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Maricopa County
Department of
Transportation
Planning Division

EL MIRAGE ROAD
BELL ROAD TO BEARDSLEY ROAD

PROJECT NO. ~~C-99-0766-16-17~~

#68993

FINAL

CANDIDATE ASSESSMENT REPORT

JANUARY 1999

Registered Professional Engineer (Civil)
CERTIFICATE NO.
24991
JAY J.
KOESTERS
1-24-99
Date Signed
ARIZONA, U.S.A.

Prepared By:

PARSONS BRINCKERHOFF
100 YEARS

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FINAL
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FOR

EL MIRAGE ROAD

PROJECT NO. C-99-0786-16-17

SEC. 25, 26, 35 & 36, T.4N., R.1W G&SRB&M

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION PLANNING DIVISION

January, 1999

Project Name: El Mirage Road

Project Termini: Bell Road to Beardsley Road

Requested by: Sun City Home Owners Association

Improvement Requested: Reconstruct a 2-lane roadway with drainage improvements.

PM_{10} Area: Yes **Length:** *3.219* Kilometers (2.00 Miles)

Summary Cost Estimated: $6,821,150

EXECUTIVE SUMMARY

The purpose of the El Mirage Road – Bell Road to Beardsley Road 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 the existing 2-lane roadway section. Both 4-lane and 6-lane roadway sections were considered. The alternatives meet MCDOT standards for a modified major urban arterial. The project includes a drainage evaluation and a traffic study of the El Mirage Road - Bell Road and the El Mirage Road – Beardsley Road intersections.

The El Mirage Road - Bell Road intersection is currently signalized. This intersection would need to be widened to accommodate a 6-lane improved El Mirage road. A 4-lane improvement would only require restriping at the Bell road intersection. The El Mirage Road - Beardsley Road intersection is stop sign controlled, with stop signs on all three approaches. Traffic projections indicate a need to widen El Mirage Road, signalize the intersection and add turn lanes at the intersection.

The concepts developed for the study include two alternatives, Alternative A and B, for the widening of El Mirage Road. 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. 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 from Station 3+700 to 4+400. Corresponding excavation on the east side of the wash is required to maintain the hydraulic capacity of the wash. 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 Bell Road and Beardsley Road. Improvements include adding a traffic signal at the Beardsley Road intersection, storm drain, realignment of the McMicken Dam Outlet Wash to eliminate the need for hard bank, building sufficient embankment for the future 6-lane roadway in the Outlet Wash and extension of the box culvert south of Beardsley Road. 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.

The estimated cost of the recommended alternative is $6,821,150, which includes $4,665,288 for construction, $559,835 for design, $699,793 for construction management, $274,400 for right-of-way, $25,000 for utility relocation, $37,000 for 404 mitigation and $559,835 for administration. See the Cost Estimate Section of this report for the assumptions used in developing the construction cost estimate.

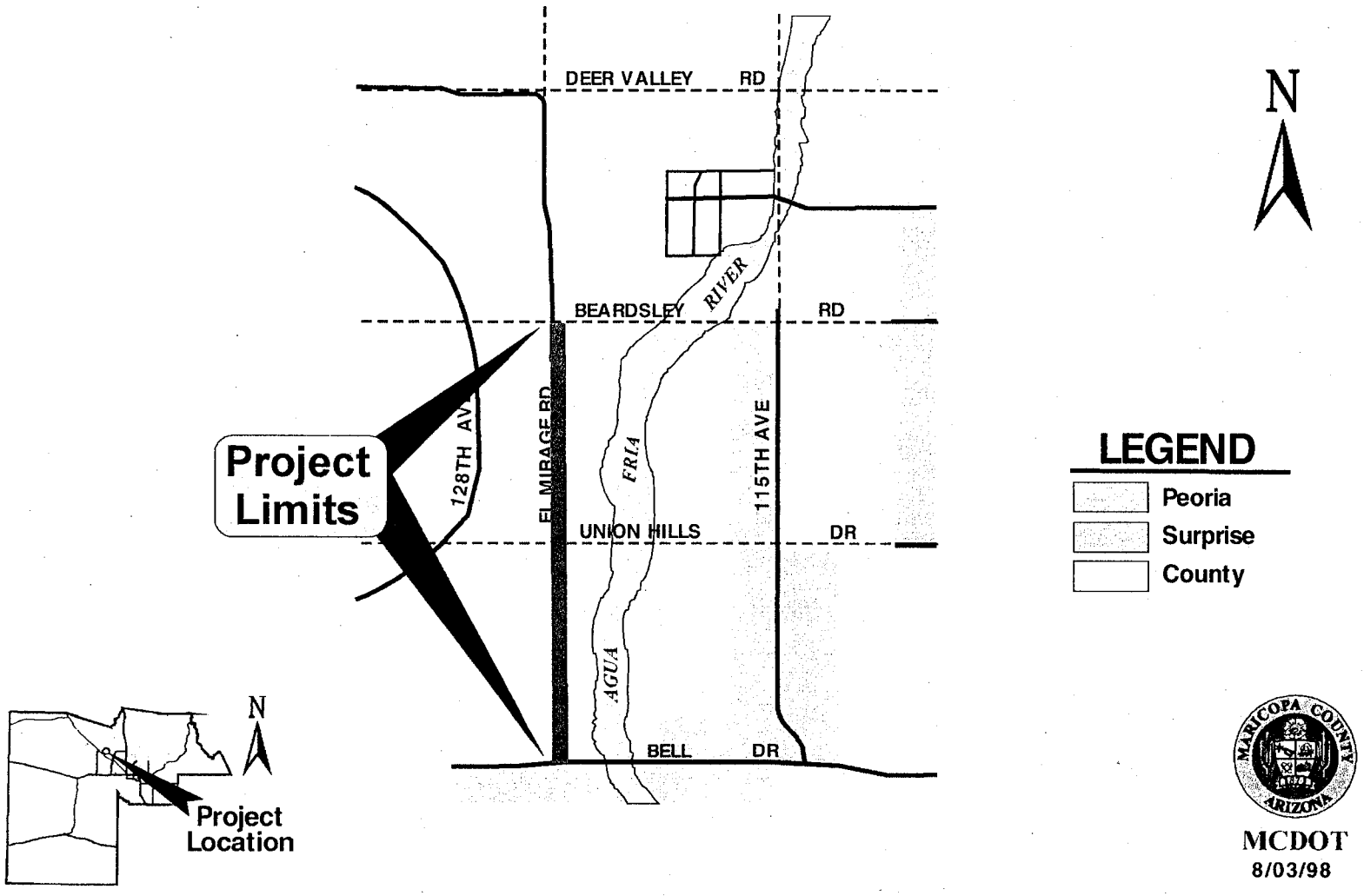
A field meeting was held at the project site. Results of the field meeting have been summarized and are included in the Appendix.

PROJECT BACKGROUND INFORMATION

Project Name:
El Mirage Road from Bell Road to Beardsley Road (See next page for Vicinity Map)

General Description and Location of the Project Area:
El Mirage Road from Bell Road to Beardsley Road 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 and the Cities of Peoria and Surprise. Maps following the vicinity map

CANDIDATE ASSESSMENT PROJECT
BELL ROAD TO BEARDSLEY RD



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SURPRISE
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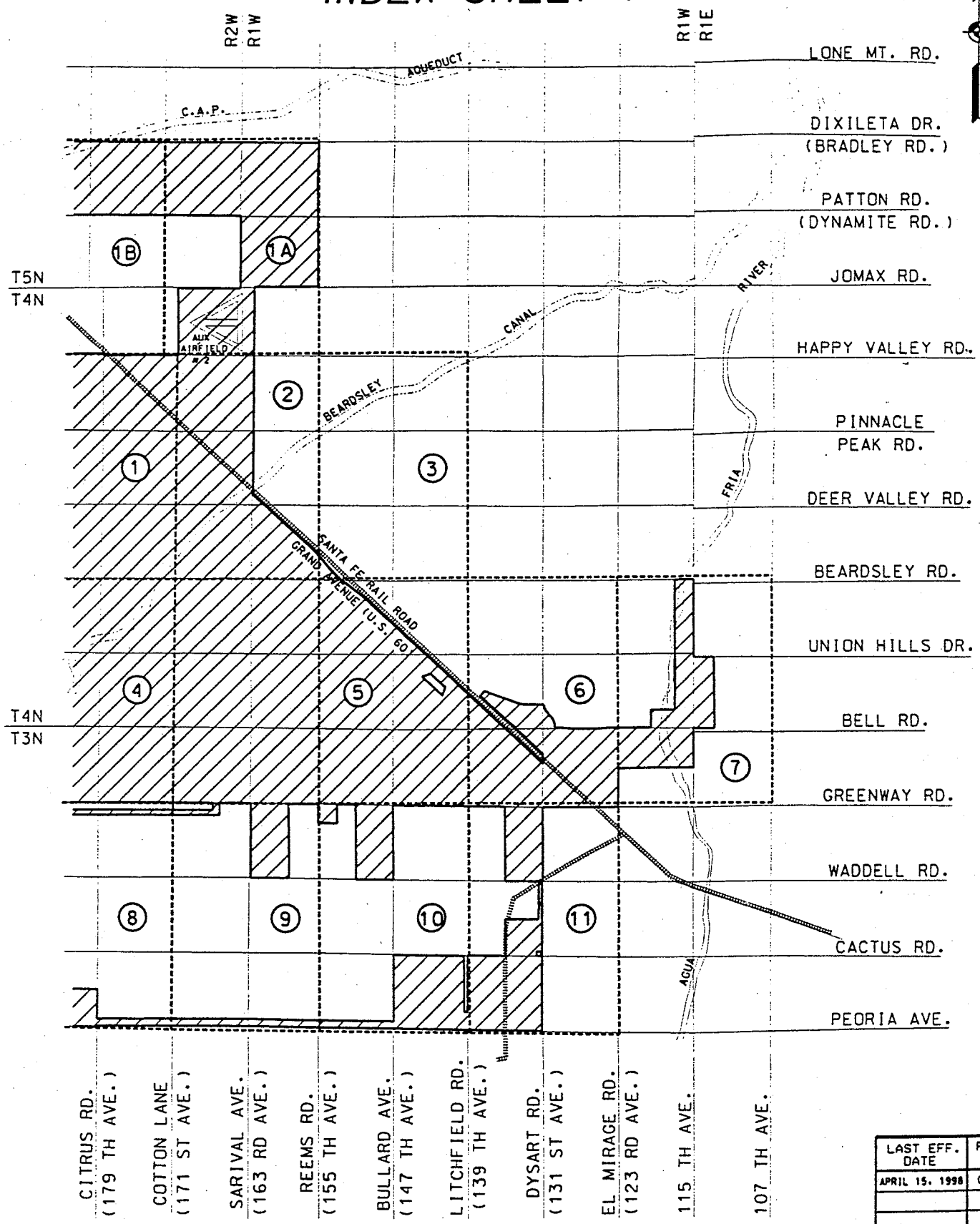

LAST EFF. DATE	REV BY
APRIL 15, 1998	C.L.

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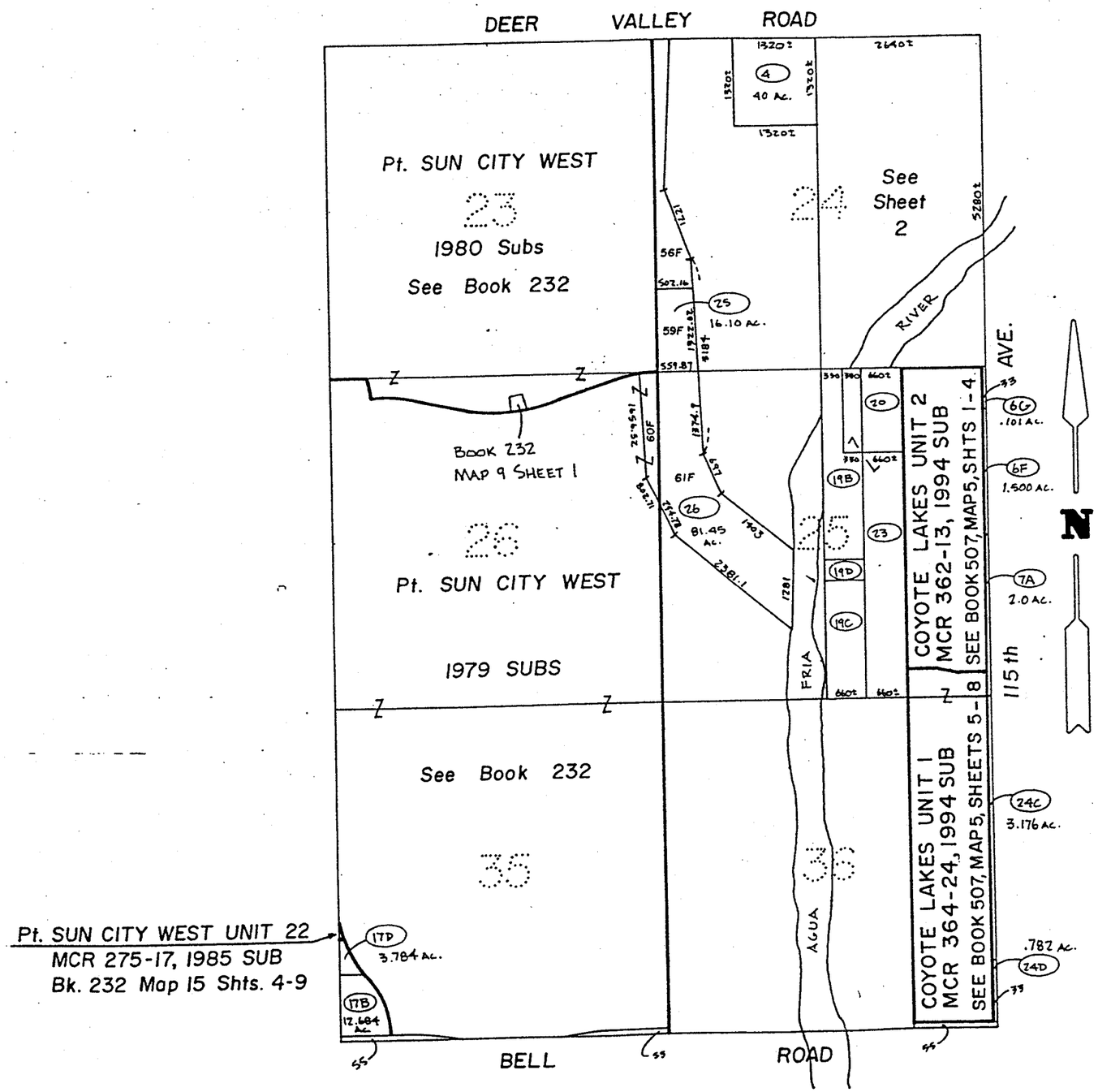
▨ - INCORPORATED AREA

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

Book 503
Map 67
Sheet 1 of 2



MARICOPA COUNTY ASSESSORS OFFICE					
SCALE 1" = 2,000'					
REVISIONS:					
Date	Was	To	Reason	Entd	Check
3/19/90	-0-	25,26	89-475019	JWC 2920	N.D. 2072
11/5/92	MAP REDRAWN			RHP 2648	—
11/5/92	6C, 6B, 6E, I,	6F, 6G, 7A	MCR 354-50	RHP 2648	—
↑	24A,B	24C, 24D 93 SUB	↑	↑	—
8/30/93	SHEET	NUMBER	CHANGE	R.C. 3123	
11/6/93	SHEET	NUMBER	CHANGE	R.C. 3123	
11/8/93	93SUB	94SUB	MCR 364-24	R.C. 3123	

show assessor parcel numbers and City of Surprise incorporated areas. The entire project resides within Maricopa County. Sun City West, a retirement community, is currently the major traffic generator along El Mirage Road from Bell Road to Beardsley Road. Future residential development north of Deer Valley Drive (1.7 kilometers (1 mile) north of the project) has the potential to add a significant amount of traffic to the study area. The future intersection of the extension of El Mirage Road north and the proposed Loop 303 is initially planned as an at-grade intersection, with a future grade separated traffic interchange ultimately planned. 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 Bell Road to Beardsley Road was paved in June, 1984 with 50mm (2 inches) of asphaltic concrete on a 200mm (8 inches) aggregate base course. The last improvement was a 50mm (2 inches) rubberized overlay applied in November 1997. Pavement corings taken in November 1998 indicate pavement thicknesses of 150mm (6 inches) to 200mm (8 inches) and an aggregate base course of 150mm (6 inches) to 300mm (12 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 92 and a SUFFICIENCY rating of 74.

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 of El Mirage Road with Bell and Beardsley Roads. The existing roadway primarily serves the community of Sun City West. The road parallels Sun City West, with a major drainage channel to the east. The posted speed limit is 50 Miles Per Hour (MPH). The speed limit is reduced to 45 and finally 35 MPH at the southbound approach to Bell Road. Advisory speeds for curves are 40 MPH. The terrain is level. The only cross streets are Bell Road and Beardsley Road. The intersection with Beardsley is stop sign controlled, with stop signs on all 3 approaches. The intersection of El Mirage Road and Bell Road is signalized. El Mirage Road continues north for 1.6 km (1 mile), then turns west to become Deer Valley Drive.

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 planing to develop 9,000 units. Since these subdivisions are in the initial stages of development, their impact is <u>not</u> considered in the analysis conducted for this report. There is only one developed parcel east of the road at this time.

Traffic Information and Analysis:

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

Existing Counts

On	*Location*	*At*	*1998*	*1997*	*1995*	*1994*
El Mirage Road	South Leg	Bell Road	2719			
El Mirage Road	North Leg	Bell Road	7807	9836	8372	3976
El Mirage Road	South Leg	Beardsley Road	7765			
El Mirage Road	North Leg	Beardsley Road	3110	3787	3196	3692
Bell Road	East Leg	El Mirage Road	35740			
Bell Road	West Leg	El Mirage Road	29768	31455		
Beardsley Road	West Leg	El Mirage Road	5074	5239		

TRA also conducted turning movement counts at the intersections of El Mirage Road with Bell Road and Beardsley Road. These counts were also taken in September 1998, 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. 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

On	*Location*	*At*	*2020*	*2010*	*2001*
El Mirage Road	North Leg	Bell Road	16112	12392	10561
El Mirage Road	North Leg	Beardsley Road	26438	4702	3110
Bell Road	East Leg	El Mirage Road	48014	53510	44971
Bell Road	West Leg	El Mirage Road	44201	40225	39477
Beardsley Road	West Leg	El Mirage Road	22231	9489	9620

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)

On	*Location*	*At*	*Motorcycles*	*Cars*	*RVs*	*Buses*	*SU Trucks*	*TT Trucks*
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. The peak hour volume was provided by MCDOT from their annual counts. K factors were between 9 and 10 percent. The K factor is the ratio of the peak hour traffic to the ADT. 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 the 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 shown in the Appendix, and the results shown in the following table:

Level of Service: No Build Alternative

On	*Location*	*At*	*2020*	*2010*	*2001*	*1998*
El Mirage Road	North Leg	Bell Road	E	E	D	C
Volume/Capacity Ratio (V/C)			1.99	1.56	1.30	0.96

The LOS becomes unacceptable in 2001. 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

On	*Location*	*At*	*2020*	*2010*	*2001*	*1998*
El Mirage Road	North Leg	Bell Road	A	A	A	A
Volume/Capacity Ratio (V/C)			0.12	0.10	0.09	0.08

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

On	*Location*	*At*	*2020*	*2010*	*2001*	*1996*
El Mirage Road	North Leg	Bell Road	A	A	A	A
Volume/Capacity Ratio (V/C)			0.06	0.05	0.04	0.04

Intersection level of service was evaluated using the unsignalized intersection module of HCS.

Unsignalized Intersection Level of Service: No Build Alternative

Intersection	*2020*	*2010*	*2001*	*1998*
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 was then evaluated with El Mirage Road improved to a 4-lane minor arterial. Left turn bays were added on both El Mirage Road and Beardsley Road. A right turn lane was added for the southbound to westbound movement.

Unsignalized Intersection Level of Service: 4-Lane Alternative

Intersection	*2020*	*2010*	*2001*	*1998*
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

Intersection	*2020*	*2010*	*2001*
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 reevaluated with the 4-lane El Mirage Road:

Signalized Intersection Capacity Analysis: 4-Lane Alternative

Intersection	*2020*
El Mirage Road/Beardsley Road (AM/PM)	Under/Under
Volume/Capacity Ratio (V/C)	0.58/0.67

The signalized intersection performs adequately with the 4-lane improvements.

The intersection of El Mirage Road and Bell Road was also evaluated, first for the no-build condition:

Signalized Intersection Capacity Analysis: No Build Alternative

Intersection	*2020*	*2010*	*2001*	*1998*
El Mirage Road/Bell Road (AM/PM)	Under/Near	Under/ Under	Under/Under	Under/Under
Volume/Capacity Ratio (V/C)	0.79/0.85	0.72/0.78	0.50/0.56	0.39/0.44

The movements operating near capacity are the left turn lanes on Bell road. Since improving Bell road is outside the scope of this report, the 4-lane alternative retained the same lane configuration and was not evaluated. The 6-lane alternative will require widening to accommodate the additional lanes. The 20-year forecast was reevaluated with El Mirage Road as a 6-lane minor arterial:

Signalized Intersection Capacity Analysis: 6-Lane Alternative

Intersection	*2020*
El Mirage Road/Bell Road (AM/PM)	Under/Near
Volume/Capacity Ratio (V/C)	0.79/0.85

The signalized intersection is still operating near capacity. Improvements to Bell road and El Mirage road south of Bell road must be made to keep this intersection at an acceptable level of service in the year 2020.

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

Incident	*Accidents*	*Severity*	*Accidents*	*Light*	*Accidents*
Right Angle	0	No Injury	2	Daylight	3
Left Turning	0	Injury - Unknown	0	Darkness	2
Rear End	2	Possible Injury	1	Dawn	0
Side Swipe	1	Non - Incapacitating	2	Dusk	0
Single Vehicle	1	Incapacitating	0		
Other	2	Fatal	0		
Total	6	**Total**	5	**Total**	5

This comes out to an average of 2 accidents per year. Only 2 of the 6 accidents were 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 included in the Appendix.

Conclusions and Recommendations:

The recommended alternative is Alternative A, 4-lane configuration. Widening El Mirage Road to 4 lanes results in an acceptable level of service into the year 2020 and beyond. The north leg of the El Mirage Road - Bell Road intersection will not be widened. The lane configuration will remain the same. The pavement will taper to the widened section north of Bell Road. The El Mirage Road - Beardsley Road intersection will require signalization. El Mirage Road at the Beardsley Road intersection will be widened to two through lanes and one dedicated left turn lane west onto Beardsley Road. A dedicated right turn lane will be added for southbound El Mirage road. The four-lane roadway will transition back to the existing two-lane roadway north of Beardsley Road.

Construction Traffic Management Evaluation and Recommendation:

The only establishment requiring access to El Mirage Road between Bell Road and Beardsley Road is the existing commercial property located on the east side of El Mirage Road, 750m (2,480 feet) north of Bell Road. Access will be required during all phases of construction. With the exception of the existing commercial property, all land east of the site is undeveloped State Land or the McMicken Dam Outlet Wash which is owned by the Maricopa County Flood Control District. Land along the McMicken Dam Outlet Wash was purchased to prevent development within the floodway. Sun City West, which is fully developed, is west of El Mirage Road. There are no access points to El Mirage Road from Sun City West between Bell Road and Beardsley Road. 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 future development, Lakeview, will require access to El Mirage Road north of the proposed Loop 303.

The recommended 4-lane roadway between Bell Road and Beardsley Road would be constructed by maintaining traffic on the existing roadway while two northbound lanes are constructed. Traffic would be shifted to the new northbound roadway to construct improvements to the existing roadway to accommodate the southbound traffic. Beardsley Road - El Mirage Road intersection improvements will be installed by reducing lane widths and shifting traffic during construction.

Widening of the roadway will be accomplished by building embankment in the McMicken Dam Outlet 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.

DESIGN CRITERIA

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

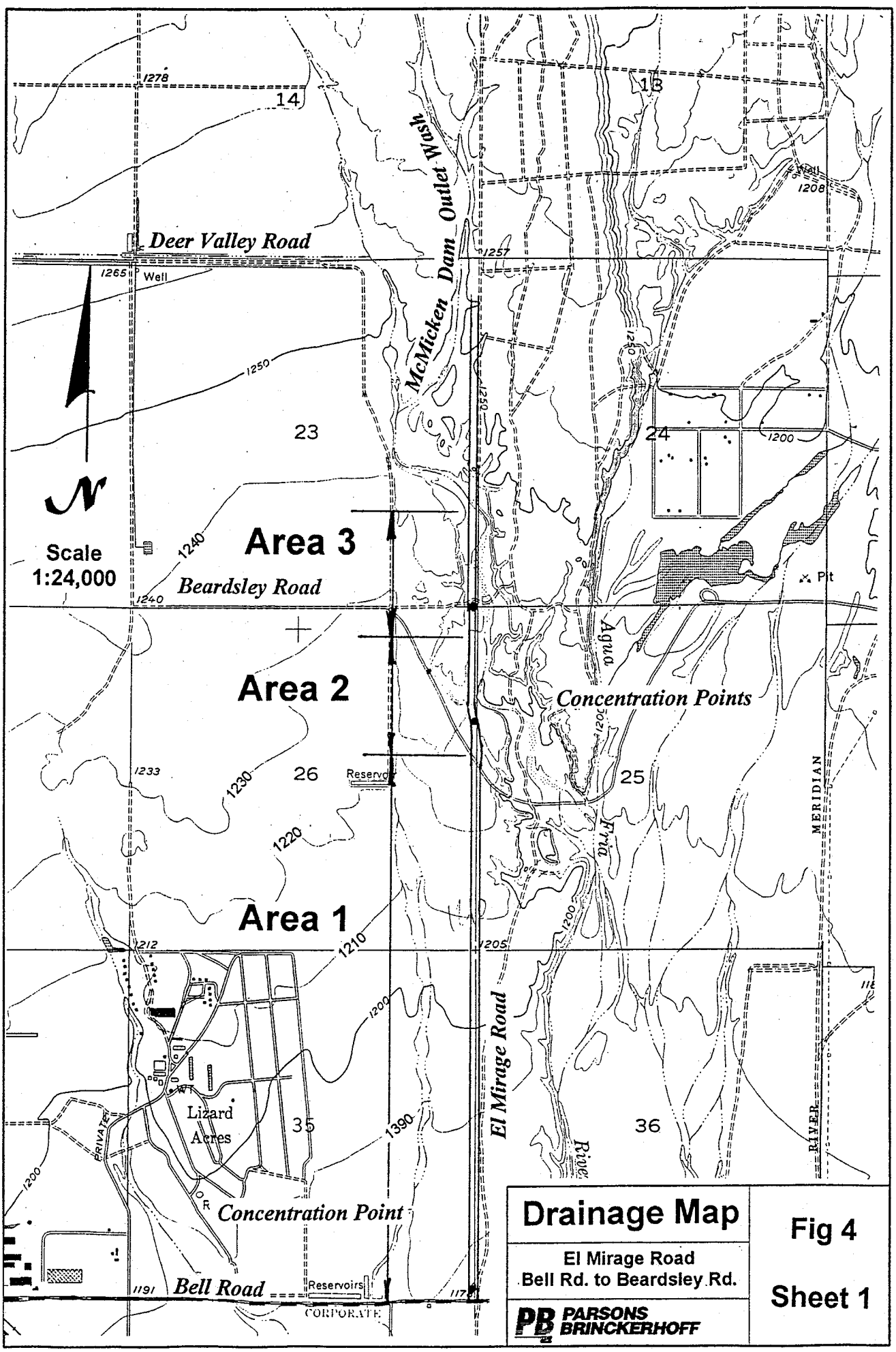
Maximum longitudinal grade	5.00%
Minimum longitudinal grade	0.25%
Minimum K-factors for vertical curves	20-yr
Curb and gutter types	MCDOT 2030, MAG 220 type A
Curb return radii	10.5m (35ft)
Tapers	L=WS W=offset, S=design speed, L=Taper length
Traffic Signals	Required
Pavement markings	Required
Signing plans	Required
Guardrails	Not Required
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:

El Mirage Road is constructed along the top of a wide, flat ridge from Bell Road to 760 meters (2,500 feet) south of the Beardsley Road intersection. The existing pavement on El Mirage Road between Bell 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 east. A block privacy wall borders the right-of-way immediately west of the site. The wall is the east perimeter wall for Sun City West. The wall provides a continuous barrier for surface runoff. A box culvert from Sun City West crosses El Mirage Road 320 meters (1,050 feet) south of Beardsley Road. The culvert conveys runoff from the subdivision to the McMicken Dam Outlet Wash. Figure 4, Sheet 1 shows the topography of the area before the construction of Sun City West.

Roadway runoff generated in the vicinity of the McMicken Dam Outlet Wash currently drains directly to the wash. Roadway runoff generated south of Station 3+550 drains south along the east edge of the pavement. The runoff discharges to an existing drainage channel which parallels the north side of Bell Road. El Mirage Road crosses the channel via a 7 barrel box culvert. It is assumed that the Bell Road Channel has sufficient capacity to convey the flows generated in the existing condition without overtopping. It is further assumed that the channel has sufficient capacity downstream from El Mirage Road to convey the increased flows generated by the widening of El Mirage Road.


Deer Valley Road
Beardsley Road
Bell Road
El Mirage Road
McMicken Dam Outlet Wash
Agua Fria River
Concentration Points
Concentration Point
Area 1
Area 2
Area 3
Scale
1:24,000
Lizard Acres
Reservoirs
Reservoir
Well
Pit
MERIDIAN
CORPORATE
PRIVATE
14
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Drainage Map
El Mirage Road
Bell Rd. to Beardsley Rd.
PARSONS BRINCKERHOFF
Fig 4
Sheet 1

The McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Deer Valley Drive to a point 410 meters (1,350 feet) south of Beardsley Road. At this point, the wash makes a ninety-degree turn to the east, toward the Agua Fria River. The wash is easily distinguishable in the design alternate sheets, located in the Appendix. Existing concrete hardbank helps keep the ninety-degree bend from washing out. A portion of the hardbank is adjacent to the roadway. 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 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.

Hydrology

Off-Site

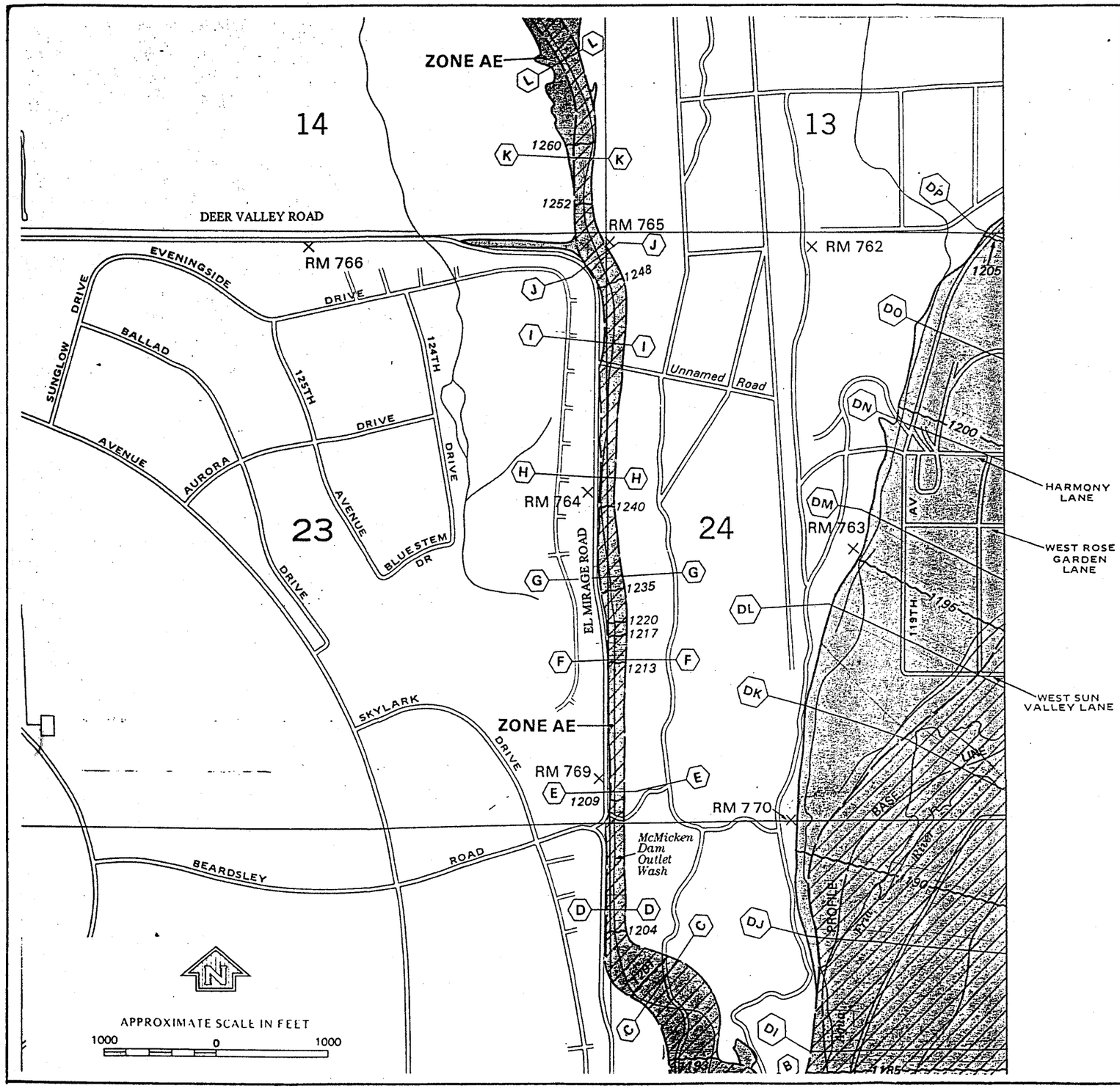
The hydrology/hydraulics of the McMicken Dam Outlet Wash have been quantified in the 1987 Wittman Area Drainage Master Study. The delineation of the floodplain is based on this study. The Flood Control District has made hydrologic and hydraulic models from the study available for use in the preparation of this report.

On-Site

The project site is divided into three distinct drainage areas. The drainage areas are delineated on Figure 4, Sheet 1.

Area 1 comprises the majority of the site. It encompasses the El Mirage right-of-way from Bell Road to Station 3+550, approximately 610 meters (2,000 feet) south of the Beardsley Road intersection. In the existing condition, the drainage outfall for Area 1 is the Bell Road Channel. The area will continue to discharge to the same location in the proposed condition.

Area 2 is the superelevated section of El Mirage Road from Station 3+550 to the Beardsley Road intersection at Station 4+190. This roadway reach is adjacent to the McMicken Dam Outlet Wash. Runoff will be diverted to the Outlet Wash.



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.

513 — Base Flood Elevation Line; Elevation in Feet*

D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7 × — 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

PB PARSONS BRINCKERHOFF

Fig 4

Sheet 2

APPENDIX A

TYPICAL SECTIONS

Area 3 is the Beardsley Road intersection. The existing intersection is depressed below the adjacent ground to the west. Vertical curves drop the existing roadway profile rapidly in the vicinity of the intersection. Existing Beardsley Road slopes steeply toward El Mirage Road from the west. The existing horizontal curves do not meet roadway design criteria. It is anticipated that the intersection will be filled to nearly eliminate the sag. The extent of the vertical realignment will be determined in final design. Runoff from the intersection will be collected and discharged into the wash.

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	
Surface	***C***
Pavement	0.95
West Shoulder	0.70
East Shoulder	0.70
Median	0.70

Times of concentration are based on Equation 3.2:

$$Tc=11.4L^{0.5}Kb^{0.52}S^{-0.31}i^{-0.38}$$

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

On-Site Drainage Design: Bell Road to Beardsley Road

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. Two additional 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 an additional lane and a raised median to the southbound lanes and an additional lane to the northbound lanes.

For budgetary purposes, it is assumed that storm drain inlets will be required at 375m (1,200-foot) intervals. Calculations included in the Appendix indicate that this spacing is adequate to meet the required criteria of maintaining a 3.7m (12-foot) dry lane of pavement during peak flow from the 10-year storm. Storm drain systems are shown on the design alternate sheets in the Appendix.

Area 1

Drainage to be collected by the proposed storm drain. Inlets will be located in the median and the roadside ditch on the east side. Curb and gutter will be installed adjacent to the median on the northbound lanes. Runoff from the southbound lanes and the median will be collected in the median. Runoff from the northbound lanes will be collected in the ditch on the east side of the roadway.

Area 2

This reach is along the McMicken Dam Outlet Wash. The proposed roadway embankment will be constructed in the wash. The embankment is to be wide enough to accommodate the ultimate 6-lane section. In this reach, the northbound outside lanes will be constructed with curb and gutter. Future widening of the northbound lanes will be into the median. A short storm drain is required from Station 3+550 to 3+750 to convey runoff north to the Outlet Wash. The storm drain is shown on the design alternate sheets. The existing low point at Station 3+880 will be drained by installing inlets into the existing box culvert. The box culvert will be extended under the proposed roadway prism to be constructed in the Outlet Wash.

Area 3

Adding the northbound lanes creates a barrier between the median and the McMicken Dam Outlet Wash. An inlet and storm drain are required to drain the intersection. Runoff from the southbound lanes, the median and Beardsley Road will be collected in inlets located in the median and the east gutter and discharged to the wash.

McMicken Dam Outlet Wash at Beardsley Road:

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 toe of fill lines are based on the width of the ultimate 6-lane roadway prism. 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. Hardbank is anticipated in the realigned wash at the ninety-degree bend.

Box Culvert Extensions:
Widening of the roadway requires the extension of the culvert 310 meters (1,015 feet) south of the Beardsley Road intersection. It is a 3 barrel, 1.042 m by 2.44 m (5 feet by 8 feet) box. The culvert conveys flows from Sun City West to the McMicken Damn Outlet Channel Wash. The box is to be extended approximately 22 meters (72 feet) east. Existing erosion protection at the outlet will be replaced as part of the extension.

A second box culvert at the intersection of Bell Road and El Mirage Road needs to be extended during construction of the ultimate 6-lane configuration. Extension of the culvert will not be required for the recommended 4-lane alternative. The culvert conveys the Bell Road Channel under El Mirage Road along the north side of Bell Road. The existing culvert is 7 barrel, 1.042 m by 1.875 m (5 feet by 9 feet) box. The sides of the channel are lined with gunite. The existing culvert will be extended 14 meters (46 feet) to the east. The channel wall at the discharge point will be realigned and re-armored with gunite.

LAND USE

The project site is in an unincorporated portion of Maricopa County. Between Bell Road and Beardsley Road, the land west of the project is 100% developed with residential dwellings (Sun City West). The land adjacent to the project to the east is mostly undeveloped State Land from Bell Road to Station 3+550. The only existing development east of the site is an existing commercial building at Station 1+700. The building appears to be occupying State Land. Current parcel maps and inquiries with the State Land Department indicate the parcel is owned by the State.

North of Station 3+550, the land east of the site is in the McMicken Dam Outlet Wash. The wash is owned by the Flood Control District to prevent development in the floodplain. 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.

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. A second development north of Loop 303, Lakeview, is expected to generate 9,000 residential units at build-out.

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.

El Mirage Road- Bell Road to Beardsley Road

Right-of-way Areas (SM)

Owner	Parcel Number	Alternative A (4-Lane)	Alternative A (6-Lane)	Alternative B (4-Lane)	Alternative B (6-Lane)
FCDMC 61F	503-67-26	2,035	2,035	2,091	2,091
FCDMC 60F	503-67-26	4,107	4,107	4,150	4,150
FCDMC 60F	232-5-820	10,821	10,821	10,936	10,936
State Land	--	57,077	57,544	57,833	58,300
Total		**74,040**	**74,507**	**75,010**	**75,477**

Right-of-way Areas (Ac)

Owner	Parcel Number	Alternative A (4-Lane)	Alternative A (6-Lane)	Alternative B (4-Lane)	Alternative B (6-Lane)
FCDMC 60F	503-67-26	0.50	0.50	0.52	0.52
FCDMC 61F	503-67-26	1.01	1.01	1.03	1.03
FCDMC 60F	232-5-820	2.67	2.67	2.70	2.70
State Land	--	14.10	14.22	14.29	14.41
Total		**18.30**	**18.41**	**18.54**	**18.65**

RIGHT-OF-WAY

This existing right-of-way width is 15.2m (50 feet).

The proposed right-of-way is 38.7m (127 feet) between Bell Road and Sta 3+550. The proposed right-of-way is 35.7m (117 feet) from Sta 3+550 to Beardsley Road (41.2m (4 feet) behind the back of the east curb in the 6-lane configuration).

No Temporary Construction Easements (TCE) are anticipated.

ENVIRONMENTAL INFORMATION

The environmental overview was provided by MCDOT.

- This two mile stretch of road is a two-lane minor collector road with a six lane intersection on the on the north side of Bell Road. The land use in this unincorporated part of Maricopa County is light commercial with the Del Web Development of Sun City West bordering the west side of El Mirage Road. A large drainage ditch on the north side of the Bell Road/El Mirage intersection conveys runoff to the Agua Fria River approximately one-quarter mile east of the traffic interchange. A fruit stand is located on the northeast corner of the El

- Mirage/Bell Road intersection. Several other commercial businesses are located along the east side of the roadway.

- While desert scrub habitat exists in the area, native vegetation is limited with no evidence of riparian habitat or wetlands. There are no known threatened and endangered species identified as likely to occur in the project area. No landfill or hazardous waste sites were observed or known to be in the area. Hazardous materials were not observed in the project area.

- While the project is in a disturbed area, a cultural resources survey will need to be included in the environmental clearance process. At the north end of the project near Beardsley Road, any additional right of way to the east would encroach on the McMicken drainage channel and a Section 404 Water Quality Permit may be necessary for any channel realignment, bank stabilization, or other activities within these waters of the US.

The following is provided by Parsons Brinckerhoff:

- Although not part of this project, 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 widening of El Mirage Road. 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.

- 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 4.2 hectares (10.2 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. Mitigation costs are included in the cost estimates.

GEO-TECHNICAL 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.

Alternative A, 4-Lane (Recommended Alternative):
Improve El Mirage Road between Bell Road and Beardsley Road to a modified 4-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include a new 4.3m (14-foot) lane, a new 3.6m (12-foot) lane and a 1.5m (5-foot) bike lane for northbound travel. The existing pavement is to remain in place and be used to the extent possible for two 3.6m (12-foot) southbound lanes and 1.5m (5-foot) a bike lane and an inside shoulder. The unpaved 7.0m (23-foot) median is to be graded to form a ditch for drainage conveyance. Curb will be installed at the inside edge of pavement northbound. The bike lane of the northbound lanes is widened to 2m (6.5 feet) and curb and gutter are added to the outside edge of pavement in sections 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).

Two sections of the existing pavement will require reconstruction due to geometric deficiencies. The reverse curves located between Stations 3+550 and 3+880 require superelevation where current conditions only provide an adverse crown. The vertical curves near the Beardsley Road intersection do not meet stopping sight distance criteria. Realigning El Mirage Road vertically to meet design standards will also require a portion of Beardsley Road to be reconstructed. It is

anticipated that the intersection will be filled to nearly eliminate the sag. The extent of the vertical realignment will be determined in final design.

The north leg of the El Mirage Road - Bell Road intersection will not be widened. The lane configuration will remain the same. The pavement will taper to the widened section north of Bell Road. The El Mirage Road - Beardsley Road intersection will require signalization. El Mirage Road at the Beardsley Road intersection will be widened to two through lanes and one dedicated left turn lane west onto Beardsley Road. A dedicated right turn lane will be added for southbound El Mirage road. The four-lane roadway will transition back to the existing two lane roadway north of Beardsley Road.

An existing privacy wall borders the R/W immediately west of El Mirage Road. The wall is about 3.6m (12 feet) from the edge of the existing roadway. 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 Beardsley Road to a point 410m (1,350 feet) south of the Beardsley Road intersection. 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 north of Beardsley Road.

On-site drainage will be collected from a roadside ditch and the median. A storm drain will convey runoff generated south of Station 3+550 to the channel paralleling the north side of Bell Road. Runoff generated north of Station 3+550 will be collected from the median and gutter and discharged to the McMicken Dam Outlet Wash. A short storm drain is required between Station 3+550 to 3+750 to convey runoff north to the Outlet Wash. Inlets and discharge pipes will drain the Beardsley Road intersection to the wash.

Advantages include the low cost, utilization of the existing pavement, the minimal drainage improvements required, 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.

Alternative A, 6-lane:
Improve El Mirage Road between Bell Road and Beardsley Road to a modified 6-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two new 3.6m (12-foot) lanes, a new 4.3m (14-foot) lane and a 1.8m (6-foot) bike lane for northbound travel. The existing pavement is to remain in place and be used to the extent possible for two 3.6m (12-foot) lanes, a 4.3m (14-foot) lane and a 1.5m (5-foot) bike lane in the southbound direction. A 4.3m (14-foot) raised median separates the northbound and southbound traffic. Curb will be installed at both edges of the northbound pavement, and the inside edge of

the southbound 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).

Two sections of the existing pavement will require reconstruction due to geometric deficiencies. The reverse curves located between Stations 3+550 and 3+880 require superelevation where current conditions only provide an adverse crown. The vertical curves near the Beardsley Road intersection do not meet stopping sight distance criteria. Realigning El Mirage Road vertically to meet design standards will also require a portion of Beardsley Road to be reconstructed. It is anticipated that the intersection will be filled to nearly eliminate the sag. The extent of the vertical realignment will be determined in final design.

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 a raised median over the continuous left turn lane. The costs associated with the recommendation include curb and gutter, and median landscape or median caps for the raised median option versus the pavement for the continuous left turn lane option.

The north leg of the El Mirage Road - Bell Road intersection will be widened. The proposed six lane section will not have matching sections south of Bell Road, therefore, the outside lane of the intersection will become a right turn drop lane, while the departure lanes will be added at the intersection. The right lane will be dropped before reaching Bell Road, leaving 2 lanes at the intersection. The northeast signal pole will need to be relocated to accommodate the widening. A dedicated right turn lane will be added for westbound Bell Road to northbound El Mirage Road.

The El Mirage Road - Beardsley Road intersection will require signalization. El Mirage Road at the Beardsley Road intersection will be widened to three through lanes and one dedicated left turn lane west onto Beardsley Road. A dedicated right turn lane will be added for southbound El Mirage road. The six-lane roadway is shown transitioning back to the four-lane roadway north of Beardsley Road.

Drainage improvements match those discussed in Alternative A, 4-lane configuration with the exception of the inlet locations and the intersection at Bell Road. Under the 6-lane configuration, inlets will be located in the gutters rather than in ditches and the median. Intersection improvements at Bell Road require widening El Mirage Road over the box culvert at Bell Road. This alternative proposes to add a dedicated right turn lane at Bell Road, westbound. As seen on the design alternate sheets, the right turn lane will encroach the Bell Road Channel downstream from the box culvert. The channel requires realignment to accommodate the extension of the culvert and the addition of the turn lane.

Advantages include the utilization of the existing pavement, the minimal drainage improvements required, 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.

Alternative B, 4-Lane:

Improve El Mirage Road between Bell Road and Beardsley Road to a modified 4-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include a new 3.6m (12-foot) lane, a new 4.3m (14-foot) lane and a 1.5m (5-foot) inside shoulder and a 1.8m (6-foot) bike lane for both northbound and southbound travel. The existing pavement is to be removed and replaced. The unpaved 9.8m (32-foot) median is to be graded to form a ditch for drainage conveyance. Curb and gutter will be installed at the outside edges of the 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 north leg of the El Mirage Road - Bell Road intersection will not be widened. The lane configuration will remain the same. The pavement will taper to the widened section north of Bell Road. The El Mirage Road - Beardsley Road intersection will require signalization. El Mirage Road at the Beardsley Road intersection will be widened to two through lanes and one dedicated left turn lane west onto Beardsley Road. A dedicated right turn lane will be added for southbound El Mirage road. The four-lane roadway will transition back to the existing two-lane roadway north of Beardsley Road.

The vertical curves near the Beardsley Road intersection do not meet stopping sight distance criteria. Realigning El Mirage Road vertically to meet design standards will also require a portion of Beardsley Road to be reconstructed. It is anticipated that the intersection will be filled to nearly eliminate the sag. The extent of the vertical realignment will be determined in final design.

An existing privacy wall borders the R/W immediately west of El Mirage Road. Proposed curb and gutter along the west side of the road provide a barrier between the wall and southbound traffic.

McMicken Dam Outlet Wash parallels the east side of El Mirage Road from Beardsley Road to a point 410m (1,350 feet) south of the Beardsley Road intersection. 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 north of Beardsley Road.

On-site drainage will be collected from the gutters. A storm drain will convey runoff generated south of Station 3+550 to the channel paralleling the north side of Bell Road. Runoff generated north of Station 3+550 will be collected from the median and gutter and discharged to the McMicken Dam Outlet Wash. A short storm drain is required between Station 3+550 to 3+750

to convey runoff north to the Outlet Wash. Inlets and discharge pipes will drain the Beardsley Road intersection to the wash.

Advantages include normal crown for the southbound traffic and barrier curb placed on the edges of pavement for added safety, minimal drainage improvements required, ease of future widening and minimal traffic maintenance during construction.

Disadvantages include the high cost of tearing out existing pavement in order to install a normal crown.

Alternative B, 6-lane:
Improve El Mirage Road between Bell Road and Beardsley Road to a modified 6-lane urban principal arterial in accordance with MCDOT Roadway Design Manual. The typical section will include two new 3.6m (12-foot) lanes, a new 4.3m (14-foot) lane a 1.8m (6-foot) bike lane for both northbound and southbound travel. The existing pavement is to be removed and replaced. A raised, unpaved 4.3m (14-foot) median is to be provided. Curb and gutter will be installed at the outside edges of the 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).

A raised median is recommended versus a continuous left turn lane for several reasons, including: limited access points along the project, 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 a raised median over the continuous left turn lane. The costs associated with the recommendation include curb and gutter, and median landscape or median caps for the raised median option versus the pavement for the continuous left turn lane option.

The north leg of the El Mirage Road - Bell Road intersection will be widened. The proposed six lane section will not have matching sections south of Bell Road, therefore, the outside lane of the intersection will become a right turn drop lane, while the departure lanes will be added at the intersection. The right lane will be dropped before reaching Bell Road, leaving 2 lanes at the intersection. The northeast signal pole will need to be relocated to accommodate the widening. A dedicated right turn lane will be added for westbound Bell Road to northbound El Mirage Road.

The El Mirage Road - Beardsley Road intersection will require signalization. El Mirage Road at the Beardsley Road intersection will be widened to three through lanes and one dedicated left turn lane west onto Beardsley Road. A dedicated right turn lane will be added for southbound El Mirage road. The six-lane roadway is shown transitioning back to the four-lane roadway north of Beardsley Road.

The vertical curves near the Beardsley Road intersection do not meet stopping sight distance criteria. Realigning El Mirage Road vertically to meet design standards will also require a portion of Beardsley Road to be reconstructed. It is anticipated that the intersection will be filled

to nearly eliminate the sag. The extent of the vertical realignment will be determined in final design.

Drainage improvements match those discussed in Alternative B, 4-lane configuration with the exception of the inlet locations and the intersection at Bell Road. Under the 6-lane configuration, inlets will be located in the gutters rather than in ditches and the median. Intersection improvements at Bell Road require widening the roadway over the box culvert at Bell Road. This alternative proposes to add a dedicated right turn lane at Bell Road, westbound. As seen on the design alternate sheets, the right turn lane will encroach the Bell Road Channel downstream from the box culvert. The channel requires realignment to accommodate the extension of the culvert and the addition of the turn lane

Advantages include, the minimal drainage improvements required, ease of future widening and minimal traffic maintenance during construction.

Disadvantages include the high cost of tearing out existing pavement in order to install a normal crown.

UTILITY INFORMATION

No overhead utilities exist at this time. There is an existing sewer line paralleling the east edge of the existing pavement of El Mirage Road from Bell Road to past 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.

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 Bell Road to Beardsley Road is $37,066 per hectare ($15,000 per acre).
3. Right-of-way must be purchased from the Flood Control District at $37,066 per hectare ($15,000 per acre).
4. Right-of-way width along the McMicken Dam Outlet Wash is limited to 1.2m (4 feet) behind the east curb of the ultimate 6-lane cross section.
5. Excavation limits on the east side of McMicken Dam Outlet Wash do not exceed the boundaries of flood control property.
6. Construction of roadway prism in McMicken Dam Outlet Wash to be full width to accommodate ultimate 6-lane configuration (both alternatives).

7. Construction of box culverts to be full width to accommodate ultimate 6-lane configuration (all alternatives). Bell Road culvert to be widened at ultimate build-out. Culvert near Beardsley Road to be widened at construction of recommended 4-lane alternative.
8. Drainage excavation to include compaction for construction of roadway prism. The MAG Standard Specification has to be modified to include compaction.
9. Earthwork calculations assume 15% shrink for borrow obtained by drainage excavation.
10. Borrow excavation is calculated by subtracting the amount of fill generated by drainage excavation. Borrow excavation quantity shown anticipates 70,000 cubic meters of waste drainage excavation from the proposed channel realignment north of Deer Valley Drive.
11. 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.
12. Not all existing pavement of El Mirage Road is salvageable. Sections of the existing roadway will be removed to correct deficient horizontal and vertical curves. See design alternate sheets.
13. The cost of signing and striping of the detour road is included in the cost of traffic control.

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

Preliminary Construction Cost Estimate:
The construction cost estimate for the recommended alternative, Alternative A, 4-lane is $$6,821,150. The cost of signing and striping the detour road is included in the cost of traffic control.

Design:
The project can be designed for approximately $ based on 12% of the 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 utilities. 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 construction cost or $699,793.

Right-of-Way:
Estimated right-of-way acquisition costs are $274,400. Land cost estimates are based on $37,066 per hectare ($15,000 per acre).

Utility Relocation Cost Estimate:
A nominal amount of $25,000 has been allocated for unanticipated utility relocations.

Administration:
Administration has been estimated at 12% of construction cost or $559,835.

Environmental and Archeological Mitigation Costs:
A lump sum of $50,000 has been allocated for archeological survey costs (includes all surveys between Bell Road and Beardsley Road). 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 $37,500 are added to the project costs. Estimated costs of 404 mitigation are $37,000. This is based on a disturbed area of 4.2 hectares (10.2 acres) with required a mitigation area of 2 times the disturbed area. Unit cost of mitigation is estimated at $4,400 per hectare ($1,800 per acre). Costs incurred in the preparation of the 404 permit and mitigation plans costs are estimated at $7,500. Permit and plan preparations are included in the construction costs.

SUMMARY COST
January 29, 1999

El Mirage Road- Bell Road to Beardsley Road
Project No. C-99-0786-16-17

Alternative A, 4-Lane Configuration

1998 CAR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

COST CATAGORIES	***Factors***	***No Build***	***Alternative A, 4-Lane***	***Alternative A, 6-Lane***	***Alternative B, 4-Lane***	***Alternative B, 6-Lane***
Construction		$0	$4,665,288	$6,085,108	$5,340,526	$6,723,852
Design (10% TO 15%)	12%	$0	$559,835	$730,213	$640,863	$806,862
Construction Management	15%	$0	$699,793	$912,766	$801,079	$1,008,578
Right-of-Way		$0	$274,400	$276,200	$278,000	$279,800
Utility Relocation		$0	$25,000	$25,000	$25,000	$25,000
404 Mitigation		$0	$37,000	$37,000	$37,000	$37,000
Administration (8% TO 13%)	12%	$0	$559,835	$730,213	$640,863	$806,862
Total		**$0**	**$6,821,150**	**$8,796,500**	**$7,763,331**	**$9,687,954**

El Mirage Road- Bell Road to Beardsley Road
Recommended Alternative
Alternative A, 4-Lane Configuration

Road Construction
January 29, 1999

1998 CONSTRUCTION COST WORK SHEET

Item #	Description	Unit	Quantity	Unit Cost	Total
	Grade, Drain & Pave (or Penetrate & Chip)				
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	$7,500.00	$7,500
	Archaeological Survey	L.S.	1	$50,000.00	$50,000
210.03000	Borrow Excavation (If anticipated)[1]	CM	60,000	$9.00	$540,000
301.00000	Subgrade Preparation	SM	46,400	$2.75	$127,600
	New Asphalt Pavement	SM	46,400	$17.90	$830,560
	Asphalt Concrete .50 mm Overlay	SM	23,300	$5.40	$125,820
336.08100	Pavement Sawcut	M	2,500	$6.50	$16,250
340.01020	Single Curb	M	3,000	$36.00	$108,000
340.01120	Conc. C & G	M	700	$34.50	$24,150
350.01110	Removal of Existing Improvements	L.S.	1	$50,000.00	$50,000
402.00000	Traffic Signal, T Intersection @ Beardsley Rd.	EA	1	$90,000.00	$90,000
402.00000	Traffic Signing & Striping - 4 lanes	M	3,350	$6.40	$21,440
505.06125	Catch Basin - Curb Inlet	EA	11	$3,600.00	$39,600
505.30000	Catch Basin - Rural location	EA	11	$1,600.00	$17,600
618.02324	610 mm (24") RGRCP, Class III	M	895	$160.00	$143,200
618.02336	760 mm & 910 mm (30" & 36") RGRCP, Class III	M	2,520	$215.00	$541,800
625.00000	1370 mm & 1520 mm Storm Drain/Irrigation Manhole	EA	21	$3,200.00	$67,200
	Dumped Riprap Erosion Protection	CM	9	$60.00	$540
	Drainage Excavation (Assume 15% Shrink)	CM	90,000	$7.00	$630,000
	Wire Tied Riprap Erosion Protection	CM	600	$140.00	$84,000
	CBC Extension South of Beardsley Rd.	SM	128	$400.00	$51,200
	Landscaping at Sun City West Entrance (Beardsley Rd)	L.S.	1	$60,000.00	$60,000
		Subtotal			$3,650,460
110.01000	Mobilization @ 3.5%	L.S.	1	$127,766.00	$127,766
401.00000	Traffic Control @ 3%	L.S.	1	$109,514.00	$109,514

Subtotal Construction		$3,887,740
Contingency	20%	$777,548
Total		**$4,665,288**

[1]Actual borrow excavation quantity of 130,000 CM has been lowered by 70,000 CM of borrow generated by channel improvements from Deer Valley Road to Loop 303.

El Mirage Road- Bell Road to Beardsley Road
Alternative A, 6-Lane Configuration

Road Construction
January 29, 1999

1998 CONSTRUCTION COST WORK SHEET

Item #	Description	Unit	Quantity	Unit Cost	Total
	Grade, Drain & Pave (or Penetrate & Chip)				
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	$7,500.00	$7,500
	Archaeological Survey	L.S.	1	$50,000.00	$50,000
210.03000	Borrow Excavation (If anticipated)[1]	CM	60,000	$9.00	$540,000
301.00000	Subgrade Preparation	SM	66,200	$2.75	$182,050
	New Asphalt Pavement	SM	66,200	$17.90	$1,184,980
	Asphalt Concrete .50 mm Overlay	SM	22,400	$5.40	$120,960
336.08100	Pavement Sawcut	M	2,800	$6.50	$18,200
340.01020	Single Curb	M	3,300	$36.00	$118,800
340.01120	Conc. C & G	M	6,800	$34.50	$234,600
350.01110	Removal of Existing Improvements	L.S.	1	$65,000.00	$65,000
402.00000	Traffic Signing & Striping - 6 lanes	M	3,350	$9.00	$30,150
402.00000	Traffic Signal, T Intersection @ Beardsley Rd.	EA	1	$90,000.00	$90,000
403.00000	Traffic Signal, Modify Existing Signal @ Bell Rd.	EA	1	$10,000.00	$10,000
505.06125	Catch Basin - Curb Inlet	EA	22	$3,600.00	$79,200
618.02324	610 mm (24") RGRCP, Class III	M	895	$160.00	$143,200
618.02336	760 mm & 910 mm (30" & 36") RGRCP, Class III	M	2,520	$215.00	$541,800
625.00000	1370 mm & 1520 mm Storm Drain/Irrigation Manhole	EA	21	$3,200.00	$67,200
	Dumped Riprap Erosion Protection	CM	9	$60.00	$540
	Wire Tied Riprap Erosion Protection	CM	600	$140.00	$84,000
	Drainage Excavation (Assume 15% Shrink)	CM	90,000	$7.00	$630,000
	Gunite Erosion Protection at Bell Rd. Channel	SM	1,500	$45.00	$67,500
415.00000	Guardrail without approach end section	M	125	$78.00	$9,750
	Median Fine Grading, Pre-emergent, & D.G.	SM	12,600	$22.00	$277,200
	CBC Extension at Bell Rd.	SM	184	$400.00	$73,600
	CBC Extension South of Beardsley Rd.	SM	128	$400.00	$51,200
	Landscaping at Sun City West Entrance (Beardsley Rd)	L.S.	1	$60,000.00	$60,000
		Subtotal			$4,761,430
110.01000	Mobilization @ 3.5%	L.S.	1	$166,650.00	$166,650
401.00000	Traffic Control @ 3%	L.S.	1	$142,843.00	$142,843

Subtotal Construction		$5,070,923
Contingency	20%	$1,014,185
Total		**$6,085,108**

[1]Actual borrow excavation quantity of 130,000 CM has been lowered by 70,000 CM of borrow generated by channel improvements from Deer Valley Road to Loop 303.

El Mirage Road- Bell Road to Beardsley Road
Recommended Alternative
Alternative B, 4-Lane Configuration

Road Construction
January 29, 1999

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	$7,500.00	$7,500
	Archaeological Survey	L.S.	1	$50,000.00	$50,000
210.03000	Borrow Excavation (If anticipated)[1]	CM	60,000	$9.00	$540,000
301.00000	Subgrade Preparation	SM	71,400	$2.75	$196,350
	New Asphalt Pavement	SM	71,400	$17.90	$1,278,060
336.08100	Pavement Sawcut	M	50	$6.50	$325
340.01120	Conc. C & G	M	6,400	$34.50	$220,800
350.01110	Removal of Existing Improvements	L.S.	1	$90,000.00	$90,000
402.00000	Traffic Signal, T Intersection @ Beardsley Rd.	EA	1	$90,000.00	$90,000
402.00000	Traffic Signing & Striping - 4 lanes	M	3,350	$6.40	$21,440
505.06125	Catch Basin - Curb Inlet	EA	22	$3,600.00	$79,200
505.30000	Catch Basin - Rural location	EA	2	$1,600.00	$3,200
618.02324	610 mm (24") RGRCP, Class III	M	895	$160.00	$143,200
618.02336	760 mm & 910 mm (30" & 36") RGRCP, Class III	M	2,520	$215.00	$541,800
625.00000	1370 mm & 1520 mm Storm Drain/Irrigation Manhole	EA	21	$3,200.00	$67,200
	Dumped Riprap Erosion Protection	CM	9	$60.00	$540
	Drainage Excavation (Assume 15% Shrink)	CM	90,000	$7.00	$630,000
	Wire Tied Riprap Erosion Protection	CM	600	$140.00	$84,000
	CBC Extension South of Beardsley Rd.	SM	128	$400.00	$51,200
	Landscaping at Sun City West Entrance (Beardsley Rd)	L.S.	1	$60,000.00	$60,000
		Subtotal			$4,178,815
110.01000	Mobilization @ 3.5%	L.S.	1	$146,259.00	$146,259
401.00000	Traffic Control @ 3%	L.S.	1	$125,364.00	$125,364

Subtotal Construction		$4,450,438
Contingency	20%	$890,088
Total		**$5,340,526**

[1]Actual borrow excavation quantity of 130,000 CM has been lowered by 70,000 CM of borrow generated by channel improvements from Deer Valley Road to Loop 303.

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	$7,500.00	$7,500
	Archaeological Survey	L.S.	1	$50,000.00	$50,000
210.03000	Borrow Excavation (If anticipated)[1]	CM	60,000	$9.00	$540,000
301.00000	Subgrade Preparation	SM	89,600	$2.75	$246,400
	New Asphalt Pavement	SM	89,600	$17.90	$1,603,840
336.08100	Pavement Sawcut	M	200	$6.50	$1,300
340.01020	Single Curb	M	6,700	$36.00	$241,200
340.01120	Conc. C & G	M	6,900	$34.50	$238,050
350.01110	Removal of Existing Improvements	L.S.	1	$90,000.00	$90,000
402.00000	Traffic Signing & Striping - 6 lanes	M	3,350	$9.00	$30,150
402.00000	Traffic Signal, T Intersection @ Beardsley Rd.	EA	1	$90,000.00	$90,000
403.00000	Traffic Signal, Modify Existing Signal @ Bell Rd.	EA	1	$10,000.00	$10,000
505.06125	Catch Basin - Curb Inlet	EA	23	$3,600.00	$82,800
618.02324	610 mm (24") RGRCP, Class III	M	895	$160.00	$143,200
618.02336	760 mm & 910 mm (30" & 36") RGRCP, Class III	M	2,520	$215.00	$541,800
625.00000	1370 mm & 1520 mm Storm Drain/Irrigation Manhole	EA	21	$3,200.00	$67,200
	Dumped Riprap Erosion Protection	CM	9	$60.00	$540
	Wire Tied Riprap Erosion Protection	CM	600	$140.00	$84,000
	Drainage Excavation (Assume 15% Shrink)	CM	90,000	$7.00	$630,000
	Gunite Erosion Protection at Bell Rd. Channel	SM	1,500	$45.00	$67,500
415.00000	Guardrail without approach end section	M	125	$78.00	$9,750
	Median Fine Grading, Pre-emergent, & D.G.	SM	12,600	$22.00	$277,200
	CBC Extension at Bell Rd.	SM	184	$400.00	$73,600
	CBC Extension South of Beardsley Rd.	SM	128	$400.00	$51,200
	Landscaping at Sun City West Entrance (Beardsley Rd)	L.S.	1	$60,000.00	$60,000
		Subtotal			$5,261,230
110.01000	Mobilization @ 3.5%	L.S.	1	$184,143.00	$184,143
401.00000	Traffic Control @ 3%	L.S.	1	$157,837.00	$157,837

Subtotal Construction		$5,603,210
Contingency	20%	$1,120,642
Total		**$6,723,852**

[1]Actual borrow excavation quantity of 130,000 CM has been lowered by 70,000 CM of borrow generated by channel improvements from Deer Valley Road to Loop 303.

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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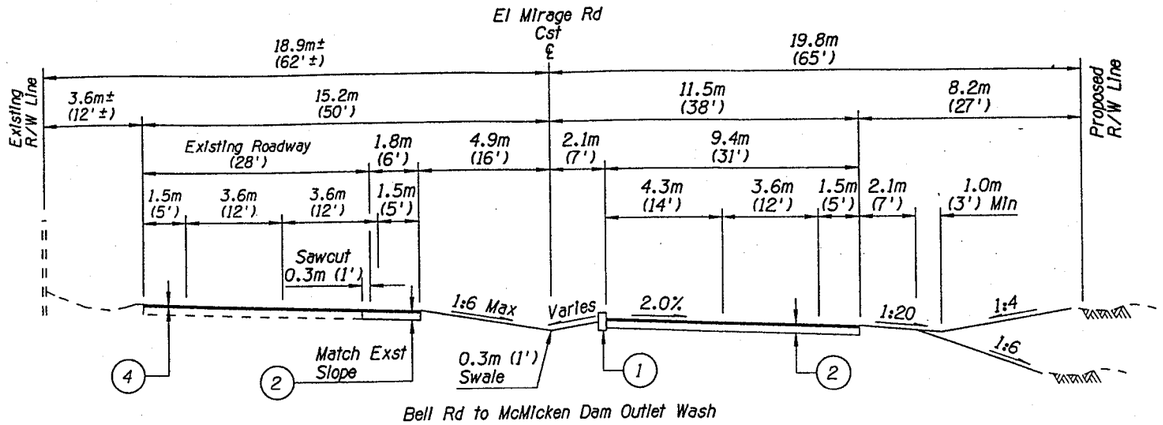
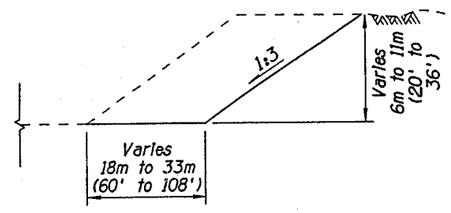
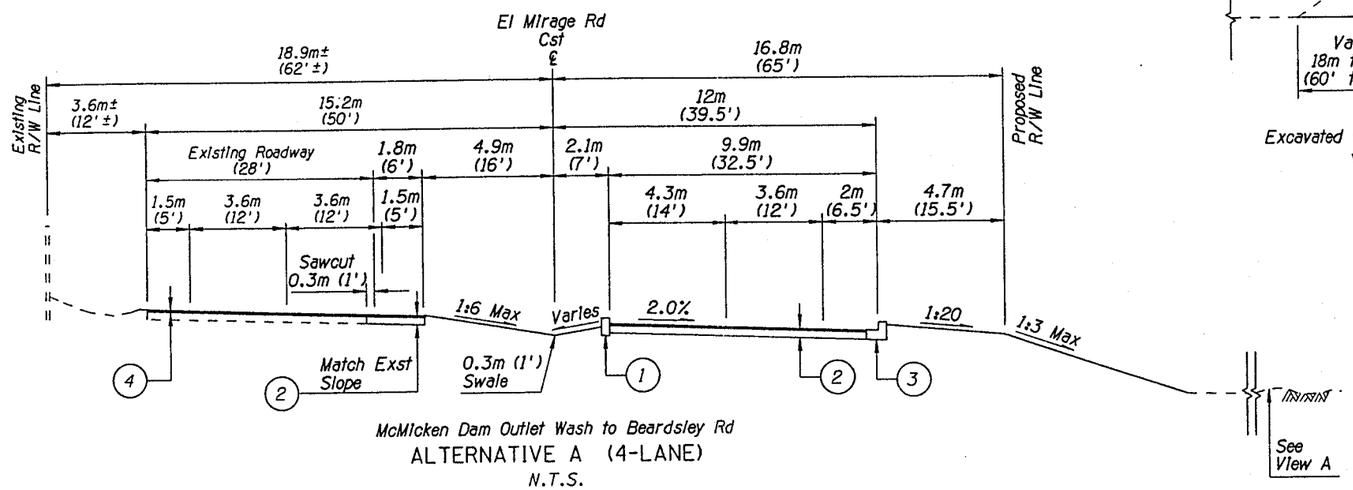


Bell Rd to McMicken Dam Outlet Wash



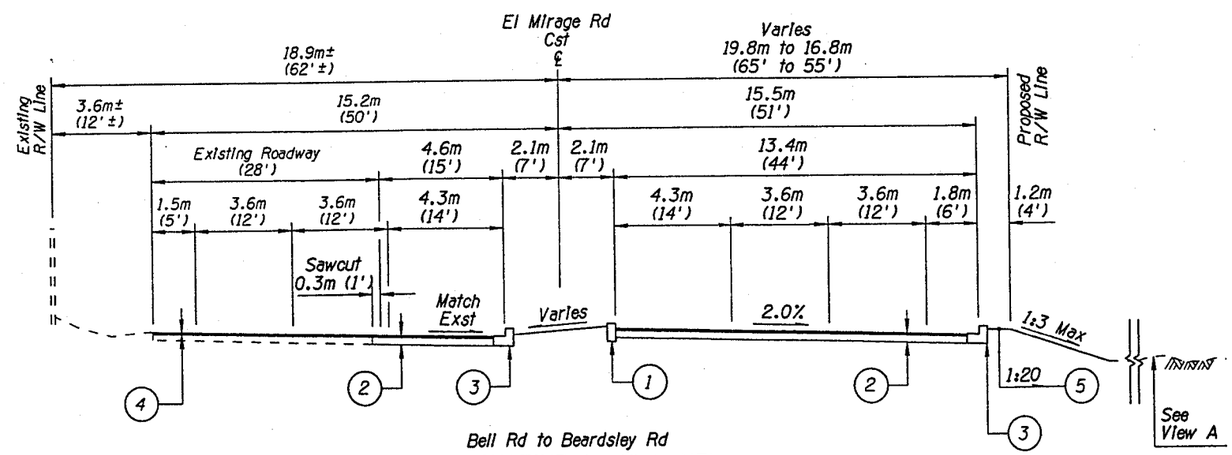
Excavated Outlet Wash Section
VIEW A
N.T.S.



McMicken Dam Outlet Wash to Beardsley Rd
ALTERNATIVE A (4-LANE)
N.T.S.

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.
5. Cut and Fill Slopes Not Adjacent to the McMicken Dam Outlet Wash Should Conform with Slopes Shown in the MCDOT Roadway Design Manual for Urban Principal Arterials.



Bell Rd to Beardsley Rd
ALTERNATIVE A (6-LANE)
N.T.S.

NO.	REVISION	BY	DATE
1			
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MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE
BELL ROAD TO BEARDSLEY ROAD
PROJECT NO. C99-0786-16-17

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JHM	01-99
DRAWN	ACH	01-99
CHECKED	JHM	01-99

PARSONS BRINCKERHOFF

TYPICAL SECTIONS

SHEET 1 OF 2

TRACS NO.

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F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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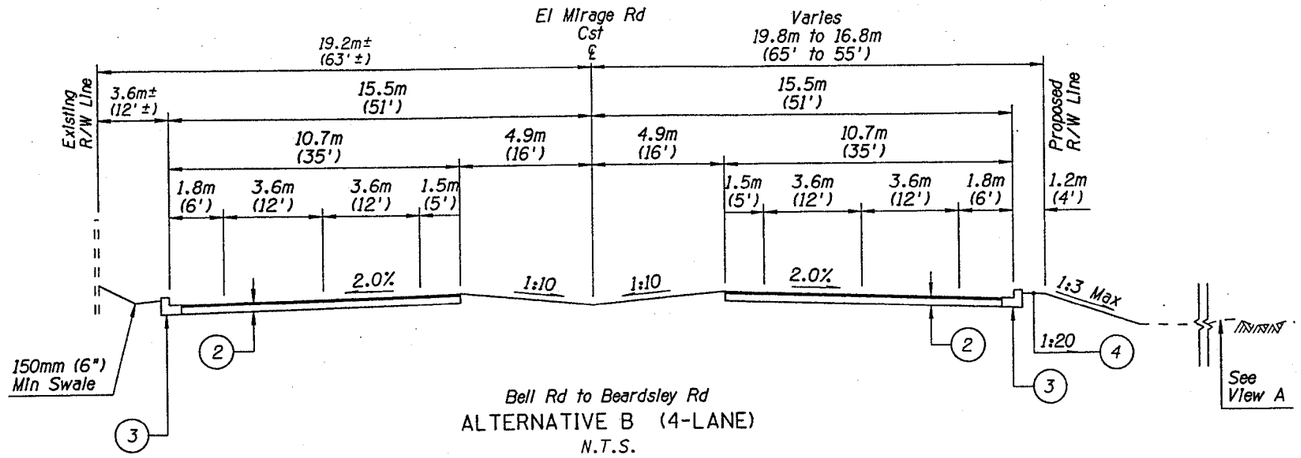
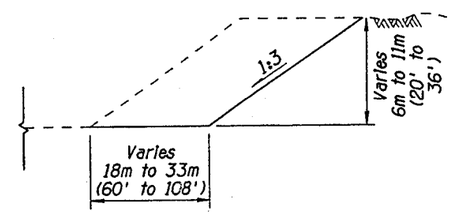
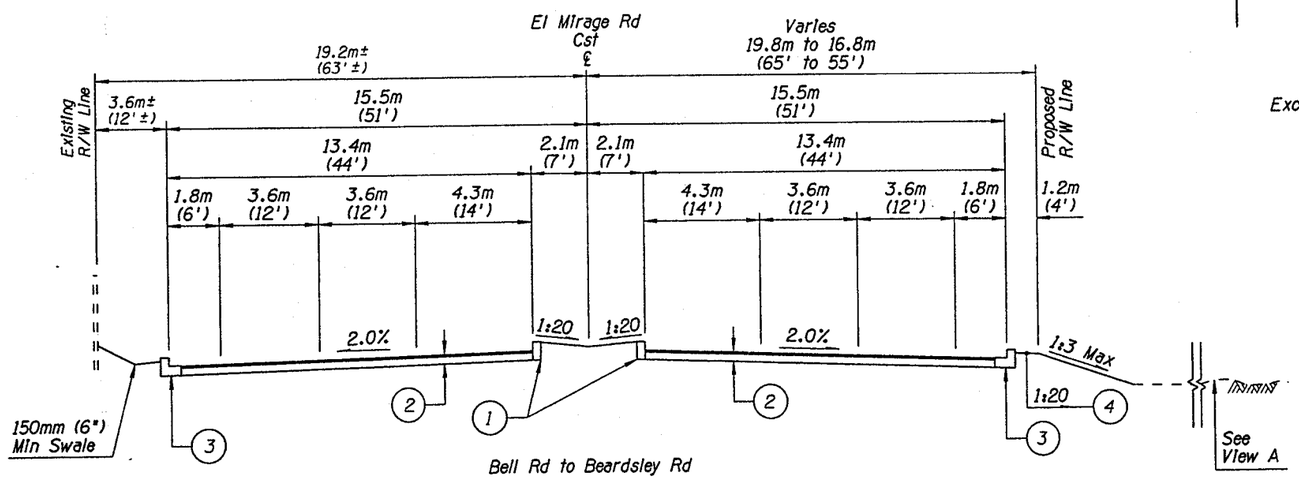


Bell Rd to Beardsley Rd
ALTERNATIVE B (4-LANE)
N.T.S.



Excavated Outlet Wash Section
VIEW A
N.T.S.



Bell Rd to Beardsley Rd
ALTERNATIVE B (6-LANE)
N.T.S.

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. Cut and Fill Slopes Not Adjacent to the McMicken Dam Outlet Wash Should Conform with Slopes Shown in the MCDOT Roadway Design Manual for Urban Principal Arterials.

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MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE
BELL ROAD TO BEARDSLEY ROAD
PROJECT NO. C99-0786-16-17

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JHM	01-99
DRAWN	ACH	01-99
CHECKED	JHM	01-99

PB PARSONS BRINCKERHOFF

TYPICAL SECTIONS

SHEET 2 OF 2

TRACS NO.

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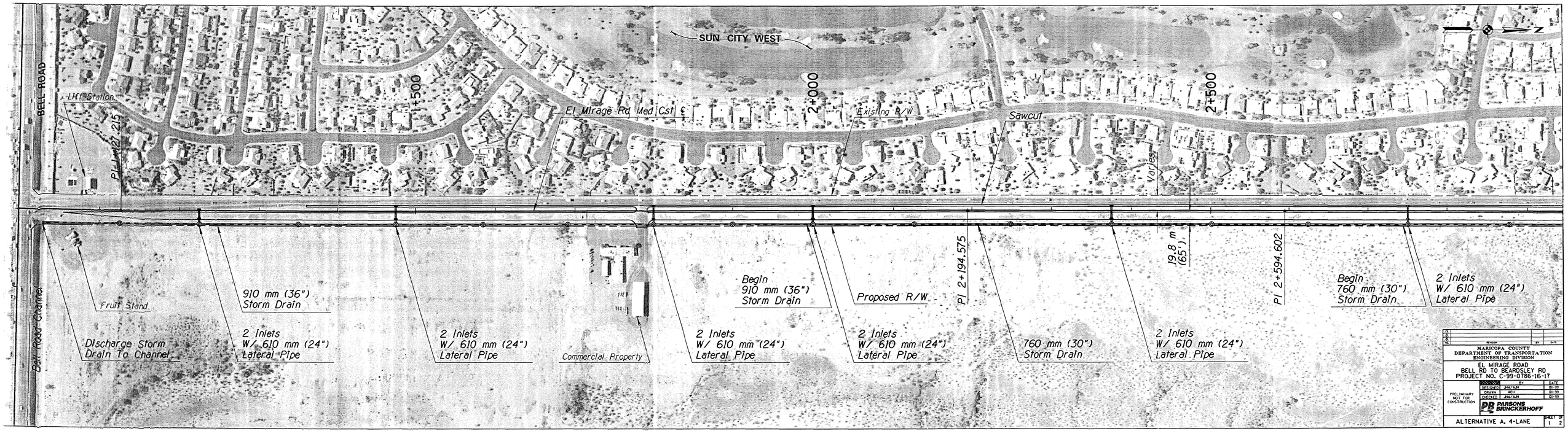
APPENDIX B

ROADWAY DESIGN ALTERNATIVES



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MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

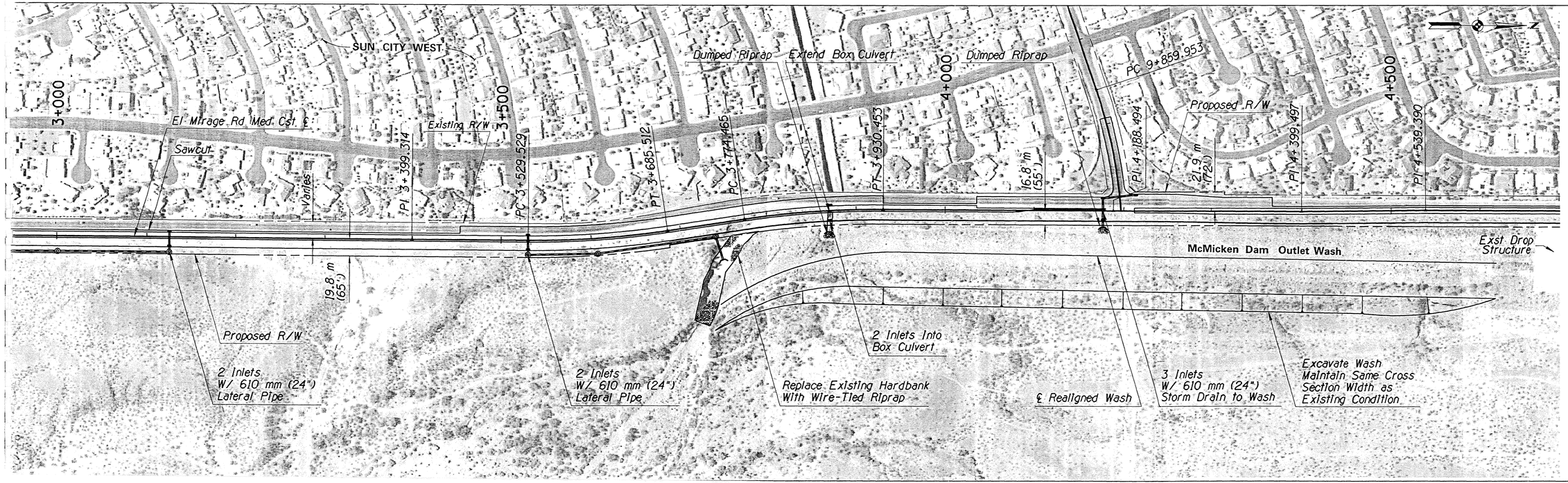
EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

			DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	JMM/AJH	01-99
	DRAWN	KCH	01-99
	CHECKED	JMM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE A, 4-LANE

SHEET 1 OF 2



REVISION	BY	DATE
A		
B		
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MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

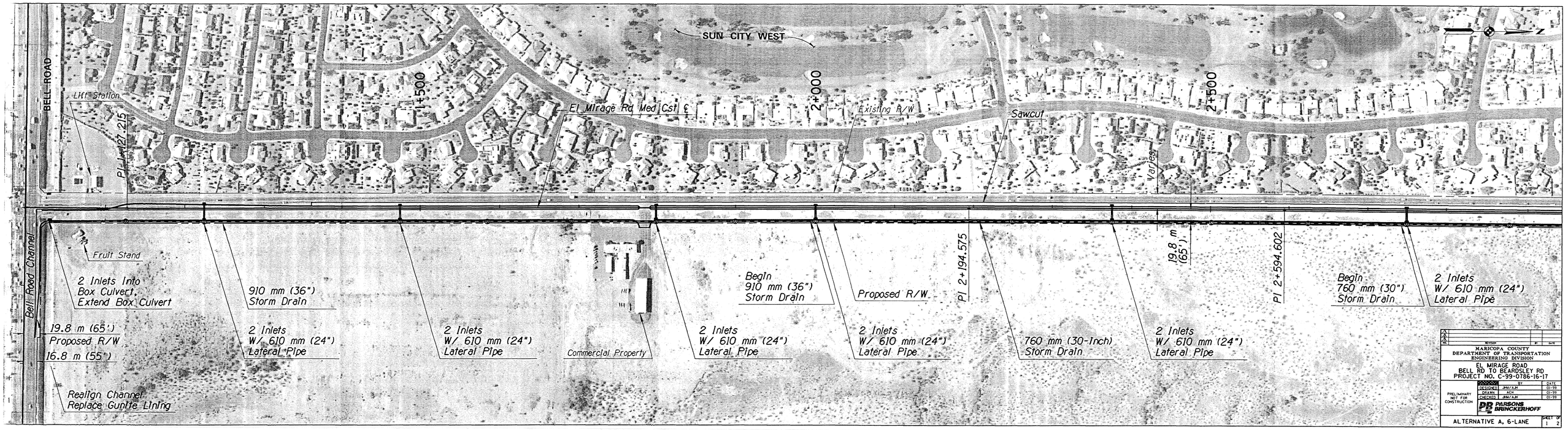
EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	JHM/AJH	01-99
	DRAWN	ACH	01-99
	CHECKED	JHM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE A, 4-LANE

SHEET 6 OF 2



REVISION	BY	DATE

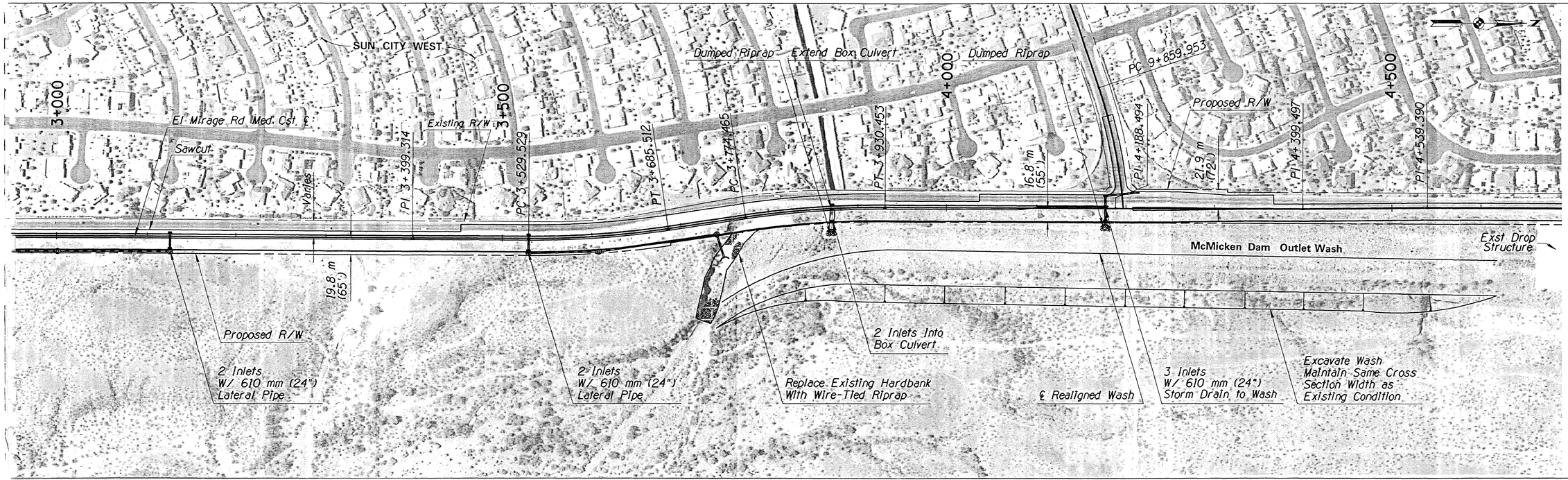
MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

PRELIMINARY NOT FOR CONSTRUCTION	PARSONS BRINCKERHOFF		
	DESIGNED	BT	DATE
			01-99
	DESIGNED	JNV/AJH	01-99
	DRAWN	ACH	01-99
	CHECKED	JNV/AJH	01-99

ALTERNATIVE A, 6-LANE

SHEET 1 OF 2



REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

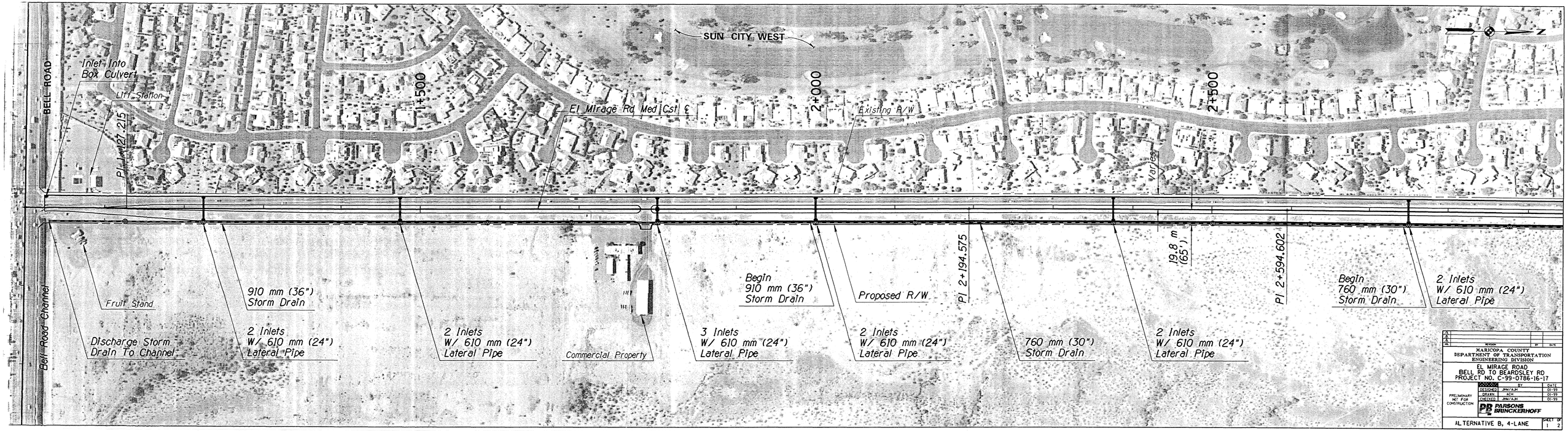
	BY	DATE
DESIGNED	JMM/AJH	01-99
DRAWN	ACH	01-99
CHECKED	JMM/AJH	01-99

PRELIMINARY NOT FOR CONSTRUCTION

PARSONS BRINCKERHOFF

ALTERNATIVE A, 6-LANE

SHEET 2 OF 2



REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

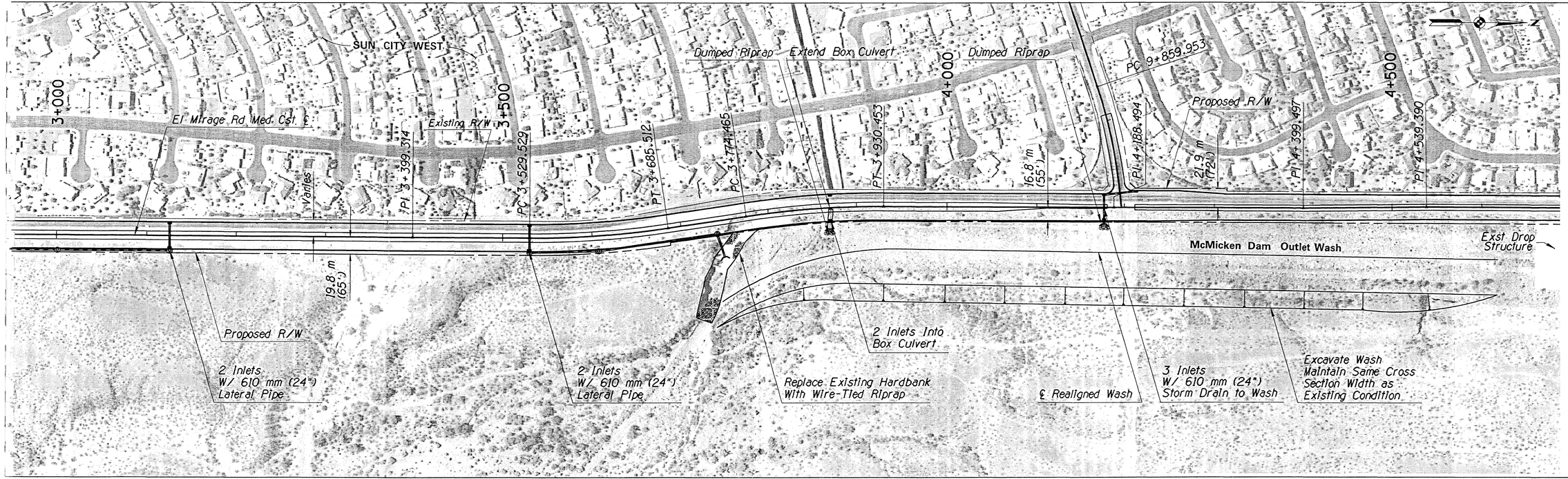
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRM/AJH	01-99
DRAWN	ACH	01-99
CHECKED	JRM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE B, 4-LANE

SHEET 1 OF 2



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	REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

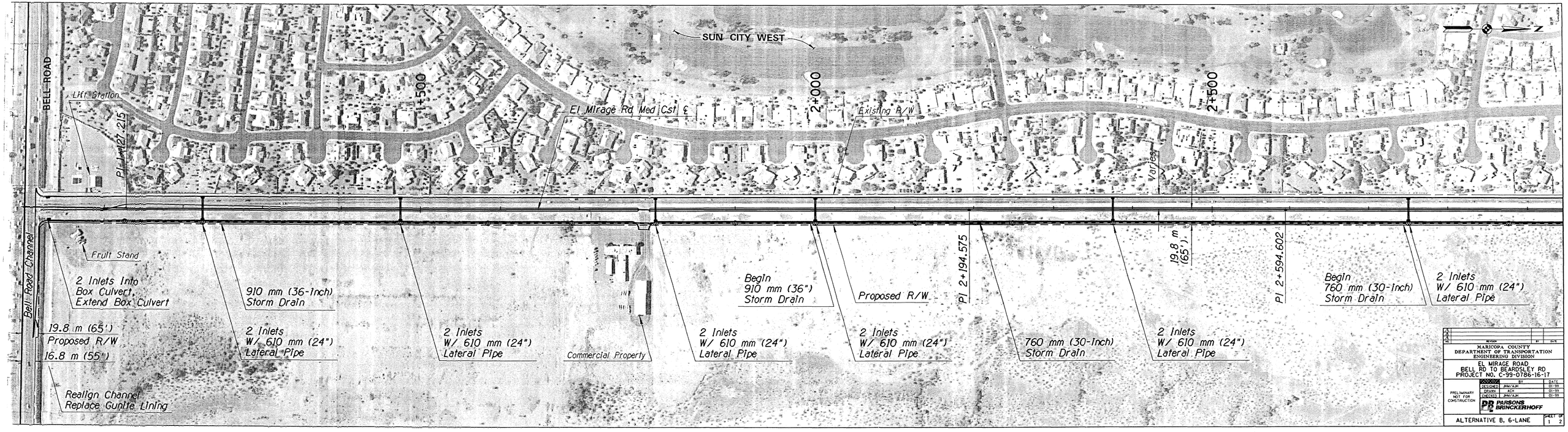
EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	JRM/AJH	01-99
	DRAWN	KCH	01-99
	CHECKED	JRM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE B, 4-LANE

SHEET 2 OF 2



3			
2			
1			
	REVISIONS	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

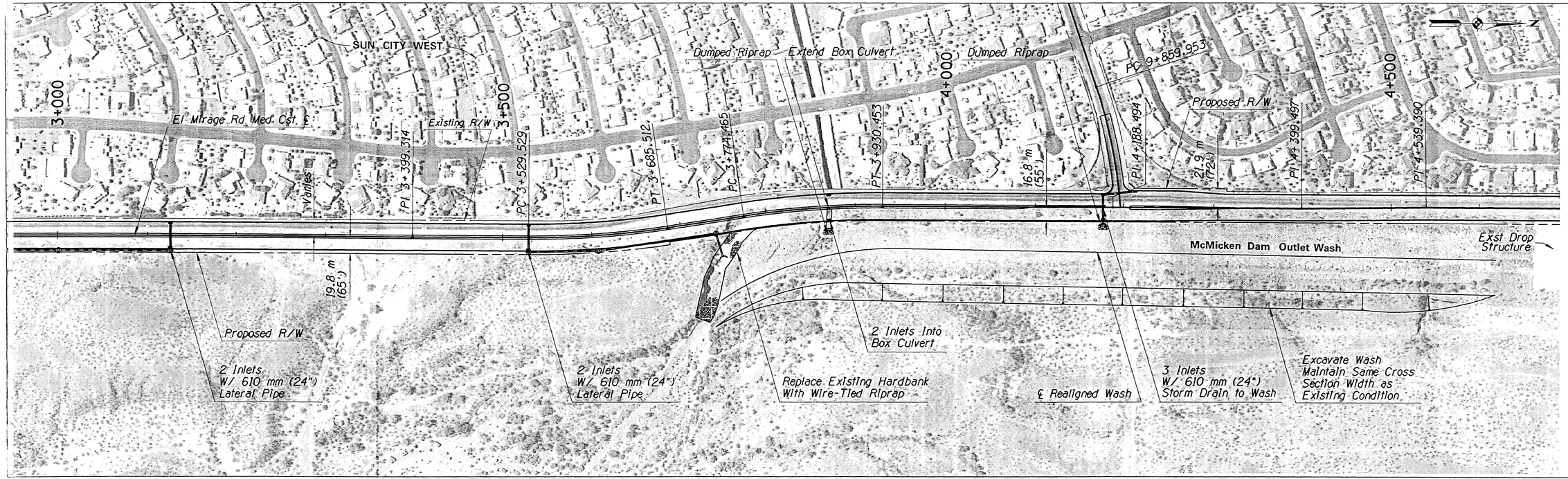
EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	JRM/AJH	01-99
	DRAWN	ACK	01-99
	CHECKED	JRM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE B, 6-LANE

SHEET 1 OF 2



REVISIONS			
NO.		BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

EL MIRAGE ROAD
BELL RD TO BEARDSLEY RD
PROJECT NO. C-99-0786-16-17

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRM/AJH	01-99
DRAWN	ACK	01-99
CHECKED	JRM/AJH	01-99

PARSONS BRINCKERHOFF

ALTERNATIVE B, 6-LANE

SHEET 2 OF 2

APPENDIX C

HIGHWAY CAPACITY SOFTWARE ANALYSIS

El Mirage And Bell

Howard Olien 27-Jan-99

ADT (2-Way)	El Mirage		Bell	
	SouthLeg	NorthLeg	WestLeg	EastLeg
1998 Existing	2719	7807	29768	35740
2001 Future	2719	10561	39477	44971
2010 Future	22809	12392	40225	53510
2020 Future	28781	16112	44201	48014
0 Future	0	0	0	0

AM Peak Hour	El Mirage						Bell					
	NorthBound			SouthBound			EastBound			WestBound		
	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right
1998 Existing	38	24	35	264	17	25	20	855	27	54	935	166
2001 Future	44	28	40	345	20	33	27	1105	31	61	1208	217
2010 Future	185	120	173	407	85	37	29	1218	131	267	1332	256
2020 Future	229	152	209	450	108	44	35	1209	163	322	1322	283
0 Future	0	0	0	0	0	0	0	0	0	0	0	0
D Factor	24.07%			75.93%			43.85%			56.15%		
K Factor	7.17%			6.61%			6.38%			6.46%		

Average K Factor 6.66%

PM Peak Hour	El Mirage						Bell					
	NorthBound			SouthBound			EastBound			WestBound		
	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right
1998 Existing	51	12	42	254	22	32	22	1139	44	57	1048	280
2001 Future	59	14	47	332	26	43	29	1472	51	64	1354	366
2010 Future	248	60	208	392	110	47	32	1622	214	282	1493	432
2020 Future	308	76	250	433	139	57	39	1611	266	340	1482	477
0 Future	0	0	0	0	0	0	0	0	0	0	0	0
D Factor	25.42%			74.58%			46.53%			53.47%		
K Factor	8.39%			7.97%			7.85%			7.89%		

Average K Factor 8.02%

El Mirage And Beardsley

Howard Olien 21-Dec-98

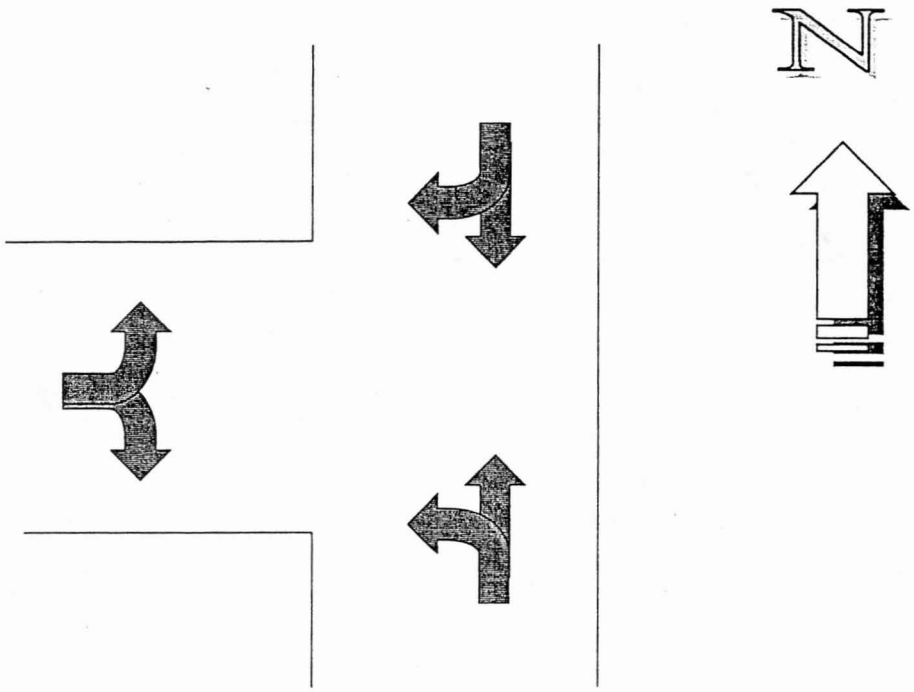
ADT (2-Way)	El Mirage		Beardsley	
	SouthLeg	NorthLeg	WestLeg	EastLeg
1998 Existing	7765	3110	5074	0
2001 Future	10561	3110	9620	0
2010 Future	12392	4702	9489	0
2020 Future	22564	22352	13354	0
0 Future	0	0	0	0

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%					

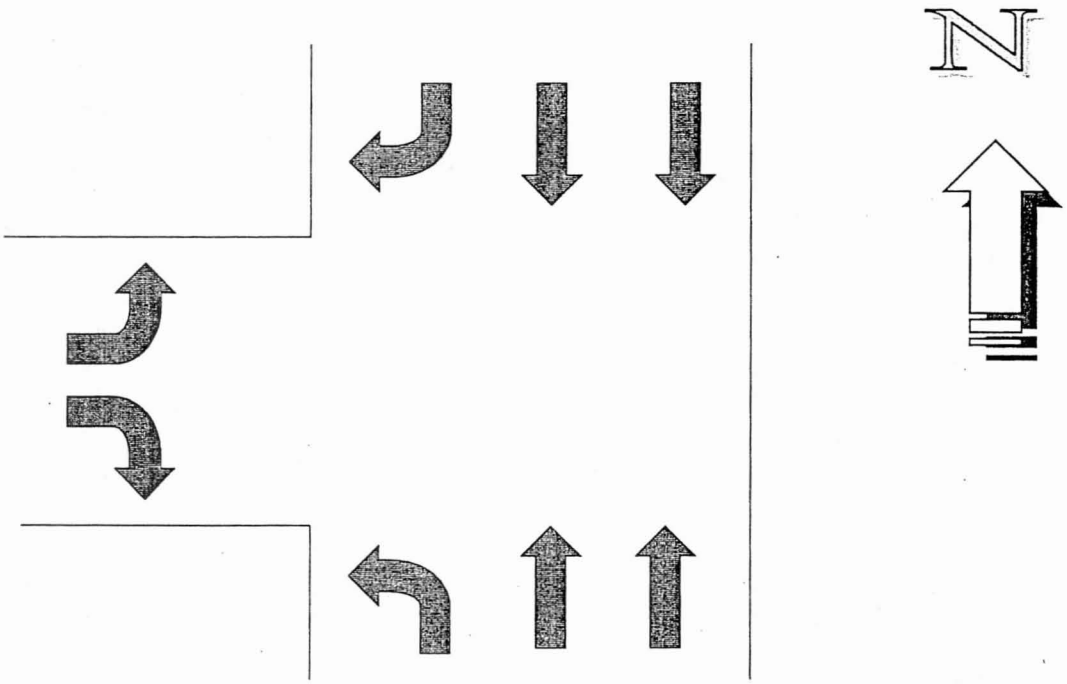
Average K Factor 6.70%

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%					

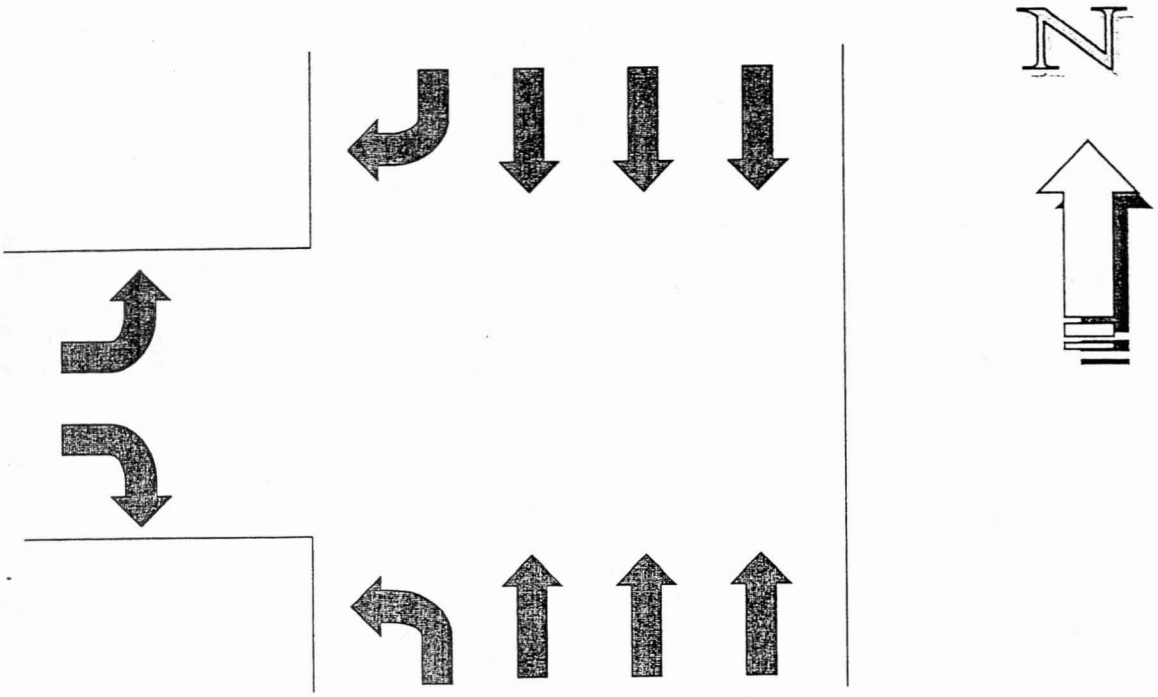
Average K Factor 7.84%



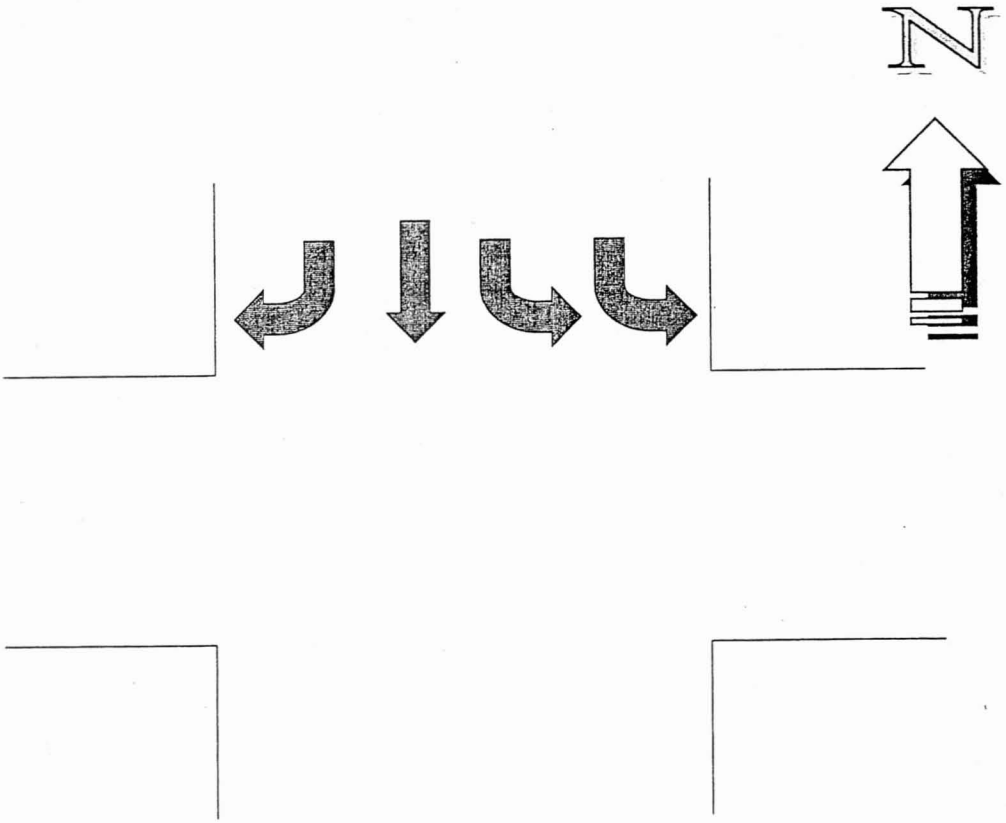
El Mirage And Beardsley
Existing Lane Configuration



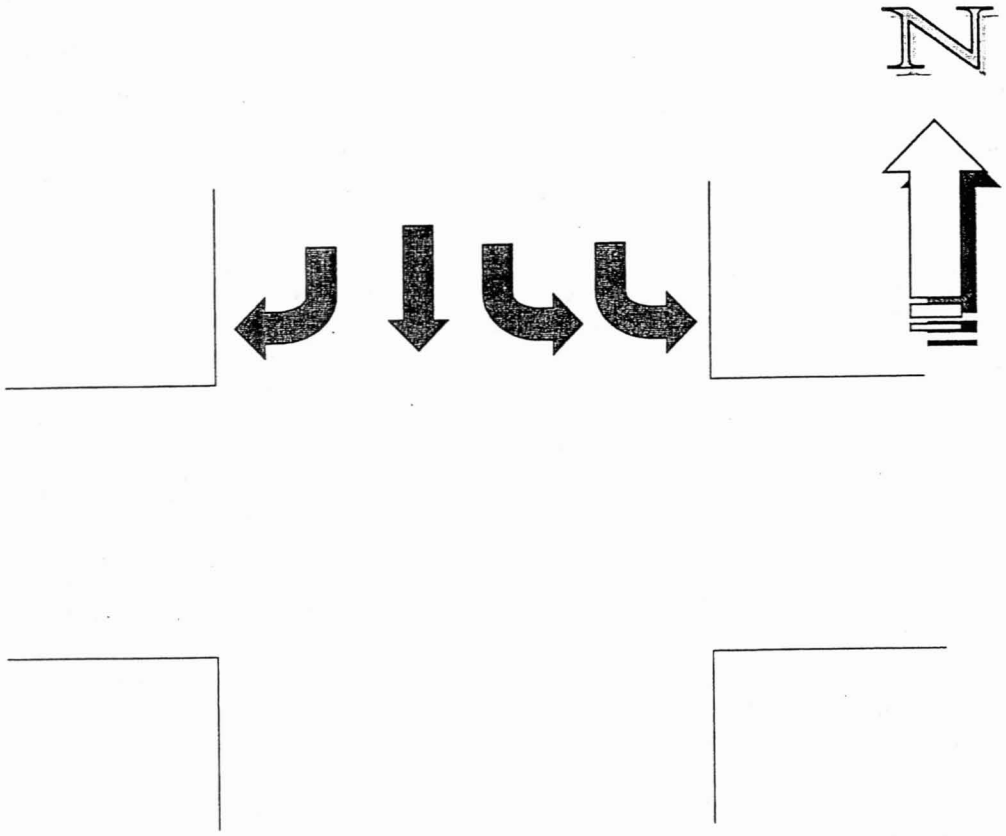
El Mirage And Beardsley
Proposed 4 Lane Configuration



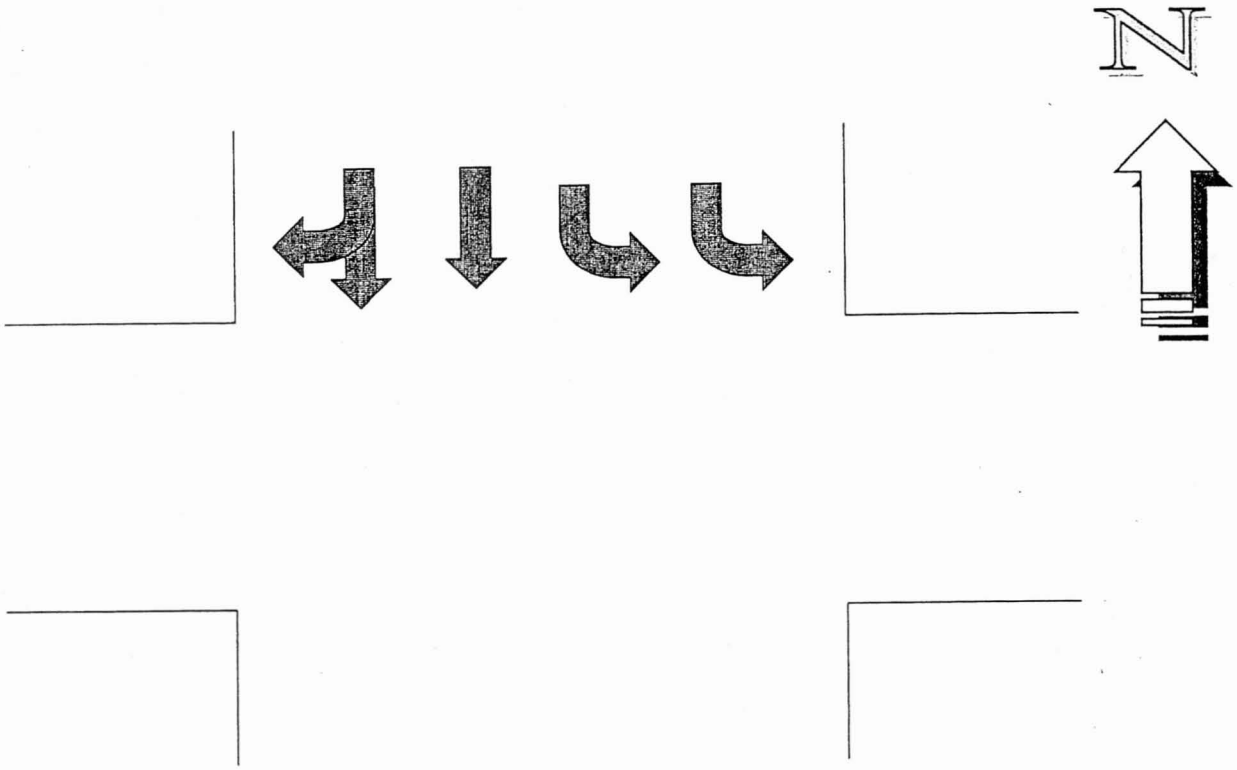
El Mirage And Beardsley
Proposed 6 Lane Configuration



El Mirage And Bell
Existing Configuration



El Mirage And Bell
Proposed 4 Lane Configuration



El Mirage And Bell
Proposed 6 Lane Configuration

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... AM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Present 1998

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.85
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	42 / 58
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	.95	.95
B	2.2	2	2.5	.81	.95	.94
C	2.2	2	2.5	.81	.95	.94
D	2	1.6	1.6	.81	.95	.95
E	2	1.6	1.6	.93	.95	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 718
ACTUAL FLOW RATE: 845

LOS	SERVICE FLOW RATE	V/C
A	308	.15
B	550	.27
C	876	.43
D	1316	.64
E	2361	1

LOS FOR GIVEN CONDITIONS: C

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... PM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Present 1998

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.92
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	48 / 52
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	.99	.95
B	2.2	2	2.5	.81	.99	.94
C	2.2	2	2.5	.81	.99	.94
D	2	1.6	1.6	.81	.99	.95
E	2	1.6	1.6	.93	.99	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 713
ACTUAL FLOW RATE: 775

LOS	SERVICE FLOW RATE	V/C
A	320	.15
B	571	.27
C	909	.43
D	1366	.64
E	2450	1

LOS FOR GIVEN CONDITIONS: C

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... AM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2001

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.85
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	42 / 58
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	.95	.95
B	2.2	2	2.5	.81	.95	.94
C	2.2	2	2.5	.81	.95	.94
D	2	1.6	1.6	.81	.95	.95
E	2	1.6	1.6	.93	.95	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 968
ACTUAL FLOW RATE: 1139

LOS	SERVICE FLOW RATE	V/C
A	308	.15
B	550	.27
C	876	.43
D	1316	.64
E	2361	1

LOS FOR GIVEN CONDITIONS: D

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... PM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2001

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.92
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	47 / 53
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	.98	.95
B	2.2	2	2.5	.81	.98	.94
C	2.2	2	2.5	.81	.98	.94
D	2	1.6	1.6	.81	.98	.95
E	2	1.6	1.6	.93	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 963
ACTUAL FLOW RATE: 1047

LOS	SERVICE FLOW RATE	V/C
A	318	.15
B	567	.27
C	903	.43
D	1358	.64
E	2435	1

LOS FOR GIVEN CONDITIONS: D

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... AM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2010

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.83
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
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	.96	.95
B	2.2	2	2.5	.81	.96	.94
C	2.2	2	2.5	.81	.96	.94
D	2	1.6	1.6	.81	.96	.95
E	2	1.6	1.6	.93	.96	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1142
ACTUAL FLOW RATE: 1376

LOS	SERVICE FLOW RATE	V/C
A	310	.15
B	553	.27
C	881	.43
D	1324	.64
E	2376	1

LOS FOR GIVEN CONDITIONS: E

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... PM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2010

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.92
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	48 / 52
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	.99	.95
B	2.2	2	2.5	.81	.99	.94
C	2.2	2	2.5	.81	.99	.94
D	2	1.6	1.6	.81	.99	.95
E	2	1.6	1.6	.93	.99	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1134
ACTUAL FLOW RATE: 1233

LOS	SERVICE FLOW RATE	V/C
A	320	.15
B	571	.27
C	909	.43
D	1366	.64
E	2450	1

LOS FOR GIVEN CONDITIONS: D

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... AM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2020

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.85
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	42 / 58
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	.95	.95
B	2.2	2	2.5	.81	.95	.94
C	2.2	2	2.5	.81	.95	.94
D	2	1.6	1.6	.81	.95	.95
E	2	1.6	1.6	.93	.95	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1485
ACTUAL FLOW RATE: 1747

LOS	SERVICE FLOW RATE	V/C
A	308	.15
B	550	.27
C	876	.43
D	1316	.64
E	2361	1

LOS FOR GIVEN CONDITIONS: E

****

FACILITY LOCATION.... El Mirage
ANALYST..... B. Good
TIME OF ANALYSIS..... PM
DATE OF ANALYSIS..... 10-07-1998
OTHER INFORMATION.... Projected 2020

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.92
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	48 / 52
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	.99	.95
B	2.2	2	2.5	.81	.99	.94
C	2.2	2	2.5	.81	.99	.94
D	2	1.6	1.6	.81	.99	.95
E	2	1.6	1.6	.93	.99	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1471
ACTUAL FLOW RATE: 1599

LOS	SERVICE FLOW RATE	V/C
A	320	.15
B	571	.27
C	909	.43
D	1366	.64
E	2450	1

LOS FOR GIVEN CONDITIONS: E

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

File Name 98AM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... AM
Date of Analysis..... 10/09/98
Other Information.... 1998

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	302	416
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	182	251
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	3.2	4.5
Level of Service (LOS)	A	A

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University of Florida
512 Weil Hall
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Ph: (904) 392-0378

File Name 98PM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... PM
Date of Analysis..... 10/09/98
Other Information.... 1998

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	342	371
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	206	224
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	3.6	4.0
Level of Service (LOS)	A	A

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

File Name 01AM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... AM
Date of Analysis..... 10/09/98
Other Information.... 2001

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	407	561
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	245	338
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	4.3	6.0
Level of Service (LOS)	A	A

Center For Microcomputers In Transportation
University of Florida
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Gainesville, FL 32611-2083
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File Name 01PM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... PM
Date of Analysis..... 10/09/98
Other Information.... 2001

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	453	510
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	273	307
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	4.8	5.5
Level of Service (LOS)	A	A

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File Name 10AM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... AM
Date of Analysis..... 10/09/98
Other Information.... 2010

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	491	651
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	296	393
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	5.2	7.0
Level of Service (LOS)	A	A

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File Name 10PM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... PM
Date of Analysis..... 10/09/98
Other Information.... 2010

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	544	590
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	328	356
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	5.8	6.3
Level of Service (LOS)	A	A

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File Name 20AM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... AM
Date of Analysis..... 10/09/98
Other Information.... 2020

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	624	861
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	376	519
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	6.7	9.3
Level of Service (LOS)	A	A

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File Name 20PM.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... B. Good
Time of Analysis..... PM
Date of Analysis..... 10/09/98
Other Information.... 2020

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	706	765
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	426	461
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	7.5	8.2
Level of Service (LOS)	A	A

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File Name 98AM6.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... Howard Olien
Time of Analysis..... AM
Date of Analysis..... 1/28/99
Other Information.... 1998 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	302	416
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	121	167
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	2.1	3.0
Level of Service (LOS)	A	A

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File Name 98PM6.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... Howard Olien
Time of Analysis..... PM
Date of Analysis..... 1/28/99
Other Information.... 1998 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	342	371
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	137	149
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	2.4	2.7
Level of Service (LOS)	A	A

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File Name 01AM6.HC7
Facility Section..... El Mirage
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Analyst..... Howard Olien
Time of Analysis..... AM
Date of Analysis..... 1 /28/99
Other Information.... 2001 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	407	561
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	164	225
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	2.9	4.0
Level of Service (LOS)	A	A

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File Name 01PM6.HC7
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Analyst..... Howard Olien
Time of Analysis..... PM
Date of Analysis..... 1/28/99
Other Information.... 2001 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	453	510
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	182	205
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	3.2	3.7
Level of Service (LOS)	A	A

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File Name 10AM6.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... Howard Olien
Time of Analysis..... AM
Date of Analysis..... 1/28/99
Other Information.... 2010 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	491	651
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	197	262
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	3.5	4.7
Level of Service (LOS)	A	A

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File Name 10PM6.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... Howard Olien
Time of Analysis..... PM
Date of Analysis..... 1/28/99
Other Information.... 2010 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	544	590
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	219	237
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	3.9	4.2
Level of Service (LOS)	A	A

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File Name 20PM6.HC7
Facility Section..... El Mirage
From/To..... Beardsley / Bell
Analyst..... Howard Olien
Time of Analysis..... PM
Date of Analysis..... 1/28/99
Other Information.... 2020 6 Lane

A. Geometrics and Traffic Input	Direction 1	Direction 2
Volume	706	765
Peak-Hour Factor or Peak 15 Minutes	0.85	0.85
Number of Lanes	3	3
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)	2.0	0.0
Access Points per Mile	4.0	4.0

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	1.60	0.00	0.90	1.00
Dir 2		1.50		0.98	1.60	0.00	1.30	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	284	307
Free Flow Speed (mph)	56.5	56.1
Average Passenger Car Speed (mph)	56.5	56.1
Density (pcpmpl)	5.0	5.5
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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Streets: (N-S) El Mirage (E-W) Beardsley
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
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	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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Streets: (N-S) El Mirage (E-W) Beardsley
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
No. 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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Ph: (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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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
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	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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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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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.....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

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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			
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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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			
PHF	.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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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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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			
PHF	.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: N/A
7200/Cmax

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

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- 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.						

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: N/A
7200/Cmax

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
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

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- 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.						

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):	E		E	
Left Turn Treatment Type:	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 equivalence			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: N/A
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N10AM.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]	392	0	131	215
LT lane vol: [5]	0	N/A	195	N/A
Left turn protection: (P/U/N)	N	U	P	U
Dominant left turn: (Indicate by '*')	*		*	

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2b

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL			NTL	NST	
Critical phase vol [CV]		392	0	0	195	215	0
Critical sum [CS]	802						
CBD adjustment [CBD]	1						
Reference sum [RS]	1454						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		27.9	0	0	15.4	16.7	0
Critical v/c ratio [Xcm]	0.54						
Status	Under capacity.						

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: N/A
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N10PM.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]	353	0	227	161
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

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL			NSG	NST	
Critical phase vol [CV]		353	0	0	348	0	0
Critical sum [CS]	701						
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]	0.44						
Status	Under capacity.						

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: 60
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N20AM.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]	626	0	424	695
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

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL			NSG	NST	
Critical phase vol [CV]		626	0	0	695	0	0
Critical sum [CS]	1321						
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]	65.6						
Green time		31.2	0	0	34.4	0	0
Critical v/c ratio [Xcm]	0.86						
Status	Near capacity.						

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: N/A
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N20PM.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]	564	0	737	515
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

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL			NSG	NST	
Critical phase vol [CV]		564	0	0	737	0	0
Critical sum [CS]	1301						
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		26.4	0	0	33.6	0	0
Critical v/c ratio [Xcm]	0.81						
Status	Under capacity.						

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 equivalence			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: N/A
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N20AM4.HC9 Date: 01-19-1999 Time Period: AM

(E/W): Beardsley (N/S): El Mirage Analyst : Howard Olien

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet				
Critical through-RT vol: [19]	626	0	212	336
LT lane vol: [5]	0	N/A	N/A	N/A
Left turn protection: (P/U/N)	N	N	U	U
Dominant left turn: (Indicate by '*')	*		*	

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 4 1

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL	WTL		NSG		
Critical phase vol [CV]		626	0	0	336	0	0
Critical sum [CS]	962						
CBD adjustment [CBD]	1						
Reference sum [RS]	1624						
Lost time/phase [PL]		3	3	0	3	0	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		36.2	3	0	20.8	0	0
Critical v/c ratio [Xcm]	0.58						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: N20~~AM~~PM4.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 equivalence			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: N/A
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: N20AM4.HC9 Date: 01-19-1999 Time Period: PM

(E/W): Beardsley (N/S): El Mirage Analyst : Howard Olien

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet				
Critical through-RT vol: [19]	564	0	368	234
LT lane vol: [5]	0	N/A	N/A	N/A
Left turn protection: (P/U/N)	N	N	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
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 4 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	WTL		NSG		
Critical phase vol [CV]		564	0	0	557	0	0
Critical sum [CS]	1121						
CBD adjustment [CBD]	1						
Reference sum [RS]	1624						
Lost time/phase [PL]		3	3	0	3	0	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		28.7	3	0	28.3	0	0
Critical v/c ratio [Xcm]	0.67						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: TODAM.HC9 Date: 10-07-1998 Time Period: Am Peak

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

Peak hour factor: .86

Comment: 1998

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	20	54	38	264
2. Opposing mainline volume	1101	882	42	59
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	22020	47628	1596	15576
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	143
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	27	166	35	25
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	29
10. Shared lane vol	32	195	41	0
THROUGH MOVEMENT				
11. Thru volume	855	935	24	17
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	887	1130	65	17
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	7.51	5.5	1.21	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	296	377	65	17
19. Critical lane volume	296	377	65	29
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	N/A	N/A	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: TODAM.HC9 Date: 10-07-1998 Time Period: Am Peak

(E/W): Bell (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]	296	377	65	29
LT lane vol: [5]	N/A	N/A	N/A	143
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		377	0	0	143	65	0
Critical sum [CS]	585						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		35.9	0	0	15.5	8.7	0
Critical v/c ratio [Xcm]	0.39						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: TODPM.HC9 Date: 10-07-1998 Time Period: Pm Peak

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

Peak hour factor: .86

Comment: 1998

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	22	57	51	254
2. Opposing mainline volume	1328	1183	54	54
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	29216	67431	2754	13716
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	138
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	44	280	42	32
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	38
10. Shared lane vol	52	329	49	0
THROUGH MOVEMENT				
11. Thru volume	1139	1048	12	22
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1191	1377	61	22
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.08	1.25	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	397	459	61	22
19. Critical lane volume	397	459	61	38
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: TODPM.HC9 Date: 10-07-1998 Time Period: Pm Peak

(E/W): Bell (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]	397	459	61	38
LT lane vol: [5]	N/A	N/A	N/A	138
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		459	0	0	138	61	0
Critical sum [CS]	658						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		38.6	0	0	13.7	7.7	0
Critical v/c ratio [Xcm]	0.44						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 01AM.HC9 Date: 10-07-1998 Time Period: AM Peak

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

Peak hour factor: .86

Comment: 2001

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	27	61	44	345
2. Opposing mainline volume	1425	1136	53	68
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	38475	69296	2332	23460
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	187
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	31	217	40	33
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	39
10. Shared lane vol	36	255	47	0
THROUGH MOVEMENT				
11. Thru volume	1105	1208	28	20
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1141	1463	75	20
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	7.75	1.25	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	380	488	75	20
19. Critical lane volume	380	488	75	39
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	N/A	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 01AM.HC9 Date: 10-07-1998 Time Period: AM Peak

(E/W): Bell (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]	380	488	75	39
LT lane vol: [5]	N/A	N/A	N/A	187
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		488	0	0	187	75	0
Critical sum [CS]	750						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		36.2	0	0	15.7	8.1	0
Critical v/c ratio [Xcm]	0.50						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 01PM.HC9 Date: 10-09-1998 Time Period: PM Peak

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

Peak hour factor: .86

Comment: 2001

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	29	64	59	332
2. Opposing mainline volume	1720	1523	69	61
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	49880	97472	4071	20252
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	180
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	51	366	47	43
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	51
10. Shared lane vol	60	431	55	0
THROUGH MOVEMENT				
11. Thru volume	1472	1354	14	26
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1532	1785	69	26
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.31	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	511	595	69	26
19. Critical lane volume	511	595	69	51
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 01PM.HC9 Date: 10-09-1998 Time Period: PM Peak

(E/W): Bell (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]	511	595	69	51
LT lane vol: [5]	N/A	N/A	N/A	180
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		595	0	0	180	69	0
Critical sum [CS]	844						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		39	0	0	13.9	7.2	0
Critical v/c ratio [Xcm]	0.56						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 10AM.HC9 Date: 10-07-1998 Time Period: AM Peak

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

Peak hour factor: .86

Comment: 2010 1

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	29	267	185	407
2. Opposing mainline volume	1588	1349	122	293
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	46052	360183	22570	119251
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	221
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	131	256	173	37
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	44
10. Shared lane vol	154	301	204	0
THROUGH MOVEMENT				
11. Thru volume	1218	1332	120	85
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1372	1633	324	85
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.51	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	457	544	324	85
19. Critical lane volume	457	544	324	85
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 10AM.HC9 Date: 10-07-1998 Time Period: AM Peak

(E/W): Bell (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]	457	544	324	85
LT lane vol: [5]	N/A	N/A	N/A	221
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG	EWT		STL	NST	NST
Critical phase vol [CV]		544	0	0	221	324	0
Critical sum [CS]	1089						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		28.5	0	0	13.3	18.2	0
Critical v/c ratio [Xcm]	0.72						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 10PM.HC9 Date: 10-07-1998 Time Period: PM Peak

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

Peak hour factor: .86

Comment: 2010

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	32	282	248	392
2. Opposing mainline volume	1925	1836	157	268
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	61600	517752	38936	105056
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	213
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	214	432	208	47
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	55
10. Shared lane vol	252	508	245	0
THROUGH MOVEMENT				
11. Thru volume	1622	1493	60	110
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1874	2001	305	110
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.64	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	625	667	305	110
19. Critical lane volume	625	667	305	110
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 10PM.HC9 Date: 10-07-1998 Time Period: PM Peak

(E/W): Bell (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]	625	667	305	110
LT lane vol: [5]	N/A	N/A	N/A	213
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		667	0	0	213	305	0
Critical sum [CS]	1185						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		31.7	0	0	12.2	16.1	0
Critical v/c ratio [Xcm]	0.78						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 20AM.HC9 Date: 10-07-1998 Time Period: AM Peak

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

Peak hour factor: .86

Comment: 2020

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	35	322	229	450
2. Opposing mainline volume	1605	1372	152	361
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	56175	441784	34808	162450
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	245
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	163	283	209	44
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	52
10. Shared lane vol	192	333	246	0
THROUGH MOVEMENT				
11. Thru volume	1209	1322	152	108
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1401	1655	398	108
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.62	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	467	552	398	108
19. Critical lane volume	467	552	398	108
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 20AM.HC9 Date: 10-07-1998 Time Period: AM Peak

(E/W): Bell (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]	467	552	398	108
LT lane vol: [5]	N/A	N/A	N/A	245
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		552	0	0	245	398	0
Critical sum [CS]	1195						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		26.6	0	0	13.5	20	0
Critical v/c ratio [Xcm]	0.79						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 20PM.HC9 Date: 10-07-1998 Time Period: PM Peak

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

Peak hour factor: .86

Comment: 2020

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	39	340	308	433
2. Opposing mainline volume	1959	1877	196	326
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	76401	638180	60368	141158
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	235
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	E
6. RT volume	266	477	250	57
7. Exclusive lanes	N/A	N/A	N/A	1
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	67
10. Shared lane vol	313	561	294	0
THROUGH MOVEMENT				
11. Thru volume	1611	1482	76	139
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	1
14. Total approach volume	1924	2043	370	139
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.78	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	641	681	370	139
19. Critical lane volume	641	681	370	139
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 20PM.HC9 Date: 10-07-1998 Time Period: PM Peak

(E/W): Bell (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]	641	681	370	139
LT lane vol: [5]	N/A	N/A	N/A	235
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		681	0	0	235	370	0
Critical sum [CS]	1286						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	71.6						
Green time		36.2	0	0	14.4	21	0
Critical v/c ratio [Xcm]	0.85						
Status	Near capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 20AM.HC9 Date: 01-28-1999 Time Period: AM Peak

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

Peak hour factor: .86

Comment: 2020 6 Lanes

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	35	322	229	450
2. Opposing mainline volume	1605	1372	152	361
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	56175	441784	34808	162450
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	245
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	163	283	209	44
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	192	333	246	52
THROUGH MOVEMENT				
11. Thru volume	1209	1322	152	108
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	2
14. Total approach volume	1401	1655	398	160
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.54	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	467	552	398	80
19. Critical lane volume	467	552	398	80
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 20AM.HC9 Date: 01-28-1999 Time Period: AM Peak

(E/W): Bell (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]	467	552	398	80
LT lane vol: [5]	N/A	N/A	N/A	245
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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		EWG			STL	NST	
Critical phase vol [CV]		552	0	0	245	398	0
Critical sum [CS]	1195						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	60						
Green time		26.6	0	0	13.5	20	0
Critical v/c ratio [Xcm]	0.79						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 20PM.HC9 Date: 01-28-1999 Time Period: PM Peak

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

Peak hour factor: .86

Comment: 2020 6 Lanes

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	39	340	308	433
2. Opposing mainline volume	1959	1877	196	326
3. Number of exclusive LT lanes	1	1	1	2
Cross Product [2] * [1]	76401	638180	60368	141158
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	Perm	Perm	Perm	Prot
4. LT adjustment factor	1.0	1.0	1.0	.92
5. LT lane vol	N/A	N/A	N/A	235
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	266	477	250	57
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	313	561	294	67
THROUGH MOVEMENT				
11. Thru volume	1611	1482	76	139
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	3	3	1	2
14. Total approach volume	1924	2043	370	206
15. Prop. of left turns in lane group	0	0	0	0
16. Left turn equivalence	8.2	8.2	1.69	N/A
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	641	681	370	103
19. Critical lane volume	641	681	370	103
Left Turn Check (if [16] > 8)				
20. Permitted left turn sneaker capacity: 7200/Cmax	60	60	N/A	N/A

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 20PM.HC9 Date: 01-28-1999 Time Period: PM Peak

(E/W): Bell (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]	641	681	370	103
LT lane vol: [5]	N/A	N/A	N/A	235
Left turn protection: (P/U/N)	U	U	U	P
Dominant left turn: (Indicate by '*')		*		*

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

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

Phase plan selected (1 to 4) 1 2a

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

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		EWG			STL	NST	
Critical phase vol [CV]		681	0	0	235	370	0
Critical sum [CS]	1286						
CBD adjustment [CBD]	1						
Reference sum [RS]	1471						
Lost time/phase [PL]		3	0	0	3	3	0
Lost time/cycle [TL]	9						
Cycle length [CYC]	71.6						
Green time		36.2	0	0	14.4	21	0
Critical v/c ratio [Xcm]	0.85						
Status	Near capacity.						

APPENDIX D

ACCIDENT DATA

Accidents On El Mirage Road: 1995-1997					**28-Jan-99**
Bell Road To Beardsley Road					**H Olien**
Incident		**Severity**		**Light**	
Right Angle	0	No Injury	0	Daylight	1
Left Turning	0	Injury - Unknown	0	Darkness	0
Rear End	1	Possible Injury	1	Dawn	0
Side Swipe	1	Non - Incapacitating	0	Dusk	0
Single Vehicle	0	Incapacitating	0		
Other	0	Fatal	0		
Total	2	**Total**	1	**Total**	1
Incident		**Severity**		**Light**	
Right Angle	0.00%	No Injury	0.00%	Daylight	100.00%
Left Turning	0.00%	Injury - Unknown	0.00%	Darkness	0.00%
Rear End	50.00%	Possible Injury	100.00%	Dawn	0.00%
Side Swipe	50.00%	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%

Accidents On El Mirage Road: 1995-1997					**29-Jan-99**
Bell Road To Beardsley Road					**H Olien**
Incident		**Severity**		**Light**	
Right Angle	0	No Injury	2	Daylight	2
Left Turning	0	Injury - Unknown	0	Darkness	2
Rear End	1	Possible Injury	0	Dawn	0
Side Swipe	0	Non - Incapacitating	2	Dusk	0
Single Vehicle	1	Incapacitating	0		
Other	2	Fatal	0		
Total	4	**Total**	4	**Total**	4
Incident		**Severity**		**Light**	
Right Angle	0.00%	No Injury	50.00%	Daylight	50.00%
Left Turning	0.00%	Injury - Unknown	0.00%	Darkness	50.00%
Rear End	25.00%	Possible Injury	0.00%	Dawn	0.00%
Side Swipe	0.00%	Non - Incapacitating	50.00%	Dusk	0.00%
Single Vehicle	25.00%	Incapacitating	0.00%		0.00%
Other	50.00%	Fatal	0.00%		0.00%
Total	100.00%	**Total**	100.00%	**Total**	100.00%

Accidents On El Mirage Road: 1995-1997					29-Jan-99
Bell Road To Beardsley Road					**H Olien**
Incident		**Severity**		**Light**	
Right Angle	0	No Injury	2	Daylight	3
Left Turning	0	Injury - Unknown	0	Darkness	2
Rear End	2	Possible Injury	1	Dawn	0
Side Swipe	1	Non - Incapacitating	2	Dusk	0
Single Vehicle	1	Incapacitating	0		
Other	2	Fatal	0		
Total	6	**Total**	5	**Total**	5
Incident		**Severity**		**Light**	
Right Angle	0.00%	No Injury	40.00%	Daylight	60.00%
Left Turning	0.00%	Injury - Unknown	0.00%	Darkness	40.00%
Rear End	33.33%	Possible Injury	20.00%	Dawn	0.00%
Side Swipe	16.67%	Non - Incapacitating	40.00%	Dusk	0.00%
Single Vehicle	16.67%	Incapacitating	0.00%		0.00%
Other	33.33%	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. RATIONAL METHOD CALCULATIONS

HEC-2 / HEC-RAS COMPARISON

Existing Condition
HEC-2 Output

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

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

MOMICKEN DAM OUTLET WASH

SUMMARY PRINTOUT

	SECNO	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	5236.38	3.13	812.77	5.69	1176.00	55.93	4.24
*	.107	6522.00	1181.02	4426.89	4282.00	5268.00	5233.88	4.04	806.99	5.02	1176.00	228.12	6.49
*	.107	5085.00	1181.08	4426.66	4282.00	5268.00	5234.06	1.50	807.40	5.08	1176.00	122.72	4.88
*	.107	2917.00	1180.70	4428.44	4282.00	5268.00	5232.71	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	5120.12	2.81	683.76	5.83	1178.00	46.17	4.29
*	.159	5085.00	1183.41	4438.96	4355.00	5150.00	5115.06	2.33	676.09	5.41	1178.00	57.50	4.17
*	.159	2917.00	1182.89	4441.93	4355.00	5150.00	5109.26	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	5263.67	2.69	449.78	6.45	1184.50	91.15	6.69
	.350	6522.00	1190.75	4897.02	4855.00	5428.00	5262.49	4.77	365.47	6.25	1184.50	117.80	7.30
*	.350	5085.00	1190.29	4493.03	4855.00	5428.00	5259.77	4.57	379.74	5.79	1184.50	132.97	6.96
*	.350	2917.00	1189.59	4917.05	4855.00	5428.00	5227.73	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	5436.52	4.01	458.65	6.76	1188.00	55.38	5.31
*	.437	5085.00	1194.40	4978.39	4970.00	5450.00	5435.62	4.11	457.23	6.40	1188.00	53.33	4.76
*	.437	2917.00	1193.66	4979.51	4970.00	5450.00	5433.70	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

	SECNO	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

	SECNO	Q	CWSEL	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	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
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	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
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	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
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	0.746	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	0.746	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

McMICKEN DAM OUTLET WASH

McMICKEN DAM OUTLET CHANNEL

OVERHEAD TRANSMISSION LINE

PINNACLE PEAK RD. (EXTENDED)

HAPPY VALLEY RD. (EXTENDED)

EL MIRAGE RD. (EXTENDED)

SEE SHEET M-2

MATCH LINE

MCMICKEN DAM STRUCTURE AND FLOWAGE EASEMENT.

RM149 PP-1017 1298.17

RM150 PP-1003 1311.92

RM151 PP-1004 1314.21

RM147 PP-1024 1306.48

RM148 PP-1016 1289.97

RM146 PP-1015 1323.74

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

McMICKEN DAM OUTLET WASH KEY MAP

SUN CITY WEST

SHEET M-1

SHEET M-2

SHEET M-3

SCALE: 1" = 200'

200 100 0 200 400

CONTOUR INTERVAL 2 FEET

The WLB Group Inc. WLB

Cooper Aerial Survey Co.

LEGEND

100-YEAR FLOODWAY

100-YEAR FLOODPLAIN

STATIONS (FT) 1000

CENTERLINE

ELEVATION REFERENCE MARK RM10

FLOODPLAIN/FLOODWAY MAP

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

SEE SHEET M-3

MATCH LINE

SEE SHEET M-1

MATCH LINE

SUN CITY WEST

123RD DRIVE

EL MIRAGE ROAD

McMICKEN DAM

DOVE VALLEY DRIVE

MORNING DEER DRIVE

EVERINGSIDE DRIVE

OUTLET WASH

MCMICKEN DAM STRUCTURE AND FLOWAGE EASEMENT.

RM157 PP-1019 1259.59

RM158 PP-1026 1271.98

RM156 PP-1027 1242.91

RM155 PP-1019 1258.61

RM153 PP-1018 1270.45

RM154 PP-1028 1256.92

RM152 PP-1025 1280.29

E 374,000

E 375,000

E 376,000

E 377,000

E 378,000

N 973,000

N 974,000

N 975,000

N 976,000

N 977,000

N 978,000

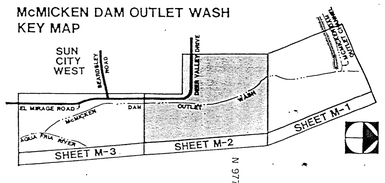
N 979,000

N 980,000

LEGEND

100-YEAR FLOODWAY	
100-YEAR FLOODPLAIN	
STATIONS (FT)	1000
CENTERLINE	
ELEVATION REFERENCE MARK	RM10

McMICKEN DAM OUTLET WASH
KEY MAP



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

SCALE: 1" = 200'

200 100 0 200 400

CONTOUR INTERVAL 2 FEET

The WLB Group Inc. WLB

Cooper Aerial Survey Co.

FLOODPLAIN/FLOODWAY MAP

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AERIAL MAPPING FOR

WITTMANN ADMS M-2

MCMICKEN DAM OUTLET WASH

DATE FLOWN: 11-13-86 | SHEET 9 OF 55

SUN CITY WEST

CONQUISTADOR DRIVE

EL MIRAGE ROAD

BEARDSLEY ROAD

CANDLELIGHT DRIVE

ROCK SPRING DRIVE

COUGAR DRIVE

123RD DRIVE

OUTLET WASH

MCMICKEN DAM

UNION HILLS DR. (EXTENDED)

AGUA FRIA RIVER

MCMICKEN DAM STRUCTURE AND FLOWAGE EASEMENT.

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

MATCH LINE SEE SHEET M-2

RM160 PP-1030 1221.72

RM161 PP-1021 1231.31

RM162 PP-1020 1240.79

RM169 PP-1023 1202.43

PP-1022 1192.07

E 374,000

E 375,000

E 376,000

E 377,000

E 378,000

E 379,000

N 379,000

N 969,000

N 968,000

N 967,000

N 966,000

N 965,000

N 970,000

N 971,000

N 972,000

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

McMICKEN DAM OUTLET WASH KEY MAP

SUN CITY WEST

SHEET M-3

SHEET M-2

SHEET M-1

SCALE: 1" = 200'

200 100 0 200 400

CONTOUR INTERVAL 2 FEET

The WLB Group Inc. WLB

Cooper Aerial Survey Co.

LEGEND

100-YEAR FLOODWAY

100-YEAR FLOODPLAIN

STATIONS (FT) 1000

CENTERLINE

ELEVATION REFERENCE MARK RM10

FLOODPLAIN/FLOODWAY MAP

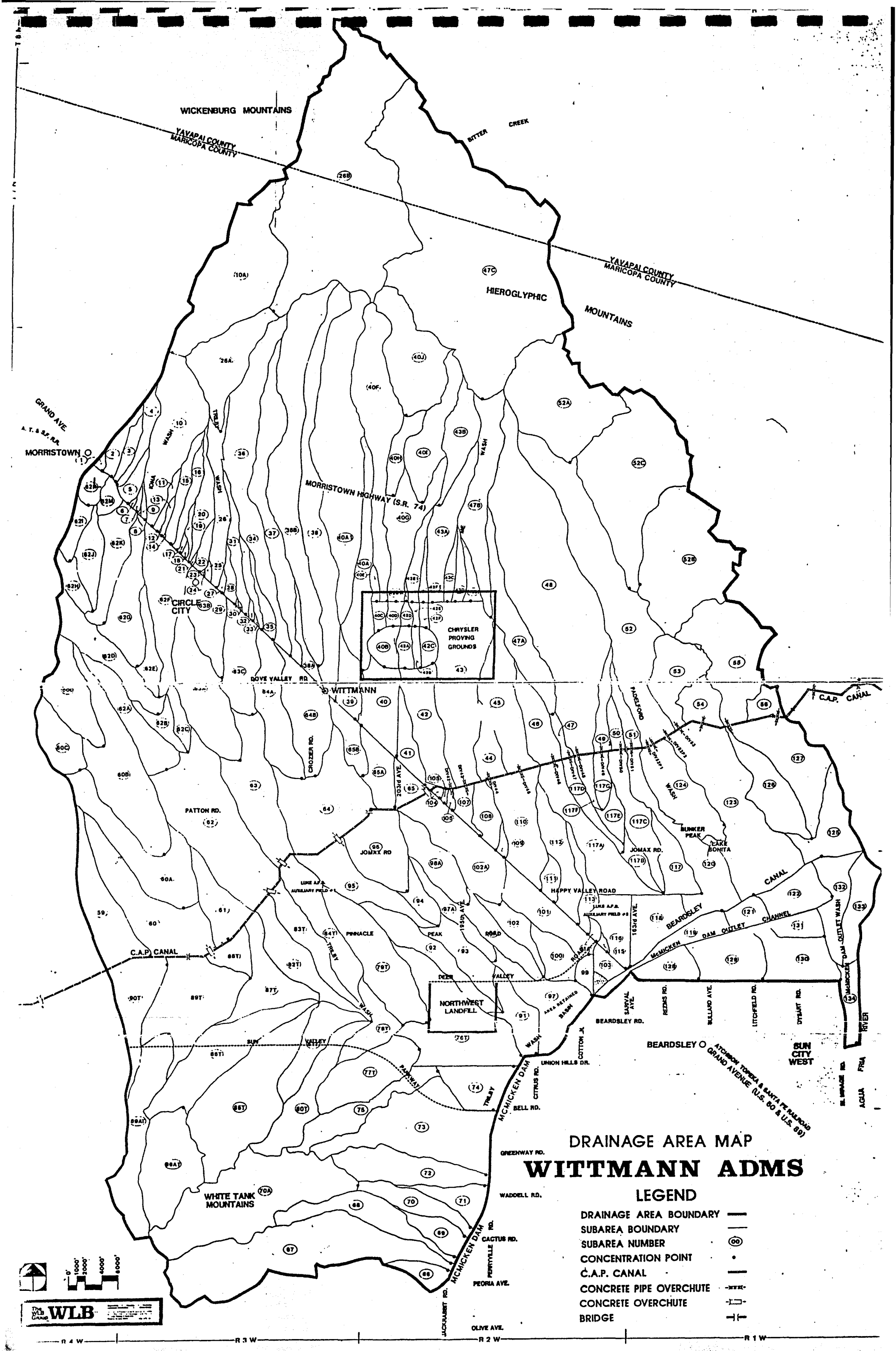
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AERIAL MAPPING FOR

WITTMANN ADMS M-3

McMICKEN DAM OUTLET WASH

DATE FLOWN: 11-13-86 | SHEET 10 OF 55


DRAINAGE AREA MAP
WITTMANN ADMS
LEGEND
DRAINAGE AREA BOUNDARY
SUBAREA BOUNDARY
SUBAREA NUMBER
CONCENTRATION POINT
C.A.P. CANAL
CONCRETE PIPE OVERCHUTE
CONCRETE OVERCHUTE
BRIDGE
WICKENBURG MOUNTAINS
YAVAPAI COUNTY
MARICOPA COUNTY
HIEROGLYPHIC MOUNTAINS
BITTER CREEK
MORRISTOWN
GRAND AVE
A. T. & S.F. R.R.
MORRISTOWN HIGHWAY (S.R. 74)
CIRCLE CITY
CHRYSLER PROVING GROUNDS
DOVE VALLEY RD.
WITTMANN
PATTON RD.
JOMAX RD.
HAPPY VALLEY ROAD
PINNACLE PEAK ROAD
DEER VALLEY
NORTHWEST LANDFILL
AREA RETAINED BASIN
SUN VALLEY PARKWAY
WHITE TANK MOUNTAINS
MCMICKEN DAM
BEARDSLEY
BEARDSLEY RD.
UNION HILLS DR.
BELL RD.
GREENWAY RD.
WADDELL RD.
CACTUS RD.
PEORIA AVE.
OLIVE AVE.
C.A.P. CANAL
LAKE BONITA
BUNKER PEAK
SUN CITY WEST
ATCHISON TOPEKA & SANTA FE RAILROAD
GRAND AVENUE (U.S. 60 & U.S. 89)
R 4 W
R 3 W
R 2 W
R 1 W
The WLB Group
WLB

```
1*************************************
*                                   *
*   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 *
*************************************
```

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

```
X     X XXXXXXX  XXXXX         X
X     X X      X     X       XX
X     X X      X              X
XXXXXXX XXXX   X       XXXXX  X
X     X X      X              X
X     X X      X     X        X
X     X XXXXXXX  XXXXX       XXX
```

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       WTMN50YR
  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
              *DIAGRAM
 14           IT     3 26JAN87    1200     640
 15           IN    15 26JAN87    1200
 16           IO     5
 17           JD  3.72    .001
 18           PC  .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 19           PC  .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 20           PC  .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 21           PC  .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 22           PC  .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 23           PC  .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 24           PC  .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 25           PC  .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 26           PC  .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 27           PC  .983    .986    .989    .992    .995    .998    1.00   1.000   1.000   1.000
 28           JD  3.68      10
 29           JD  3.53      50
 30           JD  3.47     100
 31           JD  3.37     350

 32           KK     1
 33           KM       RUNOFF FROM SUBWATERSHED 1.
 34           KM       UNIT HYDROGRAPHS HAVE BEEN COMPUTED FOR EACH SUBWATERSHED USING THE
 35           KM       CORPS OF ENGINEERS S-GRAPH COMPUTATIONS FOR UNIT HYDROGRAPHS.  THE
 36           KM       S-GRAPH PROGRAM HAS BEEN DEVELOPED FOR THE PHOENIX MOUNTAIN AND PHOENIX
 37           KM       VALLEY AREAS.  THIS SHOULD GIVE A MORE RELIABLE UNIT HYDROGRAPH FOR THE
 38           KM       HEC-1 PROGRAM TO UTILIZE WITHIN THE WITTMANN ADMS AREA.
 39           BA  .088
 40           LS     0      81       0
 41           UK   200   .0160     .11     100
 42           RK  2900   .0132     .05            TRAP      0      15

 43           KK    C1
```

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	JAN	1530	551	3665.
26	JAN	1533	72	0.	26	JAN	2333	232	57.	27	JAN	0733	392	4711.	27	JAN	1533	552	3658.
26	JAN	1536	73	0.	26	JAN	2336	233	61.	27	JAN	0736	393	4702.	27	JAN	1536	553	3651.
26	JAN	1539	74	0.	26	JAN	2339	234	67.	27	JAN	0739	394	4694.	27	JAN	1539	554	3644.
26	JAN	1542	75	0.	26	JAN	2342	235	73.	27	JAN	0742	395	4686.	27	JAN	1542	555	3637.

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.

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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			

+	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 Outlet Wash upstream from Deer Valley Channel
+	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 DV Channel @ Wash
+	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

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1*************************************
*                                   *
*   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 XXXXXXX  XXXXX        X
X    X X      X    X       XX
X    X X      X            X
XXXXXXX XXXX  X      XXXXX  X
X    X X      X            X
X    X X      X    X       X
X    X XXXXXXX  XXXXX       XXX
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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 -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

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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
              *DIAGRAM
 14           IT     3 26JAN87   1200    640
 15           IN    15 26JAN87   1200
 16           IO     5
 17           JD  4.21    .001
 18           PC  .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 19           PC  .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 20           PC  .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 21           PC  .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 22           PC  .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 23           PC  .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 24           PC  .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 25           PC  .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 26           PC  .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 27           PC  .983    .986    .989    .992    .995    .998   1.00   1.000   1.000   1.000
 28           JD  4.17      10
 29           JD  4.00      50
 30           JD  3.93     100
 31           JD  3.82     350

 32           KK     1
 33           KM       RUNOFF FROM SUBWATERSHED 1.
 34           KM       UNIT HYDROGRAPHS HAVE BEEN COMPUTED FOR EACH SUBWATERSHED USING THE
 35           KM       CORPS OF ENGINEERS S-GRAPH COMPUTATIONS FOR UNIT HYDROGRAPHS.  THE
 36           KM       S-GRAPH PROGRAM HAS BEEN DEVELOPED FOR THE PHOENIX MOUNTAIN AND PHOENIX
 37           KM       VALLEY AREAS.  THIS SHOULD GIVE A MORE RELIABLE UNIT HYDROGRAPH FOR THE
 38           KM       HEC-1 PROGRAM TO UTILIZE WITHIN THE WITTMANN ADMS AREA.
 39           BA  .088
 40           LS     0      81       0
 41           UK   200   .0160     .11     100
 42           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 Channel @ Wash

Outlet 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.	10.19 125+131
+	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 – Wash upstream from Dart Valley
+	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 DV Chan. @ Wash
+	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

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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m/s)	(m2)	(m)	
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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m/s)	(m2)	(m)	
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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m/s)	(m2)	(m)	
Reach-1	2.116	177.63	381.91	383.44		2.16	82.41	64.04	0.61
Reach-1	2.116	177.63	381.91	383.89		2.12	83.74	47.22	0.51
Reach-1	2.116	139.21	381.91	383.24		1.99	69.90	62.05	0.60
Reach-1	2.116	81.44	381.91	382.89		1.67	48.78	58.55	0.58
Reach-1	2.116	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)

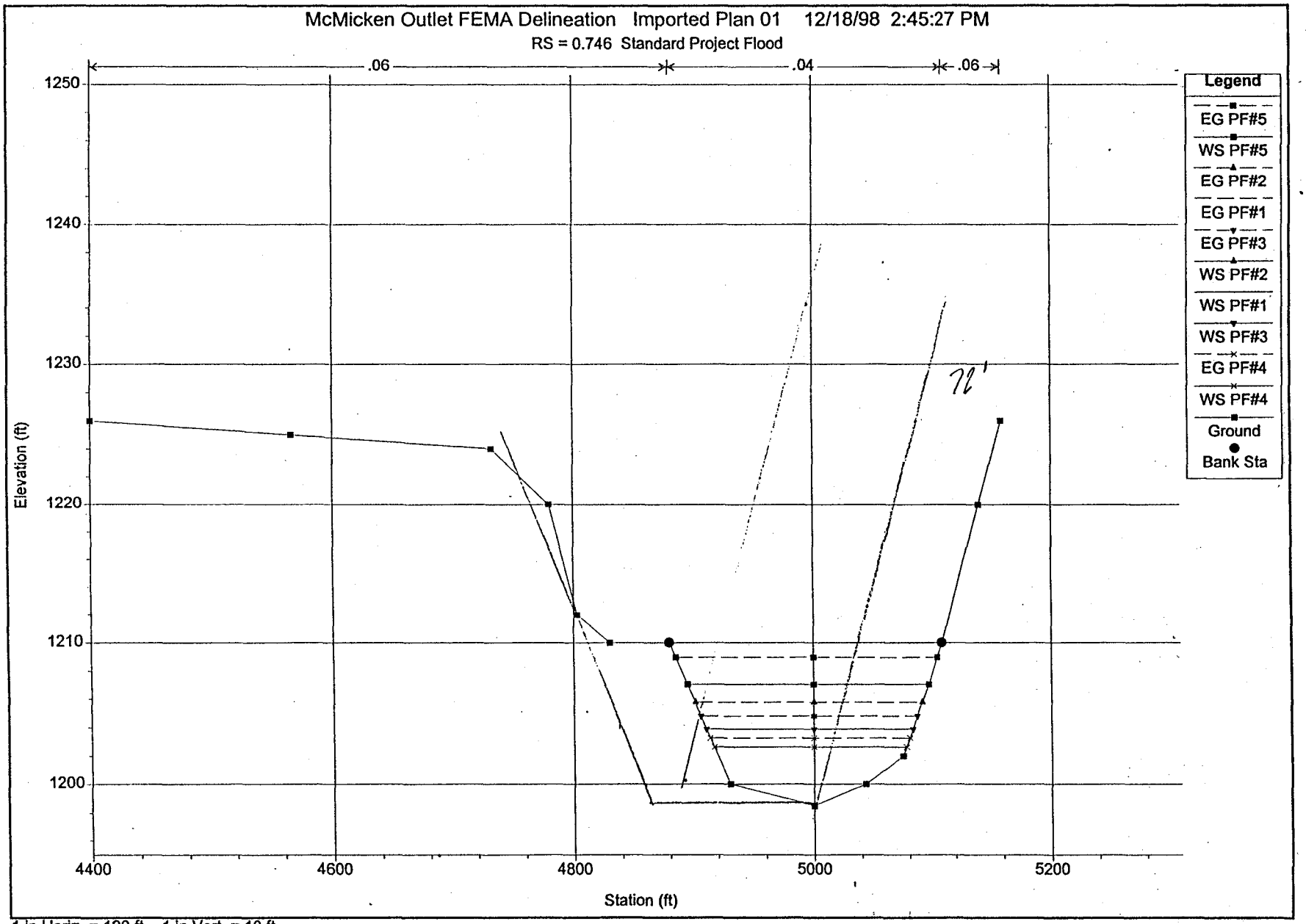
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m/s)	(m2)	(m)	
Reach-1	1.307	396.44	375.61	377.65	377.65	4.08	99.77	62.47	0.98
Reach-1	1.286	177.63	375.21	376.44	376.44	2.99	59.42	66.44	1.01
Reach-1	1.286	177.63	375.21	376.44	376.44	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

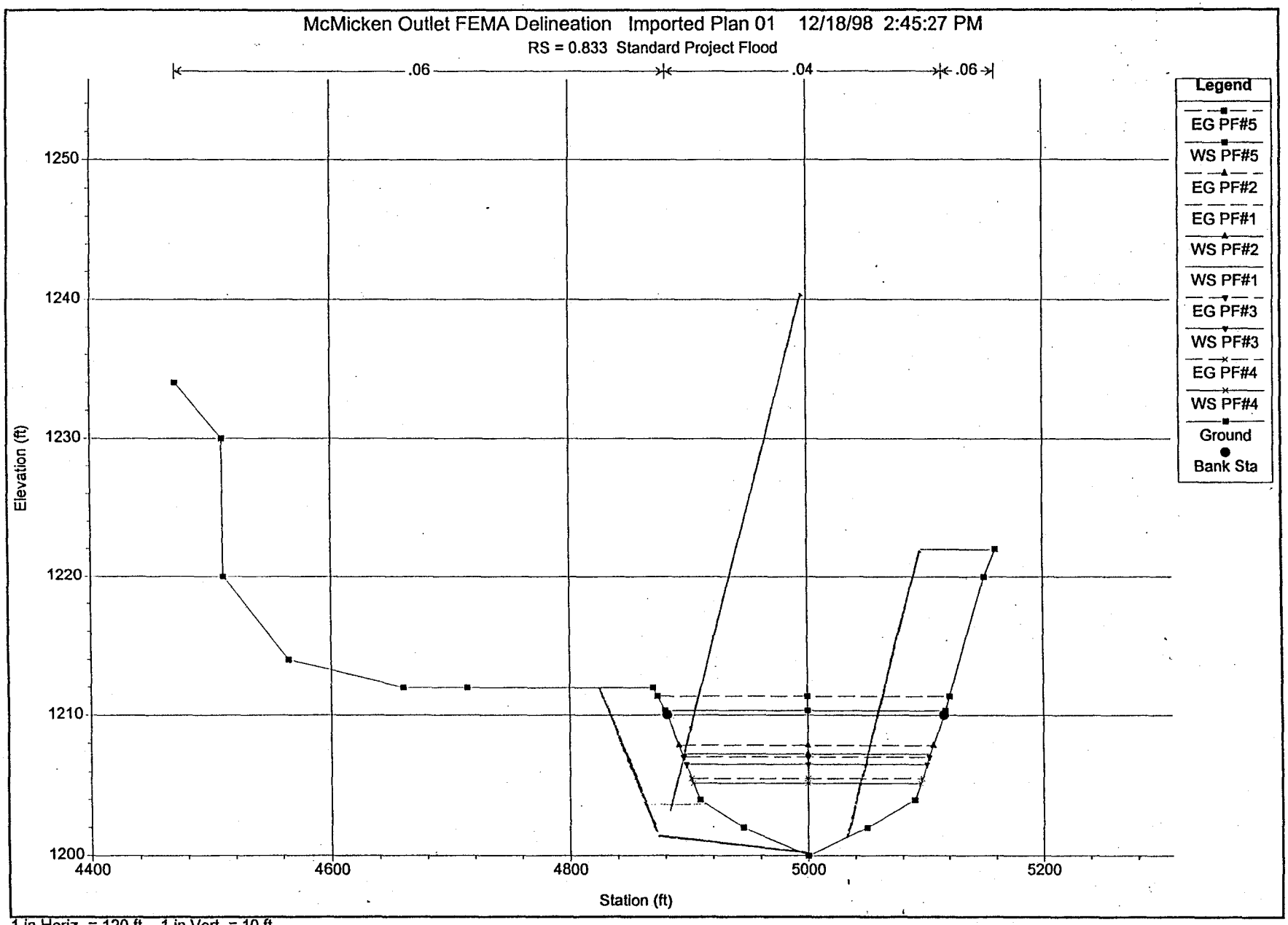
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	2.118	6273.00	1253.00	1258.01		7.07	887.03	210.10	0.61
Reach-1	2.118	6273.00	1253.00	1259.47		6.96	901.39	154.91	0.51
Reach-1	2.118	4916.00	1253.00	1257.36		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	Min Ch El	W.S. Elev	Crit W.S.	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
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



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



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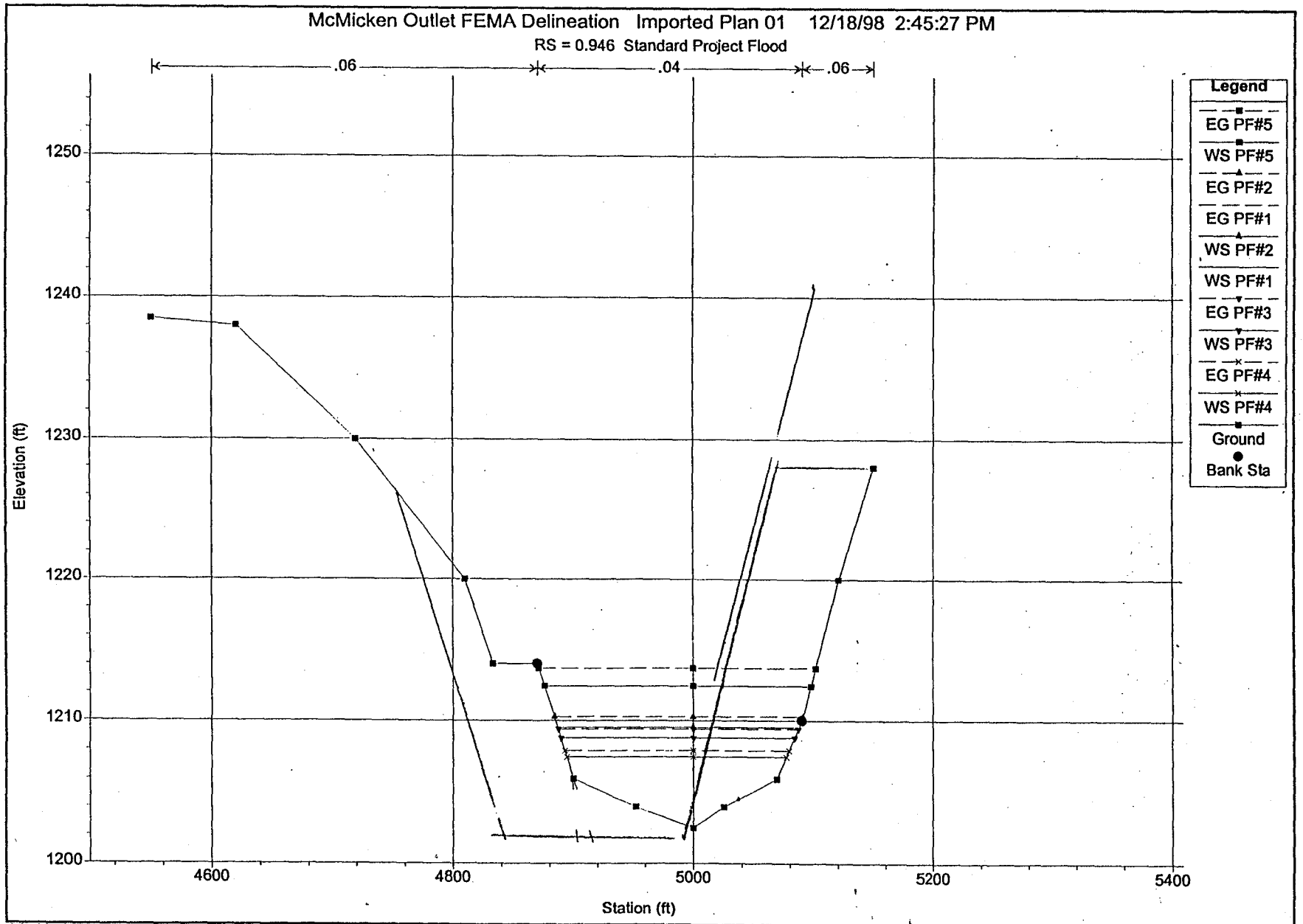

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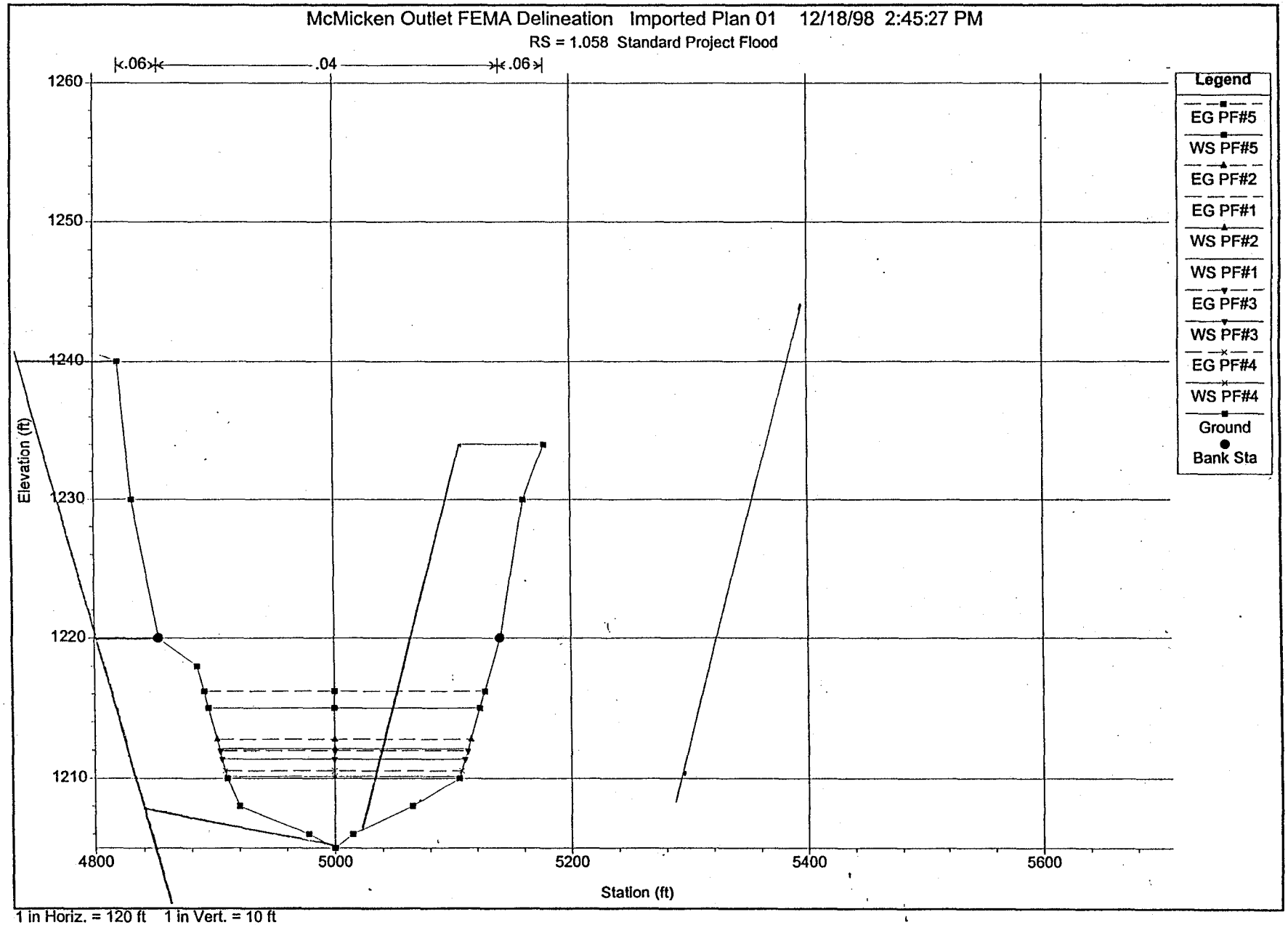

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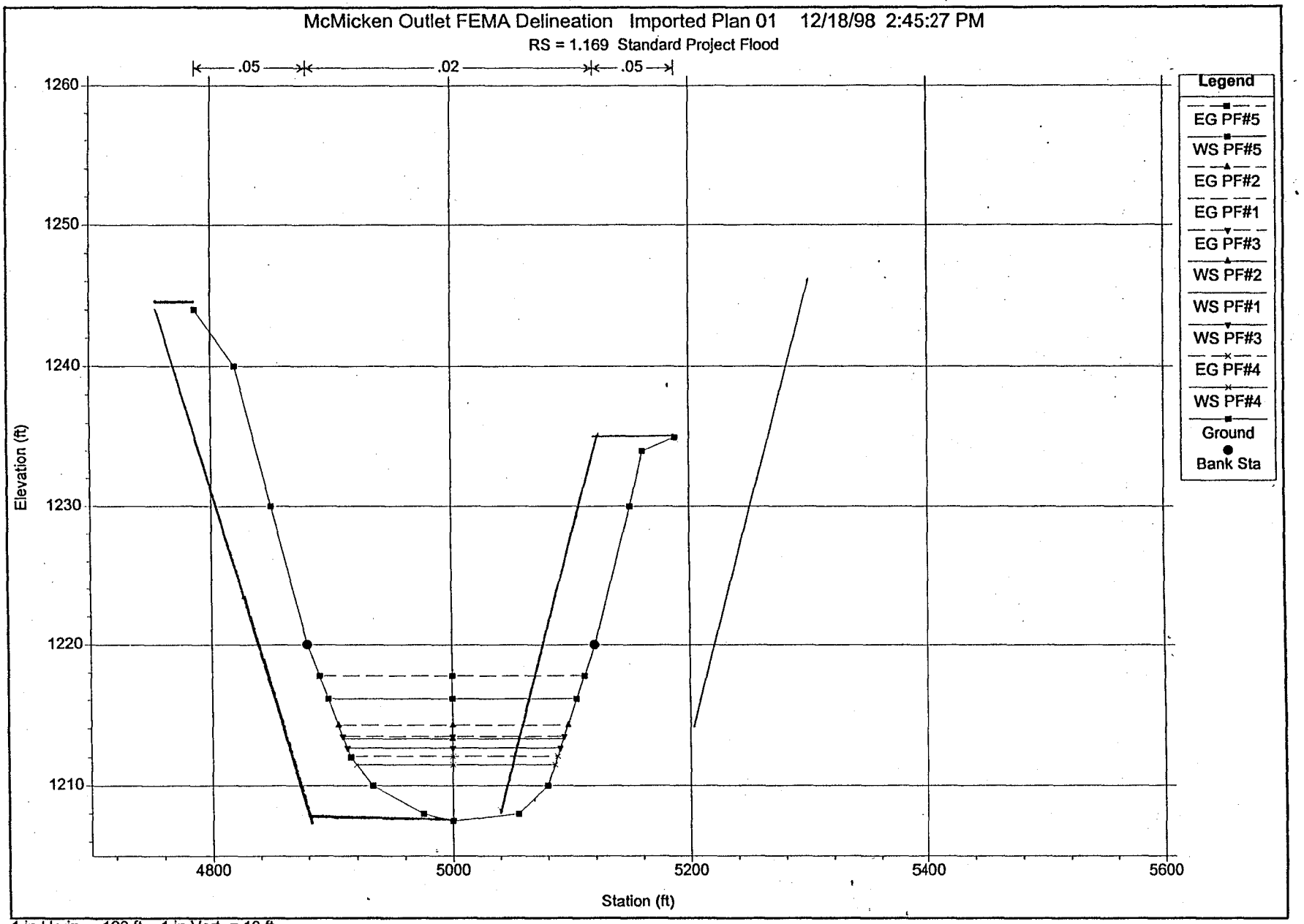

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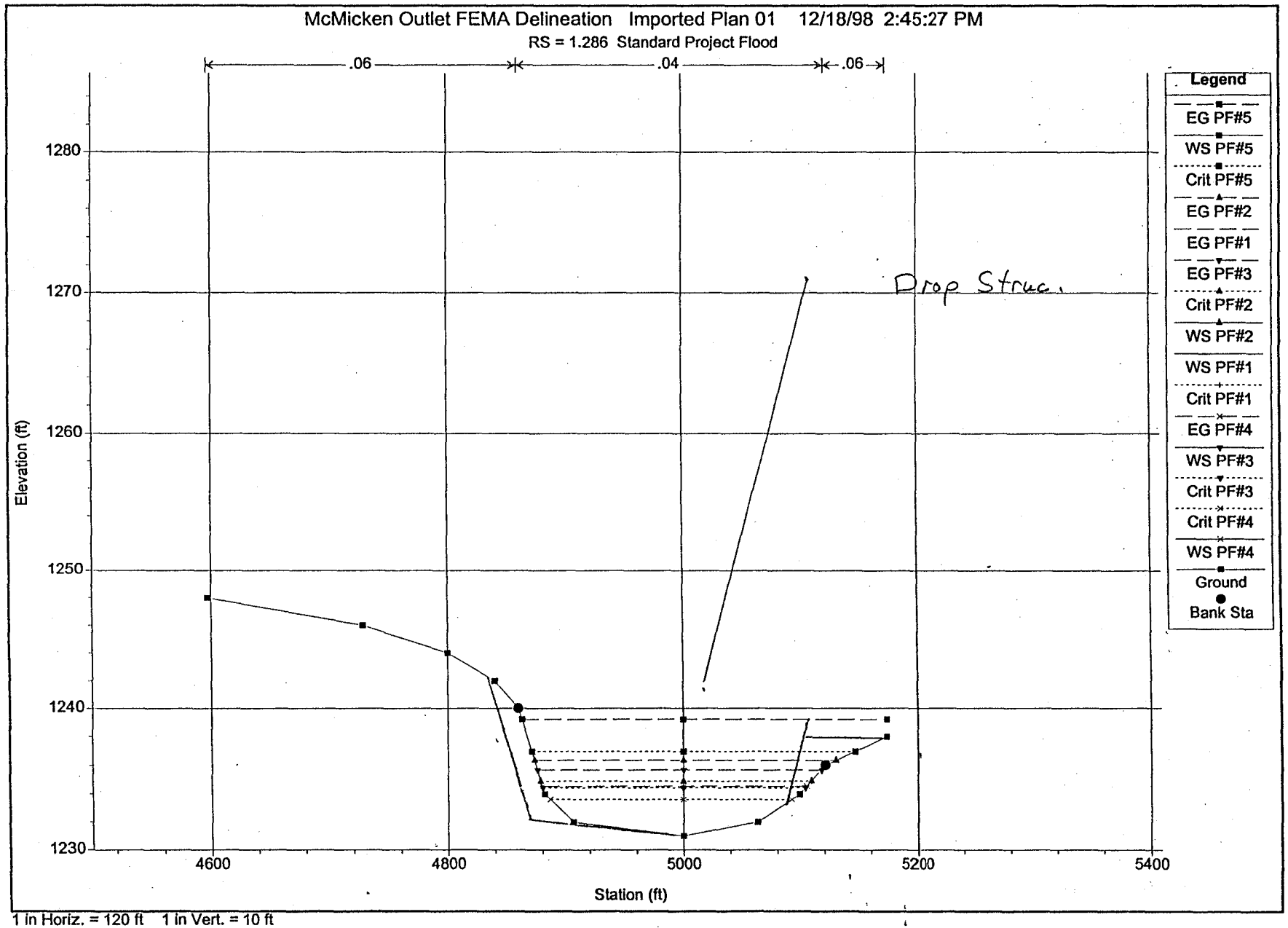

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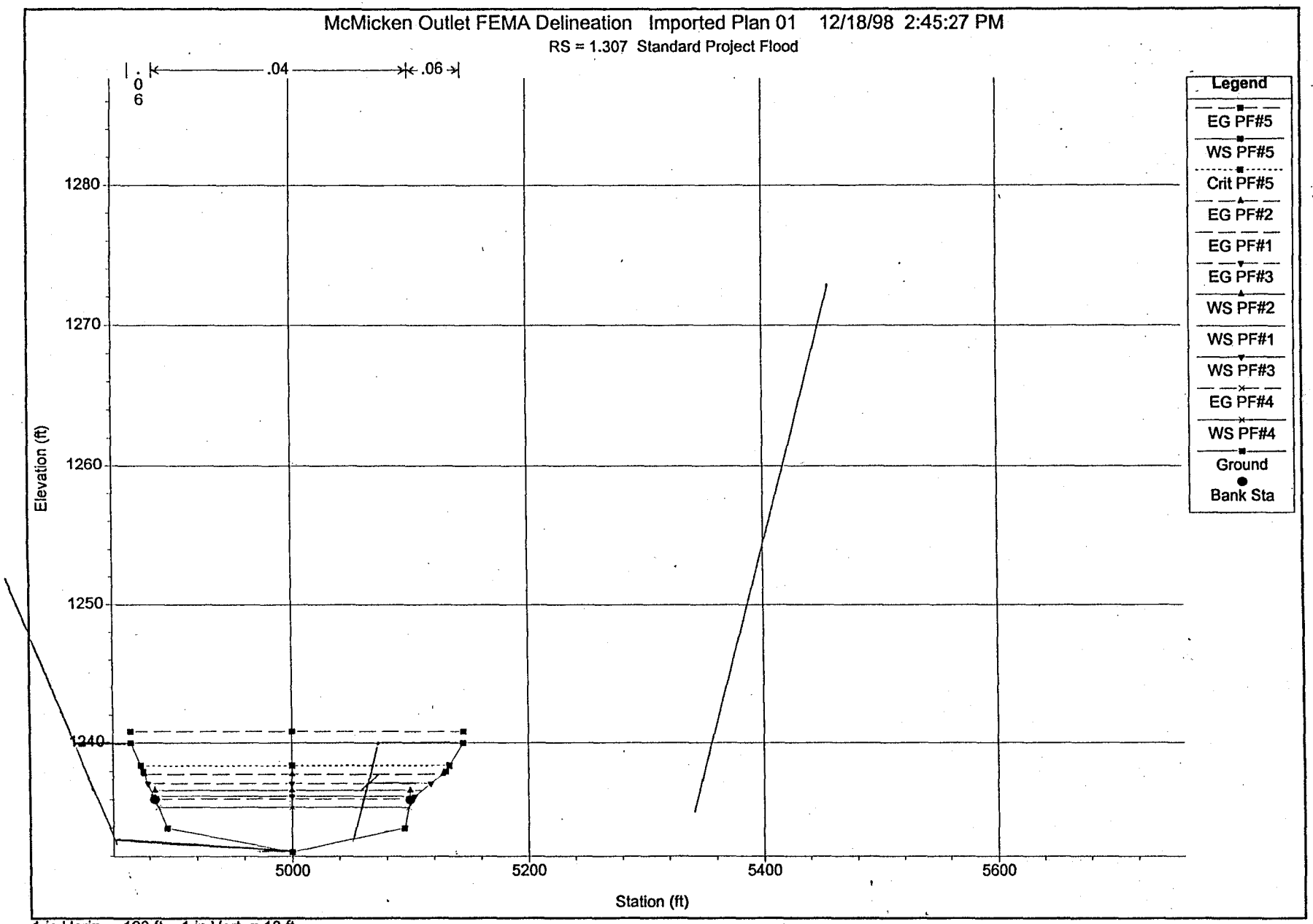

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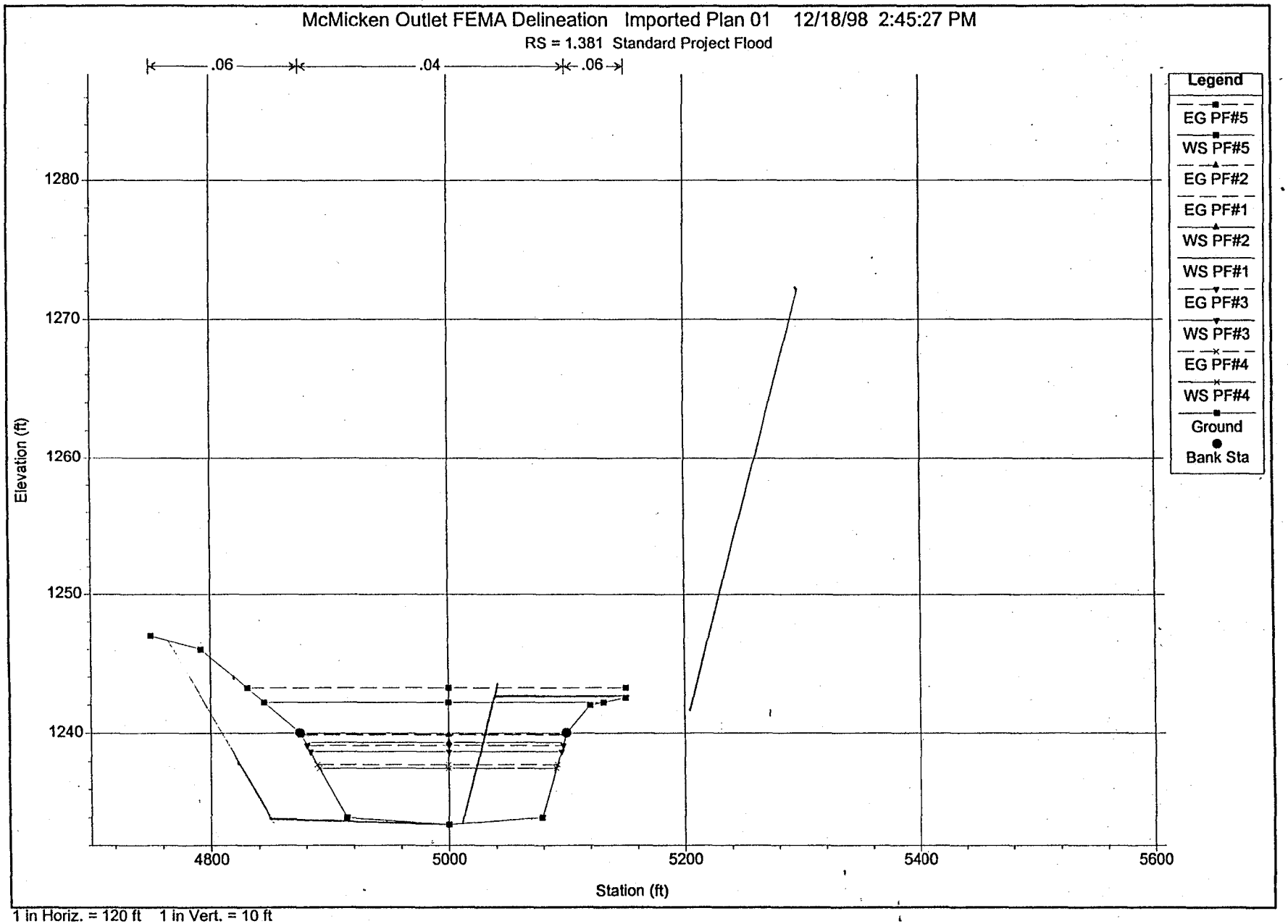
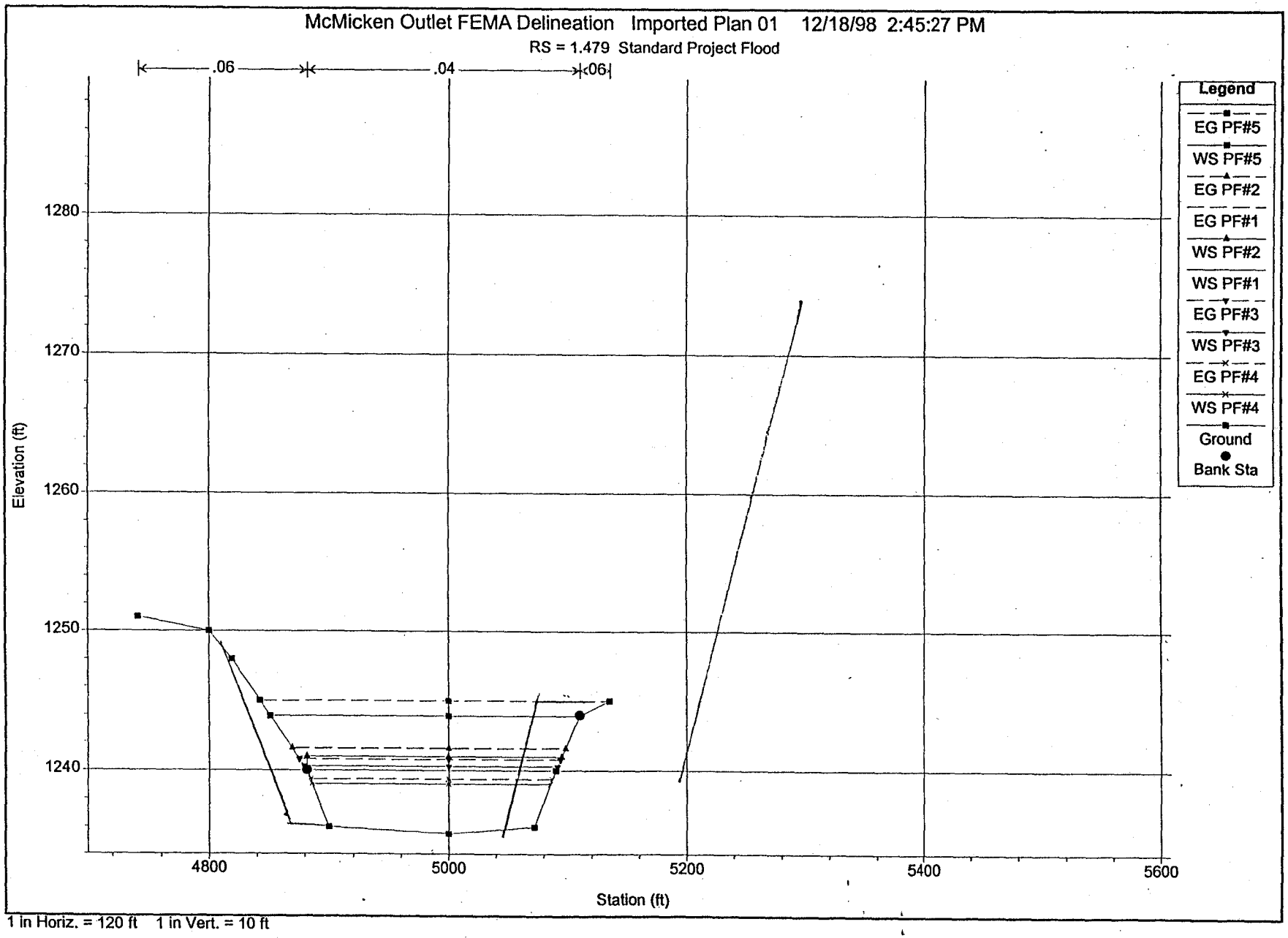
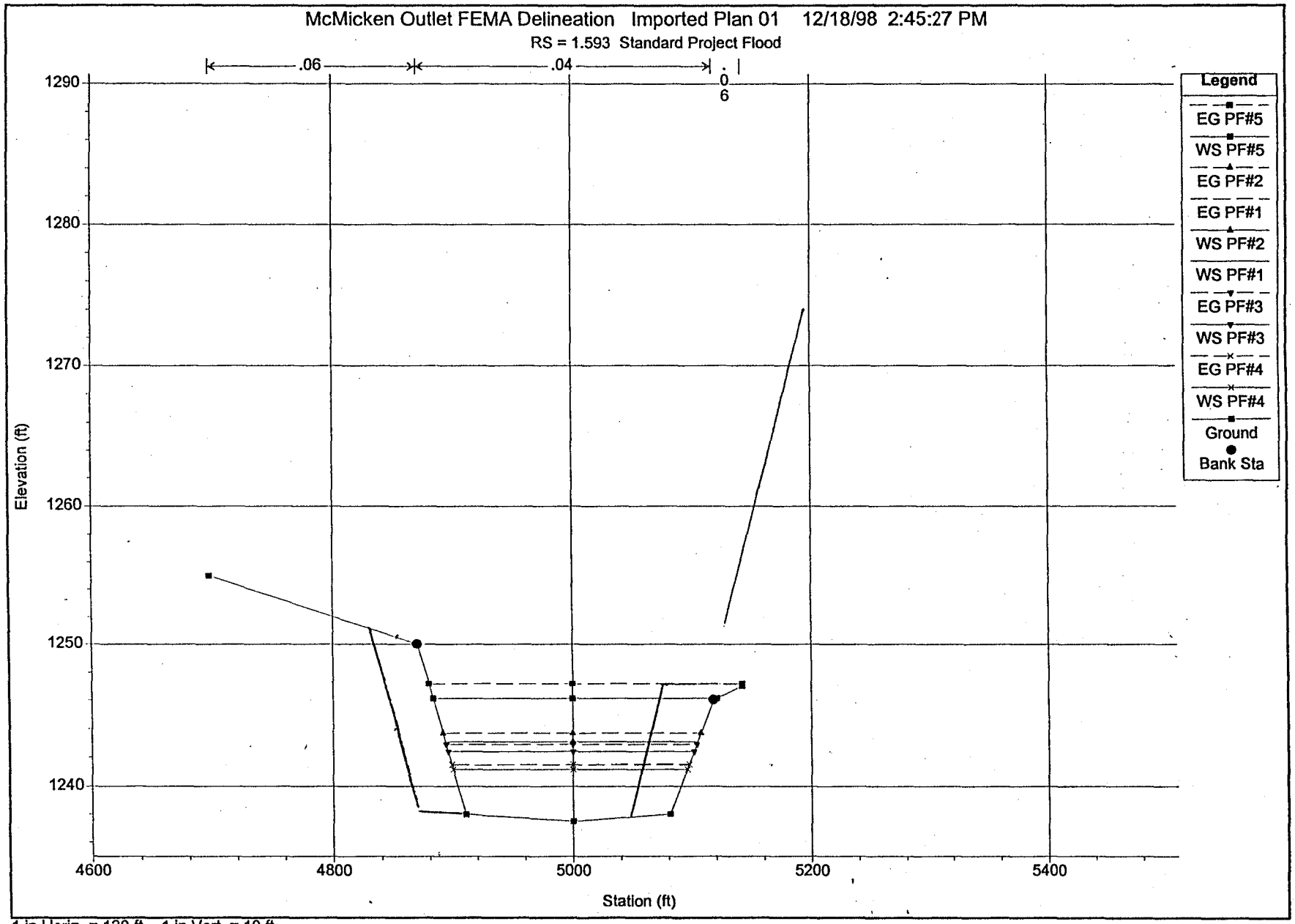


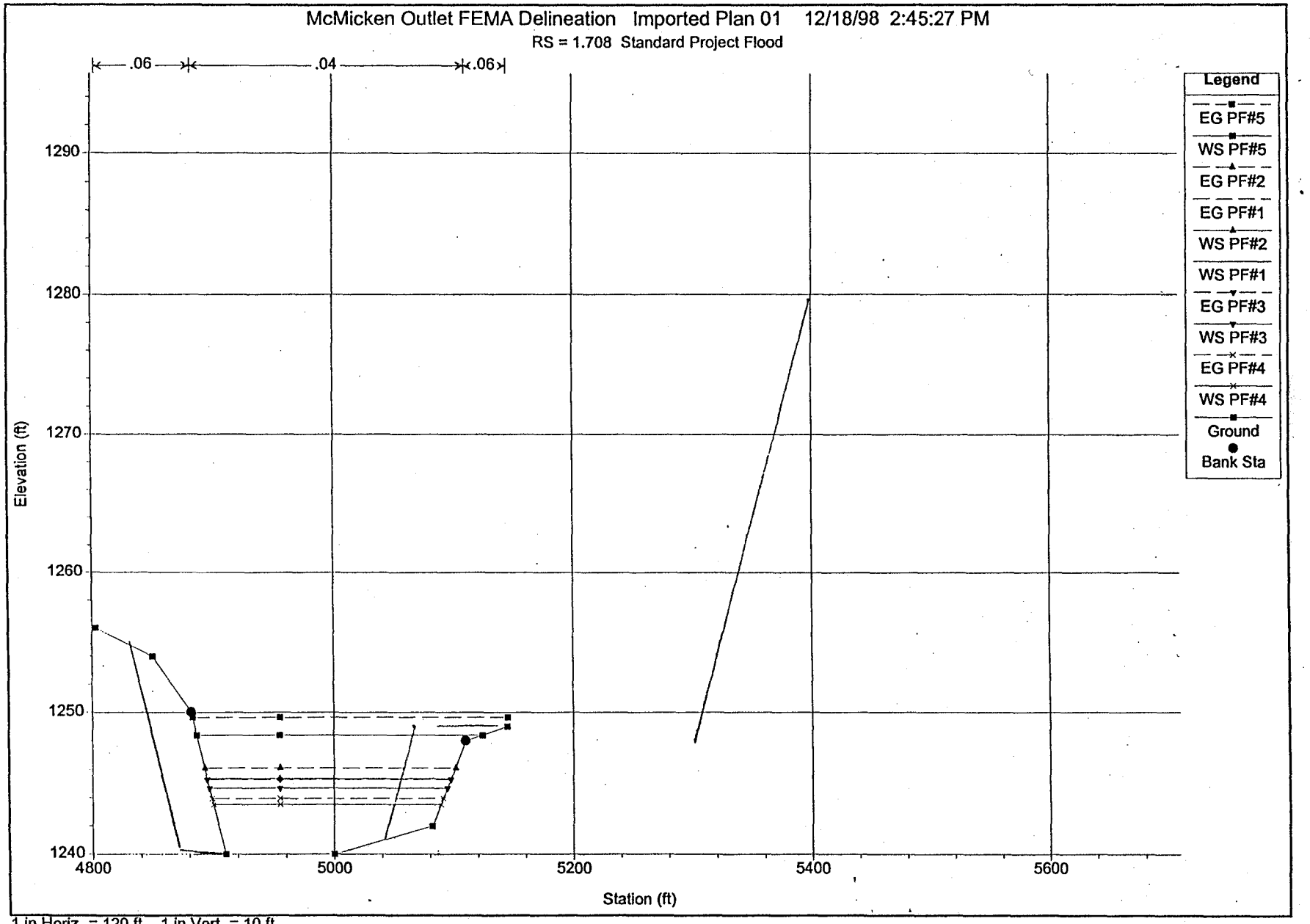
1 in Horiz. = 120 ft 1 in Vert. = 10 ft



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



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



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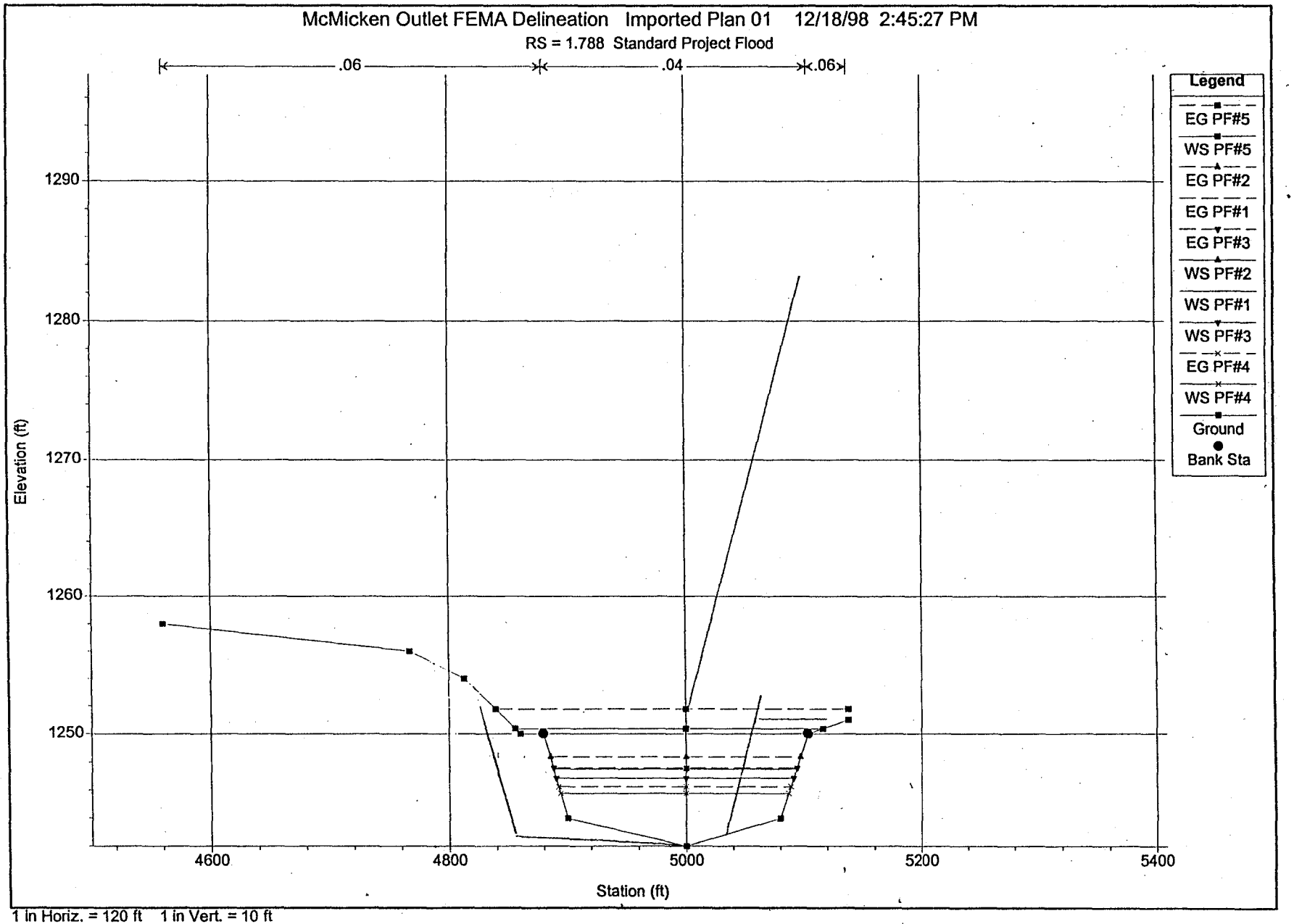

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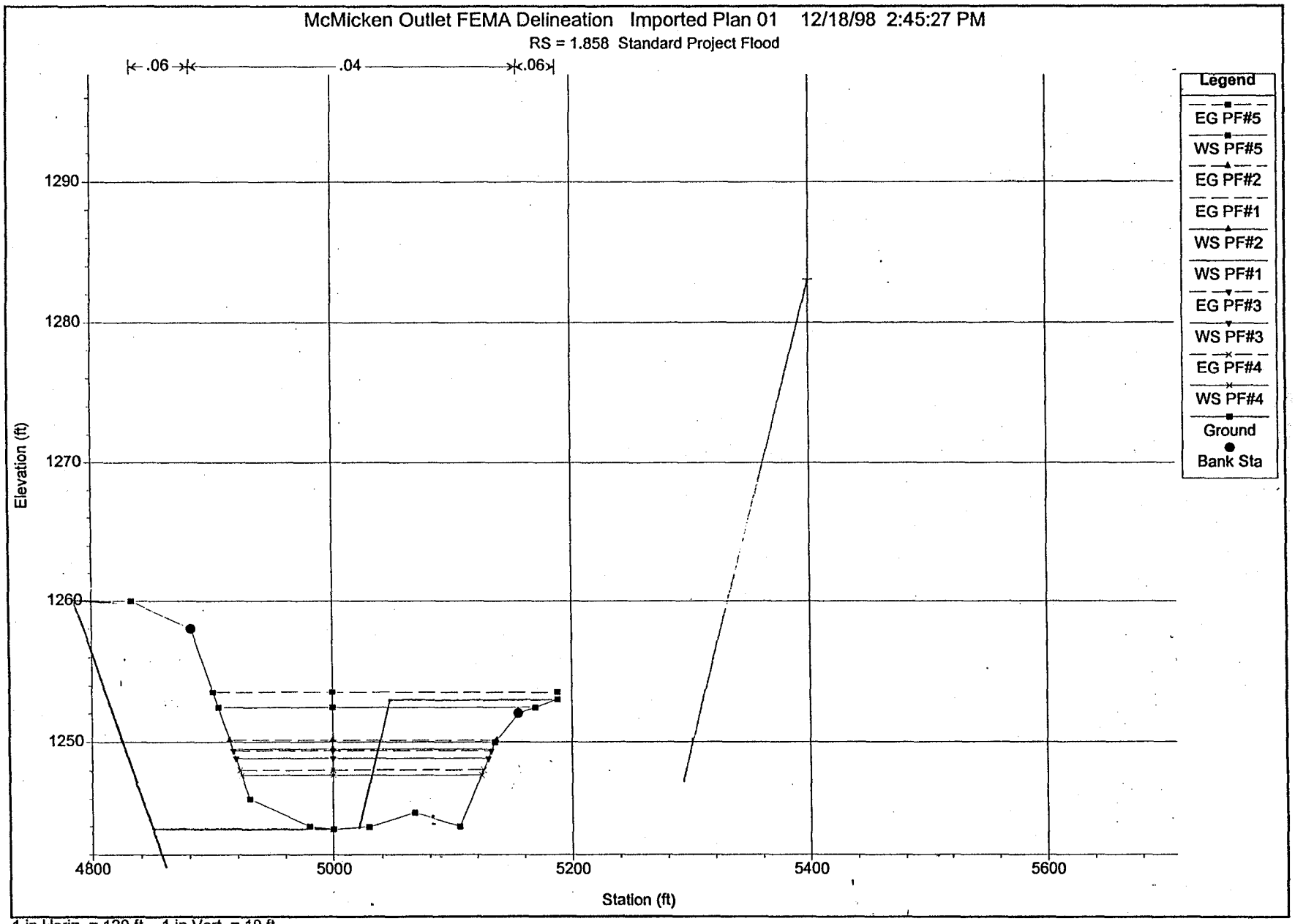

1 in Horiz. = 120 ft 1 in Vert. = 10 ft

RATIONAL METHOD CALCULATIONS

Pavement Flow Estimation

El Mirage Road between Bell and Beardsley
1,200 foot catch basin spacing
Runoff from pavement, 6-lane configuration
One side of roadway

$$T_c = 11.4 L^{0.5} K_b^{0.52} S^{-0.31} I^{-0.38}$$

L=	0.23	miles	
w=	44	roadway width (feet)	
K_b=	0.04		
S=	34	feet/mile	
I=	4	in/hr	
T_c=	0.20	hours	12 min
C=	0.95		
A=	1.2	acres	
Q_{10}=	**4.7**	**cfs**	

Pavement Flow Estimation

El Mirage Road between Bell and Beardsley
1,200 foot catch basin spacing
Runoff from pavement, 4-lane configuration
One side of roadway

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

L=	0.23	miles	
w=	34	roadway width (feet)	
K_b=	0.04		
S=	34	feet/mile	
I=	4	in/hr	
T_c=	0.20	hours	12 min
C=	0.95		
A=	0.9	acres	
Q_{10}=	**3.6**	**cfs**	

HEC-12 Pavement Drainage

JOB: MCDOT CAR- Bell to Beardsley **File: Inlets2.xls**

	Clogging factors:	80%	50%	67%	50%
	4-Lane	*6-Lane*			
Return Period	10	10			
Inlet Spacing	1200	1200			
Subarea discharge Q (cfs):	3.6	4.7			
Previous by-pass flow (cfs):	0.00	0.00			
Discharge added by operator:	---	---			
Total discharge Q (cfs):	**3.60**	**4.70**			
	Scupper	Scupper			
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016			
Longitudinal slope S (ft/ft):	0.0065	0.0065			
Inlet type (1=grate, 2=side opening or slotted):	2	2			
Longitudinal profile (1=on-grade, 2=sag):	1	1			
Gutter Configuration (1=freeway, 2=vertical):	2	2			
Inlet description:					
Grate width:	NA	NA			
Grate length:	NA	NA			
Pavement cross-slope (Sx):	0.020	0.020			
Width of gutter from flowline (ft):	1.42	1.42			
Gutter depression from horizontal (ft):	0.059	0.059			
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.042	0.042			
Flooded Width from flowline (ft): before inlet	**12.49**	**13.83**			
Depth at flowline (ft): before inlet	0.28	0.31			
Water cross-area (sq.ft): before inlet	1.58	1.93			
Velocity V for total discharge (fps): before inlet	2.28	2.43			
Ratio of gutter depression flow to total Q (Eod):	29.7%	26.9%			
Equivalent cross-slope (Se):	0.026	0.026			
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	-----	-----			
Inlet frontal flow in cfs (Qw):	-----	-----			
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	-----	-----			
Fraction of frontal flow intercepted (Rf):	-----	-----			
Side flow in cfs (Qs):	-----	-----			
Effective grate length w/clogging:	-----	-----			
Fraction of side flow interception (Rs):	-----	-----			
Grate Efficiency (E):	-----	-----			
Total flow intercepted (cfs):	-----	-----			
Grate flow-by (cfs):	-----	-----			
SLOTTED DRAINS AND SIDE-OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	24.0	27.2			
Length of inlet provided L (ft):	17	17			
Interception for length L (cfs):	2.47	2.93			
Efficiency for length L:	68.6%	62.3%			
Slotted drain or side opening flow-by (cfs):	**1.13**	**1.77**			
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	-----	-----			
Capacity of grate in a sag (4-sided weir):	-----	-----			
Length provided of curb-opening inlet at sag:					
Capacity of curb-opening inlet in a sag (weir):	-----	-----			

Inlet accept total flow?

APPENDIX F

FIELD REVIEW SUMMARY REPORT

Field Review Minutes

Candidate Assessment Report
El Mirage Road
Bell Road to Beardsley Road

PB Project Number 11101C 03

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 to a 4-lane roadway section. The cost estimate shall include the construction cost to widen the roadway 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 Bell Road and Beardsley Road must be mitigated if impacted. This segment of roadway is classified as a Secondary Roadway and has a future functional classification of an Urban Principal Arterial. The future 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 roadway alignment will be adjusted if required to accommodate the new design speed.

The proposed improvements at the Bell Road and El Mirage Road intersection may include dual left turn lanes southbound on El Mirage Road to eastbound Bell Road and an exclusive right turn lane on westbound Bell Road to northbound El Mirage Road. The lane alignment along El Mirage Road south of Bell Road will need to be evaluated to provide continuous alignment with El Mirage Road north of Bell Road. An existing box culvert under El Mirage Road just north of the intersection with Bell Road may require extension if the widening of El Mirage Road is required.

The only other access to El Mirage Road between Bell Road and Beardsley Road is the "T" intersection of El Mirage Road and Beardsley Road. El Mirage Road dips at the intersection to meet a depressed Bearsdley Road and allows access to Sun City. This dip appears to be artificial in nature to accommodate a Sun City welcome entrance. PB will investigate eliminating the dip to improve the stopping sight distance along El Mirage Road. Additional proposed improvements at the Beardsley Road and El Mirage Road intersection may include; signalization, a left turn lane northbound on El Mirage Road to westbound Beardsley Road, an exclusive right turn lane southbound on El Mirage Road to westbound Beardsley Road, and a left turn lane eastbound on Beardsley Road to northbound El Mirage Road. An existing box culvert under El Mirage Road just south of the intersection with Beardsley Road may require extension if the widening of El Mirage Road is required.

Existing El Mirage Road from Bell Road to Beardsley Road has curb and gutter on the west edge 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. Runoff from the existing roadway flows overland to the south and to the east, eventually draining to the Agua Fria River. The existing privacy fence along the west side of El Mirage Road is noticeably higher than the existing roadway.

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 may be utilized for the proposed improvements.