------------------------------------|--------|-------|--------|
| EL MIRAGE, TOWN OF | 040041 | 1165 | G |
| MARICOPA COUNTY, UNINCORPORATED AREAS | 040037 | 1165 | G |
| SURPRISE, TOWN OF | 040053 | 1165 | G |

MAP NUMBER
04013C1165 G

MAP REVISED:
SEPTEMBER 30, 1995



Federal Emergency Management Agency

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:

SEPTEMBER 29, 1989

SEPTEMBER 4, 1991

Map revised SEPTEMBER 30, 1995 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add and update roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision, and to incorporate previously issued letters of map amendment.

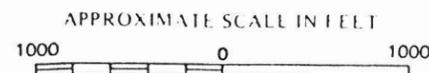
Drainage Map

El Mirage Road
Beardsley Rd. to Loop 303



Fig 4

Sheet 2



The McMicken Dam Outlet Wash is also a delineated floodplain between Deer Valley Drive and the Outlet Channel. North of Deer Valley Drive, the wash crosses undeveloped land owned by the Flood Control District of Maricopa County. The wash is unimproved north of Deer Valley Drive. The floodplain is delineated on FIRM No. 04013C1155 F, Maricopa County, Arizona and Incorporated Areas, December 3, 1993. The relevant portion of the map is shown on Figure 4, Sheet 3.

The existing pavement on El Mirage Road between Beardsley Road and Deer Valley Drive has a one-way crown sloping east. The crown slopes east in all locations, creating an adverse superelevation in some horizontal curves. The one-way crown drains roadway runoff to the wash.

Hydrology

Off-site hydrology is of primary concern on this project. The Flood Control District has made hydrologic and hydraulic models from the floodplain delineation study available for use in the preparation of this report. The models were created during the preparation of the Wittman Area Drainage Master Study.

Hydrology for roadway drainage was determined using the Rational Method as described in the *Drainage Design Manual for Maricopa County, Arizona, Vol. 1, Hydrology* by the Flood Control District of Maricopa County. Roadway drainage design is based on the 10-year storm. Storm drains and roadside ditches are sized to convey the peak runoff produced by the 10-year storm. Storm drainage systems are provided to maintain a 3.7m (12-foot) dry lane of pavement during peak flow from the design storm. The 10-year storm is the only return period applicable to the roadway drainage design of the project. Flows for the 50-year and 100-year storm were not calculated.

The following runoff coefficients were used:

| Runoff Coefficients | |
|----------------------------|----------|
| <i>Surface</i> | <i>C</i> |
| Pavement | 0.95 |
| West Shoulder | 0.70 |
| East Shoulder | 0.70 |
| Median | 0.70 |

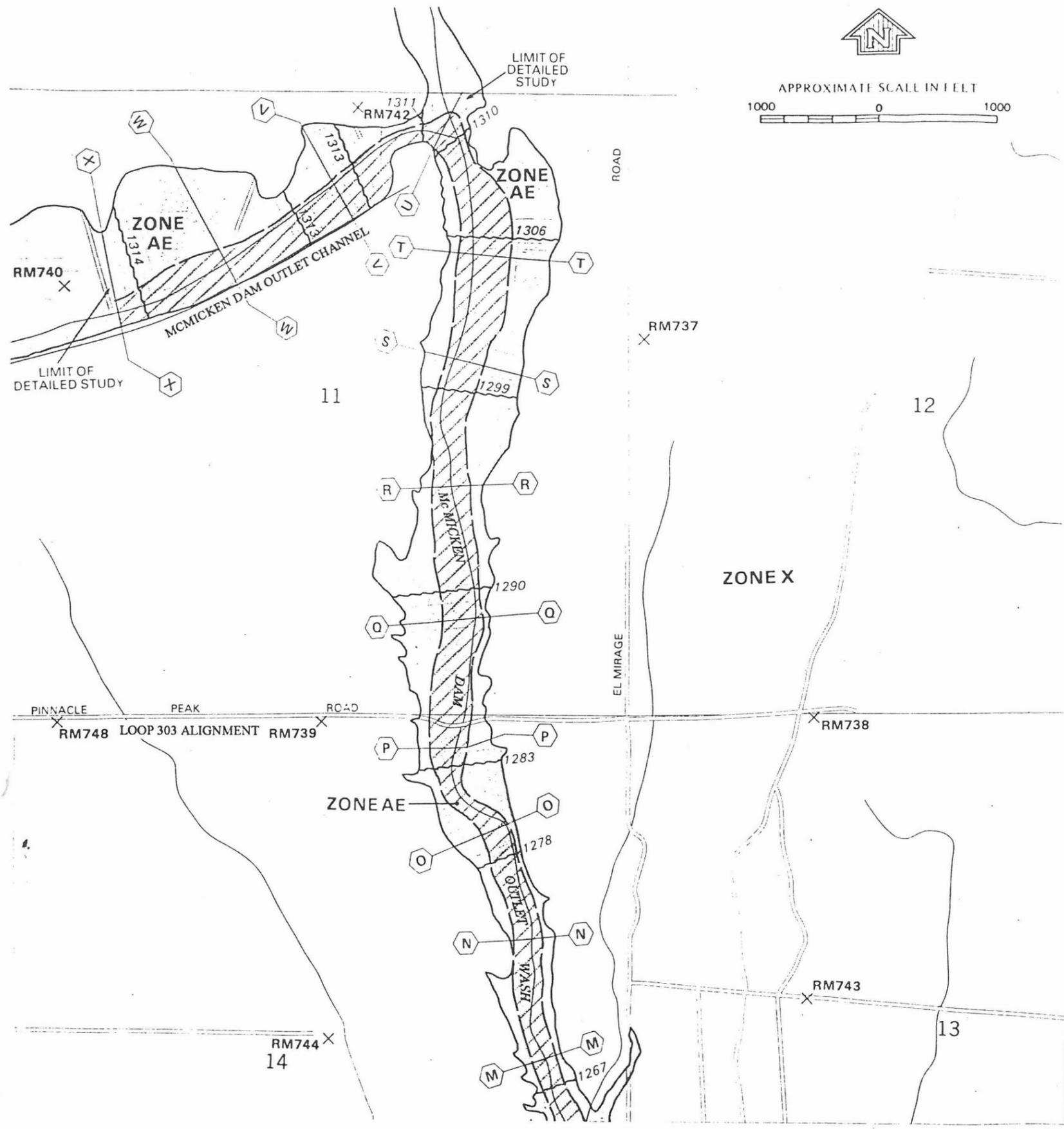
Times of concentration are based on Equation 3.2:

$$T_c = 11.4L^{0.5} K b^{0.52} S^{-0.31} i^{-0.38}$$

Intensities were read from Figure 3.2 of the *Drainage Design Manual*.

On-Site Drainage Design: Beardsley Road to Deer Valley Drive

Drainage of the roadway between Beardsley Road and Deer Valley Drive is comparatively simple. In all proposed alternatives, the roadway drainage will be directed to the McMicken Dam Outlet Wash via storm drains or directly via sheet flow off the roadway. Flows are



LEGEND

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 - ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.
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- OTHER AREAS
 - ZONE X Areas determined to be outside 500-year flood plain.
 - ZONE D Areas in which flood hazards are undetermined.
- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line; Elevation in Feet*
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone*
- Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1155 OF 4350
 CONTAINS
 COMMUNITY NUMBER PANEL SUFFIX
 MARICOPA COUNTY . . . 040037 . . . 1155 . . . F
 UNINCORPORATED AREAS . . . 040037 . . . 1155 . . . F

MAP NUMBER
 04013C1155F

MAP REVISED:
 DECEMBER 3, 1993



Federal Emergency Management Agency

EFFECTIVE DATE OF
 COUNTYWIDE FLOOD INSURANCE RATE MAP:
 APRIL 15, 1988

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:
 Map revised September 4, 1991 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to update map format, to add roads and road names and to incorporate previously issued letter of map revision.

Map revised DECEMBER 3, 1993 to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to update map format, to add roads and road names, to reflect updated topographic information, and to incorporate previously issued letters of map revision.

| | |
|---|----------------|
| Drainage Map | Fig 4 |
| El Mirage Road Beardsley Rd. to Loop 303 | Sheet 3 |
| PB PARSONS BRINCKERHOFF | |

primarily collected at low points or in the reverse curves of superelevations. Inlets are not required to remove flows that cause excessive pavement encroachment. This narrative is limited to the conditions in Alternative A. See the discussion of Alternatives section of this report for drainage features related to other alternatives.

The recommended alternative is Alternative A, 4-lane configuration. This narrative is limited to the conditions in Alternative A. See the Discussion of Alternatives section of this report for drainage features related to other alternatives. The existing pavement is to remain in place to the greatest extent possible. Four outside lanes are to be constructed with an earthen median in the center. The median will be graded as a ditch (see typical sections). Future widening to a 6-lane configuration will be accomplished by adding lanes and a raised median to the inside.

The existing pavement in the curves between Stations 4+700 and 5+190 will be removed. The pavement in this section drains to the wash, creating an adverse superelevation. The superelevation will be corrected. This causes a portion of the roadway to drain west, creating a pond at the west gutter. Storm drains with catch basins will be provided as shown on the design alternate sheets in the Appendix.

There is an existing sag curve at approximately Station 4+789. The sag will remain in place. Inlets and a discharge pipe will be used to drain the sag.

The infield created at the intersection of Deer Valley Drive and El Mirage Road will require an area drain which discharges to the wash.

On-Site Drainage Design: Deer Valley Drive to Loop 303

The recommended alternative north of Deer Valley Drive is Alternative 2. The alignment will follow the west side of the Outlet Wash. The recommended 4-lane configuration has a raised median without curb and gutter at the outside edges of pavement. The proposed alignment is along a low, flat ridge. The roadway slopes gently to the south from the proposed Loop 303 interchange to Deer Valley Drive. Runoff that drains off the west edge of pavement would be collected in a roadside ditch and conveyed south to discharge to the Deer Valley Channel. The ditch required to convey the expected runoff will be less than 0.3m (1 foot) deep and 4.3m (14 feet) wide. The flows will be accommodated in a minimal roadside drainage swale or ditch. Runoff that drains off the east edge of pavement would be allowed to drain directly to the Outlet Wash. Runoff conveyed against the median curbs is collected and discharged to the Outlet Wash with catch basins and short discharge pipes before a superelevation transition shifts the concentrated runoff to the opposite side of the road.

McMicken Dam Outlet Wash- Beardsley Road to Deer Valley Drive:

Construction of El Mirage Road requires encroachment of the wash to construct the roadway prism. The existing hydraulic model of the wash was used to determine the effect of the encroachment. The existing HEC-2 model was imported into HES-RAS for modification.

The existing model was run in HEC-RAS and HEC-2 to determine if there were significant differences in calculated velocities or water surface elevations. Comparison of the output showed the two software packages produce virtually the same results. Slight discrepancies were

noted at River Station 0.579, near the ninety-degree bend south of Beardsley Road. Output sheets are shown in the Appendix.

A fifth profile was added to the existing model to represent the flow during the SPF. Cross sections were generated showing the water surface elevation during the SPF. Flows from the SPF were shown to be conveyed within the existing channel from Deer Valley Drive to the ninety-degree bend below Beardsley Road. Cross section maps and plotted cross sections are included in the Appendix.

Approximate toe of fill lines were determined for the prism of El Mirage Road. The cross sections of the existing wash were then modified to reflect the encroachment due to the construction of El Mirage Road. Approximate fill and excavation limits are hand drawn on the cross sections. The modified model reflected velocity increases of approximately 0.6 mps (2 fps). Output tables are also included in the Appendix to show flow velocities before and after the encroachment. The Flood Control District has indicated that bank armoring will be required if velocities are increased. It is recommended that the channel be widened to the east to match the embankment constructed in the west side of the channel. Excavating the east bank has the double benefit of maintaining the hydraulic capacity of the channel and providing a convenient borrow source for the construction of the roadway embankment.

McMicken Dam Outlet Wash- Intersection of Deer Valley Drive:

As shown on the design alternative sheets, the intersection of Deer Valley Drive is expected to encroach considerably on the wash in the recommended alternative. Current alignment of the wash would threaten the roadway at the intersection. **It is recommended that the wash be widened and realigned north of Deer Valley Drive.** Cross sections of the existing and proposed conditions with the SPF water surface elevations are included in the Appendix.

Deer Valley Drive Channel

An existing channel parallels the north side of Deer Valley Drive. The channel was constructed to divert runoff from the north and northwest to the McMicken Dam Outlet Wash. Extending El Mirage Road north of Deer Valley Drive requires crossing the channel. The configuration of the intersection in the recommended alternative requires realignment of the channel as shown on the design alternate sheets. The bottom of the channel requires widening to reduce flow velocities and to accommodate the width of the proposed box culvert. **A 4 barrel, 2700 mm by 2400 mm (8 feet by 6 feet) is recommended.** It is recommended that the box culvert be constructed sufficiently long to accommodate a future widening to a 6-lane configuration. **The culvert will pass the 50-year peak without overtopping the roadway. The peak flow of 35 cms (1239 cfs) was taken from the hydrology model.** Channel hydraulic calculations and an HY8 analysis are included in the Appendix.

LAND USE

The land occupied by the project site is in an unincorporated portion of Maricopa County. Between Beardsley Road and Deer Valley Drive, the land west of the project is 100% developed with residential dwellings (Sun City West). The land adjacent to the project to the east between Beardsley Road and Deer Valley Drive is the McMicken Dam Outlet Wash. There is no access to El Mirage Road currently available within the project limits. No development currently exists

between Deer Valley Drive and Loop 300. Much of the land along the McMicken Dam Outlet Wash has been purchased by the Flood Control District of Maricopa County to prevent development in the floodplain. It is anticipated the Bodine property north of Deer Valley Drive and 0.8 kilometers (0.5 miles) west of El Mirage Road will be developed into approximately 2,300 residential units. The parcel located at the northwest corner of El Mirage Road and Deer Valley Drive is State Land.

The right-of-way table on the next page shows the parcel numbers and anticipated right-of-way needed for the properties impacted by the various alignments.

It is recommended that the McMicken Dam Outlet Wash be widened to south of Deer Valley Drive to maintain the hydraulic capacity of the existing channel.

RIGHT-OF-WAY

This existing right-of-way width is 15.2m (50 feet) between Beardsley Road and Deer Valley Drive. No roadway right-of-way currently exists between Deer Valley Drive and Loop 303

The proposed right-of-way is 39.6m (130 feet).

No Temporary Construction Easements (TCE) are anticipated.

ENVIRONMENTAL INFORMATION

The following environmental overview was provided by MCDOT:

- ◆ El Mirage Road extends for three miles north of Bell Road as a two-lane, paved roadway, and then turns west and becomes Deer Valley Drive. El Mirage Road does not exist between Deer Valley Drive and the proposed Loop 303 roadway. Land use in this unincorporated part of Maricopa County is the residential Del Web retirement community of Sun City West west of El Mirage Road north of Bell Road to Deer Valley Drive. Open desert scrub land is east of El Mirage Road and north of the El Mirage and Deer Valley Drive Intersection up to the end of the project area.
- ◆ In the vicinity of the El Mirage and Deer Valley Drive Intersection drainage from the northwest and northeast tie into the McMicken Drainage Channel, which eventually conveys drainage to the Agua Fria River to the southeast. The washes and McMicken Channel exhibit areas of dense riparian vegetation. The habitat created along these drainage areas provides for a large variety of plant and animal wildlife. While no known threatened and endangered species are identified as likely to occur in the area, a biological evaluation of this two-mile segment should be anticipated as part of the environmental clearance. This would include a desert tortoise survey for the project area.

No wetlands are in the proposed project area. Random desert dumping of domestic and commercial building waste is present, but no hazardous waste sites or landfills are located in

El Mirage Road- Beardsley Road to Loop 303
 Beardsley Road to Deer Valley Drive

Right-of-way Areas (SM)

| Owner | Parcel Number | Alternative A | Alternative B | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Total |
|-----------------------|-------------------------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|
| FCDMC 52 F-2 | 503-53-45 | | | 10,106 | 10,024 | | | 20,131 |
| FCDMC 53F | 503-53-34A | | | 15,269 | 14,712 | | | 29,981 |
| FCDMC 53F | 503-53-34D | | | 16,145 | 16,501 | | | 32,646 |
| FCDMC 55F | 503-53-47 | | | 35,166 | 35,168 | 4,344 | 9,763 | 84,441 |
| FCDMC | Sun City West Drainage Tracts | 30,293 | 30,293 | | | | | 60,586 |
| State Land | -- | | | | | 84,329 | 45,466 | 129,795 |
| Bodine | 503-53-32 | | | | | 16,910 | 16,910 | 33,820 |
| Bodine | 503-53-33 | | | | | 19,953 | 8,064 | 28,017 |
| Repubic National Bank | 503-53-35A | | | | | 8,853 | 8,853 | 17,706 |
| SQ Partnership | 503-53-34E | | | | | 7,864 | 7,864 | 15,728 |
| Total | | 30,293 | 30,293 | 76,687 | 76,405 | 142,253 | 96,920 | 452,851 |

Right-of-way Areas (Ac)

| Owner | Parcel Number | Alternative A | Alternative B | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Total |
|-----------------------|-------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| FCDMC 52 F-2 | 503-53-45 | | | 2.50 | 2.48 | | | 4.97 |
| FCDMC 53F | 503-53-34A | | | 3.77 | 3.64 | | | 7.41 |
| FCDMC 53F | 503-53-34D | | | 3.99 | 4.08 | | | 8.07 |
| FCDMC 55F | 503-53-47 | | | 8.69 | 8.69 | 1.07 | 2.41 | 20.87 |
| FCDMC | Sun City West Drainage Tracts | 7.49 | 7.49 | | | | | 14.97 |
| State Land | -- | | | | | 20.84 | 11.23 | 32.07 |
| Bodine | 503-53-32 | | | | | 4.18 | 4.18 | 8.36 |
| Bodine | 503-53-33 | | | | | 4.93 | 1.99 | 6.92 |
| Repubic National Bank | 503-53-35A | | | | | 2.19 | 2.19 | 4.38 |
| SQ Partnership | 503-53-34E | | | | | 1.94 | 1.94 | 3.89 |
| Total | | 7.49 | 7.49 | 18.95 | 18.88 | 35.15 | 23.95 | 111.90 |

- ◆ the project area. There is a possibility of abandoned mines occurring adjacent to the roadway. The project is within Maricopa County's PM₁₀ non-attainment area.
- ◆ The potential for archaeological resources exists, therefore a cultural resources survey will include in the environmental clearance process. A Section 404 Water Quality Permit will be necessary for any dip, bridge or culvert crossing, channel realignment, bank stabilization, or other activities within drainageways considered to be "waters of the U.S."

The following is provided by Parsons Brinckerhoff:

- ◆ Extensive work is required in the McMicken Dam Outlet Wash. Between Deer Valley Drive and the proposed Loop 303, realignment of the wash is necessary to construct the recommended roadway improvements. An estimated 4.2 hectares (10.3 acres) will be disturbed. This land is currently undeveloped desert. It is anticipated that this area will be declared "waters of the U.S." by the U.S Corp of Engineers. Relatively high mitigation costs are expected in this reach.
- ◆ The McMicken Dam Outlet Wash must also be realigned south of Deer Valley Drive. This reach has already been channelized. If the wash north of Deer Valley Drive is declared "waters of the U.S.", this reach may be given the same classification. The vegetation present is mostly scrub growth with little or no mature cacti or trees. It is expected that approximately 7.4 hectares (18.2) acres will be disturbed during construction of the recommended alternative. Mitigation costs are expected to be lower for this reach than they would be for the reach above Deer Valley Drive.
- ◆ The channel along Deer Valley Drive is a manmade channel constructed to convey runoff around Sun City West. It is not known if this channel will be declared "waters of the U.S.". The disturbance of this channel is relatively small at approximately 0.2 hectares (0.5 acres) in the recommended alternative.

GEOTECHNICAL ENGINEERING AND PAVEMENT DESIGN

The minimum pavement section for an urban principal arterial is 100mm (4 inches) AC over 250mm (10 inches) AB. No special geotechnical items were readily observable during the field visit and the county brought no items of interest to our attention.

DISCUSSION OF ALTERNATIVES

Typical Sections:

Please refer to the Appendix for the typical cross sections and design alternate plan sheets.

No Build Alternative:

The no-build alternative would retain the existing two-lane roadway with no capital improvements.

Beardsley Road to Deer Valley Drive - Alternative A, 4-Lane (Recommended Alternative):

Improve El Mirage Road between Beardsley Road and Deer Valley Drive to a modified 4-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two new 3.6m (12-foot) lanes plus a 1.5m (5-foot) outside shoulder and a 1.8m (6-foot) inside shoulder for northbound travel. The existing pavement is to remain in place and be used to extent possible for the southbound two 3.6m (12-foot) lanes, 1.5m (5-foot) inside shoulder and 1.8m (6-foot) outside shoulder, with a 6.8m (22-foot) uncurbed median. Curb and gutter will be installed at the edge of pavement adjacent to the McMicken Dam Outlet Wash. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). There are no proposed improvements to Beardsley Road. Deer Valley Drive will be realigned to provide a ninety-degree "T" intersection with El Mirage Road. The existing roadway has a one-way crown which slopes into the McMicken Dam Outlet Wash. A series of horizontal curves on the existing roadway north of Beardsley Road will require reconstruction to correct the reverse crown. An existing privacy wall borders the R/W immediately west of El Mirage Road. Although the wall is only about 3.6m (12 feet) from the edge of the existing roadway, it does not present a hazard. The wall is flush with no protruding pilasters or architectural treatments. No accidents have been recorded which involve the wall.

McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410m (1,350 feet) south of Beardsley Road. Widening of the roadway will be accomplished by building embankment in the wash. It is recommended that the embankment be constructed wide enough to accommodate a 6-lane ultimate section. The wash will require a corresponding widening along the east bank. It is recommended that the limits of the wash widening begin just north of Beardsley Road, near an existing drop structure. This is assuming that the El Mirage Road and the wash are widened in a similar fashion to the south of Beardsley Road. On-site drainage will be collected from the roadway and median and discharged to the wash.

Advantages include the low cost, utilization of the existing pavement, minimal drainage improvements, ease of future widening and minimal traffic maintenance during construction.

Disadvantages include the reverse crown for the southbound traffic, which is contrary to the driver's expectation.

Beardsley Road to Deer Valley Drive - Alternative A, 6-Lane:

Improve El Mirage Road between Beardsley Road and Deer Valley Drive to a modified 6-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two 3.6m (12-foot) lanes and one 4.3m (14-foot) lane for northbound travel plus a 1.5m (5-foot) outside shoulder. The existing pavement is to remain in place and be used to the extent possible for the southbound section which includes two new 3.6m (12-foot) lanes plus one 4.3m (14-foot) lane with a 1.8m (6-foot) outside shoulder. A raised median, 1.2m (4 feet) in width is included. Curb and gutter will be installed at the edge of pavement adjacent to the McMicken Dam Outlet Wash. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). There are no proposed improvements to Beardsley Road. Deer Valley Drive will be realigned to provide a

ninety-degree "T" intersection with El Mirage Road. The existing pavement will remain in place to the greatest extent possible. The existing roadway has a one-way crown which slopes into the McMicken Dam Outlet Wash. A series of horizontal curves on the existing roadway north of Beardsley Road will require reconstruction to correct the reverse crown. An existing privacy wall borders the R/W immediately west of El Mirage Road. Although the wall is only about 3.6m (12 feet) from the edge of the existing roadway, it does not present a hazard. The wall is flush with no protruding pilasters or architectural treatments. No accidents have been recorded which involve the wall.

A raised median is recommended versus a continuous left turn lane for several reasons, including added delineation for the driver, maintaining driver expectation with other local streets, and added safety of the roadway. Also, the limited access points along the project lend itself to raised median over a continuous left turn lane. The costs associated with the recommendation include single curb and median landscape or median caps for the raised median option versus the pavement for the continuous left turn lane option.

McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410m (1,350 feet) south of Beardsley Road. Widening of the roadway will be accomplished by building embankment in the wash. The wash will require a corresponding widening along the east bank. It is recommended that the limits of the wash widening begin just north of Beardsley Road, near an existing drop structure. This is assuming that the El Mirage Road and the wash are widened in a similar fashion to the south of Beardsley Road. On-site drainage will be collected from the roadway and discharged to the wash.

Advantages include the utilization of the existing pavement, the minimal drainage improvements required and minimal traffic maintenance during construction.

Disadvantages include the reverse crown for the southbound traffic, which is contrary to the driver's expectation.

There are no known design exceptions at this time.

Beardsley Road to Deer Valley Drive - Alternative B, 4-Lane:

Improve El Mirage Road between Beardsley Road and Deer Valley Drive to a modified 4-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two 3.6m (12-foot) lanes plus a 1.8m (6-foot) outside shoulder and a 1.5m (5-foot) inside shoulder in both directions with a 6.8m (22-foot) uncurbed median. Curb and gutter will be installed at both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). There are no proposed improvements to Beardsley Road. Deer Valley Drive will be realigned to provide a ninety-degree "T" intersection with El Mirage Road. The existing pavement will be removed and replaced with a normal crown section. An existing privacy wall borders the R/W immediately west of El Mirage Road. The east edge of pavement will have curb and gutter, satisfying clear zone requirements.

McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410m (1,350 feet) south of Beardsley Road. Widening of the roadway will be accomplished by building embankment in the wash. It is recommended that the embankment be constructed wide enough to accommodate a 6-lane ultimate section. The wash will require a corresponding widening along the east bank. It is recommended that the limits of the wash widening begin just north of Beardsley Road, near an existing drop structure. This is assuming that the El Mirage Road and the wash are widened in a similar fashion to the south of Beardsley Road. On-site drainage will be collected from the roadway and median and discharged to the wash.

Advantages include normal crown section throughout, curbs on the outside edge for southbound traffic, and reduced median width to minimize costs.

Disadvantages include the increased cost of removing existing pavement in order to reverse the crown.

There are no known design exceptions at this time.

Beardsley Road to Deer Valley Drive - Alternative B, 6-Lane:

Improve El Mirage Road between Beardsley Road and Deer Valley Drive to a 4-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two 3.6m (12-foot) lanes, a 4.3m (14-foot) lane, a 1.8m (6-foot) outside shoulder and a 1.5m (5-foot) inside shoulder in both directions with a 1.2m (4-foot) raised median. Curb and gutter will be installed at both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). There are no proposed improvements to Beardsley Road. Deer Valley Drive will be realigned to provide a ninety-degree "T" intersection with El Mirage Road. The existing pavement will be removed and replaced with a normal crown section. An existing privacy wall borders the R/W immediately west of El Mirage Road. The east edge of pavement will have curb and gutter, satisfying clear zone requirements.

McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410m (1,350 feet) south of Beardsley Road. Widening of the roadway will be accomplished by building embankment in the wash. It is recommended that the embankment be constructed wide enough to accommodate a 6-lane ultimate section. The wash will require a corresponding widening along the east bank. It is recommended that the limits of the wash widening begin just north of Beardsley Road, near an existing drop structure. This is assuming that the El Mirage Road and the wash are widened in a similar fashion to the south of Beardsley Road. On-site drainage will be collected from the roadway and discharged to the wash.

Advantages include normal crown section throughout, curbs on the outside edge for southbound traffic, and reduced median width to minimize costs.

Disadvantages include the increased cost of removing existing pavement in order to reverse the crown.

There are no known design exceptions at this time.

Deer Valley Drive to Loop 303 – Alternative 1, 4-Lane:

El Mirage Road extends for three miles north of Bell Road as a two-lane, paved roadway, and then turns west and becomes Deer Valley Drive. El Mirage Road does not exist between Deer Valley Drive and the proposed Loop 303. The alignment shown in Alternative 1 is along the west side of the McMicken Dam Outlet Wash. The road crosses the wash 450 meters (1475 feet) south of the intersection with proposed Loop 303. The typical section will include a new 3.6m (12-foot) lane, a 4.3m (14-foot) lane and a 1.5m (5-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. There is no curb and gutter or sidewalks. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

There are no outside gutters. Runoff generated on the roadway drains off the road in a normal crown section and toward the median in superelevated section. On-site runoff generated east of the centerline would be allowed to return to McMicken Dam Outlet Wash. Runoff generated west of the centerline would flow south in a roadside ditch to the channel along the north side of Deer Valley Drive. The land west of the road is owned by the Flood Control District. The ditch required to convey the expected runoff will be less than 0.3m (1 foot) deep and 4.3m (14 feet) wide. The flows will be accommodated in a minimal roadside drainage swale or ditch. Runoff conveyed along the median curb would be collected and discharged to the wash before the superelevation reverses, sending the concentrated flow across the pavement.

Construction of the Deer Valley Drive - El Mirage Road intersection requires realignment of a portion of the channel which parallels the north side of Deer Valley Drive. A 4 barrel, 2700mm by 2400mm (8-foot by 6-foot) box culvert is required to convey the channel through the intersection. The intersection is expected to encroach into the McMicken Dam Outlet Wash. Realignment of the wash is required to maintain the hydraulic capacity of the wash.

A box culvert is required at Station 7+350 to carry the roadway over the Outlet Wash. A 9 barrel, 3600 mm by 2700 mm (12-foot by 8-foot) culvert will pass the 50-year peak flow of 123 cms (4,348 cfs) without overtopping the roadway, as required by the drainage design criteria. As seen on the design alternate sheet, regrading of the channel is required to improve the channel capacity in the vicinity of the box culvert. There are some concerns of the performance of the culvert in the SPF. Resolution of the culvert performance during the SPF is beyond the scope of this report, but the following discussion is offered to outline the concerns associated with the installation of the culvert.

The first concern is the diversion of flows by the roadway. The proposed roadway alignment is along a slight ridge, which runs approximately north to south. The ridge roughly parallels the wash. The roadway alignment was chosen to take advantage of a natural reverse curve in the wash. The road crosses the wash at this location at nearly ninety degrees, minimizing the length of the proposed culvert. As a result, the general condition is such that the roadway and the wash run side by side, quickly cross and then continue side by side. The roadway does not form a barrier across the entire floodpath of the wash. As long as flows are contained within the wash,

the culvert can convey the flow. Once flows begin to back up behind the culvert, the wash will no longer be able to contain the runoff and the roadway begins to divert the flows to the west/southwest.

The roadway is to be elevated approximately 0.6m (2 feet) above the existing ground. As the water surface elevation begins to rise upstream from the culvert, flows will be diverted west/southwest along the west side of the roadway. The roadway does not rise south of the culvert, it goes down the ridge. There is no chance for the water to pond behind the road and eventually overtop, returning to the wash. The proposed alignment would divert flows during the SPF to the Deer Valley Channel, west of the intersection with El Mirage Road. Forcing the runoff to overtop the road in the vicinity of the culvert might be accomplished with berms upstream from the culvert crossing. It may also be necessary to elevate the roadway south and north of the culvert crossing to form an artificial dip crossing.

A second concern is the elevation in water surface caused by the SPF overtopping the roadway. The proposed culvert would require a roadway surface of approximately 391.34m (1284.0 feet). The HEC-RAS output of the existing condition shows water surface elevation of 390.77m (1282.05 feet) at cross section 2.774 (just downstream from the proposed culvert). This is a 0.63m (2-foot) increase before flow starts to weir over the roadway. The proposed culvert is shown approximately 12m (40 feet) longer than the minimum required to provide a 9m (30 feet) clear zone at each end of the culvert. This was done to eliminate the need for guardrail. During a storm event, it must be assumed that guardrail is clogged with debris. Flow must then go over or around the guardrail. An attempt was made to model a culvert that would provide a roadway elevation of 390.43m (1281.0 feet). This is roughly the top of bank elevation in the existing condition. The wash invert is approximately 387.99m (1273.0 feet). Culvert height would be limited to approximately 1200 mm (4 feet). A 26,3000mm (10-foot) barrel box culvert would be needed to convey the 50-year storm without overtopping. The design solution for the culvert lies somewhere between a bridge and a 26 barrel box culvert.

Advantages include a ninety-degree crossing of the McMicken Dam Outlet Wash and the most direct route from north to south, minimizing the purchasing of private R/W.

Disadvantages include the cost of the McMicken Dam Outlet Wash crossing and the hydraulic complications created by the culvert during the SPF.

There are no known design exceptions at this time.

Deer Valley Drive to Loop 303 – Alternative 1, 6-Lane:

A cost estimate and typical sections for the 6-lane section are provided, but plan view alternate design sheets are not shown.

The typical section will include a 2 new 3.6m (12-foot) lanes, a 4.3m (14-foot) lane and a 1.8m (6-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. Curb and gutter are included on both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph).

The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

See the discussion above for drainage related issues and the advantages/disadvantages associated with this alternative. The 6-lane configuration will have curb and gutter at the outside edges of pavement. Runoff would be discharged from the pavement in curb scuppers and conveyed in the roadside ditches as under the 4-lane configuration.

Deer Valley Drive to Loop 303 – Alternative 2, 4-Lane (Recommended Alternative):

El Mirage Road extends for three miles north of Bell Road as a two-lane, paved roadway, and then turns west and becomes Deer Valley Drive. El Mirage Road does not exist between Deer Valley Drive and the proposed Loop 303. The alignment shown in Alternative 2 is along the west side of the McMicken Dam Outlet Wash. It is west of the alignment shown in Alternative 1. The typical section will include a new 3.6m (12-foot) lane, a 4.3m (14-foot) lane and a 1.5m (5-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. There is no curb and gutter or sidewalks. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

There are no outside gutters. Runoff generated on the roadway drains off the road in a normal crown section and toward the median in superelevated section. On-site runoff generated east of the centerline would be allowed to return to McMicken Dam Outlet Wash. Runoff generated west of the centerline would be allowed to flow south in a roadside ditch to the channel along the north side of Deer Valley Drive. The land west of the road is owned by the Flood Control District. The ditch required to convey the expected runoff will be less than 0.3m (1 foot) deep and 4.3m (14 feet) wide. The flows will be accommodated in a minimal roadside drainage swale or ditch. Runoff conveyed along the median curb would be collected and discharged to the wash before the superelevation reverses, sending the concentrated flow across the pavement.

Alternative 2 will not cross the McMicken Dam Outlet Wash south of the proposed Loop 303. Alternative 2 would require El Mirage Road to cross the McMicken Dam Outlet Wash north of the proposed Loop 303. Alternative 2 shifts the location of the El Mirage interchange west. El Mirage Road must then curve east, north of the interchange to return to its original alignment. This forces a culvert crossing of the wash between the interchange and the McMicken Dam Outlet Channel to the north. The channel is shown on the Drainage Maps.

El Mirage Road would have to cross the wash at a skew angle of approximately seventy degrees if the crossing is north of the interchange. The length of the box culvert proposed as part of Alternative 1 would increase from 49m (160 feet) to 143m (468 feet) if placed on such a high degree of skew. Costs would increase by nearly a factor of three.

Construction of the Deer Valley Drive - El Mirage Road intersection requires realignment of a portion of the channel which parallels the north side of Deer Valley Drive. A 4 barrel, 2700mm by 2400mm (8-foot by 6-foot) box culvert is required to convey the channel through the intersection. The intersection is expected to encroach the McMicken Dam Outlet Wash. Realignment of the wash is required to maintain the hydraulic capacity of the wash.

Advantages of this alignment include reducing project costs and delaying the McMicken Dam Outlet Wash crossing to a future date.

Disadvantages include a non ninety-degree crossing of the McMicken Dam Outlet Wash north of the proposed Loop 303 and lengthening the route from north to south.

There are no known design exceptions at this time.

Deer Valley Drive to Loop 303 – Alternative 2, 6-Lane:

A cost estimate and typical sections for the 6-lane section are provided, but plan view alternate design sheets are not shown.

The typical section will include a 2 new 3.6m (12-foot) lanes, a 4.3m (14-foot) lane and a 1.8m (6-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. Curb and gutter are included on both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

See the discussion above for drainage related issues and the advantages/disadvantages associated with this alternative. The 6-lane configuration will have curb and gutter at the outside edges of pavement. Runoff would be discharged from the pavement in curb scuppers and conveyed in the roadside ditches as under the 4-lane configuration.

Deer Valley Drive to Loop 303 – Alternative 3, 4-Lane:

El Mirage Road extends for three miles north of Bell Road as a two-lane, paved roadway, and then turns west and becomes Deer Valley Drive. El Mirage Road does not exist between Deer Valley Drive and the proposed Loop 303. The alignment shown in Alternative 3 follows the existing alignment of Deer Valley Drive west of El Mirage Road. It turns north along the midsection line, about 0.8 kilometers (0.5 miles) west of El Mirage Road. The intersection of Alternative 3 and the proposed Loop 303 is at the midsection line. The typical section will include a new 3.6m (12-foot) lane, a 4.3m (14-foot) lane and a 1.5m (5-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. There is no curb and gutter or sidewalks. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

There are no outside gutters. Runoff generated on the roadway drains off the road in a normal crown section and toward the median in superelevated section. For budgetary purposes, storm drain inlets are supplied at 375 meter (1,200-foot) intervals. The storm drain will collect runoff from roadside ditches and convey it to the channel north of Deer Valley Drive. A trunk line connects the laterals. The upstream end is 610mm (24-inch) pipe, increasing to 760mm (30-inch) pipe. This alignment runs through state land. It is not possible to allow flows to return to the Outlet Wash as overland flow.

As seen in the alternate detail sheet, construction of the new roadway will be along the current alignment of the channel which parallels the north side of Deer Valley Drive. The channel must be relocated to the north. Construction of the Deer Valley Drive - El Mirage Road intersection includes a 4 barrel, 2700mm by 2400mm (8-foot by 6-foot) box culvert to convey the channel through the intersection. The intersection is not expected to encroach the McMicken Dam Outlet Wash as seen in the other alternatives. Realignment of the wash north of Deer Valley Drive is not necessary under this alternative.

Known design exceptions include the 90 degree curve from the El Mirage alignment to the Deer Valley Drive alignment.

Deer Valley Drive to Loop 303 – Alternative 3, 6-Lane:

A cost estimate and typical sections for the 6-lane section are provided, but plan view alternate design sheets are not shown.

The typical section will include a 2 new 3.6m (12-foot) lanes, a 4.3m (14-foot) lane and a 1.8m (6-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. Curb and gutter are included on both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

See the discussion above for drainage related issues and the advantages/disadvantages associated with this alternative. The 6-lane configuration will have curb and gutter at the outside edges of pavement. Runoff would be collected from the pavement in curb inlet catch basins instead of in the roadside ditches.

Deer Valley Drive to Loop 303 – Alternative 4, 4-Lane:

El Mirage Road extends for three miles north of Bell Road as a two-lane, paved roadway, and then turns west and becomes Deer Valley Drive. El Mirage Road does not exist between Deer Valley Drive and the proposed Loop 303. The alignment shown in Alternative 4 is similar to the alignment shown in Alternative 3, but the 90 degree curve from El Mirage Road to Deer Valley Drive has been improved to meet design standards. It turns north along the midsection line (north of the alignment in Alternative 3), about 0.8 kilometers (0.5 miles) west of El Mirage Road. The intersection of Alternative 4 and the proposed Loop 303 is at the midsection line. The typical section will include a new 3.6m (12-foot) lane, a 4.3m (14-foot) lane and a 1.5m (5-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. There is no curb and gutter or sidewalks. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

There are no outside gutters. Runoff generated on the roadway drains off the road in a normal crown section and toward the median in superelevated section. For budgetary purposes, storm drain inlets are supplied at 375 meter (1,200-foot) intervals. The storm drain will collect runoff

from roadside ditches and convey it to the channel north of Deer Valley Drive. A trunk line connects the laterals. The upstream end is 610mm (24-inch) pipe, increasing to 760mm (30-inch) pipe. This alignment runs through state land. It is not possible to allow flows to return to the Outlet Wash as overland flow.

As seen in the alternate detail sheet, construction of the Deer Valley Drive - El Mirage Road intersection requires realignment of a portion of the channel which parallels the north side of Deer Valley Drive. A 4 barrel, 2700mm by 2400mm (8-foot by 6-foot) box culvert is required to convey the channel through the intersection. The intersection is expected to encroach the McMicken Dam Outlet Wash. Realignment of the wash is required to maintain the hydraulic capacity of the wash.

Deer Valley Drive to Loop 303 – Alternative 4, 6-Lane:

A cost estimate and typical sections for the 6-lane section are provided, but plan view alternate design sheets are not shown.

The typical section will include a 2 new 3.6m (12-foot) lanes, a 4.3m (14-foot) lane and a 1.8m (6-foot) outside shoulder for travel in each direction with a 4.2m (14-foot) raised median. Curb and gutter are included on both edges of pavement. Sidewalks are not included. The MCDOT pavement structural section of 100mm (4 inches) AC over 250mm (10 inches) AB was used to develop the project costs. The design speed of the improvements shall be 100km/h (60mph). The intersection of El Mirage Road and the proposed Loop 303 will be a signalized at grade intersection with turn lanes.

See the discussion above for drainage related issues and the advantages/disadvantages associated with this alternative. The 6-lane configuration will have curb and gutter at the outside edges of pavement. Runoff would be collected from the pavement in curb inlet catch basins instead of in the roadside ditches.

UTILITY INFORMATION

There is an existing sewer line paralleling the east edge of the existing pavement of El Mirage Road. The sewer follows the road to the west on Deer Valley Drive. Manholes are spaced at approximately 150 meter (500-foot) intervals. The manholes will have to be adjusted to grade as part of the roadway widening. There are overhead power lines paralleling the north side of Deer Valley Drive. The construction of the recommended alternative will require relocating three to five poles.

COST ESTIMATE

Estimated Cost:

Several assumptions were made in the calculation of construction costs. These include:

1. Unit costs based on MCDOT 1998 Construction Cost Worksheets
2. Right-of-Way cost from Beardsley Road to Deer Valley Drive is \$37,066 per hectare (\$15,000 per acre).

3. Right-of-way cost from Deer Valley Drive to Loop 303 is \$37,066 per hectare (\$15,000 per acre) for Alternatives 1 and 2 (in McMicken Dam Outlet Wash floodpath).
4. Right-of-way cost from Deer Valley Drive to Loop 303 is \$74,132 per hectare (\$30,000 per acre) for Alternatives 3 and 4 (outside the McMicken Dam Outlet Wash floodpath).
5. Right-of-way must be purchased from the Flood Control District at \$37,066 per hectare (\$15,000 per acre).
6. Excavation limits on the east side of McMicken Dam Outlet Wash do not exceed the boundaries of flood control property.
7. Construction of roadway prism in McMicken Dam Outlet Wash to be full width to accommodate ultimate 6-lane configuration (all alternatives).
8. Construction of box culverts to be full width to accommodate ultimate 6-lane configuration (all alternatives).
9. Drainage excavation to include compaction for construction of roadway prism. The MAG Standard Specification has to be modified to include compaction.
10. Earthwork calculations assume 15% shrink for borrow obtained by drainage excavation.
11. Borrow excavation is calculated by subtracting the amount of fill generated by drainage excavation.
12. East side of McMicken Dam Outlet Wash to be excavated to match roadway prism constructed on west side. Hydraulic capacity of channel does not change and bank armoring is not required.
13. Not all existing pavement of El Mirage Road is salvageable. Three sections of the existing roadway will be removed to correct deficient horizontal and vertical curves. See design alternate sheets.

Cost estimate spreadsheets and cost summaries for all alternatives and lane configurations follow this Section.

Preliminary Construction Cost Estimate, Recommended Alternatives:

The estimated construction cost of El Mirage Road from Beardsley Road to Deer Valley Drive is \$2,111,696 for Alternative A, 4-lane configuration. The estimated cost of construction of Alternative 2, 4-lane configuration from El Mirage Road from Deer Valley Drive to Loop 303 is \$3,282,780.

Design:

The total project can be designed for approximately \$647,338 based on 12% of the total construction cost. This would include the DCR preparation and right-of-way delineation. The design time frame would depend on the review time by the County and the Utility Companies. The time frame for preparing the DCR would take 6-8 months without review time. The actual design time excluding reviews would be approximately 10-12 months. Accounting for review time, the project could be designed in 24 months, which includes the preparation of the DCR and right-of-way delineation.

Construction Management:

Construction management including construction surveying has been estimated at 15% of total construction cost or \$809,171.

Right-of-Way:

Right-of-way acquisition costs are estimated to be approximately \$396,000.

Utility Relocation Cost Estimate:

A total of \$40,800 has been estimated for utility relocations.

Administration:

Administration has been estimated at 12% of total construction cost or \$620,450.

Environmental and Archeological Mitigation Costs:

A lump sum of \$100,000 has been allocated for archeological survey costs (includes all surveys between Beardsley Road and Loop 303). The cost is included in the construction costs. Mitigation is likely to be required for work done in the McMicken Dam Outlet Wash. Mitigation costs of \$32,000 are added to the project costs of the segment from Beardsley Road to Deer Valley Drive and \$100,000 in mitigation costs is added to project costs of the Deer Valley Drive to Loop 303 segment. Total costs incurred in the preparation of the 404 permit and mitigation plans costs are estimated at \$52,000. Permit and plan preparation are included in the construction costs.

El Mirage Road- Beardsley Road to Loop 303
Beardsley Road to Deer Valley Drive
Project No. C-99-0786-18

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

| <i>COST CATAGORIES</i> | <i>Factors</i> | <i>No Build</i> | <i>Alternative A, (4-Lane)</i> | <i>Alternative A, (6-Lane)</i> | <i>Alternative B, (4-Lane)</i> | <i>Alternative B, (6-Lane)</i> |
|-----------------------------------|----------------|-----------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <i>Construction</i> | | \$0 | \$2,111,696 | \$2,543,942 | \$2,332,765 | \$2,736,742 |
| <i>Design (10% TO 15%)</i> | 12% | \$0 | \$253,404 | \$305,273 | \$279,932 | \$328,409 |
| <i>Construction Management</i> | 15% | \$0 | \$316,754 | \$381,591 | \$349,915 | \$410,511 |
| <i>Right-of-Way</i> | | \$0 | \$112,500 | \$112,500 | \$112,500 | \$112,500 |
| <i>Utility Relocation</i> | | \$0 | \$4,800 | \$4,800 | \$4,800 | \$4,800 |
| <i>404 Mitigation</i> | | \$0 | \$32,000 | \$32,000 | \$32,000 | \$32,000 |
| <i>Administration (8% TO 13%)</i> | 12% | \$0 | \$253,404 | \$305,273 | \$279,932 | \$328,409 |
| Total | | \$0 | \$3,084,558 | \$3,685,380 | \$3,391,844 | \$3,953,371 |

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Project No. C-99-0786-18

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

| <i>COST CATAGORIES</i> | <i>Factors</i> | <i>No Build</i> | <i>Alternative 1 (4-Lane)</i> | <i>Alternative 2 (4-Lane)</i> | <i>Alternative 3 (4-Lane)</i> | <i>Alternative 4 (4-Lane)</i> |
|-----------------------------------|----------------|-----------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| <i>Construction</i> | | \$0 | \$4,238,461 | \$3,282,780 | \$3,406,923 | \$4,108,428 |
| <i>Design (10% TO 15%)</i> | 12% | \$0 | \$508,615 | \$393,934 | \$408,831 | \$493,011 |
| <i>Construction Management</i> | 15% | \$0 | \$635,769 | \$492,417 | \$511,038 | \$616,264 |
| <i>Right-of-Way</i> | | \$0 | \$284,300 | \$283,500 | \$1,054,500 | \$718,500 |
| <i>Utility Relocation</i> | | \$0 | \$36,000 | \$36,000 | \$50,000 | \$36,000 |
| <i>404 Mitigation</i> | | \$0 | \$140,000 | \$100,000 | \$30,000 | \$100,000 |
| <i>Administration (8% TO 13%)</i> | 12% | \$0 | \$508,615 | \$393,934 | \$408,831 | \$493,011 |
| Total | | \$0 | \$6,351,761 | \$4,982,564 | \$5,870,123 | \$6,565,215 |

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Project No. C-99-0786-16-17

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

| <i>COST CATAGORIES</i> | <i>Factors</i> | <i>No Build</i> | <i>Alternative 1, (6-Lane)</i> | <i>Alternative 2, (6-Lane)</i> | <i>Alternative 3, (6-Lane)</i> | <i>Alternative 4, (6-Lane)</i> |
|-----------------------------------|----------------|-----------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <i>Construction</i> | | \$0 | \$4,812,449 | \$3,851,010 | \$4,145,044 | \$4,784,108 |
| <i>Design (10% TO 15%)</i> | 12% | \$0 | \$577,494 | \$462,121 | \$497,405 | \$574,093 |
| <i>Construction Management</i> | 15% | \$0 | \$721,867 | \$577,652 | \$621,757 | \$717,616 |
| <i>Right-of-Way</i> | | \$0 | \$284,300 | \$283,500 | \$1,054,500 | \$718,500 |
| <i>Utility Relocation</i> | | \$0 | \$36,000 | \$36,000 | \$50,000 | \$36,000 |
| <i>404 Mitigation</i> | | \$0 | \$140,000 | \$100,000 | \$30,000 | \$100,000 |
| <i>Administration (8% TO 13%)</i> | 12% | \$0 | \$577,494 | \$462,121 | \$497,405 | \$574,093 |
| <i>Total</i> | | \$0 | \$7,149,604 | \$5,772,404 | \$6,896,111 | \$7,504,410 |

El Mirage Road- Beardsley Road to Loop 303
Beardsley Road to Deer Valley Drive
Project No. C-99-0786-18

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

| <i>COST CATAGORIES</i> | <i>Factors</i> | <i>No Build</i> | <i>* Alternative A, (4-Lane)</i> | <i>Alternative A, (6-Lane)</i> | <i>Alternative B, (4-Lane)</i> | <i>Alternative B, (6-Lane)</i> |
|-----------------------------------|----------------|-----------------|--|------------------------------------|------------------------------------|------------------------------------|
| <i>Construction</i> | | \$0 | \$2,111,696 | \$2,543,942 | \$2,332,765 | \$2,736,742 |
| <i>Design (10% TO 15%)</i> | 12% | \$0 | \$253,404 | \$305,273 | \$279,932 | \$328,409 |
| <i>Construction Management</i> | 15% | \$0 | \$316,754 | \$381,591 | \$349,915 | \$410,511 |
| <i>Right-of-Way</i> | | \$0 | \$112,500 | \$112,500 | \$112,500 | \$112,500 |
| <i>Utility Relocation</i> | | \$0 | \$4,800 | \$4,800 | \$4,800 | \$4,800 |
| <i>404 Mitigation</i> | | \$0 | \$32,000 | \$32,000 | \$32,000 | \$32,000 |
| <i>Administration (8% TO 13%)</i> | 12% | \$0 | \$253,404 | \$305,273 | \$279,932 | \$328,409 |
| Total | | \$0 | \$3,084,558 | \$3,685,380 | \$3,391,844 | \$3,953,371 |

El Mirage Road- Beardsley Road to Loop 303
 Deer Valley Drive to Loop 303
 Project No. C-99-0786-18

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

*MCDOT
Preferred*

*CONTINENTAL
PREFERRED*

| COST CATAGORIES | Factors | No Build | Alternative 1 (4-Lane) | Alternative 2 (4-Lane) | Alternative 3 (4-Lane) | Alternative 4 (4-Lane) |
|----------------------------|---------|------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Construction | | \$0 | \$4,238,461 | \$3,282,780 | \$3,406,923 | \$4,108,428 |
| Design (10% TO 15%) | 12% | \$0 | \$508,615 | \$393,934 | \$408,831 | \$493,011 |
| Construction Management | 15% | \$0 | \$635,769 | \$492,417 | \$511,038 | \$616,264 |
| Right-of-Way | | \$0 | \$284,300 | \$283,500 | \$1,054,500 | \$718,500 |
| Utility Relocation | | \$0 | \$36,000 | \$36,000 | \$50,000 | \$36,000 |
| 404 Mitigation | | \$0 | \$140,000 | \$100,000 | \$30,000 | \$100,000 |
| Administration (8% TO 13%) | 12% | \$0 | \$508,615 | \$393,934 | \$408,831 | \$493,011 |
| Total | | \$0 | \$6,351,761 | \$4,982,564 | \$5,870,123 | \$6,565,215 |

El Mirage Road- Beardsley Road to Loop 303
 Beardsley Road to Deer Valley Drive
 Recommended Alternative
 Alternative A, 4-Lane Configuration

Road Construction
 January 22, 1999

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave (or Penetrate & Chip)</i> | | | | | |
|--|---|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archaeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 16,000 | \$9.00 | \$144,000 |
| 301.00000 | Subgrade Preparation | SM | 24,000 | \$2.75 | \$66,000 |
| | New Asphalt Pavement | SM | 24,000 | \$17.90 | \$429,600 |
| | Asphalt Concrete .50 mm Overlay | SM | 5,800 | \$5.40 | \$31,320 |
| 336.08100 | Pavement Sawcut | M | 750 | \$6.50 | \$4,875 |
| 340.01120 | Conc. C & G | M | 1,500 | \$34.50 | \$51,750 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$40,000.00 | \$40,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 1,500 | \$6.40 | \$9,600 |
| 505.30000 | Catch Basin - Rural location | EA | 5 | \$1,600.00 | \$8,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 2 | \$3,600.00 | \$7,200 |
| 505.06200 | Scupper | EA | 6 | \$600.00 | \$3,600 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 215 | \$160.00 | \$34,400 |
| | Dumped Riprap Erosion Protection | CM | 250 | \$60.00 | \$15,000 |
| | Drainage Excavation | CM | 88,000 | \$7.00 | \$616,000 |
| | Remove Existing Drop Structure Channel Lining | SM | 2,000 | \$10.00 | \$20,000 |
| | Drop Structure Channel Lining | SM | 2,000 | \$45.00 | \$90,000 |
| | | Subtotal | | | \$1,652,345 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$57,832.00 | \$57,832 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$49,570.00 | \$49,570 |

Subtotal Construction \$1,759,747

Contingency 20% \$351,949

Total \$2,111,696

El Mirage Road- Beardsley Road to Loop 303
Beardsley Road to Deer Valley Drive
Alternative A, 6-Lane

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave. (or Penetrate & Chip)</i> | | | | | |
|---|---|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archaeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 16,000 | \$9.00 | \$144,000 |
| 301.00000 | Subgrade Preparation | CM | 32,800 | \$2.75 | \$90,200 |
| | New Asphalt Pavement | SM | 32,800 | \$17.90 | \$587,120 |
| | Asphalt Concrete .50 mm Overlay | SM | 5,800 | \$5.40 | \$31,320 |
| 336.08100 | Pavement Sawcut | M | 750 | \$6.50 | \$4,875 |
| 340.01020 | Single Curb | M | 3,000 | \$36.00 | \$108,000 |
| 340.01120 | Conc. C & G | M | 1,500 | \$34.50 | \$51,750 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$40,000.00 | \$40,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 1,500 | \$9.00 | \$13,500 |
| 505.30000 | Catch Basin - Rural location | EA | 1 | \$1,600.00 | \$1,600 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 7 | \$3,600.00 | \$25,200 |
| 505.06200 | Scupper | EA | 6 | \$600.00 | \$3,600 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 215 | \$160.00 | \$34,400 |
| | Dumped Riprap Erosion Protection | CM | 250 | \$60.00 | \$15,000 |
| | Drainage Excavation | CM | 88,000 | \$7.00 | \$616,000 |
| | Remove Existing Drop Structure Channel Lining | SM | 2,000 | \$10.00 | \$20,000 |
| | Drop Structure Channel Lining | SM | 2,000 | \$45.00 | \$90,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 1,500 | \$22.00 | \$33,000 |
| | | Subtotal | | | \$1,990,565 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$69,670.00 | \$69,670 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$59,717.00 | \$59,717 |

Subtotal Construction \$2,119,952

Contingency 20% \$423,990

Total \$2,543,942

El Mirage Road- Beardsley Road to Loop 303
Beardsley Road to Deer Valley Drive
Alternative B, 4-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| Grade, Drain & Pave (or Penetrate & Chip) | | | | | |
|--|---|-------------|-----------------|------------------|--------------|
| Item # | Description | Unit | Quantity | Unit Cost | Total |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archaeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 16,000 | \$9.00 | \$144,000 |
| 301.00000 | Subgrade Preparation | CM | 30,500 | \$2.75 | \$83,875 |
| | New Asphalt Pavement | SM | 30,500 | \$17.90 | \$545,950 |
| 340.01120 | Conc. C & G | M | 3,000 | \$34.50 | \$103,500 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$60,000.00 | \$60,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 1,500 | \$6.40 | \$9,600 |
| 505.30000 | Catch Basin - Rural location | EA | 4 | \$1,600.00 | \$6,400 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 4 | \$3,600.00 | \$14,400 |
| 505.06200 | Scupper | EA | 6 | \$600.00 | \$3,600 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 200 | \$160.00 | \$32,000 |
| | Dumped Riprap Erosion Protection | CM | 250 | \$60.00 | \$15,000 |
| | Drainage Excavation | CM | 88,000 | \$7.00 | \$616,000 |
| | Remove Existing Drop Structure Channel Lining | SM | 2,000 | \$10.00 | \$20,000 |
| | Drop Structure Channel Lining | SM | 2,000 | \$45.00 | \$90,000 |
| | | Subtotal | | | \$1,825,325 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$63,886.00 | \$63,886 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$54,760.00 | \$54,760 |

Subtotal Construction \$1,943,971

Contingency 20% \$388,794

Total \$2,332,765

El Mirage Road- Beardsley Road to Loop 303
Beardsley Road to Deer Valley Drive
Alternative B, 6-Lane

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave: (or Penetrate & Chip)</i> | | | | | |
|---|---|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archaeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 16,000 | \$9.00 | \$144,000 |
| 301.00000 | Subgrade Preparation | CM | 38,500 | \$2.75 | \$105,875 |
| | New Asphalt Pavement | SM | 38,500 | \$17.90 | \$689,150 |
| 340.01020 | Single Curb | M | 3,000 | \$36.00 | \$108,000 |
| 340.01120 | Conc. C & G | M | 3,000 | \$34.50 | \$103,500 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$60,000.00 | \$60,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 1,500 | \$9.00 | \$13,500 |
| 505.30000 | Catch Basin - Rural location | EA | 1 | \$1,600.00 | \$1,600 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 7 | \$3,600.00 | \$25,200 |
| 505.06200 | Scupper | EA | 6 | \$600.00 | \$3,600 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 200 | \$160.00 | \$32,000 |
| | Dumped Riprap Erosion Protection | CM | 250 | \$60.00 | \$15,000 |
| | Drainage Excavation | CM | 88,000 | \$7.00 | \$616,000 |
| | Remove Existing Drop Structure Channel Lining | SM | 2,000 | \$10.00 | \$20,000 |
| | Drop Structure Channel Lining | SM | 2,000 | \$45.00 | \$90,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 1,500 | \$22.00 | \$33,000 |
| | | Subtotal | | | \$2,141,425 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$74,950.00 | \$74,950 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$64,243.00 | \$64,243 |

Subtotal Construction \$2,280,618

Contingency 20% \$456,124

Total \$2,736,742

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 1, 4-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave (or Penetrate & Chip)</i> | | | | | |
|--|--|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 301.00000 | Subgrade Preparation | CM | 40,000 | \$2.75 | \$110,000 |
| | New Asphalt Pavement | SM | 40,000 | \$17.90 | \$716,000 |
| 340.01020 | Single Curb | M | 3,900 | \$36.00 | \$140,400 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 1,950 | \$6.40 | \$12,480 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 5 | \$3,600.00 | \$18,000 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 20 | \$160.00 | \$3,200 |
| | Dumped Riprap Erosion Protection | CM | 380 | \$60.00 | \$22,800 |
| | Drainage Excavation | CM | 137,000 | \$7.00 | \$959,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,400 | \$22.00 | \$162,800 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | 9 Bbl, 3600 mm x2700 mm | SM | 1,617 | \$400.00 | \$646,800 |
| | | Subtotal | | | \$3,316,480 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$116,077.00 | \$116,077 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$99,494.00 | \$99,494 |

Subtotal Construction \$3,532,051
Contingency 20% \$706,410
Total \$4,238,461

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 1, 6-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave, (or Penetrate & Chip)</i> | | | | | |
|---|--|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 301.00000 | Subgrade Preparation | CM | 53,400 | \$2.75 | \$146,850 |
| | New Asphalt Pavement | SM | 53,400 | \$17.90 | \$955,860 |
| 340.01020 | Single Curb | M | 3,900 | \$36.00 | \$140,400 |
| 340.01120 | Conc. C & G | M | 3,900 | \$34.50 | \$134,550 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 1,950 | \$9.00 | \$17,550 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 8 | \$3,600.00 | \$28,800 |
| 505.06200 | Scupper | EA | 18 | \$600.00 | \$10,800 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 90 | \$160.00 | \$14,400 |
| | Dumped Riprap Erosion Protection | CM | 380 | \$60.00 | \$22,800 |
| | Drainage Excavation | CM | 137,000 | \$7.00 | \$959,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,400 | \$22.00 | \$162,800 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | 9 Bbl, 3600 mm x2700 mm | SM | 1,617 | \$400.00 | \$646,800 |
| | | Subtotal | | | \$3,765,610 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$131,796.00 | \$131,796 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$112,968.00 | \$112,968 |

Subtotal Construction \$4,010,374

Contingency 20% \$802,075

Total \$4,812,449

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Recommended Alternative
Alternative 2, 4-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave: (or.Penetrat,& Chip)</i> | | | | | |
|---|--|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 0 | \$9.00 | \$0 |
| 301.00000 | Subgrade Preparation | SM | 40,500 | \$2.75 | \$111,375 |
| | New Asphalt Pavement | SM | 40,500 | \$17.90 | \$724,950 |
| 340.01020 | Single Curb | M | 3,900 | \$36.00 | \$140,400 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 2,000 | \$6.40 | \$12,800 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 403.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 1 | \$3,600.00 | \$3,600 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 20 | \$160.00 | \$3,200 |
| | Dumped Riprap Erosion Protection | CM | 240 | \$60.00 | \$14,400 |
| | Drainage Excavation | CM | 125,000 | \$7.00 | \$875,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,180 | \$22.00 | \$157,960 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | | Subtotal | | | \$2,568,685 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$89,904.00 | \$89,904 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$77,061.00 | \$77,061 |

Subtotal Construction \$2,735,650

Contingency 20% \$547,130

Total \$3,282,780

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 2, 6-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave. (or Penetrate & Chip)</i> | | | | | |
|---|--|-----------|----------|--------------|-------------|
| Item # | Description | Unit | Quantity | Unit Cost | Total |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 301.00000 | Subgrade Preparation | CM | 53,000 | \$2.75 | \$145,750 |
| | New Asphalt Pavement | SM | 53,000 | \$17.90 | \$948,700 |
| 340.01020 | Single Curb | M | 3,900 | \$36.00 | \$140,400 |
| 340.01120 | Conc. C & G | M | 3,900 | \$34.50 | \$134,550 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 1,950 | \$9.00 | \$17,550 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 8 | \$3,600.00 | \$28,800 |
| 505.06200 | Scupper | EA | 18 | \$600.00 | \$10,800 |
| | Drywell | EA | 0 | \$4,700.00 | \$0 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 90 | \$160.00 | \$14,400 |
| | Dumped Riprap Erosion Protection | CM | 240 | \$60.00 | \$14,400 |
| | Drainage Excavation | CM | 125,000 | \$7.00 | \$875,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,180 | \$22.00 | \$157,960 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | | Subtotal | | | \$3,013,310 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$105,466.00 | \$105,466 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$90,399.00 | \$90,399 |

Subtotal Construction \$3,209,175

Contingency 20% \$641,835

Total \$3,851,010

El Mirage Road-Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 3, 4-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| Grade, Drain & Pave (or Penetrate & Chip) | | | | | |
|--|--|-------------|-----------------|------------------|--------------|
| Item # | Description | Unit | Quantity | Unit Cost | Total |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 11,000 | \$9.00 | \$99,000 |
| 301.00000 | Subgrade Preparation | SM | 48,300 | \$2.75 | \$132,825 |
| | New Asphalt Pavement | SM | 48,300 | \$17.90 | \$864,570 |
| 336.08100 | Pavement Sawcut | M | 9 | \$6.50 | \$59 |
| 340.01020 | Single Curb | M | 4,500 | \$36.00 | \$162,000 |
| 340.01120 | Conc. C & G | M | 600 | \$34.50 | \$20,700 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$50,000.00 | \$50,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 2,300 | \$6.40 | \$14,720 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 402.00000 | Traffic Signal, T Intersection | EA | 1 | \$90,000.00 | \$90,000 |
| 505.30000 | Catch Basin - Rural location | EA | 9 | \$1,600.00 | \$14,400 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 3 | \$3,600.00 | \$10,800 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 950 | \$160.00 | \$152,000 |
| 618.02336 | 760 mm & 910 mm (30" & 36") RGRCP, Class III | M | 670 | \$215.00 | \$144,050 |
| 625.00000 | 1370 mm & 1520 mm Storm Drain/Irrigation Manhole | EA | 10 | \$3,200.00 | \$32,000 |
| | Dumped Riprap Erosion Protection | CM | 115 | \$60.00 | \$6,900 |
| | Drainage Excavation | CM | 36,000 | \$7.00 | \$252,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,400 | \$22.00 | \$162,800 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | | Subtotal | | | \$2,665,824 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$93,304.00 | \$93,304 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$79,975.00 | \$79,975 |

Subtotal Construction \$2,839,103
Contingency 20% \$567,821
Total \$3,406,923

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 3, 6-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave, (or Penetrate & Chip)</i> | | | | | |
|---|--|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$7,000.00 | \$7,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 25,000 | \$9.00 | \$225,000 |
| 301.00000 | Subgrade Preparation | SM | 66,500 | \$2.75 | \$182,875 |
| | New Asphalt Pavement | SM | 66,500 | \$17.90 | \$1,190,350 |
| 336.08100 | Pavement Sawcut | M | 9 | \$6.50 | \$59 |
| 340.01020 | Single Curb | M | 4,500 | \$36.00 | \$162,000 |
| 340.01120 | Conc. C & G | M | 4,500 | \$34.50 | \$155,250 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$50,000.00 | \$50,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 2,300 | \$9.00 | \$20,700 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 14 | \$3,600.00 | \$50,400 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 950 | \$160.00 | \$152,000 |
| 618.02336 | 760 mm & 910 mm (30" & 36") RGRCP, Class III | M | 670 | \$215.00 | \$144,050 |
| 625.00000 | 1370 mm & 1520 mm Storm Drain/Irrigation Manhole | EA | 10 | \$3,200.00 | \$32,000 |
| | Dumped Riprap Erosion Protection | CM | 115 | \$60.00 | \$6,900 |
| | Drainage Excavation | CM | 36,000 | \$7.00 | \$252,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 7,400 | \$22.00 | \$162,800 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | | Subtotal | | | \$3,243,384 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$113,518.00 | \$113,518 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$97,302.00 | \$97,302 |

Subtotal Construction \$3,454,204

Contingency 20% \$690,841

Total \$4,145,044

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Road to Loop 303
Alternative 4, 4-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

| <i>Grade, Drain & Pave (or Penetrate & Chip)</i> | | | | | |
|--|--|-------------|-----------------|------------------|--------------|
| <i>Item #</i> | <i>Description</i> | <i>Unit</i> | <i>Quantity</i> | <i>Unit Cost</i> | <i>Total</i> |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 301.00000 | Subgrade Preparation | SM | 42,600 | \$2.75 | \$117,150 |
| | New Asphalt Pavement | SM | 42,600 | \$17.90 | \$762,540 |
| 340.01020 | Single Curb | M | 4,350 | \$36.00 | \$156,600 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 4 lanes | M | 2,180 | \$6.40 | \$13,952 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 402.00000 | Traffic Signal, T Intersection | EA | 1 | \$90,000.00 | \$90,000 |
| 505.30000 | Catch Basin - Rural location | EA | 10 | \$1,600.00 | \$16,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 4 | \$3,600.00 | \$14,400 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 900 | \$160.00 | \$144,000 |
| 618.02336 | 760 mm & 910 mm (30" & 36") RGRCP, Class III | M | 1,150 | \$215.00 | \$247,250 |
| 625.00000 | 1370 mm & 1520 mm Storm Drain/Irrigation Manhole | EA | 18 | \$3,200.00 | \$57,600 |
| | Dumped Riprap Erosion Protection | CM | 240 | \$60.00 | \$14,400 |
| | Drainage Excavation | CM | 125,000 | \$7.00 | \$875,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 8,220 | \$22.00 | \$180,840 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| Subtotal | | | | | \$3,214,732 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$112,516.00 | \$112,516 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$96,442.00 | \$96,442 |

Subtotal Construction \$3,423,690

Contingency 20% \$684,738

Total \$4,108,428

El Mirage Road- Beardsley Road to Loop 303
Deer Valley Drive to Loop 303
Alternative 4, 6-Lane Configuration

1998 CONSTRUCTION COST WORK SHEET

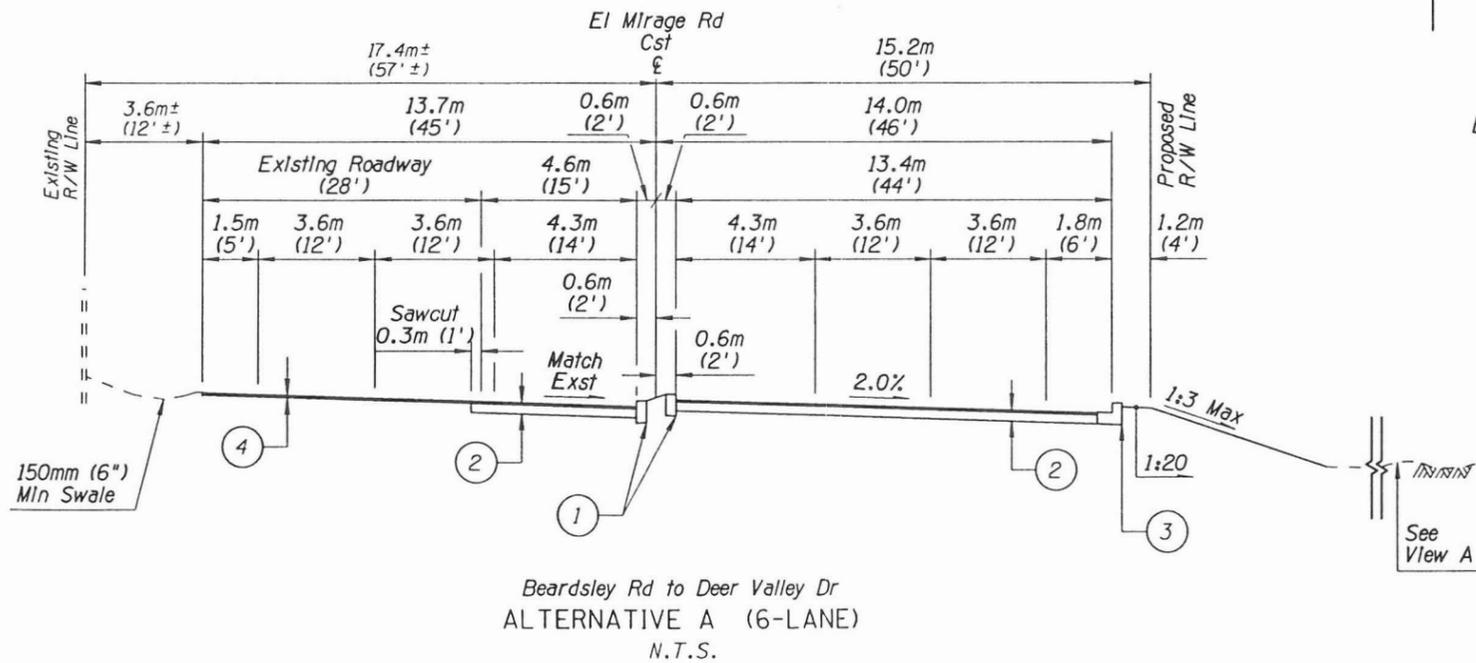
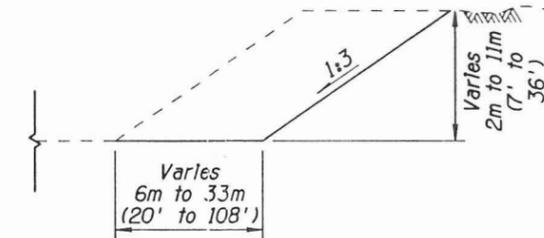
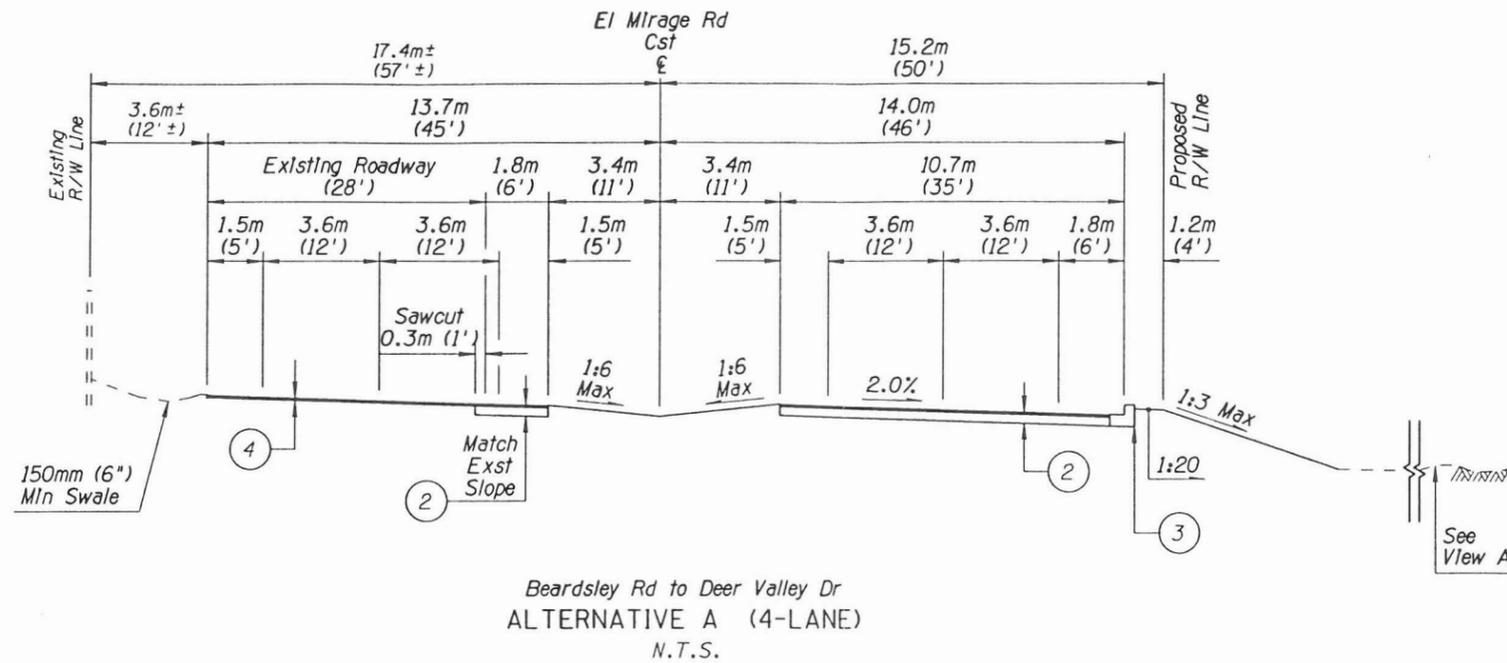
| Grade, Drain & Pave (or Penetrate & Chip) | | | | | |
|--|--|-------------|-----------------|------------------|--------------|
| Item # | Description | Unit | Quantity | Unit Cost | Total |
| 107.01100 | N.P.D.E.S. | L.S. | 1 | \$4,000.00 | \$4,000 |
| 107.09200 | Community Relations | Allowance | 1 | \$20,000.00 | \$20,000 |
| | 404 Permit and Mitigation Plans | L.S. | 1 | \$45,000.00 | \$45,000 |
| | Archaeological Survey | L.S. | 1 | \$50,000.00 | \$50,000 |
| 210.03000 | Borrow Excavation (If anticipated) | CM | 12,500 | \$9.00 | \$112,500 |
| 301.00000 | Subgrade Preparation | CM | 58,600 | \$2.75 | \$161,150 |
| | New Asphalt Pavement | SM | 58,600 | \$17.90 | \$1,048,940 |
| 336.08100 | Pavement Sawcut | M | 9 | \$6.50 | \$59 |
| 340.01020 | Single Curb | M | 4,350 | \$36.00 | \$156,600 |
| 340.01120 | Conc. C & G | M | 4,350 | \$34.50 | \$150,075 |
| 350.01110 | Removal of Existing Improvements | L.S. | 1 | \$30,000.00 | \$30,000 |
| 402.00000 | Traffic Signing & Striping - 6 lanes | M | 2,180 | \$9.00 | \$19,620 |
| 402.00000 | Traffic Signal, Full Intersection @ Loop 303 | EA | 1 | \$110,000.00 | \$110,000 |
| 402.00000 | Traffic Signal, T Intersection @ Deer Valley Drive | EA | 1 | \$90,000.00 | \$90,000 |
| 505.06125 | Catch Basin - Curb Inlet | EA | 14 | \$3,600.00 | \$50,400 |
| 618.02324 | 610 mm (24") RGRCP, Class III | M | 900 | \$160.00 | \$144,000 |
| 618.02336 | 760 mm & 910 mm (30" & 36") RGRCP, Class III | M | 1,150 | \$215.00 | \$247,250 |
| 625.00000 | 1370 mm & 1520 mm Storm Drain/Irrigation Manhole | EA | 18 | \$3,200.00 | \$57,600 |
| | Dumped Riprap Erosion Protection | CM | 240 | \$60.00 | \$14,400 |
| | Drainage Excavation | CM | 125,000 | \$7.00 | \$875,000 |
| | Median Fine Grading, Pre-emergent, & D.G. | SM | 8,220 | \$22.00 | \$180,840 |
| | 4 Bbl, 2700 mm x2400 mm | SM | 440 | \$400.00 | \$176,000 |
| | | Subtotal | | | \$3,743,434 |
| 110.01000 | Mobilization @ 3.5% | L.S. | 1 | \$131,020.00 | \$131,020 |
| 401.00000 | Traffic Control @ 3% | L.S. | 1 | \$112,303.00 | \$112,303 |

Subtotal Construction \$3,986,757

Contingency 20% \$797,351

Total \$4,784,108

APPENDIX A
TYPICAL SECTIONS



NOTES:

- ① MCDOT Std Detail 2030, Single Curb.
- ② 100mm (4") Min AC Over 250mm (10") Min AB or Approved Equivalent.
- ③ MAG Std Detail 220, Type A or MCDOT Std Detail 2030, Curb & Gutter.
- ④ 50mm (2") Min AC or Approved Equivalent.

| NO. | REVISION | BY | DATE |
|-----|----------|----|------|
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MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

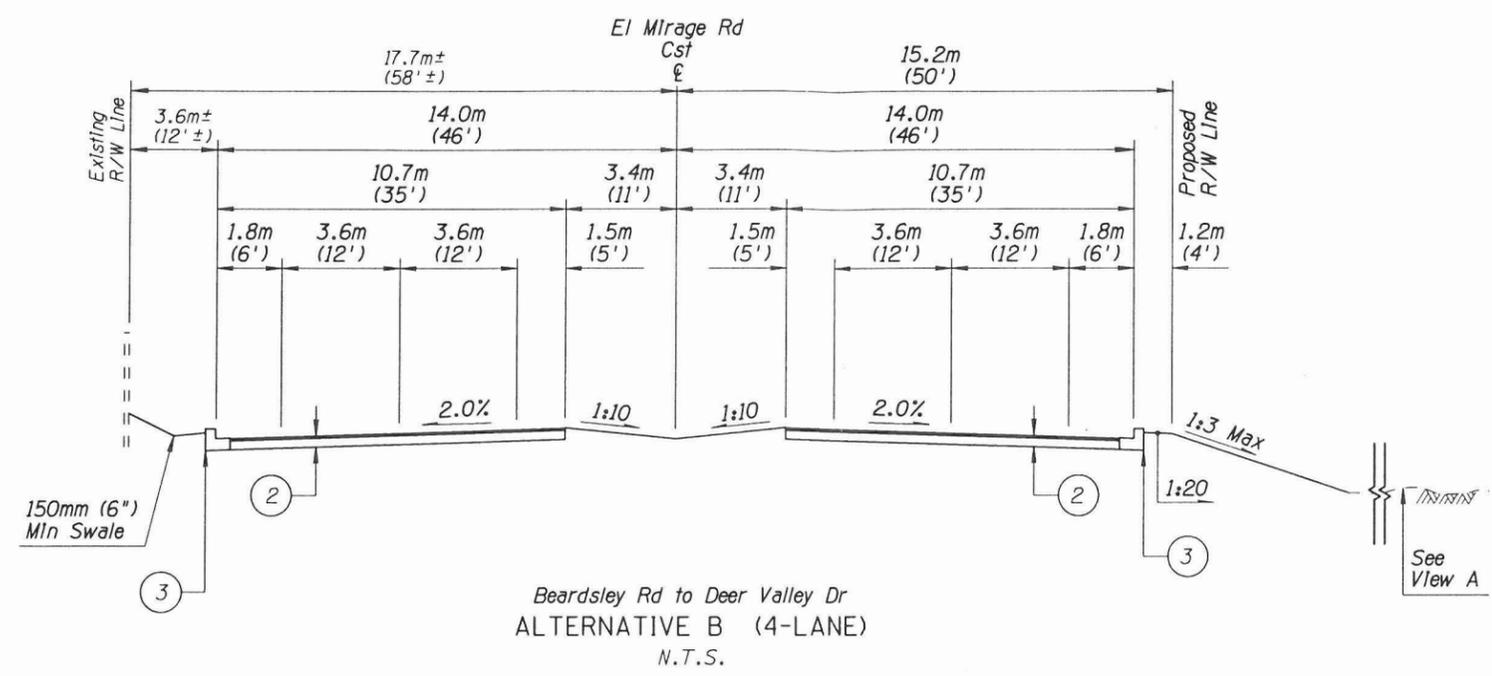
EL MIRAGE ROAD
BEARDSLEY RD TO LOOP 303
PROJECT NO. C-99-0786-18

| | | | |
|--|----------|-----|-------|
| PRELIMINARY NOT FOR CONSTRUCTION | DESIGNED | JHM | 01-99 |
| | DRAWN | ACH | 01-99 |
| | CHECKED | JHM | 01-99 |

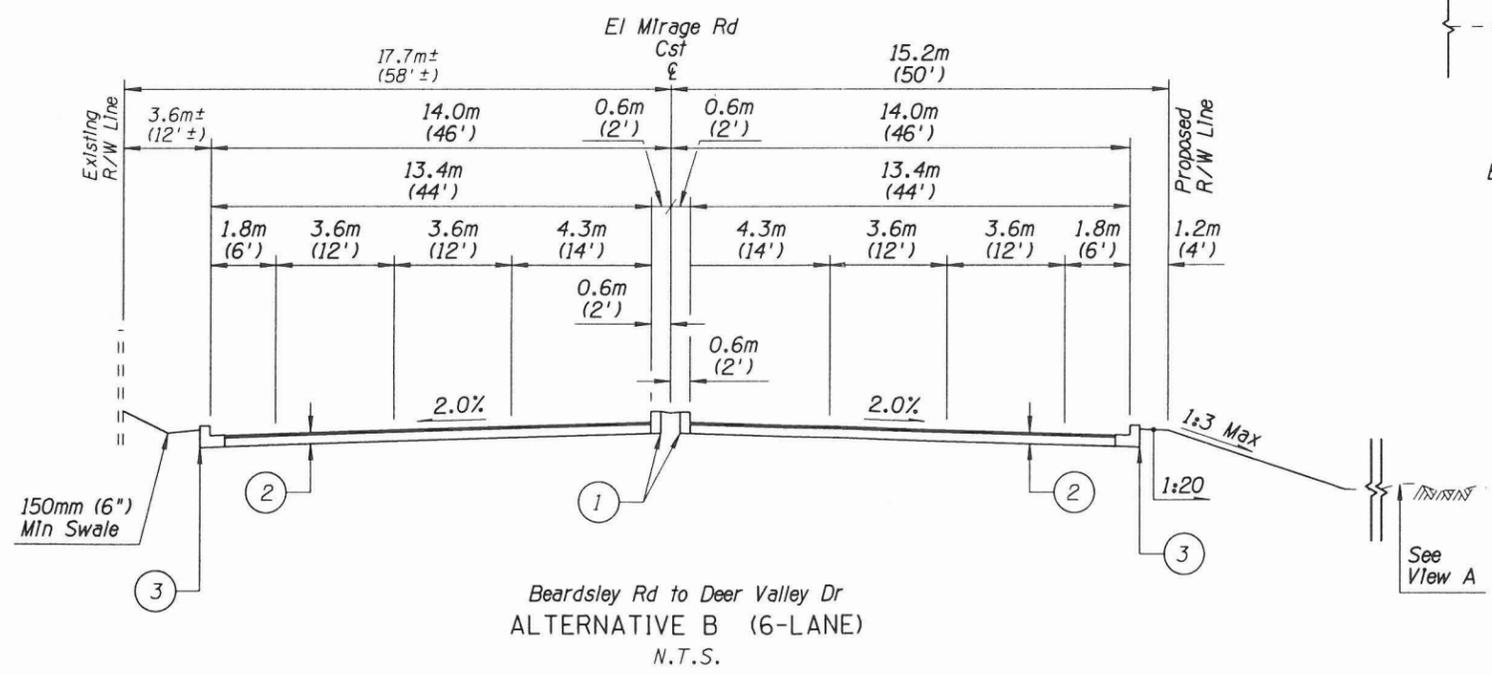
**PARSONS
BRINCKERHOFF**

TYPICAL SECTIONS

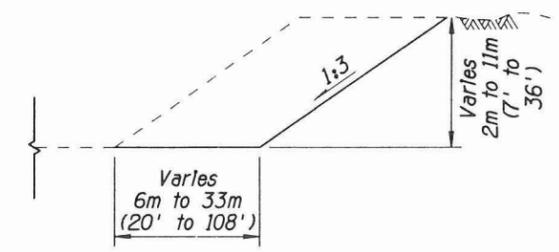
SHEET OF
1 3



See View A



See View A

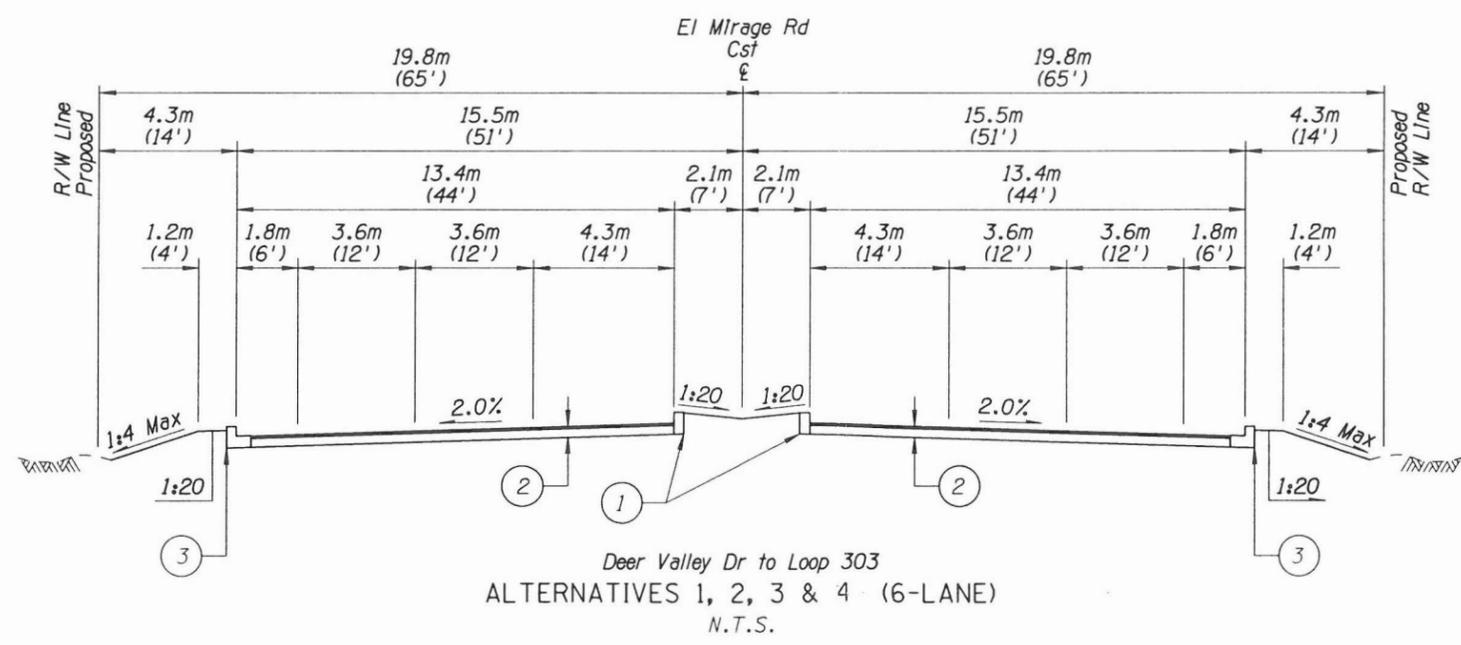
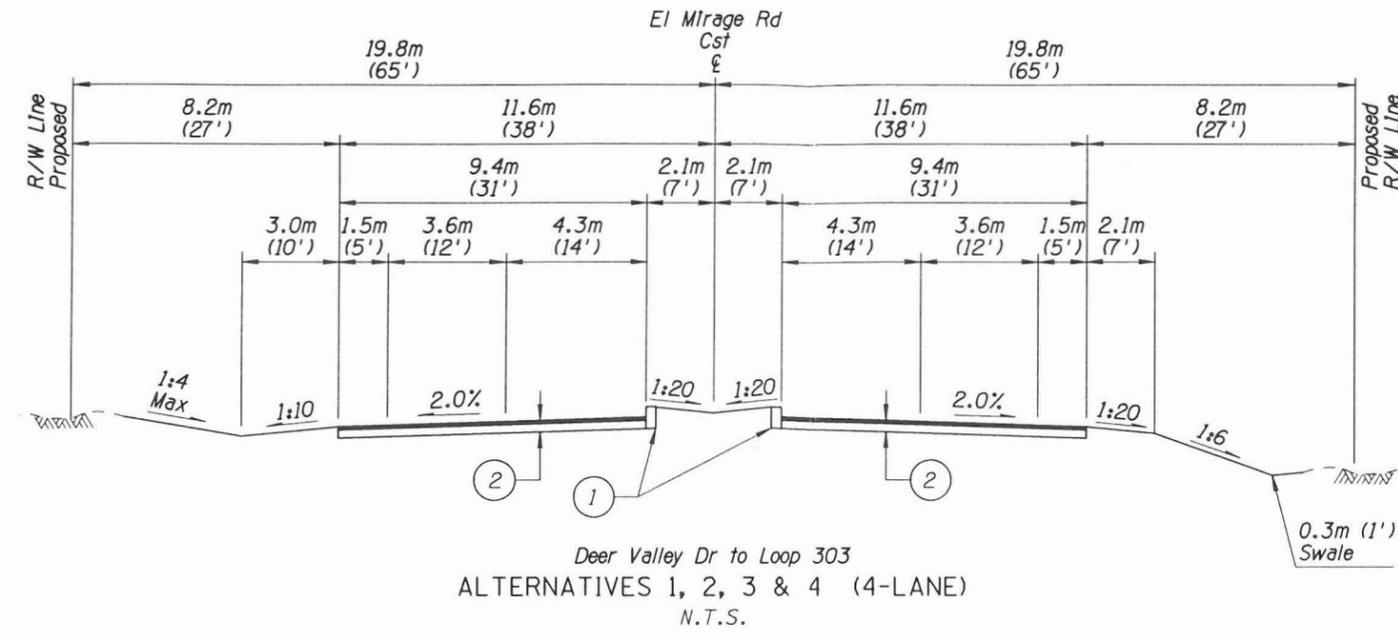


NOTES:

- ① MCDOT Std Detail 2030, Single Curb.
- ② 100mm (4") MIn AC Over 250mm (10") MIn AB or Approved Equivalent.
- ③ MAG Std Detail 220, Type A or MCDOT Std Detail 2030, Curb & Gutter.

| | | | |
|---|----------|-----|-----------------|
| NO. | REVISION | BY | DATE |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | | |
| EL MIRAGE ROAD BEARDSLEY RD TO LOOP 303 PROJECT NO. C-99-0786-18 | | | |
| PRELIMINARY NOT FOR CONSTRUCTION | DESIGNED | JHM | 01-99 |
| | DRAWN | TOU | 01-99 |
| | CHECKED | JHM | 01-99 |
| PARSONS BRINCKERHOFF | | | |
| TYPICAL SECTIONS | | | SHEET OF 2 3 |

mb.dgn 12/02/94



NOTES:

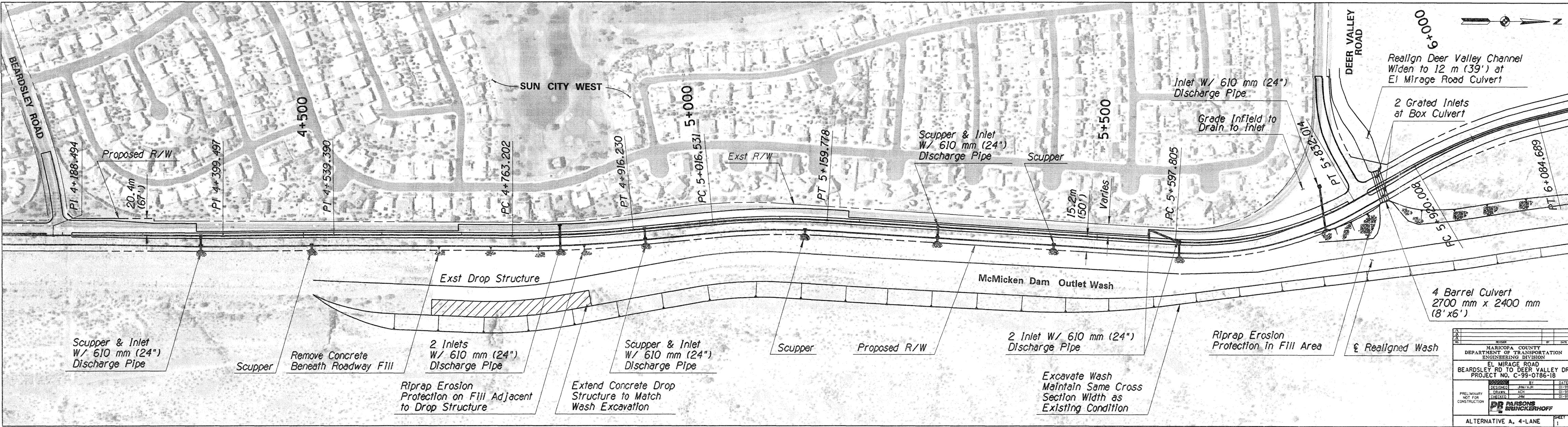
- ① MCDOT Std Detail 2030, Single Curb.
- ② 100mm (4") Min AC Over 250mm (10") Min AB or Approved Equivalent.
- ③ MAG Std Detail 220, Type A or MCDOT Std Detail 2030, Curb & Gutter.

| | | | |
|--|----------|-----|------------------------|
| NO. | REVISION | BY | DATE |
| | | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | | |
| EL MIRAGE ROAD BEARDSLEY RD TO LOOP 303 PROJECT NO. C-99-0786-18 | | | |
| PRELIMINARY NOT FOR CONSTRUCTION | DESIGNED | JHM | 01-99 |
| | DRAWN | TOU | 01-99 |
| | CHECKED | JHM | 01-99 |
| | | | SHEET OF 3 3 |
| TYPICAL SECTIONS | | | |

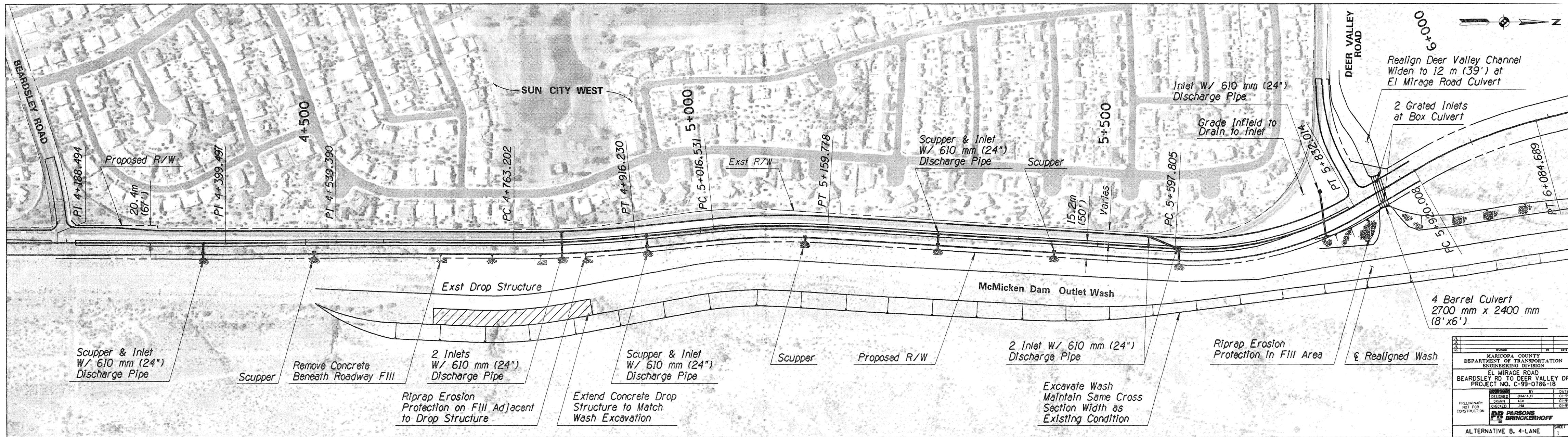
mb.dgn 12/02/94

APPENDIX B

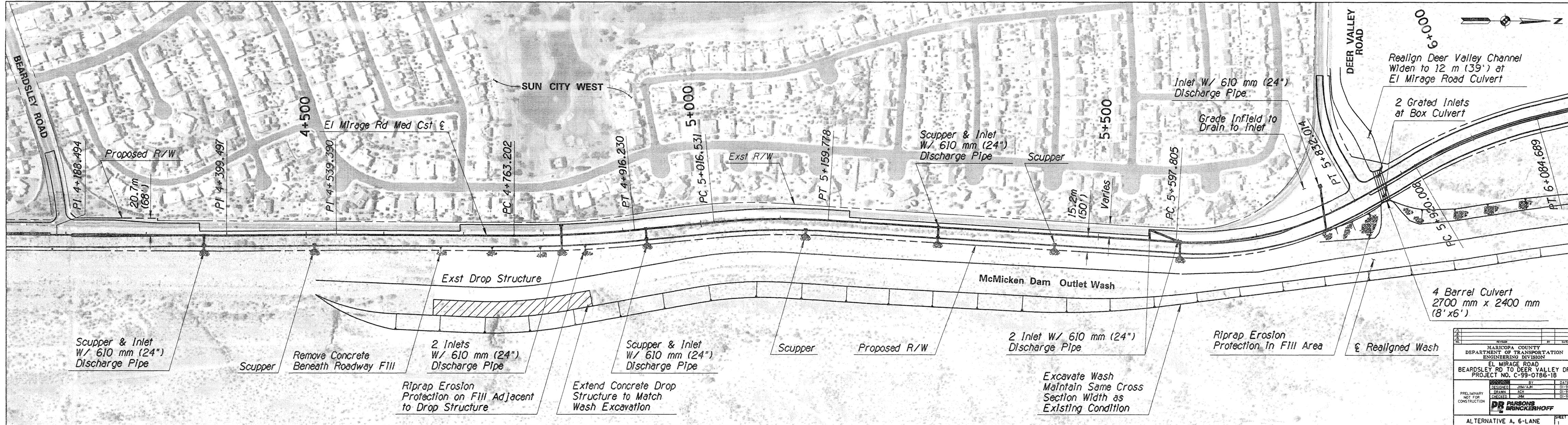
ROADWAY DESIGN ALTERNATIVES



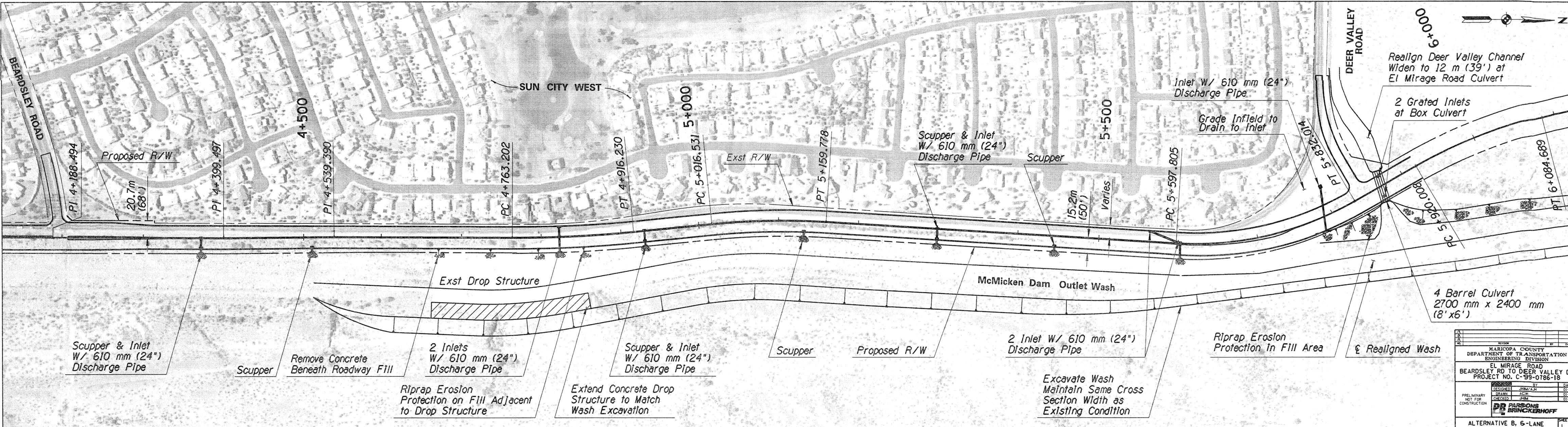
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|--|---------|------------|
| REVISION | BY | DATE |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD BEARDSLEY RD TO DEER VALLEY DR PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJH | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM | 01-99 |
| | | |
| ALTERNATIVE A, 4-LANE | | SHEET OF 1 |



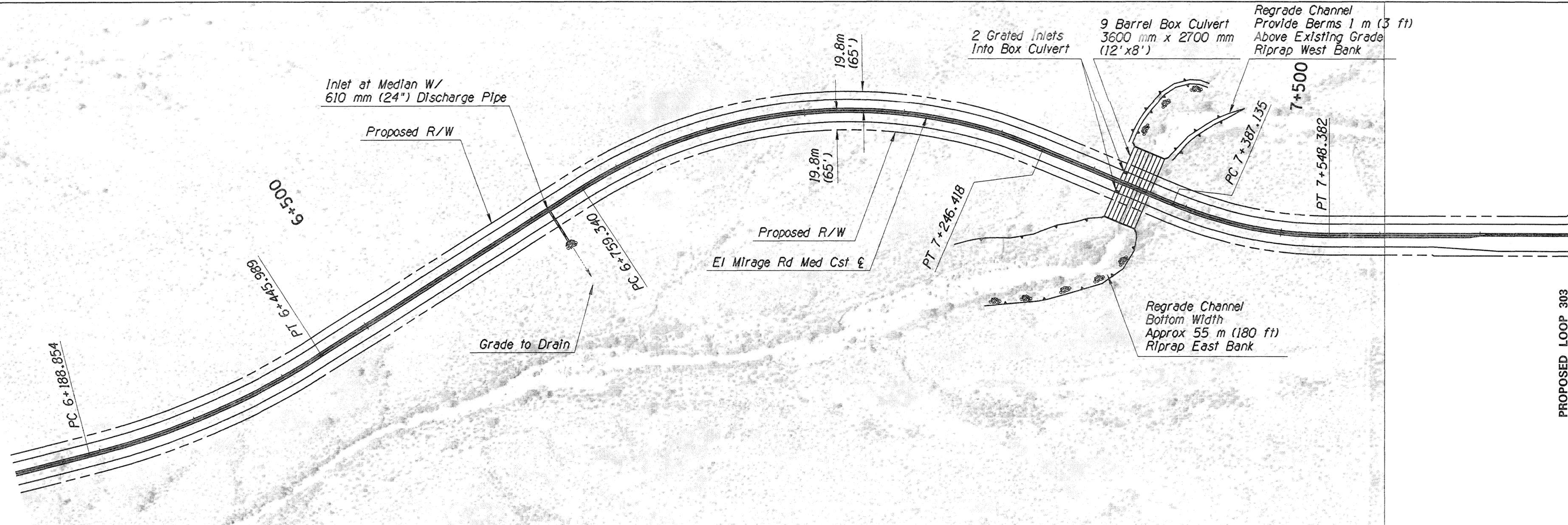
| | | |
|---|---------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION EL MIRAGE ROAD BEARDSLEY RD TO DEER VALLEY DR PROJECT NO. C-99-0786-1B | | |
| DESIGNED | JHM/AJM | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| PARSONS BRINCKERHOFF | | SHEET OF 1 1 |
| ALTERNATIVE B, 4-LANE | | |



| | | |
|---|---------|------------|
| REVISION | BY | DATE |
| | | |
| | | |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION EL MIRAGE ROAD BEARDSLEY RD TO DEER VALLEY DR PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJM | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM | 01-99 |
| NOT FOR CONSTRUCTION | | |
| ALTERNATIVE A, 6-LANE | | SHEET OF 1 |



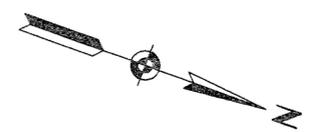
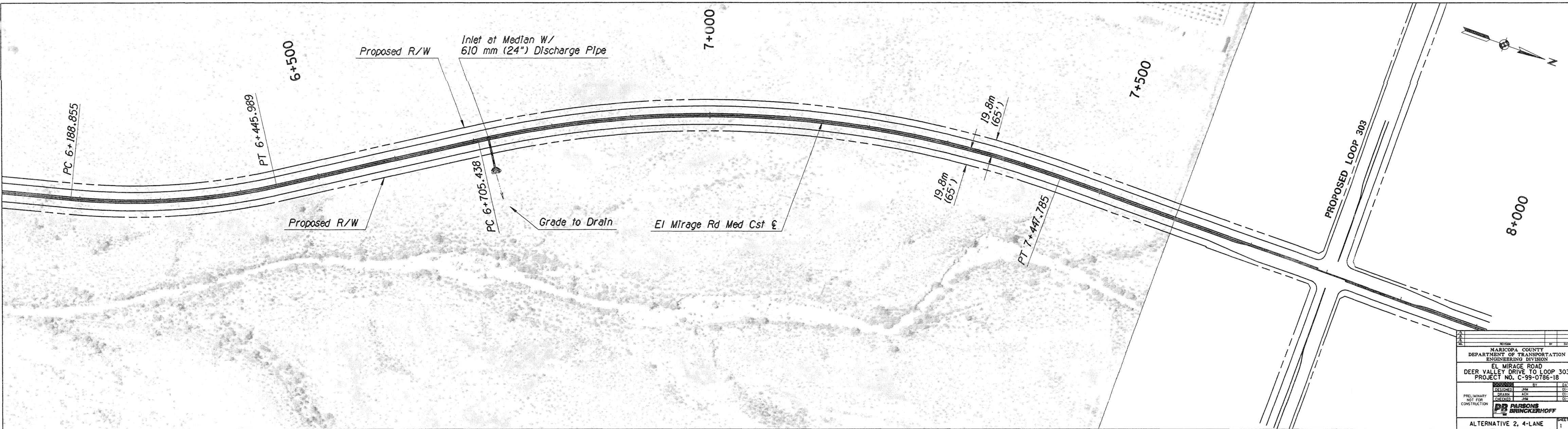
| | | |
|---|---------|-----------------|
| REVISION | BY | DATE |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION EL MIRAGE ROAD BEARDSLEY RD TO DEER VALLEY DR PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/ASH | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| DB PARSONS BRINCKERHOFF | | SHEET OF 1 1 |
| ALTERNATIVE B, 6-LANE | | |



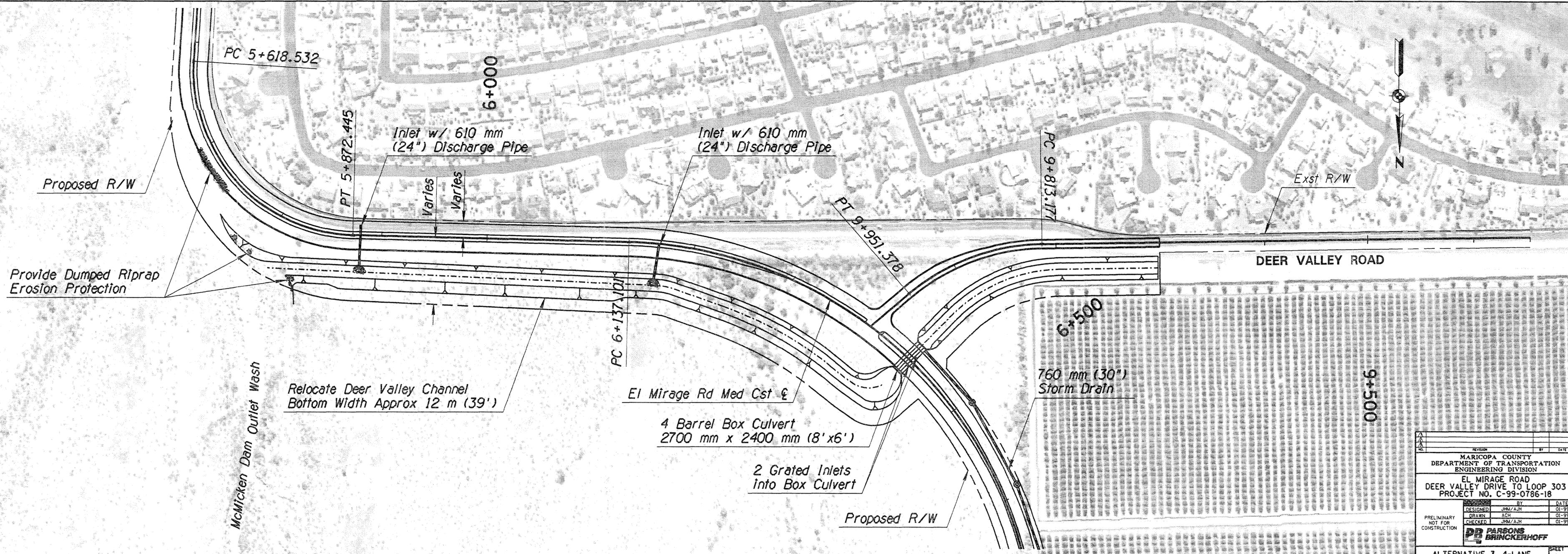
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PROPOSED LOOP 303

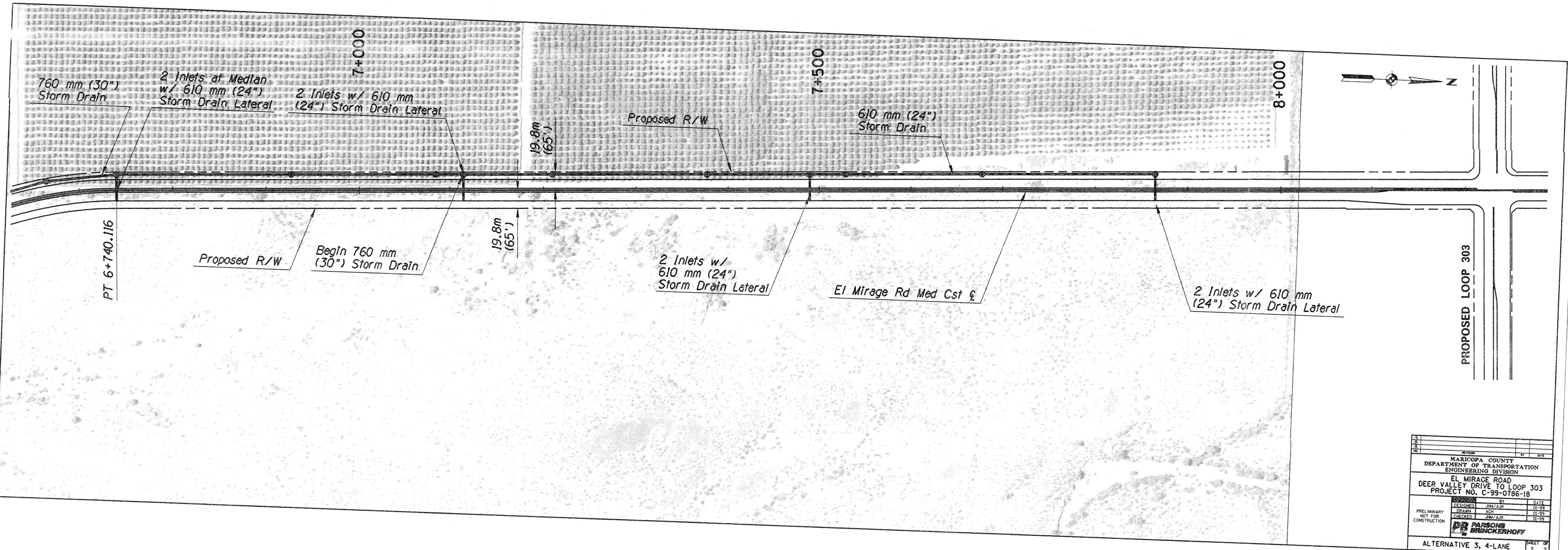
| | | |
|---|---------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJM | 01-99 |
| DRAWN | ICH | 01-99 |
| CHECKED | JHM | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| PARSONS BRINCKERHOFF | | SHEET OF 1 1 |
| ALTERNATIVE 1, 4-LANE | | |



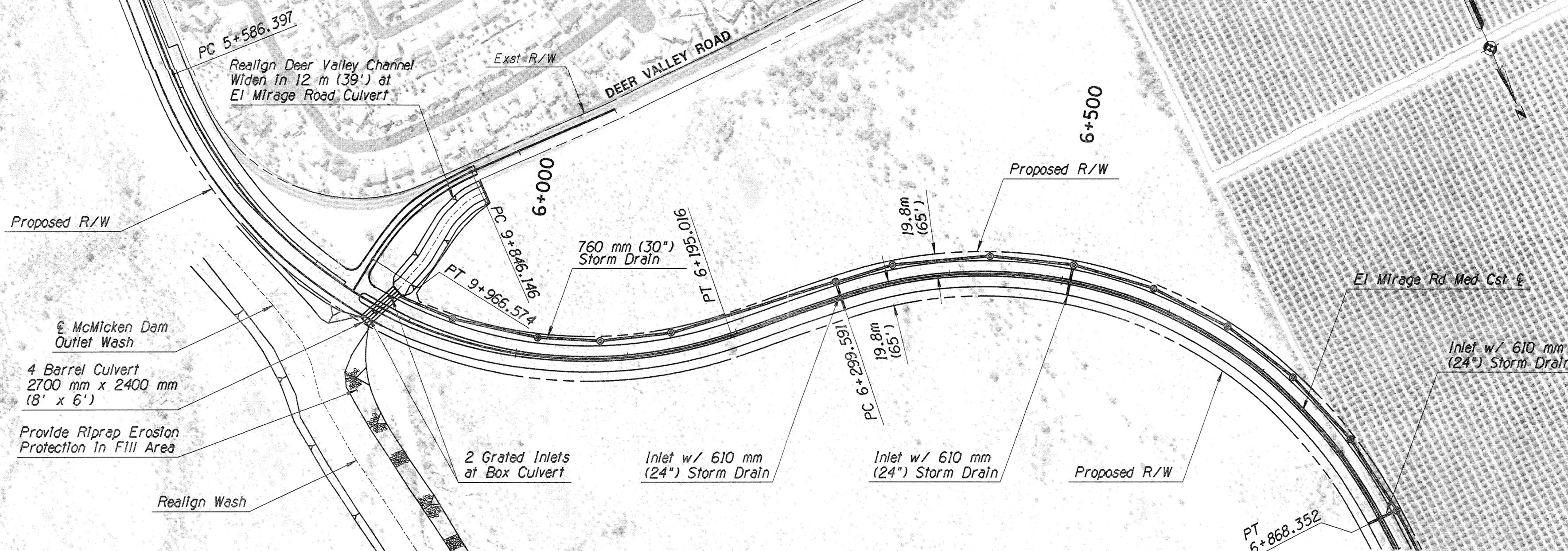
| | | |
|---|-----|---------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| | | SHEET OF 1 |
| ALTERNATIVE 2, 4-LANE | | |



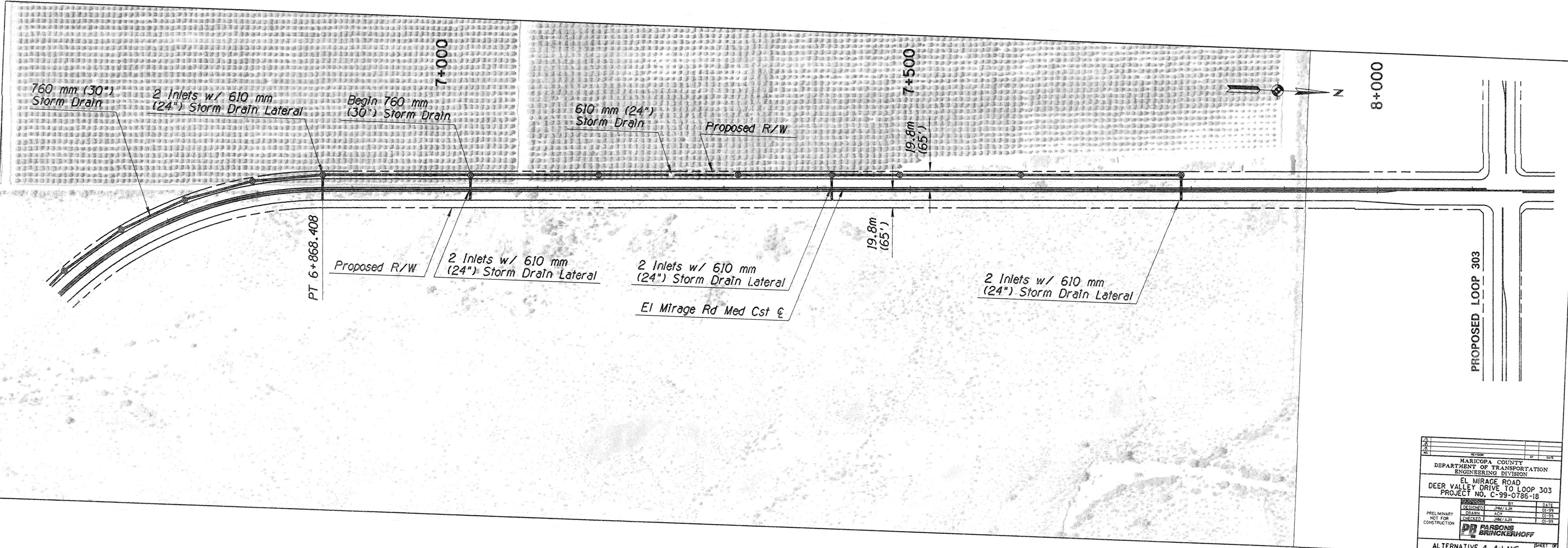
| | | |
|--|---------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJM | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM/AJM | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| | | SHEET OF 1 2 |
| ALTERNATIVE 3, 4-LANE | | |



| | | |
|---|--------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JM/AJR | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JM/AJR | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| | | SHEET OF 2 2 |
| ALTERNATIVE 3, 4-LANE | | |



| | | |
|--|---------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJH | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM/AJH | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| | | SHEET OF 1 2 |
| ALTERNATIVE 4, 4-LANE | | |



PT 6+868.408

7+000

7+500

8+000



PROPOSED LOOP 303

| | | |
|---|---------|-----------------|
| REVISION | BY | DATE |
| | | |
| MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION | | |
| EL MIRAGE ROAD DEER VALLEY DRIVE TO LOOP 303 PROJECT NO. C-99-0786-18 | | |
| DESIGNED | JHM/AJH | 01-99 |
| DRAWN | ACH | 01-99 |
| CHECKED | JHM/AJH | 01-99 |
| PRELIMINARY NOT FOR CONSTRUCTION | | |
| | | SHEET OF 2 2 |
| ALTERNATIVE 4, 4-LANE | | |

APPENDIX C

HIGHWAY CAPACITY SOFTWARE ANALYSIS

El Mirage And Beardsley

Howard Olien 19-Jan-99

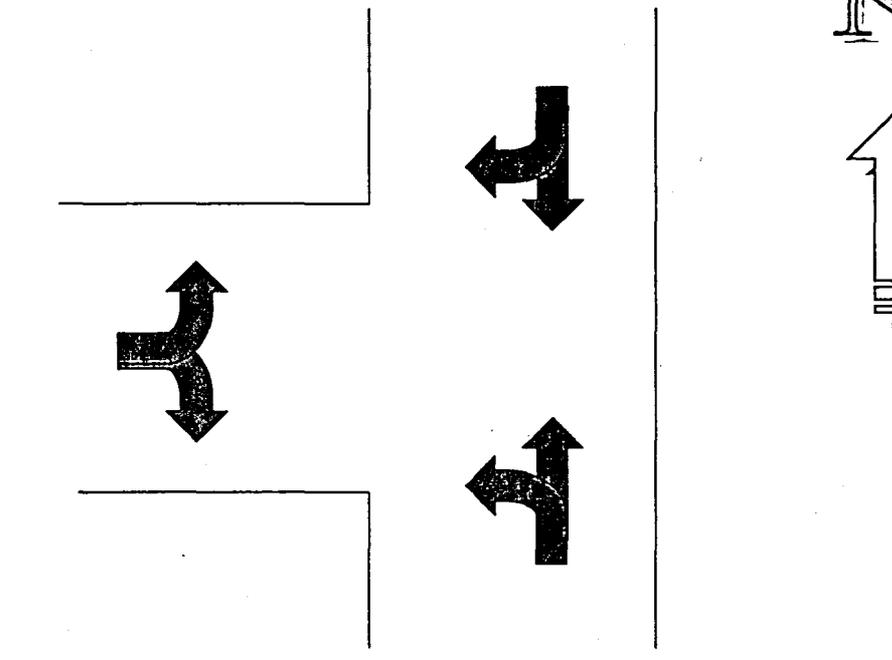
| ADT (2-Way) | El Mirage | | Beardsley | |
|---------------|-----------|----------|-----------|---------|
| | SouthLeg | NorthLeg | WestLeg | EastLeg |
| 1998 Existing | 7765 | 3110 | 5074 | 0 |
| 2001 Future | 10561 | 3110 | 9620 | 0 |
| 2010 Future | 12392 | 4702 | 9489 | 0 |
| 2020 Future | 22564 | 22352 | 13354 | 0 |
| 0 Future | 0 | 0 | 0 | 0 |

| AM Peak Hour | El Mirage | | | | | | Beardsley | | | | | |
|---------------|------------|----------|-------|------------|----------|-------|-----------|----------|-------|-----------|----------|-------|
| | NorthBound | | | SouthBound | | | EastBound | | | WestBound | | |
| | Left | Straight | Right | Left | Straight | Right | Left | Straight | Right | Left | Straight | Right |
| 1998 Existing | 107 | 84 | | | 133 | 4 | 7 | | 192 | | | |
| 2001 Future | 174 | 99 | | | 157 | 6 | 10 | | 313 | | | |
| 2010 Future | 185 | 131 | | | 207 | 7 | 12 | | 333 | | | |
| 2020 Future | 296 | 424 | | | 671 | 20 | 34 | | 532 | | | |
| 0 Future | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | |
| D Factor | 58.23% | | | 41.77% | | | 100.00% | | | 0.00% | | |
| K Factor | 6.65% | | | 7.33% | | | 6.11% | | | | | |

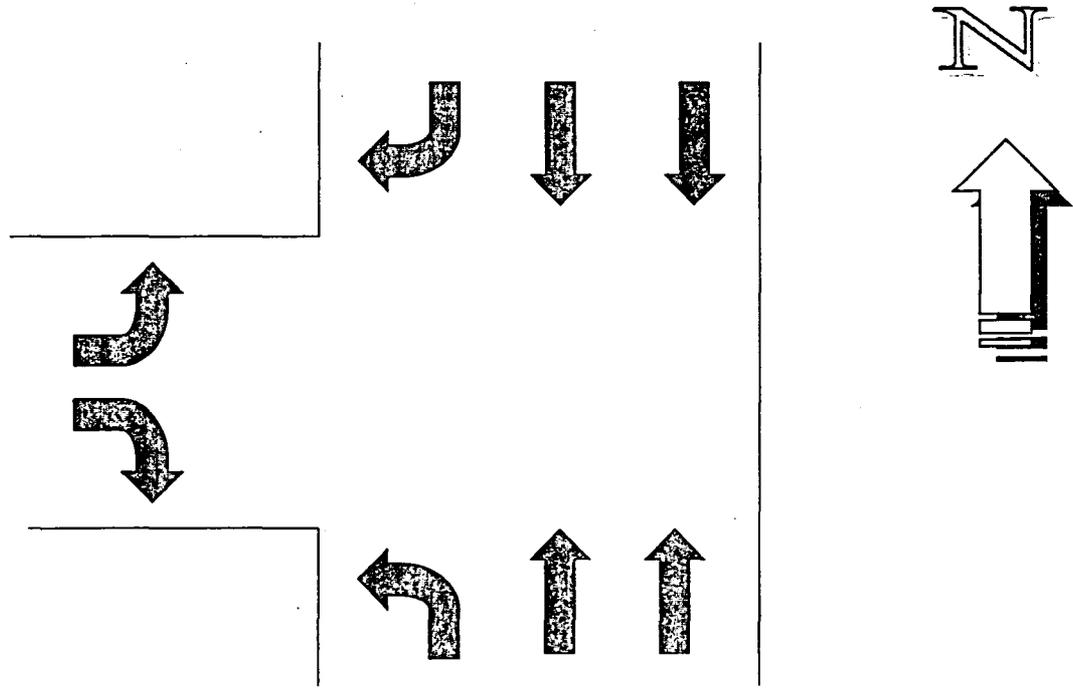
Average K Factor 6.70%

| PM Peak Hour | El Mirage | | | | | | Beardsley | | | | | |
|---------------|------------|----------|-------|------------|----------|-------|-----------|----------|-------|-----------|----------|-------|
| | NorthBound | | | SouthBound | | | EastBound | | | WestBound | | |
| | Left | Straight | Right | Left | Straight | Right | Left | Straight | Right | Left | Straight | Right |
| 1998 Existing | 201 | 146 | | | 93 | 8 | 3 | | 173 | | | |
| 2001 Future | 327 | 172 | | | 110 | 12 | 4 | | 282 | | | |
| 2010 Future | 348 | 227 | | | 145 | 14 | 5 | | 300 | | | |
| 2020 Future | 557 | 737 | | | 469 | 39 | 15 | | 479 | | | |
| 0 Future | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | |
| D Factor | 77.46% | | | 22.54% | | | 100.00% | | | 0.00% | | |
| K Factor | 7.89% | | | 8.04% | | | 7.59% | | | | | |

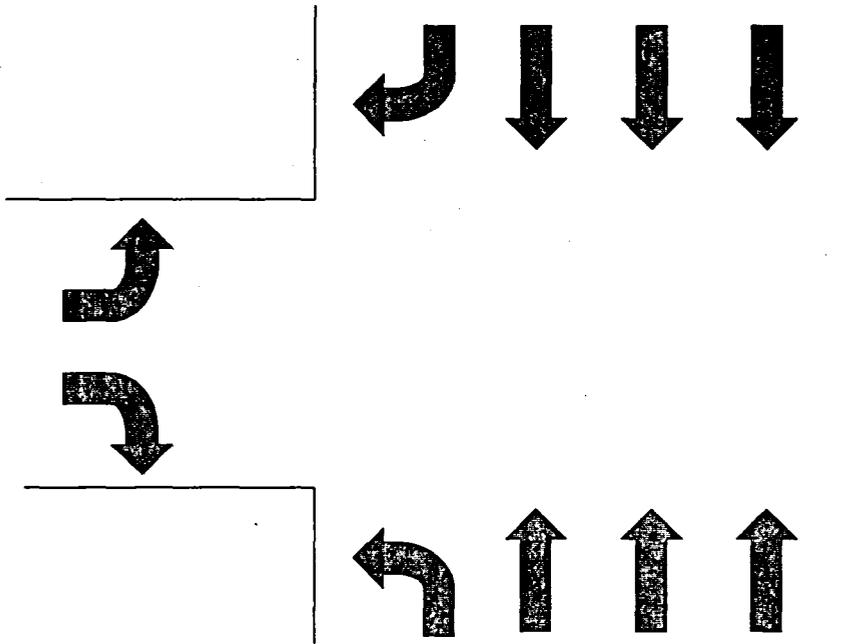
Average K Factor 7.84%



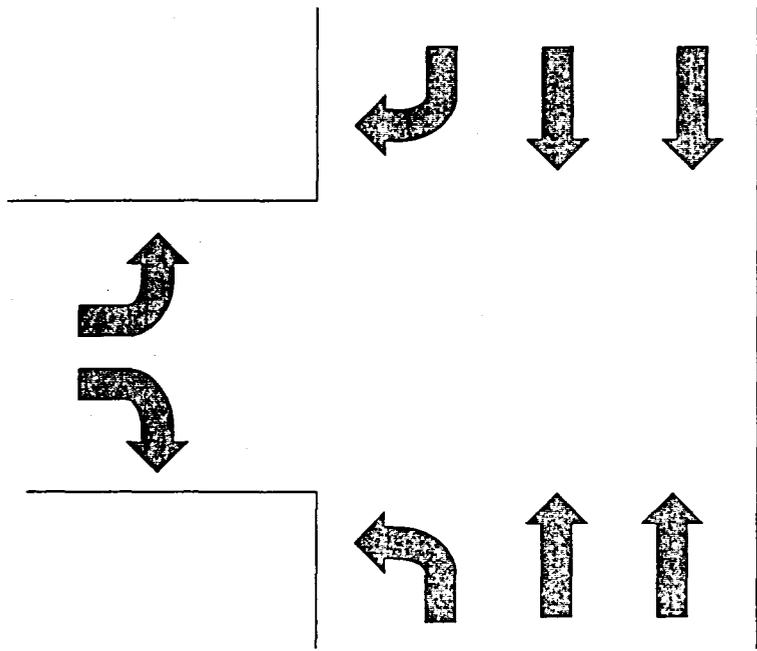
**El Mirage And Beardsley
Existing Lane Configuration**



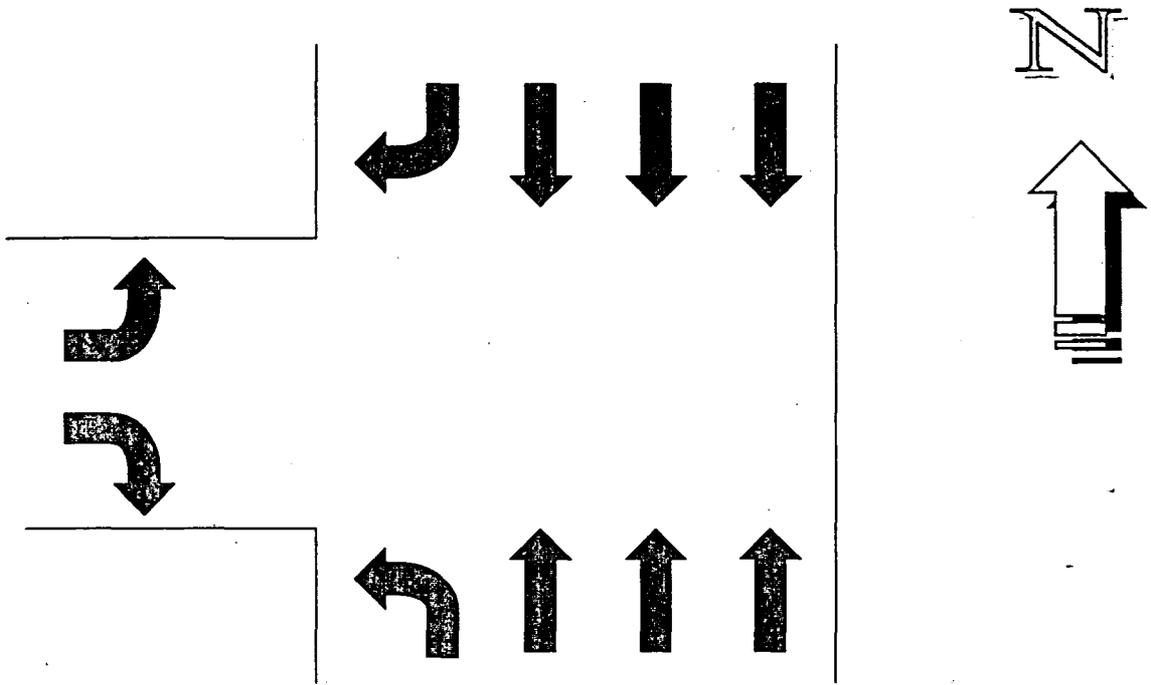
**El Mirage And Beardsley
Proposed 4 Lane Configuration**



**El Mirage And Beardsley
Proposed 6 Lane Configuration**



**El Mirage And Deer Valley
Proposed 4 Lane Configuration**



**El Mirage And Deer Valley
Proposed 6 Lane Configuration**



**El Mirage And Loop 303
Proposed 4 Lane Configuration**

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... 1 Mirage: Beardsley To Deer Valley
 ANALYST..... Howard Olien
 TIME OF ANALYSIS..... 2010 AM
 DATE OF ANALYSIS..... 19JAN1999
 OTHER INFORMATION.... 2 Lane (Existing) Option

A) ADJUSTMENT FACTORS

 PERCENTAGE OF TRUCKS..... 5
 PERCENTAGE OF BUSES..... 0
 PERCENTAGE OF RECREATIONAL VEHICLES..... 0
 DESIGN SPEED (MPH)..... 60
 PEAK HOUR FACTOR..... .87
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 61 / 39
 LANE WIDTH (FT)..... 12
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 2
 PERCENT NO PASSING ZONES..... 10

B) CORRECTION FACTORS

 LEVEL TERRAIN

| LOS | E T | E B | E R | f w | f d | f HV |
|-----|--------|--------|--------|--------|--------|---------|
| A | 2 | 1.8 | 2.2 | .81 | .94 | .95 |
| B | 2.2 | 2 | 2.5 | .81 | .94 | .94 |
| C | 2.2 | 2 | 2.5 | .81 | .94 | .94 |
| D | 2 | 1.6 | 1.6 | .81 | .94 | .95 |
| E | 2 | 1.6 | 1.6 | .93 | .94 | .95 |

C) LEVEL OF SERVICE RESULTS

 INPUT VOLUME (vph) : 444
 ACTUAL FLOW RATE: 510

| LOS | SERVICE FLOW RATE | V/C |
|-----|----------------------|-----|
| A | 303 | .15 |
| B | 540 | .27 |
| C | 860 | .43 |
| D | 1293 | .64 |
| E | 2319 | 1 |

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... 1 Mirage: Beardsley To Deer Valley
 ANALYST..... Howard Olien
 TIME OF ANALYSIS..... 2020 AM
 DATE OF ANALYSIS..... 19JAN1999
 OTHER INFORMATION.... 2 Lane (Existing) Option

A) ADJUSTMENT FACTORS

 PERCENTAGE OF TRUCKS..... 5
 PERCENTAGE OF BUSES..... 0
 PERCENTAGE OF RECREATIONAL VEHICLES..... 0
 DESIGN SPEED (MPH)..... 60
 PEAK HOUR FACTOR..... .87
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 60 / 40
 LANE WIDTH (FT)..... 12
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 2
 PERCENT NO PASSING ZONES..... 10

B) CORRECTION FACTORS

 LEVEL TERRAIN

| LOS | E T | E B | E R | f w | f d | f HV |
|-----|--------|--------|--------|--------|--------|---------|
| A | 2 | 1.8 | 2.2 | .81 | .94 | .95 |
| B | 2.2 | 2 | 2.5 | .81 | .94 | .94 |
| C | 2.2 | 2 | 2.5 | .81 | .94 | .94 |
| D | 2 | 1.6 | 1.6 | .81 | .94 | .95 |
| E | 2 | 1.6 | 1.6 | .93 | .94 | .95 |

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME (vph): 2111
 ACTUAL FLOW RATE: 2426

| LOS | SERVICE FLOW RATE | V/C |
|-----|----------------------|-----|
| A | 305 | .15 |
| B | 543 | .27 |
| C | 865 | .43 |
| D | 1299 | .64 |
| E | 2331 | 1 |

LOS FOR GIVEN CONDITIONS: F

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File Name ELMBD014.HC7
 Facility Section..... El Mirage
 From/To..... Beardsley/Deer Valle
 Analyst..... Howard Olien
 Time of Analysis..... AM 2001
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| B. Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 179 | 119 |
| Peak-Hour Factor or Peak 15 Minutes | 0.87 | 0.87 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Ideal Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | U | U |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

C. Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |

D. Level of Service Results

| | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 105 | 70 |
| Free Flow Speed (mph) | 57.5 | 57.5 |
| Average Passenger Car Speed (mph) | 57.5 | 57.5 |
| Density (pcpmpl) | 1.8 | 1.2 |
| Level of Service (LOS) | A | A |

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File Name ELMBD104.HC7
 Facility Section..... El Mirage
 From/To..... Beardsley/Deer Valle
 Analyst..... Howard Olien
 Time of Analysis..... AM 2010
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 266 | 178 |
| Peak-Hour Factor or Peak 15 Minutes | 0.87 | 0.87 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Ideal Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | U | U |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |

Level of Service Results

| | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 157 | 105 |
| Free Flow Speed (mph) | 57.5 | 57.5 |
| Average Passenger Car Speed (mph) | 57.5 | 57.5 |
| Density (pcpmp1) | 2.7 | 1.8 |
| Level of Service (LOS) | A | A |

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File Name ELMBD204.HC7
 Facility Section..... El Mirage
 From/To..... Beardsley/Deer Valle
 Analyst..... Howard Olien
 Time of Analysis..... AM 2020
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| B. Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 1266 | 844 |
| Peak-Hour Factor or Peak 15 Minutes | 0.87 | 0.87 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Ideal Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | U | U |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

C. Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |

| C. Level of Service Results | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 746 | 497 |
| Free Flow Speed (mph) | 57.5 | 57.5 |
| Average Passenger Car Speed (mph) | 57.5 | 57.5 |
| Density (pcpmp1) | 13.0 | 8.6 |
| Level of Service (LOS) | B | A |

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File Name ELMD3014.HC7
 Facility Section..... El Mirage
 From/To..... Deer Valley/Loop 303
 Analyst..... Howard Olien
 Time of Analysis..... AM 2001
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| A. Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 277 | 184 |
| Peak-Hour Factor or Peak 15 Minutes | 0.79 | 0.79 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Ideal Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | D | D |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

B. Adjustment Factors

| Terrain Type | E T | E R | F HV | F M | F LW | F LC | F A |
|--------------|--------|--------|---------|--------|---------|---------|--------|
| Dir 1 LEVEL | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |

C. Level of Service Results

| | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 180 | 119 |
| Free Flow Speed (mph) | 57.7 | 57.7 |
| Average Passenger Car Speed (mph) | 57.7 | 57.7 |
| Density (pcpmpl) | 3.1 | 2.1 |
| Level of Service (LOS) | A | A |

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File Name ELMD3104.HC7
 Facility Section..... El Mirage
 From/To..... Deer Valley/Loop 303
 Analyst..... Howard Olien
 Time of Analysis..... AM 2010
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| B. Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 578 | 386 |
| Peak-Hour Factor or Peak 15 Minutes | 0.79 | 0.79 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Ideal Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | D | D |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

C. Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |

| C. Level of Service Results | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 375 | 250 |
| Free Flow Speed (mph) | 57.7 | 57.7 |
| Average Passenger Car Speed (mph) | 57.7 | 57.7 |
| Density (pcpml) | 6.5 | 4.3 |
| Level of Service (LOS) | A | A |

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File Name ELMD3204.HC7
 Facility Section..... El Mirage
 From/To..... Deer Valley/Loop 303
 Analyst..... Howard Olien
 Time of Analysis..... AM 2020
 Date of Analysis..... 1 /19/99
 Other Information.... 4 Lane Option

| B. Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 916 | 611 |
| Peak-Hour Factor or Peak 15 Minutes | 0.79 | 0.79 |
| Number of Lanes | 2 | 2 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Design Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | D | D |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

C. Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 0.00 | 0.00 | 1.80 | 0.50 |

| C. Level of Service Results | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 594 | 396 |
| Free Flow Speed (mph) | 57.7 | 57.7 |
| Average Passenger Car Speed (mph) | 57.7 | 57.7 |
| Density (pcpmp1) | 10.3 | 6.9 |
| Level of Service (LOS) | A | A |

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File Name ELMBD206.HC7
 Facility Section..... El Mirage
 From/To..... Beardsley/Deer Valle
 Analyst..... Howard Olien
 Time of Analysis..... AM 2020
 Date of Analysis..... 1 /19/99
 Other Information.... 6 Lane Option

| Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 1266 | 844 |
| Peak-Hour Factor or Peak 15 Minutes | 0.87 | 0.87 |
| Number of Lanes | 3 | 3 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Design Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | U | U |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 1.60 | 0.00 | 0.40 | 0.50 |

| Level of Service Results | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 497 | 331 |
| Free Flow Speed (mph) | 57.5 | 57.5 |
| Average Passenger Car Speed (mph) | 57.5 | 57.5 |
| Density (pcpmp1) | 8.6 | 5.8 |
| Level of Service (LOS) | A | A |

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File Name ELMD3206.HC7
 Facility Section..... El Mirage
 From/To..... Deer Valley/Loop 303
 Analyst..... Howard Olien
 Time of Analysis..... AM 2020
 Date of Analysis..... 1 /19/99
 Other Information.... 6 Lane Option

| Geometrics and Traffic Input | Direction 1 | Direction 2 |
|-------------------------------------|-------------|-------------|
| Volume | 916 | 611 |
| Peak-Hour Factor or Peak 15 Minutes | 0.79 | 0.79 |
| Number of Lanes | 3 | 3 |
| Percentage of Trucks and Buses | 5 | 5 |
| Percentage of Recreational Vehicles | 0 | 0 |
| Design Free-Flow Speed (mph) | 60.0 | 60.0 |
| Type of Median | D | D |
| Lane Width (ft) | 12.0 | 12.0 |
| Distance from Roadway Edge (ft) | 4.0 | 4.0 |
| Access Points per Mile | 2.0 | 2.0 |

Adjustment Factors

| Terrain Type | E | E | F | F | F | F | F |
|--------------|------|---|------|------|------|------|------|
| | T | R | HV | M | LW | LC | A |
| Dir 1 LEVEL | 1.50 | | 0.98 | 0.00 | 0.00 | 1.70 | 0.50 |
| Dir 2 | 1.50 | | 0.98 | 0.00 | 0.00 | 1.70 | 0.50 |

| Level of Service Results | Direction 1 | Direction 2 |
|-----------------------------------|-------------|-------------|
| Service Flow Rate (Vp) | 396 | 264 |
| Free Flow Speed (mph) | 57.8 | 57.8 |
| Average Passenger Car Speed (mph) | 57.8 | 57.8 |
| Density (pcpmp) | 6.9 | 4.6 |
| Level of Service (LOS) | A | A |

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Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....1998 AM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 107 | 84 | | 133 | 4 | | 7 | 0 | 192 | | | |
| PHF | .84 | .84 | | .84 | .84 | | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 127 | 0 | 8 | |
| RT Flow Rate | 0 | 5 | 221 | |
| Approach Flow Rate | 227 | 163 | 229 | |
| Proportion LT | 0.56 | 0.00 | 0.03 | |
| Proportion RT | 0.00 | 0.03 | 0.97 | |
| Opposing Approach Flow Rate | 163 | 227 | 0 | |
| Conflicting Approaches Flow Rate | 229 | 229 | 390 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.26 | 0.37 | |
| Proportion, Opposing Approach Flow Rate | 0.26 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 127 | 0 | |
| RT, Opposing Approach | 5 | 0 | 0 | |
| LT, Conflicting Approaches | 8 | 8 | 127 | |
| RT, Conflicting Approaches | 221 | 221 | 5 | |
| Proportion LT, Opposing Approach | 0.00 | 0.56 | 0.00 | |
| Proportion RT, Opposing Approach | 0.03 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.03 | 0.03 | 0.33 | |
| Proportion RT, Conflicting Approaches | 0.97 | 0.97 | 0.01 | |
| Approach Capacity | 936 | 731 | 476 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 227 | 936 | 0.24 | 2.5 | A |
| SB | 163 | 731 | 0.22 | 2.3 | A |
| EB | 229 | 476 | 0.48 | 6.2 | B |

Intersection Delay = 3.8
 Level of Service (Intersection) = A

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Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....1998 PM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 201 | 146 | | | 93 | 8 | 3 | 0 | 173 | | | |
| PHF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 212 | 0 | 3 | |
| RT Flow Rate | 0 | 10 | 192 | |
| Approach Flow Rate | 366 | 123 | 195 | |
| Proportion LT | 0.58 | 0.00 | 0.02 | |
| Proportion RT | 0.00 | 0.08 | 0.98 | |
| Opposing Approach Flow Rate | 123 | 366 | 0 | |
| Conflicting Approaches Flow Rate | 195 | 195 | 489 | |
| Proportion, Subject Approach Flow Rate | 0.54 | 0.18 | 0.29 | |
| Proportion, Opposing Approach Flow Rate | 0.18 | 0.54 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 212 | 0 | |
| RT, Opposing Approach | 10 | 0 | 0 | |
| LT, Conflicting Approaches | 3 | 3 | 212 | |
| RT, Conflicting Approaches | 192 | 192 | 10 | |
| Proportion LT, Opposing Approach | 0.00 | 0.58 | 0.00 | |
| Proportion RT, Opposing Approach | 0.08 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.02 | 0.02 | 0.43 | |
| Proportion RT, Conflicting Approaches | 0.98 | 0.98 | 0.02 | |
| Approach Capacity | 1068 | 771 | 361 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 366 | 1068 | 0.34 | 3.7 | A |
| SB | 123 | 771 | 0.16 | 1.8 | A |
| EB | 195 | 361 | 0.54 | 7.8 | B |

Intersection Delay = 4.5
 Level of Service (Intersection) = A

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 Phone: (904) 392-0378

Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information..... 2001 AM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 174 | 99 | | 157 | 6 | | 10 | 0 | 313 | | | |
| PHF | .84 | .84 | | .84 | .84 | | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 207 | 0 | 11 | |
| RT Flow Rate | 0 | 7 | 360 | |
| Approach Flow Rate | 325 | 194 | 371 | |
| Proportion LT | 0.64 | 0.00 | 0.03 | |
| Proportion RT | 0.00 | 0.04 | 0.97 | |
| Opposing Approach Flow Rate | 194 | 325 | 0 | |
| Conflicting Approaches Flow Rate | 371 | 371 | 519 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.22 | 0.42 | |
| Proportion, Opposing Approach Flow Rate | 0.22 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 207 | 0 | |
| RT, Opposing Approach | 7 | 0 | 0 | |
| LT, Conflicting Approaches | 11 | 11 | 207 | |
| RT, Conflicting Approaches | 360 | 360 | 7 | |
| Proportion LT, Opposing Approach | 0.00 | 0.64 | 0.00 | |
| Proportion RT, Opposing Approach | 0.04 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.03 | 0.03 | 0.40 | |
| Proportion RT, Conflicting Approaches | 0.97 | 0.97 | 0.01 | |
| Approach Capacity | 907 | 665 | 501 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 325 | 907 | 0.36 | 3.9 | A |
| SB | 194 | 665 | 0.29 | 3.0 | A |
| EB | 371 | 501 | 0.74 | 16.7 | C |

Intersection Delay = 9.0
 Level of Service (Intersection) = B

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Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2001 PM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 327 | 172 | | | 110 | 12 | 4 | 0 | 282 | | | |
| PHF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| NT Flow Rate | 344 | 0 | 4 | |
| RT Flow Rate | 0 | 15 | 313 | |
| Approach Flow Rate | 525 | 149 | 317 | |
| Proportion LT | 0.66 | 0.00 | 0.01 | |
| Proportion RT | 0.00 | 0.10 | 0.99 | |
| Opposing Approach Flow Rate | 149 | 525 | 0 | |
| Conflicting Approaches Flow Rate | 317 | 317 | 674 | |
| Proportion, Subject Approach Flow Rate | 0.53 | 0.15 | 0.32 | |
| Proportion, Opposing Approach Flow Rate | 0.15 | 0.53 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 344 | 0 | |
| RT, Opposing Approach | 15 | 0 | 0 | |
| LT, Conflicting Approaches | 4 | 4 | 344 | |
| RT, Conflicting Approaches | 313 | 313 | 15 | |
| Proportion LT, Opposing Approach | 0.00 | 0.66 | 0.00 | |
| Proportion RT, Opposing Approach | 0.10 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.01 | 0.01 | 0.51 | |
| Proportion RT, Conflicting Approaches | 0.99 | 0.99 | 0.02 | |
| Approach Capacity | 1048 | 717 | 373 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 525 | 1048 | 0.50 | 6.7 | B |
| SB | 149 | 717 | 0.21 | 2.2 | A |
| EB | 317 | 373 | 0.85 | 25.3 | D |

Intersection Delay = 12.0
 Level of Service (Intersection) = C

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information..... 2010 AM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 185 | 131 | | | 207 | 7 | 12 | 0 | 333 | | | |
| PHF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 220 | 0 | 14 | |
| RT Flow Rate | 0 | 8 | 383 | |
| Approach Flow Rate | 376 | 254 | 397 | |
| Proportion LT | 0.59 | 0.00 | 0.04 | |
| Proportion RT | 0.00 | 0.03 | 0.96 | |
| Opposing Approach Flow Rate | 254 | 376 | 0 | |
| Conflicting Approaches Flow Rate | 397 | 397 | 630 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.25 | 0.39 | |
| Proportion, Opposing Approach Flow Rate | 0.25 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 220 | 0 | |
| RT, Opposing Approach | 8 | 0 | 0 | |
| LT, Conflicting Approaches | 14 | 14 | 220 | |
| RT, Conflicting Approaches | 383 | 383 | 8 | |
| Proportion LT, Opposing Approach | 0.00 | 0.59 | 0.00 | |
| Proportion RT, Opposing Approach | 0.03 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.04 | 0.04 | 0.35 | |
| Proportion RT, Conflicting Approaches | 0.96 | 0.96 | 0.01 | |
| Approach Capacity | 924 | 707 | 486 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 376 | 924 | 0.41 | 4.7 | A |
| SB | 254 | 707 | 0.36 | 3.9 | A |
| EB | 397 | 486 | 0.82 | 22.3 | D |

Intersection Delay = 11.3
 Level of Service (Intersection) = C

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information..... 2010 PM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 348 | 227 | | 145 | 14 | | 5 | 0 | 300 | | | |
| PHF | .95 | .95 | | .82 | .82 | | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 366 | 0 | 6 | |
| RT Flow Rate | 0 | 17 | 333 | |
| Approach Flow Rate | 605 | 194 | 339 | |
| Proportion LT | 0.60 | 0.00 | 0.02 | |
| Proportion RT | 0.00 | 0.09 | 0.98 | |
| Opposing Approach Flow Rate | 194 | 605 | 0 | |
| Conflicting Approaches Flow Rate | 339 | 339 | 799 | |
| Proportion, Subject Approach Flow Rate | 0.53 | 0.17 | 0.30 | |
| Proportion, Opposing Approach Flow Rate | 0.17 | 0.53 | 0.00 | |
| Lanes on Subject Approach | 1 | 1 | 1 | |
| Lanes on Opposing Approach | 1 | 1 | 0 | |
| LT, Opposing Approach | 0 | 366 | 0 | |
| RT, Opposing Approach | 17 | 0 | 0 | |
| LT, Conflicting Approaches | 6 | 6 | 366 | |
| RT, Conflicting Approaches | 333 | 333 | 17 | |
| Proportion LT, Opposing Approach | 0.00 | 0.60 | 0.00 | |
| Proportion RT, Opposing Approach | 0.09 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.02 | 0.02 | 0.46 | |
| Proportion RT, Conflicting Approaches | 0.98 | 0.98 | 0.02 | |
| Approach Capacity | 1058 | 751 | 367 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 605 | 1058 | 0.57 | 8.8 | B |
| SB | 194 | 751 | 0.26 | 2.7 | A |
| EB | 339 | 367 | 0.92 | 33.5 | E |

Intersection Delay = 15.1
 Level of Service (Intersection) = C

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2020 AM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 296 | 424 | | | 671 | 20 | 34 | 0 | 532 | | | |
| HF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Range Limit(s) Exceeded

From HCM Range of Model Validity (p. 10-37):

The intersection volume exceeds 2100 vph.

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2020 PM
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | > 1 | 0 | 0 | 1 | < 0 | 0 | > 1 | < 0 | 0 | 0 | 0 |
| Volumes | 557 | 737 | | | 469 | 39 | 15 | 0 | 479 | | | |
| HF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Range Limit(s) Exceeded

From HCM Range of Model Validity (p. 10-37):

The intersection volume exceeds 2100 vph.

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....1998 AM 4 Lane
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Volumes | 107 | 84 | | | 133 | 4 | 7 | 0 | 192 | | | |
| PHF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| NT Flow Rate | 127 | 0 | 8 | |
| RT Flow Rate | 0 | 5 | 221 | |
| Approach Flow Rate | 227 | 163 | 229 | |
| Proportion LT | 0.56 | 0.00 | 0.03 | |
| Proportion RT | 0.00 | 0.03 | 0.97 | |
| Opposing Approach Flow Rate | 163 | 227 | 0 | |
| Conflicting Approaches Flow Rate | 229 | 229 | 390 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.26 | 0.37 | |
| Proportion, Opposing Approach Flow Rate | 0.26 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 127 | 0 | |
| RT, Opposing Approach | 5 | 0 | 0 | |
| LT, Conflicting Approaches | 8 | 8 | 127 | |
| RT, Conflicting Approaches | 221 | 221 | 5 | |
| Proportion LT, Opposing Approach | 0.00 | 0.56 | 0.00 | |
| Proportion RT, Opposing Approach | 0.03 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.03 | 0.03 | 0.33 | |
| Proportion RT, Conflicting Approaches | 0.97 | 0.97 | 0.01 | |
| Approach Capacity | 1136 | 931 | 676 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 227 | 1136 | 0.20 | 2.1 | A |
| SB | 163 | 931 | 0.18 | 1.9 | A |
| EB | 229 | 676 | 0.34 | 3.6 | A |

Intersection Delay = 2.6
 Level of Service (Intersection) = A

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....1998 PM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|------------|------------|-----|---|------------|-----|-----|-----------|----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Opp. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 201 | 146 | | | 93 | 8 | 3 | 0 | 173 | | | |
| PHF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 212 | 0 | 3 | |
| RT Flow Rate | 0 | 10 | 192 | |
| Approach Flow Rate | 366 | 123 | 195 | |
| Proportion LT | 0.58 | 0.00 | 0.02 | |
| Proportion RT | 0.00 | 0.08 | 0.98 | |
| Opposing Approach Flow Rate | 123 | 366 | 0 | |
| Conflicting Approaches Flow Rate | 195 | 195 | 489 | |
| Proportion, Subject Approach Flow Rate | 0.54 | 0.18 | 0.29 | |
| Proportion, Opposing Approach Flow Rate | 0.18 | 0.54 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 212 | 0 | |
| RT, Opposing Approach | 10 | 0 | 0 | |
| LT, Conflicting Approaches | 3 | 3 | 212 | |
| RT, Conflicting Approaches | 192 | 192 | 10 | |
| Proportion LT, Opposing Approach | 0.00 | 0.58 | 0.00 | |
| Proportion RT, Opposing Approach | 0.08 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.02 | 0.02 | 0.43 | |
| Proportion RT, Conflicting Approaches | 0.98 | 0.98 | 0.02 | |
| Approach Capacity | 1268 | 971 | 561 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 366 | 1268 | 0.29 | 3.0 | A |
| SB | 123 | 971 | 0.13 | 1.6 | A |
| EB | 195 | 561 | 0.35 | 3.7 | A |

Intersection Delay = 3.0
 Level of Service (Intersection) = A

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2001 AM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 174 | 99 | | | 157 | 6 | 10 | 0 | 313 | | | |
| PHF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 207 | 0 | 11 | |
| RT Flow Rate | 0 | 7 | 360 | |
| Approach Flow Rate | 325 | 194 | 371 | |
| Proportion LT | 0.64 | 0.00 | 0.03 | |
| Proportion RT | 0.00 | 0.04 | 0.97 | |
| Opposing Approach Flow Rate | 194 | 325 | 0 | |
| Conflicting Approaches Flow Rate | 371 | 371 | 519 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.22 | 0.42 | |
| Proportion, Opposing Approach Flow Rate | 0.22 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 207 | 0 | |
| RT, Opposing Approach | 7 | 0 | 0 | |
| LT, Conflicting Approaches | 11 | 11 | 207 | |
| RT, Conflicting Approaches | 360 | 360 | 7 | |
| Proportion LT, Opposing Approach | 0.00 | 0.64 | 0.00 | |
| Proportion RT, Opposing Approach | 0.04 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.03 | 0.03 | 0.40 | |
| Proportion RT, Conflicting Approaches | 0.97 | 0.97 | 0.01 | |
| Approach Capacity | 1107 | 865 | 701 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 325 | 1107 | 0.29 | 3.1 | A |
| SB | 194 | 865 | 0.22 | 2.3 | A |
| EB | 371 | 701 | 0.53 | 7.5 | B |

Intersection Delay = 4.7
 Level of Service (Intersection) = A

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2001 PM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 327 | 172 | | | 110 | 12 | 4 | 0 | 282 | | | |
| PHF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis Worksheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 344 | 0 | 4 | |
| RT Flow Rate | 0 | 15 | 313 | |
| Approach Flow Rate | 525 | 149 | 317 | |
| Proportion LT | 0.66 | 0.00 | 0.01 | |
| Proportion RT | 0.00 | 0.10 | 0.99 | |
| Opposing Approach Flow Rate | 149 | 525 | 0 | |
| Conflicting Approaches Flow Rate | 317 | 317 | 674 | |
| Proportion, Subject Approach Flow Rate | 0.53 | 0.15 | 0.32 | |
| Proportion, Opposing Approach Flow Rate | 0.15 | 0.53 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 344 | 0 | |
| RT, Opposing Approach | 15 | 0 | 0 | |
| LT, Conflicting Approaches | 4 | 4 | 344 | |
| RT, Conflicting Approaches | 313 | 313 | 15 | |
| Proportion LT, Opposing Approach | 0.00 | 0.66 | 0.00 | |
| Proportion RT, Opposing Approach | 0.10 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.01 | 0.01 | 0.51 | |
| Proportion RT, Conflicting Approaches | 0.99 | 0.99 | 0.02 | |
| Approach Capacity | 1248 | 917 | 573 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 525 | 1248 | 0.42 | 4.9 | A |
| SB | 149 | 917 | 0.16 | 1.9 | A |
| EB | 317 | 573 | 0.55 | 8.2 | B |

Intersection Delay = 5.5
 Level of Service (Intersection) = B

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2010 AM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 185 | 131 | | | 207 | 7 | 12 | 0 | 333 | | | |
| PHF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 220 | 0 | 14 | |
| RT Flow Rate | 0 | 8 | 383 | |
| Approach Flow Rate | 376 | 254 | 397 | |
| Proportion LT | 0.59 | 0.00 | 0.04 | |
| Proportion RT | 0.00 | 0.03 | 0.96 | |
| Opposing Approach Flow Rate | 254 | 376 | 0 | |
| Conflicting Approaches Flow Rate | 397 | 397 | 630 | |
| Proportion, Subject Approach Flow Rate | 0.37 | 0.25 | 0.39 | |
| Proportion, Opposing Approach Flow Rate | 0.25 | 0.37 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 220 | 0 | |
| RT, Opposing Approach | 8 | 0 | 0 | |
| LT, Conflicting Approaches | 14 | 14 | 220 | |
| RT, Conflicting Approaches | 383 | 383 | 8 | |
| Proportion LT, Opposing Approach | 0.00 | 0.59 | 0.00 | |
| Proportion RT, Opposing Approach | 0.03 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.04 | 0.04 | 0.35 | |
| Proportion RT, Conflicting Approaches | 0.96 | 0.96 | 0.01 | |
| Approach Capacity | 1124 | 907 | 686 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 376 | 1124 | 0.33 | 3.6 | A |
| SB | 254 | 907 | 0.28 | 2.9 | A |
| EB | 397 | 686 | 0.58 | 9.0 | B |

Intersection Delay = 5.5
 Level of Service (Intersection) = B

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 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2010 PM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 348 | 227 | | | 145 | 14 | 5 | 0 | 300 | | | |
| PHF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Volume Summary and Capacity Analysis WorkSheet

| | NB | SB | EB | WB |
|---|------|------|------|----|
| LT Flow Rate | 366 | 0 | 6 | |
| RT Flow Rate | 0 | 17 | 333 | |
| Approach Flow Rate | 605 | 194 | 339 | |
| Proportion LT | 0.60 | 0.00 | 0.02 | |
| Proportion RT | 0.00 | 0.09 | 0.98 | |
| Opposing Approach Flow Rate | 194 | 605 | 0 | |
| Conflicting Approaches Flow Rate | 339 | 339 | 799 | |
| Proportion, Subject Approach Flow Rate | 0.53 | 0.17 | 0.30 | |
| Proportion, Opposing Approach Flow Rate | 0.17 | 0.53 | 0.00 | |
| Lanes on Subject Approach | 3 | 3 | 2 | |
| Lanes on Opposing Approach | 3 | 3 | 0 | |
| LT, Opposing Approach | 0 | 366 | 0 | |
| RT, Opposing Approach | 17 | 0 | 0 | |
| LT, Conflicting Approaches | 6 | 6 | 366 | |
| RT, Conflicting Approaches | 333 | 333 | 17 | |
| Proportion LT, Opposing Approach | 0.00 | 0.60 | 0.00 | |
| Proportion RT, Opposing Approach | 0.09 | 0.00 | 0.00 | |
| Proportion LT, Conflicting Approaches | 0.02 | 0.02 | 0.46 | |
| Proportion RT, Conflicting Approaches | 0.98 | 0.98 | 0.02 | |
| Approach Capacity | 1258 | 951 | 567 | |

Intersection Performance Summary

| Movement | Approach Flow Rate | Approach Capacity | V/C Ratio | Average Total Delay | LOS |
|----------|--------------------|-------------------|-----------|---------------------|-----|
| NB | 605 | 1258 | 0.48 | 6.2 | B |
| SB | 194 | 951 | 0.20 | 2.2 | A |
| EB | 339 | 567 | 0.60 | 9.7 | B |

Intersection Delay = 6.6
 Level of Service (Intersection) = B

Center For Microcomputers In Transportation
 University of Florida
 512 Weil Hall
 Gainesville, FL 32611-2083
 Ph: (904) 392-0378

Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2020 AM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|-----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 296 | 424 | | | 671 | 20 | 34 | 0 | 532 | | | |
| PHF | .84 | .84 | | | .84 | .84 | .87 | .87 | .87 | | | |

Range Limit(s) Exceeded

From HCM Range of Model Validity (p. 10-37):

The intersection volume exceeds 2100 vph.

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 Ph: (904) 392-0378

Streets: (N-S) El Mirage (E-W) Beardsley
 Analyst..... B. Good
 Date of Analysis..... 1/19/99
 Other Information.....2020 PM 4 Lanes
 All-way Stop-controlled Intersection

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|-----------|------------|-----|---|------------|-----|-----|-----------|----|-----|-----------|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 1 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | < 0 | 0 | 0 | 0 |
| Volumes | 557 | 737 | | | 469 | 39 | 15 | 0 | 479 | | | |
| HF | .95 | .95 | | | .82 | .82 | .9 | .9 | .9 | | | |

Range Limit(s) Exceeded

From HCM Range of Model Validity (p. 10-37):

The intersection volume exceeds 2100 vph.

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N01AM.HC9 Date: 01-19-1999 Time Period: AM

(E/W): Beardsley (N/S): El Mirage Analyst : B. Good

Peak hour factor: .85

Comment: 2001

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 10 | 0 | 174 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 163 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 28362 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | Perm | Perm | Perm |
| 4. LT adjustment factor | .85 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 313 | 0 | 0 | 6 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 368 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 7 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 99 | 157 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 12 | 0 | 99 | 164 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalence | | | 1.66 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 12 | 0 | 99 | 164 |
| 19. Critical lane volume | 368 | 0 | 99 | 164 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N01AM.HC9

Date: 01-19-1999

Time Period: AM

(E/W): Beardsley

(N/S): El Mirage

Analyst : B. Good

| | | | |
|---------------|---------------|----------------|----------------|
| EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|---------------|---------------|----------------|----------------|

Phase Plan Selection from Lane Volume Worksheet

| | | | | |
|---------------------------------------|-----|-----|-----|-----|
| Critical through-RT vol: [19] | 368 | 0 | 99 | 164 |
| LT lane vol: [5] | 0 | N/A | N/A | N/A |
| Left turn protection: (P/U/N) | N | U | U | U |
| Dominant left turn: (Indicate by '*') | * | | * | |

Selection Criteria based on the specified left turn protection

| | | | | |
|----------|----|----|----|----|
| Plan 1: | U | U | U | U |
| Plan 2a: | U | P | U | P |
| Plan 2b: | P | U | P | U |
| Plan 3a: | *P | P | *P | P |
| Plan 3b: | P | *P | P | *P |
| Plan 4: | N | N | N | N |

* Indicates the dominant left turn for each opposing pair

| | | |
|------------------------------|---|---|
| Phase plan selected (1 to 4) | 1 | 1 |
|------------------------------|---|---|

| | | | |
|-------------------|----|-------------------|-----|
| Min. cycle (Cmin) | 60 | Max. cycle (Cmax) | 120 |
|-------------------|----|-------------------|-----|

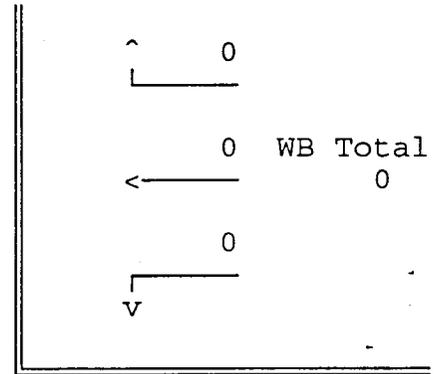
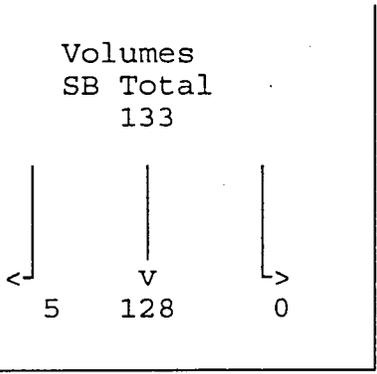
Timing Plan

| Value | --- EAST-WEST --- | | | -- NORTH-SOUTH -- | | |
|--------------------------|-------------------|------|------|-------------------|------|------|
| | Ph 1 | Ph 2 | Ph 3 | Ph 1 | Ph 2 | Ph 3 |
| Movement codes | ETL | | | NSG | | |
| Critical phase vol [CV] | 368 | 0 | 0 | 174 | 0 | 0 |
| Critical sum [CS] | 542 | | | | | |
| CBD adjustment [CBD] | 1 | | | | | |
| Reference sum [RS] | 1454 | | | | | |
| Lost time/phase [PL] | 3 | 0 | 0 | 3 | 0 | 0 |
| Lost time/cycle [TL] | 6 | | | | | |
| Cycle length [CYC] | 60 | | | | | |
| Green time | 39.7 | 0 | 0 | 20.3 | 0 | 0 |
| Critical v/c ratio [Xcm] | 0.35 | | | | | |
| Status | Under capacity. | | | | | |

INTERSECTION DIAGRAM

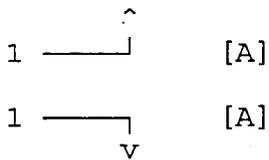
Intersection: Beardsley and El Mirage
 Time period: AM

El Mirage

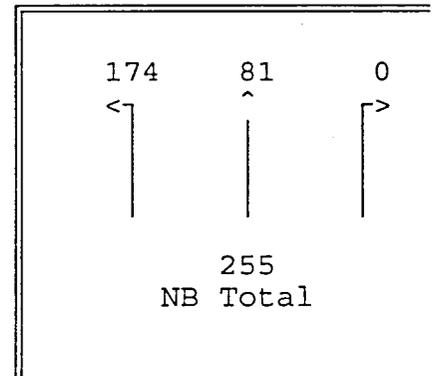
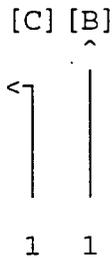
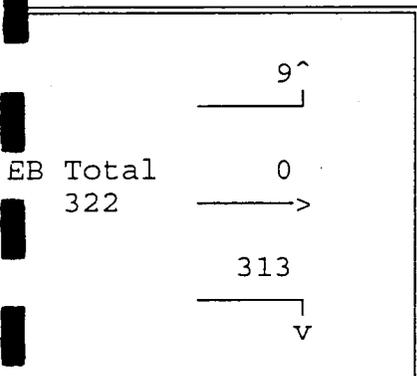


- Legend
- [X] = Level of Service
 - ^ = No. of Lanes
 - v = De facto Turn

Intersection
 [B]



Beardsley



HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N01PM.HC9 Date: 01-19-1999 Time Period: PM
 E/W): Beardsley (N/S): El Mirage Analyst : B. Good
 Peak hour factor: .89
 Comment: 2001

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 4 | 0 | 327 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 122 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 39894 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | Perm | Perm | Perm |
| 4. LT adjustment factor | .85 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 282 | 0 | 0 | 12 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 332 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 14 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 172 | 110 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 5 | 0 | 172 | 124 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalence | | | 1.51 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 5 | 0 | 172 | 124 |
| 19. Critical lane volume | 332 | 0 | 172 | 124 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N01PM.HC9

Date: 01-19-1999

Time Period: PM

(E/W): Beardsley

(N/S): El Mirage

Analyst : B. Good

| | | | |
|---------------|---------------|----------------|----------------|
| EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|---------------|---------------|----------------|----------------|

Phase Plan Selection from Lane Volume Worksheet

| | | | | |
|---------------------------------------|-----|-----|-----|-----|
| Critical through-RT vol: [19] | 332 | 0 | 172 | 124 |
| RT lane vol: [5] | 0 | N/A | N/A | N/A |
| Left turn protection: (P/U/N) | N | U | U | U |
| Dominant left turn: (Indicate by '*') | * | | * | |

Selection Criteria based on the specified left turn protection

| | | | | |
|----------|----|----|----|----|
| Plan 1: | U | U | U | U |
| Plan 2a: | U | P | U | P |
| Plan 2b: | P | U | P | U |
| Plan 3a: | *P | P | *P | P |
| Plan 3b: | P | *P | P | *P |
| Plan 4: | N | N | N | N |

* Indicates the dominant left turn for each opposing pair

| | | |
|------------------------------|---|---|
| Phase plan selected (1 to 4) | 1 | 1 |
|------------------------------|---|---|

| | | | |
|-------------------|----|-------------------|-----|
| Min. cycle (Cmin) | 60 | Max. cycle (Cmax) | 120 |
|-------------------|----|-------------------|-----|

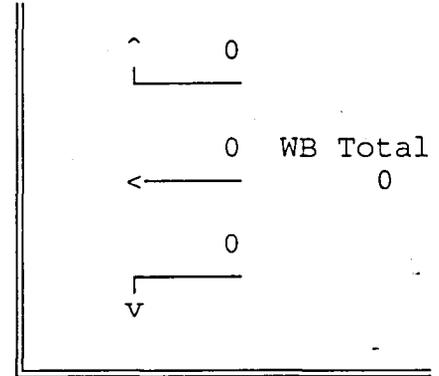
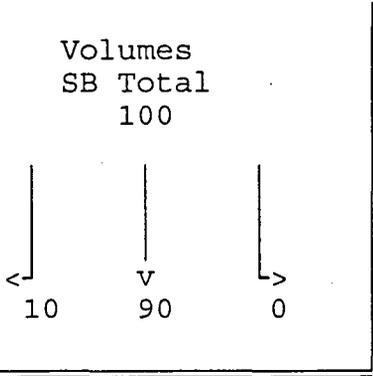
Timing Plan

| Value | --- EAST-WEST --- | | | -- NORTH-SOUTH -- | | |
|--------------------------|-------------------|------|------|-------------------|------|------|
| | Ph 1 | Ph 2 | Ph 3 | Ph 1 | Ph 2 | Ph 3 |
| Movement codes | ETL | | | NSG | | |
| Critical phase vol [CV] | 332 | 0 | 0 | 327 | 0 | 0 |
| Critical sum [CS] | 659 | | | | | |
| CBD adjustment [CBD] | 1 | | | | | |
| Reference sum [RS] | 1522 | | | | | |
| Lost time/phase [PL] | 3 | 0 | 0 | 3 | 0 | 0 |
| Lost time/cycle [TL] | 6 | | | | | |
| Cycle length [CYC] | 60 | | | | | |
| Green time | 30.2 | 0 | 0 | 29.8 | 0 | 0 |
| Critical v/c ratio [Xcm] | 0.41 | | | | | |
| Status | Under capacity. | | | | | |

INTERSECTION DIAGRAM

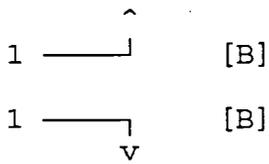
Intersection: Beardsley and El Mirage
 Time period: PM

El Mirage

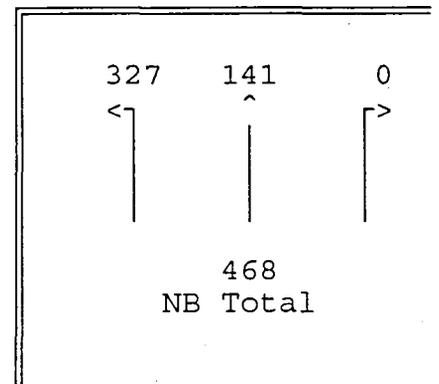
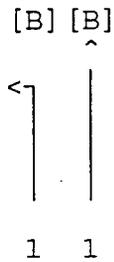
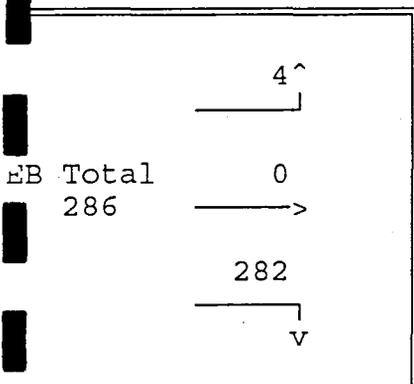


- Legend
- [X] = Level of Service
 - ^ = No. of Lanes
 - └┘ = De facto Turn

Intersection
 [B]



Beardsley



HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N10AM.HC9

Date: 01-19-1999

Time Period: AM

E/W): Beardsley

(N/S): El Mirage

Analyst : B. Good

Peak hour factor: .85

Comment: 2010

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
|--|---------------|---------------|----------------|----------------|

LEFT TURN MOVEMENT

| | | | | |
|---------------------------------|----|-----|-------|-----|
| 1. LT volume | 12 | 0 | 185 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 214 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 39590 | N/A |

Left Lane Configuration (E=Excl, S=Shrd):
Left Turn Treatment Type:

| | | | |
|------|------|------|------|
| E | E | E | E |
| NOpp | Perm | Prot | Perm |

| | | | | |
|-------------------------|-----|-----|-----|-----|
| 4. LT adjustment factor | .85 | N/A | .95 | N/A |
| 5. LT lane vol | 0 | N/A | 195 | N/A |

RIGHT TURN MOVEMENT

| | | | | |
|---|-----|-----|-----|-----|
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 333 | 0 | 0 | 7 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 392 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 8 |

THROUGH MOVEMENT

| | | | | |
|--|-----|-----|-----|-----|
| 11. Thru volume | 0 | 0 | 131 | 207 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 14 | 0 | 131 | 215 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalency | | | N/A | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 14 | 0 | 131 | 215 |
| 19. Critical lane volume | 392 | 0 | 131 | 215 |

Left Turn Check (if [16] > 8)

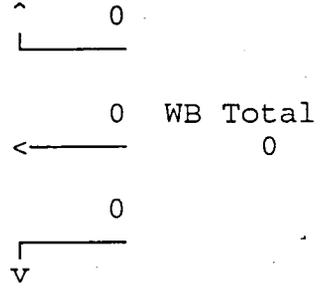
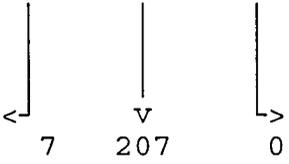
| | |
|--|-----|
| 20. Permitted left turn sneaker capacity: 7200/Cmax | N/A |
|--|-----|

INTERSECTION DIAGRAM

Intersection: Beardsley and El Mirage
 Time period: AM

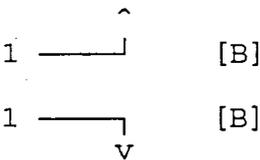
El Mirage

Volumes
 SB Total
 214

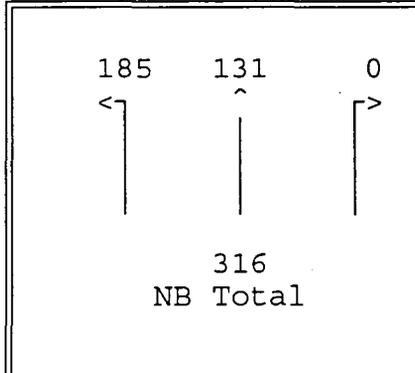
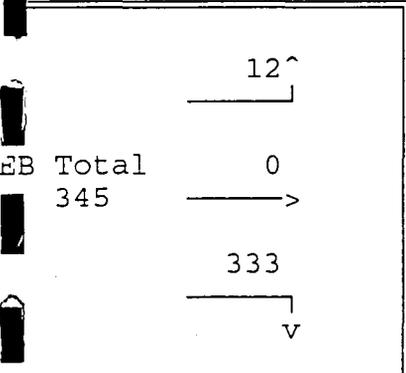


Legend
 [X] = Level of Service
 ^ = No. of Lanes
 v = De facto Turn

Intersection
 [B]



Beardsley



HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N10PM.HC9 Date: 01-19-1999 Time Period: PM
 E/W): Beardsley (N/S): El Mirage Analyst : B. Good
 Peak hour factor: .89
 Comment: 2010

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 5 | 0 | 348 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 159 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 55332 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | Perm | Perm | Perm |
| 4. LT adjustment factor | .85 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 300 | 0 | 0 | 14 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 353 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 16 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 227 | 145 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 6 | 0 | 227 | 161 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalence | | | 1.65 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 6 | 0 | 227 | 161 |
| 19. Critical lane volume | 353 | 0 | 227 | 161 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N20AM.HC9

Date: 01-19-1999

Time Period: AM

(E/W): Beardsley

(N/S): El Mirage

Analyst : B. Good

Peak hour factor: .85

Comment: 2020

| EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|---------------|---------------|----------------|----------------|
|---------------|---------------|----------------|----------------|

LEFT TURN MOVEMENT

| | | | | |
|---|------|------|--------|------|
| 1. LT volume | 34 | 0 | 296 | 0 |
| 2. Opposing mainline volume. | 0 | N/A | 691 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 204536 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | Perm | Perm | Perm |
| 4. LT adjustment factor | .85 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |

RIGHT TURN MOVEMENT

| | | | | |
|---|-----|-----|-----|-----|
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 532 | 0 | 0 | 20 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 626 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 24 |

THROUGH MOVEMENT

| | | | | |
|--|-----|-----|-----|-----|
| 11. Thru volume | 0 | 0 | 424 | 671 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 40 | 0 | 424 | 695 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalence | | | 8.2 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 40 | 0 | 424 | 695 |
| 19. Critical lane volume | 626 | 0 | 424 | 695 |

Left Turn Check (if [16] > 8)

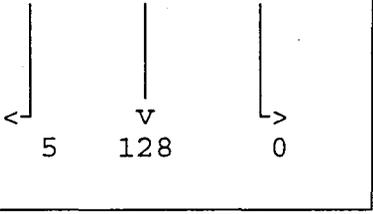
20. Permitted left turn sneaker capacity:
7200/Cmax 60

INTERSECTION DIAGRAM

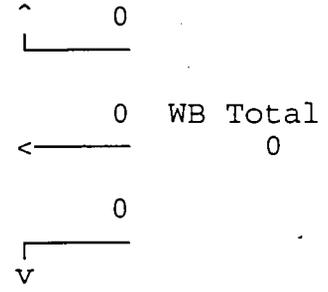
Intersection: Beardsley and El Mirage
 Time period: AM

El Mirage

Volumes
 SB Total
 133



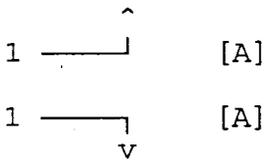
1



Legend

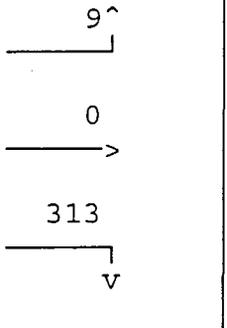
- [X] = Level of Service
- ^ = No. of Lanes
- v = De facto Turn

Intersection
 [B]

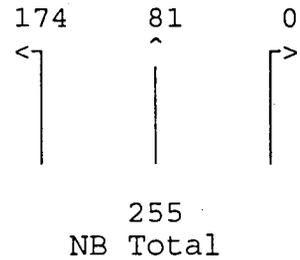


Beardsley

EB Total
 322



[C] [B]



HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N20PM.HC9

Date: 01-19-1999

Time Period: PM

(E/W): Beardsley

(N/S): El Mirage

Analyst : B. Good

Peak hour factor: .89

Comment: 2020

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 15 | 0 | 557 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 508 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 282956 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | Perm | Perm | Perm |
| 4. LT adjustment factor | .85 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | S |
| 6. RT volume | 479 | 0 | 0 | 39 |
| 7. Exclusive lanes | 1 | N/A | N/A | N/A |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 564 | 0 | 0 | 0 |
| 10. Shared lane vol | 0 | 0 | 0 | 46 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 737 | 469 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 1 | 1 |
| 14. Total approach volume | 18 | 0 | 737 | 515 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalence | | | 5.95 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 18 | 0 | 737 | 515 |
| 19. Critical lane volume | 564 | 0 | 737 | 515 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N20AM4.HC9 Date: 01-19-1999 Time Period: AM
 E/W): Beardsley (N/S): El Mirage Analyst : Howard Olien
 Peak hour factor: .95
 Comment: 2020 4 Lane Section

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 34 | 0 | 296 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 691 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 204536 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | NOpp | Perm | Perm |
| 4. LT adjustment factor | .95 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | E |
| 6. RT volume | 532 | 0 | 0 | 20 |
| 7. Exclusive lanes | 1 | N/A | N/A | 1 |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 626 | 0 | 0 | 24 |
| 10. Shared lane vol | 0 | 0 | 0 | 0 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 424 | 671 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 2 | 2 |
| 14. Total approach volume | 36 | 0 | 424 | 671 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalance | | | 4.65 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 36 | 0 | 212 | 336 |
| 19. Critical lane volume | 626 | 0 | 212 | 336 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N20AM4.HC9 Date: 01-19-1999 Time Period: PM
 E/W): Beardsley (N/S): El Mirage Analyst : Howard Olien
 Peak hour factor: .95
 Comment: 2020 4 Lane Section

| | EAST BOUND | WEST BOUND | NORTH BOUND | SOUTH BOUND |
|--|---------------|---------------|----------------|----------------|
| LEFT TURN MOVEMENT | | | | |
| 1. LT volume | 15 | 0 | 557 | 0 |
| 2. Opposing mainline volume | 0 | N/A | 508 | N/A |
| 3. Number of exclusive LT lanes | 1 | 0 | 1 | 0 |
| Cross Product [2] * [1] | 0 | N/A | 282956 | N/A |
| Left Lane Configuration (E=Excl, S=Shrd): | E | | E | |
| Left Turn Treatment Type: | NOpp | NOpp | Perm | Perm |
| 4. LT adjustment factor | .95 | N/A | 1.0 | N/A |
| 5. LT lane vol | 0 | N/A | N/A | N/A |
| RIGHT TURN MOVEMENT | | | | |
| Right Lane Configuration (E=Excl, S=Shrd) | E | S | S | E |
| 6. RT volume | 479 | 0 | 0 | 39 |
| 7. Exclusive lanes | 1 | N/A | N/A | 1 |
| 8. RT adjustment factor | .85 | .85 | .85 | .85 |
| 9. Exclusive RT lane volume | 564 | 0 | 0 | 46 |
| 10. Shared lane vol | 0 | 0 | 0 | 0 |
| THROUGH MOVEMENT | | | | |
| 11. Thru volume | 0 | 0 | 737 | 469 |
| 12. Parking adjustment factor | 1 | 1 | 1 | 1 |
| 13. No. of thru lanes including shared | 0 | 0 | 2 | 2 |
| 14. Total approach volume | 16 | 0 | 737 | 469 |
| 15. Prop. of left turns in lane group | N/A | N/A | 0 | N/A |
| 16. Left turn equivalency | | | 3.05 | |
| 17. LT adj. factor: | N/A | N/A | N/A | N/A |
| 18. Through lane volume | 16 | 0 | 368 | 234 |
| 19. Critical lane volume | 564 | 0 | 368 | 234 |
| Left Turn Check (if [16] > 8) | | | | |
| 20. Permitted left turn sneaker capacity: 7200/Cmax | | | N/A | |

APPENDIX D
ACCIDENT DATA

Intersection

| Accidents On El Mirage Road: 1995-1997 | | | | | 19-Jan-99 |
|--|----------------|----------------------|----------------|--------------|----------------|
| Beardsley Road To Deer Valley Drive | | | | | H Olien |
| Incident | | Severity | | Light | |
| Right Angle | 0 | No Injury | 1 | Daylight | 0 |
| Left Turning | 0 | Injury - Unknown | 0 | Darkness | 1 |
| Rear End | 0 | Possible Injury | 0 | Dawn | 0 |
| Side Swipe | 1 | Non - Incapacitating | 0 | Dusk | 0 |
| Single Vehicle | 0 | Incapacitating | 0 | | |
| Other | 0 | Fatal | 0 | | |
| Total | 1 | Total | 1 | Total | 1 |
| Incident | | Severity | | Light | |
| Right Angle | 0.00% | No Injury | 100.00% | Daylight | 0.00% |
| Left Turning | 0.00% | Injury - Unknown | 0.00% | Darkness | 100.00% |
| Rear End | 0.00% | Possible Injury | 0.00% | Dawn | 0.00% |
| Side Swipe | 100.00% | Non - Incapacitating | 0.00% | Dusk | 0.00% |
| Single Vehicle | 0.00% | Incapacitating | 0.00% | | 0.00% |
| Other | 0.00% | Fatal | 0.00% | | 0.00% |
| Total | 100.00% | Total | 100.00% | Total | 100.00% |

Non Intersection

| Accidents On El Mirage Road: 1995-1997 | | | | | 19-Jan-99 |
|--|----------------|----------------------|----------------|--------------|----------------|
| Beardsley Road To Deer Valley Drive | | | | | H Olien |
| Incident | | Severity | | Light | |
| Right Angle | 0 | No Injury | 1 | Daylight | 0 |
| Left Turning | 0 | Injury - Unknown | 0 | Darkness | 1 |
| Rear End | 0 | Possible Injury | 0 | Dawn | 0 |
| Side Swipe | 1 | Non - Incapacitating | 0 | Dusk | 0 |
| Single Vehicle | 0 | Incapacitating | 0 | | |
| Other | 0 | Fatal | 0 | | |
| Total | 1 | Total | 1 | Total | 1 |
| Incident | | Severity | | Light | |
| Right Angle | 0.00% | No Injury | 100.00% | Daylight | 0.00% |
| Left Turning | 0.00% | Injury - Unknown | 0.00% | Darkness | 100.00% |
| Rear End | 0.00% | Possible Injury | 0.00% | Dawn | 0.00% |
| Side Swipe | 100.00% | Non - Incapacitating | 0.00% | Dusk | 0.00% |
| Single Vehicle | 0.00% | Incapacitating | 0.00% | | 0.00% |
| Other | 0.00% | Fatal | 0.00% | | 0.00% |
| Total | 100.00% | Total | 100.00% | Total | 100.00% |

Total

| Accidents On El Mirage Road: 1995-1997 | | | 19-Jan-99 |
|--|------------------------------|----------------------|----------------|
| Beardsley Road To Deer Valley Drive | | | H Olien |
| Incident | Severity | Light | |
| Right Angle | 0 No Injury | 2 Daylight | 0 |
| Left Turning | 0 Injury - Unknown | 0 Darkness | 2 |
| Rear End | 0 Possible Injury | 0 Dawn | 0 |
| Side Swipe | 2 Non - Incapacitating | 0 Dusk | 0 |
| Single Vehicle | 0 Incapacitating | 0 | |
| Other | 0 Fatal | 0 | |
| Total | 2 Total | 2 Total | 2 |
| Incident | Severity | Light | |
| Right Angle | 0.00% No Injury | 100.00% Daylight | 0.00% |
| Left Turning | 0.00% Injury - Unknown | 0.00% Darkness | 100.00% |
| Rear End | 0.00% Possible Injury | 0.00% Dawn | 0.00% |
| Side Swipe | 100.00% Non - Incapacitating | 0.00% Dusk | 0.00% |
| Single Vehicle | 0.00% Incapacitating | 0.00% | 0.00% |
| Other | 0.00% Fatal | 0.00% | 0.00% |
| Total | 100.00% Total | 100.00% Total | 100.00% |

APPENDIX E

DRAINAGE

- I. HEC-2 / HEC-RAS COMPARISON
- II. CROSS SECTION MAPS AND HEC-1 OUTPUT FROM WITTMAN ADMS
- III. EXISTING CONDITION CROSS SECTIONS AND OUTPUT TABLES
- IV. HY8 OUTPUT AND CHANNEL HYDRAULICS

HEC-2 / HEC-RAS COMPARISON

 HEC-2 WATER SURFACE PROFILES
 Version 4.6.2; May 1991

*Existing Condition
 HEC-2 Output*

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

MOMICKEN DAM OUTLET WASH

SUMMARY PRINTOUT

| SEENO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|-------|---------|---------|---------|---------|---------|---------|--------|---------|-------|---------|--------|------|
| .000 | 6522.00 | 1176.64 | 4025.13 | 4010.00 | 5062.00 | 5032.43 | .00 | 1007.30 | 4.64 | 1172.00 | 27.64 | 3.15 |
| .000 | 6522.00 | 1176.98 | 4023.59 | 4010.00 | 5062.00 | 5033.91 | .00 | 1010.32 | 4.98 | 1172.00 | 16.59 | 2.70 |
| .000 | 5085.00 | 1176.00 | 4028.00 | 4010.00 | 5062.00 | 5029.67 | .00 | 915.67 | 4.00 | 1172.00 | 50.93 | 3.56 |
| .000 | 2917.00 | 1175.00 | 4394.00 | 4010.00 | 5062.00 | 5025.33 | .00 | 522.67 | 3.00 | 1172.00 | 93.57 | 4.28 |
| * | .107 | 6522.00 | 1181.69 | 4423.61 | 4282.00 | 5268.00 | 3.13 | 812.77 | 5.69 | 1176.00 | 55.93 | 4.24 |
| * | .107 | 6522.00 | 1181.02 | 4426.89 | 4282.00 | 5268.00 | 4.04 | 806.99 | 5.02 | 1176.00 | 228.12 | 6.49 |
| * | .107 | 5085.00 | 1181.08 | 4426.66 | 4282.00 | 5268.00 | 1.50 | 807.40 | 5.08 | 1176.00 | 122.72 | 4.88 |
| * | .107 | 2917.00 | 1180.70 | 4428.44 | 4282.00 | 5268.00 | 1.53 | 804.27 | 4.70 | 1176.00 | 117.32 | 3.86 |
| .159 | 6522.00 | 1183.46 | 4438.60 | 4355.00 | 5150.00 | 5115.76 | 1.77 | 677.17 | 5.46 | 1178.00 | 84.73 | 5.17 |
| * | .159 | 6522.00 | 1183.83 | 4436.36 | 4355.00 | 5150.00 | 2.81 | 683.76 | 5.83 | 1178.00 | 46.17 | 4.29 |
| * | .159 | 5085.00 | 1183.41 | 4438.96 | 4355.00 | 5150.00 | 2.33 | 676.09 | 5.41 | 1178.00 | 57.50 | 4.17 |
| * | .159 | 2917.00 | 1182.89 | 4441.93 | 4355.00 | 5150.00 | 2.19 | 667.33 | 4.89 | 1178.00 | 54.92 | 3.31 |
| .238 | 6522.00 | 1186.39 | 4551.20 | 4500.00 | 5503.00 | 5311.97 | 2.93 | 760.76 | 6.39 | 1180.00 | 54.15 | 4.32 |
| .238 | 6522.00 | 1185.98 | 4552.75 | 4500.00 | 5503.00 | 5039.71 | 2.14 | 486.96 | 5.98 | 1180.00 | 64.54 | 5.44 |
| .238 | 5085.00 | 1185.72 | 4553.69 | 4500.00 | 5503.00 | 5036.27 | 2.32 | 482.58 | 5.72 | 1180.00 | 55.89 | 4.73 |
| .238 | 2917.00 | 1185.10 | 4555.97 | 4500.00 | 5503.00 | 5027.98 | 2.21 | 472.01 | 5.10 | 1180.00 | 52.42 | 3.75 |
| * | .350 | 6522.00 | 1190.95 | 4488.67 | 4855.00 | 5428.00 | 2.69 | 449.78 | 6.45 | 1184.50 | 91.15 | 6.69 |
| * | .350 | 6522.00 | 1190.75 | 4897.02 | 4855.00 | 5428.00 | 4.77 | 365.47 | 6.25 | 1184.50 | 117.80 | 7.30 |
| * | .350 | 5085.00 | 1190.29 | 4493.03 | 4855.00 | 5428.00 | 4.57 | 379.74 | 5.79 | 1184.50 | 132.97 | 6.96 |
| * | .350 | 2917.00 | 1189.59 | 4917.05 | 4855.00 | 5428.00 | 4.49 | 310.68 | 5.09 | 1184.50 | 136.48 | 5.90 |
| .437 | 6522.00 | 1194.65 | 4978.03 | 4970.00 | 5450.00 | 5436.23 | 3.70 | 458.20 | 6.65 | 1188.00 | 63.62 | 5.54 |
| * | .437 | 6522.00 | 1194.76 | 4977.86 | 4970.00 | 5450.00 | 4.01 | 458.65 | 6.76 | 1188.00 | 55.38 | 5.31 |
| * | .437 | 5085.00 | 1194.40 | 4978.39 | 4970.00 | 5450.00 | 4.11 | 457.23 | 6.40 | 1188.00 | 53.33 | 4.76 |
| * | .437 | 2917.00 | 1193.66 | 4979.51 | 4970.00 | 5450.00 | 4.07 | 421.71 | 5.66 | 1188.00 | 54.19 | 3.96 |
| .527 | 6522.00 | 1198.15 | 4654.51 | 4603.00 | 5200.00 | 5175.80 | 3.51 | 431.47 | 5.15 | 1193.00 | 89.93 | 6.30 |
| .527 | 6522.00 | 1198.07 | 4657.17 | 4603.00 | 5200.00 | 5175.33 | 3.31 | 418.14 | 5.07 | 1193.00 | 98.51 | 6.56 |
| .527 | 5085.00 | 1197.52 | 4697.73 | 4603.00 | 5200.00 | 5161.85 | 3.12 | 329.15 | 4.52 | 1193.00 | 93.42 | 6.43 |
| .527 | 2917.00 | 1196.49 | 4908.24 | 4603.00 | 5200.00 | 5133.80 | 2.83 | 225.56 | 3.49 | 1193.00 | 72.69 | 5.56 |

1

22OCT98 15:56:15

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| SEENO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH | |
|-------|---------|---------|---------|---------|---------|---------|---------|--------|--------|---------|---------|--------|------|
| * | .579 | 6522.00 | 1200.11 | 4562.41 | 4465.00 | 5062.00 | 5030.11 | .23 | 467.69 | 7.61 | 1192.50 | 122.39 | 6.69 |
| * | .579 | 6522.00 | 1200.51 | 4552.77 | 4465.00 | 5062.00 | 5030.51 | 2.44 | 477.73 | 8.01 | 1192.50 | 69.59 | 5.60 |
| * | .579 | 5085.00 | 1199.80 | 4585.25 | 4465.00 | 5062.00 | 5029.19 | .32 | 443.94 | 7.30 | 1192.50 | 117.46 | 6.11 |
| * | .579 | 2917.00 | 1198.83 | 4682.37 | 4465.00 | 5062.00 | 5025.31 | .85 | 326.78 | 6.33 | 1192.50 | 197.39 | 6.46 |
| * | .647 | 6522.00 | 1202.68 | 4745.20 | 4686.00 | 5228.00 | 5181.86 | 2.56 | 357.24 | 6.68 | 1196.00 | 38.42 | 5.27 |
| * | .647 | 6522.00 | 1202.48 | 4746.00 | 4686.00 | 5228.00 | 5180.64 | 1.97 | 343.62 | 6.48 | 1196.00 | 44.01 | 5.57 |
| * | .647 | 5085.00 | 1202.13 | 4747.47 | 4686.00 | 5228.00 | 5178.41 | 2.33 | 318.63 | 6.13 | 1196.00 | 34.41 | 4.83 |
| * | .647 | 2917.00 | 1201.02 | 4937.30 | 4686.00 | 5228.00 | 5171.40 | 2.19 | 234.11 | 5.02 | 1196.00 | 21.01 | 3.77 |
| * | .746 | 6522.00 | 1204.67 | 4906.64 | 4880.00 | 5109.00 | 5086.36 | 1.12 | 179.71 | 6.17 | 1198.50 | 66.21 | 8.15 |
| * | .746 | 6522.00 | 1204.81 | 4905.95 | 4880.00 | 5109.00 | 5086.94 | 2.33 | 180.98 | 6.31 | 1198.50 | 60.39 | 7.91 |
| * | .746 | 5085.00 | 1204.13 | 4909.38 | 4880.00 | 5109.00 | 5084.03 | 2.00 | 174.66 | 5.63 | 1198.50 | 59.55 | 7.23 |
| * | .746 | 2917.00 | 1202.61 | 4916.96 | 4880.00 | 5109.00 | 5077.58 | 1.59 | 160.62 | 4.11 | 1198.50 | 78.17 | 6.50 |
| .833 | 6522.00 | 1207.27 | 4894.29 | 4882.00 | 5116.00 | 5104.16 | 2.60 | 209.87 | 7.27 | 1200.00 | 35.06 | 6.33 | |
| .833 | 6522.00 | 1207.26 | 4894.33 | 4882.00 | 5116.00 | 5104.13 | 2.45 | 209.80 | 7.26 | 1200.00 | 35.23 | 6.34 | |
| .833 | 5085.00 | 1206.51 | 4897.73 | 4882.00 | 5116.00 | 5100.86 | 2.38 | 203.13 | 6.51 | 1200.00 | 35.46 | 5.83 | |
| * | .833 | 2917.00 | 1205.22 | 4903.55 | 4882.00 | 5116.00 | 5095.25 | 2.61 | 191.69 | 5.22 | 1200.00 | 34.26 | 4.73 |
| .946 | 6522.00 | 1209.53 | 4886.78 | 4870.00 | 5090.00 | 5087.51 | 2.26 | 200.73 | 7.03 | 1202.50 | 43.47 | 6.88 | |
| .946 | 6522.00 | 1209.53 | 4886.78 | 4870.00 | 5090.00 | 5087.51 | 2.27 | 200.73 | 7.03 | 1202.50 | 43.48 | 6.88 | |
| .946 | 5085.00 | 1208.80 | 4889.51 | 4870.00 | 5090.00 | 5083.68 | 2.29 | 194.17 | 6.30 | 1202.50 | 43.73 | 6.32 | |
| .946 | 2917.00 | 1207.50 | 4894.40 | 4870.00 | 5090.00 | 5076.85 | 2.28 | 182.45 | 5.00 | 1202.50 | 44.40 | 5.21 | |
| 1.058 | 6273.00 | 1212.09 | 4903.48 | 4853.00 | 5140.00 | 5112.30 | 2.56 | 208.82 | 7.09 | 1205.00 | 40.47 | 6.52 | |

| | | | | | | | | | | | | | |
|---|-------|---------|---------|---------|---------|---------|---------|------|--------|------|---------|-------|-------|
| | 1.058 | 6273.00 | 1212.09 | 4903.48 | 4853.00 | 5140.00 | 5112.30 | 2.56 | 208.83 | 7.09 | 1205.00 | 40.46 | 6.52 |
| | 1.058 | 4916.00 | 1211.38 | 4905.68 | 4853.00 | 5140.00 | 5109.84 | 2.58 | 204.15 | 6.38 | 1205.00 | 41.62 | 6.02 |
| | 1.058 | 2876.00 | 1210.15 | 4909.52 | 4853.00 | 5140.00 | 5105.53 | 2.66 | 196.01 | 5.15 | 1205.00 | 44.47 | 5.04 |
| * | 1.169 | 6273.00 | 1213.29 | 4909.37 | 4880.00 | 5120.00 | 5093.15 | 1.20 | 183.78 | 5.79 | 1207.50 | 15.99 | 7.87 |
| * | 1.169 | 6273.00 | 1213.29 | 4909.37 | 4880.00 | 5120.00 | 5093.15 | 1.20 | 183.78 | 5.79 | 1207.50 | 15.99 | 7.87 |
| * | 1.169 | 4916.00 | 1212.64 | 4912.21 | 4880.00 | 5120.00 | 5090.55 | 1.25 | 178.34 | 5.14 | 1207.50 | 16.04 | 7.24 |
| * | 1.169 | 2876.00 | 1211.49 | 4919.56 | 4880.00 | 5120.00 | 5085.97 | 1.34 | 166.41 | 3.99 | 1207.50 | 15.78 | 5.98 |
| * | 1.191 | 6273.00 | 1216.02 | 4903.27 | 4890.00 | 5120.00 | 5100.76 | 1.63 | 197.50 | 7.52 | 1208.50 | 43.44 | 10.30 |
| * | 1.191 | 6273.00 | 1216.02 | 4903.25 | 4890.00 | 5120.00 | 5100.79 | 2.74 | 197.54 | 7.52 | 1208.50 | 43.22 | 10.28 |
| * | 1.191 | 4916.00 | 1215.55 | 4904.85 | 4890.00 | 5120.00 | 5098.47 | 1.77 | 193.62 | 7.05 | 1208.50 | 45.03 | 9.52 |
| * | 1.191 | 2876.00 | 1214.67 | 4907.75 | 4890.00 | 5120.00 | 5094.26 | 2.15 | 186.50 | 6.17 | 1208.50 | 53.23 | 8.20 |
| * | 1.213 | 6273.00 | 1217.60 | 4885.97 | 4880.00 | 5122.00 | 5112.44 | .15 | 226.47 | 8.60 | 1209.00 | 2.87 | 4.32 |
| * | 1.213 | 6273.00 | 1217.60 | 4886.01 | 4880.00 | 5122.00 | 5112.38 | 1.57 | 226.37 | 8.60 | 1209.00 | 2.89 | 4.33 |
| * | 1.213 | 4916.00 | 1216.93 | 4887.67 | 4880.00 | 5122.00 | 5109.73 | .12 | 222.05 | 7.93 | 1209.00 | 2.49 | 3.78 |
| * | 1.213 | 2876.00 | 1215.76 | 4890.61 | 4880.00 | 5122.00 | 5105.03 | .14 | 214.42 | 6.76 | 1209.00 | 1.69 | 2.76 |
| * | 1.251 | 6273.00 | 1222.81 | 4891.58 | 4870.00 | 5130.00 | 5094.04 | 3.24 | 202.46 | 3.81 | 1219.00 | 40.40 | 10.01 |
| * | 1.251 | 6273.00 | 1222.80 | 4891.60 | 4870.00 | 5130.00 | 5094.00 | 5.20 | 202.40 | 3.80 | 1219.00 | 40.70 | 10.03 |
| * | 1.251 | 4916.00 | 1222.32 | 4893.04 | 4870.00 | 5130.00 | 5091.61 | 3.25 | 198.57 | 3.32 | 1219.00 | 42.41 | 9.28 |
| * | 1.251 | 2876.00 | 1221.49 | 4895.53 | 4870.00 | 5130.00 | 5087.44 | 4.89 | 191.91 | 2.49 | 1219.00 | 47.06 | 7.84 |

1

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| | SECNO | Q | QWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|---|-------|---------|---------|---------|---------|---------|---------|--------|--------|-------|---------|--------|------|
| * | 1.286 | 6273.00 | 1234.89 | 4878.74 | 4860.00 | 5121.00 | 5108.78 | 12.08 | 230.04 | 3.89 | 1231.00 | 168.16 | 9.63 |
| * | 1.286 | 6273.00 | 1234.89 | 4878.74 | 4860.00 | 5121.00 | 5108.79 | 12.09 | 230.05 | 3.89 | 1231.00 | 168.04 | 9.63 |
| * | 1.286 | 4916.00 | 1234.43 | 4880.42 | 4860.00 | 5121.00 | 5103.75 | 12.11 | 223.34 | 3.43 | 1231.00 | 176.81 | 8.98 |
| * | 1.286 | 2876.00 | 1233.62 | 4886.52 | 4860.00 | 5121.00 | 5092.22 | 12.13 | 205.69 | 2.62 | 1231.00 | 195.20 | 7.71 |
| | 1.307 | 6273.00 | 1236.70 | 4881.52 | 4885.00 | 5100.00 | 5110.44 | 1.81 | 228.92 | 4.40 | 1232.30 | 102.82 | 8.53 |
| | 1.307 | 6273.00 | 1236.70 | 4885.00 | 4885.00 | 5100.00 | 5100.00 | 1.81 | 215.00 | 4.40 | 1232.30 | 103.48 | 8.53 |
| | 1.307 | 4916.00 | 1236.27 | 4883.67 | 4885.00 | 5100.00 | 5103.98 | 1.84 | 220.31 | 3.97 | 1232.30 | 99.10 | 7.66 |
| * | 1.307 | 2876.00 | 1235.47 | 4887.67 | 4885.00 | 5100.00 | 5098.66 | 1.85 | 210.99 | 3.17 | 1232.30 | 92.74 | 6.10 |
| * | 1.381 | 6273.00 | 1239.19 | 4880.25 | 4875.00 | 5100.00 | 5097.17 | .78 | 216.92 | 5.69 | 1233.50 | 33.60 | 6.07 |
| * | 1.381 | 6273.00 | 1239.36 | 4879.19 | 4875.00 | 5100.00 | 5097.74 | 2.66 | 218.55 | 5.86 | 1233.50 | 30.34 | 5.87 |
| * | 1.381 | 4916.00 | 1238.70 | 4883.48 | 4875.00 | 5100.00 | 5095.44 | 2.42 | 211.96 | 5.20 | 1233.50 | 28.74 | 5.31 |
| * | 1.381 | 2876.00 | 1237.51 | 4891.17 | 4875.00 | 5100.00 | 5091.29 | 2.04 | 200.12 | 4.01 | 1233.50 | 25.20 | 4.21 |
| | 1.479 | 6273.00 | 1240.96 | 4874.48 | 4882.00 | 5110.00 | 5094.78 | 1.77 | 220.30 | 5.46 | 1235.50 | 35.92 | 6.25 |
| | 1.479 | 6273.00 | 1241.00 | 4882.00 | 4882.00 | 5110.00 | 5094.96 | 1.64 | 212.96 | 5.50 | 1235.50 | 35.29 | 6.20 |
| | 1.479 | 4916.00 | 1240.30 | 4879.71 | 4882.00 | 5110.00 | 5091.46 | 1.60 | 211.75 | 4.80 | 1235.50 | 35.69 | 5.69 |
| | 1.479 | 2876.00 | 1239.03 | 4886.40 | 4882.00 | 5110.00 | 5085.60 | 1.52 | 199.21 | 3.53 | 1235.50 | 37.59 | 4.76 |
| | 1.593 | 6273.00 | 1243.09 | 4893.03 | 4870.00 | 5118.00 | 5104.54 | 2.13 | 211.51 | 5.59 | 1237.50 | 34.32 | 6.17 |
| | 1.593 | 6273.00 | 1243.10 | 4893.01 | 4870.00 | 5118.00 | 5104.58 | 2.10 | 211.57 | 5.60 | 1237.50 | 34.16 | 6.16 |
| | 1.593 | 4916.00 | 1242.40 | 4895.33 | 4870.00 | 5118.00 | 5101.36 | 2.11 | 206.03 | 4.90 | 1237.50 | 33.81 | 5.63 |
| | 1.593 | 2876.00 | 1241.17 | 4899.42 | 4870.00 | 5118.00 | 5095.68 | 2.14 | 196.25 | 3.67 | 1237.50 | 32.85 | 4.60 |
| | 1.708 | 6273.00 | 1245.39 | 4894.90 | 4882.00 | 5110.00 | 5097.84 | 2.30 | 202.94 | 5.39 | 1240.00 | 46.38 | 6.87 |
| | 1.708 | 6273.00 | 1245.39 | 4894.90 | 4882.00 | 5110.00 | 5097.84 | 2.29 | 202.94 | 5.39 | 1240.00 | 46.39 | 6.87 |
| | 1.708 | 4916.00 | 1244.71 | 4896.80 | 4882.00 | 5110.00 | 5094.66 | 2.31 | 197.85 | 4.71 | 1240.00 | 47.20 | 6.33 |
| | 1.708 | 2876.00 | 1243.51 | 4900.15 | 4882.00 | 5110.00 | 5089.08 | 2.34 | 188.93 | 3.51 | 1240.00 | 49.22 | 5.27 |
| | 1.788 | 6273.00 | 1247.52 | 4888.26 | 4880.00 | 5104.00 | 5094.09 | 2.13 | 205.82 | 5.52 | 1242.00 | 57.80 | 7.30 |
| | 1.788 | 6273.00 | 1247.52 | 4888.26 | 4880.00 | 5104.00 | 5094.09 | 2.13 | 205.83 | 5.52 | 1242.00 | 57.79 | 7.30 |
| | 1.788 | 4916.00 | 1246.89 | 4890.36 | 4880.00 | 5104.00 | 5091.57 | 2.18 | 201.20 | 4.89 | 1242.00 | 58.96 | 6.72 |
| | 1.788 | 2876.00 | 1245.80 | 4894.00 | 4880.00 | 5104.00 | 5087.19 | 2.29 | 193.19 | 3.80 | 1242.00 | 61.11 | 5.58 |
| | 1.858 | 6273.00 | 1249.50 | 4916.02 | 4882.00 | 5155.00 | 5132.48 | 1.97 | 216.46 | 5.70 | 1243.80 | 40.08 | 6.41 |
| | 1.858 | 6273.00 | 1249.50 | 4916.02 | 4882.00 | 5155.00 | 5132.48 | 1.97 | 216.46 | 5.70 | 1243.80 | 40.09 | 6.41 |
| | 1.858 | 4916.00 | 1248.85 | 4918.62 | 4882.00 | 5155.00 | 5129.23 | 1.95 | 210.61 | 5.05 | 1243.80 | 39.49 | 5.85 |
| | 1.858 | 2876.00 | 1247.70 | 4923.21 | 4882.00 | 5155.00 | 5123.48 | 1.90 | 200.27 | 3.90 | 1243.80 | 37.92 | 4.76 |

Existing Condition, HEC-RAS

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

| Reach | River Sta | 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) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 1.858 | 6273.00 | 1243.80 | 1249.50 | | 1250.13 | 0.004008 | 6.41 | 978.68 | 216.46 | 0.53 |
| Reach-1 | 1.858 | 6273.00 | 1243.80 | 1249.50 | | 1250.13 | 0.004008 | 6.41 | 978.68 | 216.46 | 0.53 |
| Reach-1 | 1.858 | 4916.00 | 1243.80 | 1248.84 | | 1249.38 | 0.003956 | 5.86 | 839.38 | 210.59 | 0.52 |
| Reach-1 | 1.858 | 2876.00 | 1243.80 | 1247.70 | | 1248.05 | 0.003791 | 4.76 | 603.78 | 200.27 | 0.48 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.52 | | 1248.35 | 0.005780 | 7.30 | 859.39 | 205.83 | 0.63 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.52 | | 1248.35 | 0.005780 | 7.30 | 859.39 | 205.83 | 0.63 |
| Reach-1 | 1.788 | 4916.00 | 1242.00 | 1246.89 | | 1247.59 | 0.005896 | 6.72 | 731.15 | 201.21 | 0.62 |
| Reach-1 | 1.788 | 2876.00 | 1242.00 | 1245.80 | | 1246.28 | 0.006081 | 5.57 | 516.43 | 193.22 | 0.60 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1245.39 | | 1246.13 | 0.004643 | 6.87 | 913.19 | 202.94 | 0.57 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1245.39 | | 1246.13 | 0.004643 | 6.87 | 913.19 | 202.94 | 0.57 |
| Reach-1 | 1.708 | 4916.00 | 1240.00 | 1244.71 | | 1245.33 | 0.004722 | 6.33 | 776.76 | 197.85 | 0.56 |
| Reach-1 | 1.708 | 2876.00 | 1240.00 | 1243.51 | | 1243.95 | 0.004941 | 5.28 | 544.98 | 188.90 | 0.55 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.09 | | 1243.68 | 0.003440 | 6.18 | 1015.63 | 211.49 | 0.50 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.09 | | 1243.68 | 0.003426 | 6.17 | 1016.95 | 211.54 | 0.50 |
| Reach-1 | 1.593 | 4916.00 | 1237.50 | 1242.40 | | 1242.89 | 0.003391 | 5.64 | 871.79 | 206.00 | 0.48 |
| Reach-1 | 1.593 | 2876.00 | 1237.50 | 1241.17 | | 1241.50 | 0.003304 | 4.61 | 624.29 | 196.21 | 0.46 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1240.99 | | 1241.59 | 0.003503 | 6.20 | 1015.82 | 220.78 | 0.50 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1241.00 | | 1241.59 | 0.003517 | 6.19 | 1013.06 | 212.99 | 0.50 |
| Reach-1 | 1.479 | 4916.00 | 1235.50 | 1240.30 | | 1240.80 | 0.003557 | 5.68 | 865.11 | 211.81 | 0.49 |
| Reach-1 | 1.479 | 2876.00 | 1235.50 | 1239.03 | | 1239.38 | 0.003741 | 4.75 | 604.99 | 199.25 | 0.48 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.35 | | 1239.89 | 0.003038 | 5.87 | 1067.80 | 218.53 | 0.47 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.36 | | 1239.89 | 0.003027 | 5.87 | 1069.06 | 218.59 | 0.47 |
| Reach-1 | 1.381 | 4916.00 | 1233.50 | 1238.69 | | 1239.13 | 0.002877 | 5.31 | 926.13 | 211.95 | 0.45 |
| Reach-1 | 1.381 | 2876.00 | 1233.50 | 1237.51 | | 1237.79 | 0.002523 | 4.22 | 682.17 | 200.11 | 0.40 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.69 | | 1237.82 | 0.010393 | 8.56 | 737.06 | 228.71 | 0.82 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.69 | | 1237.83 | 0.010453 | 8.55 | 733.39 | 215.00 | 0.82 |
| Reach-1 | 1.307 | 4916.00 | 1232.30 | 1236.26 | | 1237.17 | 0.009984 | 7.67 | 641.39 | 220.18 | 0.78 |
| Reach-1 | 1.307 | 2876.00 | 1232.30 | 1235.47 | | 1236.05 | 0.009223 | 6.09 | 472.02 | 211.02 | 0.72 |
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1234.90 | 1234.90 | 1236.33 | 0.016557 | 9.58 | 654.56 | 230.25 | 1.00 |

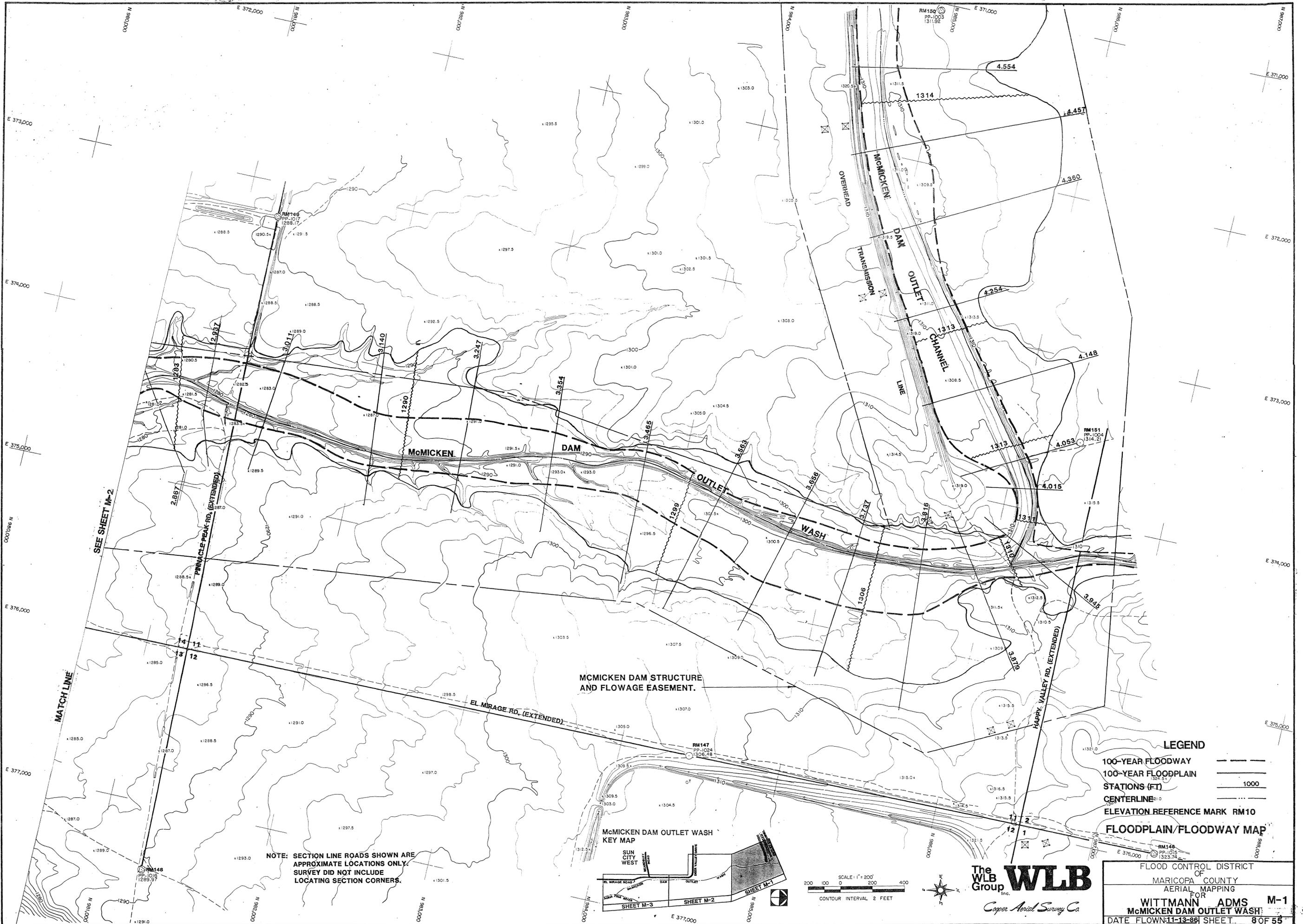
HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | 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) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1234.90 | 1234.90 | 1236.33 | 0.016557 | 9.58 | 654.56 | 230.25 | 1.00 |
| Reach-1 | 1.286 | 4916.00 | 1231.00 | 1234.45 | 1234.45 | 1235.68 | 0.017305 | 8.91 | 551.46 | 223.59 | 1.00 |
| Reach-1 | 1.286 | 2876.00 | 1231.00 | 1233.62 | 1233.62 | 1234.55 | 0.019519 | 7.71 | 372.88 | 205.70 | 1.01 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1222.80 | 1222.80 | 1224.36 | 0.004059 | 10.02 | 625.94 | 202.42 | 1.00 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1222.80 | 1222.80 | 1224.36 | 0.004059 | 10.02 | 625.94 | 202.42 | 1.00 |
| Reach-1 | 1.251 | 4916.00 | 1219.00 | 1222.31 | 1222.31 | 1223.66 | 0.004303 | 9.33 | 527.08 | 198.48 | 1.01 |
| Reach-1 | 1.251 | 2876.00 | 1219.00 | 1221.48 | 1221.48 | 1222.44 | 0.004807 | 7.89 | 364.46 | 191.81 | 1.01 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1217.59 | | 1217.88 | 0.000291 | 4.34 | 1446.32 | 226.33 | 0.30 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1217.59 | | 1217.88 | 0.000291 | 4.34 | 1446.32 | 226.33 | 0.30 |
| Reach-1 | 1.213 | 4916.00 | 1209.00 | 1216.92 | | 1217.14 | 0.000250 | 3.79 | 1296.86 | 221.99 | 0.28 |
| Reach-1 | 1.213 | 2876.00 | 1209.00 | 1215.74 | | 1215.86 | 0.000170 | 2.77 | 1039.27 | 214.32 | 0.22 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.07 | 1216.07 | 1217.67 | 0.004123 | 10.13 | 619.20 | 197.92 | 1.01 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.07 | 1216.07 | 1217.67 | 0.004123 | 10.13 | 619.20 | 197.92 | 1.01 |
| Reach-1 | 1.191 | 4916.00 | 1208.50 | 1215.57 | 1215.57 | 1216.95 | 0.004376 | 9.44 | 521.02 | 193.82 | 1.01 |
| Reach-1 | 1.191 | 2876.00 | 1208.50 | 1214.72 | 1214.72 | 1215.72 | 0.004924 | 8.01 | 359.18 | 186.88 | 1.02 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1213.29 | | 1214.25 | 0.001601 | 7.88 | 796.25 | 183.76 | 0.67 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1213.29 | | 1214.25 | 0.001601 | 7.88 | 796.25 | 183.76 | 0.67 |
| Reach-1 | 1.169 | 4916.00 | 1207.50 | 1212.64 | | 1213.45 | 0.001607 | 7.24 | 678.74 | 178.33 | 0.65 |
| Reach-1 | 1.169 | 2876.00 | 1207.50 | 1211.49 | | 1212.05 | 0.001583 | 5.99 | 480.48 | 166.37 | 0.62 |
| Reach-1 | 1.058 | 6273.00 | 1205.00 | 1212.08 | | 1212.75 | 0.004054 | 6.53 | 961.34 | 208.81 | 0.54 |
| Reach-1 | 1.058 | 6273.00 | 1205.00 | 1212.08 | | 1212.75 | 0.004054 | 6.53 | 961.34 | 208.81 | 0.54 |
| Reach-1 | 1.058 | 4916.00 | 1205.00 | 1211.38 | | 1211.94 | 0.004165 | 6.02 | 816.16 | 204.15 | 0.53 |
| Reach-1 | 1.058 | 2876.00 | 1205.00 | 1210.15 | | 1210.54 | 0.004466 | 5.05 | 569.64 | 195.99 | 0.52 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1209.53 | | 1210.26 | 0.004338 | 6.87 | 949.23 | 200.76 | 0.56 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1209.53 | | 1210.26 | 0.004338 | 6.87 | 949.23 | 200.76 | 0.56 |
| Reach-1 | 0.946 | 5085.00 | 1202.50 | 1208.80 | | 1209.42 | 0.004364 | 6.32 | 805.07 | 194.19 | 0.55 |
| Reach-1 | 0.946 | 2917.00 | 1202.50 | 1207.49 | | 1207.92 | 0.004442 | 5.22 | 559.31 | 182.45 | 0.52 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1207.26 | | 1207.89 | 0.003533 | 6.35 | 1027.31 | 209.81 | 0.51 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1207.26 | | 1207.89 | 0.003533 | 6.35 | 1027.31 | 209.81 | 0.51 |

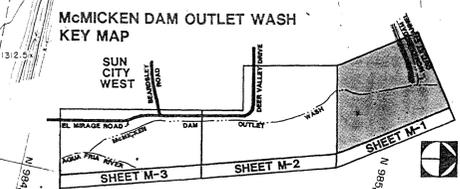
HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | 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) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 0.833 | 5085.00 | 1200.00 | 1206.53 | | 1207.05 | 0.003495 | 5.80 | 876.45 | 203.36 | 0.49 |
| Reach-1 | 0.833 | 2917.00 | 1200.00 | 1205.21 | | 1205.56 | 0.003445 | 4.74 | 615.59 | 191.69 | 0.47 |
| Reach-1 | 0.748 | 6522.00 | 1198.50 | 1204.81 | | 1205.78 | 0.006041 | 7.91 | 824.61 | 180.98 | 0.65 |
| Reach-1 | 0.746 | 6522.00 | 1198.50 | 1204.81 | | 1205.78 | 0.006041 | 7.91 | 824.63 | 180.98 | 0.65 |
| Reach-1 | 0.746 | 5085.00 | 1198.50 | 1203.91 | | 1204.81 | 0.007055 | 7.65 | 665.03 | 172.63 | 0.69 |
| Reach-1 | 0.748 | 2917.00 | 1198.50 | 1202.63 | | 1203.27 | 0.007662 | 6.46 | 451.51 | 160.79 | 0.68 |
| Reach-1 | 0.647 | 6522.00 | 1196.00 | 1202.49 | | 1202.97 | 0.004378 | 5.56 | 1173.05 | 344.17 | 0.53 |
| Reach-1 | 0.647 | 6522.00 | 1196.00 | 1202.49 | | 1202.97 | 0.004380 | 5.56 | 1172.76 | 344.11 | 0.53 |
| Reach-1 | 0.647 | 5085.00 | 1196.00 | 1201.83 | | 1202.25 | 0.003274 | 5.25 | 969.07 | 249.34 | 0.47 |
| Reach-1 | 0.647 | 2917.00 | 1196.00 | 1200.93 | | 1201.16 | 0.002279 | 3.88 | 752.41 | 232.43 | 0.38 |
| Reach-1 | 0.579 | 6522.00 | 1192.50 | 1200.49 | 1199.78 | 1200.98 | 0.007162 | 5.65 | 1153.87 | 477.19 | 0.64 |
| Reach-1 | 0.579 | 6522.00 | 1192.50 | 1200.49 | 1199.78 | 1200.98 | 0.007141 | 5.65 | 1154.98 | 477.24 | 0.64 |
| Reach-1 | 0.579 | 5085.00 | 1192.50 | 1200.07 | 1199.43 | 1200.51 | 0.007916 | 5.32 | 955.75 | 466.69 | 0.66 |
| Reach-1 | 0.579 | 2917.00 | 1192.50 | 1199.09 | 1198.77 | 1199.54 | 0.012466 | 5.35 | 544.96 | 370.58 | 0.78 |
| Reach-1 | 0.527 | 6522.00 | 1193.00 | 1198.14 | | 1198.77 | 0.009139 | 6.35 | 1027.31 | 429.15 | 0.72 |
| Reach-1 | 0.527 | 6522.00 | 1193.00 | 1198.14 | | 1198.77 | 0.009216 | 6.37 | 1023.55 | 427.92 | 0.73 |
| Reach-1 | 0.527 | 5085.00 | 1193.00 | 1197.57 | | 1198.19 | 0.009004 | 6.30 | 807.58 | 337.69 | 0.72 |
| Reach-1 | 0.527 | 2917.00 | 1193.00 | 1196.49 | | 1196.98 | 0.007359 | 5.58 | 522.81 | 225.23 | 0.65 |
| Reach-1 | 0.437 | 6522.00 | 1188.00 | 1194.66 | | 1195.13 | 0.006232 | 5.51 | 1184.65 | 458.27 | 0.60 |
| Reach-1 | 0.437 | 6522.00 | 1188.00 | 1194.67 | | 1195.14 | 0.006147 | 5.48 | 1189.58 | 458.31 | 0.60 |
| Reach-1 | 0.437 | 5085.00 | 1188.00 | 1194.37 | | 1194.73 | 0.005662 | 4.85 | 1048.84 | 457.06 | 0.56 |
| Reach-1 | 0.437 | 2917.00 | 1188.00 | 1193.67 | | 1193.91 | 0.005345 | 3.94 | 740.41 | 422.03 | 0.52 |
| Reach-1 | 0.35 | 6522.00 | 1184.50 | 1190.92 | | 1191.62 | 0.009407 | 6.76 | 993.54 | 447.04 | 0.74 |
| Reach-1 | 0.35 | 6522.00 | 1184.50 | 1190.93 | | 1191.65 | 0.009466 | 6.80 | 959.58 | 370.87 | 0.74 |
| Reach-1 | 0.35 | 5085.00 | 1184.50 | 1190.37 | | 1191.07 | 0.011958 | 6.72 | 762.71 | 387.45 | 0.81 |
| Reach-1 | 0.35 | 2917.00 | 1184.50 | 1189.57 | | 1190.13 | 0.014053 | 5.96 | 489.19 | 309.38 | 0.84 |
| Reach-1 | 0.238 | 6522.00 | 1180.00 | 1186.20 | | 1186.56 | 0.007553 | 4.79 | 1362.83 | 754.17 | 0.63 |
| Reach-1 | 0.238 | 6522.00 | 1180.00 | 1186.20 | | 1186.56 | 0.007553 | 4.79 | 1362.83 | 754.17 | 0.63 |
| Reach-1 | 0.238 | 5085.00 | 1180.00 | 1185.65 | | 1186.02 | 0.006190 | 4.88 | 1041.41 | 481.40 | 0.59 |

CROSS SECTION MAPS
AND HEC-1 OUTPUT
FROM WITTMAN ADMS



NOTE: SECTION LINE ROADS SHOWN ARE APPROXIMATE LOCATIONS ONLY. SURVEY DID NOT INCLUDE LOCATING SECTION CORNERS.

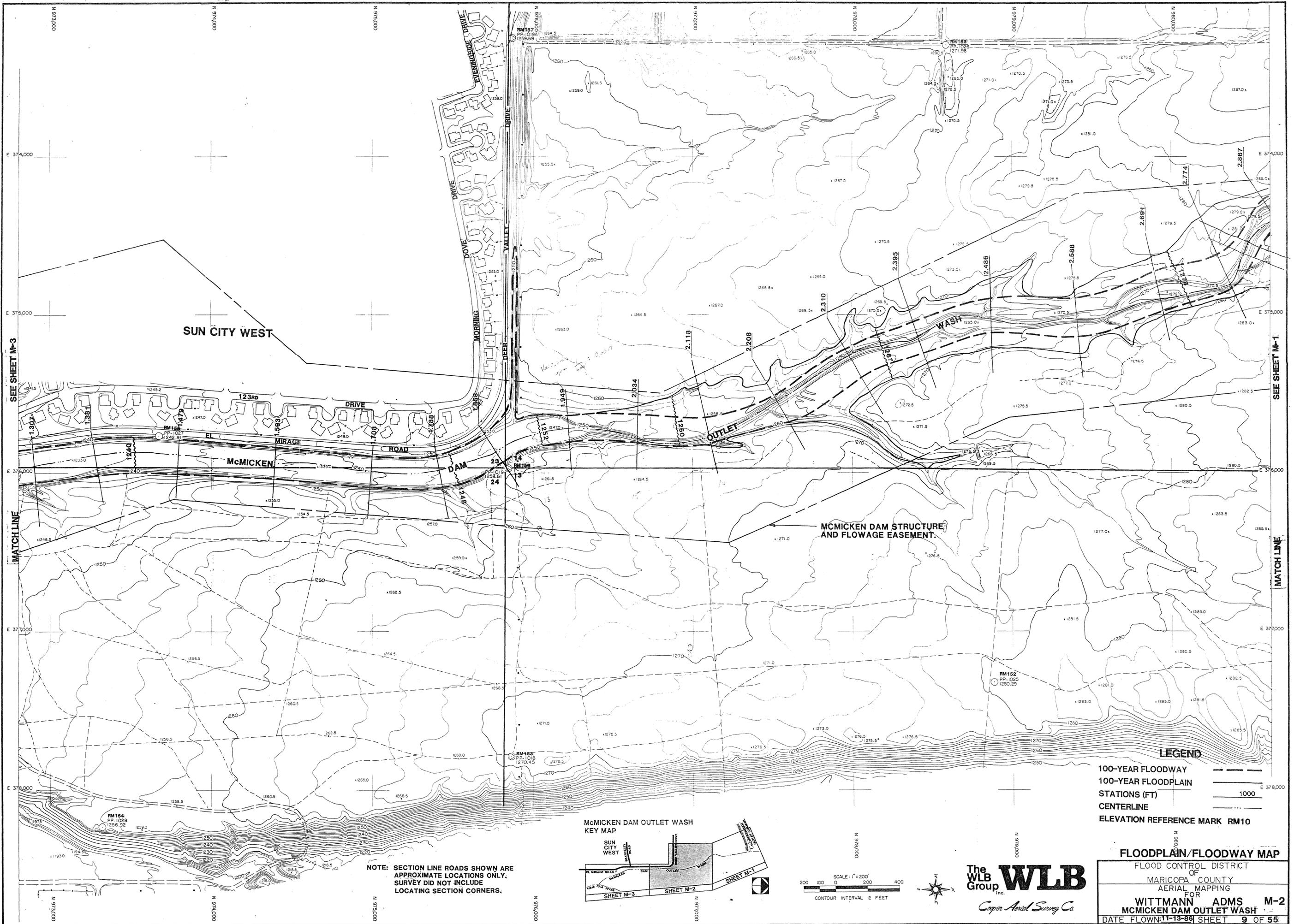


- LEGEND**
- 100-YEAR FLOODWAY
 - 100-YEAR FLOODPLAIN
 - STATIONS (FT) 1000
 - CENTERLINE
 - ELEVATION REFERENCE MARK RM10
 - FLOODPLAIN/FLOODWAY MAP

SCALE: 1" = 200'
CONTOUR INTERVAL 2 FEET

The WLB Group, Inc.
WLB
Copper Aerial Survey Co.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AERIAL MAPPING FOR WITTMANN ADMS M-1 McMICKEN DAM OUTLET WASH DATE FLOWN 11-13-86 SHEET 8 OF 55



SUN CITY WEST

McMICKEN DAM

McMICKEN DAM STRUCTURE AND FLOWAGE EASEMENT

LEGEND

- 100-YEAR FLOODWAY
- 100-YEAR FLOODPLAIN
- STATIONS (FT)
- CENTERLINE
- ELEVATION REFERENCE MARK RM10

FLOODPLAIN/FLOODWAY MAP

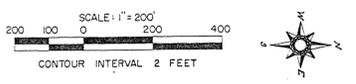
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AERIAL MAPPING FOR

WITTMANN ADMS M-2
McMICKEN DAM OUTLET WASH

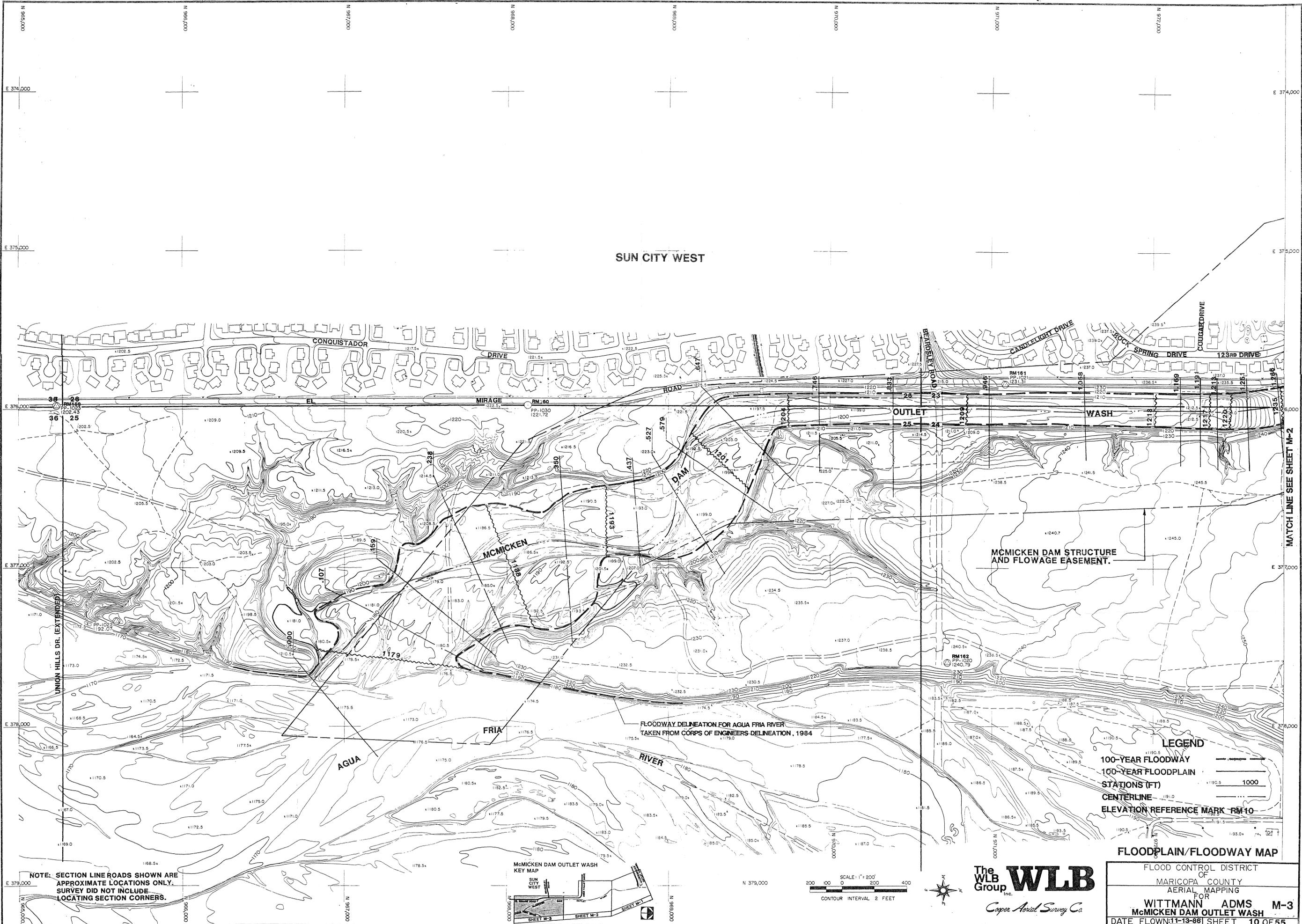
DATE FLOWN: 11-13-89 SHEET 9 OF 55

NOTE: SECTION LINE ROADS SHOWN ARE APPROXIMATE LOCATIONS ONLY. SURVEY DID NOT INCLUDE LOCATING SECTION CORNERS.

McMICKEN DAM OUTLET WASH KEY MAP



The WLB Group Inc. **WLB**
Copper Aerial Survey Co.



SUN CITY WEST

McMICKEN DAM STRUCTURE AND FLOWAGE EASEMENT.

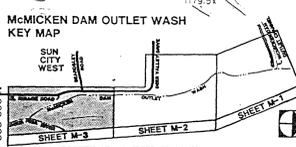
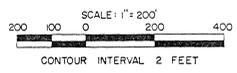
FLOODWAY DELINEATION FOR AGUA FRIA RIVER
TAKEN FROM CORPS OF ENGINEERS DELINEATION, 1984

- LEGEND**
- 100-YEAR FLOODWAY
 - 100-YEAR FLOODPLAIN
 - STATIONS (FT)
 - CENTERLINE
 - ELEVATION REFERENCE MARK RM 10

FLOODPLAIN/FLOODWAY MAP

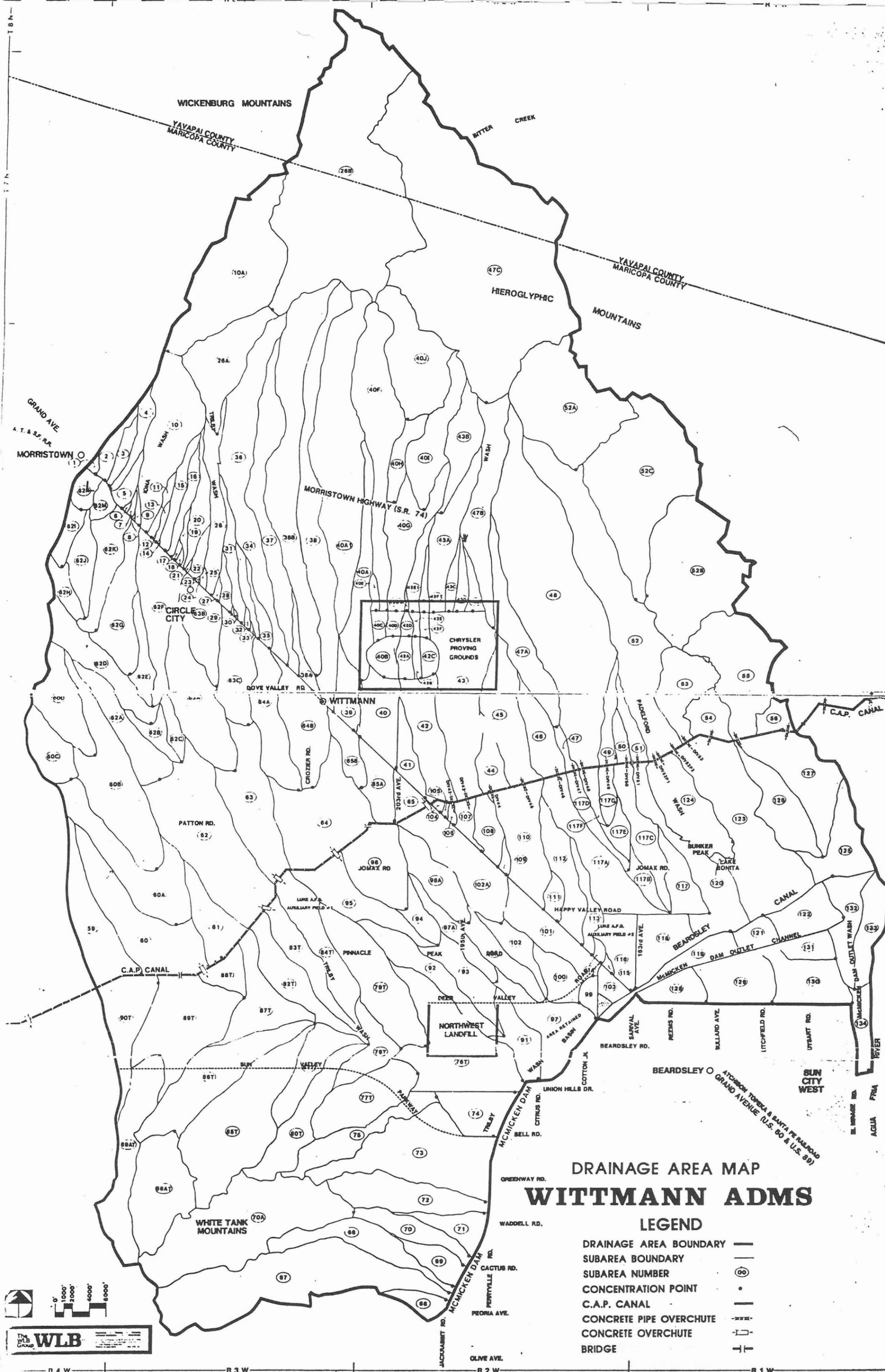
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AERIAL MAPPING FOR WITTMANN ADMS M-3 McMICKEN DAM OUTLET WASH DATE FLOWN 11-13-86 SHEET 10 OF 55

The WLB Group Inc. **WLB** Cooper Aerial Survey Co.



NOTE: SECTION LINE ROADS SHOWN ARE APPROXIMATE LOCATIONS ONLY. SURVEY DID NOT INCLUDE LOCATING SECTION CORNERS.

MATCH LINE SEE SHEET M-2



DRAINAGE AREA MAP
WITTMANN ADMS

- LEGEND**
- DRAINAGE AREA BOUNDARY ———
 - SUBAREA BOUNDARY ———
 - SUBAREA NUMBER (00)
 - CONCENTRATION POINT •
 - C.A.P. CANAL ———
 - CONCRETE PIPE OVERCHUTE ———
 - CONCRETE OVERCHUTE ———
 - BRIDGE ———

The WLB Group

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lahey F77L-EM/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 10/22/98 TIME 13:05:22 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****

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50-yr Model

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 WTMN5OYR
2 ID
3 ID
4 ID THIS IS THE HEC-1 COMPUTER MODEL FOR THE WITTMANN AREA DRAINAGE MASTER
5 ID STUDY. THIS STUDY IS PREPARED FOR THE FLOOD CONTROL DISTRICT OF
6 ID MARICOPA COUNTY BY THE WLB GROUP, INC.
7 ID
8 ID THIS IS THE 50 YEAR MODEL FOR THE STUDY AREA AND INCLUDES STORAGE
9 ID ROUTING AND DIVERSIONS ALONG THE A.T. & S.F. RAILROAD, THE CAP CANAL,
10 ID AND THE BEARDSLEY CANAL.
11 ID
12 ID
13 ID
14 *DIAGRAM
15 IT 3 26JAN87 1200 640
16 IN 15 26JAN87 1200
17 IO 5
18 JD 3.72 .001
19 PC .000 .002 .005 .008 .011 .014 .017 .020 .023 .026
20 PC .029 .032 .035 .038 .041 .044 .048 .052 .056 .060
21 PC .064 .068 .072 .076 .080 .085 .090 .095 .100 .105
22 PC .110 .115 .120 .126 .133 .140 .147 .155 .163 .172
23 PC .181 .191 .203 .218 .236 .257 .283 .387 .663 .707
24 PC .735 .758 .776 .791 .804 .815 .825 .834 .842 .849
25 PC .856 .863 .869 .875 .881 .887 .893 .898 .903 .908
26 PC .913 .918 .922 .926 .930 .934 .938 .942 .946 .950
27 PC .953 .956 .959 .962 .965 .968 .971 .974 .977 .980
28 PC .983 .986 .989 .992 .995 .998 1.00 1.000 1.000 1.000
29 JD 3.68 10
30 JD 3.53 50
31 JD 3.47 100
32 JD 3.37 350
33 KK 1
34 KM RUNOFF FROM SUBWATERSHED 1.
35 KM UNIT HYDROGRAPHS HAVE BEEN COMPUTED FOR EACH SUBWATERSHED USING THE
36 KM CORPS OF ENGINEERS S-GRAPH COMPUTATIONS FOR UNIT HYDROGRAPHS. THE
37 KM S-GRAPH PROGRAM HAS BEEN DEVELOPED FOR THE PHOENIX MOUNTAIN AND PHOENIX
38 KM VALLEY AREAS. THIS SHOULD GIVE A MORE RELIABLE UNIT HYDROGRAPH FOR THE
39 KM HEC-1 PROGRAM TO UTILIZE WITHIN THE WITTMANN ADMS AREA.
40 BA .088
41 LS 0 81 0
42 UK 200 .0160 .11 100
43 RK 2900 .0132 .05 TRAP 0 15
44 KK C1

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Hydrograph @ McMicken
Dam Outlet Wash above
Deer Valley Channel

INTERPOLATED HYDROGRAPH AT C132

50-yr Storm

| DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * |
|----|-----|------|-----|------|---|----|-----|------|-----|------|---|----|-----|------|-----|-------|---|----|-----|------|-----|-------|---|
| 26 | JAN | 1200 | 1 | 0. | * | 26 | JAN | 2000 | 161 | 0. | * | 27 | JAN | 0400 | 321 | 4746. | * | 27 | JAN | 1200 | 481 | 4114. | * |
| 26 | JAN | 1203 | 2 | 0. | * | 26 | JAN | 2003 | 162 | 0. | * | 27 | JAN | 0403 | 322 | 4753. | * | 27 | JAN | 1203 | 482 | 4110. | * |
| 26 | JAN | 1206 | 3 | 0. | * | 26 | JAN | 2006 | 163 | 0. | * | 27 | JAN | 0406 | 323 | 4760. | * | 27 | JAN | 1206 | 483 | 4107. | * |
| 26 | JAN | 1209 | 4 | 0. | * | 26 | JAN | 2009 | 164 | 0. | * | 27 | JAN | 0409 | 324 | 4767. | * | 27 | JAN | 1209 | 484 | 4103. | * |
| 26 | JAN | 1212 | 5 | 0. | * | 26 | JAN | 2012 | 165 | 0. | * | 27 | JAN | 0412 | 325 | 4773. | * | 27 | JAN | 1212 | 485 | 4099. | * |
| 26 | JAN | 1215 | 6 | 0. | * | 26 | JAN | 2015 | 166 | 0. | * | 27 | JAN | 0415 | 326 | 4778. | * | 27 | JAN | 1215 | 486 | 4096. | * |
| 26 | JAN | 1218 | 7 | 0. | * | 26 | JAN | 2018 | 167 | 0. | * | 27 | JAN | 0418 | 327 | 4783. | * | 27 | JAN | 1218 | 487 | 4092. | * |
| 26 | JAN | 1221 | 8 | 0. | * | 26 | JAN | 2021 | 168 | 0. | * | 27 | JAN | 0421 | 328 | 4787. | * | 27 | JAN | 1221 | 488 | 4088. | * |
| 26 | JAN | 1224 | 9 | 0. | * | 26 | JAN | 2024 | 169 | 0. | * | 27 | JAN | 0424 | 329 | 4790. | * | 27 | JAN | 1224 | 489 | 4085. | * |
| 26 | JAN | 1227 | 10 | 0. | * | 26 | JAN | 2027 | 170 | 0. | * | 27 | JAN | 0427 | 330 | 4793. | * | 27 | JAN | 1227 | 490 | 4081. | * |
| 26 | JAN | 1230 | 11 | 0. | * | 26 | JAN | 2030 | 171 | 0. | * | 27 | JAN | 0430 | 331 | 4796. | * | 27 | JAN | 1230 | 491 | 4077. | * |
| 26 | JAN | 1233 | 12 | 0. | * | 26 | JAN | 2033 | 172 | 0. | * | 27 | JAN | 0433 | 332 | 4799. | * | 27 | JAN | 1233 | 492 | 4073. | * |
| 26 | JAN | 1236 | 13 | 0. | * | 26 | JAN | 2036 | 173 | 0. | * | 27 | JAN | 0436 | 333 | 4801. | * | 27 | JAN | 1236 | 493 | 4069. | * |
| 26 | JAN | 1239 | 14 | 0. | * | 26 | JAN | 2039 | 174 | 0. | * | 27 | JAN | 0439 | 334 | 4803. | * | 27 | JAN | 1239 | 494 | 4065. | * |
| 26 | JAN | 1242 | 15 | 0. | * | 26 | JAN | 2042 | 175 | 0. | * | 27 | JAN | 0442 | 335 | 4804. | * | 27 | JAN | 1242 | 495 | 4060. | * |
| 26 | JAN | 1245 | 16 | 0. | * | 26 | JAN | 2045 | 176 | 0. | * | 27 | JAN | 0445 | 336 | 4806. | * | 27 | JAN | 1245 | 496 | 4056. | * |
| 26 | JAN | 1248 | 17 | 0. | * | 26 | JAN | 2048 | 177 | 0. | * | 27 | JAN | 0448 | 337 | 4808. | * | 27 | JAN | 1248 | 497 | 4051. | * |
| 26 | JAN | 1251 | 18 | 0. | * | 26 | JAN | 2051 | 178 | 0. | * | 27 | JAN | 0451 | 338 | 4809. | * | 27 | JAN | 1251 | 498 | 4047. | * |
| 26 | JAN | 1254 | 19 | 0. | * | 26 | JAN | 2054 | 179 | 0. | * | 27 | JAN | 0454 | 339 | 4811. | * | 27 | JAN | 1254 | 499 | 4042. | * |
| 26 | JAN | 1257 | 20 | 0. | * | 26 | JAN | 2057 | 180 | 0. | * | 27 | JAN | 0457 | 340 | 4812. | * | 27 | JAN | 1257 | 500 | 4037. | * |
| 26 | JAN | 1300 | 21 | 0. | * | 26 | JAN | 2100 | 181 | 0. | * | 27 | JAN | 0500 | 341 | 4813. | * | 27 | JAN | 1300 | 501 | 4031. | * |
| 26 | JAN | 1303 | 22 | 0. | * | 26 | JAN | 2103 | 182 | 0. | * | 27 | JAN | 0503 | 342 | 4815. | * | 27 | JAN | 1303 | 502 | 4026. | * |
| 26 | JAN | 1306 | 23 | 0. | * | 26 | JAN | 2106 | 183 | 1. | * | 27 | JAN | 0506 | 343 | 4816. | * | 27 | JAN | 1306 | 503 | 4020. | * |
| 26 | JAN | 1309 | 24 | 0. | * | 26 | JAN | 2109 | 184 | 1. | * | 27 | JAN | 0509 | 344 | 4817. | * | 27 | JAN | 1309 | 504 | 4014. | * |
| 26 | JAN | 1312 | 25 | 0. | * | 26 | JAN | 2112 | 185 | 1. | * | 27 | JAN | 0512 | 345 | 4819. | * | 27 | JAN | 1312 | 505 | 4008. | * |
| 26 | JAN | 1315 | 26 | 0. | * | 26 | JAN | 2115 | 186 | 1. | * | 27 | JAN | 0515 | 346 | 4820. | * | 27 | JAN | 1315 | 506 | 4002. | * |
| 26 | JAN | 1318 | 27 | 0. | * | 26 | JAN | 2118 | 187 | 1. | * | 27 | JAN | 0518 | 347 | 4821. | * | 27 | JAN | 1318 | 507 | 3996. | * |
| 26 | JAN | 1321 | 28 | 0. | * | 26 | JAN | 2121 | 188 | 1. | * | 27 | JAN | 0521 | 348 | 4822. | * | 27 | JAN | 1321 | 508 | 3989. | * |
| 26 | JAN | 1324 | 29 | 0. | * | 26 | JAN | 2124 | 189 | 1. | * | 27 | JAN | 0524 | 349 | 4823. | * | 27 | JAN | 1324 | 509 | 3982. | * |
| 26 | JAN | 1327 | 30 | 0. | * | 26 | JAN | 2127 | 190 | 1. | * | 27 | JAN | 0527 | 350 | 4825. | * | 27 | JAN | 1327 | 510 | 3975. | * |
| 26 | JAN | 1330 | 31 | 0. | * | 26 | JAN | 2130 | 191 | 1. | * | 27 | JAN | 0530 | 351 | 4826. | * | 27 | JAN | 1330 | 511 | 3968. | * |
| 26 | JAN | 1333 | 32 | 0. | * | 26 | JAN | 2133 | 192 | 2. | * | 27 | JAN | 0533 | 352 | 4826. | * | 27 | JAN | 1333 | 512 | 3961. | * |
| 26 | JAN | 1336 | 33 | 0. | * | 26 | JAN | 2136 | 193 | 2. | * | 27 | JAN | 0536 | 353 | 4827. | * | 27 | JAN | 1336 | 513 | 3954. | * |
| 26 | JAN | 1339 | 34 | 0. | * | 26 | JAN | 2139 | 194 | 2. | * | 27 | JAN | 0539 | 354 | 4828. | * | 27 | JAN | 1339 | 514 | 3946. | * |
| 26 | JAN | 1342 | 35 | 0. | * | 26 | JAN | 2142 | 195 | 2. | * | 27 | JAN | 0542 | 355 | 4829. | * | 27 | JAN | 1342 | 515 | 3939. | * |
| 26 | JAN | 1345 | 36 | 0. | * | 26 | JAN | 2145 | 196 | 3. | * | 27 | JAN | 0545 | 356 | 4829. | * | 27 | JAN | 1345 | 516 | 3931. | * |
| 26 | JAN | 1348 | 37 | 0. | * | 26 | JAN | 2148 | 197 | 3. | * | 27 | JAN | 0548 | 357 | 4829. | * | 27 | JAN | 1348 | 517 | 3923. | * |
| 26 | JAN | 1351 | 38 | 0. | * | 26 | JAN | 2151 | 198 | 3. | * | 27 | JAN | 0551 | 358 | 4830. | * | 27 | JAN | 1351 | 518 | 3916. | * |
| 26 | JAN | 1354 | 39 | 0. | * | 26 | JAN | 2154 | 199 | 4. | * | 27 | JAN | 0554 | 359 | 4830. | * | 27 | JAN | 1354 | 519 | 3908. | * |
| 26 | JAN | 1357 | 40 | 0. | * | 26 | JAN | 2157 | 200 | 4. | * | 27 | JAN | 0557 | 360 | 4830. | * | 27 | JAN | 1357 | 520 | 3900. | * |
| 26 | JAN | 1400 | 41 | 0. | * | 26 | JAN | 2200 | 201 | 4. | * | 27 | JAN | 0600 | 361 | 4830. | * | 27 | JAN | 1400 | 521 | 3892. | * |
| 26 | JAN | 1403 | 42 | 0. | * | 26 | JAN | 2203 | 202 | 5. | * | 27 | JAN | 0603 | 362 | 4829. | * | 27 | JAN | 1403 | 522 | 3884. | * |
| 26 | JAN | 1406 | 43 | 0. | * | 26 | JAN | 2206 | 203 | 5. | * | 27 | JAN | 0606 | 363 | 4829. | * | 27 | JAN | 1406 | 523 | 3876. | * |
| 26 | JAN | 1409 | 44 | 0. | * | 26 | JAN | 2209 | 204 | 6. | * | 27 | JAN | 0609 | 364 | 4828. | * | 27 | JAN | 1409 | 524 | 3868. | * |
| 26 | JAN | 1412 | 45 | 0. | * | 26 | JAN | 2212 | 205 | 7. | * | 27 | JAN | 0612 | 365 | 4827. | * | 27 | JAN | 1412 | 525 | 3860. | * |
| 26 | JAN | 1415 | 46 | 0. | * | 26 | JAN | 2215 | 206 | 7. | * | 27 | JAN | 0615 | 366 | 4826. | * | 27 | JAN | 1415 | 526 | 3852. | * |
| 26 | JAN | 1418 | 47 | 0. | * | 26 | JAN | 2218 | 207 | 8. | * | 27 | JAN | 0618 | 367 | 4825. | * | 27 | JAN | 1418 | 527 | 3844. | * |
| 26 | JAN | 1421 | 48 | 0. | * | 26 | JAN | 2221 | 208 | 9. | * | 27 | JAN | 0621 | 368 | 4823. | * | 27 | JAN | 1421 | 528 | 3836. | * |
| 26 | JAN | 1424 | 49 | 0. | * | 26 | JAN | 2224 | 209 | 10. | * | 27 | JAN | 0624 | 369 | 4821. | * | 27 | JAN | 1424 | 529 | 3829. | * |
| 26 | JAN | 1427 | 50 | 0. | * | 26 | JAN | 2227 | 210 | 10. | * | 27 | JAN | 0627 | 370 | 4820. | * | 27 | JAN | 1427 | 530 | 3821. | * |
| 26 | JAN | 1430 | 51 | 0. | * | 26 | JAN | 2230 | 211 | 11. | * | 27 | JAN | 0630 | 371 | 4817. | * | 27 | JAN | 1430 | 531 | 3813. | * |
| 26 | JAN | 1433 | 52 | 0. | * | 26 | JAN | 2233 | 212 | 13. | * | 27 | JAN | 0633 | 372 | 4815. | * | 27 | JAN | 1433 | 532 | 3805. | * |
| 26 | JAN | 1436 | 53 | 0. | * | 26 | JAN | 2236 | 213 | 14. | * | 27 | JAN | 0636 | 373 | 4812. | * | 27 | JAN | 1436 | 533 | 3797. | * |
| 26 | JAN | 1439 | 54 | 0. | * | 26 | JAN | 2239 | 214 | 15. | * | 27 | JAN | 0639 | 374 | 4810. | * | 27 | JAN | 1439 | 534 | 3789. | * |
| 26 | JAN | 1442 | 55 | 0. | * | 26 | JAN | 2242 | 215 | 16. | * | 27 | JAN | 0642 | 375 | 4807. | * | 27 | JAN | 1442 | 535 | 3782. | * |
| 26 | JAN | 1445 | 56 | 0. | * | 26 | JAN | 2245 | 216 | 17. | * | 27 | JAN | 0645 | 376 | 4803. | * | 27 | JAN | 1445 | 536 | 3774. | * |
| 26 | JAN | 1448 | 57 | 0. | * | 26 | JAN | 2248 | 217 | 19. | * | 27 | JAN | 0648 | 377 | 4800. | * | 27 | JAN | 1448 | 537 | 3767. | * |
| 26 | JAN | 1451 | 58 | 0. | * | 26 | JAN | 2251 | 218 | 20. | * | 27 | JAN | 0651 | 378 | 4796. | * | 27 | JAN | 1451 | 538 | 3759. | * |
| 26 | JAN | 1454 | 59 | 0. | * | 26 | JAN | 2254 | 219 | 22. | * | 27 | JAN | 0654 | 379 | 4791. | * | 27 | JAN | 1454 | 539 | 3751. | * |
| 26 | JAN | 1457 | 60 | 0. | * | 26 | JAN | 2257 | 220 | 24. | * | 27 | JAN | 0657 | 380 | 4787. | * | 27 | JAN | 1457 | 540 | 3744. | * |
| 26 | JAN | 1500 | 61 | 0. | * | 26 | JAN | 2300 | 221 | 25. | * | 27 | JAN | 0700 | 381 | 4782. | * | 27 | JAN | 1500 | 541 | 3737. | * |
| 26 | JAN | 1503 | 62 | 0. | * | 26 | JAN | 2303 | 222 | 27. | * | 27 | JAN | 0703 | 382 | 4777. | * | 27 | JAN | 1503 | 542 | 3729. | * |
| 26 | JAN | 1506 | 63 | 0. | * | 26 | JAN | 2306 | 223 | 29. | * | 27 | JAN | 0706 | 383 | 4772. | * | 27 | JAN | 1506 | 543 | 3722. | * |
| 26 | JAN | 1509 | 64 | 0. | * | 26 | JAN | 2309 | 224 | 32. | * | 27 | JAN | 0709 | 384 | 4766. | * | 27 | JAN | 1509 | 544 | 3715. | * |
| 26 | JAN | 1512 | 65 | 0. | * | 26 | JAN | 2312 | 225 | 34. | * | 27 | JAN | 0712 | 385 | 4760. | * | 27 | JAN | 1512 | 545 | 3707. | * |
| 26 | JAN | 1515 | 66 | 0. | * | 26 | JAN | 2315 | 226 | 37. | * | 27 | JAN | 0715 | 386 | 4754. | * | 27 | JAN | 1515 | 546 | 3700. | * |
| 26 | JAN | 1518 | 67 | 0. | * | 26 | JAN | 2318 | 227 | 39. | * | 27 | JAN | 0718 | 387 | 4747. | * | 27 | JAN | 1518 | 547 | 3693. | * |
| 26 | JAN | 1521 | 68 | 0. | * | 26 | JAN | 2321 | 228 | 42. | * | 27 | JAN | 0721 | 388 | 4741. | * | 27 | JAN | 1521 | 548 | 3686. | * |
| 26 | JAN | 1524 | 69 | 0. | * | 26 | JAN | 2324 | 229 | 45. | * | 27 | JAN | 0724 | 389 | 4733. | * | 27 | JAN | 1524 | 549 | 3679. | * |
| 26 | JAN | 1527 | 70 | 0. | * | 26 | JAN | 2327 | 230 | 49. | * | 27 | JAN | 0727 | 390 | 4726. | * | 27 | JAN | 1527 | 550 | 3672. | * |
| 26 | JAN | 1530 | 71 | 0. | * | 26 | JAN | 2330 | 231 | 52. | * | 27 | JAN | 0730 | 391 | 4718. | * | 27 | | | | | |

13.09 hrs

| | | | | | | | | | | | | | | |
|-------------|-----|----|---|-------------|-----|-------|---|-------------|-----|-------|---|-------------|-----|-------|
| 26 JAN 1545 | 76 | 0. | * | 26 JAN 2345 | 236 | 79. | * | 27 JAN 0745 | 396 | 4677. | * | 27 JAN 1545 | 556 | 3630. |
| 26 JAN 1548 | 77 | 0. | * | 26 JAN 2348 | 237 | 90. | * | 27 JAN 0748 | 397 | 4668. | * | 27 JAN 1548 | 557 | 3623. |
| 26 JAN 1551 | 78 | 0. | * | 26 JAN 2351 | 238 | 101. | * | 27 JAN 0751 | 398 | 4658. | * | 27 JAN 1551 | 558 | 3616. |
| 26 JAN 1554 | 79 | 0. | * | 26 JAN 2354 | 239 | 119. | * | 27 JAN 0754 | 399 | 4649. | * | 27 JAN 1554 | 559 | 3610. |
| 26 JAN 1557 | 80 | 0. | * | 26 JAN 2357 | 240 | 139. | * | 27 JAN 0757 | 400 | 4639. | * | 27 JAN 1557 | 560 | 3603. |
| 26 JAN 1600 | 81 | 0. | * | 27 JAN 0000 | 241 | 173. | * | 27 JAN 0800 | 401 | 4629. | * | 27 JAN 1600 | 561 | 3596. |
| 26 JAN 1603 | 82 | 0. | * | 27 JAN 0003 | 242 | 216. | * | 27 JAN 0803 | 402 | 4618. | * | 27 JAN 1603 | 562 | 3590. |
| 26 JAN 1606 | 83 | 0. | * | 27 JAN 0006 | 243 | 280. | * | 27 JAN 0806 | 403 | 4607. | * | 27 JAN 1606 | 563 | 3583. |
| 26 JAN 1609 | 84 | 0. | * | 27 JAN 0009 | 244 | 355. | * | 27 JAN 0809 | 404 | 4596. | * | 27 JAN 1609 | 564 | 3577. |
| 26 JAN 1612 | 85 | 0. | * | 27 JAN 0012 | 245 | 447. | * | 27 JAN 0812 | 405 | 4585. | * | 27 JAN 1612 | 565 | 3570. |
| 26 JAN 1615 | 86 | 0. | * | 27 JAN 0015 | 246 | 554. | * | 27 JAN 0815 | 406 | 4574. | * | 27 JAN 1615 | 566 | 3563. |
| 26 JAN 1618 | 87 | 0. | * | 27 JAN 0018 | 247 | 680. | * | 27 JAN 0818 | 407 | 4562. | * | 27 JAN 1618 | 567 | 3557. |
| 26 JAN 1621 | 88 | 0. | * | 27 JAN 0021 | 248 | 848. | * | 27 JAN 0821 | 408 | 4551. | * | 27 JAN 1621 | 568 | 3550. |
| 26 JAN 1624 | 89 | 0. | * | 27 JAN 0024 | 249 | 1015. | * | 27 JAN 0824 | 409 | 4540. | * | 27 JAN 1624 | 569 | 3543. |
| 26 JAN 1627 | 90 | 0. | * | 27 JAN 0027 | 250 | 1178. | * | 27 JAN 0827 | 410 | 4529. | * | 27 JAN 1627 | 570 | 3536. |
| 26 JAN 1630 | 91 | 0. | * | 27 JAN 0030 | 251 | 1341. | * | 27 JAN 0830 | 411 | 4518. | * | 27 JAN 1630 | 571 | 3529. |
| 26 JAN 1633 | 92 | 0. | * | 27 JAN 0033 | 252 | 1509. | * | 27 JAN 0833 | 412 | 4507. | * | 27 JAN 1633 | 572 | 3522. |
| 26 JAN 1636 | 93 | 0. | * | 27 JAN 0036 | 253 | 1684. | * | 27 JAN 0836 | 413 | 4497. | * | 27 JAN 1636 | 573 | 3515. |
| 26 JAN 1639 | 94 | 0. | * | 27 JAN 0039 | 254 | 1864. | * | 27 JAN 0839 | 414 | 4486. | * | 27 JAN 1639 | 574 | 3507. |
| 26 JAN 1642 | 95 | 0. | * | 27 JAN 0042 | 255 | 2043. | * | 27 JAN 0842 | 415 | 4476. | * | 27 JAN 1642 | 575 | 3500. |
| 26 JAN 1645 | 96 | 0. | * | 27 JAN 0045 | 256 | 2216. | * | 27 JAN 0845 | 416 | 4467. | * | 27 JAN 1645 | 576 | 3492. |
| 26 JAN 1648 | 97 | 0. | * | 27 JAN 0048 | 257 | 2380. | * | 27 JAN 0848 | 417 | 4457. | * | 27 JAN 1648 | 577 | 3485. |
| 26 JAN 1651 | 98 | 0. | * | 27 JAN 0051 | 258 | 2539. | * | 27 JAN 0851 | 418 | 4448. | * | 27 JAN 1651 | 578 | 3477. |
| 26 JAN 1654 | 99 | 0. | * | 27 JAN 0054 | 259 | 2693. | * | 27 JAN 0854 | 419 | 4439. | * | 27 JAN 1654 | 579 | 3469. |
| 26 JAN 1657 | 100 | 0. | * | 27 JAN 0057 | 260 | 2842. | * | 27 JAN 0857 | 420 | 4430. | * | 27 JAN 1657 | 580 | 3462. |
| 26 JAN 1700 | 101 | 0. | * | 27 JAN 0100 | 261 | 2987. | * | 27 JAN 0900 | 421 | 4422. | * | 27 JAN 1700 | 581 | 3454. |
| 26 JAN 1703 | 102 | 0. | * | 27 JAN 0103 | 262 | 3126. | * | 27 JAN 0903 | 422 | 4413. | * | 27 JAN 1703 | 582 | 3446. |
| 26 JAN 1706 | 103 | 0. | * | 27 JAN 0106 | 263 | 3259. | * | 27 JAN 0906 | 423 | 4405. | * | 27 JAN 1706 | 583 | 3438. |
| 26 JAN 1709 | 104 | 0. | * | 27 JAN 0109 | 264 | 3386. | * | 27 JAN 0909 | 424 | 4397. | * | 27 JAN 1709 | 584 | 3430. |
| 26 JAN 1712 | 105 | 0. | * | 27 JAN 0112 | 265 | 3505. | * | 27 JAN 0912 | 425 | 4389. | * | 27 JAN 1712 | 585 | 3423. |
| 26 JAN 1715 | 106 | 0. | * | 27 JAN 0115 | 266 | 3617. | * | 27 JAN 0915 | 426 | 4382. | * | 27 JAN 1715 | 586 | 3415. |
| 26 JAN 1718 | 107 | 0. | * | 27 JAN 0118 | 267 | 3718. | * | 27 JAN 0918 | 427 | 4374. | * | 27 JAN 1718 | 587 | 3407. |
| 26 JAN 1721 | 108 | 0. | * | 27 JAN 0121 | 268 | 3804. | * | 27 JAN 0921 | 428 | 4367. | * | 27 JAN 1721 | 588 | 3399. |
| 26 JAN 1724 | 109 | 0. | * | 27 JAN 0124 | 269 | 3877. | * | 27 JAN 0924 | 429 | 4360. | * | 27 JAN 1724 | 589 | 3392. |
| 26 JAN 1727 | 110 | 0. | * | 27 JAN 0127 | 270 | 3939. | * | 27 JAN 0927 | 430 | 4353. | * | 27 JAN 1727 | 590 | 3384. |
| 26 JAN 1730 | 111 | 0. | * | 27 JAN 0130 | 271 | 3995. | * | 27 JAN 0930 | 431 | 4346. | * | 27 JAN 1730 | 591 | 3377. |
| 26 JAN 1733 | 112 | 0. | * | 27 JAN 0133 | 272 | 4046. | * | 27 JAN 0933 | 432 | 4339. | * | 27 JAN 1733 | 592 | 3369. |
| 26 JAN 1736 | 113 | 0. | * | 27 JAN 0136 | 273 | 4093. | * | 27 JAN 0936 | 433 | 4332. | * | 27 JAN 1736 | 593 | 3362. |
| 26 JAN 1739 | 114 | 0. | * | 27 JAN 0139 | 274 | 4137. | * | 27 JAN 0939 | 434 | 4326. | * | 27 JAN 1739 | 594 | 3354. |
| 26 JAN 1742 | 115 | 0. | * | 27 JAN 0142 | 275 | 4178. | * | 27 JAN 0942 | 435 | 4320. | * | 27 JAN 1742 | 595 | 3347. |
| 26 JAN 1745 | 116 | 0. | * | 27 JAN 0145 | 276 | 4218. | * | 27 JAN 0945 | 436 | 4313. | * | 27 JAN 1745 | 596 | 3339. |
| 26 JAN 1748 | 117 | 0. | * | 27 JAN 0148 | 277 | 4255. | * | 27 JAN 0948 | 437 | 4307. | * | 27 JAN 1748 | 597 | 3332. |
| 26 JAN 1751 | 118 | 0. | * | 27 JAN 0151 | 278 | 4291. | * | 27 JAN 0951 | 438 | 4301. | * | 27 JAN 1751 | 598 | 3325. |
| 26 JAN 1754 | 119 | 0. | * | 27 JAN 0154 | 279 | 4326. | * | 27 JAN 0954 | 439 | 4295. | * | 27 JAN 1754 | 599 | 3318. |
| 26 JAN 1757 | 120 | 0. | * | 27 JAN 0157 | 280 | 4359. | * | 27 JAN 0957 | 440 | 4289. | * | 27 JAN 1757 | 600 | 3311. |
| 26 JAN 1800 | 121 | 0. | * | 27 JAN 0200 | 281 | 4390. | * | 27 JAN 1000 | 441 | 4284. | * | 27 JAN 1800 | 601 | 3304. |
| 26 JAN 1803 | 122 | 0. | * | 27 JAN 0203 | 282 | 4420. | * | 27 JAN 1003 | 442 | 4278. | * | 27 JAN 1803 | 602 | 3297. |
| 26 JAN 1806 | 123 | 0. | * | 27 JAN 0206 | 283 | 4449. | * | 27 JAN 1006 | 443 | 4273. | * | 27 JAN 1806 | 603 | 3290. |
| 26 JAN 1809 | 124 | 0. | * | 27 JAN 0209 | 284 | 4477. | * | 27 JAN 1009 | 444 | 4267. | * | 27 JAN 1809 | 604 | 3283. |
| 26 JAN 1812 | 125 | 0. | * | 27 JAN 0212 | 285 | 4503. | * | 27 JAN 1012 | 445 | 4262. | * | 27 JAN 1812 | 605 | 3276. |
| 26 JAN 1815 | 126 | 0. | * | 27 JAN 0215 | 286 | 4527. | * | 27 JAN 1015 | 446 | 4257. | * | 27 JAN 1815 | 606 | 3269. |
| 26 JAN 1818 | 127 | 0. | * | 27 JAN 0218 | 287 | 4549. | * | 27 JAN 1018 | 447 | 4252. | * | 27 JAN 1818 | 607 | 3263. |
| 26 JAN 1821 | 128 | 0. | * | 27 JAN 0221 | 288 | 4569. | * | 27 JAN 1021 | 448 | 4247. | * | 27 JAN 1821 | 608 | 3256. |
| 26 JAN 1824 | 129 | 0. | * | 27 JAN 0224 | 289 | 4588. | * | 27 JAN 1024 | 449 | 4242. | * | 27 JAN 1824 | 609 | 3249. |
| 26 JAN 1827 | 130 | 0. | * | 27 JAN 0227 | 290 | 4604. | * | 27 JAN 1027 | 450 | 4237. | * | 27 JAN 1827 | 610 | 3243. |
| 26 JAN 1830 | 131 | 0. | * | 27 JAN 0230 | 291 | 4619. | * | 27 JAN 1030 | 451 | 4232. | * | 27 JAN 1830 | 611 | 3237. |
| 26 JAN 1833 | 132 | 0. | * | 27 JAN 0233 | 292 | 4632. | * | 27 JAN 1033 | 452 | 4227. | * | 27 JAN 1833 | 612 | 3230. |
| 26 JAN 1836 | 133 | 0. | * | 27 JAN 0236 | 293 | 4648. | * | 27 JAN 1036 | 453 | 4223. | * | 27 JAN 1836 | 613 | 3224. |
| 26 JAN 1839 | 134 | 0. | * | 27 JAN 0239 | 294 | 4665. | * | 27 JAN 1039 | 454 | 4218. | * | 27 JAN 1839 | 614 | 3218. |
| 26 JAN 1842 | 135 | 0. | * | 27 JAN 0242 | 295 | 4670. | * | 27 JAN 1042 | 455 | 4214. | * | 27 JAN 1842 | 615 | 3212. |
| 26 JAN 1845 | 136 | 0. | * | 27 JAN 0245 | 296 | 4669. | * | 27 JAN 1045 | 456 | 4210. | * | 27 JAN 1845 | 616 | 3205. |
| 26 JAN 1848 | 137 | 0. | * | 27 JAN 0248 | 297 | 4665. | * | 27 JAN 1048 | 457 | 4205. | * | 27 JAN 1848 | 617 | 3199. |
| 26 JAN 1851 | 138 | 0. | * | 27 JAN 0251 | 298 | 4664. | * | 27 JAN 1051 | 458 | 4201. | * | 27 JAN 1851 | 618 | 3193. |
| 26 JAN 1854 | 139 | 0. | * | 27 JAN 0254 | 299 | 4660. | * | 27 JAN 1054 | 459 | 4197. | * | 27 JAN 1854 | 619 | 3187. |
| 26 JAN 1857 | 140 | 0. | * | 27 JAN 0257 | 300 | 4653. | * | 27 JAN 1057 | 460 | 4193. | * | 27 JAN 1857 | 620 | 3181. |
| 26 JAN 1900 | 141 | 0. | * | 27 JAN 0300 | 301 | 4645. | * | 27 JAN 1100 | 461 | 4189. | * | 27 JAN 1900 | 621 | 3176. |
| 26 JAN 1903 | 142 | 0. | * | 27 JAN 0303 | 302 | 4637. | * | 27 JAN 1103 | 462 | 4185. | * | 27 JAN 1903 | 622 | 3170. |
| 26 JAN 1906 | 143 | 0. | * | 27 JAN 0306 | 303 | 4631. | * | 27 JAN 1106 | 463 | 4181. | * | 27 JAN 1906 | 623 | 3164. |
| 26 JAN 1909 | 144 | 0. | * | 27 JAN 0309 | 304 | 4626. | * | 27 JAN 1109 | 464 | 4177. | * | 27 JAN 1909 | 624 | 3158. |
| 26 JAN 1912 | 145 | 0. | * | 27 JAN 0312 | 305 | 4624. | * | 27 JAN 1112 | 465 | 4173. | * | 27 JAN 1912 | 625 | 3152. |
| 26 JAN 1915 | 146 | 0. | * | 27 JAN 0315 | 306 | 4623. | * | 27 JAN 1115 | 466 | 4169. | * | 27 JAN 1915 | 626 | 3146. |
| 26 JAN 1918 | 147 | 0. | * | 27 JAN 0318 | 307 | 4626. | * | 27 JAN 1118 | 467 | 4165. | * | 27 JAN 1918 | 627 | 3141. |
| 26 JAN 1921 | 148 | 0. | * | 27 JAN 0321 | 308 | 4630. | * | 27 JAN 1121 | 468 | 4162. | * | 27 JAN 1921 | 628 | 3135. |
| 26 JAN 1924 | 149 | 0. | * | 27 JAN 0324 | 309 | 4636. | * | 27 JAN 1124 | 469 | 4158. | * | 27 JAN 1924 | 629 | 3129. |
| 26 JAN 1927 | 150 | 0. | * | 27 JAN 0327 | 310 | 4643. | * | 27 JAN 1127 | 470 | 4154. | * | 27 JAN 1927 | 630 | 3123. |
| 26 JAN 1930 | 151 | 0. | * | 27 JAN 0330 | 311 | 4651. | * | 27 JAN 1130 | 471 | 4150. | * | 27 JAN 1930 | 631 | 3117. |
| 26 JAN 1933 | 152 | 0. | * | 27 JAN 0333 | 312 | 4661. | * | 27 JAN 1133 | 472 | 4147. | * | 27 JAN 1933 | 632 | 3112. |
| 26 JAN 1936 | 153 | 0. | * | 27 JAN 0336 | 313 | 4671. | * | 27 JAN 1136 | 473 | 4143. | * | 27 JAN 1936 | 633 | 3106. |
| 26 JAN 1939 | 154 | 0. | * | 27 JAN 0339 | 314 | 4681. | * | 27 JAN 1139 | 474 | 4139. | * | 27 JAN 1939 | 634 | 3100. |
| 26 JAN 1942 | 155 | 0. | * | 27 JAN 0342 | 315 | 4691. | * | 27 JAN 1142 | 475 | 4136. | * | 27 JAN 1942 | 635 | 3094. |
| 26 JAN 1945 | 156 | 0. | * | 27 JAN 0345 | 316 | 4701. | * | 27 JAN 1145 | 476 | 4132. | * | 27 JAN 1945 | 636 | 3088. |
| 26 JAN 1948 | 157 | 0. | * | 27 JAN 0348 | 317 | 4710. | * | 27 JAN 1148 | 477 | 4129. | * | 27 JAN 1948 | 637 | 3082. |
| 26 JAN 1951 | 158 | 0. | * | 27 JAN 0351 | 318 | 4720. | * | 27 JAN 1151 | 478 | 4125. | * | 27 JAN 1951 | 638 | 3076. |
| 26 JAN 1954 | 159 | 0. | * | 27 JAN 0354 | 319 | 4729. | * | 27 JAN 1154 | 479 | 4121. | * | 27 JAN 1954 | 639 | 3070. |

26 JAN 1957 160 0. * 27 JAN 0357 320 4738. * 27 JAN 1157 480 4118. * 27 JAN 1957 640 3064.



RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

| OPERATION | STATION | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD | | | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|-----------|---------|--------------|-----------------|---------------------------------|---------|---------|---------------|------------------|----------------------|
| | | | | 6-HOUR | 24-HOUR | 72-HOUR | | | |

| | | | | | | | |
|---------------|-------|-------|-------|-------|-------|-------|--------|
| ROUTED TO | C122 | 4313. | 18.40 | 4147. | 2807. | 2108. | 303.82 |
| + | | | | | | | |
| HYDROGRAPH AT | 122 | 554. | 12.75 | 144. | 46. | 35. | 1.10 |
| + | | | | | | | |
| 2 COMBINED AT | C122 | 4348. | 18.35 | 4181. | 2846. | 2138. | 304.92 |
| + | | | | | | | |
| ROUTED TO | C132 | 4341. | 18.80 | 4174. | 2790. | 2096. | 304.92 |
| + | | | | | | | |
| HYDROGRAPH AT | 55 | 1368. | 12.50 | 356. | 111. | 83. | 3.27 |
| + | | | | | | | |
| ROUTED TO | C55 | 1366. | 12.50 | 356. | 111. | 83. | 3.27 |
| + | | | | | | | |
| ROUTED TO | C127A | 1083. | 12.85 | 356. | 111. | 83. | 3.27 |
| + | | | | | | | |
| HYDROGRAPH AT | 127A | 480. | 12.50 | 101. | 32. | 24. | 0.61 |
| + | | | | | | | |
| 2 COMBINED AT | C127A | 1405. | 12.75 | 456. | 142. | 107. | 3.88 |
| + | | | | | | | |
| HYDROGRAPH AT | 56 | 673. | 12.15 | 94. | 29. | 22. | 0.48 |
| + | | | | | | | |
| ROUTED TO | C56 | 336. | 12.40 | 94. | 29. | 22. | 0.48 |
| + | | | | | | | |
| ROUTED TO | 127B | 299. | 12.85 | 94. | 29. | 22. | 0.48 |
| + | | | | | | | |
| HYDROGRAPH AT | 127B | 296. | 12.15 | 46. | 14. | 11. | 0.25 |
| + | | | | | | | |
| 2 COMBINED AT | C127B | 430. | 12.20 | 140. | 43. | 33. | 0.73 |
| + | | | | | | | |
| 2 COMBINED AT | C127A | 1775. | 12.75 | 594. | 185. | 139. | 4.61 |
| + | | | | | | | |
| ROUTED TO | C127 | 1519. | 13.20 | 592. | 185. | 139. | 4.61 |
| + | | | | | | | |
| HYDROGRAPH AT | 127 | 1740. | 12.60 | 400. | 126. | 95. | 2.44 |
| + | | | | | | | |
| 2 COMBINED AT | C127 | 2705. | 12.70 | 991. | 311. | 234. | 7.05 |
| + | | | | | | | |
| HYDROGRAPH AT | 126 | 822. | 12.70 | 259. | 80. | 60. | 1.67 |
| + | | | | | | | |
| 2 COMBINED AT | C127 | 3522. | 12.70 | 1247. | 391. | 294. | 8.72 |
| + | | | | | | | |
| ROUTED TO | C125 | 3457. | 12.80 | 1246. | 391. | 294. | 8.72 |
| + | | | | | | | |
| HYDROGRAPH AT | 125 | 1135. | 12.45 | 225. | 70. | 53. | 1.47 |
| + | | | | | | | |
| 2 COMBINED AT | C125 | 4098. | 12.75 | 1468. | 461. | 346. | 10.19 |
| + | | | | | | | |
| ROUTED TO | C125 | 3782. | 12.95 | 1467. | 461. | 346. | 10.19 |
| + | | | | | | | |
| ROUTED TO | C132 | 2965. | 13.70 | 1447. | 460. | 346. | 10.19 |
| + | | | | | | | |
| HYDROGRAPH AT | 131 | 246. | 13.00 | 76. | 25. | 19. | 0.59 |
| + | | | | | | | |
| ROUTED TO | C132 | 191. | 13.45 | 75. | 25. | 19. | 0.59 |
| + | | | | | | | |
| 3 COMBINED AT | C132 | 4734. | 18.10 | 4618. | 3208. | 2409. | 315.70 |

Outlet Channel @
Outlet Wash Confl.

| | | | | | | | | |
|---|---------------|------|-------|-------|-------|-------|-------|--------|
| + | HYDROGRAPH AT | 132 | 471. | 13.20 | 163. | 54. | 40. | 1.23 |
| + | 2 COMBINED AT | C132 | 4779. | 18.00 | 4675. | 3253. | 2444. | 316.93 |
| + | HYDROGRAPH AT | 133 | 971. | 12.65 | 241. | 76. | 57. | 1.20 |
| + | 2 COMBINED AT | C132 | 4830. | 17.90 | 4739. | 3319. | 2493. | 318.13 |
| + | ROUTED TO | C134 | 4828. | 18.20 | 4735. | 3276. | 2461. | 318.13 |
| + | HYDROGRAPH AT | 128 | 547. | 12.45 | 110. | 35. | 26. | 0.82 |
| + | ROUTED TO | C129 | 289. | 12.95 | 108. | 34. | 26. | 0.82 |
| + | HYDROGRAPH AT | 129 | 758. | 12.90 | 214. | 70. | 52. | 1.66 |
| + | 2 COMBINED AT | C129 | 1044. | 12.90 | 322. | 104. | 78. | 2.48 |
| + | ROUTED TO | C130 | 757. | 13.40 | 317. | 104. | 78. | 2.48 |
| + | HYDROGRAPH AT | 130 | 851. | 12.75 | 217. | 70. | 53. | 1.61 |
| + | 2 COMBINED AT | C130 | 1239. | 13.10 | 529. | 174. | 131. | 4.09 |
| + | ROUTED TO | C134 | 1108. | 13.60 | 524. | 174. | 131. | 4.09 |
| + | 2 COMBINED AT | C134 | 5198. | 14.80 | 5018. | 3423. | 2571. | 322.22 |
| + | HYDROGRAPH AT | 134 | 757. | 12.40 | 149. | 47. | 35. | 0.77 |
| + | 2 COMBINED AT | C134 | 5264. | 14.75 | 5062. | 3464. | 2602. | 322.99 |

*Outlet Wash upstream
From Deer Valley Channel*

DV Channel @ Wash

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lahey F77L-EM/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 10/21/98 TIME 08:03:15 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****

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X X XXXXXXXX XXXXX X
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100yr Model

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTICR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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 WTM100YR
2 ID
3 ID
4 ID THIS IS THE HEC-1 COMPUTER MODEL FOR THE WITTMANN AREA DRAINAGE MASTER
5 ID STUDY. THIS STUDY IS PREPARED FOR THE FLOOD CONTROL DISTRICT OF
6 ID MARICOPA COUNTY BY THE WLB GROUP, INC.
7 ID
8 ID THIS IS THE 100 YEAR MODEL FOR THE STUDY AREA AND INCLUDES STORAGE
9 ID ROUTING AND DIVERSIONS ALONG THE A.T. & S.F. RAILROAD, THE CAP CANAL,
10 ID AND THE BEARDSLEY CANAL.
11 ID
12 ID
13 ID
14 IT *DIAGRAM
15 IN 3 26JAN87 1200 640
16 IO 15 26JAN87 1200
17 JD 5
18 PC 4.21 .001
19 PC .000 .002 .005 .008 .011 .014 .017 .020 .023 .026
20 PC .029 .032 .035 .038 .041 .044 .048 .052 .056 .060
21 PC .064 .068 .072 .076 .080 .085 .090 .095 .100 .105
22 PC .110 .115 .120 .126 .133 .140 .147 .155 .163 .172
23 PC .181 .191 .203 .218 .236 .257 .283 .387 .663 .707
24 PC .735 .758 .776 .791 .804 .815 .825 .834 .842 .849
25 PC .856 .863 .869 .875 .881 .887 .893 .898 .903 .908
26 PC .913 .918 .922 .926 .930 .934 .938 .942 .946 .950
27 PC .953 .956 .959 .962 .965 .968 .971 .974 .977 .980
28 PC .983 .986 .989 .992 .995 .998 1.00 1.000 1.000 1.000
29 JD 4.17 10
30 JD 4.00 50
31 JD 3.93 100
32 JD 3.82 350
33 KK 1
34 KM RUNOFF FROM SUBWATERSHED 1.
35 KM UNIT HYDROGRAPHS HAVE BEEN COMPUTED FOR EACH SUBWATERSHED USING THE
36 KM CORPS OF ENGINEERS S-GRAPH COMPUTATIONS FOR UNIT HYDROGRAPHS. THE
37 KM S-GRAPH PROGRAM HAS BEEN DEVELOPED FOR THE PHOENIX MOUNTAIN AND PHOENIX
38 KM VALLEY AREAS. THIS SHOULD GIVE A MORE RELIABLE UNIT HYDROGRAPH FOR THE
39 KM HEC-1 PROGRAM TO UTILIZE WITHIN THE WITTMANN ADMS AREA.
40 BA .088
41 LS 0 81 0
42 UK 200 .0160 .11 100
RK 2900 .0132 .05 TRAP 0 15

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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

| OPERATION | STATION | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD | | | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|-----------|---------|--------------|-----------------|---------------------------------|---------|---------|---------------|------------------|----------------------|
| | | | | 6-HOUR | 24-HOUR | 72-HOUR | | | |

| | | | | | | | | |
|---|---------------|-------|-------|-------|-------|-------|-------|--------|
| + | 2 COMBINED AT | C123 | 3090. | 13.00 | 2603. | 1178. | 885. | 9.34 |
| + | ROUTED TO | C123 | 2777. | 15.85 | 2512. | 1170. | 879. | 9.34 |
| + | ROUTED TO | C121 | 2773. | 16.05 | 2501. | 1168. | 878. | 9.34 |
| + | 2 COMBINED AT | C121 | 5134. | 16.65 | 4969. | 3628. | 2725. | 303.27 |
| + | HYDROGRAPH AT | 121 | 350. | 12.70 | 91. | 29. | 22. | 0.55 |
| + | 2 COMBINED AT | C121 | 5160. | 16.65 | 4997. | 3653. | 2744. | 303.82 |
| + | ROUTED TO | C122 | 5141. | 17.35 | 4957. | 3540. | 2659. | 303.82 |
| + | HYDROGRAPH AT | 122 | 753. | 12.65 | 182. | 57. | 43. | 1.10 |
| + | 2 COMBINED AT | C122 | 5188. | 17.30 | 5002. | 3589. | 2696. | 304.92 |
| + | ROUTED TO | C132 | 5180. | 17.75 | 4991. | 3515. | 2641. | 304.92 |
| + | HYDROGRAPH AT | 55 | 1652. | 12.50 | 428. | 133. | 100. | 3.27 |
| + | ROUTED TO | C55 | 1650. | 12.50 | 428. | 133. | 100. | 3.27 |
| + | ROUTED TO | C127A | 1310. | 12.85 | 427. | 133. | 100. | 3.27 |
| + | HYDROGRAPH AT | 127A | 616. | 12.45 | 123. | 39. | 29. | 0.61 |
| + | 2 COMBINED AT | C127A | 1671. | 12.75 | 550. | 172. | 129. | 3.88 |
| + | HYDROGRAPH AT | 56 | 801. | 12.15 | 112. | 35. | 26. | 0.48 |
| + | ROUTED TO | C56 | 375. | 12.40 | 112. | 35. | 26. | 0.48 |
| + | ROUTED TO | 127B | 335. | 12.85 | 112. | 35. | 26. | 0.48 |
| + | HYDROGRAPH AT | 127B | 373. | 12.15 | 55. | 17. | 13. | 0.25 |
| + | 2 COMBINED AT | C127B | 511. | 12.15 | 167. | 52. | 39. | 0.73 |
| + | 2 COMBINED AT | C127A | 2085. | 12.75 | 715. | 223. | 168. | 4.61 |
| + | ROUTED TO | C127 | 1803. | 13.20 | 713. | 223. | 168. | 4.61 |
| + | HYDROGRAPH AT | 127 | 2262. | 12.50 | 490. | 154. | 115. | 2.44 |
| + | 2 COMBINED AT | C127 | 3319. | 12.60 | 1202. | 377. | 283. | 7.05 |
| + | HYDROGRAPH AT | 126 | 1014. | 12.70 | 317. | 98. | 74. | 1.67 |
| + | 2 COMBINED AT | C127 | 4300. | 12.60 | 1516. | 474. | 356. | 8.72 |
| + | ROUTED TO | C125 | 4228. | 12.75 | 1516. | 474. | 356. | 8.72 |
| + | HYDROGRAPH AT | 125 | 1490. | 12.35 | 277. | 86. | 65. | 1.47 |

*Outlet outlet
Channel@Wash conf.*

| | | | | | | | | |
|---|---------------|------|-------|-------|-------|-------|-------|--------|
| + | 2 COMBINED AT | C125 | 5068. | 12.65 | 1790. | 560. | 421. | 10.19 |
| + | ROUTED TO | C125 | 4514. | 12.95 | 1790. | 560. | 421. | 10.19 |
| + | ROUTED TO | C132 | 3640. | 13.75 | 1768. | 560. | 421. | 10.19 |
| + | HYDROGRAPH AT | 131 | 335. | 12.90 | 96. | 31. | 23. | 0.59 |
| + | ROUTED TO | C132 | 255. | 13.30 | 95. | 31. | 23. | 0.59 |
| + | 3 COMBINED AT | C132 | 6105. | 15.30 | 5744. | 4027. | 3025. | 315.70 |
| + | HYDROGRAPH AT | 132 | 638. | 13.05 | 206. | 67. | 50. | 1.23 |
| + | 2 COMBINED AT | C132 | 6211. | 15.25 | 5824. | 4084. | 3068. | 316.93 |
| + | HYDROGRAPH AT | 133 | 1209. | 12.60 | 287. | 90. | 68. | 1.20 |
| + | 2 COMBINED AT | C132 | 6320. | 15.15 | 5910. | 4163. | 3127. | 318.13 |
| + | ROUTED TO | C134 | 6290. | 15.60 | 5901. | 4107. | 3085. | 318.13 |
| + | HYDROGRAPH AT | 128 | 735. | 12.40 | 138. | 43. | 32. | 0.82 |
| + | ROUTED TO | C129 | 379. | 12.85 | 136. | 43. | 32. | 0.82 |
| + | HYDROGRAPH AT | 129 | 1030. | 12.75 | 271. | 86. | 65. | 1.66 |
| + | 2 COMBINED AT | C129 | 1402. | 12.80 | 406. | 129. | 97. | 2.48 |
| + | ROUTED TO | C130 | 993. | 13.30 | 401. | 129. | 97. | 2.48 |
| + | HYDROGRAPH AT | 130 | 1155. | 12.60 | 273. | 87. | 65. | 1.61 |
| + | 2 COMBINED AT | C130 | 1616. | 12.95 | 667. | 216. | 162. | 4.09 |
| + | ROUTED TO | C134 | 1437. | 13.50 | 661. | 216. | 162. | 4.09 |
| + | 2 COMBINED AT | C134 | 6812. | 15.20 | 6299. | 4291. | 3223. | 322.22 |
| + | HYDROGRAPH AT | 134 | 971. | 12.35 | 178. | 56. | 42. | 0.77 |
| + | 2 COMBINED AT | C134 | 6875. | 15.20 | 6355. | 4340. | 3260. | 322.99 |

125 + 131

Wash upstream from Deer Valley

DV chan. e Wash

EXISTING CONDITION

CROSS SECTIONS AND OUTPUT TABLES

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Existing Condition Metric

| Reach | River Sta | Q Total (m ³ /s) | Min Ch El (m) | W.S. Elev (m) | Crit W.S. (m) | Vel Chnl (m/s) | Flow Area (m ²) | Top Width (m) | Froude # Chl |
|---------|-----------|--------------------------------|------------------|------------------|------------------|-------------------|--------------------------------|------------------|--------------|
| Reach-1 | 2.118 | 177.63 | 381.30 | 384.62 | | 2.07 | 129.06 | 124.03 | 0.50 |
| Reach-1 | 2.118 | 177.63 | 381.30 | 384.70 | | 2.40 | 92.05 | 60.96 | 0.56 |
| Reach-1 | 2.118 | 139.21 | 381.30 | 384.41 | | 2.03 | 104.01 | 119.29 | 0.51 |
| Reach-1 | 2.118 | 81.44 | 381.30 | 384.03 | | 1.90 | 60.30 | 94.53 | 0.51 |
| Reach-1 | 2.118 | 396.44 | 381.30 | 385.55 | | 2.39 | 293.19 | 233.99 | 0.47 |
| Reach-1 | 2.034 | 177.63 | 380.24 | 383.62 | 383.38 | 2.97 | 90.83 | 72.09 | 0.64 |
| Reach-1 | 2.034 | 177.63 | 380.24 | 383.62 | 383.37 | 3.12 | 81.47 | 54.86 | 0.65 |
| Reach-1 | 2.034 | 139.21 | 380.24 | 383.38 | 383.20 | 2.87 | 73.62 | 68.50 | 0.64 |
| Reach-1 | 2.034 | 81.44 | 380.24 | 382.94 | 382.84 | 2.62 | 44.76 | 61.99 | 0.63 |
| Reach-1 | 2.034 | 396.44 | 380.24 | 384.57 | 384.05 | 3.72 | 168.11 | 95.55 | 0.68 |
| Reach-1 | 1.949 | 177.63 | 380.09 | 381.75 | | 3.12 | 57.00 | 48.51 | 0.92 |
| Reach-1 | 1.949 | 177.63 | 380.09 | 381.75 | | 3.12 | 57.00 | 48.51 | 0.92 |
| Reach-1 | 1.949 | 139.21 | 380.09 | 381.55 | | 2.90 | 47.93 | 44.38 | 0.89 |
| Reach-1 | 1.949 | 81.44 | 380.09 | 381.22 | | 2.41 | 33.82 | 40.95 | 0.85 |
| Reach-1 | 1.949 | 396.44 | 380.09 | 382.57 | 382.51 | 3.82 | 104.90 | 69.10 | 0.94 |
| Reach-1 | 1.858 | 177.63 | 379.11 | 380.85 | | 1.95 | 90.92 | 65.98 | 0.53 |
| Reach-1 | 1.858 | 177.63 | 379.11 | 380.85 | | 1.95 | 90.92 | 65.98 | 0.53 |
| Reach-1 | 1.858 | 139.21 | 379.11 | 380.65 | | 1.79 | 77.98 | 64.19 | 0.52 |
| Reach-1 | 1.858 | 81.44 | 379.11 | 380.30 | | 1.45 | 56.09 | 61.04 | 0.48 |
| Reach-1 | 1.858 | 396.44 | 379.11 | 381.74 | | 2.56 | 155.09 | 80.75 | 0.57 |
| Reach-1 | 1.788 | 177.63 | 378.56 | 380.24 | | 2.22 | 79.84 | 62.74 | 0.63 |
| Reach-1 | 1.788 | 177.63 | 378.56 | 380.24 | | 2.22 | 79.84 | 62.74 | 0.63 |
| Reach-1 | 1.788 | 139.21 | 378.56 | 380.05 | | 2.05 | 67.93 | 61.33 | 0.62 |
| Reach-1 | 1.788 | 81.44 | 378.56 | 379.72 | | 1.70 | 47.98 | 58.89 | 0.60 |
| Reach-1 | 1.788 | 396.44 | 378.56 | 381.11 | | 2.89 | 137.99 | 79.53 | 0.65 |
| Reach-1 | 1.708 | 177.63 | 377.95 | 379.60 | | 2.09 | 84.84 | 61.85 | 0.57 |
| Reach-1 | 1.708 | 177.63 | 377.95 | 379.60 | | 2.09 | 84.84 | 61.85 | 0.57 |
| Reach-1 | 1.708 | 139.21 | 377.95 | 379.39 | | 1.93 | 72.16 | 60.31 | 0.56 |
| Reach-1 | 1.708 | 81.44 | 377.95 | 379.02 | | 1.61 | 50.63 | 57.58 | 0.55 |
| Reach-1 | 1.708 | 396.44 | 377.95 | 380.51 | | 2.74 | 144.90 | 72.40 | 0.60 |
| Reach-1 | 1.593 | 177.63 | 377.19 | 378.89 | | 1.88 | 94.36 | 64.46 | 0.50 |
| Reach-1 | 1.593 | 177.63 | 377.19 | 378.89 | | 1.88 | 94.48 | 64.48 | 0.50 |
| Reach-1 | 1.593 | 139.21 | 377.19 | 378.68 | | 1.72 | 80.99 | 62.79 | 0.48 |
| Reach-1 | 1.593 | 81.44 | 377.19 | 378.31 | | 1.40 | 58.00 | 59.80 | 0.46 |
| Reach-1 | 1.593 | 396.44 | 377.19 | 379.82 | | 2.52 | 157.29 | 72.50 | 0.54 |
| Reach-1 | 1.479 | 177.63 | 376.58 | 378.25 | | 1.89 | 94.37 | 67.29 | 0.50 |
| Reach-1 | 1.479 | 177.63 | 376.58 | 378.26 | | 1.89 | 94.12 | 64.92 | 0.50 |
| Reach-1 | 1.479 | 139.21 | 376.58 | 378.04 | | 1.73 | 80.37 | 64.56 | 0.49 |
| Reach-1 | 1.479 | 81.44 | 376.58 | 377.66 | | 1.45 | 56.21 | 60.73 | 0.48 |
| Reach-1 | 1.479 | 396.44 | 376.58 | 379.15 | | 2.55 | 159.81 | 78.83 | 0.55 |
| Reach-1 | 1.381 | 177.63 | 375.97 | 377.75 | | 1.79 | 99.20 | 66.61 | 0.47 |
| Reach-1 | 1.381 | 177.63 | 375.97 | 377.76 | | 1.79 | 99.32 | 66.63 | 0.47 |
| Reach-1 | 1.381 | 139.21 | 375.97 | 377.55 | | 1.62 | 86.04 | 64.60 | 0.45 |
| Reach-1 | 1.381 | 81.44 | 375.97 | 377.19 | | 1.29 | 63.38 | 60.99 | 0.40 |
| Reach-1 | 1.381 | 396.44 | 375.97 | 378.62 | | 2.49 | 163.67 | 87.36 | 0.52 |
| Reach-1 | 1.307 | 177.63 | 375.61 | 376.94 | | 2.61 | 68.48 | 69.71 | 0.82 |
| Reach-1 | 1.307 | 177.63 | 375.61 | 376.94 | | 2.61 | 68.13 | 65.53 | 0.82 |
| Reach-1 | 1.307 | 139.21 | 375.61 | 376.81 | | 2.34 | 59.59 | 67.11 | 0.78 |
| Reach-1 | 1.307 | 81.44 | 375.61 | 376.57 | | 1.86 | 43.85 | 64.32 | 0.72 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | Q Total (m ³ /s) | Min Ch El (m) | W.S. Elev (m) | Crit W.S. (m) | Vel Chnl (m/s) | Flow Area (m ²) | Top Width (m) | Froude # Chl |
|---------|-----------|--------------------------------|------------------|------------------|------------------|-------------------|--------------------------------|------------------|--------------|
| Reach-1 | 1.307 | 396.44 | 375.61 | 377.47 | 377.47 | 3.81 | 107.88 | 79.30 | 0.97 |
| Reach-1 | 1.286 | 177.63 | 375.21 | 376.40 | 376.40 | 2.92 | 60.81 | 70.18 | 1.00 |
| Reach-1 | 1.286 | 177.63 | 375.21 | 376.40 | 376.40 | 2.92 | 60.81 | 70.18 | 1.00 |
| Reach-1 | 1.286 | 139.21 | 375.21 | 376.26 | 376.26 | 2.72 | 51.23 | 68.15 | 1.00 |
| Reach-1 | 1.286 | 81.44 | 375.21 | 376.01 | 376.01 | 2.35 | 34.64 | 62.70 | 1.01 |
| Reach-1 | 1.286 | 396.44 | 375.21 | 377.02 | 377.02 | 3.70 | 108.23 | 83.87 | 0.99 |
| Reach-1 | 1.251 | 177.63 | 371.55 | 372.71 | 372.71 | 3.05 | 58.15 | 61.70 | 1.00 |
| Reach-1 | 1.251 | 177.63 | 371.55 | 372.71 | 372.71 | 3.05 | 58.15 | 61.70 | 1.00 |
| Reach-1 | 1.251 | 139.21 | 371.55 | 372.56 | 372.56 | 2.84 | 48.97 | 60.50 | 1.01 |
| Reach-1 | 1.251 | 81.44 | 371.55 | 372.31 | 372.31 | 2.41 | 33.86 | 58.46 | 1.01 |
| Reach-1 | 1.251 | 396.44 | 371.55 | 373.40 | 373.40 | 3.87 | 102.45 | 67.20 | 1.00 |
| Reach-1 | 1.213 | 177.63 | 368.50 | 371.12 | | 1.32 | 134.37 | 68.98 | 0.30 |
| Reach-1 | 1.213 | 177.63 | 368.50 | 371.12 | | 1.32 | 134.37 | 68.98 | 0.30 |
| Reach-1 | 1.213 | 139.21 | 368.50 | 370.92 | | 1.16 | 120.48 | 67.66 | 0.28 |
| Reach-1 | 1.213 | 81.44 | 368.50 | 370.56 | | 0.84 | 96.55 | 65.32 | 0.22 |
| Reach-1 | 1.213 | 396.44 | 368.50 | 372.02 | | 1.99 | 198.99 | 74.71 | -0.39 |
| Reach-1 | 1.191 | 177.63 | 368.35 | 370.66 | 370.66 | 3.09 | 57.53 | 60.32 | 1.01 |
| Reach-1 | 1.191 | 177.63 | 368.35 | 370.66 | 370.66 | 3.09 | 57.53 | 60.32 | 1.01 |
| Reach-1 | 1.191 | 139.21 | 368.35 | 370.51 | 370.51 | 2.88 | 48.40 | 59.08 | 1.01 |
| Reach-1 | 1.191 | 81.44 | 368.35 | 370.25 | 370.25 | 2.44 | 33.37 | 56.96 | 1.02 |
| Reach-1 | 1.191 | 396.44 | 368.35 | 371.36 | 371.36 | 3.89 | 101.90 | 66.06 | 1.00 |
| Reach-1 | 1.169 | 177.63 | 368.05 | 369.81 | | 2.40 | 73.98 | 56.01 | 0.67 |
| Reach-1 | 1.169 | 177.63 | 368.05 | 369.81 | | 2.40 | 73.98 | 56.01 | 0.67 |
| Reach-1 | 1.169 | 139.21 | 368.05 | 369.61 | | 2.21 | 63.06 | 54.35 | 0.65 |
| Reach-1 | 1.169 | 81.44 | 368.05 | 369.26 | | 1.82 | 44.64 | 50.71 | 0.62 |
| Reach-1 | 1.169 | 396.44 | 368.05 | 370.67 | | 3.17 | 125.14 | 63.20 | 0.72 |
| Reach-1 | 1.058 | 177.63 | 367.28 | 369.44 | | 1.99 | 89.31 | 63.65 | 0.54 |
| Reach-1 | 1.058 | 177.63 | 367.28 | 369.44 | | 1.99 | 89.31 | 63.65 | 0.54 |
| Reach-1 | 1.058 | 139.21 | 367.28 | 369.23 | | 1.84 | 75.83 | 62.23 | 0.53 |
| Reach-1 | 1.058 | 81.44 | 367.28 | 368.85 | | 1.54 | 52.94 | 59.74 | 0.52 |
| Reach-1 | 1.058 | 396.44 | 367.28 | 370.33 | | 2.67 | 148.26 | 69.51 | 0.58 |
| Reach-1 | 0.946 | 184.68 | 366.52 | 368.66 | | 2.10 | 88.12 | 61.18 | 0.56 |
| Reach-1 | 0.946 | 184.68 | 366.52 | 368.66 | | 2.10 | 88.12 | 61.18 | 0.56 |
| Reach-1 | 0.946 | 143.99 | 366.52 | 368.44 | | 1.93 | 74.73 | 59.18 | 0.55 |
| Reach-1 | 0.946 | 82.60 | 366.52 | 368.04 | | 1.59 | 51.90 | 55.60 | 0.53 |
| Reach-1 | 0.946 | 396.44 | 366.52 | 369.55 | | 2.74 | 145.58 | 67.59 | 0.59 |
| Reach-1 | 0.833 | 184.68 | 365.76 | 367.97 | | 1.93 | 95.50 | 63.95 | 0.51 |
| Reach-1 | 0.833 | 184.68 | 365.76 | 367.97 | | 1.93 | 95.50 | 63.95 | 0.51 |
| Reach-1 | 0.833 | 143.99 | 365.76 | 367.75 | | 1.77 | 81.48 | 61.98 | 0.49 |
| Reach-1 | 0.833 | 82.60 | 365.76 | 367.35 | | 1.44 | 57.23 | 58.42 | 0.47 |
| Reach-1 | 0.833 | 396.44 | 365.76 | 368.91 | | 2.49 | 159.17 | 72.26 | 0.53 |
| Reach-1 | 0.746 | 184.68 | 365.30 | 367.23 | | 2.41 | 76.61 | 55.16 | 0.65 |
| Reach-1 | 0.746 | 184.68 | 365.30 | 367.23 | | 2.41 | 76.61 | 55.16 | 0.65 |
| Reach-1 | 0.746 | 143.99 | 365.30 | 366.95 | | 2.33 | 61.78 | 52.62 | 0.69 |
| Reach-1 | 0.746 | 82.60 | 365.30 | 366.56 | | 1.97 | 41.95 | 49.01 | 0.68 |
| Reach-1 | 0.746 | 396.44 | 365.30 | 367.91 | | 3.41 | 116.42 | 61.48 | 0.79 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Existing Condition, English

| Reach | River Sta | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 2.118 | 6273.00 | 1251.00 | 1261.87 | | 6.78 | 1389.20 | 406.91 | 0.50 |
| Reach-1 | 2.118 | 6273.00 | 1251.00 | 1262.13 | | 7.88 | 990.85 | 200.00 | 0.56 |
| Reach-1 | 2.118 | 4916.00 | 1251.00 | 1261.19 | | 6.66 | 1119.52 | 391.37 | 0.51 |
| Reach-1 | 2.118 | 2876.00 | 1251.00 | 1259.93 | | 6.25 | 649.06 | 310.14 | 0.51 |
| Reach-1 | 2.118 | 14000.00 | 1251.00 | 1264.94 | | 7.84 | 3155.92 | 767.68 | 0.47 |
| Reach-1 | 2.034 | 6273.00 | 1247.50 | 1258.61 | 1257.81 | 9.75 | 977.64 | 236.53 | 0.64 |
| Reach-1 | 2.034 | 6273.00 | 1247.50 | 1258.61 | 1257.78 | 10.24 | 876.90 | 180.00 | 0.65 |
| Reach-1 | 2.034 | 4916.00 | 1247.50 | 1257.80 | 1257.23 | 9.40 | 792.48 | 224.73 | 0.64 |
| Reach-1 | 2.034 | 2876.00 | 1247.50 | 1256.35 | 1256.05 | 8.58 | 481.81 | 203.40 | 0.63 |
| Reach-1 | 2.034 | 14000.00 | 1247.50 | 1261.71 | 1259.99 | 12.21 | 1809.53 | 313.49 | 0.68 |
| Reach-1 | 1.949 | 6273.00 | 1247.00 | 1252.46 | | 10.22 | 613.57 | 159.15 | 0.92 |
| Reach-1 | 1.949 | 6273.00 | 1247.00 | 1252.46 | | 10.22 | 613.57 | 159.15 | 0.92 |
| Reach-1 | 1.949 | 4916.00 | 1247.00 | 1251.82 | | 9.53 | 515.88 | 145.62 | 0.89 |
| Reach-1 | 1.949 | 2876.00 | 1247.00 | 1250.73 | | 7.90 | 364.03 | 134.36 | 0.85 |
| Reach-1 | 1.949 | 14000.00 | 1247.00 | 1255.14 | 1254.95 | 12.53 | 1129.15 | 226.71 | 0.94 |
| Reach-1 | 1.858 | 6273.00 | 1243.80 | 1249.50 | | 6.41 | 978.68 | 216.46 | 0.53 |
| Reach-1 | 1.858 | 6273.00 | 1243.80 | 1249.50 | | 6.41 | 978.68 | 216.46 | 0.53 |
| Reach-1 | 1.858 | 4916.00 | 1243.80 | 1248.84 | | 5.86 | 839.38 | 210.59 | 0.52 |
| Reach-1 | 1.858 | 2876.00 | 1243.80 | 1247.70 | | 4.76 | 603.78 | 200.27 | 0.48 |
| Reach-1 | 1.858 | 14000.00 | 1243.80 | 1252.43 | | 8.40 | 1669.40 | 264.91 | 0.57 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.52 | | 7.30 | 859.39 | 205.83 | 0.63 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.52 | | 7.30 | 859.39 | 205.83 | 0.63 |
| Reach-1 | 1.788 | 4916.00 | 1242.00 | 1246.89 | | 6.72 | 731.15 | 201.21 | 0.62 |
| Reach-1 | 1.788 | 2876.00 | 1242.00 | 1245.80 | | 5.57 | 516.43 | 193.22 | 0.60 |
| Reach-1 | 1.788 | 14000.00 | 1242.00 | 1250.37 | | 9.49 | 1485.35 | 260.92 | 0.65 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1245.39 | | 6.87 | 913.19 | 202.94 | 0.57 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1245.39 | | 6.87 | 913.19 | 202.94 | 0.57 |
| Reach-1 | 1.708 | 4916.00 | 1240.00 | 1244.71 | | 6.33 | 776.76 | 197.85 | 0.56 |
| Reach-1 | 1.708 | 2876.00 | 1240.00 | 1243.51 | | 5.28 | 544.98 | 188.90 | 0.55 |
| Reach-1 | 1.708 | 14000.00 | 1240.00 | 1248.40 | | 8.99 | 1559.74 | 237.54 | 0.60 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.09 | | 6.18 | 1015.63 | 211.49 | 0.50 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.09 | | 6.17 | 1016.95 | 211.54 | 0.50 |
| Reach-1 | 1.593 | 4916.00 | 1237.50 | 1242.40 | | 5.64 | 871.79 | 206.00 | 0.48 |
| Reach-1 | 1.593 | 2876.00 | 1237.50 | 1241.17 | | 4.61 | 624.29 | 196.21 | 0.46 |
| Reach-1 | 1.593 | 14000.00 | 1237.50 | 1246.12 | | 8.27 | 1693.10 | 237.87 | 0.54 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1240.99 | | 6.20 | 1015.82 | 220.78 | 0.50 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1241.00 | | 6.19 | 1013.06 | 212.99 | 0.50 |
| Reach-1 | 1.479 | 4916.00 | 1235.50 | 1240.30 | | 5.68 | 865.11 | 211.81 | 0.49 |
| Reach-1 | 1.479 | 2876.00 | 1235.50 | 1239.03 | | 4.75 | 604.99 | 199.25 | 0.48 |
| Reach-1 | 1.479 | 14000.00 | 1235.50 | 1243.93 | | 8.35 | 1720.23 | 258.62 | 0.55 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.35 | | 5.87 | 1067.80 | 218.53 | 0.47 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.36 | | 5.87 | 1069.06 | 218.59 | 0.47 |
| Reach-1 | 1.381 | 4916.00 | 1233.50 | 1238.69 | | 5.31 | 926.13 | 211.95 | 0.45 |
| Reach-1 | 1.381 | 2876.00 | 1233.50 | 1237.51 | | 4.22 | 682.17 | 200.11 | 0.40 |
| Reach-1 | 1.381 | 14000.00 | 1233.50 | 1242.19 | | 8.17 | 1761.76 | 286.62 | 0.52 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.69 | | 8.56 | 737.06 | 228.71 | 0.82 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.69 | | 8.55 | 733.39 | 215.00 | 0.82 |
| Reach-1 | 1.307 | 4916.00 | 1232.30 | 1236.26 | | 7.67 | 641.39 | 220.18 | 0.78 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 1.307 | 2876.00 | 1232.30 | 1235.47 | | 6.09 | 472.02 | 211.02 | 0.72 |
| Reach-1 | 1.307 | 14000.00 | 1232.30 | 1238.41 | 1238.41 | 12.51 | 1161.24 | 260.16 | 0.97 |
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1234.90 | 1234.90 | 9.58 | 654.56 | 230.25 | 1.00 |
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1234.90 | 1234.90 | 9.58 | 654.56 | 230.25 | 1.00 |
| Reach-1 | 1.286 | 4916.00 | 1231.00 | 1234.45 | 1234.45 | 8.91 | 551.46 | 223.59 | 1.00 |
| Reach-1 | 1.286 | 2876.00 | 1231.00 | 1233.62 | 1233.62 | 7.71 | 372.88 | 205.70 | 1.01 |
| Reach-1 | 1.286 | 14000.00 | 1231.00 | 1236.96 | 1236.96 | 12.12 | 1165.03 | 275.16 | 0.99 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1222.80 | 1222.80 | 10.02 | 625.94 | 202.42 | 1.00 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1222.80 | 1222.80 | 10.02 | 625.94 | 202.42 | 1.00 |
| Reach-1 | 1.251 | 4916.00 | 1219.00 | 1222.31 | 1222.31 | 9.33 | 527.08 | 198.48 | 1.01 |
| Reach-1 | 1.251 | 2876.00 | 1219.00 | 1221.48 | 1221.48 | 7.89 | 364.46 | 191.81 | 1.01 |
| Reach-1 | 1.251 | 14000.00 | 1219.00 | 1225.06 | 1225.06 | 12.70 | 1102.74 | 220.46 | 1.00 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1217.59 | | 4.34 | 1446.32 | 226.33 | 0.30 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1217.59 | | 4.34 | 1446.32 | 226.33 | 0.30 |
| Reach-1 | 1.213 | 4916.00 | 1209.00 | 1216.92 | | 3.79 | 1296.86 | 221.99 | 0.28 |
| Reach-1 | 1.213 | 2876.00 | 1209.00 | 1215.74 | | 2.77 | 1039.27 | 214.32 | 0.22 |
| Reach-1 | 1.213 | 14000.00 | 1209.00 | 1220.54 | | 6.54 | 2141.91 | 245.12 | 0.39 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.07 | 1216.07 | 10.13 | 619.20 | 197.92 | 1.01 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.07 | 1216.07 | 10.13 | 619.20 | 197.92 | 1.01 |
| Reach-1 | 1.191 | 4916.00 | 1208.50 | 1215.57 | 1215.57 | 9.44 | 521.02 | 193.82 | 1.01 |
| Reach-1 | 1.191 | 2876.00 | 1208.50 | 1214.72 | 1214.72 | 8.01 | 359.18 | 186.88 | 1.02 |
| Reach-1 | 1.191 | 14000.00 | 1208.50 | 1218.38 | 1218.38 | 12.76 | 1096.84 | 216.73 | 1.00 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1213.29 | | 7.88 | 796.27 | 183.76 | 0.67 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1213.29 | | 7.88 | 796.27 | 183.76 | 0.67 |
| Reach-1 | 1.169 | 4916.00 | 1207.50 | 1212.64 | | 7.24 | 678.76 | 178.33 | 0.65 |
| Reach-1 | 1.169 | 2876.00 | 1207.50 | 1211.49 | | 5.99 | 480.52 | 166.37 | 0.62 |
| Reach-1 | 1.169 | 14000.00 | 1207.50 | 1216.10 | | 10.39 | 1346.97 | 207.35 | 0.72 |
| Reach-1 | 1.058 | 6273.00 | 1205.00 | 1212.08 | | 6.53 | 961.37 | 208.81 | 0.54 |
| Reach-1 | 1.058 | 6273.00 | 1205.00 | 1212.08 | | 6.53 | 961.37 | 208.81 | 0.54 |
| Reach-1 | 1.058 | 4916.00 | 1205.00 | 1211.38 | | 6.02 | 816.26 | 204.15 | 0.53 |
| Reach-1 | 1.058 | 2876.00 | 1205.00 | 1210.15 | | 5.05 | 569.83 | 195.99 | 0.52 |
| Reach-1 | 1.058 | 14000.00 | 1205.00 | 1214.99 | | 8.77 | 1595.81 | 228.05 | 0.58 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1209.53 | | 6.88 | 948.57 | 200.73 | 0.56 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1209.53 | | 6.88 | 948.57 | 200.73 | 0.56 |
| Reach-1 | 0.946 | 5085.00 | 1202.50 | 1208.80 | | 6.32 | 804.41 | 194.16 | 0.55 |
| Reach-1 | 0.946 | 2917.00 | 1202.50 | 1207.49 | | 5.22 | 558.68 | 182.42 | 0.53 |
| Reach-1 | 0.946 | 14000.00 | 1202.50 | 1212.45 | | 8.98 | 1567.03 | 221.77 | 0.59 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1207.26 | | 6.34 | 1027.97 | 209.80 | 0.51 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1207.26 | | 6.34 | 1027.97 | 209.80 | 0.51 |
| Reach-1 | 0.833 | 5085.00 | 1200.00 | 1206.53 | | 5.80 | 877.01 | 203.34 | 0.49 |
| Reach-1 | 0.833 | 2917.00 | 1200.00 | 1205.21 | | 4.74 | 616.02 | 191.67 | 0.47 |
| Reach-1 | 0.833 | 14000.00 | 1200.00 | 1210.33 | | 8.17 | 1713.29 | 237.08 | 0.53 |
| Reach-1 | 0.746 | 6522.00 | 1198.50 | 1204.81 | | 7.91 | 824.61 | 180.98 | 0.65 |
| Reach-1 | 0.746 | 6522.00 | 1198.50 | 1204.81 | | 7.91 | 824.63 | 180.98 | 0.65 |
| Reach-1 | 0.746 | 5085.00 | 1198.50 | 1203.91 | | 7.65 | 665.03 | 172.63 | 0.69 |
| Reach-1 | 0.746 | 2917.00 | 1198.50 | 1202.63 | | 6.46 | 451.51 | 160.79 | 0.68 |
| Reach-1 | 0.746 | 14000.00 | 1198.50 | 1207.05 | | 11.17 | 1253.11 | 201.70 | 0.79 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Encroached Condition Metric

| Reach | River Sta | Q Total (m ³ /s) | Min Ch El (m) | W.S. Elev (m) | Crit W.S. (m) | Vel Chnl (m/s) | Flow Area (m ²) | Top Width (m) | Froude # Cbl |
|---------|-----------|--------------------------------|------------------|------------------|------------------|-------------------|--------------------------------|------------------|--------------|
| Reach-1 | 2.118 | 177.63 | 381.91 | 383.44 | | 2.16 | 82.41 | 64.04 | 0.61 |
| Reach-1 | 2.118 | 177.63 | 381.91 | 383.89 | | 2.12 | 83.74 | 47.22 | 0.51 |
| Reach-1 | 2.118 | 139.21 | 381.91 | 383.24 | | 1.99 | 69.90 | 62.05 | 0.60 |
| Reach-1 | 2.118 | 81.44 | 381.91 | 382.89 | | 1.67 | 48.78 | 58.55 | 0.58 |
| Reach-1 | 2.118 | 396.44 | 381.91 | 384.27 | | 2.86 | 140.09 | 77.57 | 0.64 |
| Reach-1 | 2.034 | 177.63 | 380.85 | 382.48 | | 1.98 | 89.53 | 65.14 | 0.54 |
| Reach-1 | 2.034 | 177.63 | 380.85 | 382.64 | | 2.86 | 62.19 | 38.96 | 0.72 |
| Reach-1 | 2.034 | 139.21 | 380.85 | 382.28 | | 1.82 | 76.63 | 63.13 | 0.53 |
| Reach-1 | 2.034 | 81.44 | 380.85 | 381.93 | | 1.48 | 55.01 | 59.60 | 0.49 |
| Reach-1 | 2.034 | 396.44 | 380.85 | 383.33 | | 2.69 | 149.79 | 80.49 | 0.59 |
| Reach-1 | 1.949 | 177.63 | 379.93 | 381.50 | | 2.09 | 85.06 | 64.45 | 0.58 |
| Reach-1 | 1.949 | 177.63 | 379.93 | 381.50 | | 2.09 | 85.06 | 64.45 | 0.58 |
| Reach-1 | 1.949 | 139.21 | 379.93 | 381.30 | | 1.93 | 72.03 | 62.40 | 0.57 |
| Reach-1 | 1.949 | 81.44 | 379.93 | 380.93 | | 1.63 | 49.86 | 58.74 | 0.57 |
| Reach-1 | 1.949 | 396.44 | 379.93 | 382.37 | | 2.75 | 146.14 | 79.40 | 0.61 |
| Reach-1 | 1.858 | 177.63 | 379.17 | 380.87 | | 1.90 | 93.48 | 65.74 | 0.51 |
| Reach-1 | 1.858 | 177.63 | 379.17 | 380.87 | | 1.90 | 93.49 | 65.74 | 0.51 |
| Reach-1 | 1.858 | 139.21 | 379.17 | 380.66 | | 1.74 | 79.98 | 63.66 | 0.50 |
| Reach-1 | 1.858 | 81.44 | 379.17 | 380.30 | | 1.41 | 57.73 | 60.06 | 0.46 |
| Reach-1 | 1.858 | 396.44 | 379.17 | 381.80 | | 2.52 | 161.73 | 85.70 | 0.53 |
| Reach-1 | 1.788 | 177.63 | 378.56 | 380.34 | | 2.07 | 85.97 | 63.45 | 0.57 |
| Reach-1 | 1.788 | 177.63 | 378.56 | 380.34 | | 2.07 | 85.97 | 63.45 | 0.57 |
| Reach-1 | 1.788 | 139.21 | 378.56 | 380.12 | | 1.94 | 71.84 | 61.79 | 0.57 |
| Reach-1 | 1.788 | 81.44 | 378.56 | 379.73 | | 1.67 | 48.79 | 59.00 | 0.59 |
| Reach-1 | 1.788 | 396.44 | 378.56 | 381.37 | | 2.55 | 160.06 | 89.10 | 0.54 |
| Reach-1 | 1.708 | 177.63 | 377.95 | 379.82 | | 2.04 | 86.94 | 54.13 | 0.51 |
| Reach-1 | 1.708 | 177.63 | 377.95 | 379.82 | | 2.04 | 86.96 | 54.13 | 0.51 |
| Reach-1 | 1.708 | 139.21 | 377.95 | 379.58 | | 1.88 | 73.92 | 52.63 | 0.51 |
| Reach-1 | 1.708 | 81.44 | 377.95 | 379.14 | | 1.58 | 51.65 | 49.97 | 0.50 |
| Reach-1 | 1.708 | 396.44 | 377.95 | 380.87 | | 2.70 | 149.36 | 81.33 | 0.54 |
| Reach-1 | 1.593 | 177.63 | 377.19 | 379.13 | | 2.11 | 84.10 | 51.16 | 0.53 |
| Reach-1 | 1.593 | 177.63 | 377.19 | 379.13 | | 2.11 | 84.36 | 51.19 | 0.52 |
| Reach-1 | 1.593 | 139.21 | 377.19 | 378.89 | | 1.92 | 72.32 | 49.65 | 0.51 |
| Reach-1 | 1.593 | 81.44 | 377.19 | 378.48 | | 1.56 | 52.05 | 46.94 | 0.47 |
| Reach-1 | 1.593 | 396.44 | 377.19 | 380.12 | | 2.88 | 138.05 | 57.64 | 0.59 |
| Reach-1 | 1.479 | 177.63 | 376.58 | 378.42 | | 2.13 | 84.03 | 55.93 | 0.54 |
| Reach-1 | 1.479 | 177.63 | 376.58 | 378.42 | | 2.13 | 83.30 | 52.26 | 0.54 |
| Reach-1 | 1.479 | 139.21 | 376.58 | 378.19 | | 1.95 | 71.40 | 53.34 | 0.53 |
| Reach-1 | 1.479 | 81.44 | 376.58 | 377.77 | | 1.63 | 50.08 | 49.28 | 0.51 |
| Reach-1 | 1.479 | 396.44 | 376.58 | 379.34 | | 2.95 | 140.30 | 65.65 | 0.60 |
| Reach-1 | 1.381 | 177.63 | 375.97 | 377.94 | | 1.83 | 97.30 | 60.80 | 0.46 |
| Reach-1 | 1.381 | 177.63 | 375.97 | 377.94 | | 1.82 | 97.38 | 60.81 | 0.46 |
| Reach-1 | 1.381 | 139.21 | 375.97 | 377.70 | | 1.67 | 83.41 | 58.51 | 0.45 |
| Reach-1 | 1.381 | 81.44 | 375.97 | 377.29 | | 1.35 | 60.29 | 54.48 | 0.41 |
| Reach-1 | 1.381 | 396.44 | 375.97 | 378.86 | | 2.55 | 161.03 | 76.61 | 0.51 |
| Reach-1 | 1.307 | 177.63 | 375.61 | 376.95 | 376.91 | 3.06 | 58.30 | 56.66 | 0.95 |
| Reach-1 | 1.307 | 177.63 | 375.61 | 376.95 | 376.91 | 3.05 | 58.22 | 54.86 | 0.95 |
| Reach-1 | 1.307 | 139.21 | 375.61 | 376.83 | | 2.70 | 51.55 | 55.66 | 0.89 |
| Reach-1 | 1.307 | 81.44 | 375.61 | 376.60 | | 2.07 | 39.25 | 53.86 | 0.78 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | Q Total (m ³ /s) | Min Ch El (m) | W.S. Elev (m) | Crit W.S. (m) | Vel Chnl (m/s) | Flow Area (m ²) | Top Width (m) | Froude # Chl |
|---------|-----------|--------------------------------|------------------|------------------|------------------|-------------------|--------------------------------|------------------|--------------|
| Reach-1 | 1.307 | 396.44 | 375.61 | 377.65 | 377.65 | 4.08 | 99.77 | 62.47 | 0.98 |
| Reach-1 | 1.286 | 177.63 | 375.21 | 376.44 | 376.44 | 2.99 | 59.42 | 66.44 | 1.01 |
| Reach-1 | 1.286 | 177.63 | 375.21 | 376.44 | 376.44 | 2.99 | 59.42 | 66.44 | 1.01 |
| Reach-1 | 1.286 | 139.21 | 375.21 | 376.31 | 376.31 | 2.75 | 50.53 | 65.40 | 1.00 |
| Reach-1 | 1.286 | 81.44 | 375.21 | 376.06 | 376.06 | 2.33 | 34.98 | 63.06 | 1.00 |
| Reach-1 | 1.286 | 396.44 | 375.21 | 377.08 | 377.08 | 3.83 | 103.80 | 71.38 | 1.00 |
| Reach-1 | 1.251 | 177.63 | 371.55 | 372.89 | 372.89 | 3.32 | 53.54 | 48.20 | 1.00 |
| Reach-1 | 1.251 | 177.63 | 371.55 | 372.89 | 372.89 | 3.32 | 53.54 | 48.20 | 1.00 |
| Reach-1 | 1.251 | 139.21 | 371.55 | 372.72 | 372.72 | 3.07 | 45.29 | 47.10 | 1.00 |
| Reach-1 | 1.251 | 81.44 | 371.55 | 372.41 | 372.41 | 2.62 | 31.13 | 45.16 | 1.01 |
| Reach-1 | 1.251 | 396.44 | 371.55 | 373.70 | 373.70 | 4.18 | 94.88 | 53.36 | 1.00 |
| Reach-1 | 1.213 | 177.63 | 368.50 | 371.30 | | 1.54 | 115.24 | 54.75 | 0.34 |
| Reach-1 | 1.213 | 177.63 | 368.50 | 371.30 | | 1.54 | 115.24 | 54.75 | 0.34 |
| Reach-1 | 1.213 | 139.21 | 368.50 | 371.06 | | 1.36 | 102.50 | 53.42 | 0.31 |
| Reach-1 | 1.213 | 81.44 | 368.50 | 370.65 | | 1.01 | 80.76 | 51.07 | 0.26 |
| Reach-1 | 1.213 | 396.44 | 368.50 | 372.34 | | 2.27 | 175.67 | 60.90 | 0.42 |
| Reach-1 | 1.191 | 177.63 | 368.35 | 370.77 | 370.77 | 3.34 | 53.15 | 47.42 | 1.01 |
| Reach-1 | 1.191 | 177.63 | 368.35 | 370.77 | 370.77 | 3.34 | 53.15 | 47.42 | 1.01 |
| Reach-1 | 1.191 | 139.21 | 368.35 | 370.60 | 370.60 | 3.11 | 44.81 | 46.45 | 1.01 |
| Reach-1 | 1.191 | 81.44 | 368.35 | 370.29 | 370.29 | 2.64 | 30.85 | 44.77 | 1.02 |
| Reach-1 | 1.191 | 396.44 | 368.35 | 371.58 | 371.58 | 4.25 | 93.32 | 51.85 | 1.01 |
| Reach-1 | 1.169 | 177.63 | 368.05 | 369.67 | 369.67 | 3.43 | 51.86 | 43.48 | 1.00 |
| Reach-1 | 1.169 | 177.63 | 368.05 | 369.67 | 369.67 | 3.43 | 51.86 | 43.48 | 1.00 |
| Reach-1 | 1.169 | 139.21 | 368.05 | 369.48 | 369.48 | 3.19 | 43.63 | 42.08 | 1.00 |
| Reach-1 | 1.169 | 81.44 | 368.05 | 369.13 | 369.13 | 2.76 | 29.53 | 38.17 | 1.00 |
| Reach-1 | 1.169 | 396.44 | 368.05 | 370.54 | 370.54 | 4.27 | 92.76 | 49.87 | 1.00 |
| Reach-1 | 1.058 | 177.63 | 36.77 | 369.35 | 62.03 | 0.06 | 2823.50 | 50.35 | 0.00 |
| Reach-1 | 1.058 | 177.63 | 36.77 | 369.35 | 62.03 | 0.06 | 2823.50 | 50.35 | 0.00 |
| Reach-1 | 1.058 | 139.21 | 36.77 | 369.03 | 59.65 | 0.05 | 2807.72 | 49.35 | 0.00 |
| Reach-1 | 1.058 | 81.44 | 36.77 | 368.46 | 55.22 | 0.03 | 2780.16 | 46.89 | 0.00 |
| Reach-1 | 1.058 | 396.44 | 36.77 | 370.61 | 71.53 | 0.14 | 2889.66 | 54.35 | 0.01 |
| Reach-1 | 0.946 | 184.68 | 366.52 | 369.00 | | 2.47 | 74.70 | 44.42 | 0.61 |
| Reach-1 | 0.946 | 184.68 | 366.52 | 369.00 | | 2.47 | 74.70 | 44.42 | 0.61 |
| Reach-1 | 0.946 | 143.99 | 366.52 | 368.74 | | 2.28 | 63.19 | 42.51 | 0.60 |
| Reach-1 | 0.946 | 82.60 | 366.52 | 368.26 | | 1.90 | 43.56 | 39.03 | 0.57 |
| Reach-1 | 0.946 | 396.44 | 366.52 | 370.04 | | 3.18 | 124.94 | 63.20 | 0.65 |
| Reach-1 | 0.833 | 184.68 | 365.76 | 368.24 | | 2.23 | 82.71 | 48.26 | 0.54 |
| Reach-1 | 0.833 | 184.68 | 365.76 | 368.24 | | 2.23 | 82.71 | 48.26 | 0.54 |
| Reach-1 | 0.833 | 143.99 | 365.76 | 367.99 | | 2.03 | 71.02 | 46.32 | 0.52 |
| Reach-1 | 0.833 | 82.60 | 365.76 | 367.51 | | 1.67 | 49.54 | 42.54 | 0.49 |
| Reach-1 | 0.833 | 396.44 | 365.76 | 369.34 | | 2.83 | 141.08 | 57.39 | 0.56 |
| Reach-1 | 0.746 | 184.68 | 365.30 | 367.25 | | 2.95 | 62.56 | 42.64 | 0.78 |
| Reach-1 | 0.746 | 184.68 | 365.30 | 367.25 | | 2.95 | 62.56 | 42.64 | 0.78 |
| Reach-1 | 0.746 | 143.99 | 365.30 | 366.95 | | 2.87 | 50.20 | 40.29 | 0.82 |
| Reach-1 | 0.746 | 82.60 | 365.30 | 366.55 | | 2.38 | 34.71 | 37.15 | 0.79 |
| Reach-1 | 0.746 | 396.44 | 365.30 | 367.89 | 367.88 | 4.33 | 91.60 | 47.69 | 1.00 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1

Encroached Condition, English

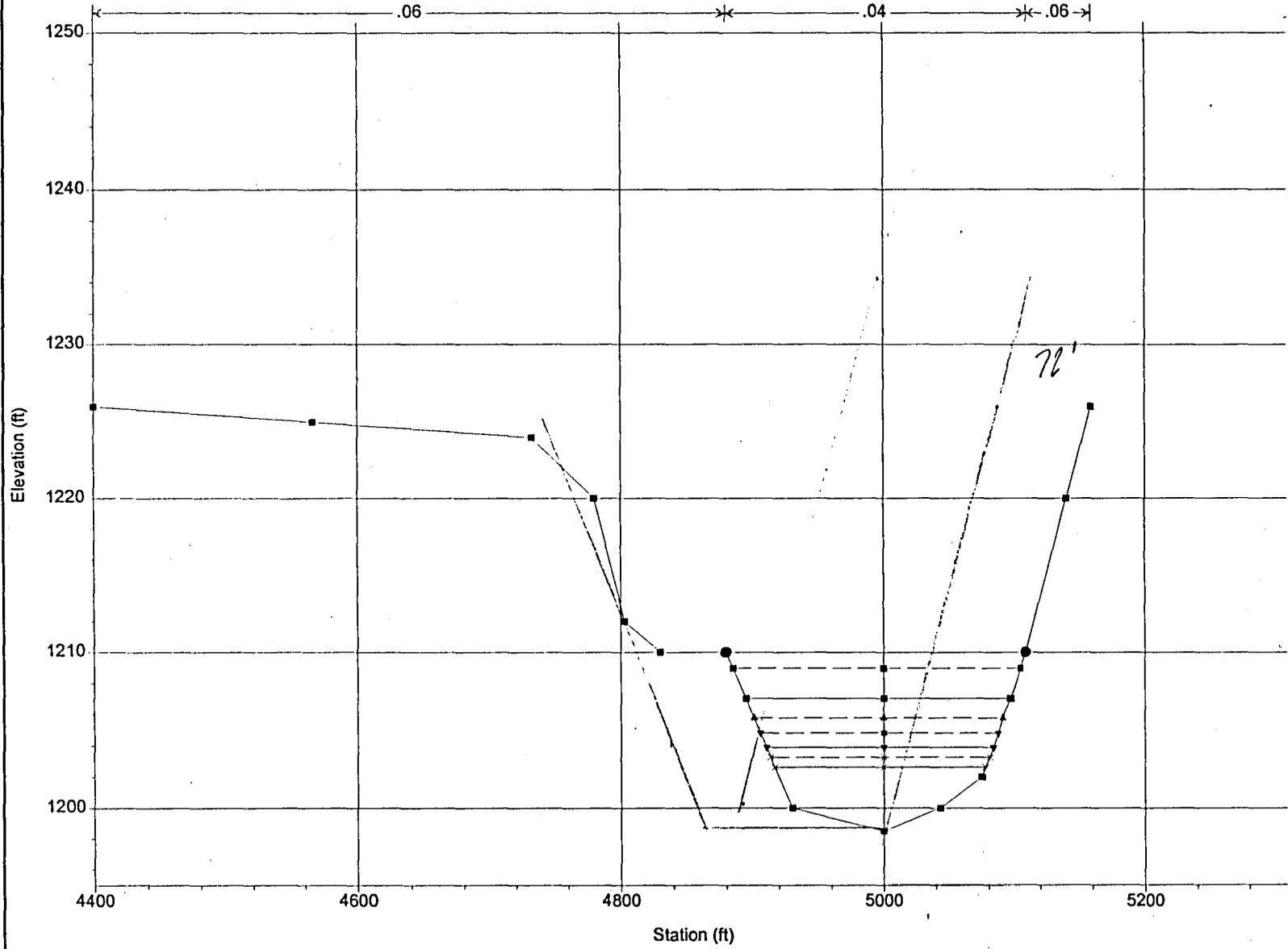
| Reach | River Sta | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Chl W.S. (ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 2.118 | 6273.00 | 1253.00 | 1258.01 | | 7.07 | 887.03 | 210.10 | 0.61 |
| Reach-1 | 2.118 | 6273.00 | 1253.00 | 1259.47 | | 6.96 | 901.39 | 154.91 | 0.51 |
| Reach-1 | 2.118 | 4916.00 | 1253.00 | 1257.36 | | 6.53 | 752.42 | 203.59 | 0.60 |
| Reach-1 | 2.118 | 2876.00 | 1253.00 | 1256.21 | | 5.48 | 525.07 | 192.10 | 0.58 |
| Reach-1 | 2.118 | 14000.00 | 1253.00 | 1260.74 | | 9.38 | 1507.89 | 254.49 | 0.64 |
| Reach-1 | 2.034 | 6273.00 | 1249.50 | 1254.87 | | 6.51 | 963.70 | 213.71 | 0.54 |
| Reach-1 | 2.034 | 6273.00 | 1249.50 | 1255.38 | | 9.37 | 669.41 | 127.84 | 0.72 |
| Reach-1 | 2.034 | 4916.00 | 1249.50 | 1254.21 | | 5.96 | 824.89 | 207.12 | 0.53 |
| Reach-1 | 2.034 | 2876.00 | 1249.50 | 1253.06 | | 4.86 | 592.07 | 195.55 | 0.49 |
| Reach-1 | 2.034 | 14000.00 | 1249.50 | 1257.64 | | 8.83 | 1612.31 | 264.09 | 0.59 |
| Reach-1 | 1.949 | 6273.00 | 1246.50 | 1251.65 | | 6.85 | 915.56 | 211.45 | 0.58 |
| Reach-1 | 1.949 | 6273.00 | 1246.50 | 1251.64 | | 6.85 | 915.53 | 211.45 | 0.58 |
| Reach-1 | 1.949 | 4916.00 | 1246.50 | 1250.97 | | 6.34 | 775.32 | 204.71 | 0.57 |
| Reach-1 | 1.949 | 2876.00 | 1246.50 | 1249.77 | | 5.36 | 536.69 | 192.70 | 0.57 |
| Reach-1 | 1.949 | 14000.00 | 1246.50 | 1254.49 | | 9.03 | 1572.99 | 260.51 | 0.61 |
| Reach-1 | 1.858 | 6273.00 | 1244.00 | 1249.57 | | 6.23 | 1006.26 | 215.70 | 0.51 |
| Reach-1 | 1.858 | 6273.00 | 1244.00 | 1249.57 | | 6.23 | 1006.29 | 215.70 | 0.51 |
| Reach-1 | 1.858 | 4916.00 | 1244.00 | 1248.88 | | 5.71 | 860.87 | 208.85 | 0.50 |
| Reach-1 | 1.858 | 2876.00 | 1244.00 | 1247.70 | | 4.63 | 621.35 | 197.05 | 0.46 |
| Reach-1 | 1.858 | 14000.00 | 1244.00 | 1252.62 | | 8.25 | 1740.83 | 281.17 | 0.53 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.84 | | 6.78 | 925.36 | 208.16 | 0.57 |
| Reach-1 | 1.788 | 6273.00 | 1242.00 | 1247.84 | | 6.78 | 925.39 | 208.16 | 0.57 |
| Reach-1 | 1.788 | 4916.00 | 1242.00 | 1247.10 | | 6.36 | 773.23 | 202.73 | 0.57 |
| Reach-1 | 1.788 | 2876.00 | 1242.00 | 1245.85 | | 5.48 | 525.21 | 193.55 | 0.59 |
| Reach-1 | 1.788 | 14000.00 | 1242.00 | 1251.22 | | 8.36 | 1722.90 | 292.33 | 0.54 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1246.13 | | 6.70 | 935.85 | 177.59 | 0.51 |
| Reach-1 | 1.708 | 6273.00 | 1240.00 | 1246.13 | | 6.70 | 936.02 | 177.60 | 0.51 |
| Reach-1 | 1.708 | 4916.00 | 1240.00 | 1245.33 | | 6.18 | 795.64 | 172.68 | 0.51 |
| Reach-1 | 1.708 | 2876.00 | 1240.00 | 1243.91 | | 5.17 | 555.99 | 163.95 | 0.50 |
| Reach-1 | 1.708 | 14000.00 | 1240.00 | 1249.58 | | 8.86 | 1607.71 | 266.82 | 0.54 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.86 | | 6.93 | 905.29 | 167.85 | 0.53 |
| Reach-1 | 1.593 | 6273.00 | 1237.50 | 1243.88 | | 6.91 | 908.06 | 167.96 | 0.52 |
| Reach-1 | 1.593 | 4916.00 | 1237.50 | 1243.09 | | 6.31 | 778.47 | 162.90 | 0.51 |
| Reach-1 | 1.593 | 2876.00 | 1237.50 | 1241.72 | | 5.13 | 560.26 | 154.00 | 0.47 |
| Reach-1 | 1.593 | 14000.00 | 1237.50 | 1247.12 | | 9.43 | 1485.98 | 189.10 | 0.59 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1241.53 | | 6.99 | 904.48 | 183.51 | 0.54 |
| Reach-1 | 1.479 | 6273.00 | 1235.50 | 1241.54 | | 7.00 | 896.68 | 171.47 | 0.54 |
| Reach-1 | 1.479 | 4916.00 | 1235.50 | 1240.77 | | 6.41 | 768.59 | 175.01 | 0.53 |
| Reach-1 | 1.479 | 2876.00 | 1235.50 | 1239.41 | | 5.34 | 539.06 | 161.68 | 0.51 |
| Reach-1 | 1.479 | 14000.00 | 1235.50 | 1244.57 | | 9.69 | 1510.18 | 215.38 | 0.60 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.95 | | 5.99 | 1047.35 | 199.46 | 0.46 |
| Reach-1 | 1.381 | 6273.00 | 1233.50 | 1239.95 | | 5.98 | 1048.15 | 199.50 | 0.46 |
| Reach-1 | 1.381 | 4916.00 | 1233.50 | 1239.18 | | 5.48 | 897.82 | 191.95 | 0.45 |
| Reach-1 | 1.381 | 2876.00 | 1233.50 | 1237.84 | | 4.43 | 648.94 | 178.75 | 0.41 |
| Reach-1 | 1.381 | 14000.00 | 1233.50 | 1242.99 | | 8.37 | 1733.35 | 251.35 | 0.51 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.71 | 1236.58 | 10.03 | 627.51 | 185.91 | 0.95 |
| Reach-1 | 1.307 | 6273.00 | 1232.30 | 1236.72 | 1236.58 | 10.01 | 626.69 | 180.00 | 0.95 |
| Reach-1 | 1.307 | 4916.00 | 1232.30 | 1236.31 | | 8.87 | 554.90 | 182.62 | 0.89 |

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (Continued)

| Reach | River Sta | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---------|-----------|------------------|-------------------|-------------------|-------------------|--------------------|----------------------|-------------------|--------------|
| Reach-1 | 1.307 | 2876.00 | 1232.30 | 1235.58 | | 6.81 | 422.51 | 176.71 | 0.78 |
| Reach-1 | 1.307 | 14000.00 | 1232.30 | 1238.99 | 1238.99 | 13.38 | 1073.89 | 204.94 | 0.98 |
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1235.04 | 1235.04 | 9.81 | 639.61 | 217.98 | 1.01 |
| Reach-1 | 1.286 | 6273.00 | 1231.00 | 1235.04 | 1235.04 | 9.81 | 639.61 | 217.98 | 1.01 |
| Reach-1 | 1.286 | 4916.00 | 1231.00 | 1234.60 | 1234.60 | 9.04 | 543.90 | 214.58 | 1.00 |
| Reach-1 | 1.286 | 2876.00 | 1231.00 | 1233.81 | 1233.81 | 7.64 | 376.54 | 206.89 | 1.00 |
| Reach-1 | 1.286 | 14000.00 | 1231.00 | 1237.15 | 1237.15 | 12.55 | 1117.34 | 234.18 | 1.00 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1223.39 | 1223.39 | 10.88 | 576.34 | 158.14 | 1.00 |
| Reach-1 | 1.251 | 6273.00 | 1219.00 | 1223.39 | 1223.39 | 10.88 | 576.34 | 158.14 | 1.00 |
| Reach-1 | 1.251 | 4916.00 | 1219.00 | 1222.82 | 1222.82 | 10.08 | 487.52 | 154.54 | 1.00 |
| Reach-1 | 1.251 | 2876.00 | 1219.00 | 1221.81 | 1221.81 | 8.58 | 335.07 | 148.16 | 1.01 |
| Reach-1 | 1.251 | 14000.00 | 1219.00 | 1226.06 | 1226.06 | 13.71 | 1021.25 | 175.05 | 1.00 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1218.17 | | 5.06 | 1240.43 | 179.64 | 0.34 |
| Reach-1 | 1.213 | 6273.00 | 1209.00 | 1218.17 | | 5.06 | 1240.43 | 179.64 | 0.34 |
| Reach-1 | 1.213 | 4916.00 | 1209.00 | 1217.40 | | 4.46 | 1103.34 | 175.26 | 0.31 |
| Reach-1 | 1.213 | 2876.00 | 1209.00 | 1216.03 | | 3.31 | 869.25 | 167.54 | 0.26 |
| Reach-1 | 1.213 | 14000.00 | 1209.00 | 1221.60 | | 7.43 | 1890.93 | 199.80 | 0.42 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.45 | 1216.45 | 10.97 | 572.05 | 155.57 | 1.01 |
| Reach-1 | 1.191 | 6273.00 | 1208.50 | 1216.45 | 1216.45 | 10.97 | 572.05 | 155.57 | 1.01 |
| Reach-1 | 1.191 | 4916.00 | 1208.50 | 1215.87 | 1215.87 | 10.19 | 482.38 | 152.38 | 1.01 |
| Reach-1 | 1.191 | 2876.00 | 1208.50 | 1214.86 | 1214.86 | 8.66 | 332.02 | 146.88 | 1.02 |
| Reach-1 | 1.191 | 14000.00 | 1208.50 | 1219.11 | 1219.11 | 13.94 | 1004.48 | 170.11 | 1.01 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1212.82 | 1212.82 | 11.24 | 558.23 | 142.65 | 1.00 |
| Reach-1 | 1.169 | 6273.00 | 1207.50 | 1212.82 | 1212.82 | 11.24 | 558.23 | 142.65 | 1.00 |
| Reach-1 | 1.169 | 4916.00 | 1207.50 | 1212.19 | 1212.19 | 10.47 | 469.59 | 138.05 | 1.00 |
| Reach-1 | 1.169 | 2876.00 | 1207.50 | 1211.04 | 1211.04 | 9.05 | 317.89 | 125.23 | 1.00 |
| Reach-1 | 1.169 | 14000.00 | 1207.50 | 1215.70 | 1215.70 | 14.02 | 998.41 | 163.61 | 1.00 |
| Reach-1 | 1.058 | 6273.00 | 120.65 | 1211.77 | 203.50 | 0.21 | 30391.89 | 165.19 | 0.00 |
| Reach-1 | 1.058 | 6273.00 | 120.65 | 1211.77 | 203.50 | 0.21 | 30391.89 | 165.19 | 0.00 |
| Reach-1 | 1.058 | 4916.00 | 120.65 | 1210.73 | 195.72 | 0.16 | 30222.05 | 161.90 | 0.00 |
| Reach-1 | 1.058 | 2876.00 | 120.65 | 1208.86 | 181.16 | 0.10 | 29925.37 | 153.82 | 0.00 |
| Reach-1 | 1.058 | 14000.00 | 120.65 | 1215.92 | 234.67 | 0.45 | 31104.06 | 178.32 | 0.01 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1210.64 | | 8.11 | 804.09 | 145.74 | 0.61 |
| Reach-1 | 0.946 | 6522.00 | 1202.50 | 1210.64 | | 8.11 | 804.07 | 145.74 | 0.61 |
| Reach-1 | 0.946 | 5085.00 | 1202.50 | 1209.77 | | 7.48 | 680.22 | 139.46 | 0.60 |
| Reach-1 | 0.946 | 2917.00 | 1202.50 | 1208.19 | | 6.22 | 468.87 | 128.04 | 0.57 |
| Reach-1 | 0.946 | 14000.00 | 1202.50 | 1214.05 | | 10.42 | 1344.82 | 207.36 | 0.65 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1208.13 | | 7.33 | 890.30 | 158.33 | 0.54 |
| Reach-1 | 0.833 | 6522.00 | 1200.00 | 1208.13 | | 7.33 | 890.28 | 158.33 | 0.54 |
| Reach-1 | 0.833 | 5085.00 | 1200.00 | 1207.32 | | 6.65 | 764.43 | 151.98 | 0.52 |
| Reach-1 | 0.833 | 2917.00 | 1200.00 | 1205.73 | | 5.47 | 533.23 | 139.55 | 0.49 |
| Reach-1 | 0.833 | 14000.00 | 1200.00 | 1211.76 | | 9.29 | 1518.56 | 188.30 | 0.56 |
| Reach-1 | 0.746 | 6522.00 | 1198.50 | 1204.89 | | 9.69 | 673.38 | 139.88 | 0.78 |
| Reach-1 | 0.746 | 6522.00 | 1198.50 | 1204.89 | | 9.68 | 673.42 | 139.89 | 0.78 |
| Reach-1 | 0.746 | 5085.00 | 1198.50 | 1203.92 | | 9.41 | 540.36 | 132.20 | 0.82 |
| Reach-1 | 0.746 | 2917.00 | 1198.50 | 1202.60 | | 7.81 | 373.60 | 121.89 | 0.79 |
| Reach-1 | 0.746 | 14000.00 | 1198.50 | 1207.00 | 1206.96 | 14.20 | 985.93 | 156.46 | 1.00 |

McMicken Outlet FEMA Delineation Imported Plan 01 12/18/98 2:45:27 PM

RS = 0.746 Standard Project Flood

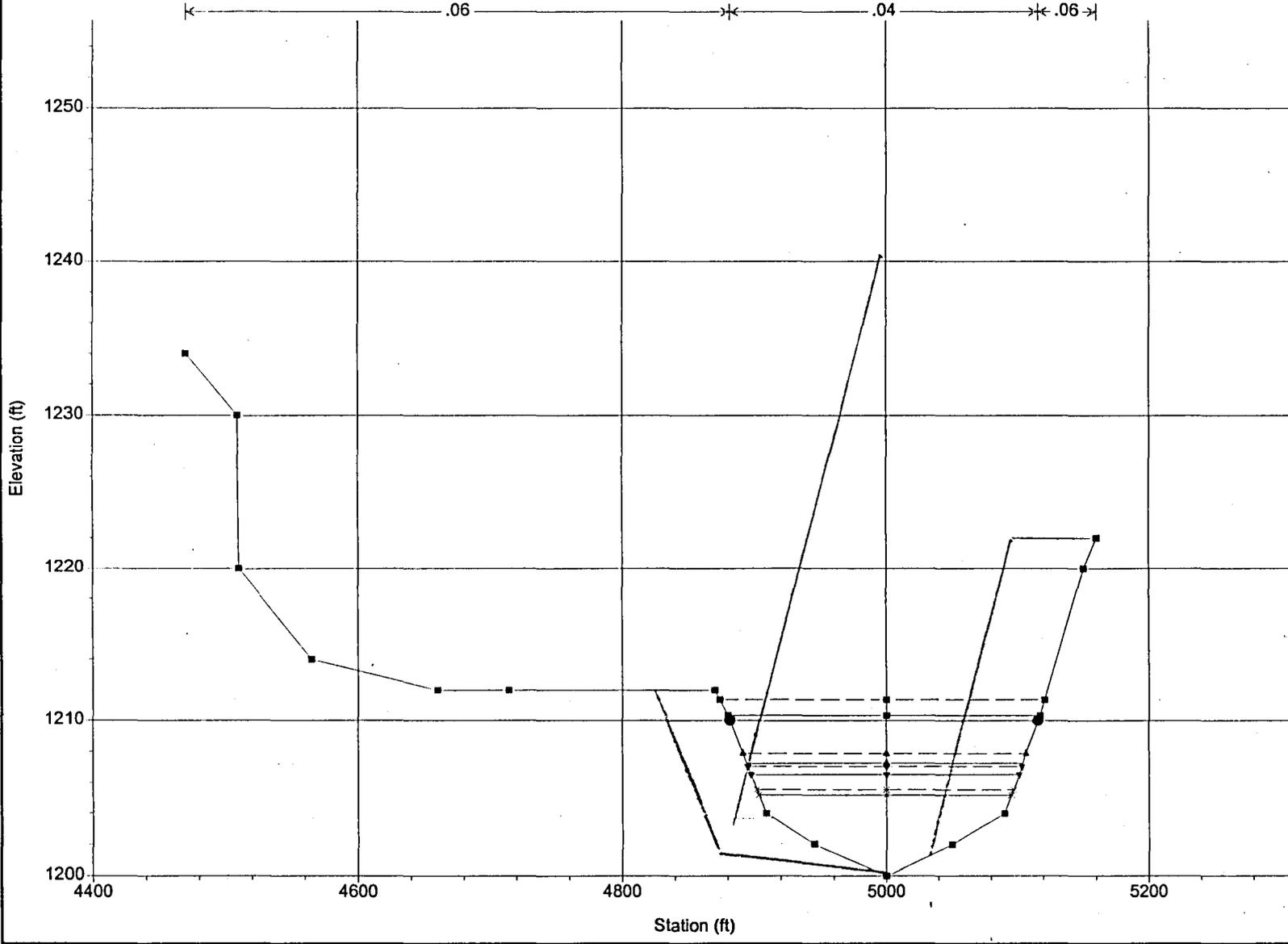


| Legend | |
|--------|----------|
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| ■ | WS PF#5 |
| ▲ | EG PF#2 |
| □ | EG PF#1 |
| ▼ | EG PF#3 |
| ▲ | WS PF#2 |
| □ | WS PF#1 |
| ▼ | WS PF#3 |
| × | EG PF#4 |
| × | WS PF#4 |
| ■ | Ground |
| ● | Bank Sta |

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

McMicken Outlet FEMA Delineation Imported Plan 01 12/18/98 2:45:27 PM

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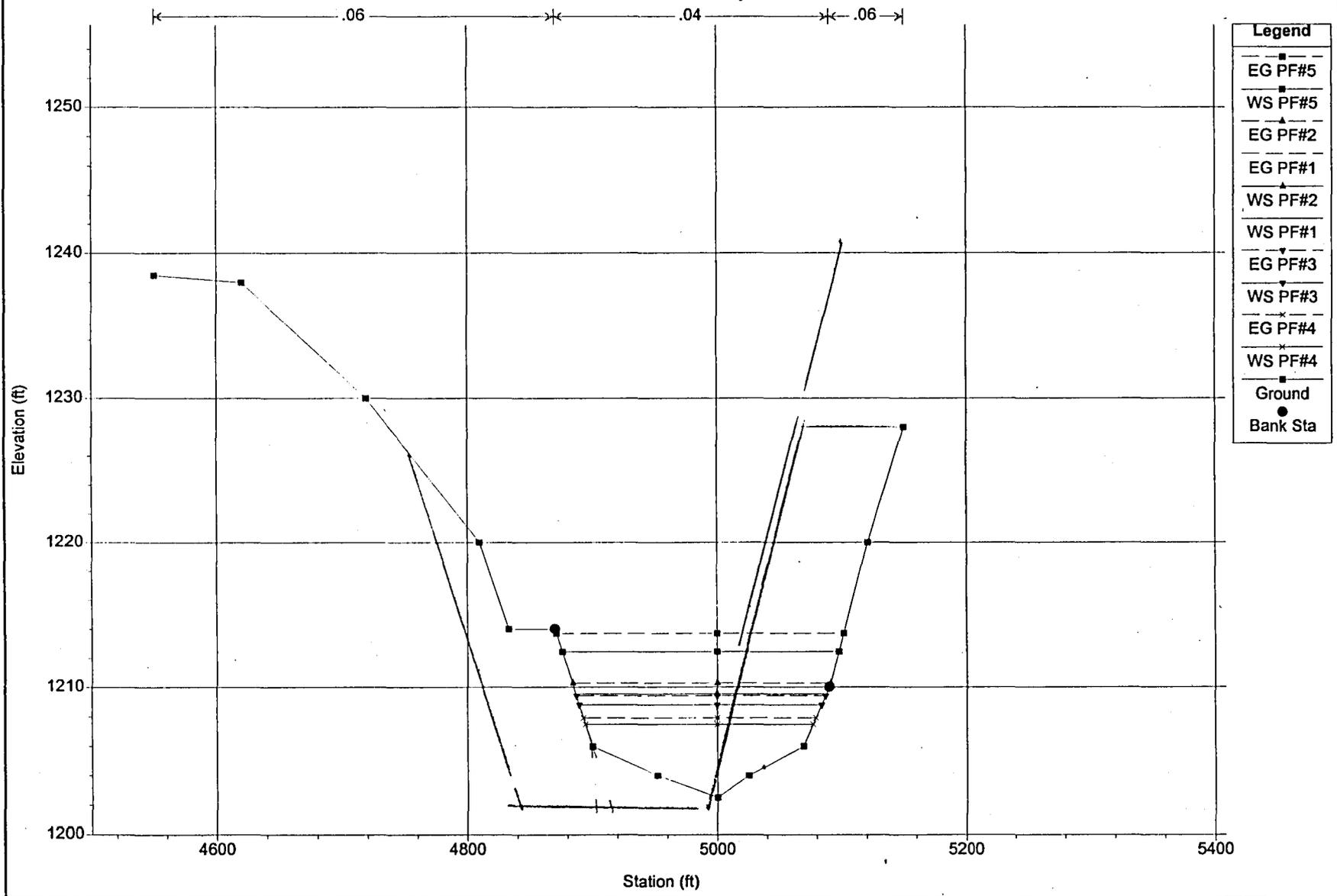


| Legend | |
|--------|----------|
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| ■ | WS PF#5 |
| ▲ | EG PF#2 |
| ▲ | EG PF#1 |
| ▲ | WS PF#2 |
| ▼ | WS PF#1 |
| ▼ | EG PF#3 |
| ▼ | WS PF#3 |
| × | EG PF#4 |
| × | WS PF#4 |
| ■ | Ground |
| ● | Bank Sta |

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

McMicken Outlet FEMA Delineation Imported Plan 01 12/18/98 2:45:27 PM

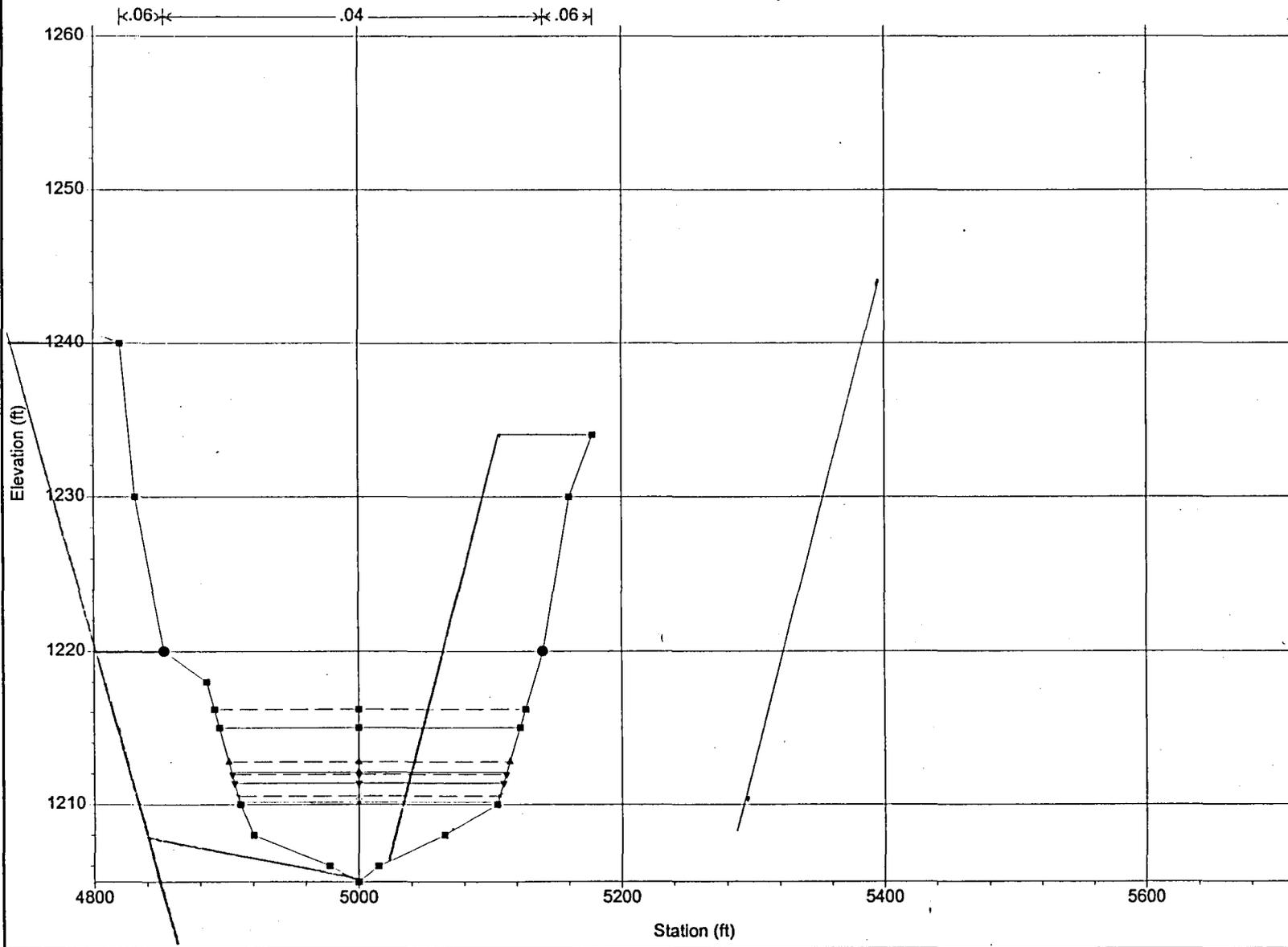
RS = 0.946 Standard Project Flood



1 in Horiz. = 120 ft 1 in Vert. = 10 ft

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RS = 1.058 Standard Project Flood

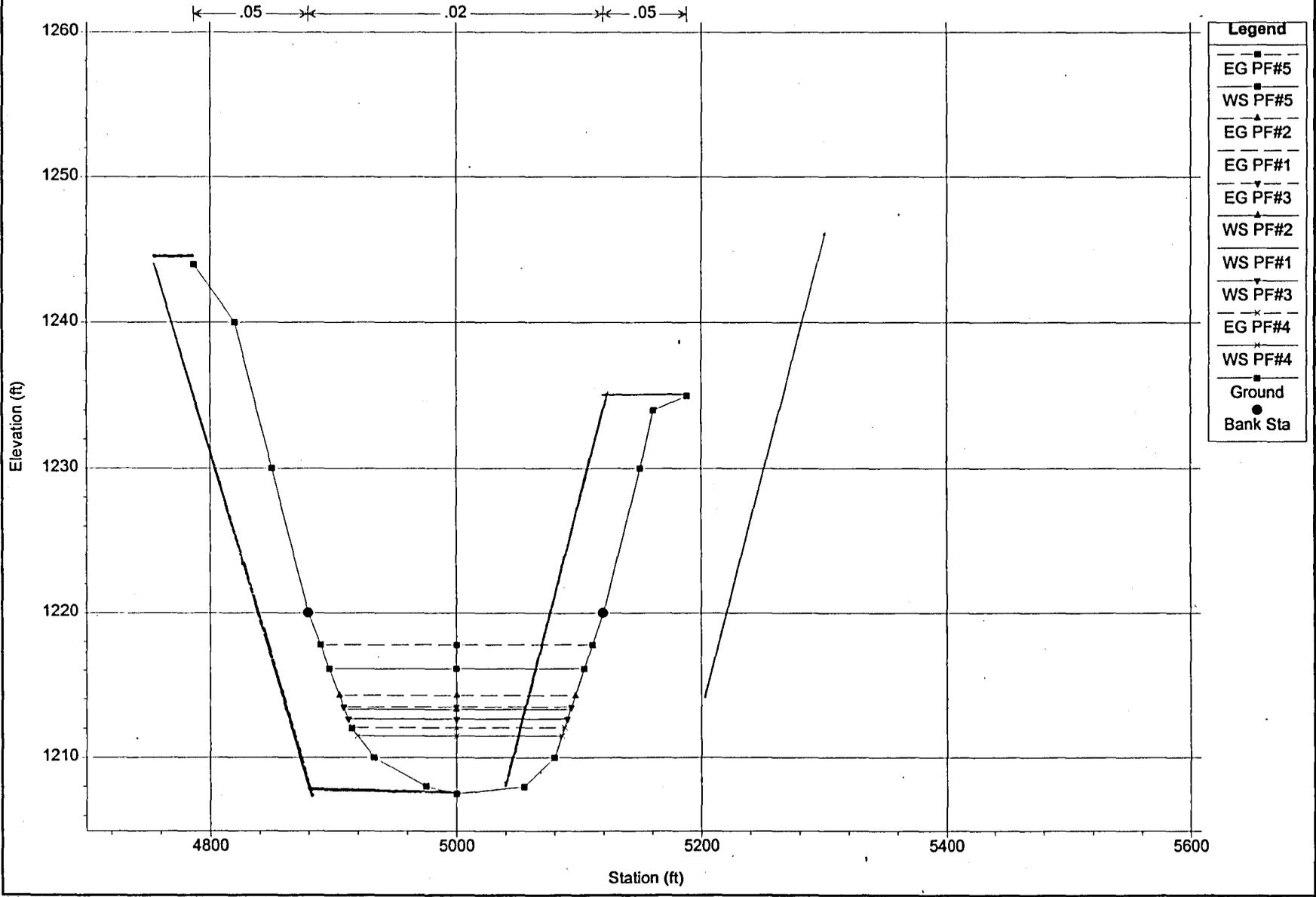


| Legend | |
|--------|----------|
| ■ | EG PF#5 |
| ■ | WS PF#5 |
| ▲ | EG PF#2 |
| ▲ | EG PF#1 |
| ▲ | WS PF#2 |
| ▼ | WS PF#1 |
| ▼ | EG PF#3 |
| ▼ | WS PF#3 |
| × | EG PF#4 |
| × | WS PF#4 |
| ■ | Ground |
| ● | Bank Sta |

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

McMicken Outlet FEMA Delineation Imported Plan 01 12/18/98 2:45:27 PM

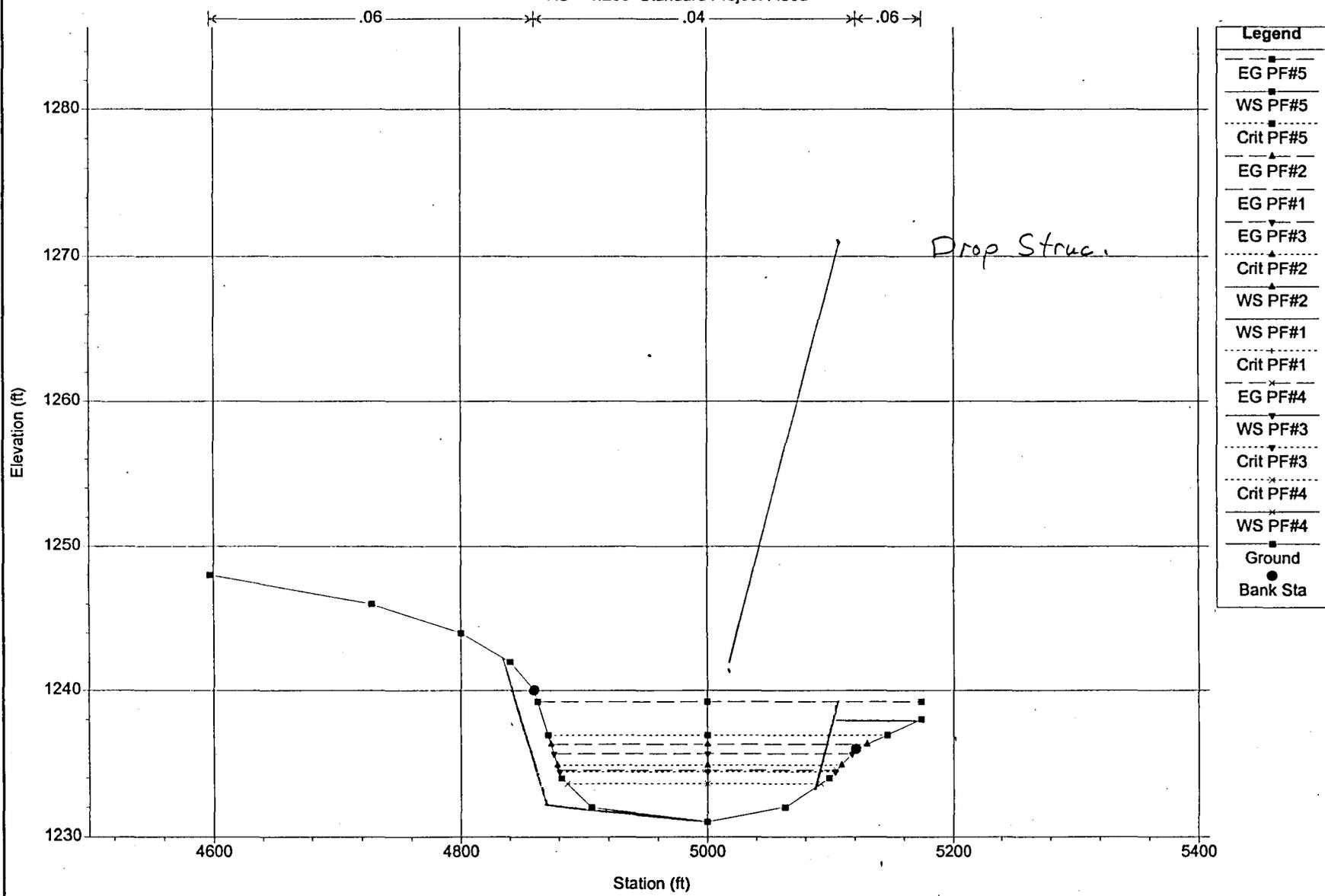
RS = 1.169 Standard Project Flood



1 in Horiz. = 120 ft 1 in Vert. = 10 ft

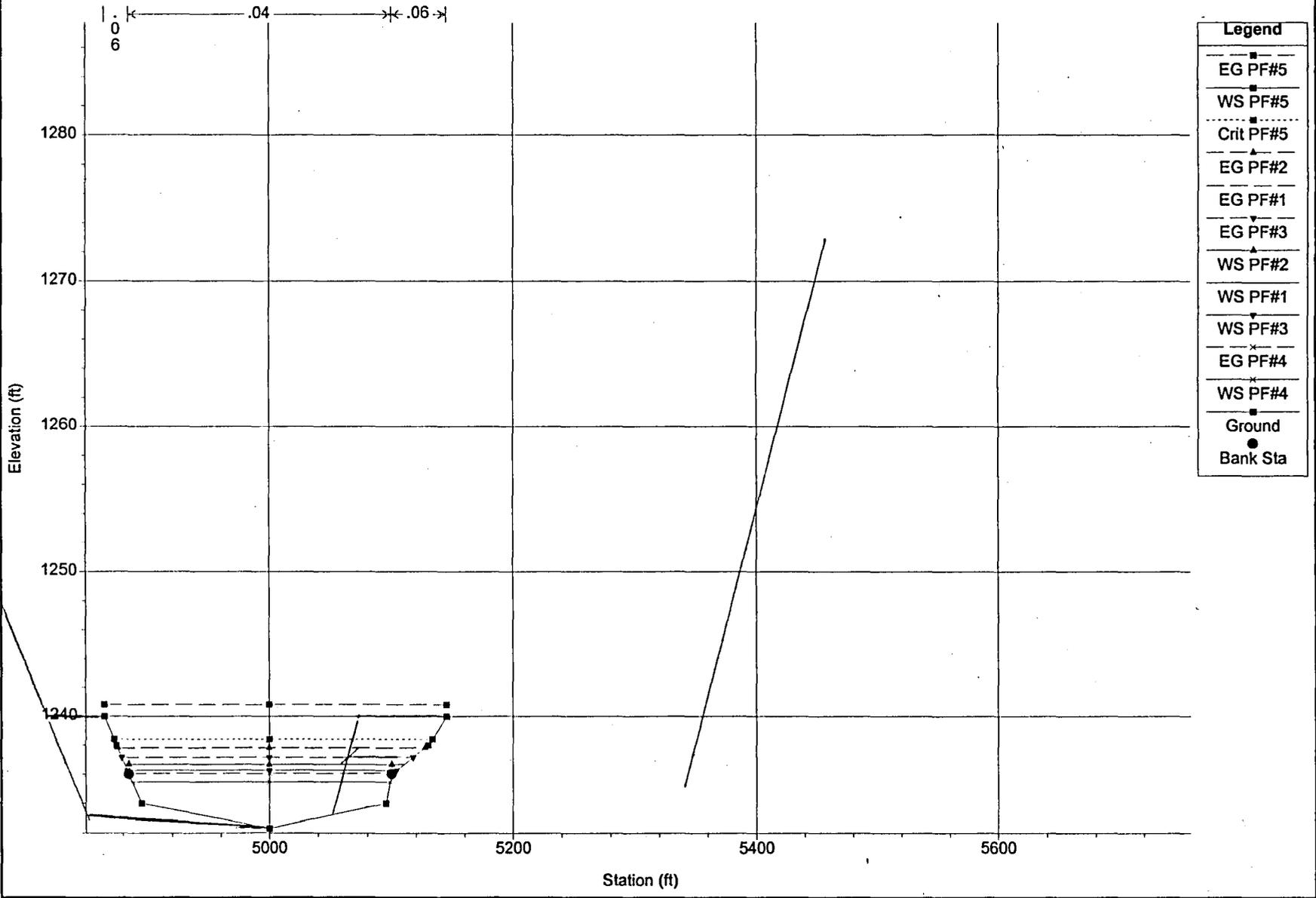
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RS = 1.286 Standard Project Flood



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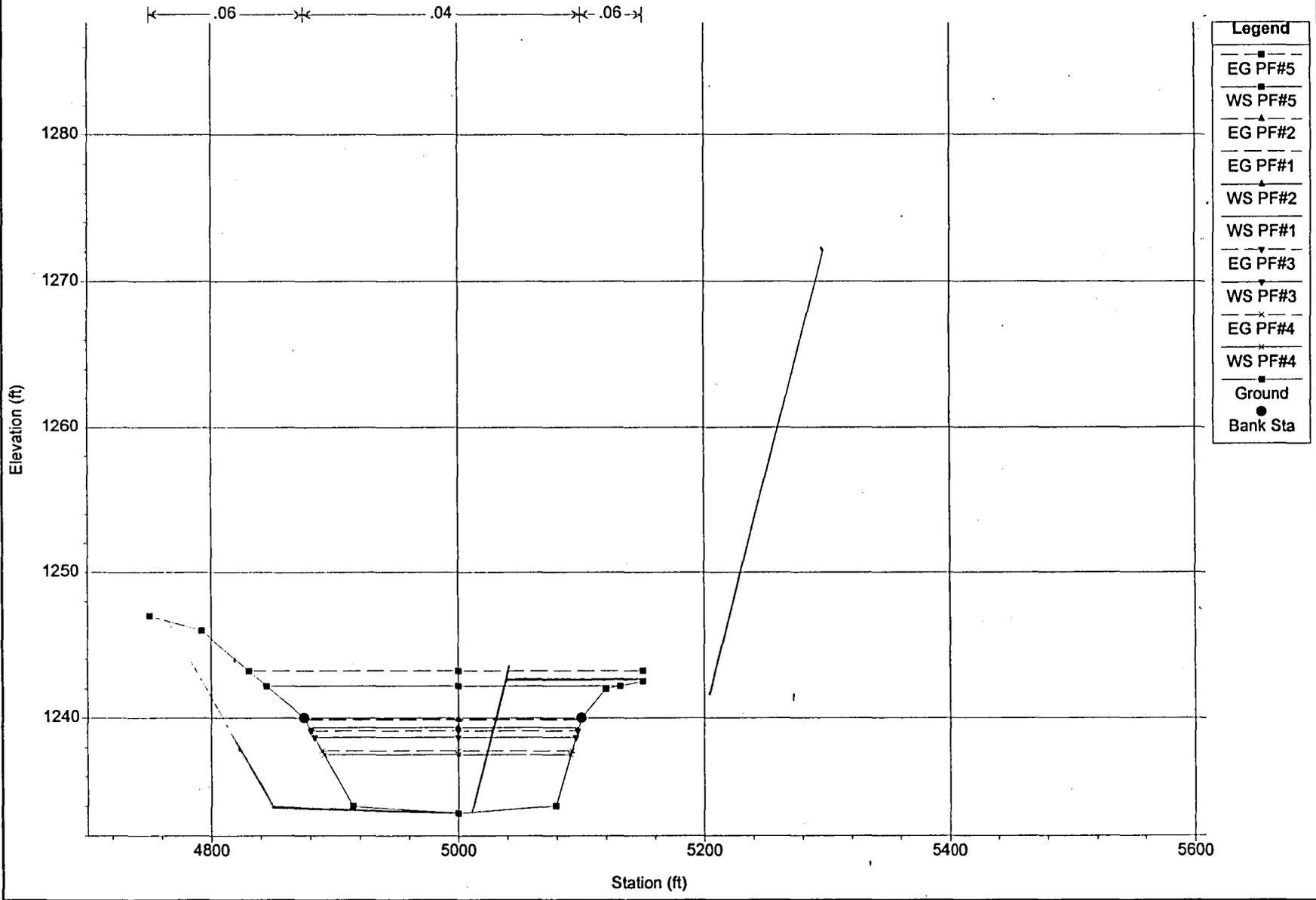
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1 in Horiz. = 120 ft 1 in Vert. = 10 ft

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RS = 1.381 Standard Project Flood



← .06 *← .04 *← .06 →

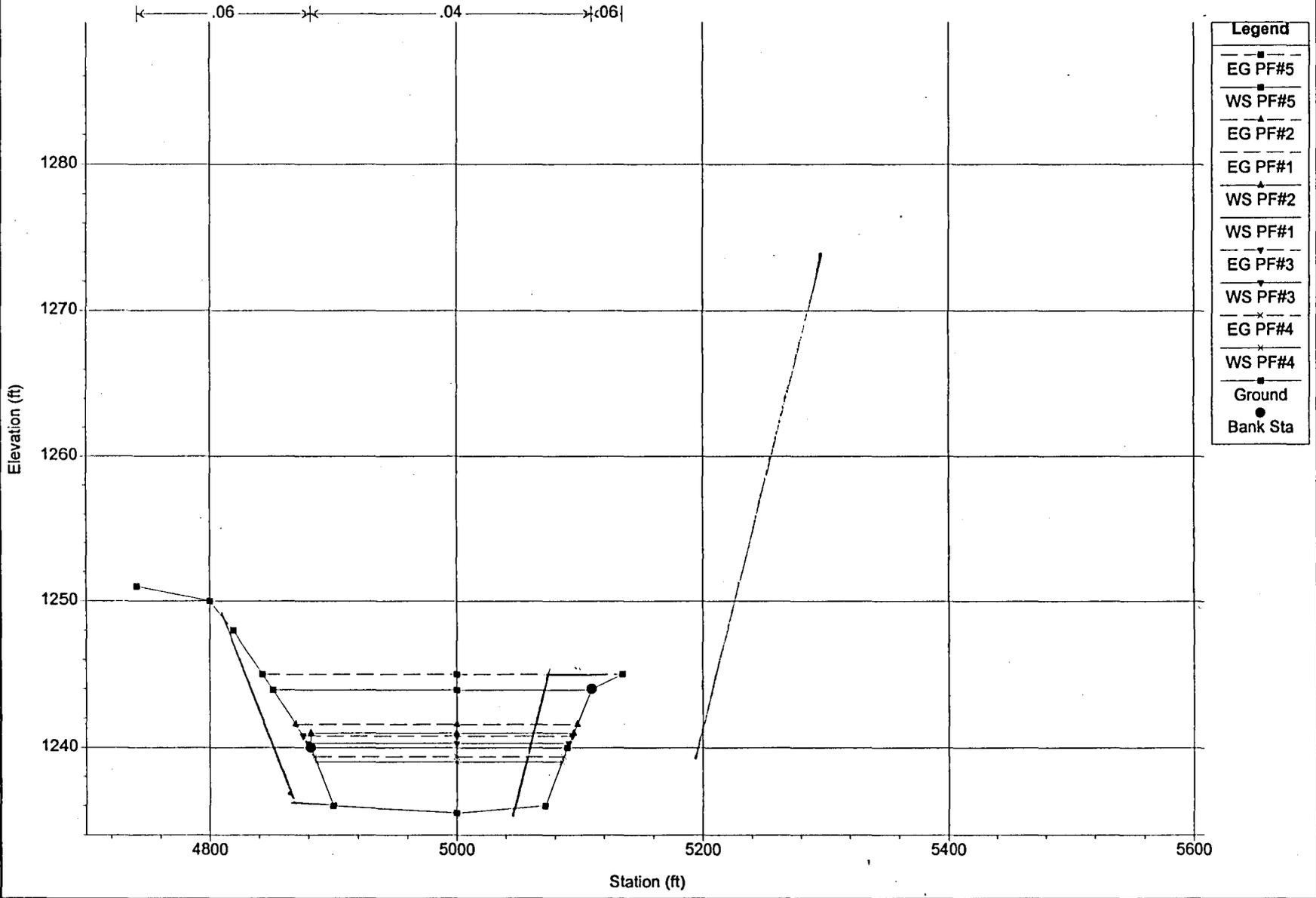
Elevation (ft)

Station (ft)

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

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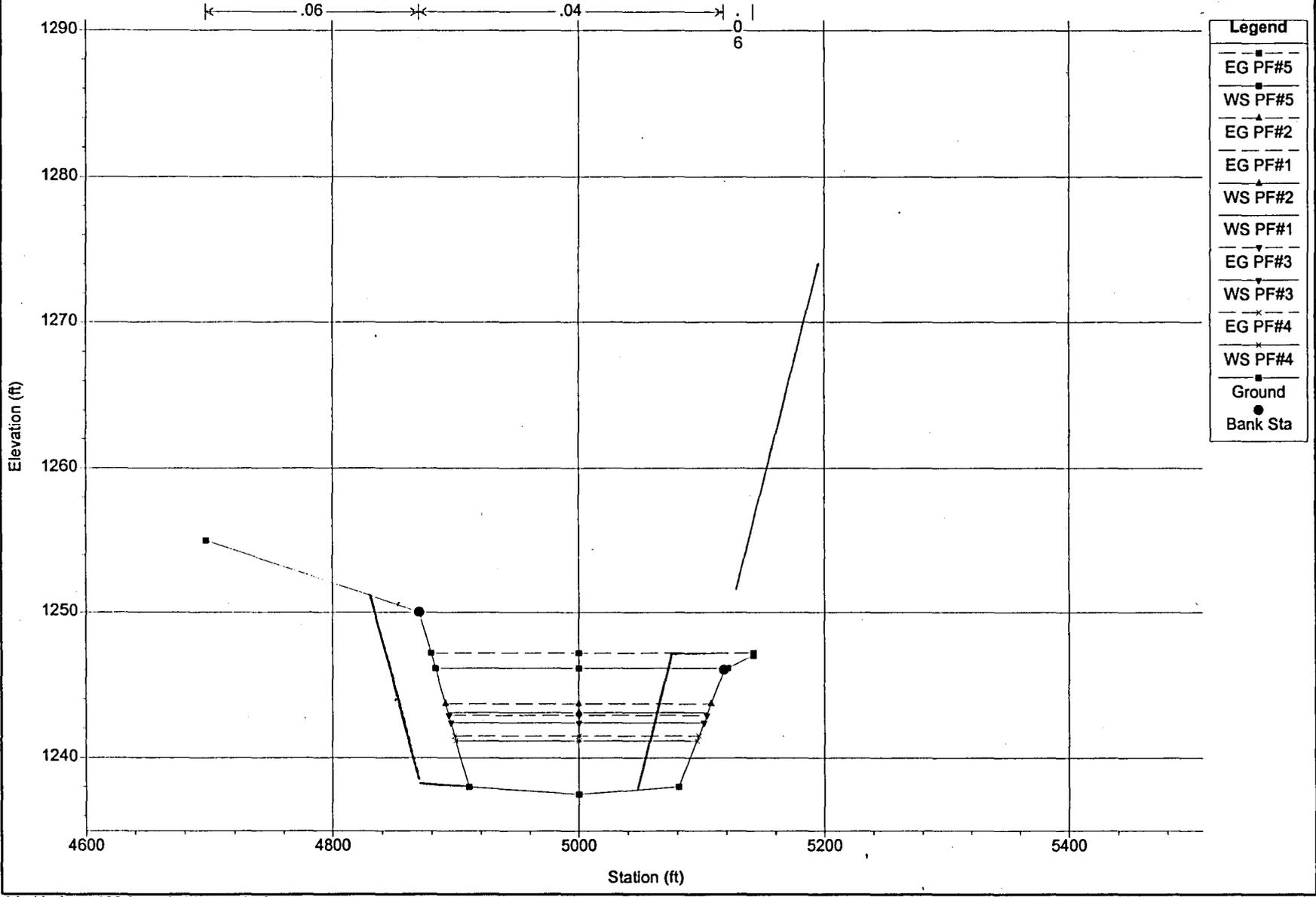
RS = 1.479 Standard Project Flood



1 in Horiz. = 120 ft 1 in Vert. = 10 ft

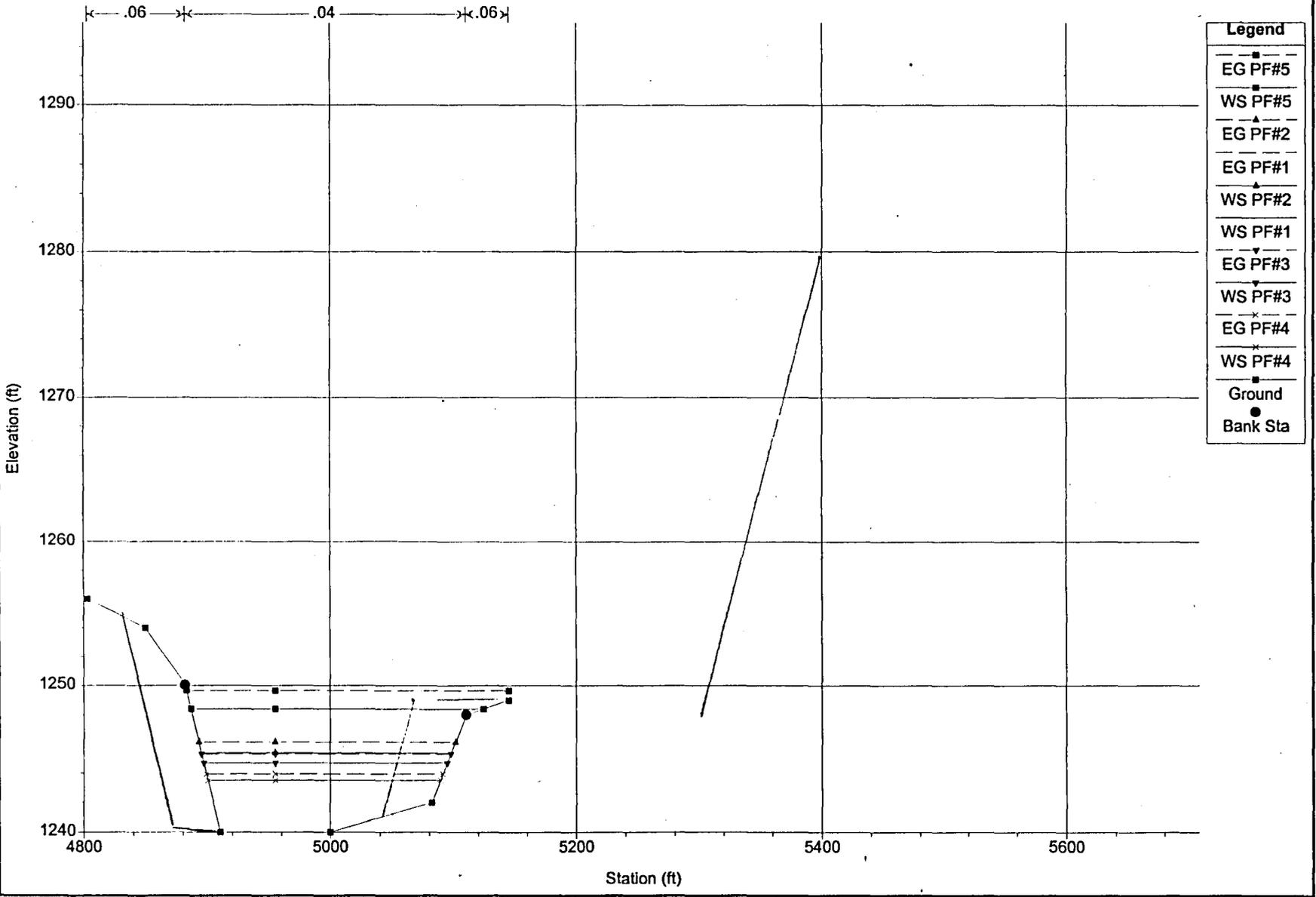
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RS = 1.593 Standard Project Flood



1 in Horiz. = 120 ft 1 in Vert. = 10 ft

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 RS = 1.708 Standard Project Flood

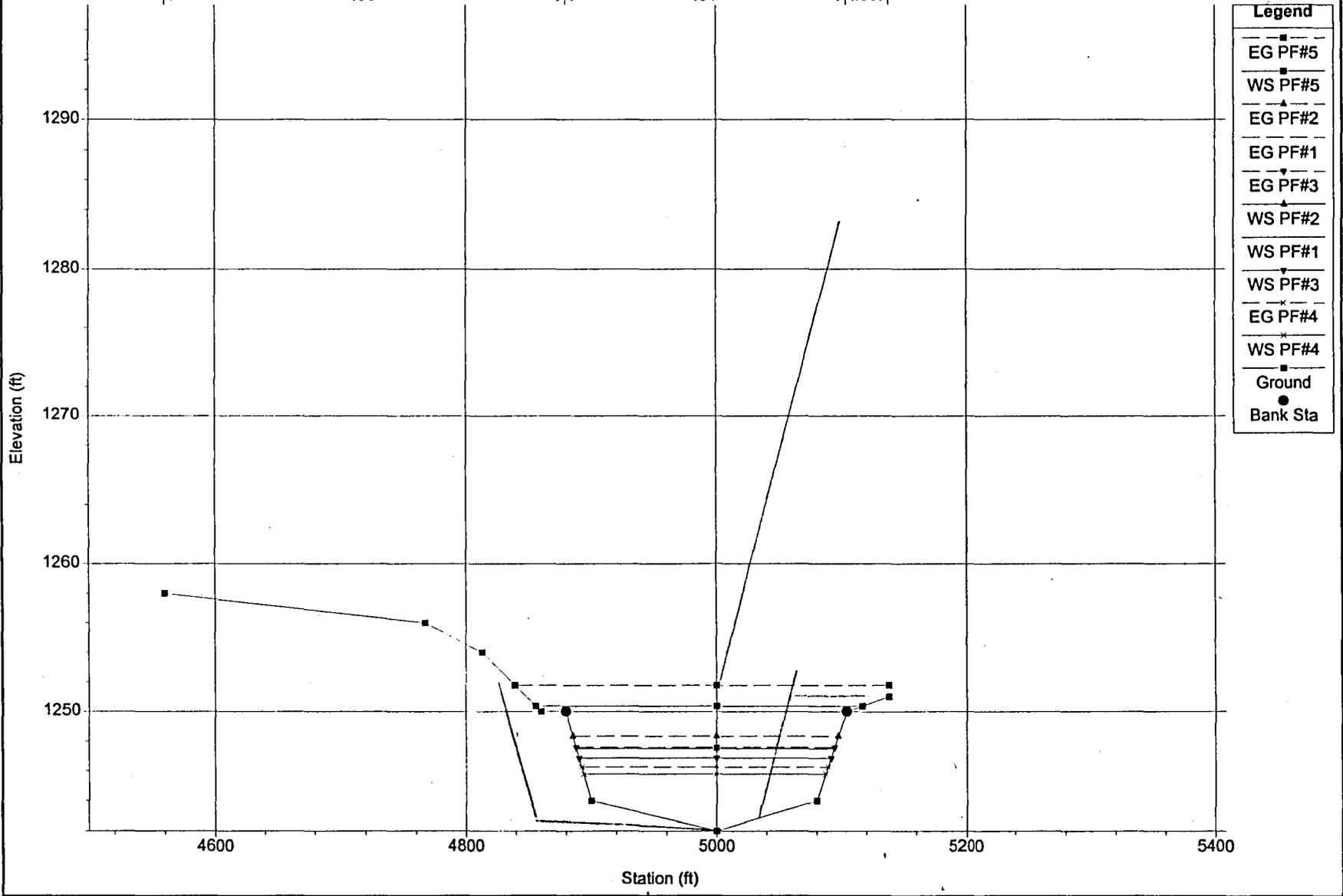


1 in Horiz. = 120 ft 1 in Vert. = 10 ft

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RS = 1.788 Standard Project Flood

← .06 → ← .04 → ← .06 →

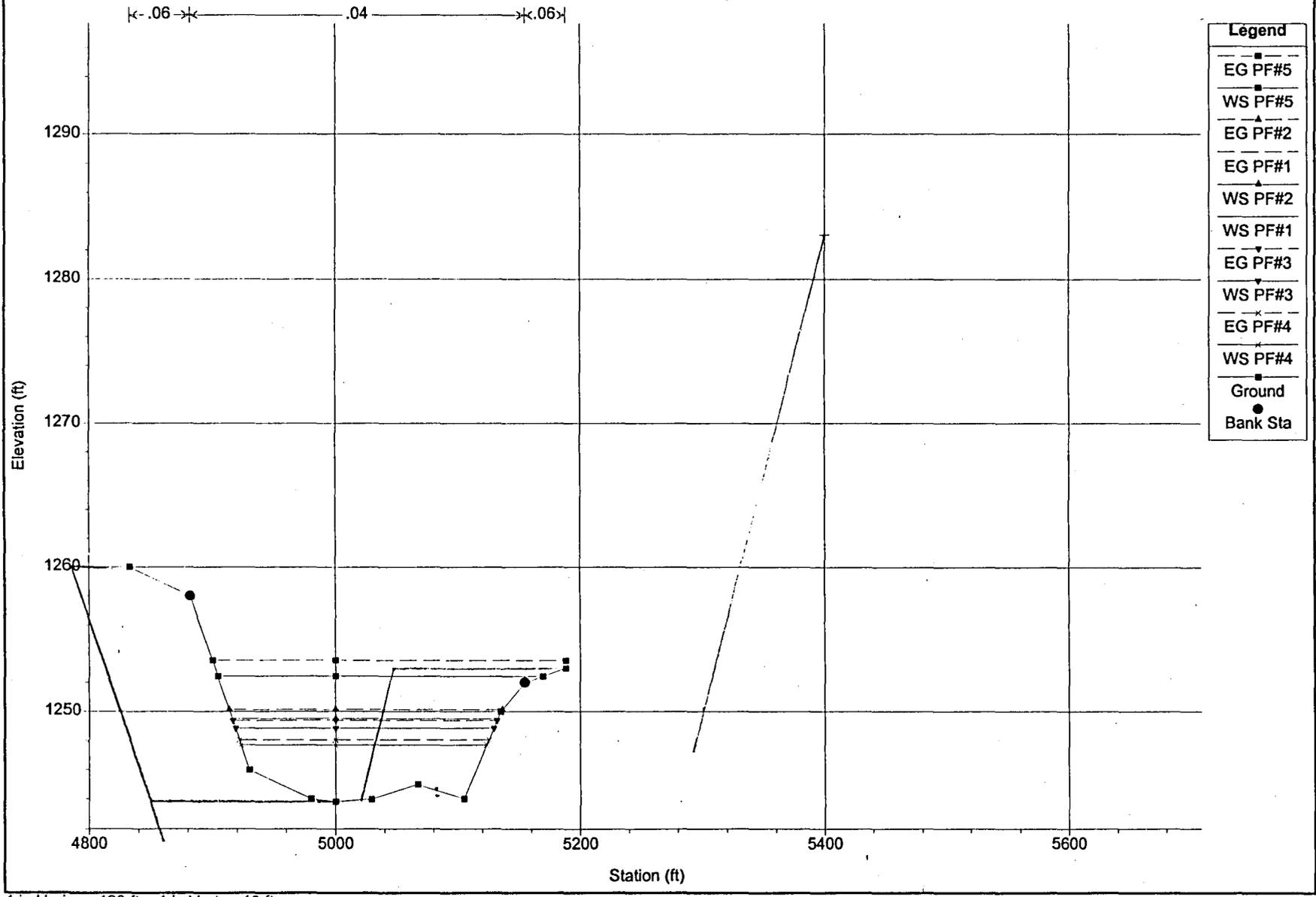


| Legend | |
|--------|----------|
| —■— | EG PF#5 |
| —■— | WS PF#5 |
| —▲— | EG PF#2 |
| —▼— | EG PF#1 |
| —▲— | EG PF#3 |
| —▲— | WS PF#2 |
| —▼— | WS PF#1 |
| —■— | WS PF#3 |
| —x— | EG PF#4 |
| —x— | WS PF#4 |
| —■— | Ground |
| ● | Bank Sta |

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

McMicken Outlet FEMA Delineation Imported Plan 01 12/18/98 2:45:27 PM

RS = 1.858 Standard Project Flood



← .06 → .04 → .06 ←

Elevation (ft)

Station (ft)

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

HY8 OUTPUT AND
CHANNEL HYDRAULICS

CURRENT DATE: 10-28-1998
CURRENT TIME: 11:18:26

FILE DATE: 10-28-1998
FILE NAME: DEERVAL

PERFORMANCE CURVE FOR CULVERT 1 - 4(8.00 (ft) BY 6.00 (ft)) RCB

| DIS-CHARGE FLOW (cfs) | HEAD- WATER ELEV. (ft) | INLET CONTROL DEPTH (ft) | OUTLET CONTROL DEPTH (ft) | FLOW TYPE <F4> | NORMAL DEPTH (ft) | CRIT. DEPTH (ft) | OUTLET DEPTH (ft) | TW DEPTH (ft) | OUTLET VEL. (fps) | TW VEL. (fps) |
|-----------------------|------------------------|--------------------------|---------------------------|----------------|-------------------|------------------|-------------------|---------------|-------------------|---------------|
| 0.00 | 1252.30 | 0.00 | 5.05 | 0-NF | 0.00 | 0.00 | 0.00 | 5.30 | 0.00 | 0.00 |
| 161.60 | 1252.34 | 1.58 | 5.09 | 3-M1t | 1.08 | 0.93 | 5.30 | 5.30 | 0.95 | 0.00 |
| 323.20 | 1252.42 | 2.50 | 5.17 | 3-M1t | 1.73 | 1.47 | 5.30 | 5.30 | 1.91 | 0.00 |
| 484.80 | 1252.56 | 3.25 | 5.31 | 3-M1t | 2.30 | 1.93 | 5.30 | 5.30 | 2.86 | 0.00 |
| 646.40 | 1252.76 | 3.90 | 5.51 | 3-M1t | 2.82 | 2.34 | 5.30 | 5.30 | 3.81 | 0.00 |
| 808.00 | 1253.07 | 4.52 | 5.82 | 3-M1t | 3.32 | 2.71 | 5.30 | 5.30 | 4.76 | 0.00 |
| 969.60 | 1253.30 | 5.13 | 6.05 | 3-M1t | 3.79 | 3.06 | 5.30 | 5.30 | 5.72 | 0.00 |
| 1131.20 | 1253.65 | 5.73 | 6.40 | 3-M1t | 4.26 | 3.39 | 5.30 | 5.30 | 6.67 | 0.00 |
| 1239.00 | 1253.91 | 6.14 | 6.66 | 3-M1t | 4.57 | 3.61 | 5.30 | 5.30 | 7.31 | 0.00 |
| 1454.40 | 1254.49 | 6.99 | 7.24 | 3-M1t | 5.17 | 4.01 | 5.30 | 5.30 | 8.58 | 0.00 |
| 1616.00 | 1254.95 | 7.67 | 7.70 | 3-M2t | 6.00 | 4.30 | 5.30 | 5.30 | 9.53 | 0.00 |

Depth = 6.17'

El. inlet face invert 1247.25 ft El. outlet invert 1247.00 ft
 El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****
 INLET STATION 0.00 ft
 INLET ELEVATION 1247.25 ft
 OUTLET STATION 150.00 ft
 OUTLET ELEVATION 1247.00 ft
 NUMBER OF BARRELS 4
 SLOPE (V/H) 0.0017
 CULVERT LENGTH ALONG SLOPE 150.00 ft

***** CULVERT DATA SUMMARY *****
 BARREL SHAPE BOX
 BARREL SPAN 8.00 ft
 BARREL RISE 6.00 ft
 BARREL MATERIAL CONCRETE
 BARREL MANNING'S n 0.012
 INLET TYPE CONVENTIONAL
 INLET EDGE AND WALL SQUARE EDGE (0 DEG. FLARE)
 INLET DEPRESSION NONE

Deer Valley Channel, Existing Cond., Q50
Worksheet for Irregular Channel

| Project Description | |
|---------------------|-------------------------------|
| Project File | untitled.fm2 |
| Worksheet | Deer Valley Channel, Existing |
| Flow Element | Irregular Channel |
| Method | Manning's Formula |
| Solve For | Water Elevation |

| Input Data | | | | |
|--|----------------|---------------|-------------|-----------|
| Channel Slope | 0.005400 ft/ft | | | |
| Elevation range: 1,247.20 ft to 1,259.40 ft. | | | | |
| Station (ft) | Elevation (ft) | Start Station | End Station | Roughness |
| 100.00 | 1,259.40 | 100.00 | 224.00 | 0.045 |
| 214.00 | 1,258.40 | 224.00 | 270.00 | 0.025 |
| 224.00 | 1,256.80 | 270.00 | 345.00 | 0.045 |
| 236.00 | 1,247.50 | | | |
| 246.00 | 1,247.40 | | | |
| 257.00 | 1,247.20 | | | |
| 270.00 | 1,252.20 | | | |
| 283.00 | 1,253.40 | | | |
| 303.00 | 1,253.80 | | | |
| 332.00 | 1,253.90 | | | |
| 345.00 | 1,254.50 | | | |
| Discharge | 1,239.00 | cfs | | |

| Results | |
|---------------------------|------------------------|
| Wtd. Mannings Coefficient | 0.025 |
| Water Surface Elevation | 1,251.75 ft |
| Flow Area | 130.34 ft ² |
| Wetted Perimeter | 40.59 ft |
| Top Width | 38.30 ft |
| Height | 4.55 ft |
| Critical Depth | 1,251.51 ft |
| Critical Slope | 0.006633 ft/ft |
| Velocity | 9.51 ft/s |
| Velocity Head | 1.40 ft |
| Specific Energy | 1,253.15 ft |
| Froude Number | 0.91 |
| Flow is subcritical. | |

Roadside Ditch, Alt 1 and 2
Worksheet for Triangular Channel

| Project Description | |
|---------------------|---|
| Project File | I:\projects\mc-carlelmerberd\deervall.fm2 |
| Worksheet | Roadside Ditch- Alt 1 and 2 |
| Flow Element | Triangular Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | |
|----------------------|-----------------|
| Mannings Coefficient | 0.025 |
| Channel Slope | 0.005200 ft/ft |
| Left Side Slope | 6.000000 H : V |
| Right Side Slope | 10.000000 H : V |
| Discharge | 15.00 cfs |

| Results | | |
|----------------------|----------|-----------------|
| Depth | 0.87 | ft |
| Flow Area | 6.11 | ft ² |
| Wetted Perimeter | 14.10 | ft |
| Top Width | 13.98 | ft |
| Critical Depth | 0.74 | ft |
| Critical Slope | 0.012839 | ft/ft |
| Velocity | 2.45 | ft/s |
| Velocity Head | 0.09 | ft |
| Specific Energy | 0.97 | ft |
| Froude Number | 0.65 | |
| Flow is subcritical. | | |

APPENDIX F

FIELD REVIEW SUMMARY REPORT

Field Review Minutes

Candidate Assessment Report El Mirage Road Beardsley Road to Loop 303

PB Project Number 11101C 04

September 3, 1998

Attendees:

| Name | Agency | Phone |
|----------------|----------------------|----------|
| Mike Smith | MCDOT | 506-8622 |
| Chris Plumb | MCDOT | 506-4176 |
| Ray Smith | MCDOT | 506-2901 |
| Nicolaas Swart | MCDOT | 506-0599 |
| Chris Banks | MCFCD | 506-4746 |
| Alan Humphrey | Parsons Brinckerhoff | 966-8295 |
| Howard Olien | Parsons Brinckerhoff | 966-8295 |
| Greg Heinz | Parsons Brinckerhoff | 966-8295 |
| Frank Medina | Parsons Brinckerhoff | 966-8295 |
| Jay Koesters | Parsons Brinckerhoff | 966-8295 |

Mike Smith opened with introductions of all present. A general review occurred regarding the elements of the project. The Sun City Home Owners Association has requested that El Mirage Road be widened from the existing 2-lane roadway section and extended north of Deer Valley Drive to Loop 303. The cost estimate shall include the construction cost to widen the existing roadway north of Beardsley Road and to construct a new roadway north of Deer Valley Drive to both a 4-lane and 6-lane roadway section with a median or continuous left turn lane. The existing channel east of El Mirage Road between Beardsley Road and Deer Valley Drive must be mitigated if impacted. The new roadway north of Deer Valley Drive will be constructed in the flood plain and needs to cross both the Deer Valley Drive channel and the McMicken Dam outlet channel. The alignment of the new roadway section should provide the most cost effective crossing of these channels. This segment of roadway is not currently classified in the County Transportation System Plan, but should be considered as a Primary Roadway and has a future functional classification of an Urban Principal Arterial. The 6-lane roadway section will utilize the Urban Principal Arterial Road section as shown in figure 5.6 of the Maricopa County Department of Transportation (MCDOT) *Roadway Design Manual*. The 4-lane roadway section will utilize the Urban Minor Arterial Road section as shown in figure 5.8 of the MCDOT *Roadway Design Manual* or it may utilize a modified 6-lane roadway section. The 4-lane section could use a 19.8m (65') typical section half-width to accommodate the 6-lane section. The 4-lane section could be evaluated to accommodate the future transition from the 4-lane section to the 6-lane section, this may include a recommendation to construct the outside four lanes of the 6-lane section.

The anticipated design speed will be 97kmph (60mph) and the posted speed limit will be 81kmph (50mph) as defined in the MCDOT *Roadway Design Manual* for an Urban Principal Arterial with level terrain. The existing roadway will be adjusted if required to accommodate the new design speed.

The proposed improvements at the new Deer Valley Drive and El Mirage Road "T" intersection may include signalization, realigning of the existing Deer Valley Drive roadway to provide the most efficient Deer Valley Drive channel crossing and to improve the sight distance of the existing curve. Additionally, the Deer Valley Drive roadway may require widening to provide a left turn lane from eastbound Deer Valley Drive to northbound El Mirage Road.

No other access to El Mirage Road between Beardsley Road and Loop 303 is anticipated.

Existing El Mirage Road from Beardsley Road to Deer Valley Drive has curb and gutter on the west side of the roadway. The east side of the roadway has no curb, gutter or sidewalk. A one-way crown sloping from west to east provides the necessary pavement drainage. A large existing drainage channel parallels the east side of El Mirage Road from Beardsley Road to Deer Valley Drive. The channel conveys runoff from the McMicken Dam outlet channel to the Agua Fria River. The proposed roadway widening is expected to encroach on the existing channel. The channel will have to be moved farther east to maintain a channel cross-section equivalent to the existing condition. The proposed roadway drainage can easily be conveyed to the channel for conveyance to the river.

The existing channel along the east side of El Mirage Road begins at Deer Valley Drive. North of Deer Valley Drive, the McMicken Dam outlet channel is unimproved. The proposed extension of El Mirage Road must cross the McMicken Dam outlet channel between Deer Valley Drive and the Loop 303 alignment. Two possible crossing sites have been selected for further study. The first is at the intersection of Deer Valley Road and El Mirage Drive. This crossing is complicated by several factors:

- A high degree of skew would be required at this location, lengthening the proposed bridge.
- Minimizing the skew angle required for the bridge causes design difficulties at the intersection of Deer Valley Drive and El Mirage Road.
- A large drainage channel parallels the north side of Deer Valley Drive. Intersection improvements and bridge abutments would have to be designed to accommodate the channel.

A second crossing is proposed just south of the Loop 303 alignment. The McMicken Dam outlet channel has a naturally occurring "S" curve approximately 230m (750') south and 410m (1350') west of the intersection of the El Mirage Road Alignment and the Loop 303 alignment. The sharp angle of the curve presents a suitable location to cross

the wash at nearly right angles. Field examination of the crossing site shows a relatively narrow, shallow wash. The soils visible along the wash banks are highly cementitious. The degree of cementation visible is nearly equal to that of man-made soil cement. The cementation has allowed the wash to retain its sharp curve shape over time.

The existing wash configuration was formed by the erosion of veins of comparatively softer materials within the streambed. The wash overbanks indicate evidence that this reach of wash overflows on occasion. The width, and therefore the capacity, of the wash has been limited by the cementitious soils along the banks. It is doubtful that this reach of the wash is capable of conveying 50-year design flows without overflowing.

Runoff from the proposed roadway could be collected in a roadside ditch and conveyed south to the drainage channel parallel to the north side of Bell Road. The proposed roadway widening will increase runoff from the right-of-way. Providing a collection system will reduce the impact to the adjoining properties and facilitate the development of these properties. The existing roadway will not be suitable for the proposed improvements due to the one-way cross slope, the existing curb, gutter and sidewalk will be utilized for the proposed improvements.