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DRAFT DESIGN CONCEPT REPORT
TECHNICAL APPENDIX - VOLUME 2 OF 2
(PRELIMINARY DRAINAGE REPORT)

Indian Bend Road – Scottsdale Road to Hayden Road

S-0402

Prepared For:

Prepared By:

URS

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DRAFT

INDIAN BEND ROAD DRAINAGE REPORT

Prepared for

The City of Scottsdale

Prepared by

URS

June 21, 2004

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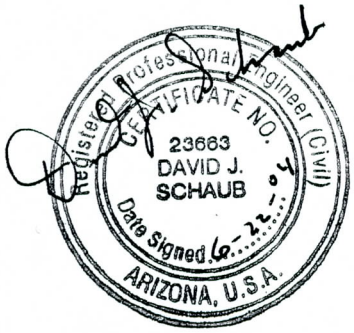

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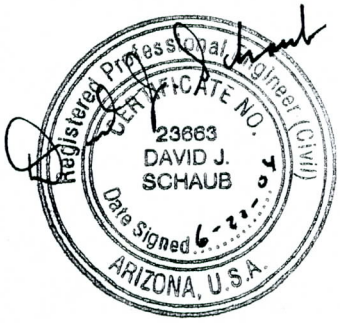

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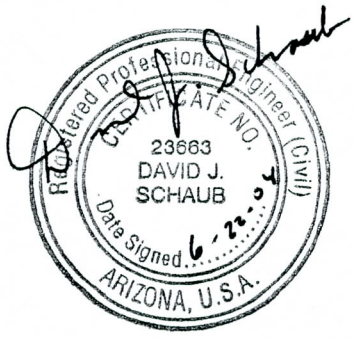


1.0 INTRODUCTION

1.1 BACKGROUND AND STUDY AREA

In the City of Scottsdale, Indian Bend Road is a minor arterial roadway extending from Pima Road on the east to 600-feet west of Scottsdale Road on the west. The study area is shown in Figure 1.1. This preliminary drainage report is for that portion of Indian Bend Road between Hayden Road on the east and Scottsdale Road on the west. This section of roadway is currently one lane in each direction and characterized by heavy traffic and delays during the peak hours and intermittent flooding at the crossing of the Indian Bend Wash. In 1981, the City developed roadway improvement plans for widening and reconstruction of Indian Bend Road from Scottsdale Road to Hayden Road. The project, which was never constructed, called for widening to four lanes with the two eastbound lanes on a bridge south of the existing alignment and the two westbound lanes on the existing alignment. A copy of these plans is contained in Appendix N.

1.2 PURPOSE AND SCOPE

The purpose of this preliminary drainage report is to document the hydrologic and hydraulic analysis for drainage improvements to Indian Bend Road including on-site and off-site flows and flows in the Indian Bend Wash. This drainage study consisted of a review of previous studies and investigations, field investigations to verify results of previous investigations, determination of additional data needs and verification of drainage areas, off-site flow patterns and concentration points, and development of drainage improvement alternatives to support the roadway improvements.

1.3 DESIGN CRITERIA

The design criteria for drainage analysis and design of drainage improvements for Indian Bend Road are in conformance with Chapter 2, *Drainage of the City of Scottsdale Design Standards and Policies Manual.*

Design criteria for modifications or improvements to the Indian Bend Wash were discussed with the Army Corps of Engineers and the Flood Control District of Maricopa County. The results of those discussions are as follows.

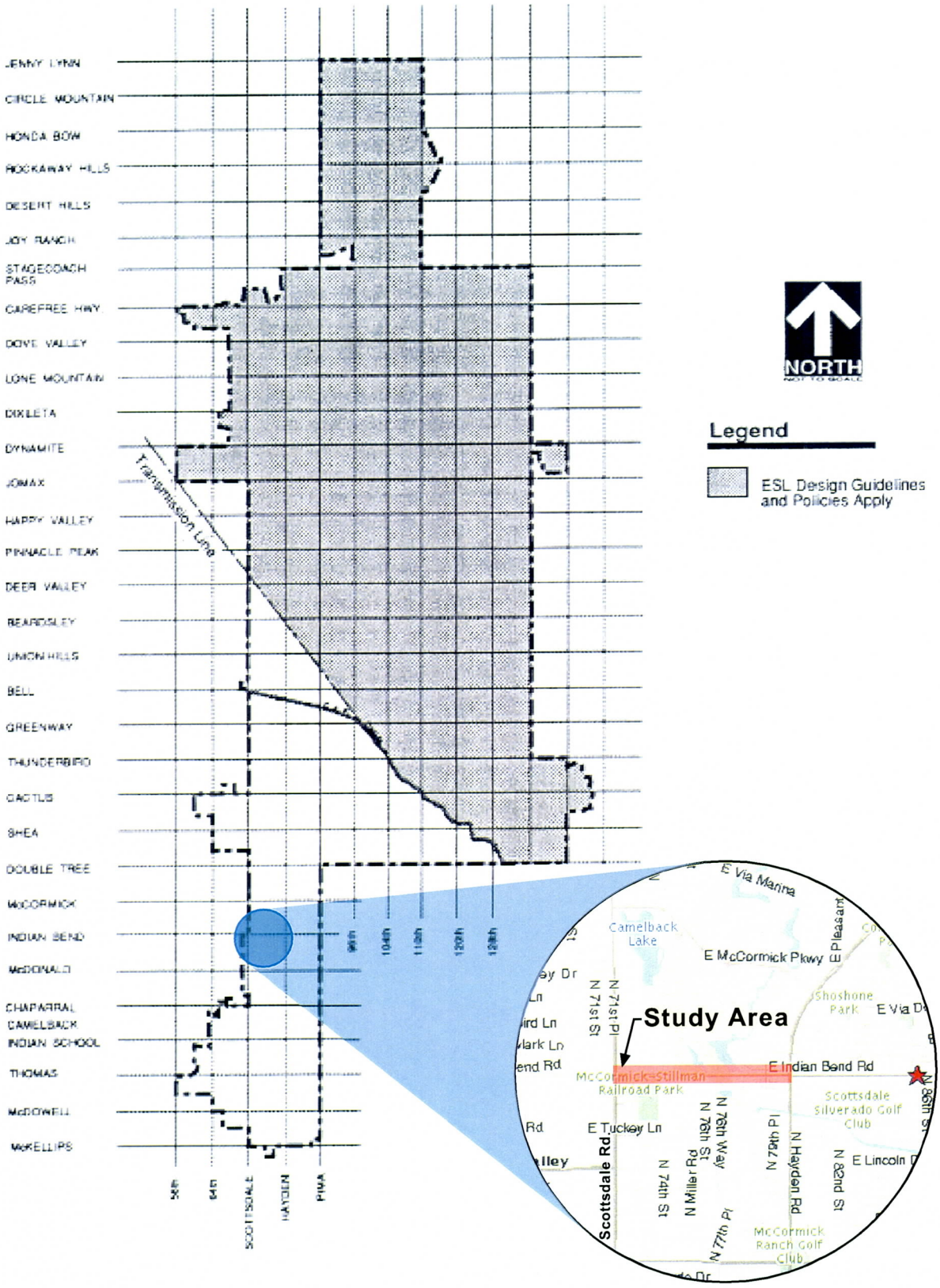


Figure 1.1

Location and Study Area Map

Hydrology: The original 100-year design discharge for the wash is documented to be 30,000 cfs. This value is the original 100-year design discharge determined when the Indian Bend Wash was designed in 1978. The 1997 FEMA study performed by Simons, Li & Associates calculated a 100-year discharge of 17,000 cfs at Indian Bend Road. The results of the study reduced the 100-year discharge for Indian Bend Wash to 17,000 cfs due to a reduction in watershed area as a result of construction of the Central Arizona Project Canal. In discussions with the Corps of Engineers and the Flood Control District, it was agreed that the design discharge would remain at 30,000 cfs so as to preserve the capacity of the wash. Floodplain delineations and evaluation of water surface elevations for floodplain purposes will use the calculated 100-year discharge of 17,000 cfs from the FEMA study.

The Corps has no requirements to use the standard project flood discharge of 62,000 cfs for design. There are no hydrology models available from the Corps for the Indian Bend Wash. A new HEC RAS model should be prepared with the water surface elevation calibrated to the elevations in the Design Memorandum No. 3.

Hydraulics: The Corps is primarily concerned with maintaining the freeboard on the levees of the drop structure and not the freeboard associated with the proposed structure for the roadway. The freeboard requirement for the levee is 3-feet. There are no Corps requirements for the proposed roadway structure provided there is no increase in water surface elevation for the design discharge of 30,000 cfs.

Structures/Geotechnical: The Corps does not consider the drop structure a structure since it is not made of reinforced concrete. However, the Corps will require a geotechnical review of any modifications.

1.4 REVIEW OF EXISTING REPORTS

City of Scottsdale Stormwater Master Plan – The Master Plan was used as a basis for design discharges for off-site flows impacting Indian Bend Road. A copy of the Master Plan is contained in Appendix L.

FEMA Floodplain Study – Simons, Li & Associates, 1997 – The Simons, Li study provided the latest 100-year discharge for the Indian Bend Wash that considered the reduction in drainage area as a result of construction of the Central Arizona Project Canal. A copy of the latest floodplain map is included in Appendix P.

Design Memorandum No. 3 – Feature Design for Inlet Channel, Project Design for Indian Wash, Los Angeles Corps of Engineers, January 1978 – Design Memorandum No. 3 provides the design information associated with the Indian Bend Wash, and in particular, the inlet structure at Indian Bend Road.

2.0 EXISTING DRAINAGE FACILITIES AND CAPACITIES

In accordance with the design concept analysis for Indian Bend Road, the corridor is divided into three segments. The discussion of existing drainage facilities will be presented in the same three segments. These drainage facilities are depicted on the existing drainage system map contained in Appendix C.

2.1 SEGMENT 1 – SCOTTSDALE ROAD TO PARADISE VIEW

Seville Channel – The Seville Channel runs along the north side of Indian Bend Road from Scottsdale Road to the Indian Bend Wash. The channel carries stormwater that flows under Scottsdale Road in a 3-10'x6' concrete box culvert just south of Indian Bend Road and a 36"x22" arch culvert that flows under Scottsdale Road just north of the Indian Bend Road intersection. A 2-8'x4' concrete box culvert also discharges into the channel at the eastern property line of the Park. Photographs 1 through 6 in Appendix M show these facilities.

There are no design documents or as-built plans available for the Seville Channel. Therefore, the original design criteria and other details of the design are not available for review. According to the Stormwater Master Plan, the total discharge entering the channel is 1073 cfs increasing to 1292 cfs at the outfall to Indian Bend Wash. Based on an analysis of the culvert structures contributing flow to the channel, it does not appear there are adequate inflow facilities to get that amount of flow to the channel. The geometry of the channel varies along its length. On the upstream end the channel has vertical walls. Further to the east, the channel becomes a trapezoidal grass-lined channel. The driveway entrances to the adjacent Seville Shopping Center are set on bridges over the channel. The bridges act as constrictions to the flow and the maximum capacity of the channel is estimated to be 1160 cfs. In Appendix M, photographs 7 through 10 show the Seville Channel.

Box Culvert under Scottsdale Road – An existing box culvert is located under Scottsdale Road just south of the intersection with Indian Bend Road. The concrete box culvert is a 3-10'x 6' and discharges into a downstream channel in the Park. There are no as-built drawings of this box culvert available. The capacity of the box culvert is estimated to be 1195 cfs based on inlet control calculations. The downstream channel in the Park is a grass-lined trapezoidal channel and is in a serpentine configuration conveying flow to a box culvert under Indian Bend Road just east of Scottsdale Road.

Box Culvert #1 under Indian Bend Road – Just east of Scottsdale there is an existing 3-10'x4' concrete box culvert that crosses under Indian Bend Road. Upstream of the box is the channel in the Park that conveys flow from the Scottsdale Road box culvert to the box culvert under Indian Bend Road. The downstream end of the box culvert discharges into the Seville Channel.

Box Culvert #2 under Indian Bend Road – Just west of Rocking Road there is an 2-8'x4' concrete box culvert under Indian Bend Road that flows to the Seville Channel. This culvert carries runoff that flows along the Park east property line. The capacity of the culvert is estimated to be 405 cfs based on inlet control calculations.

2.2 SEGMENT 2 – PARADISE VIEW TO 78TH PLACE

The Indian Bend Wash crosses Indian Bend Road at the mid-mile point between Scottsdale Road and Hayden Road. Upstream of Indian Bend Road, the wash is a wide, grassy channel approximately 1660-feet wide. The McCormick Ranch Golf Club occupies the channel and is built with varying terrain and a series of lakes, typical of golf course construction. Immediately upstream of Indian Bend Road are two lakes separated by a raised area, which is the location of a golf hole.

The golf course lakes are equipped with overflow pipes that maintain the lake level when there are low flows that fill the lake above their normal water surface elevation. The pipes are 6-inch diameter, the western lake outlets to a catch basin located in the Indian Bend Road north ditch and the eastern lake outlets directly to the north ditch. When more significant flows occur in the wash and the lakes begin to spill over the south edges, the water drains to a swale along the north side of the roadway where there are 2 area drains that intercept the flow. These area drains outlet with 36-inch concrete pipes through the face of the drop structure on the south side of the roadway. Once the flow in the wash reaches a point where the overflow pipes and area drains cannot intercept all of the flow, the water begins to spill over the roadway. Photographs 45 through 51 in appendix M show these facilities.

The existing topography and lakes in the golf course have an impact on how higher flows in the wash reach the drop structure at Indian Bend Wash. The raised area between the lakes causes a flow split to occur sending a portion of the flow to the west side of the drop structure and a portion to the east side of the drop structure. The flow split will be discussed in further detail in the hydraulic analysis of existing conditions.

Indian Bend Road is approximately 1660-feet wide and immediately downstream; the upstream face of the drop structure is a 3:1 slope constructed of concrete. The crest of the drop structure is

located about 15-feet downstream from the south edge of the roadway at an elevation of 1281.0. The crest length is approximately 800-feet long. According to the design memorandum (Design Memorandum No.3 Features Design For Inlet Channel Project Design for Indian Bend Wash, LA District Corps of Engineers, January 1978) the drop structure would lower the invert 12-feet from the crest elevation of about 1281.0 to the main channel invert elevation of 1269.0. Critical depth at the crest would be 3.5-feet for the design discharge of 30,000 cfs. The water surface elevation would drop from about 1286.5 upstream of the crest to 1280.0 downstream of the drop structure. Because of the high tailwater depth the hydraulic jump would occur on the sloping chute for all significant flow conditions.

The top of the levees at the drop structure provides a minimum freeboard of 3.0-feet at the standard project flood of 62,000 cfs. The top of channel walls are set at a minimum of 1.0 foot above the water surface elevation of the standard project flood discharge of 62,000 cfs. The tops of the inlet channel banks were set to provide a minimum freeboard of 3.0-feet at the 100-year design discharge of 30,000 cfs. The minimum thickness of stone revetment and grouted stonework is reported to be 15 inches. Appendix M contains a panoramic view of the inlet channel and levees.

2.3 SEGMENT 3 – 78TH PLACE TO HAYDEN ROAD

43"x27" Storm Drain – An existing CMP arch crosses Hayden Road on the north side of Indian Bend Road and ties into a 42" RCP storm drain that continues west to 78th Place. Plans containing this information are located in Appendix M.

42" Storm Drain - The 42" RCP storm drain referenced above flows west to 78th Place where it ties into a 48" RCP and crosses over to the south side of Indian Bend Road. As-built drawings contained in Appendix M show this storm drain (Indian Bend Road Storm Drain at Villa La Playa).

48" Storm Drain – The 48" RCP storm drain referenced above flows west on the south side of the roadway to the Indian Bend Wash where it outlets into the existing drop structure basin south of the roadway. Plans containing this information are located in Appendix M.

Photographs 28 through 35 in Appendix M show this storm drain system.

3.0 ALTERNATIVES FOR PROPOSED FACILITIES

The proposed drainage facilities are shown on the proposed drainage system map contained in Appendix C.

3.1 SEGMENT 1 – SCOTTSDALE ROAD TO PARADISE VIEW

Seville Channel: Two alternatives were considered for the Seville Channel that corresponds to the two alternatives considered for roadway alignment.

The first alternative is for the roadway alignment that holds the existing north curb alignment. This roadway alternative would require only minor modifications to the existing channel to accommodate the new roadway cross section.

The second alternative is for the roadway alignment alternative that is centered on the monument line. This roadway alternative would require elimination of the existing channel and replacement with a box culvert. The box culvert would be a 2-12'x7' to accommodate the 100-year design discharge of 1073 to 1292 cfs as indicated in the Stormwater Master Plan. Provisions to capture surface runoff that is not carried in the box culverts under Scottsdale Road and Indian Bend Road would be made by adding additional catch basins just east of Scottsdale Road to intercept off-site surface runoff. These catch basins could be located within the proposed swale area (over the proposed box culvert) along the north side of Indian Bend Road.

Box Culvert Under Scottsdale Road – No modifications of the box under Scottsdale Road will be made for either of the roadway alternatives in Segment1.

Box Culvert#1 Under Indian Bend Road – No modifications to the 3-10'x4' box culvert under Indian Bend Road will be made for the roadway alternative that holds the existing north curb line. For the alternative that is centered on the monument line, the box culvert will be connected to the proposed 2-12'x7' concrete box culvert that will replace the Seville Channel.

Box Culvert #2 Under Indian Bend Road – The 2-8'x4' box culvert under Indian Bend Road will be lengthened to the south for the roadway alternative that holds the existing north curb line. For the roadway alternative that is centered on the monument line, the box culvert will be lengthened on the upstream side and tied into the proposed 2-12'x7' concrete box culvert that will replace the Seville Channel.

3.2 SEGMENT 2 – PARADISE VIEW TO 78TH PLACE

The portion of the project that is designated as Segment 2 includes the crossing of the Indian Bend Wash. The three alternatives under consideration for modifications to the wash to accommodate the new roadway are:

Alternative A: Maintain 2 lanes on the existing alignment and construct an additional 2 lanes on a bridge that crosses the drop structure at the levee on the backside of the structure. This alternative does not relocate the crest of the drop structure.

Alternative B: Construct 4 lanes on either a bridge, box culvert or ConArch structure with the crest of the drop structure relocated and reconstructed approximately 100-feet upstream of its present location.

Alternative C: Maintain 2 lanes on the existing alignment and construct an additional 2 lanes on a bridge that crosses the drop structure just downstream of the existing crest. This alternative does not relocate the crest of the drop structure.

An existing conditions HEC-RAS model was developed to provide a baseline for comparing the hydraulic performance of the above alternatives. Discussions of the results are contained in Section 5.

Alternative A Hydraulic Analysis: This alternative would not affect the existing hydraulic conditions. The proposed additional 2 lanes on realignment would cross the constricted inlet channel with a bridge well above the water surfaces of both the 30,000 cfs design flow and the 100-year flow. The addition of piers to the constriction may slightly raise the water surface elevation, but this increase would not propagate upstream of the drop structure.

Alternatives B and C Hydraulic Analysis: These two alternatives would have the same effect on the upstream water surface elevations. A proposed condition HEC-RAS model was developed for Alternative B. These alternatives would result in insignificant changes in upstream water surface elevations for the 30,000 cfs design flow. Discussions of the results are contained in Section 5.

3.3 SEGMENT 3 – 78TH PLACE TO HAYDEN ROAD

This portion of the project contains a storm drain system that begins in the northeast corner of the Indian Bend Road/Scottsdale Road intersection and discharges into Indian Bend wash at the eastern end of the drop structure. It captures onsite Indian Bend Road runoff as well as offsite runoff from the north at Hayden Road and 78th Place.

This existing system would be incorporated into the proposed improvement with only minor modifications. For example, the 48-inch outfall at the Indian Bend Wash drop structure would be extended to a new outfall location, the manhole located in the northeast corner of the 78th Place intersection would be reconstructed, and the junction structure located in the northwest corner of the Hayden Road intersection would require some modifications. As necessary, additional curb opening catch basins would be connected to this existing system.

4.0 ONSITE DRAINAGE DESIGN

4.1 DISCUSSION

The on-site drainage system shown on the drainage plans contained in Appendix A will drain all areas within the street right-of-way to an appropriate off-site discharge point. This system is comprised of pavement catch basins that will maintain storm water encroachment on the roadway below acceptable limits. The Indian Bend Road storm drain system is sized for the 10-year storm event.

4.2 FACILITY SELECTION

Storm water interception for the Indian Bend Road storm drain systems will be accomplished with curb opening catch basins and offroad catch basins.

4.3 PAVEMENT AND EMBANKMENT DRAINAGE (HYDROLOGY)

The Rational Method was employed to determine the peak runoffs from pavement and landscape areas. Parameters used were:

Design storm	-	10-year
Time of concentration	-	10 minutes
Rainfall intensity (10 yr.)	-	4.40 inches/hr. Max.
Rainfall intensity (50 yr.)	-	6.13 inches/hr Max.
Runoff Coefficients	-	Paved areas = 0.90,
		Unpaved Areas (Moderate Urban,
		40% Impervious) = 0.70
		Commerical areas = 0.90

Peak runoff values are calculated based on the Rational Equation (English Version) of the ADOT Highway Drainage Design Manual (HDDM) as follows:

$$Q = C\ I\ A$$

where, Q = the peak discharge in cfs, of selected return period

C = Rational Method runoff coefficient

I = the average rainfall intensity in inches/hr
for the selected rainfall return period

A = the contributing drainage area in acres

The above listed values of "C" were based on Figure 2-3 of the HDDM with a 50-year rainfall depth of 2.21 inches.

The initial time of concentration is calculated from Equation 2-2 of the HDDM as illustrated below:

$$T_c = 11.4\, L^{0.5}\, K_b^{0.52} S^{-.31}\, I^{-0.38}$$

where, T_c = time of concentration, in hours

L = the length of the longest flow path, in miles

K_b = the watershed resistance coefficient from Table 2-1

S = the slope of the longest flow path, in feet/mile

I = the average rainfall intensity, in inches/hr, for a duration of rainfall equal to T_c

This method calculates a T_c through an iterative process because T_c is based on an intensity (I), which varies with T_c. The minimum T_c used for calculation was ten minutes. All pavement drainage areas analyzed had a T_c less than ten minutes, and therefore, the minimum ten-minute value was applied.

The project specific rainfall intensity calculations are contained in Appendix K.

4.4 INLET/CATCH BASIN SPACING DESIGN

Catch basin spacing and pavement spread calculations were determined by employing Hydraulic Engineering Circular No. 12, *Drainage of Highway Pavements,* FHWA, March 1984. The actual calculations were completed by a computer program obtained from McTrans Center for Microcomputers in Transportation, University of Florida, Gainesville, Florida. This program, entitled "SMF Pavement Drainage Program, HEC-12, Version 2.11", analyzes an entire system of catch basins including by-pass flow, and it is capable of evaluating up to 100 catch basins. Design parameters, based on COS Hydrology Design Criteria, Table 2.3-1), used to design and locate the catch basins are:

- Allowable Ponding Depth

  Allowable ponding depth should not exceed the height of the curb for the 10-year runoff.

  10-Year Runoff: For collector and arterial streets, one 12-foot dry driving lane must be maintained in each direction.

  50-Year Runoff: Not applicable.

- Catch Basin Capture Ratios

Type	Inlet Capture Ratio	
	Sump	On-Grade
Curb-opening	80	80
Grate inlets	50	50
Slotted drain	50	67
Slotted drain/Grate inlets	50/50	67/50

- Grates

  If used, catch basin grates on city streets will be bicycle and motorcycle safe.

The selected locations for the new catch basins were based on roadway profiles, catch basin spacing required to maintain water spread on the pavement below maximum allowable, near superelevation crossover points to minimize sheet flow across the pavement, at intersections to prevent storm water runoff from flowing out and across the main street pavements, and at the low point in sag areas.

Catch basins were sized based on the 10-year event and checked for the 50-year event. The drainage areas, peak discharges (10-year) and time of concentration for the on-site drainage are contained in Appendix D. Calculations for spacing and sizing the catch basins are contained in Appendix E.

4.5 STORM SEWER DESIGN

Storm sewer pipe sizes and the hydraulic grade line will be determined during final design with a computer program. STORMCAD For Windows is a computer program that designs and analyzes any new and existing storm sewer system for non-uniform flow, and the hydraulic grade line (HGL). STORMCAD is a registered trademark of Haestad Methods, Inc., 37 Brookside Road, Waterbury, Connecticut, 06708. The storm sewer design was based on criteria contained in COS's Drainage Design Standards and Policies, Chapter 2, Revised December 1999. These are:

- Minimum Pipe Size

  Trunk Lines - 24-inches, except 18-inch pipes may be used where conflicts occur with utilities or other highway appurtenances.

  Laterals - 18-inches

- Pipe Material and Roughness

Pipe material was selected based on the requirements of the City. Cast-in-Place Concrete Pipe will be allowed as an alternative for pipe sizes of 30-inches and greater and where cover requirements allow. Manning's "n" values used for the selected pipe materials are:

Pipe Material	Manning's "n"
Concrete Pipe	0.012
Cast-in-Place Concrete Pipe	0.014
Plastic Pipe, Smooth	0.012

- Pipe Size Design

Pipe size selection will be based on full flow with the 10-year storm event for non-depressed roadways. The hydraulic grade line will be set a minimum 6 inches below the top of grate for the selected design storm event.

The storm sewer calculations for pipe sizes and hydraulic grade lines will be contained in the final drainage design report.

5.0 OFFSITE DRAINAGE DESIGN

5.1 DISCUSSION

The three offsite drainage systems along this corridor are the Indian Bend Wash roadway overflow crossing within the middle of the project, the Seville Channel along the western segment of the project, and the storm drain system along the eastern segment of the project. Both the Seville Channel and the storm drain system outlet to Indian Bend Wash. HEC-RAS models have been prepared for Indian Bend Wash and the Seville Channel. These models are contained in the Appendices of this report.

5.2 INDIAN BEND WASH/STRUCTURE CROSSING

An existing condition model was developed for comparison to three proposed alternative structure types for Alternatives B and C roadway alignments. The alternative structure types are eight 42'x10'-4" ConArches, a ten barrel 30'x10' box culvert and a 3-Span bridge (each span at 124.5-feet). Models were run for the selected design discharge of 30,000 cfs and the 100-Year peak runoff of 17,000 cfs. The results are tabulated in Tables 4.1 and 4.2, respectively. The HEC-RAS existing conditions model is contained in Appendix G and Figure 4.1, the HEC-RAS Cross-Section Locations Map for Existing Conditions is contained in Appendix F. The HEC-RAS alternatives models are contained in Appendix I, and Figures 4.2, 4.3 and 4.4, the HEC-RAS Cross-Section Locations Map for Alternative Structures are contained in Appendix H.

The proposed box and bridge have approximately the same opening and have the same affect on the upstream water surface elevations. The total opening perpendicular to the flow direction is 322.5-feet. For the design flow of 30,000 cfs, the water surface elevation would rise 0.31-feet at the relocated drop, decrease by 0.21-feet at the flow split by the golf course mounds, and decrease by 0.57-feet approximately 700-feet upstream of the inlet channel. For the 100-Year flow of 17,000 cfs, the water surface elevation would rise 2.86-feet at the relocated drop, increase by 0.18-feet at the flow split by the golf course mounds, and decrease by 0.52-feet 700-feet upstream of the inlet channel.

Table 4.1
Water Surface Elevations
Existing versus Proposed Conditions for Design Discharge
Q=30,000 cfs

River Cross-Section	Description of Cross-Section	Existing	Proposed Conarch (8-42'x10'-4")[2]			Proposed Box Culvert (10-30'x10')[3]			Proposed Bridge (3-124.5' Span)[4]		
		Existing	Proposed WSE	Dh[1]	Proposed EGL	Proposed WSE	Dh[1]	Proposed EGL	Proposed WSE	Dh[1]	Proposed EGL
		(msl)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)
10	Most Downstream X-Section, U.S. of East Interceptor Channel	1278.54	1278.54	0.00	1279.26	1278.54	0.00	1279.26	1278.54	0.00	1279.26
11	Expanding Indian Bend Wash Inlet Channel	1279.08	1279.08	0.00	1279.58	1279.08	0.00	1279.58	1279.08	0.00	1279.58
12	Expanding Indian Bend Wash Inlet Channel	1278.93	1279.08	0.15	1279.76	1279.01	0.08	1279.81	1279.01	0.08	1279.81
13	Narrow Point of Indian Bend Wash Inlet Channel	1277.78	1278.42	0.64	1280.32	1278.24	0.46	1280.48	1278.24	0.46	1280.48
14/13.5	Leveee Toe of Slope @ Entrance to Indian Bend Wash Inlet Channel or Downstream Face of Structure	1282.02	1279.30	-2.72	1280.79	1278.92	-3.10	1281.06	1278.92	-3.10	1281.06
15	Indian Bend Road Toe of Slope or Upstream Face of Structure	1282.27	1281.75	-0.52	1282.90	1282.14	-0.13	1283.35	1280.40	-1.87	1282.14
16.5	Controlling Section U.S. of Drop Structure	1285.86	1286.76	0.90	1288.58	1286.17	0.31	1287.74	1286.17	0.31	1287.74
16.75	Flow Split by Golf Course Mounds	1288.10	1289.53	1.43	1289.71	1287.89	-0.21	1288.22	1287.89	-0.21	1288.22
17	Most Upstream X-Section, D.S. of East Channel	1288.92	1289.69	0.77	1289.94	1288.35	-0.57	1288.74	1288.35	-0.57	1288.74

Notes: (1) Dh is the change in water surface elevation (WSE) in relation to existing conditions.
(2) Proposed structure low concrete elevation is 1281.83
(3) Proposed structure low concrete elevation is 1281.5
(4) Proposed structure low concrete elevation is 1286.9.

Table 4.2
Water Surface Elevations
Existing versus Proposed Conditions for 100-Year Flow
Q=17,000 cfs

River Cross-Section	Description of Cross-Section	Existing	Proposed Conarch (8-42'x10'-4'')[2]			Proposed Box Culvert (10-30'x10')[3]			Proposed Bridge (3-124.5' Span)[4]		
		Existing	Proposed WSE	Dh[1]	Proposed EGL	Proposed WSE	Dh[1]	Proposed EGL	Proposed WSE	Dh[1]	Proposed EGL
		(msl)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)
10	Most Downstream X-Section, U.S. of East Interceptor Channel	1276.12	1276.12	0.00	1276.59	1276.12	0.00	1276.59	1276.12	0.00	1276.59
11	Expanding Indian Bend Wash Inlet Channel	1276.58	1276.58	0.00	1276.87	1276.58	0.00	1276.87	1276.58	0.00	1276.87
12	Expanding Indian Bend Wash Inlet Channel	1276.54	1276.62	0.08	1276.99	1276.58	0.04	1277.02	1276.58	0.04	1277.02
13	Narrow Point of Indian Bend Wash Inlet Channel	1275.68	1276.10	0.42	1277.45	1275.99	0.31	1277.57	1275.99	0.31	1277.57
14/13.5	Leveee Toe of Slope @ Entrance to Indian Bend Wash Inlet Channel or Downstream Face of Structure	1278.86	1276.97	-1.89	1277.93	1276.92	-1.94	1278.15	1276.92	-1.94	1278.15
15	Indian Bend Road Toe of Slope or Upstream Face of Structure	1279.01	1278.14	-0.87	1279.04	1278.77	-0.24	1279.62	1278.07	-0.94	1279.10
16.5	Controlling Section U.S. of Drop Structure	1282.03	1285.13	3.10	1286.83	1284.89	2.86	1286.30	1284.89	2.86	1286.30
16.75	Flow Split by Golf Course Mounds	1286.77	1287.84	1.07	1287.95	1286.59	-0.18	1286.79	1286.59	-0.18	1286.79
17	Most Upstream X-Section, D.S. of East Channel	1287.51	1288.00	0.49	1288.14	1286.99	-0.52	1287.23	1286.99	-0.52	1287.23

Notes: (1) Dh is the change in water surface elevation (WSE) in relation to existing conditions.
(2) Proposed structure low concrete elevation is 1281.83
(3) Proposed structure low concrete elevation is 1281.5
(4) Proposed structure low concrete elevation is 1286.9.

The proposed ConArch had to span a greater opening than the box and bridge alternatives in order to have similar hydraulic characteristics. The arch of the ConArch alternative decreases the effective flow area. The total opening perpendicular to the flow direction is 343.0-feet. For the design flow of 30,000 cfs, the water surface elevation would rise 0.90-feet at the relocated drop, rise by 1.43-feet at the flow split by the golf course mounds, and rise by 0.77-feet approximately 700-feet upstream of the inlet channel. For the 100-Year flow of 17,000 cfs, the water surface elevation would rise 3.10-feet at the relocated drop, increase by 1.07-feet at the flow split by the golf course mounds, and increase by 0.49-feet 700-feet upstream of the inlet channel.

The hydraulic characteristics of the box and bridge are slightly better than the hydraulic characteristics of the ConArch. This is due to the fact that the arch reduces available effective flow area for equivalent overall span lengths. The box and bridge alternatives better meet the Corps of Engineers requirement that the hydraulic characteristics of the inlet channel (for the 30,000 cfs design flow) not be significantly changed by the proposed improvement. The water surface would increase by 0.31-feet at the relocated drop, but it would decrease immediately upstream of the drop. The ConArch would increase the water surface by 0.90-feet at the relocated drop and also increase the upstream water surface by 0.77 to 1.43-feet.

For the 100-Year flow rate of 17,000 cfs, all structure alternatives exhibit an increase in water surface elevations at the relocated drop. This is due to the fact that the flow split reduces the available conveyance area immediately upstream of the structure. The roadway fill creating a levee that is closer to the golf course mounds causes the reduced conveyance area. The box culvert and bridge alternatives would increase the water surface elevation by 2.86-feet at the relocated drop, while the ConArch would increase the water surface elevation by 3.10-feet at the relocated drop. Immediately upstream of the relocated drop, the box and bridge alternatives would decrease the water surface elevation by 0.18-feet and the ConArch would increase the water surface elevation by 1.07-feet. Within 700-feet of the inlet channel, these increases would be significantly reduced to near existing conditions. The box and bridge alternatives would be decrease the water surface elevation by 0.52-feet and the ConArch would increase the water surface elevation by 0.49-feet.

The box and bridge alternatives meet FEMA requirements of not raising the water surface by more than 1-foot, and therefore, a Conditional Letter of Map Revision may not be required. The ConArch alternative is 0.07-feet over the 1-foot requirement, but some minor modifications could reduce this to less than 1-foot. It is anticipated that each of the alternatives evaluated could meet the FEMA process. The existing bank elevation upstream of the relocated drop structure is slightly higher than 1290.0, which is above all of the modeled water surface elevations. For the

100-Year flow, the modeled alternatives have water surface elevations ranging from 1284.89 to 1288.0. For the design flow, the modeled alternatives have water surface elevations ranging from 1286.17 to 1289.69.

5.3 SEVILLE CHANNEL DRAINAGE STRUCTURE

The existing system is described within Section 2.1 and the proposed box culvert improvement alternative is described within Section 3.1. Several of the proposed roadway improvements would not require modification of the existing channel. With those alternatives, it is assumed that the channel capacity would not be increased.

The proposed 2- 12'x7' concrete box culvert would have the capability to convey the 1073 to 1292 cfs flows reported in the Storm Water Master Plan. A HEC-RAS model, which is contained in Appendix J, has been prepared for the proposed box culvert. Key issues raised by this model are:

- The existing upstream box under Scottsdale Road will handle the 100-year runoff.
- The existing upstream box under Indian Bend Road is undersized for the anticipated 100-Year runoffs.
- Adequate cover over the top of the proposed box can only be obtained by setting the outflow elevation below the existing channel flow line elevation at the outlet to Indian Bend Wash.
- A new channel may be required from the existing channel outlet to the relocated drop structure in order to get positive flow. This would require obtaining an easement or right-of-way from the golf course. Another solution would be to install a storm drain system from the new box outfall to the relocated drop structure. This would provide positive drainage of the sump at the box outfall.

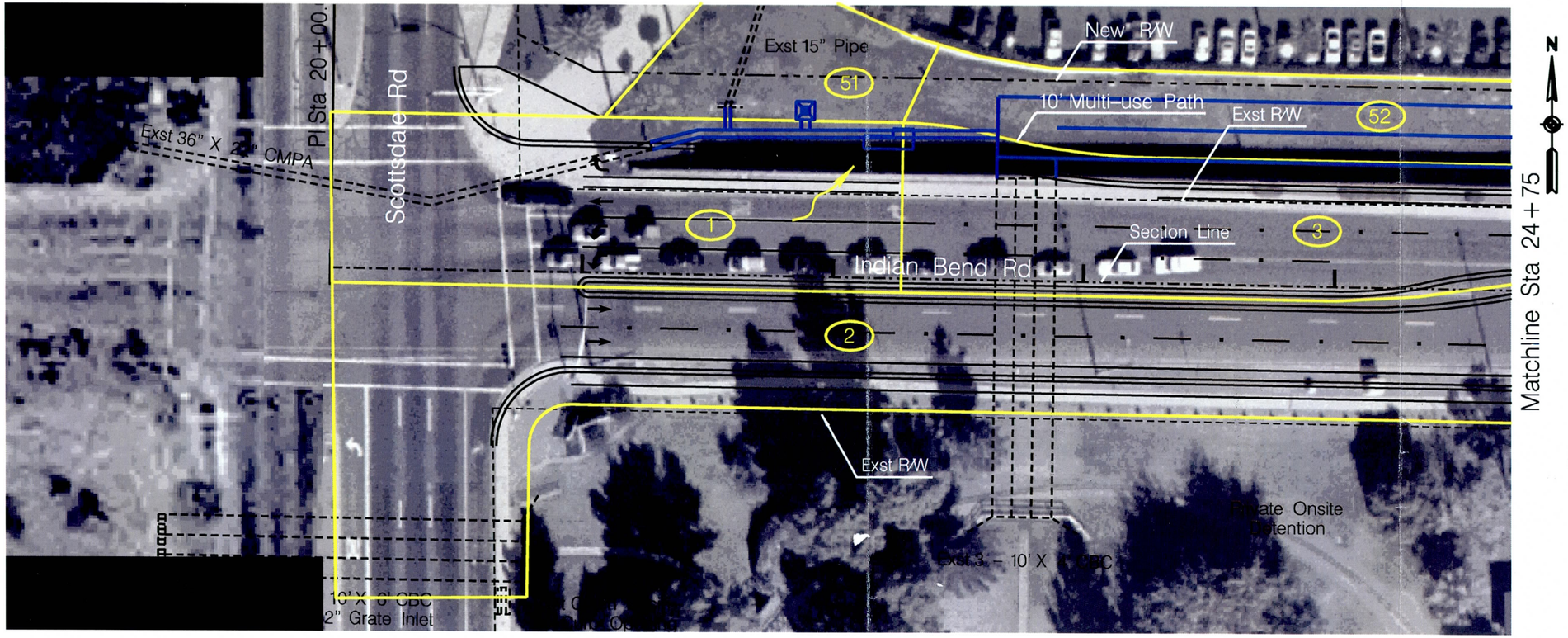
5.4 STORM DRAIN, INDIAN BEND WASH TO HAYDEN ROAD

The existing system is described within Section 2.3 and the proposed improvements are described within Section 3.3. It is assumed that the existing system can handle the anticipated runoff rates, and therefore, a hydraulic evaluation has not been performed. This analysis will be performed during final design.

6.0 REFERENCES

1. City of Scottsdale, Arizona, Design Standards and Policies Manual, Chapter 2-Drainage, Revised December 1999.
2. City of Scottsdale, Arizona, Stormwater Master Plan, 1994-1996.
3. Flood Control District of Maricopa County, Design Manual for Maricopa County, Arizona, Volume 1, Hydrology, January 1995.
4. Flood Control District of Maricopa County, Design Manual for Maricopa County, Arizona, Volume 2, Hydraulics, January 1996.
5. City of Scottsdale, Standard Details, May 16, 2001.
6. Arizona Department of Transportation, Highways Division, Draft Roadway Design Guidelines, Chapter 600-Highway Drainage Design, May 11, 1994.
7. Arizona Department of Transportation, Highway Drainage Design Manual, Hydrology, March 1993.
8. Arizona Department of Transportation, Highways Division, Urban Highways Section, Design Procedures Manual, March 1988 and Revisions.
9. Arizona Highway Department, Bridge Division, Hydrologic Design for Highway Drainage in Arizona, revised March 1969.
10. Arizona Highway Department, Structures Section, Hydraulics Division, Hydrologic and Hydraulic Training Session Manual, October 16-18, 1972, revised December 1973.
11. Arizona Department of Transportation, Highways Division, Construction Standard Drawings, April 2000.
12. Arizona Department of Transportation, Highways Division, Structures Section, Standard Drawings, June 1992.
13. U.S. Department of Transportation, Federal Highway Administration, Hydraulic Design of Highway Culverts, Hydraulic Design Series No. 5, September 1982.
14. U.S. Department of Transportation, Federal Highway Administration, Drainage of Highway Pavements, Hydraulic Engineering Circular No. 12, March 1984.
15. U.S. Department of Transportation, Federal Highway Administration, Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, November 1966.
16. Arizona Department of Transportation, Intermodel Transportation Division, Roadway Engineering Group Design Section, Pipe Selection Guidelines and Procedures, February 1, 1996.

APPENDIX A



CONSTRUCTION NOTES

LEGEND

- Drainage Area Boundary
- XX Drainage Basin No.
- Swale
- Flow

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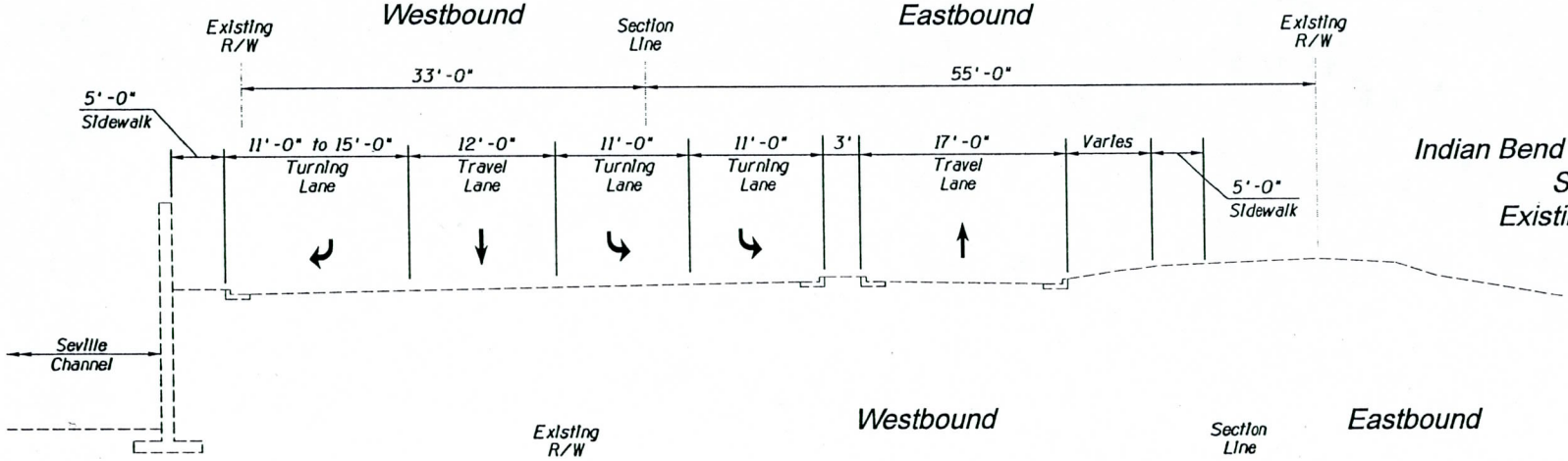
CITY OF SCOTTSDALE
TRANSPORTATION DEPARTMENT
CIP PLANNING
7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

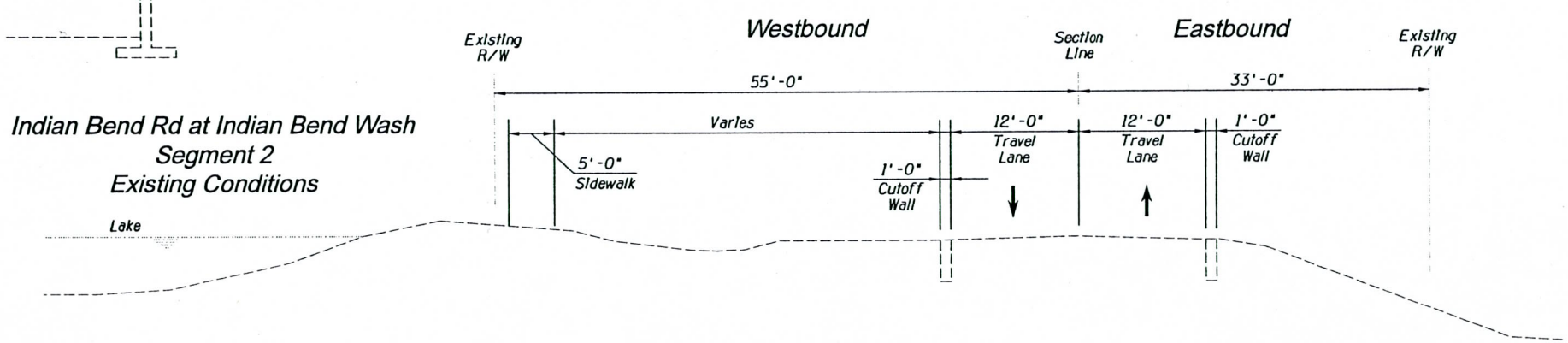
PROJECT TITLE: Indian Bend Road Improvements
Segment 1 – Alternative 2
Roadway Drainage System Plan and Area Map

SCALE: HORIZ. 1"=50' VERT. 1"=5'
DESIGNED BY: BWG
DRAWN BY: DRR
DATE:
AS-BUILT:
BID NO.
PROJECT No. S0402
SHEET OF

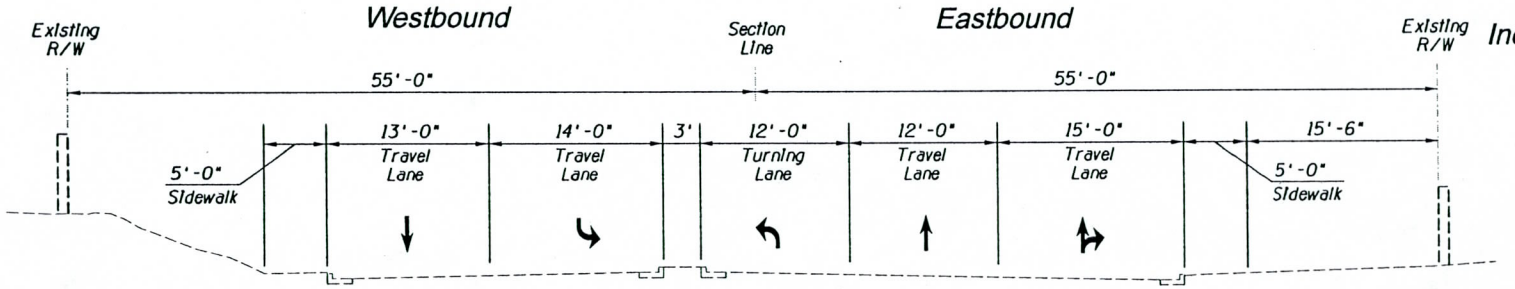
APPENDIX B



Indian Bend Rd at Scottsdale Rd
Segment 1
Existing Conditions



Indian Bend Rd at Indian Bend Wash
Segment 2
Existing Conditions



Indian Bend Rd at Hayden Rd
Segment 3
Existing Conditions

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CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING
7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE
INDIAN BEND ROAD IMPROVEMENTS
EXISTING - TYPICAL SECTIONS

DESIGNED BY	DATE	BID NO.	SHEET
CAS	06/04		
DRAWN BY	AS-BUILT	PROJECT NO.	OF
BWG		50402	

URS

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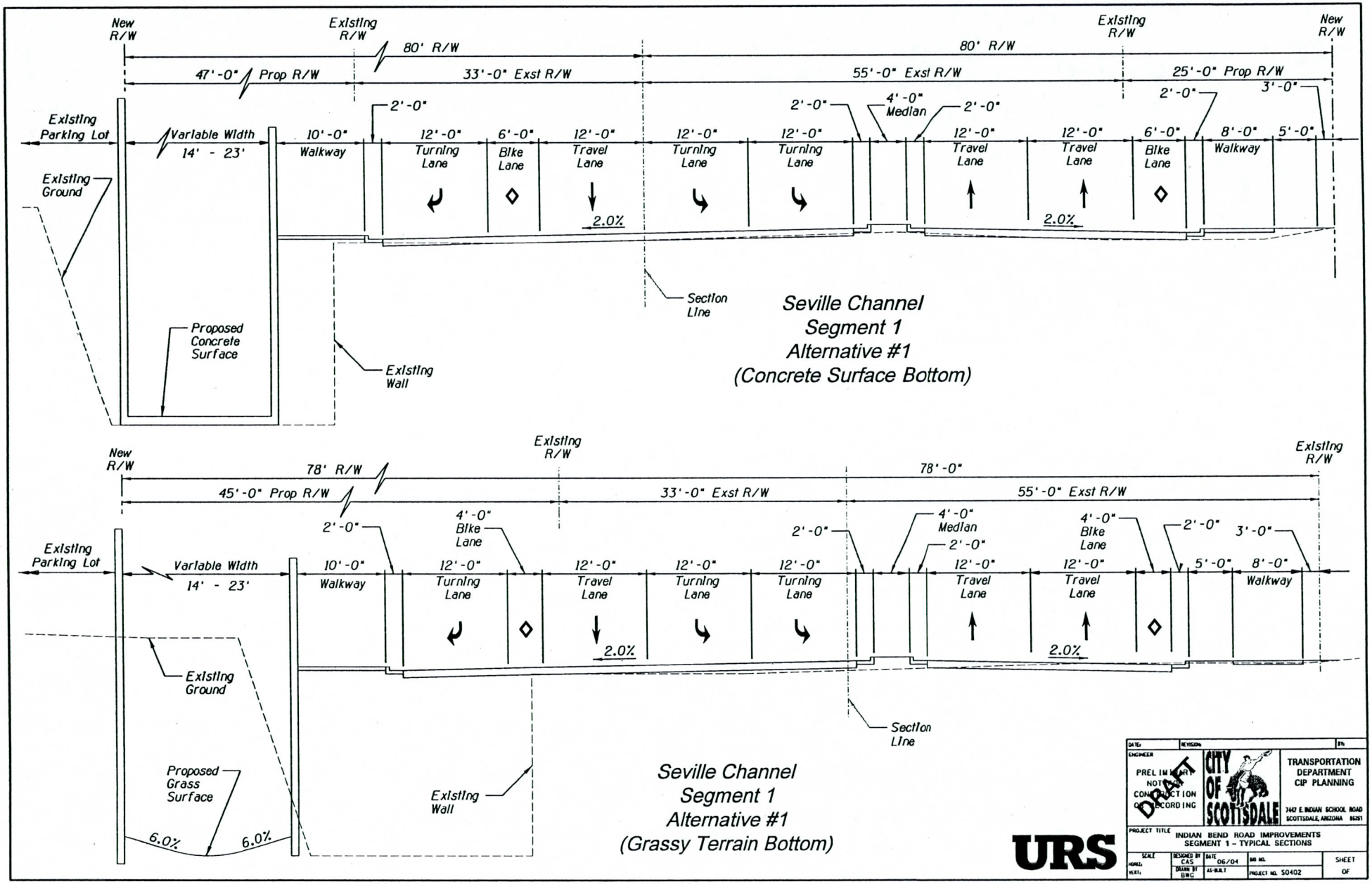

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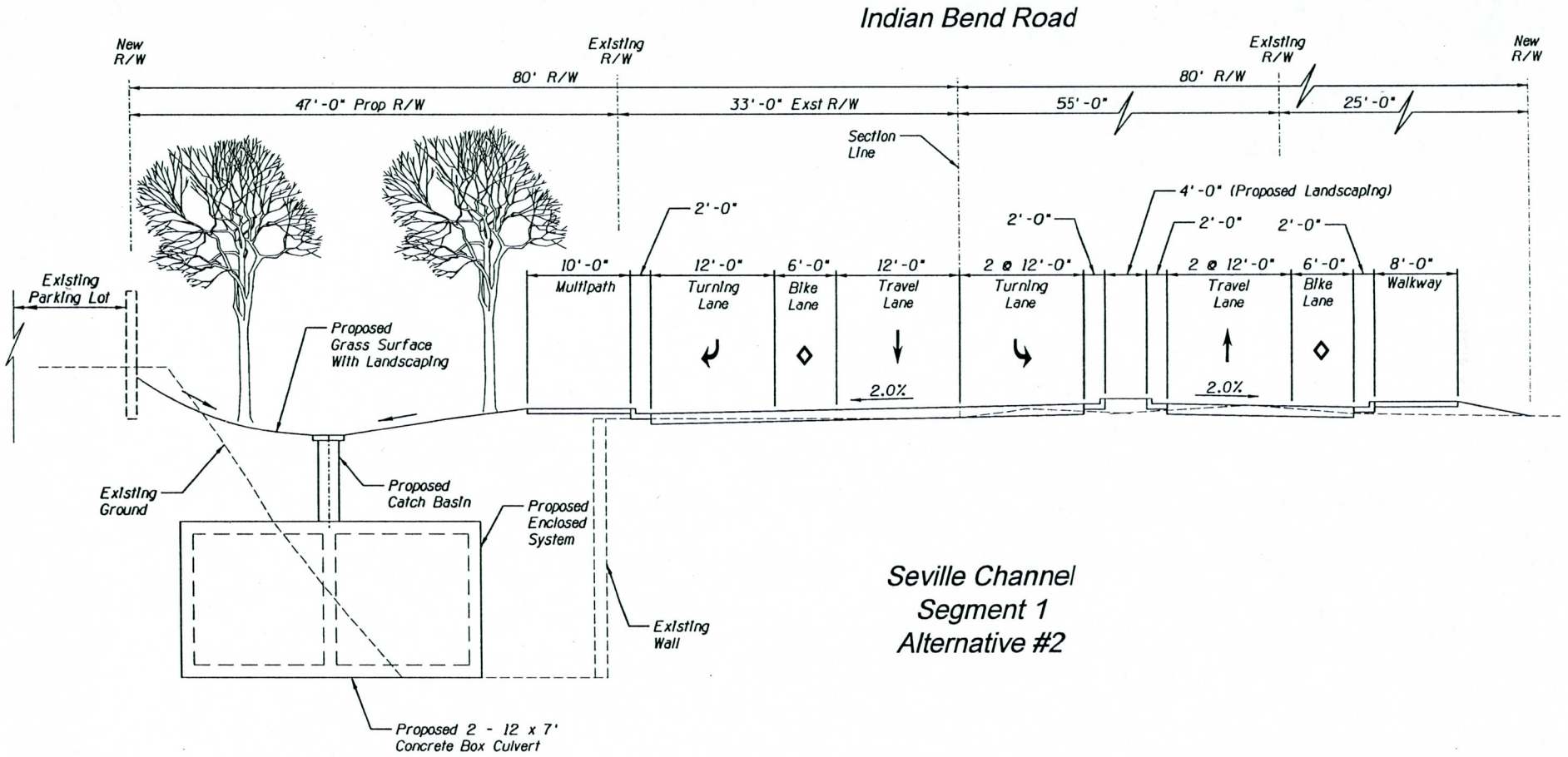

Seville Channel
Segment 1
Alternative #2

URS

DRAFT

CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING

7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE
INDIAN BEND ROAD IMPROVEMENTS
SEGMENT 1 – TYPICAL SECTIONS

DESIGNED BY	DATE	BID NO.	SHEET
CAS	06/04		
DRAWN BY	AS-BUILT	PROJECT NO.	OF
BMG		50402	

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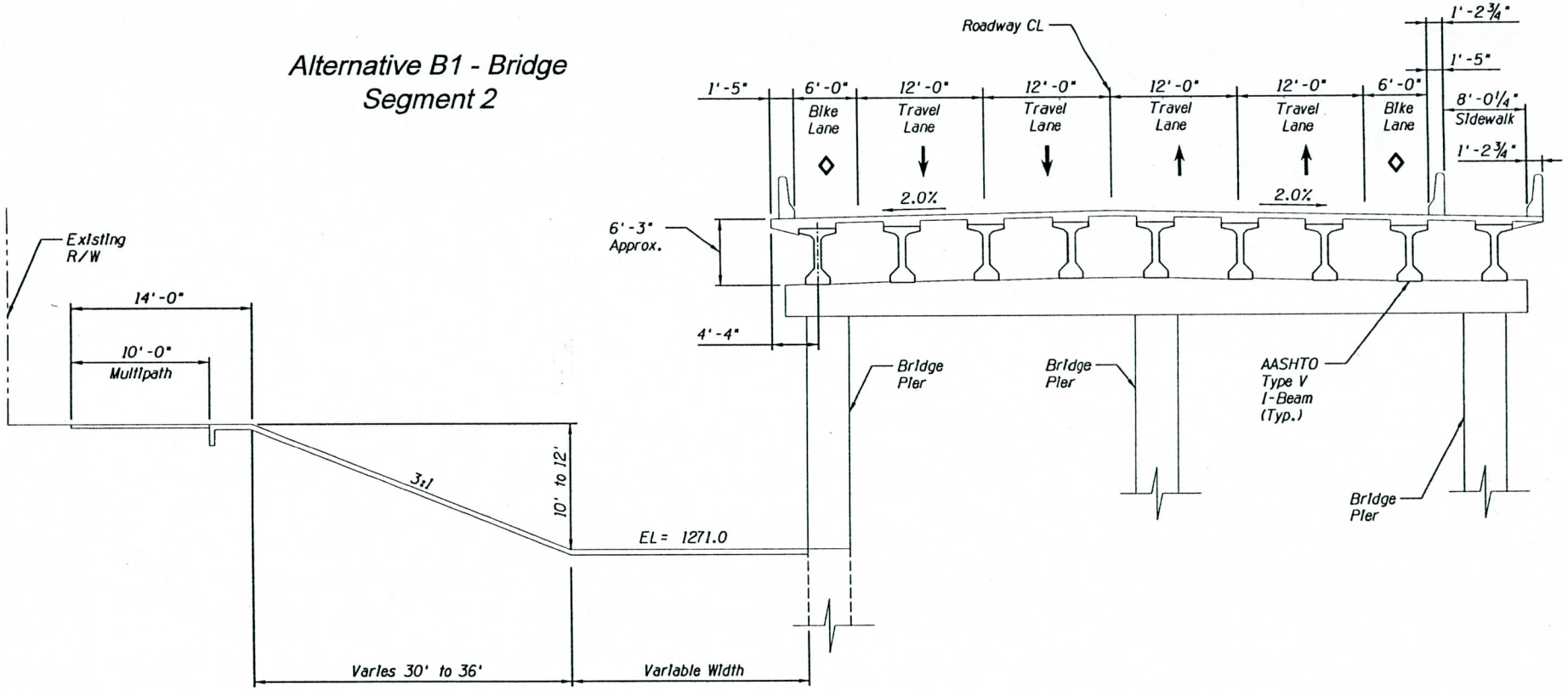
Alternative B1 - Bridge Segment 2



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TRANSPORTATION DEPARTMENT
CIP PLANNING
7447 E INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE: INDIAN BEND ROAD IMPROVEMENTS
SEGMENT 2 - TYPICAL SECTION

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORIZ:	CAS	06/04		
VERT:	DRAWN BY	AS-BUILT	PROJECT NO. 50402	OF
	BWG			

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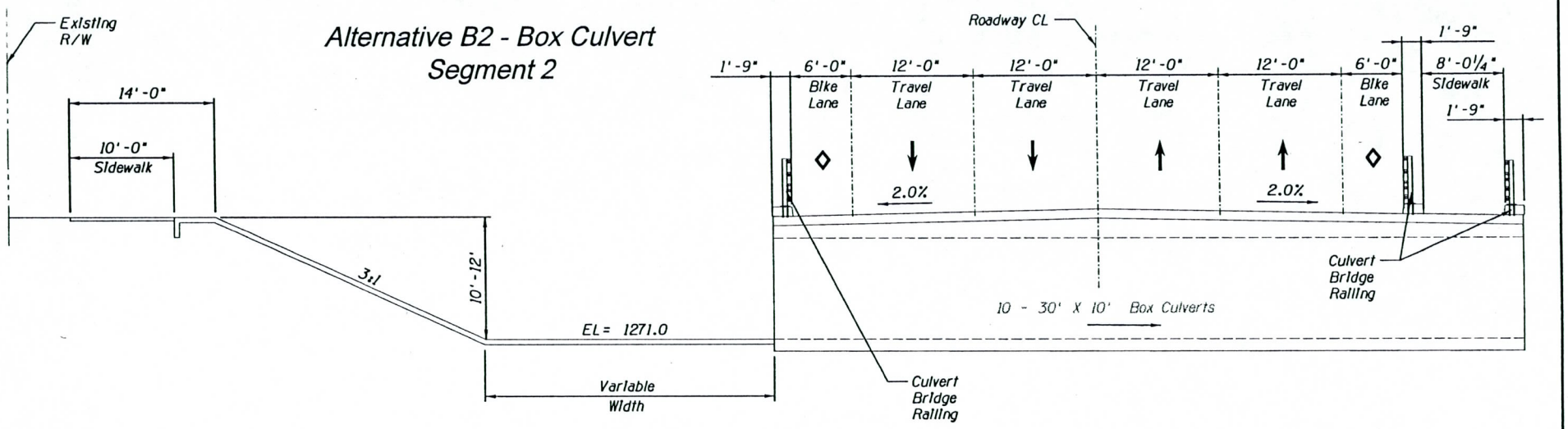

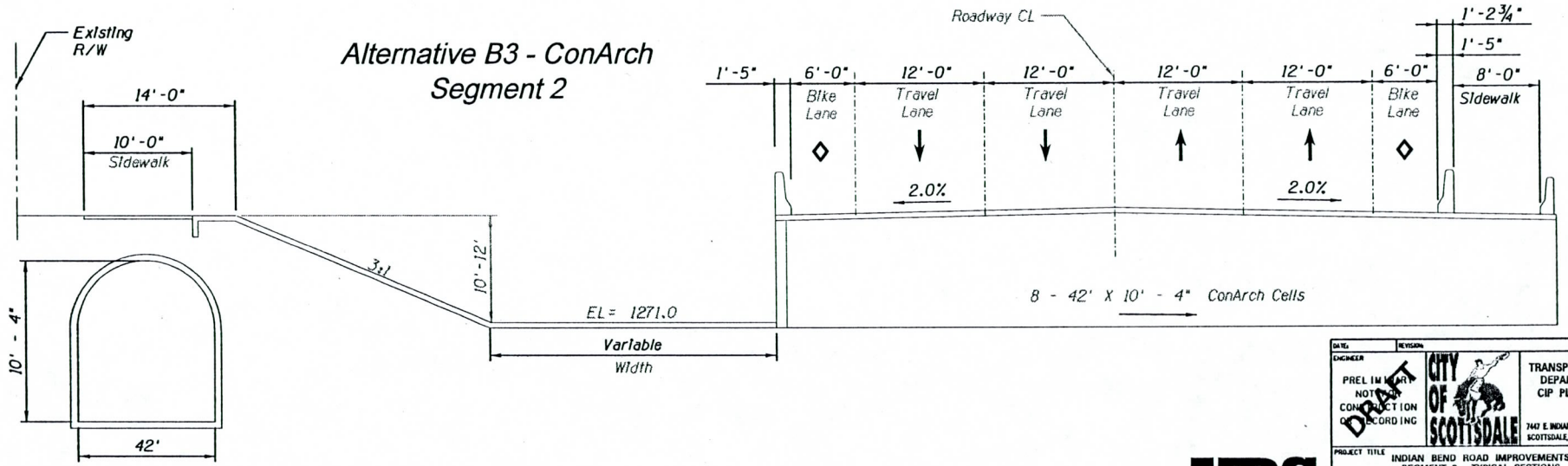

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CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING

7447 E INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE
INDIAN BEND ROAD IMPROVEMENTS
SEGMENT 2 - TYPICAL SECTIONS

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORIZ.	CAS	06/04		
VERT.	DRAWN BY	AS-BUILT	PROJECT NO. 50402	OF
	DWG			

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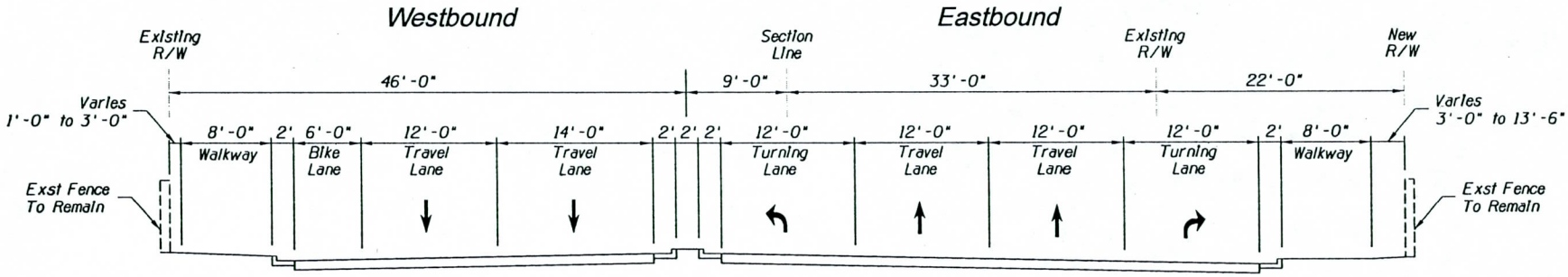
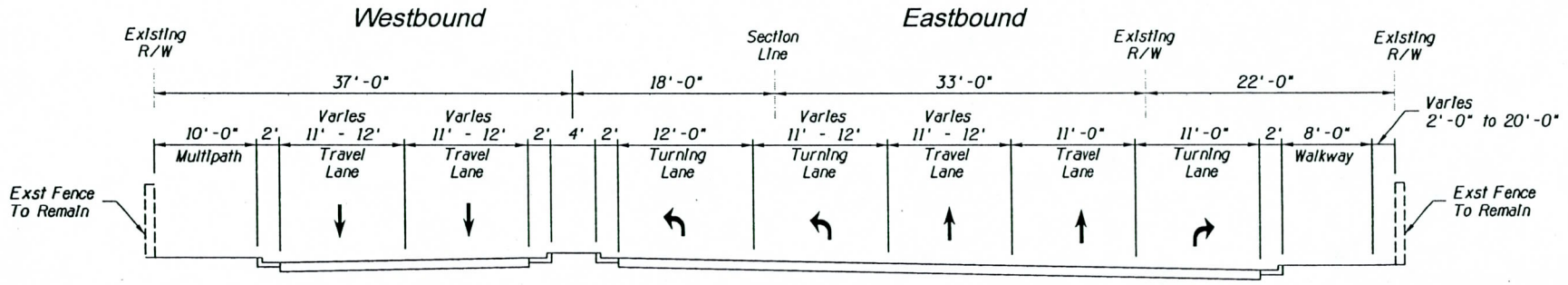


Indian Bend Rd at Hayden Rd
Segment 3
Alternative #1



Indian Bend Rd at Hayden Rd
Segment 3
Alternative #2

DRAFT

CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING

7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PRELIMINARY - NOT FOR CONSTRUCTION OR RECORDING

PROJECT TITLE: INDIAN BEND ROAD IMPROVEMENTS
SEGMENT 3 – TYPICAL SECTIONS

DESIGNED BY: CAS
DRAWN BY: BWC
DATE: 06/04
AS-BUILT
BID NO.
PROJECT NO. 50402
SHEET OF

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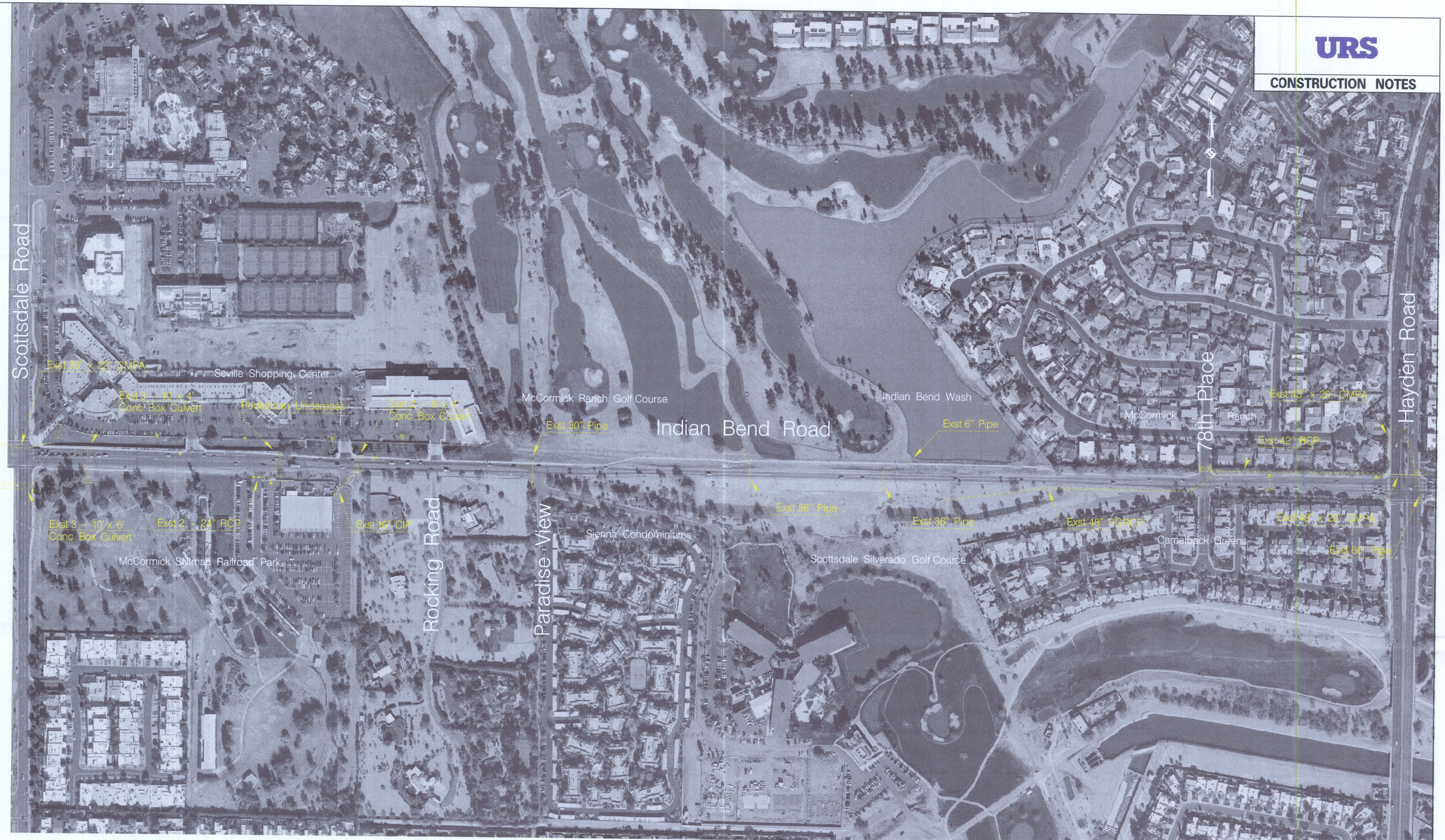
APPENDIX C



URS

CONSTRUCTION NOTES

Legend

Existing Drainage System

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CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING

7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE

Figure 2.1
Existing Drainage System Map
Indian Bend Road Improvements

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORIZ: NTS	DS	0604		
VERT:	DRAWN BY	AS-BUILT	PROJECT NO. S0402	OF
	DRR			

DATE: | REVISION: | BY:

ENGINEER

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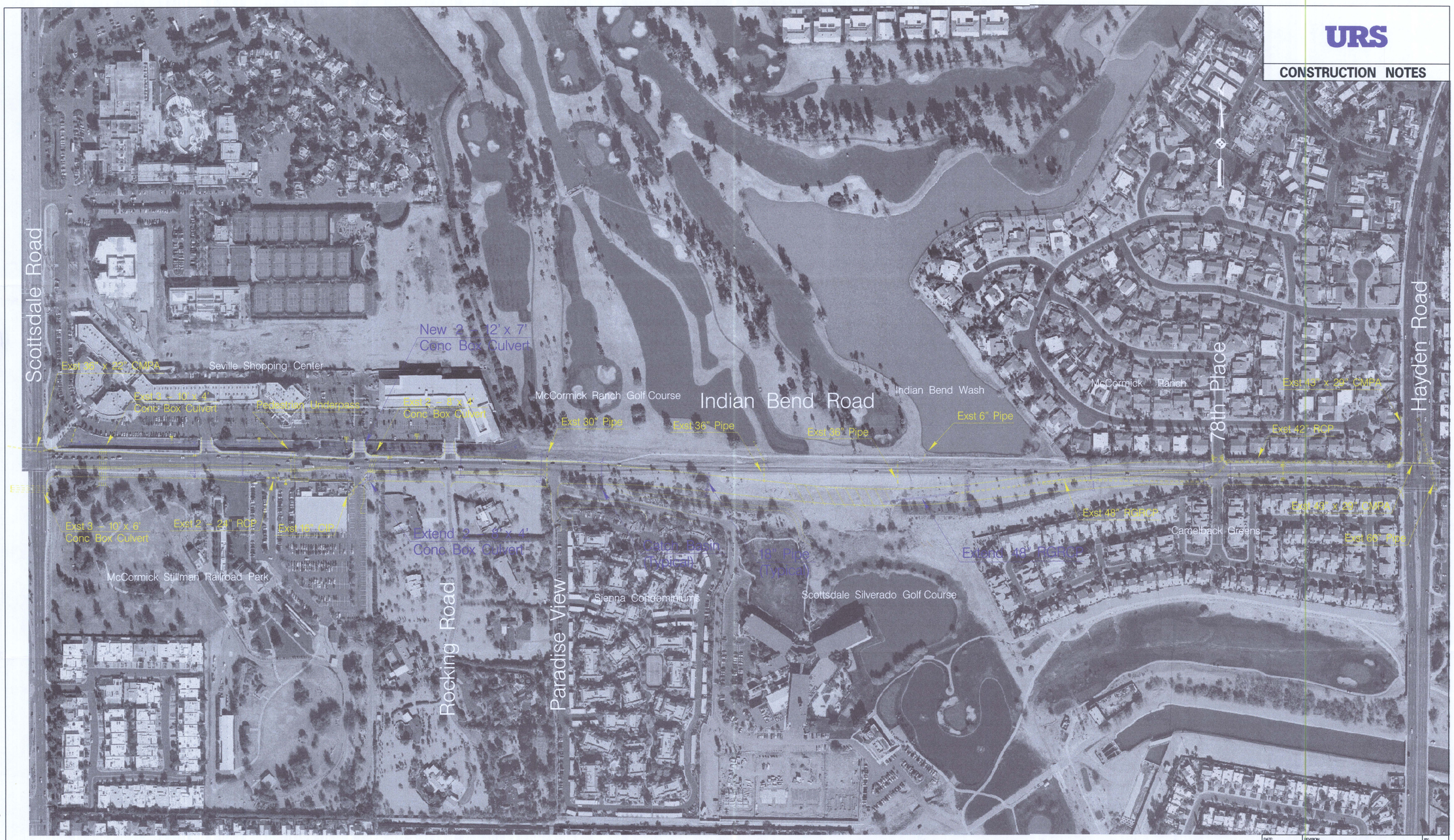

URS

CONSTRUCTION NOTES

Legend

- Proposed Drainage System
- Existing Drainage System
- Proposed Roadway

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CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT CIP PLANNING

7447 E. INDIAN SCHOOL ROAD SCOTTSDALE, ARIZONA 85251

Figure 2.2
Proposed Drainage System Map
Indian Bend Road Improvements

DATE:	REVISION:	BY:	
ENGINEER			
SCALE HORIZ: NTS VERT:	DESIGNED BY: DS	DATE: 0604	BID NO.
	DRAWN BY: DRR	AS-BUILT	PROJECT NO. S0402
			SHEET OF

6/22/2004 P:\City_of_Scottsdale\23443636\CADD\Plans\Drainage\Exhibits\3636-D006-PropSS.dgn

APPENDIX D

STORM SEWER RUNOFF CALCULATION RECORD

URS CORP.
Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PROJ. NO.:

DESIGN DATA

FREQUENCY: 10 years
P6= 1.89 Inches P24= 2.17 Inches P1= 1.55 Inches

RUNOFF CALCULATIONS

INLET	DRAINAGE AREA			PAVEMENT (1)			PAVEMENT						DESERT LANDSCAPING				Tc	INTENSITY	Q(2)
NO.	Station		ACRES	SX	SL	T	C	A	CA	C	A	CA	C	A	CA	SUM CA	min	inches/hr	cfs
CB-1	20+00	22+20 LT	0.35				0.95	0.35	0.33	0.80		0.00	0.70		0.00	0.33	10	4.40	1.46
CB-2	20+00	26+20 RT	0.79				0.95	0.79	0.75	0.80		0.00	0.70		0.00	0.75	10	4.40	3.30
CB-3	22+20	26+20 LT	0.49				0.95	0.49	0.47	0.80		0.00	0.70		0.00	0.47	10	4.40	2.05
CB-5	26+20	28+00 RT	0.23				0.95	0.23	0.22	0.80		0.00	0.70		0.00	0.22	10	4.40	0.96
CB-5	26+20	28+00 LT	0.24				0.95	0.24	0.23	0.80		0.00	0.70		0.00	0.23	10	4.40	1.00
CB-6	28+00	28+75 RT	0.11				0.95	0.11	0.10	0.80		0.00	0.70		0.00	0.10	10	4.40	0.46
CB-7	28+75	31+95 RT	0.46				0.95	0.37	0.35	0.80		0.00	0.70	0.09	0.06	0.41	10	4.40	1.82
CB-8	28+00	31+95 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	4.40	2.01
CB-9 W	31+95	33+64 RT	0.19				0.95	0.19	0.18	0.80		0.00	0.70		0.00	0.18	10	4.40	0.79
CB-9 E	34+00	33+64 RT	0.04				0.95	0.04	0.04	0.80		0.00	0.70		0.00	0.04	10	4.40	0.17
CB-10 W	31+95	33+64 LT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	4.40	1.13
CB-10 E	34+00	33+64 LT	0.05				0.95	0.05	0.05	0.80		0.00	0.70		0.00	0.05	10	4.40	0.21
CB-11	36+15	34+00 RT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	4.40	1.13
CB-12	36+15	34+00 LT	0.26				0.95	0.26	0.25	0.80		0.00	0.70		0.00	0.25	10	4.40	1.09
CB-13	37+02	36+15 RT	0.09				0.95	0.09	0.09	0.80		0.00	0.70		0.00	0.09	10	4.40	0.38
CB-14	37+02	36+15 LT	0.14				0.95	0.14	0.13	0.80		0.00	0.70		0.00	0.13	10	4.40	0.59
CB-15	37+02	39+25 RT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	4.40	1.13
CB-16	37+02	39+25 LT	0.29				0.95	0.29	0.28	0.80		0.00	0.70		0.00	0.28	10	4.40	1.21
CB-17 W	39+25	40+70 RT	0.13				0.95	0.13	0.12	0.80		0.00	0.70		0.00	0.12	10	4.40	0.54
CB-17 E	41+50	40+70 RT	0.07				0.95	0.07	0.07	0.80		0.00	0.70		0.00	0.07	10	4.40	0.29
CB-18 W	39+25	40+70 LT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	4.40	0.92
CB-18 E	41+50	40+70 LT	0.12				0.95	0.12	0.11	0.80		0.00	0.70		0.00	0.11	10	4.40	0.50

Sx: Cross-Slope SL: Longitudinal Slope T: Spread (feet) CB: Catch Basin SC: Scupper SP: Spillway

Computed by: RS Date: JUNE 14, 2004 Checked by: DJS

NOTES:

(1) - See "STORM SEWER INLET CALCULATION RECORD" for pavement parameters.

(2) - See HEC12 results for actual Q interception at catch basin.

STORM SEWER RUNOFF CALCULATION RECORD

URS CORP.
Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PROJ. NO.:

DESIGN DATA

FREQUENCY: 10 years
P6= 1.89 Inches P24= 2.17 Inches P1= 1.55 Inches

RUNOFF CALCULATIONS

INLET	DRAINAGE AREA			PAVEMENT (1)			PAVEMENT						DESERT LANDSCAPING				Tc	INTENSITY	$Q^{(2)}$
NO.	Station		ACRES	SX	SL	T	C	A	CA	C	A	CA	C	A	CA	SUM CA	min	inches/hr	cfs
CB-19	45+50	41+50 RT	0.37				0.95	0.37	0.35	0.80		0.00	0.70		0.00	0.35	10	4.40	1.55
CB-20	45+50	41+50 LT	0.39				0.95	0.39	0.37	0.80		0.00	0.70		0.00	0.37	10	4.40	1.63
CB-21	50+11	45+50 RT	0.42				0.95	0.42	0.40	0.80		0.00	0.70		0.00	0.40	10	4.40	1.76
CB-22	50+11	45+50 LT	0.44				0.95	0.44	0.42	0.80		0.00	0.70		0.00	0.42	10	4.40	1.84
CB-23	50+11	55+30 RT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	4.40	2.01
CB-24	50+11	55+30 LT	0.50				0.95	0.50	0.48	0.80		0.00	0.70		0.00	0.48	10	4.40	2.09
CB-25	55+30	60+00 RT	0.49				0.95	0.49	0.47	0.80		0.00	0.70		0.00	0.47	10	4.40	2.05
CB-26	55+30	60+00 LT	0.51				0.95	0.51	0.48	0.80		0.00	0.70		0.00	0.48	10	4.40	2.13
CB-27	60+00	64+25 RT	0.52				0.95	0.52	0.49	0.80		0.00	0.70		0.00	0.49	10	4.40	2.17
CB-28	60+00	64+25 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	4.40	2.01
CB-29	66+37	65+25 RT	0.11				0.95	0.11	0.10	0.80		0.00	0.70		0.00	0.10	10	4.40	0.46
CB-30	66+37	65+25 LT	0.14				0.95	0.14	0.13	0.80		0.00	0.70		0.00	0.13	10	4.40	0.59
CB-31	66+37	69+30 RT	0.34				0.95	0.34	0.32	0.80		0.00	0.70		0.00	0.32	10	4.40	1.42
CB-32	66+37	69+30 LT	0.40				0.95	0.40	0.38	0.80		0.00	0.70		0.00	0.38	10	4.40	1.67
CB-33 W	69+30	71+00 RT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	4.40	0.92
CB-33 E	72+20	71+00 RT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	4.40	0.92
CB-34 W	69+30	71+00 LT	0.19				0.95	0.19	0.18	0.80		0.00	0.70		0.00	0.18	10	4.40	0.79
CB-34 E	72+20	71+00 LT	0.15				0.95	0.15	0.14	0.80		0.00	0.70		0.00	0.14	10	4.40	0.63
CB-35	NORTH	71+70 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	4.40	2.01
CB-36	NORTH	72+70 LT	0.57				0.95	0.57	0.54	0.80		0.00	0.70		0.00	0.54	10	4.40	2.38

Sx: Cross-Slope SL: Longitudinal Slope T: Spread (feet) CB: Catch Basin SC: Scupper SP: Spillway

Computed by: RS Date: JUNE 14, 2004 Checked by: DJS

NOTES:

(1) - See "STORM SEWER INLET CALCULATION RECORD" for pavement parameters.

(2) - See HEC12 results for actual Q interception at catch basin.

STORM SEWER RUNOFF CALCULATION RECORD

URS CORP.
Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PROJ. NO.:

DESIGN DATA

FREQUENCY: 50 years
P6= 2.67 Inches P24= 3.03 Inches P1= 2.21 Inches

RUNOFF CALCULATIONS

INLET	DRAINAGE AREA			PAVEMENT (1)			PAVEMENT						DESERT LANDSCAPING				Tc	INTENSITY	$Q^{(2)}$
NO.	Station		ACRES	SX	SL	T	C	A	CA	C	A	CA	C	A	CA	SUM CA	min	inches/hr	cfs
CB-1	20+00	22+20 LT	0.35				0.95	0.35	0.33	0.80		0.00	0.70		0.00	0.33	10	6.13	2.04
CB-2	20+00	26+20 RT	0.79				0.95	0.79	0.75	0.80		0.00	0.70		0.00	0.75	10	6.13	4.60
CB-3	22+20	26+20 LT	0.49				0.95	0.49	0.47	0.80		0.00	0.70		0.00	0.47	10	6.13	2.85
CB-5	26+20	28+00 RT	0.23				0.95	0.23	0.22	0.80		0.00	0.70		0.00	0.22	10	6.13	1.34
CB-5	26+20	28+00 LT	0.24				0.95	0.24	0.23	0.80		0.00	0.70		0.00	0.23	10	6.13	1.40
CB-6	28+00	28+75 RT	0.11				0.95	0.11	0.10	0.80		0.00	0.70		0.00	0.10	10	6.13	0.64
CB-7	28+75	31+95 RT	0.46				0.95	0.37	0.35	0.80		0.00	0.70	0.09	0.06	0.41	10	6.13	2.54
CB-8	28+00	31+95 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	6.13	2.80
CB-9 W	31+95	33+64 RT	0.19				0.95	0.19	0.18	0.80		0.00	0.70		0.00	0.18	10	6.13	1.11
CB-9 E	34+00	33+64 RT	0.04				0.95	0.04	0.04	0.80		0.00	0.70		0.00	0.04	10	6.13	0.23
CB-10 W	31+95	33+64 LT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	6.13	1.57
CB-10 E	34+00	33+64 LT	0.05				0.95	0.05	0.05	0.80		0.00	0.70		0.00	0.05	10	6.13	0.29
CB-11	36+15	34+00 RT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	6.13	1.57
CB-12	36+15	34+00 LT	0.26				0.95	0.26	0.25	0.80		0.00	0.70		0.00	0.25	10	6.13	1.51
CB-13	37+02	36+15 RT	0.09				0.95	0.09	0.09	0.80		0.00	0.70		0.00	0.09	10	6.13	0.52
CB-14	37+02	36+15 LT	0.14				0.95	0.14	0.13	0.80		0.00	0.70		0.00	0.13	10	6.13	0.82
CB-15	37+02	39+25 RT	0.27				0.95	0.27	0.26	0.80		0.00	0.70		0.00	0.26	10	6.13	1.57
CB-16	37+02	39+25 LT	0.29				0.95	0.29	0.28	0.80		0.00	0.70		0.00	0.28	10	6.13	1.69
CB-17 W	39+25	40+70 RT	0.13				0.95	0.13	0.12	0.80		0.00	0.70		0.00	0.12	10	6.13	0.76
CB-17 E	41+50	40+70 RT	0.07				0.95	0.07	0.07	0.80		0.00	0.70		0.00	0.07	10	6.13	0.41
CB-18 W	39+25	40+70 LT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	6.13	1.28
CB-18 E	41+50	40+70 LT	0.12				0.95	0.12	0.11	0.80		0.00	0.70		0.00	0.11	10	6.13	0.70

Sx: Cross-Slope SL: Longitudinal Slope T: Spread (feet) CB: Catch Basin SC: Scupper SP: Spillway

Computed by: RS Date: JUNE 14, 2004 Checked by: DJS

NOTES:

(1) - See "STORM SEWER INLET CALCULATION RECORD" for pavement parameters.

(2) - See HEC12 results for actual Q interception at catch basin.

STORM SEWER RUNOFF CALCULATION RECORD

URS CORP.
Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PROJ. NO.:

DESIGN DATA

FREQUENCY: 50 years
P6= 2.67 Inches P24= 3.03 Inches P1= 2.21 Inches

RUNOFF CALCULATIONS

INLET	DRAINAGE AREA			PAVEMENT (1)			PAVEMENT						DESERT LANDSCAPING				Tc	INTENSITY	$Q^{(2)}$
NO.	Station		ACRES	SX	SL	T	C	A	CA	C	A	CA	C	A	CA	SUM CA	min	inches/hr	cfs
CB-19	45+50	41+50 RT	0.37				0.95	0.37	0.35	0.80		0.00	0.70		0.00	0.35	10	6.13	2.15
CB-20	45+50	41+50 LT	0.39				0.95	0.39	0.37	0.80		0.00	0.70		0.00	0.37	10	6.13	2.27
CB-21	50+11	45+50 RT	0.42				0.95	0.42	0.40	0.80		0.00	0.70		0.00	0.40	10	6.13	2.45
CB-22	50+11	45+50 LT	0.44				0.95	0.44	0.42	0.80		0.00	0.70		0.00	0.42	10	6.13	2.56
CB-23	50+11	55+30 RT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	6.13	2.80
CB-24	50+11	55+30 LT	0.50				0.95	0.50	0.48	0.80		0.00	0.70		0.00	0.48	10	6.13	2.91
CB-25	55+30	60+00 RT	0.49				0.95	0.49	0.47	0.80		0.00	0.70		0.00	0.47	10	6.13	2.85
CB-26	55+30	60+00 LT	0.51				0.95	0.51	0.48	0.80		0.00	0.70		0.00	0.48	10	6.13	2.97
CB-27	60+00	64+25 RT	0.52				0.95	0.52	0.49	0.80		0.00	0.70		0.00	0.49	10	6.13	3.03
CB-28	60+00	64+25 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	6.13	2.80
CB-29	66+37	65+25 RT	0.11				0.95	0.11	0.10	0.80		0.00	0.70		0.00	0.10	10	6.13	0.64
CB-30	66+37	65+25 LT	0.14				0.95	0.14	0.13	0.80		0.00	0.70		0.00	0.13	10	6.13	0.82
CB-31	66+37	69+30 RT	0.34				0.95	0.34	0.32	0.80		0.00	0.70		0.00	0.32	10	6.13	1.98
CB-32	66+37	69+30 LT	0.40				0.95	0.40	0.38	0.80		0.00	0.70		0.00	0.38	10	6.13	2.33
CB-33 W	69+30	71+00 RT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	6.13	1.28
CB-33 E	72+20	71+00 RT	0.22				0.95	0.22	0.21	0.80		0.00	0.70		0.00	0.21	10	6.13	1.28
CB-34 W	69+30	71+00 LT	0.19				0.95	0.19	0.18	0.80		0.00	0.70		0.00	0.18	10	6.13	1.11
CB-34 E	72+20	71+00 LT	0.15				0.95	0.15	0.14	0.80		0.00	0.70		0.00	0.14	10	6.13	0.87
CB-35	NORTH	71+70 LT	0.48				0.95	0.48	0.46	0.80		0.00	0.70		0.00	0.46	10	6.13	2.80
CB-36	NORTH	72+70 LT	0.57				0.95	0.57	0.54	0.80		0.00	0.70		0.00	0.54	10	6.13	3.32

Sx: Cross-Slope SL: Longitudinal Slope T: Spread (feet) CB: Catch Basin SC: Scupper SP: Spillway

Computed by: RS Date: JUNE 14, 2004 Checked by: DJS

NOTES:

(1) - See "STORM SEWER INLET CALCULATION RECORD" for pavement parameters.

(2) - See HEC12 results for actual Q interception at catch basin.

APPENDIX E

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 10 years
P6= 1.89 Inches
P24= 2.17 Inches
P1= 1.55 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-1	22+20	LT	1.46	0.0	1.46	22	9	6 W	17	0.0200	0.0050	8.56	13.42	1.46	0.0	
CB-2	26+20	RT	3.30	0.0	3.30	22	13	10 W	17	0.0200	0.0040	12.36	19.42	3.30	0.0	
CB-3	26+20	LT	2.05	0.0	2.05	22	9	6 W	17	0.0200	0.0040	10.26	19.42	2.05	0.0	
CB-4	28+00	RT	0.96	0.0	0.96	22	6	3 W	17	0.0200	0.0071	6.76	13.42	0.96	0.0	
CB-5	28+00	LT	1.00	0.0	1.00	22	6	3 W	17	0.0200	0.0071	6.86	13.42	1.00	0.0	
CB-6	28+75	RT	0.46	0.0	0.46	22	6	3 E	17	0.0200	0.0071	4.96	13.42	0.46	0.0	
CB-7	31+95	RT	1.82	0.0	1.82	22	9	6 W	17	0.0200	0.0071	8.76	19.42	1.82	0.0	
CB-8	31+95	LT	2.01	0.0	2.01	22	9	6 W	17	0.0200	0.0071	9.11	19.42	2.01	0.0	
CB-9 W	33+64	RT	0.79	0.0	0.79	22	9	3 E&W	17	0.0200	SAG	6.71	19.42	0.79	0.0	
CB-9 E	33+64	RT	0.17	0.0	0.17	22	9	3 E&W	17	0.0200	SAG	3.56	19.42	0.17	0.0	
CB-10 W	33+64	LT	1.13	0.0	1.13	22	9	3 E&W	17	0.0200	SAG	7.76	13.42	1.13	0.0	
CB-10 E	33+64	LT	0.21	0.0	0.21	22	9	3 E&W	17	0.0200	SAG	3.91	13.42	0.21	0.0	
CB-11	34+00	RT	1.13	0.0	1.13	22	6	3 E	17	0.0200	0.0040	8.11	19.42	1.13	0.0	
CB-12	34+00	LT	1.09	0.0	1.09	22	6	3 E	17	0.0200	0.0040	7.96	13.42	1.09	0.0	
CB-13	36+15	RT	0.38	0.0	0.38	22	3		17	0.0200	0.0040	5.11	19.42	0.38	0.0	
CB-14	36+15	LT	0.59	0.0	0.59	22	6	3 E	17	0.0200	0.0040	6.16	13.42	0.59	0.0	

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 10 years
P6= 1.89 Inches
P24= 2.17 Inches
P1= 1.55 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-15	39+25	RT	1.13	0.0	1.13	22	6	3 W	17	0.0200	0.0040	8.06	19.42	1.13	0.0	
CB-16	39+25	LT	1.21	0.0	1.21	22	6	3 W	17	0.0200	0.0040	8.31	19.42	1.21	0.0	
CB-17 W	40+70	RT	0.54	0.0	0.54	22	9	3 E&W	17	0.0200	SAG	6.91	19.42	0.54	0.0	
CB-17 E	40+70	RT	0.29	0.0	0.29	22	9	3 E&W	17	0.0200	SAG	5.31	19.42	0.29	0.0	
CB-18 W	40+70	LT	0.92	0.0	0.92	22	9	3 E&W	17	0.0200	SAG	8.61	19.42	0.92	0.0	
CB-18 E	40+70	LT	0.50	0.0	0.50	22	9	3 E&W	17	0.0200	SAG	6.71	19.42	0.50	0.0	
CB-19	41+50	RT	1.55	0.0	1.55	22	9	6 E	17	0.0200	0.0040	9.16	19.42	1.55	0.0	
CB-20	41+50	LT	1.63	0.0	1.63	22	9	6 E	17	0.0200	0.0040	9.36	19.42	1.63	0.0	
CB-21	45+50	RT	1.76	0.0	1.76	22	9	6 E	17	0.0200	0.0040	9.66	19.42	1.76	0.0	
CB-22	45+50	LT	1.84	0.0	1.84	22	9	6 E	17	0.0200	0.0040	9.81	19.42	1.84	0.0	
CB-23	55+30	RT	2.01	0.0	2.01	22	9	6 W	17	0.0200	0.0040	10.16	19.42	2.01	0.0	
CB-24	55+30	LT	2.09	0.0	2.09	22	9	6 W	17	0.0200	0.0040	10.31	19.42	2.09	0.0	
CB-25	60+00	RT	2.05	0.0	2.05	22	9	6 W	17	0.0200	0.0040	10.26	19.42	2.05	0.0	
CB-26	60+00	LT	2.13	0.0	2.13	22	9	6 W	17	0.0200	0.0040	10.41	19.42	2.13	0.0	
CB-27	64+25	RT	2.17	0.0	2.17	22	9	6 W	17	0.0200	0.0070	9.41	19.42	2.17	0.0	
CB-28	64+25	LT	2.01	0.0	2.01	22	9	6 W	17	0.0200	0.0070	9.11	19.42	2.01	0.0	

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 10 years
P6= 1.89 Inches
P24= 2.17 Inches
P1= 1.55 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-29	65+25	RT	0.46	0.0	0.46	22	6	3 E	17	0.0200	0.0040	5.81	19.42	0.46	0.0	
CB-30	65+25	LT	0.59	0.0	0.59	22	6	3 E	17	0.0200	0.0040	6.26	19.42	0.59	0.0	
CB-31	69+30	RT	1.42	0.0	1.42	22	9	6 W	17	0.0200	0.0040	8.86	19.42	1.42	0.0	
CB-32	69+30	LT	1.67	0.0	1.67	22	9	6 W	17	0.0200	0.0040	9.46	19.42	1.67	0.0	
CB-33 W	71+00	RT	0.92	0.0	0.92	22	9	3 E&W	17	0.0200	SAG	7.46	13.42	0.92	0.0	
CB-33 E	71+00	RT	0.92	0.0	0.92	22	9	3 E&W	17	0.0200	SAG	7.46	13.42	0.92	0.0	
CB-34 W	71+00	LT	0.79	0.0	0.79	22	9	3 E&W	17	0.0200	SAG	7.01	19.42	0.79	0.0	
CB-34 E	71+00	LT	0.63	0.0	0.63	22	9	3 E&W	17	0.0200	SAG	6.36	19.42	0.63	0.0	
CB-35	71+70	LT	2.01	0.0	2.01	22	9	6 N	17	0.0200	0.0025	11.16	25.42	2.01	0.0	
CB-36	72+70	LT	2.38	0.0	2.38	22	9	6 N	17	0.0200	0.0025	11.91	25.42	2.38	0.0	

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

PAVEMENT DRAINAGE PROGRAM - HEC-12
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Sta 22+20 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.35 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 1 C2=0.70 A2= 0.00 Qrunoff= 1.5 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0050 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 1.5 Qint= 1.5 Flowby dn= 0.0 Depth=0.20 Spread= 8.56 Veloc= 1.95

Sta 26+20 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.49 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 3 C2=0.70 A2= 0.00 Qrunoff= 2.1 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.1 Qint= 2.1 Flowby dn= 0.0 Depth=0.24 Spread= 10.26 Veloc= 1.91

Sta 28+00 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.24 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 5 C2=0.70 A2= 0.00 Qrunoff= 1.0 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0071 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 1.0 Qint= 1.0 Flowby dn= 0.0 Depth=0.17 Spread= 6.86 Veloc= 2.04

Sta 31+95 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.48 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 8 C2=0.70 A2= 0.00 Qrunoff= 2.0 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0071 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.0 Qint= 2.0 Flowby dn= 0.0 Depth=0.21 Spread= 9.11 Veloc= 2.38

Sta 33+64 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.27 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 10W C2=0.70 A2= 0.00 Qrunoff= 1.1 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0050 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 1.2 Qint= 1.2 Flowby dn= 0.0 Depth=0.19 Spread= 7.76 Veloc= 1.85

Sta 36+15 LT — INPUT

Intens.= 4.40 C1=0.95 A1= 0.14 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 14 C2=0.70 A2= 0.00 Qrunoff= 0.6 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 0.6 Qint= 0.6 Flowby dn= 0.0 Depth=0.15 Spread= 6.16 Veloc= 1.46

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Sta 34+00 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.26	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 12	C2=0.70	A2= 0.00	Qrunoff=	1.1	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 6.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 1.1	Qint= 1.1	Flowby dn=	0.0	Depth=0.19	Spread= 7.96	Veloc= 1.66		
Sta 33+64 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.05	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 10E	C2=0.70	A2= 0.00	Qrunoff=	0.2	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 0.2	Qint= 0.2	Flowby dn=	0.0	Depth=0.11	Spread= 3.91	Veloc= 1.20		
Sta 39+25 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.29	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 16	C2=0.70	A2= 0.00	Qrunoff=	1.2	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 6.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 1.2	Qint= 1.2	Flowby dn=	0.0	Depth=0.20	Spread= 8.31	Veloc= 1.71		
Sta 40+70 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.22	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 18W	C2=0.70	A2= 0.00	Qrunoff=	0.9	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0020	Slope3= 0.0200	W = 1.42	Length= 9.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 0.9	Qint= 0.9	Flowby dn=	0.0	Depth=0.20	Spread= 8.61	Veloc= 1.22		
Sta 45+50 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.44	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 22	C2=0.70	A2= 0.00	Qrunoff=	1.9	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 1.9	Qint= 1.9	Flowby dn=	0.0	Depth=0.23	Spread= 9.81	Veloc= 1.88		
Sta 41+50 LT				INPUT					
Intens.= 4.40	C1=0.95	A1= 0.39	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00		
CB ID = 20	C2=0.70	A2= 0.00	Qrunoff=	1.6	Slope2= 0.0417	a = 2.00	Perim = 0.00		
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00		
				OUTPUT					
Flowby= 0.0	Qtotal= 1.6	Qint= 1.6	Flowby dn=	0.0	Depth=0.22	Spread= 9.36	Veloc= 1.82		

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¤Sta 40+70 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.12 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 18E C2=0.70 A2= 0.00 Qrunoff= 0.5 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0020 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 0.5 Qint= 0.5 Flowby dn= 0.0 Depth=0.16 Spread= 6.71 Veloc= 1.07¤

¤Sta 55+30 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.50 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 24 C2=0.70 A2= 0.00 Qrunoff= 2.1 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.1 Qint= 2.1 Flowby dn= 0.0 Depth=0.24 Spread= 10.31 Veloc= 1.93¤

¤Sta 60+00 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.51 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 26 C2=0.70 A2= 0.00 Qrunoff= 2.1 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.1 Qint= 2.1 Flowby dn= 0.0 Depth=0.24 Spread= 10.41 Veloc= 1.94¤

¤Sta 64+25 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.48 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 28 C2=0.70 A2= 0.00 Qrunoff= 2.0 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0070 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.0 Qint= 2.0 Flowby dn= 0.0 Depth=0.21 Spread= 9.11 Veloc= 2.36¤

¤Sta 65+25 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.14 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 30 C2=0.70 A2= 0.00 Qrunoff= 0.6 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 0.6 Qint= 0.6 Flowby dn= 0.0 Depth=0.16 Spread= 6.26 Veloc= 1.46¤

¤Sta 69+30 LT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.40 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 32 C2=0.70 A2= 0.00 Qrunoff= 1.7 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 1.7 Qint= 1.7 Flowby dn= 0.0 Depth=0.22 Spread= 9.46 Veloc= 1.83¤

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Sta 71+00 LT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.19 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 34W C2=0.70 A2= 0.00 Qrunoff= 0.8 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.8 Qint= 0.8 Flowby dn= 0.0 Depth=0.17 Spread= 7.01 Veloc= 1.55

Sta 71+70 LT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.48 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 35 C2=0.70 A2= 0.00 Qrunoff= 2.0 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0025 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.0 Qint= 2.0 Flowby dn= 0.0 Depth=0.25 Spread= 11.16 Veloc= 1.59

Sta 71+00 LT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.15 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 34E C2=0.70 A2= 0.00 Qrunoff= 0.6 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.6 Qint= 0.6 Flowby dn= 0.0 Depth=0.16 Spread= 6.36 Veloc= 1.48

Sta 72+70 LT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.57 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 36 C2=0.70 A2= 0.00 Qrunoff= 2.4 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0025 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.4 Qint= 2.4 Flowby dn= 0.0 Depth=0.27 Spread= 11.91 Veloc= 1.66

CRITERIA

Runoff computed by Rational Method Manning's n Gutter=0.012 Manning's n Pavement=0.016
Clogging Factors in Sag Location:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 2.00 Comb-Curb= 1.25 Comb-Grate= 2.00
Clogging Factors on Continuous Grade:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 1.50 Comb-Curb= 1.50 Comb-Grate= 2.00

Prepared by: Date:06/16/10 Time:09:27:51 Checked by: Date:

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Sta 71+00 RT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.22 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 33W C2=0.70 A2= 0.00 Qrunoff= 0.9 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.9 Qint= 0.9 Flowby dn= 0.0 Depth=0.18 Spread= 7.46 Veloc= 1.60

Sta 71+00 RT

INPUT

Intens.= 4.40 C1=0.95 A1= 0.22 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 33E C2=0.70 A2= 0.00 Qrunoff= 0.9 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.9 Qint= 0.9 Flowby dn= 0.0 Depth=0.18 Spread= 7.46 Veloc= 1.60

CRITERIA

Runoff computed by Rational Method Manning's n Gutter=0.012 Manning's n Pavement=0.016
Clogging Factors in Sag Location:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 2.00 Comb-Curb= 1.25 Comb-Grate= 2.00
Clogging Factors on Continuous Grade:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 1.50 Comb-Curb= 1.50 Comb-Grate= 2.00

Prepared by: Date:06/16/10 Time:10:53:49 Checked by: Date:

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INPUT

Sta 26+20 RT
Intens.= 4.40 C1=0.95 A1= 0.79 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 2 C2=0.70 A2= 0.00 Qrunoff= 3.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length=13.00

OUTPUT

Flowby= 0.0 Qtotal= 3.3 Qint= 3.3 Flowby dn= 0.0 Depth=0.28 Spread= 12.36 Veloc= 2.14

INPUT

Sta 28+00 RT
Intens.= 4.40 C1=0.95 A1= 0.23 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 4 C2=0.70 A2= 0.00 Qrunoff= 1.0 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0071 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 1.0 Qint= 1.0 Flowby dn= 0.0 Depth=0.17 Spread= 6.76 Veloc= 2.02

INPUT

Sta 28+75 RT
Intens.= 4.40 C1=0.95 A1= 0.11 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 6 C2=0.70 A2= 0.00 Qrunoff= 0.5 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0071 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 0.5 Qint= 0.5 Flowby dn= 0.0 Depth=0.13 Spread= 4.96 Veloc= 1.74

INPUT

Sta 31+95 RT
Intens.= 4.40 C1=0.95 A1= 0.37 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 7 C2=0.70 A2= 0.09 Qrunoff= 1.8 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0071 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 1.8 Qint= 1.8 Flowby dn= 0.0 Depth=0.21 Spread= 8.76 Veloc= 2.32

INPUT

Sta 33+64 RT
Intens.= 4.40 C1=0.95 A1= 0.19 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 9W C2=0.70 A2= 0.00 Qrunoff= 0.8 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0050 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.8 Qint= 0.8 Flowby dn= 0.0 Depth=0.16 Spread= 6.71 Veloc= 1.69

INPUT

Sta 36+15 RT
Intens.= 4.40 C1=0.95 A1= 0.09 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 13 C2=0.70 A2= 0.00 Qrunoff= 0.4 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 3.00

OUTPUT

Flowby= 0.0 Qtotal= 0.4 Qint= 0.4 Flowby dn= 0.0 Depth=0.13 Spread= 5.11 Veloc= 1.33

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¤PAVEMENT DRAINAGE PROGRAM - HEC-12                                    Page   2 ¤
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¤Project    : Indian Bend Road                                                  ¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 34+00 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.27 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 11   C2=0.70  A2= 0.00 Qrunoff=  1.1    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 6.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  1.1 Qint=  1.1 Flowby dn=  0.0 Depth=0.19 Spread=  8.11 Veloc= 1.68¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 33+64 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.04 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 9E   C2=0.70  A2= 0.00 Qrunoff=  0.2    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  0.2 Qint=  0.2 Flowby dn=  0.0 Depth=0.10 Spread=  3.56 Veloc= 1.14¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 39+25 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.27 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 15   C2=0.70  A2= 0.00 Qrunoff=  1.1    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 6.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  1.1 Qint=  1.1 Flowby dn=  0.0 Depth=0.19 Spread=  8.06 Veloc= 1.69¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 40+70 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.13 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 17W  C2=0.70  A2= 0.00 Qrunoff=  0.5    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0020 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  0.5 Qint=  0.5 Flowby dn=  0.0 Depth=0.17 Spread=  6.91 Veloc= 1.09¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 45+50 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.42 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 21   C2=0.70  A2= 0.00 Qrunoff=  1.8    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  1.8 Qint=  1.8 Flowby dn=  0.0 Depth=0.22 Spread=  9.66 Veloc= 1.85¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 41+50 RT                              INPUT                                ¤
¤Intens.= 4.40 C1=0.95  A1= 0.37 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 19   C2=0.70  A2= 0.00 Qrunoff=  1.6    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                          OUTPUT                               ¤
¤Flowby=  0.0 Qtotal=  1.6 Qint=  1.6 Flowby dn=  0.0 Depth=0.21 Spread=  9.16 Veloc= 1.80¤
```

¤Licensed to: BRW, Inc., Phoenix, AZ 85012 ¤
¤Project : Indian Bend Road ¤

¤Sta 40+70 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.07 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 17E C2=0.70 A2= 0.00 Qrunoff= 0.3 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0020 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 0.3 Qint= 0.3 Flowby dn= 0.0 Depth=0.14 Spread= 5.31 Veloc= 0.97¤

¤Sta 55+30 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.48 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 23 C2=0.70 A2= 0.00 Qrunoff= 2.0 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.0 Qint= 2.0 Flowby dn= 0.0 Depth=0.23 Spread= 10.16 Veloc= 1.91¤

¤Sta 60+00 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.49 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 25 C2=0.70 A2= 0.00 Qrunoff= 2.1 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.1 Qint= 2.1 Flowby dn= 0.0 Depth=0.24 Spread= 10.26 Veloc= 1.91¤

¤Sta 64+25 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.52 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 27 C2=0.70 A2= 0.00 Qrunoff= 2.2 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0070 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.2 Qint= 2.1 Flowby dn= 0.0 Depth=0.22 Spread= 9.41 Veloc= 2.41¤

¤Sta 65+25 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.11 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 29 C2=0.70 A2= 0.00 Qrunoff= 0.5 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 0.5 Qint= 0.5 Flowby dn= 0.0 Depth=0.15 Spread= 5.81 Veloc= 1.41¤

¤Sta 69+30 RT INPUT ¤
¤Intens.= 4.40 C1=0.95 A1= 0.34 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 31 C2=0.70 A2= 0.00 Qrunoff= 1.4 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 1.4 Qint= 1.4 Flowby dn= 0.0 Depth=0.21 Spread= 8.86 Veloc= 1.77¤

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 50 years
P6= 2.67 Inches
P24= 3.03 Inches
P1= 2.21 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-1	22+20	LT	2.04	0.0	2.04	22	9	6 W	17	0.0200	0.0050	9.81	13.42	2.04	0.0	
CB-2	26+20	RT	4.60	0.0	4.60	22	13	10 W	17	0.0200	0.0040	14.06	19.42	4.50	0.1	TO CB-4
CB-3	26+20	LT	2.85	0.0	2.85	22	9	6 W	17	0.0200	0.0040	11.66	19.42	2.75	0.1	TO CB-5
CB-4	28+00	RT	1.44	0.1	1.34	22	6	3 W	17	0.0200	0.0071	7.86	13.42	1.34	0.1	TO CB-6
CB-5	28+00	LT	1.50	0.1	1.40	22	6	3 W	17	0.0200	0.0071	8.06	13.42	1.40	0.1	TO CB-8
CB-6	28+75	RT	0.74	0.1	0.64	22	6	3 E	17	0.0200	0.0071	6.06	13.42	0.74	0.0	
CB-7	31+95	RT	2.54	0.0	2.54	22	9	6 W	17	0.0200	0.0071	9.96	19.42	2.44	0.1	TO CB-9 W
CB-8	31+95	LT	2.90	0.1	2.80	22	9	6 W	17	0.0200	0.0071	10.56	19.42	2.60	0.3	TO CB 10 W
CB-9 W	33+64	RT	1.21	0.1	1.11	22	9	3 E&W	17	0.0200	SAG	8.06	19.42	1.21	0.0	
CB-9 E	33+64	RT	0.33	0.1	0.23	22	9	3 E&W	17	0.0200	SAG	4.81	19.42	0.33	0.0	
CB-10 W	33+64	LT	1.87	0.3	1.57	22	9	3 E&W	17	0.0200	SAG	9.41	13.42	1.87	0.0	
CB-10 E	33+64	LT	0.39	0.1	0.29	22	9	3 E&W	17	0.0200	SAG	5.01	13.42	0.39	0.0	
CB-11	34+00	RT	1.57	0.0	1.57	22	6	3 E	17	0.0200	0.0040	9.31	19.42	1.47	0.1	TO CB-9 E
CB-12	34+00	LT	1.51	0.0	1.51	22	6	3 E	17	0.0200	0.0040	9.11	13.42	1.41	0.1	TO CB-10 E
CB-13	36+15	RT	0.52	0.0	0.52	22	3		17	0.0200	0.0040	5.91	19.42	0.52	0.0	
CB-14	36+15	LT	0.82	0.0	0.82	22	6	3 E	17	0.0200	0.0040	7.06	13.42	0.82	0.0	

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 50 years
P6= 2.67 Inches
P24= 3.03 Inches
P1= 2.21 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-15	39+25	RT	1.57	0.0	1.57	22	6	3 W	17	0.0200	0.0040	9.21	19.42	1.47	0.1	TO CB-17 W
CB-16	39+25	LT	1.69	0.0	1.69	22	6	3 W	17	0.0200	0.0040	9.51	19.42	1.59	0.1	TO CB-18 W
CB-17 W	40+70	RT	0.86	0.1	0.76	22	9	3 E&W	17	0.0200	SAG	8.26	19.42	0.86	0.0	
CB-17 E	40+70	RT	0.41	0.0	0.41	22	9	3 E&W	17	0.0200	SAG	6.16	19.42	0.41	0.0	
CB-18 W	40+70	LT	1.38	0.1	1.28	22	9	3 E&W	17	0.0200	SAG	10.11	19.42	1.38	0.0	
CB-18 E	40+70	LT	0.70	0.0	0.70	22	9	3 E&W	17	0.0200	SAG	7.71	19.42	0.70	0.0	
CB-19	41+50	RT	2.15	0.0	2.15	22	9	6 E	17	0.0200	0.0040	10.51	19.42	2.15	0.0	
CB-20	41+50	LT	2.27	0.0	2.27	22	9	6 E	17	0.0200	0.0040	10.76	19.42	2.27	0.0	
CB-21	45+50	RT	2.45	0.0	2.45	22	9	6 E	17	0.0200	0.0040	11.01	19.42	2.45	0.0	
CB-22	45+50	LT	2.56	0.0	2.56	22	9	6 E	17	0.0200	0.0040	11.21	19.42	2.56	0.0	
CB-23	55+30	RT	2.80	0.0	2.80	22	9	6 W	17	0.0200	0.0040	11.56	19.42	2.70	0.1	TO CB-25
CB-24	55+30	LT	2.91	0.0	2.91	22	9	6 W	17	0.0200	0.0040	11.76	19.42	2.81	0.1	TO CB-26
CB-25	60+00	RT	2.95	0.1	2.85	22	9	6 W	17	0.0200	0.0040	11.81	19.42	2.85	0.1	TO CB-27
CB-26	60+00	LT	3.07	0.1	2.97	22	9	6 W	17	0.0200	0.0040	12.06	19.42	2.87	0.2	TO CB-28
CB-27	64+25	RT	3.13	0.1	3.03	22	9	6 W	17	0.0200	0.0070	10.91	19.42	2.73	0.4	TO CB-29
CB-28	64+25	LT	3.00	0.2	2.80	22	9	6 W	17	0.0200	0.0070	10.61	19.42	2.70	0.3	TO CB-30

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

STORM SEWER INLET CALCULATION RECORD

URS CORP.

Engineering
Transportation
Planning
Urban Design
Landscape Architects

LOCATION DATA

STREET: Indian Bend Road
LOCATION:
PRO. NO.:

DESIGN DATA

FREQUENCY: 50 years
P6= 2.67 Inches
P24= 3.03 Inches
P1= 2.21 Inches

STORM SEWER INLET CALCULATIONS

Inlet			Q	Carryover	Design Q	Inlet	Curb Opening	Wing / Slot	Gutter	Pavement		Spread T(ft)		Intercepted	Flowby	Notes
No.	Station	Offset	(cfs)	(cfs)	(cfs)	Std.	L (ft)	L (ft)	Type	SX	SL	Actual	Allow	Flow (cfs)	(cfs)	
CB-29	65+25	RT	1.04	0.4	0.64	22	6	3 E	17	0.0200	0.0040	7.66	19.42	1.04	0.0	
CB-30	65+25	LT	1.12	0.3	0.82	22	6	3 E	17	0.0200	0.0040	8.01	19.42	1.12	0.0	
CB-31	69+30	RT	1.98	0.0	1.98	22	9	6 W	17	0.0200	0.0040	10.11	19.42	1.98	0.0	
CB-32	69+30	LT	2.33	0.0	2.33	22	9	6 W	17	0.0200	0.0040	10.81	19.42	2.33	0.0	
CB-33 W	71+00	RT	1.28	0.0	1.28	22	9	3 E&W	17	0.0200	SAG	8.51	13.42	1.28	0.0	
CB-33 E	71+00	RT	1.28	0.0	1.28	22	9	3 E&W	17	0.0200	SAG	8.51	13.42	1.28	0.0	
CB-34 W	71+00	LT	1.11	0.0	1.11	22	9	3 E&W	17	0.0200	SAG	8.06	19.42	1.11	0.0	
CB-34 E	71+00	LT	0.87	0.0	0.87	22	9	3 E&W	17	0.0200	SAG	7.36	19.42	0.87	0.0	
CB-35	71+70	LT	2.80	0.0	2.80	22	9	6 N	17	0.0200	0.0025	12.71	25.42	2.80	0.0	
CB-36	72+70	LT	3.32	0.0	3.32	22	9	6 N	17	0.0200	0.0025	13.56	25.42	3.22	0.1	

SX: Cross-Slope SL: Longitudinal Slope CB: Catch Basin SC: Scupper

Computed by: RS Date: JUNE 15, 2004 Checked by: DJS

NOTE: FOR ACTUAL Q CALCULATIONS, SEE APPENDIX C.

1- ADOT C-15.30 (SINGLE)
2- ADOT C-15.30 (DOUBLE)
3- ADOT C-15.20 (ONE WING)
4- ADOT C-15.20 (TWO WINGS)
5- ADOT C-05.10 (CURB & GUTTER TYPE D)
6- ADOT C-15.92
7- MAG 531
8- MAG 532
9- MAG 534, Type E
10- SCUPPER
11- ADOT C-15.10 (Double)
12- ADOT C-05.10 (SINGLE CURB TYPE A1)
13- CONCRETE BARRIER
14- ADOT C-15.10 (SINGLE)
15- ADOT C-05.10 (CURB & GUTTER TYPE B)
16- ADOT C-05.10 (CURB & GUTTER TYPE C)
17- MAG 220 (CURB & GUTTER TYPE A)
18- ADOT C-15.91
19- COP P1570 (SPECIAL)
20- ADOT C-15.80
21- ADOT C-15.40
22- COP P1569
23- COP P1570
24- COP P1570 (MODIFIED)

```
PAVEMENT DRAINAGE PROGRAM - HEC-12                                    Page   1
Licensed to: BRW, Inc., Phoenix, AZ 85012
Project    : Indian Bend Road
Sta 22+20 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.35 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 1    C2=0.70  A2= 0.00 Qrunoff=  2.1    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0050 Slope3= 0.0200 W     = 1.42 Length= 9.00
                                          OUTPUT
Flowby=  0.0 Qtotal=  2.1 Qint=  2.1 Flowby dn=  0.0 Depth=0.23 Spread=  9.81 Veloc= 2.08
Sta 26+20 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.49 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 3    C2=0.70  A2= 0.00 Qrunoff=  2.9    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00
                                          OUTPUT
Flowby=  0.0 Qtotal=  2.9 Qint=  2.8 Flowby dn=  0.1 Depth=0.26 Spread= 11.66 Veloc= 2.08
Sta 28+00 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.24 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 5    C2=0.70  A2= 0.00 Qrunoff=  1.4    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0071 Slope3= 0.0200 W     = 1.42 Length= 6.00
                                          OUTPUT
Flowby=  0.1 Qtotal=  1.5 Qint=  1.4 Flowby dn=  0.1 Depth=0.19 Spread=  8.06 Veloc= 2.25
Sta 31+95 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.48 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 8    C2=0.70  A2= 0.00 Qrunoff=  2.8    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0071 Slope3= 0.0200 W     = 1.42 Length= 9.00
                                          OUTPUT
Flowby=  0.1 Qtotal=  3.0 Qint=  2.7 Flowby dn=  0.3 Depth=0.24 Spread= 10.56 Veloc= 2.59
Sta 33+64 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.27 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 10W  C2=0.70  A2= 0.00 Qrunoff=  1.6    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0050 Slope3= 0.0200 W     = 1.42 Length= 9.00
                                          OUTPUT
Flowby=  0.3 Qtotal=  1.9 Qint=  1.9 Flowby dn=  0.0 Depth=0.22 Spread=  9.41 Veloc= 2.04
Sta 36+15 LT                              INPUT
Intens.= 6.13 C1=0.95  A1= 0.14 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00
CB ID  = 14   C2=0.70  A2= 0.00 Qrunoff=  0.8    Slope2= 0.0417 a     = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 6.00
                                          OUTPUT
Flowby=  0.0 Qtotal=  0.8 Qint=  0.8 Flowby dn=  0.0 Depth=0.17 Spread=  7.06 Veloc= 1.57
```

Sta 34+00 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.26 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 12 C2=0.70 A2= 0.00 Qrunoff= 1.5 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 1.5 Qint= 1.5 Flowby dn= 0.1 Depth=0.21 Spread= 9.11 Veloc= 1.78

Sta 33+64 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.05 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 10E C2=0.70 A2= 0.00 Qrunoff= 0.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.1 Qtotal= 0.4 Qint= 0.4 Flowby dn= 0.0 Depth=0.13 Spread= 5.01 Veloc= 1.31

Sta 39+25 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.29 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 16 C2=0.70 A2= 0.00 Qrunoff= 1.7 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00

OUTPUT

Flowby= 0.0 Qtotal= 1.7 Qint= 1.6 Flowby dn= 0.1 Depth=0.22 Spread= 9.51 Veloc= 1.83

Sta 40+70 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.22 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 18W C2=0.70 A2= 0.00 Qrunoff= 1.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0020 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.1 Qtotal= 1.4 Qint= 1.4 Flowby dn= 0.0 Depth=0.23 Spread= 10.11 Veloc= 1.35

Sta 45+50 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.44 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 22 C2=0.70 A2= 0.00 Qrunoff= 2.6 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.6 Qint= 2.5 Flowby dn= 0.0 Depth=0.25 Spread= 11.21 Veloc= 2.01

Sta 41+50 LT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.39 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 20 C2=0.70 A2= 0.00 Qrunoff= 2.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.3 Qint= 2.3 Flowby dn= 0.0 Depth=0.25 Spread= 10.76 Veloc= 1.97

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¤Project : Indian Bend Road ¤

¤Sta 40+70 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.12	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 18E	C2=0.70	A2= 0.00	Qrunoff=	0.7	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0020	Slope3= 0.0200	W = 1.42	Length= 9.00¤
¤				OUTPUT			¤
¤Flowby= 0.0	Qtotal= 0.7	Qint= 0.7	Flowby dn=	0.0	Depth=0.18	Spread= 7.71	Veloc= 1.15¤
¤Sta 55+30 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.50	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 24	C2=0.70	A2= 0.00	Qrunoff=	2.9	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00¤
¤				OUTPUT			¤
¤Flowby= 0.0	Qtotal= 2.9	Qint= 2.8	Flowby dn=	0.1	Depth=0.27	Spread= 11.76	Veloc= 2.08¤
¤Sta 60+00 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.51	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 26	C2=0.70	A2= 0.00	Qrunoff=	3.0	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00¤
¤				OUTPUT			¤
¤Flowby= 0.1	Qtotal= 3.1	Qint= 2.9	Flowby dn=	0.2	Depth=0.27	Spread= 12.06	Veloc= 2.10¤
¤Sta 64+25 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.48	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 28	C2=0.70	A2= 0.00	Qrunoff=	2.8	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0070	Slope3= 0.0200	W = 1.42	Length= 9.00¤
¤				OUTPUT			¤
¤Flowby= 0.2	Qtotal= 3.0	Qint= 2.7	Flowby dn=	0.3	Depth=0.24	Spread= 10.61	Veloc= 2.60¤
¤Sta 65+25 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.14	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 30	C2=0.70	A2= 0.00	Qrunoff=	0.8	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 6.00¤
¤				OUTPUT			¤
¤Flowby= 0.3	Qtotal= 1.1	Qint= 1.1	Flowby dn=	0.0	Depth=0.19	Spread= 8.01	Veloc= 1.66¤
¤Sta 69+30 LT				INPUT			¤
¤Intens.= 6.13	C1=0.95	A1= 0.40	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00¤
¤CB ID = 32	C2=0.70	A2= 0.00	Qrunoff=	2.3	Slope2= 0.0417	a = 2.00	Perim = 0.00¤
¤Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 9.00¤
¤				OUTPUT			¤
¤Flowby= 0.0	Qtotal= 2.3	Qint= 2.3	Flowby dn=	0.0	Depth=0.25	Spread= 10.81	Veloc= 1.96¤

```
¤PAVEMENT DRAINAGE PROGRAM - HEC-12                                    Page   4 ¤
¤Licensed to: BRW, Inc., Phoenix, AZ 85012                                      ¤
¤Project    : Indian Bend Road                                                  ¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 71+00 LT                          INPUT                                    ¤
¤Intens.= 6.13 C1=0.95  A1= 0.19 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 34W  C2=0.70  A2= 0.00 Qrunoff=  1.1    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                       OUTPUT                                   ¤
¤Flowby=  0.0 Qtotal=  1.1 Qint=  1.1 Flowby dn=  0.0 Depth=0.19 Spread=  8.06 Veloc= 1.67¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 71+70 LT                          INPUT                                    ¤
¤Intens.= 6.13 C1=0.95  A1= 0.48 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 35   C2=0.70  A2= 0.00 Qrunoff=  2.8    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0025 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                       OUTPUT                                   ¤
¤Flowby=  0.0 Qtotal=  2.8 Qint=  2.8 Flowby dn=  0.0 Depth=0.29 Spread= 12.71 Veloc= 1.71¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 71+00 LT                          INPUT                                    ¤
¤Intens.= 6.13 C1=0.95  A1= 0.15 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 34E  C2=0.70  A2= 0.00 Qrunoff=  0.9    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0040 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                       OUTPUT                                   ¤
¤Flowby=  0.0 Qtotal=  0.9 Qint=  0.9 Flowby dn=  0.0 Depth=0.18 Spread=  7.36 Veloc= 1.59¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Sta 72+70 LT                          INPUT                                    ¤
¤Intens.= 6.13 C1=0.95  A1= 0.57 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.42 Area  = 0.00¤
¤CB ID  = 36   C2=0.70  A2= 0.00 Qrunoff=  3.3    Slope2= 0.0417 a     = 2.00 Perim = 0.00¤
¤Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0025 Slope3= 0.0200 W     = 1.42 Length= 9.00¤
¤.....¤
¤                                       OUTPUT                                   ¤
¤Flowby=  0.0 Qtotal=  3.3 Qint=  3.2 Flowby dn=  0.1 Depth=0.30 Spread= 13.56 Veloc= 1.79¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤                                     CRITERIA                                   ¤
¤Runoff computed by Rational Method   Manning's n Gutter=0.012  Manning's n Pavement=0.016¤
¤Clogging Factors in Sag Location:                                              ¤
¤----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 2.00 Comb-Curb= 1.25 Comb-Grate= 2.00¤
¤Clogging Factors on Continuous Grade:                                          ¤
¤----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 1.50 Comb-Curb= 1.50 Comb-Grate= 2.00¤
¤ááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá¤
¤Prepared by:          Date:06/16/10    Time:12:00:36     Checked by:         Date:          ¤
¤Pavement Drainage Program (C), 1991 Copyright by SMF Engineering Corporation, Phoenix, AZ¤
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PAVEMENT DRAINAGE PROGRAM - HEC-12
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Project : Indian Bend Road

Sta 26+20 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.79	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 2	C2=0.70	A2= 0.00	Qrunoff=	4.6	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length=13.00

OUTPUT

Flowby= 0.0 Qtotal= 4.6 Qint= 4.6 Flowby dn= 0.1 Depth=0.31 Spread= 14.06 Veloc= 2.31

Sta 28+00 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.23	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 4	C2=0.70	A2= 0.00	Qrunoff=	1.4	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0071	Slope3= 0.0200	W = 1.42	Length= 6.00

OUTPUT

Flowby= 0.1 Qtotal= 1.4 Qint= 1.3 Flowby dn= 0.1 Depth=0.19 Spread= 7.86 Veloc= 2.20

Sta 28+75 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.11	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 6	C2=0.70	A2= 0.00	Qrunoff=	0.6	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0071	Slope3= 0.0200	W = 1.42	Length= 6.00

OUTPUT

Flowby= 0.1 Qtotal= 0.8 Qint= 0.8 Flowby dn= 0.0 Depth=0.15 Spread= 6.06 Veloc= 1.92

Sta 31+95 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.37	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 7	C2=0.70	A2= 0.09	Qrunoff=	2.6	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0071	Slope3= 0.0200	W = 1.42	Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.6 Qint= 2.4 Flowby dn= 0.1 Depth=0.23 Spread= 9.96 Veloc= 2.52

Sta 33+64 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.19	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 9W	C2=0.70	A2= 0.00	Qrunoff=	1.1	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0050	Slope3= 0.0200	W = 1.42	Length= 9.00

OUTPUT

Flowby= 0.1 Qtotal= 1.3 Qint= 1.3 Flowby dn= 0.0 Depth=0.19 Spread= 8.06 Veloc= 1.86

Sta 36+15 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.09	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area = 0.00
CB ID = 13	C2=0.70	A2= 0.00	Qrunoff=	0.5	Slope2= 0.0417	a = 2.00	Perim = 0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W = 1.42	Length= 3.00

OUTPUT

Flowby= 0.0 Qtotal= 0.5 Qint= 0.5 Flowby dn= 0.0 Depth=0.15 Spread= 5.91 Veloc= 1.42

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¤Sta 34+00 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.27 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 11 C2=0.70 A2= 0.00 Qrunoff= 1.6 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 1.6 Qint= 1.5 Flowby dn= 0.1 Depth=0.22 Spread= 9.31 Veloc= 1.82¤

¤Sta 33+64 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.04 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 9E C2=0.70 A2= 0.00 Qrunoff= 0.2 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.1 Qtotal= 0.3 Qint= 0.3 Flowby dn= 0.0 Depth=0.13 Spread= 4.81 Veloc= 1.30¤

¤Sta 39+25 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.27 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 15 C2=0.70 A2= 0.00 Qrunoff= 1.6 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 6.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 1.6 Qint= 1.5 Flowby dn= 0.1 Depth=0.21 Spread= 9.21 Veloc= 1.81¤

¤Sta 40+70 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.13 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 17W C2=0.70 A2= 0.00 Qrunoff= 0.8 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0020 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.1 Qtotal= 0.8 Qint= 0.8 Flowby dn= 0.0 Depth=0.20 Spread= 8.26 Veloc= 1.20¤

¤Sta 45+50 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.42 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 21 C2=0.70 A2= 0.00 Qrunoff= 2.5 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.5 Qint= 2.4 Flowby dn= 0.0 Depth=0.25 Spread= 11.01 Veloc= 1.99¤

¤Sta 41+50 RT INPUT ¤
¤Intens.= 6.13 C1=0.95 A1= 0.37 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00¤
¤CB ID = 19 C2=0.70 A2= 0.00 Qrunoff= 2.2 Slope2= 0.0417 a = 2.00 Perim = 0.00¤
¤Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00¤
¤ OUTPUT ¤
¤Flowby= 0.0 Qtotal= 2.2 Qint= 2.2 Flowby dn= 0.0 Depth=0.24 Spread= 10.51 Veloc= 1.94¤

PAVEMENT DRAINAGE PROGRAM - HEC-12
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Project : Indian Bend Road

Sta 40+70 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.07	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 17E	C2=0.70	A2= 0.00	Qrunoff=	0.4	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0020	Slope3= 0.0200	W =	1.42	Length=	9.00

OUTPUT

Flowby= 0.0 Qtotal= 0.4 Qint= 0.4 Flowby dn= 0.0 Depth=0.15 Spread= 6.16 Veloc= 1.02

Sta 55+30 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.48	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 23	C2=0.70	A2= 0.00	Qrunoff=	2.8	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W =	1.42	Length=	9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.8 Qint= 2.7 Flowby dn= 0.1 Depth=0.26 Spread= 11.56 Veloc= 2.07

Sta 60+00 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.49	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 25	C2=0.70	A2= 0.00	Qrunoff=	2.9	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W =	1.42	Length=	9.00

OUTPUT

Flowby= 0.1 Qtotal= 3.0 Qint= 2.8 Flowby dn= 0.1 Depth=0.27 Spread= 11.81 Veloc= 2.09

Sta 64+25 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.52	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 27	C2=0.70	A2= 0.00	Qrunoff=	3.1	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0070	Slope3= 0.0200	W =	1.42	Length=	9.00

OUTPUT

Flowby= 0.1 Qtotal= 3.2 Qint= 2.8 Flowby dn= 0.4 Depth=0.25 Spread= 10.91 Veloc= 2.62

Sta 65+25 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.11	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 29	C2=0.70	A2= 0.00	Qrunoff=	0.6	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W =	1.42	Length=	6.00

OUTPUT

Flowby= 0.4 Qtotal= 1.0 Qint= 1.0 Flowby dn= 0.0 Depth=0.18 Spread= 7.66 Veloc= 1.64

Sta 69+30 RT — INPUT

Intens.= 6.13	C1=0.95	A1= 0.34	Qadd =	0.0	Slope1= 6.0000	Gutter= 1.42	Area =	0.00
CB ID = 31	C2=0.70	A2= 0.00	Qrunoff=	2.0	Slope2= 0.0417	a =	2.00	Perim =	0.00
Curb Opening	C3=0.00	A3= 0.00	Grade =	0.0040	Slope3= 0.0200	W =	1.42	Length=	9.00

OUTPUT

Flowby= 0.0 Qtotal= 2.0 Qint= 2.0 Flowby dn= 0.0 Depth=0.23 Spread= 10.11 Veloc= 1.90

PAVEMENT DRAINAGE PROGRAM - HEC-12

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Sta 71+00 RT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.22 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 33W C2=0.70 A2= 0.00 Qrunoff= 1.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 1.3 Qint= 1.3 Flowby dn= 0.0 Depth=0.20 Spread= 8.51 Veloc= 1.72

Sta 71+00 RT

INPUT

Intens.= 6.13 C1=0.95 A1= 0.22 Qadd = 0.0 Slope1= 6.0000 Gutter= 1.42 Area = 0.00
CB ID = 33E C2=0.70 A2= 0.00 Qrunoff= 1.3 Slope2= 0.0417 a = 2.00 Perim = 0.00
Curb Opening C3=0.00 A3= 0.00 Grade = 0.0040 Slope3= 0.0200 W = 1.42 Length= 9.00

OUTPUT

Flowby= 0.0 Qtotal= 1.3 Qint= 1.3 Flowby dn= 0.0 Depth=0.20 Spread= 8.51 Veloc= 1.72

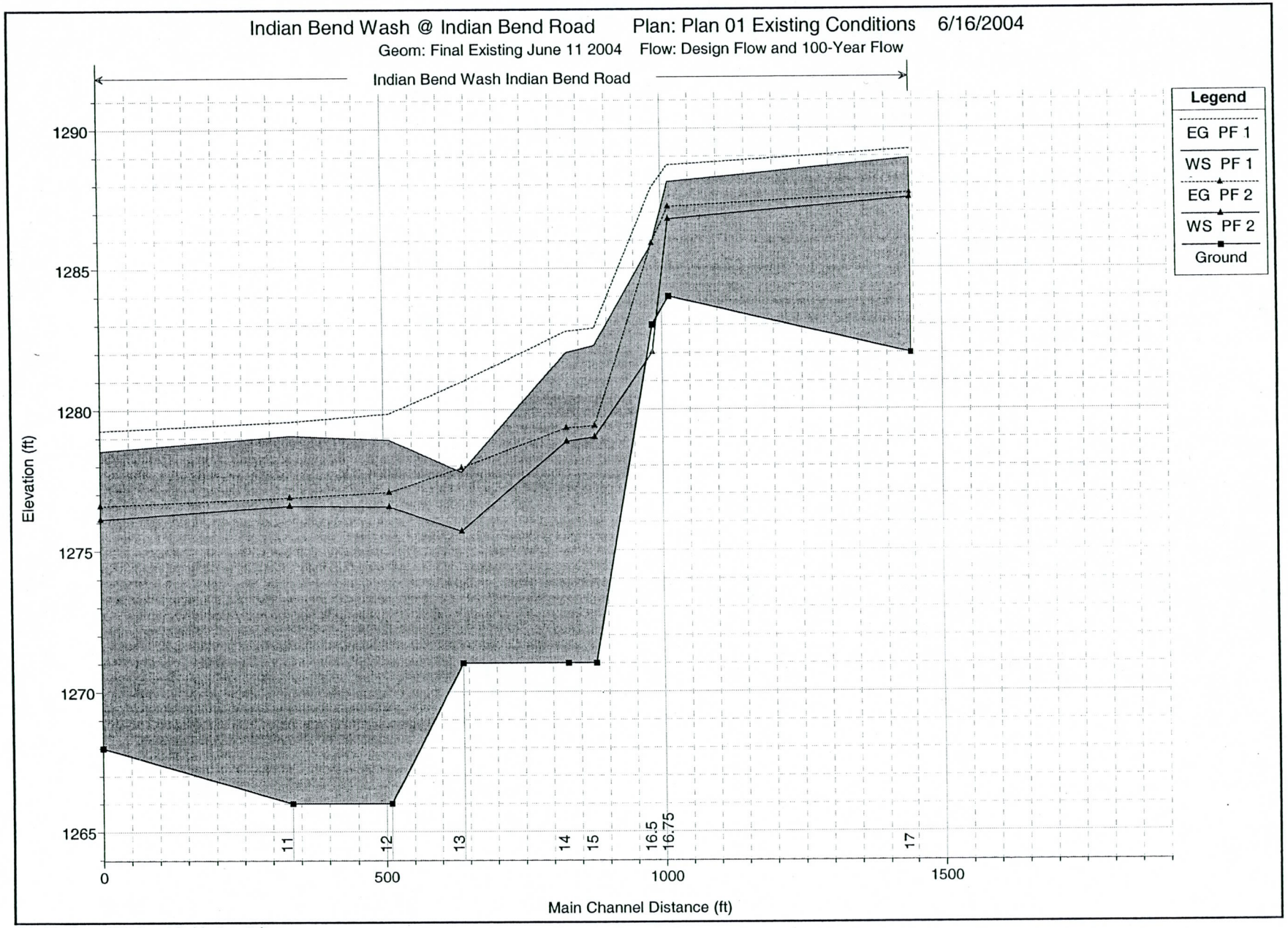
CRITERIA

Runoff computed by Rational Method Manning's n Gutter=0.012 Manning's n Pavement=0.016
Clogging Factors in Sag Location:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 2.00 Comb-Curb= 1.25 Comb-Grate= 2.00
Clogging Factors on Continuous Grade:
----- Curb Opening= 1.25 Grate= 2.00 Slotted Drain= 1.50 Comb-Curb= 1.50 Comb-Grate= 2.00

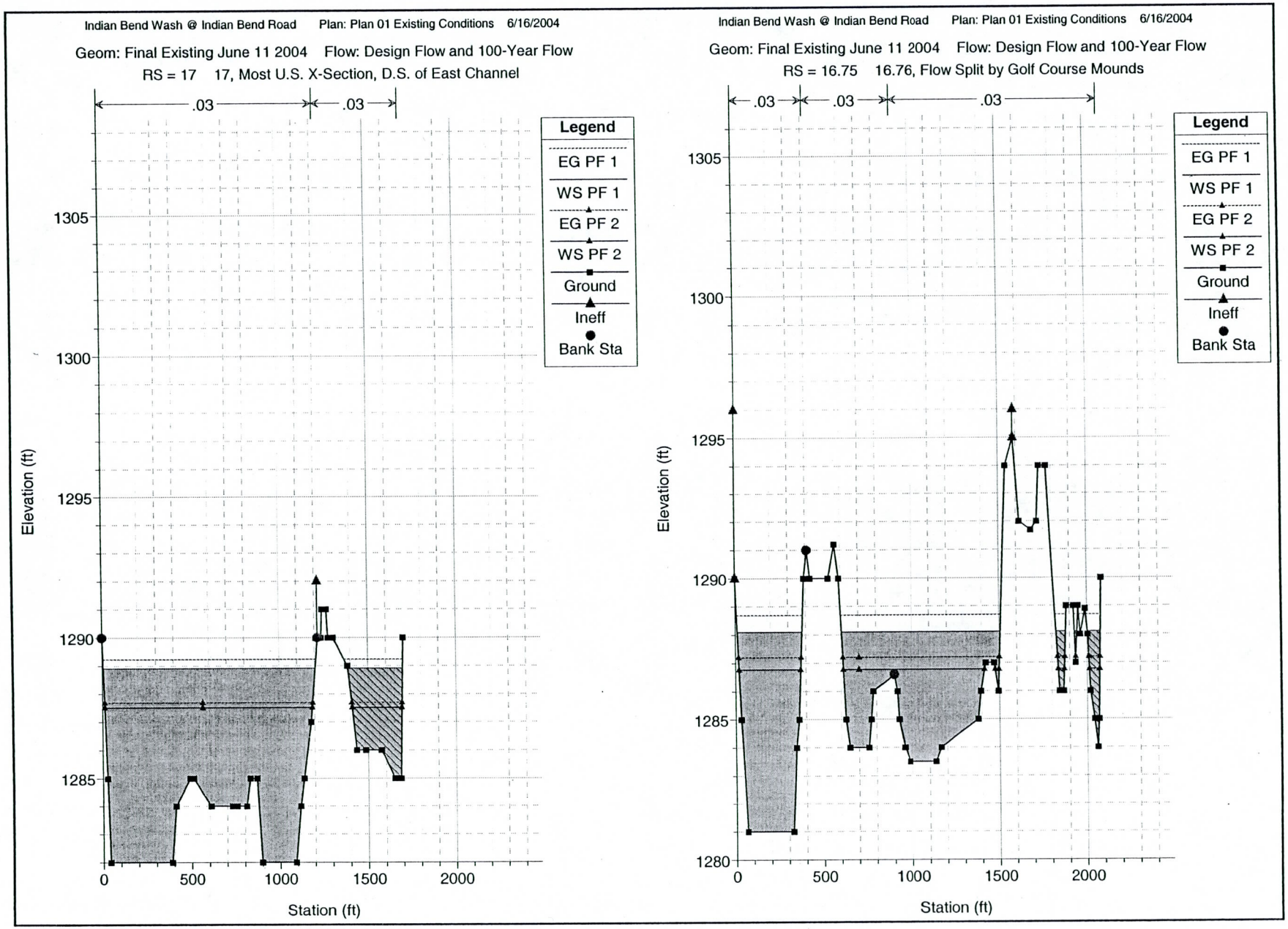
Prepared by: Date:06/16/10 Time:10:57:19 Checked by: Date:

Pavement Drainage Program (C), 1991 Copyright by SMF Engineering Corporation, Phoenix, AZ

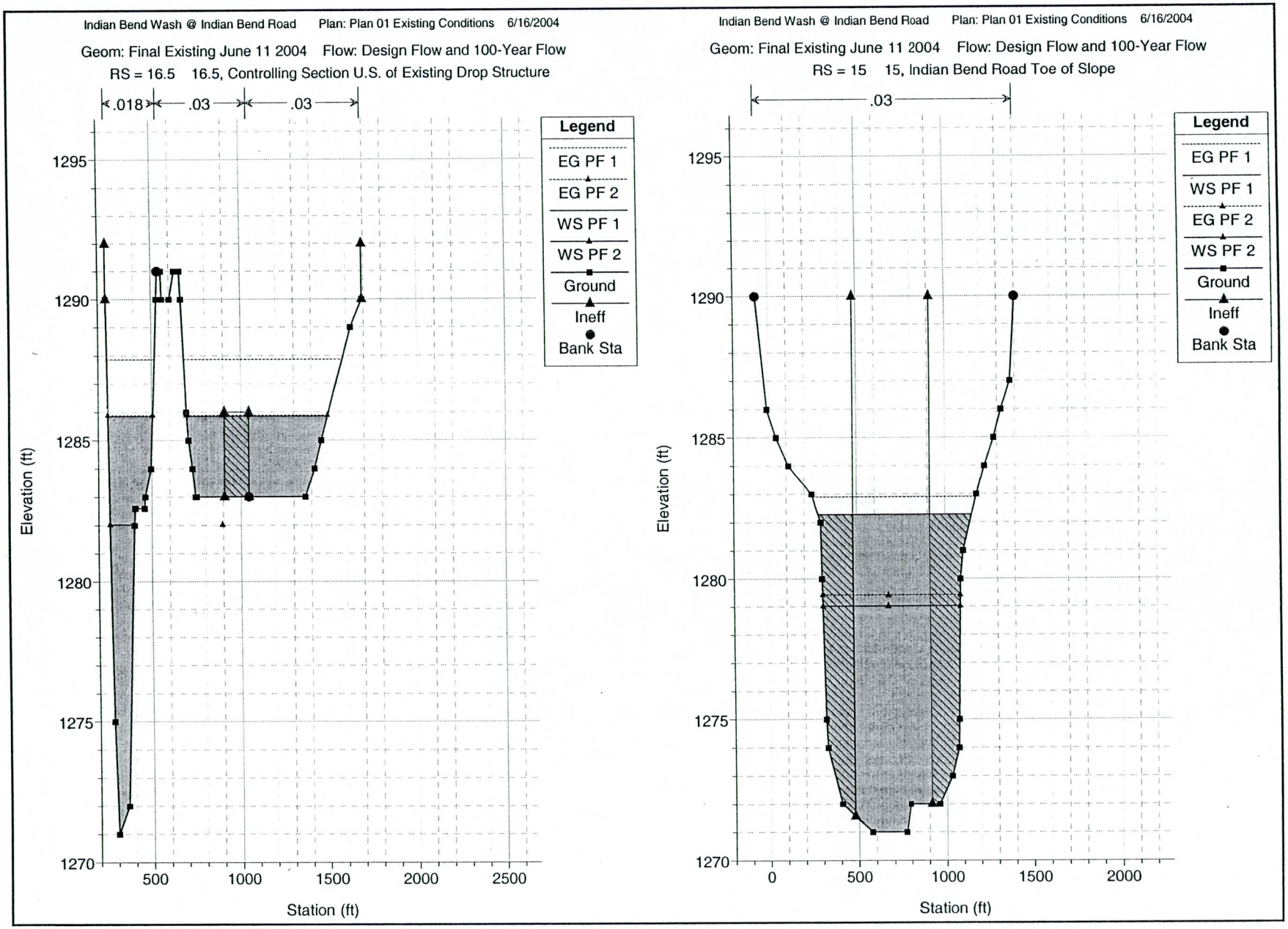
APPENDIX F



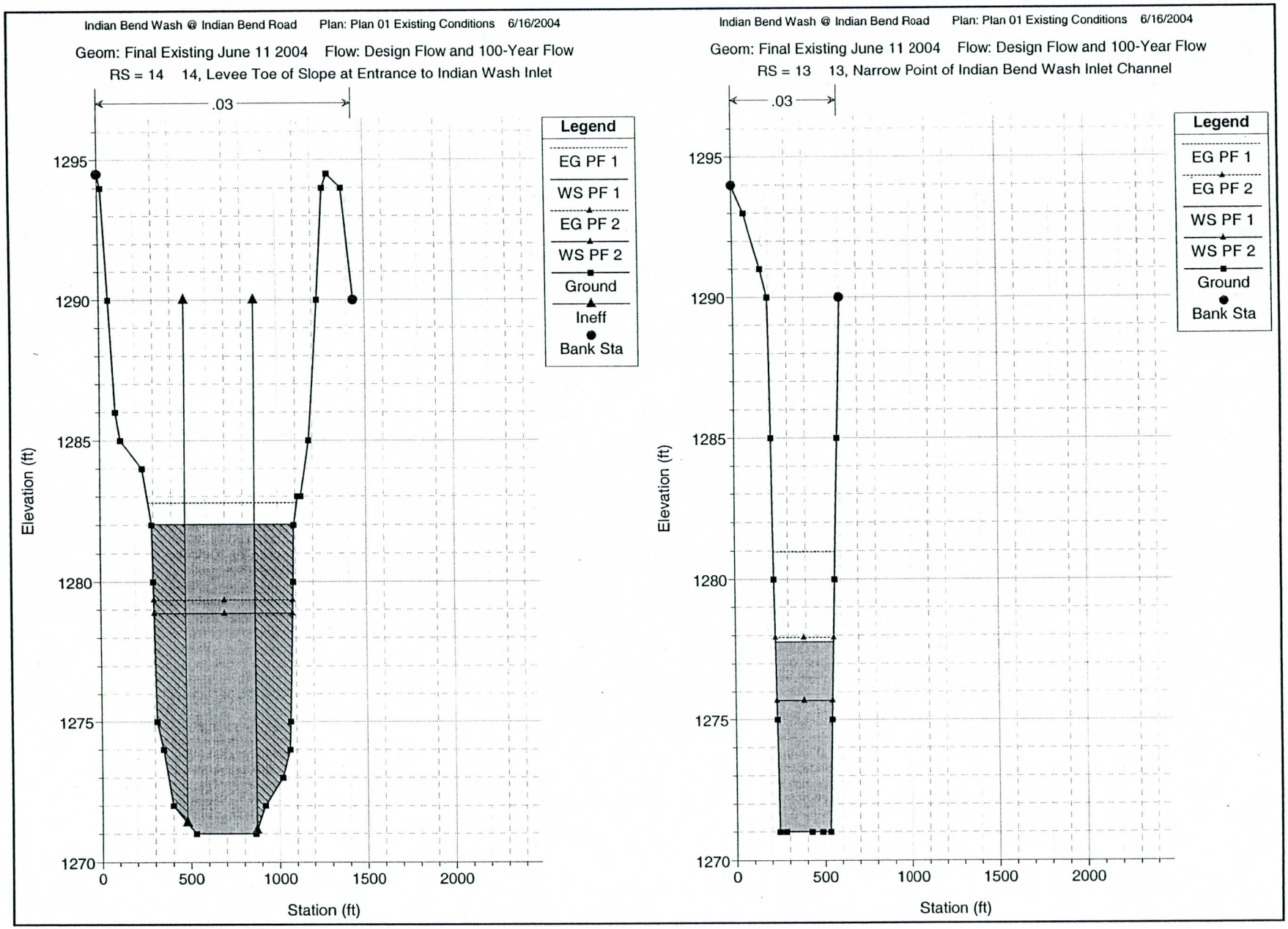
1 in Horiz. = 250 ft 1 in Vert. = 5 ft



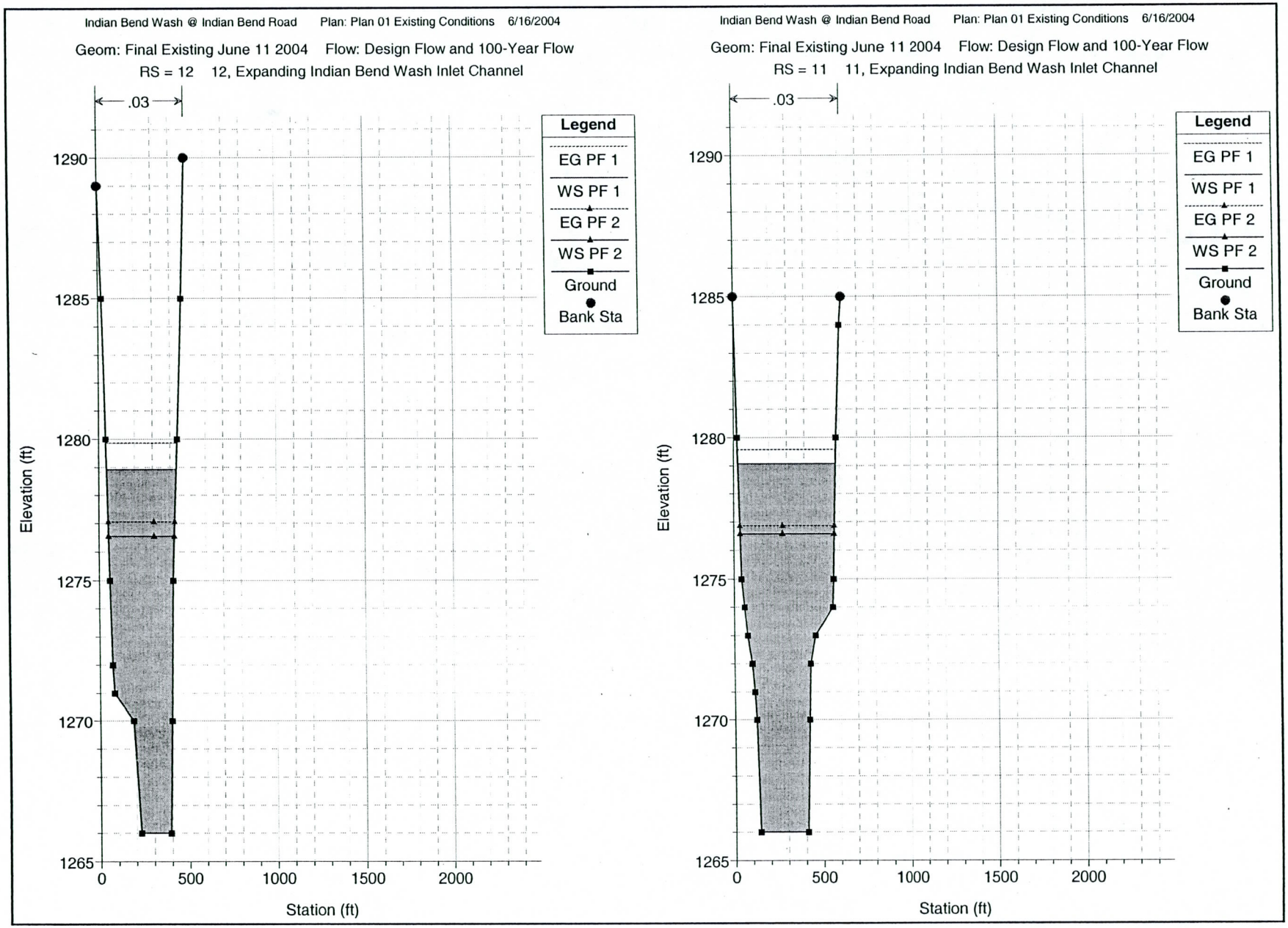
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



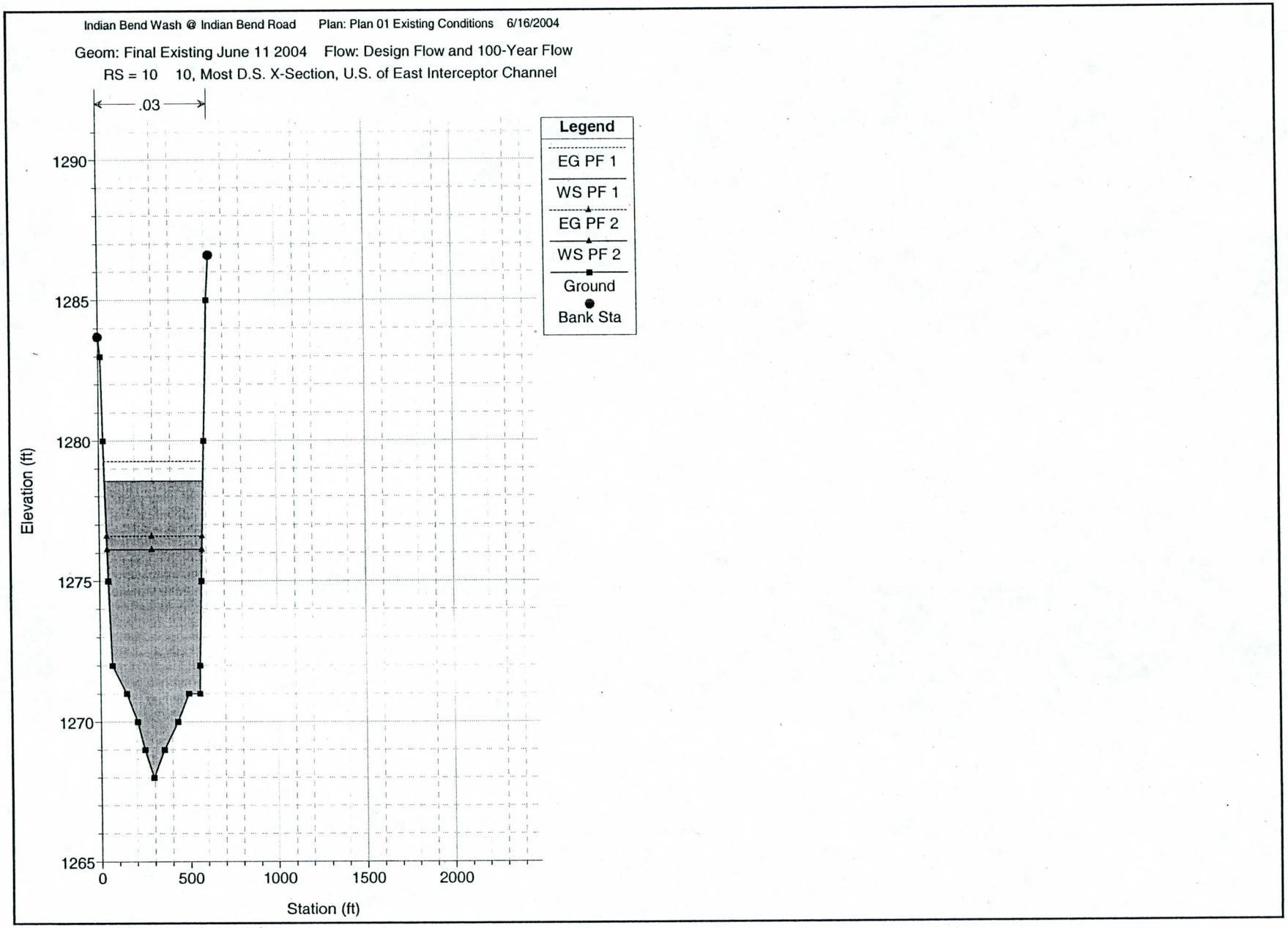
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



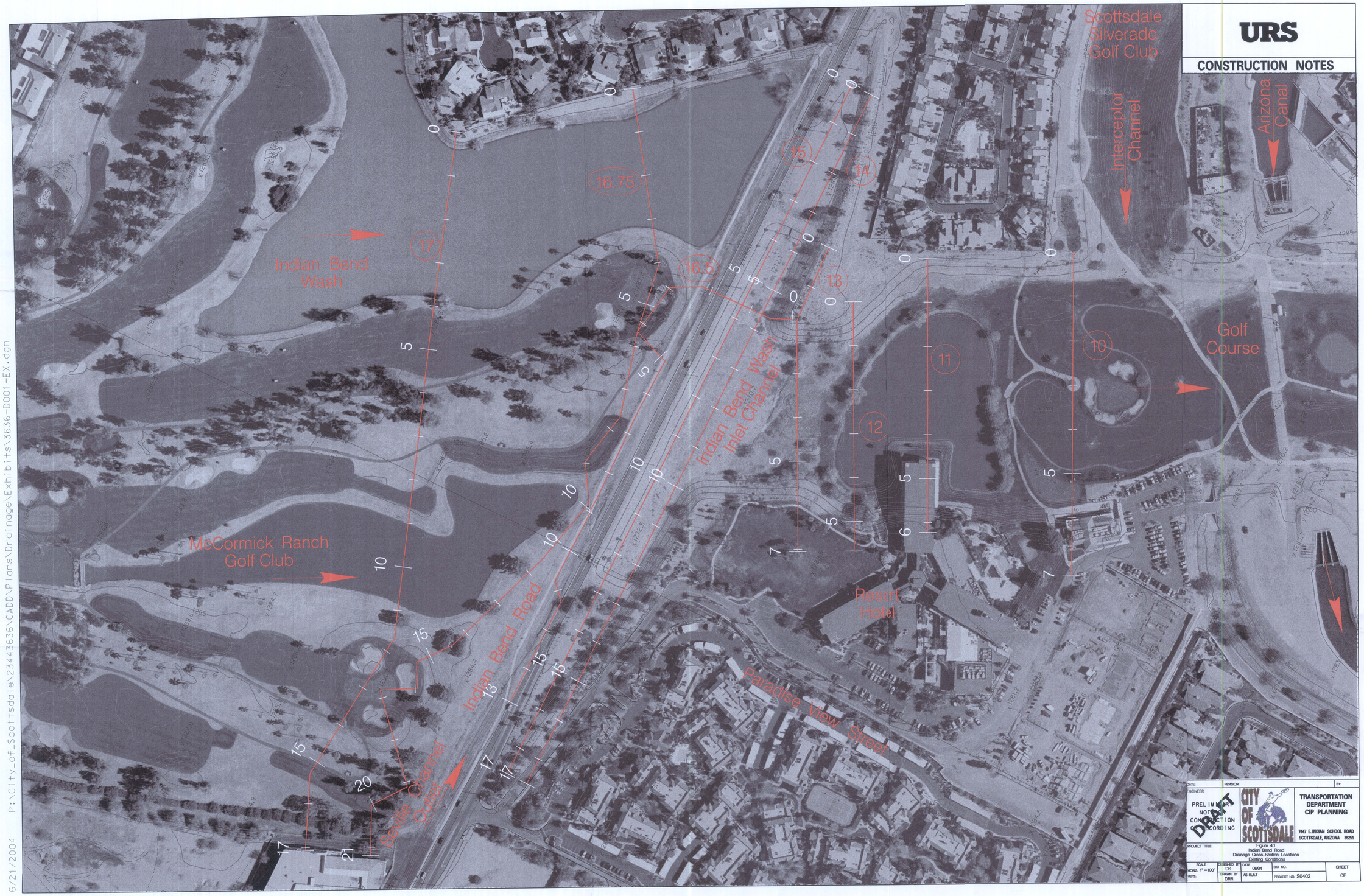
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



1 in Horiz. = 800 ft 1 in Vert. = 5 ft



1 in Horiz. = 800 ft 1 in Vert. = 5 ft



URS

CONSTRUCTION NOTES

DATE: | REVISION: | BY:

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

DRAFT

CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT CIP PLANNING

7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE

Figure 4.1
Indian Bend Road
Drainage Cross-Section Locations
Existing Conditions

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORZ: 1"=100'	DS	0604		
VERT:	DRAWN BY: DRR	AS-BUILT	PROJECT NO. S0402	OF

6/21/2004 P:\City_of_Scottsdale\23443636\CADD\Plans\Drainage\Exhibits\3636-D001-EX.dgn

APPENDIX G

Table 1
Indian Bend Wash
Existing Conditions
for
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: Exst Plan River: Indian Bend Wash Reach: Indian Bend Road												
Reach	River Sta	Profile	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)	
Indian Bend Road	17	PF 1	30000	1282	1288.92	1285.96	1289.24	0.00085	4.52	6641.72	1509.28	0.34
Indian Bend Road	17	PF 2	17000	1282	1287.51	1285.05	1287.69	0.000699	3.42	4965.51	1456.53	0.29
Indian Bend Road	16.75	PF 1	30000	1284	1288.1	1286.8	1288.69	0.0019	4.35	5164.26	1418.72	0.45
Indian Bend Road	16.75	PF 2	17000	1284	1286.77	1285.6	1287.21	0.001776	2.86	3509.72	1272.53	0.4
Indian Bend Road	16.5	PF 1	30000	1283	1285.86	1285.86	1287.86	0.001586	3.67	3561.01	1050.24	0.41
Indian Bend Road	16.5	PF 2	17000	1283	1282.03	1282.03	1285.9	0.002456		1076.78	139.07	0
Indian Bend Road	15	PF 1	30000	1271	1282.27	1276.67	1282.89	0.000675	6.32	4743.73	873.04	0.34
Indian Bend Road	15	PF 2	17000	1271	1279.01	1275	1279.42	0.000708	5.11	3325.36	781.66	0.33
Indian Bend Road	14	PF 1	30000	1271	1282.02	1276.69	1282.78	0.000808	6.96	4307.44	801.03	0.37
Indian Bend Road	14	PF 2	17000	1271	1278.86	1274.92	1279.34	0.000803	5.54	3069.26	780.43	0.35
Indian Bend Road	13	PF 1	30000	1271	1277.78	1277.78	1280.97	0.007227	14.35	2091.22	330.32	1
Indian Bend Road	13	PF 2	17000	1271	1275.68	1275.68	1277.93	0.008089	12.04	1412.43	316.46	1
Indian Bend Road	12	PF 1	30000	1266	1278.93		1279.86	0.001162	7.74	3877.73	392.11	0.43
Indian Bend Road	12	PF 2	17000	1266	1276.54		1277.05	0.000841	5.73	2968.39	370.16	0.36
Indian Bend Road	11	PF 1	30000	1266	1279.08		1279.58	0.000653	5.67	5290.37	555.17	0.32
Indian Bend Road	11	PF 2	17000	1266	1276.58		1276.87	0.000541	4.33	3924.66	536.66	0.28
Indian Bend Road	10	PF 1	30000	1268	1278.54	1274.91	1279.26	0.001201	6.82	4398.49	553.75	0.43
Indian Bend Road	10	PF 2	17000	1268	1276.12	1273.38	1276.59	0.001202	5.52	3079.67	533.37	0.4

Table 2
Indian Bend Wash
Existing Condtions
for
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: Exst Plan River: Indian Bend Wash Reach: Indian Bend Road											
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Indian Bend Road	17	PF 1	1289.24	1288.92	0.32	0.51	0.03		30000		1509.28
Indian Bend Road	17	PF 2	1287.69	1287.51	0.18	0.45	0.03		17000		1456.53
Indian Bend Road	16.75	PF 1	1288.69	1288.1	0.6	0.69	0.14	16231.13	3682.54	10086.33	1418.72
Indian Bend Road	16.75	PF 2	1287.21	1286.77	0.44	0.97	0.34	10855.87	1316.71	4827.43	1272.53
Indian Bend Road	16.5	PF 1	1287.86	1285.86	2	0.1	1.1	24017.2	1975.2	4007.61	1050.24
Indian Bend Road	16.5	PF 2	1285.9	1282.03	3.87	0.13	2.77	17000			139.07
Indian Bend Road	15	PF 1	1282.89	1282.27	0.62	0.04	0.08		30000		873.04
Indian Bend Road	15	PF 2	1279.42	1279.01	0.41	0.04	0.04		17000		781.66
Indian Bend Road	14	PF 1	1282.78	1282.02	0.75	0.34	1.47		30000		801.03
Indian Bend Road	14	PF 2	1279.34	1278.86	0.48	0.35	1.06		17000		780.43
Indian Bend Road	13	PF 1	1280.97	1277.78	3.2	0.31	0.68		30000		330.32
Indian Bend Road	13	PF 2	1277.93	1275.68	2.25	0.25	0.52		17000		316.46
Indian Bend Road	12	PF 1	1279.86	1278.93	0.93	0.15	0.13		30000		392.11
Indian Bend Road	12	PF 2	1277.05	1276.54	0.51	0.12	0.07		17000		370.16
Indian Bend Road	11	PF 1	1279.58	1279.08	0.5	0.29	0.02		30000		555.17
Indian Bend Road	11	PF 2	1276.87	1276.58	0.29	0.26	0.02		17000		536.66
Indian Bend Road	10	PF 1	1279.26	1278.54	0.72				30000		553.75
Indian Bend Road	10	PF 2	1276.59	1276.12	0.47				17000		533.37

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
                HEC-RAS Version 3.1.1 May 2003
                 U.S. Army Corp of Engineers
                Hydrologic Engineering Center
                  609 Second Street, Suite D
                  Davis, California 95616-4687
                         (916) 756-1104


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

********************************************************************************

PROJECT DATA
Project Title: Indian Bend Wash @ Indian Bend Road
Project File : IBWexst.prj
Run Date and Time: 6/18/2004 7:12:45 AM

Project in English units

********************************************************************************

PLAN DATA

Plan Title: Plan 01 Existing Conditions
Plan File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.p99

          Geometry Title: Final Existing June 11 2004
          Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g22

          Flow Title    : Design Flow and 100-Year Flow
          Flow File     : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Plan Summary Information:
Number of:  Cross Sections =    9    Mulitple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
```

```
    Maximum number of interations        =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*****************************************************************************

FLOW DATA

Flow Title: Design Flow and 100-Year Flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Flow Data (cfs)
*****************************************************************************
* River           Reach           RS      *           PF 1           PF 2 *
* Indian Bend WashIndian Bend Road17      *          30000          17000 *
*****************************************************************************

Boundary Conditions
*************************************************************************************************************
* River           Reach           Profile         *           Upstream                 Downstream     *
*************************************************************************************************************
* Indian Bend WashIndian Bend RoadPF 1            *                                Normal S = 0.0012 *
*************************************************************************************************************

*****************************************************************************

GEOMETRY DATA

Geometry Title: Final Existing June 11 2004
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g22

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 17

INPUT
Description: 17, Most U.S. X-Section, D.S. of East Channel
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
**********************************************************************************
       0    1290      25    1285      40    1282     388    1282     410    1284
     490    1285     510    1285     608    1284     730    1284     755    1284
     810    1284     832    1285     870    1285     898    1282    1090    1282
    1118    1284    1138    1285    1180    1287    1218    1290    1240    1290
    1245    1291    1270    1291    1278    1290    1305    1290    1385    1289
    1435    1286    1486    1286    1575    1286    1650    1285    1685    1285
    1700    1290

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
       0     .03        0     .03     1218     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
             0    1218                 470     430     315              .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R     Elev  Permanent
    1218    1700     1292          F

CROSS SECTION OUTPUT  Profile #PF 1
**********************************************************************************************
* E.G. Elev (ft)         * 1289.24  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    0.32  * Wt. n-Val.            *         *   0.030 *          *
* W.S. Elev (ft)         * 1288.92  * Reach Len. (ft)       *  470.00 *  430.00 *  315.00  *
* Crit W.S. (ft)         * 1285.96  * Flow Area (sq ft)     *         * 6641.72 *          *
* E.G. Slope (ft/ft)     *0.000850  * Area (sq ft)          *         * 6641.72 *  896.05  *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *         *30000.00 *          *
* Top Width (ft)         * 1509.28  * Top Width (ft)        *         * 1198.89 *  310.39  *
* Vel Total (ft/s)       *    4.52  * Avg. Vel. (ft/s)      *         *    4.52 *          *
* Max Chl Dpth (ft)      *    6.92  * Hydr. Depth (ft)      *         *    5.54 *          *
* Conv. Total (cfs)      *1029284.0  * Conv. (cfs)          *         *1029284.0 *          *
* Length Wtd. (ft)       *  421.49  * Wetted Per. (ft)      *         * 1200.08 *          *
* Min Ch El (ft)         * 1282.00  * Shear (lb/sq ft)      *         *    0.29 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *    1.33 *          *
* Frctn Loss (ft)        *    0.51  * Cum Volume (acre-ft)  *   40.76  *  143.69 *   17.78  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)        *    6.21  *   19.72 *    6.05  *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
**********************************************************************************************
* E.G. Elev (ft)         * 1287.69  * Element                * Left OB * Channel * Right OB *
```

* Vel Head (ft)	*	0.18	* Wt. n-Val.	*		*	0.030	*		*	
* W.S. Elev (ft)	*	1287.51	* Reach Len. (ft)	*	470.00	*	430.00	*	315.00	*	
* Crit W.S. (ft)	*	1285.05	* Flow Area (sq ft)	*		*	4965.51	*		*	
* E.G. Slope (ft/ft)	*	0.000699	* Area (sq ft)	*		*	4965.51	*	477.14	*	
* Q Total (cfs)	*	17000.00	* Flow (cfs)	*		*	17000.00	*		*	
* Top Width (ft)	*	1456.53	* Top Width (ft)	*		*	1173.93	*	282.61	*	
* Vel Total (ft/s)	*	3.42	* Avg. Vel. (ft/s)	*		*	3.42	*		*	
* Max Chl Dpth (ft)	*	5.51	* Hydr. Depth (ft)	*		*	4.23	*		*	
* Conv. Total (cfs)	*	642897.1	* Conv. (cfs)	*		*	642897.1	*		*	
* Length Wtd. (ft)	*	426.44	* Wetted Per. (ft)	*		*	1174.92	*		*	
* Min Ch El (ft)	*	1282.00	* Shear (lb/sq ft)	*		*	0.18	*		*	
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	0.63	*		*	
* Frctn Loss (ft)	*	0.45	* Cum Volume (acre-ft)	*	28.86	*	101.69	*	8.68	*	
* C & E Loss (ft)	*	0.03	* Cum SA (acres)	*	5.17	*	18.47	*	4.19	*	

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.75

INPUT
Description: 16.76, Flow Split by Golf Course Mounds
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1290	29	1285	63	1281	324	1281	344	1284
360	1285	392	1290	410	1291	428	1290	530	1290
567	1291.2	590	1290	627	1285	648	1284	756	1284
770	1285	782	1286	900	1286.6	917	1286	926	1285
956	1284	985	1283.5	1135	1283.5	1165	1284	1378	1285
1395	1286	1422	1287	1470	1287	1494	1286	1540	1294
1585	1295	1620	1292	1685	1291.7	1720	1292	1732	1294
1770	1294	1842	1286	1867	1286	1882	1289	1922	1289
1935	1287	1950	1289	1962	1288	1990	1288.9	2004	1288
2019	1286	2043	1285	2061	1284	2068	1285	2082	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	410	.03	900	.03

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
410	900	550	30	120	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	0	1296	F
1585	2082	1296	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1288.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	1288.10	Reach Len. (ft)	550.00	30.00	120.00
Crit W.S. (ft)	1286.80	Flow Area (sq ft)	2253.23	846.76	2064.27
E.G. Slope (ft/ft)	*0.001900	Area (sq ft)	2253.23	846.76	2338.16
Q Total (cfs)	*30000.00	Flow (cfs)	*16231.13	3682.54	*10086.33
Top Width (ft)	1418.72	Top Width (ft)	368.77	295.91	754.04
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)	7.20	4.35	4.89
Max Chl Dpth (ft)	7.10	Hydr. Depth (ft)	6.11	2.86	3.41
Conv. Total (cfs)	*688182.4	Conv. (cfs)	*372332.6	84475.3	*231374.4
Length Wtd. (ft)	399.96	Wetted Per. (ft)	369.77	296.22	606.39
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	0.72	0.34	0.40
Alpha	1.14	Stream Power (lb/ft s)	5.21	1.47	1.97
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	28.61	106.73	6.09
C & E Loss (ft)	0.14	Cum SA (acres)	4.22	12.34	2.20

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1287.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.030	0.030	0.030
W.S. Elev (ft)	1286.77	Reach Len. (ft)	550.00	30.00	120.00
Crit W.S. (ft)	1285.60	Flow Area (sq ft)	1773.70	459.86	1276.16
E.G. Slope (ft/ft)	*0.001776	Area (sq ft)	1773.70	459.86	1393.05
Q Total (cfs)	*17000.00	Flow (cfs)	*10855.87	1316.71	4827.43
Top Width (ft)	1272.53	Top Width (ft)	352.55	286.07	633.91
Vel Total (ft/s)	4.84	Avg. Vel. (ft/s)	6.12	2.86	3.78
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)	5.03	1.61	2.37
Conv. Total (cfs)	*403340.8	Conv. (cfs)	*257565.6	31240.1	*114535.1
Length Wtd. (ft)	468.81	Wetted Per. (ft)	353.33	286.29	538.71
Min Ch El (ft)	1284.00	Shear (lb/sq ft)	0.56	0.18	0.26
Alpha	1.22	Stream Power (lb/ft s)	3.41	0.51	0.99

* Frctn Loss (ft)	* 0.97	* Cum Volume (acre-ft)	* 19.29	* 74.91	* 1.92	*
* C & E Loss (ft)	* 0.34	* Cum SA (acres)	* 3.27	* 11.26	* 0.87	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.5

INPUT
Description: 16.5, Controlling Section U.S. of Existing Drop Structure
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
244	1290	280	1275	300	1271	359	1272	402	1282
407	1282.6	459	1282.6	462	1283	496	1284	529	1290
536	1291	556	1291	560	1290	602	1290	631	1291
660	1291	666	1290	694	1286	706	1285	728	1284
745	1283	750	1283	1045	1283	1365	1283	1419	1284
1458	1285	1624	1289	1690	1290				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
244	.018	536	.03	1045	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
536	1045	105	105	.6	.8

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
244	244	1292	F
907	1045	1286	F
1690	1690	1292	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1287.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.00	* Wt. n-Val.	* 0.018	* 0.030	* 0.030 *
* W.S. Elev (ft)	* 1285.86	* Reach Len. (ft)	* 105.00	* 105.00	* 105.00 *

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Crit W.S. (ft)	1285.86	Flow Area (sq ft)	1912.92	537.56	1110.53
E.G. Slope (ft/ft)	0.001586	Area (sq ft)	1912.92	932.09	1110.53
Q Total (cfs)	30000.00	Flow (cfs)	24017.20	1975.20	4007.61
Top Width (ft)	1050.24	Top Width (ft)	252.29	349.31	448.64
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)	12.56	3.67	3.61
Max Chl Dpth (ft)	14.86	Hydr. Depth (ft)	7.58	2.54	2.48
Conv. Total (cfs)	753419.5	Conv. (cfs)	603167.5	49605.1	100646.9
Length Wtd. (ft)	105.00	Wetted Per. (ft)	256.25	211.39	448.68
Min Ch El (ft)	1283.00	Shear (lb/sq ft)	0.74	0.25	0.24
Alpha	1.82	Stream Power (lb/ft s)	9.28	0.92	0.88
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	2.31	106.12	1.34
C & E Loss (ft)	1.10	Cum SA (acres)	0.30	12.12	0.54

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1285.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.87	Wt. n-Val.	0.018		
W.S. Elev (ft)	1282.03	Reach Len. (ft)	105.00	105.00	105.00
Crit W.S. (ft)	1282.03	Flow Area (sq ft)	1076.78		
E.G. Slope (ft/ft)	0.002456	Area (sq ft)	1076.78		
Q Total (cfs)	17000.00	Flow (cfs)	17000.00		
Top Width (ft)	139.07	Top Width (ft)	139.07		
Vel Total (ft/s)	15.79	Avg. Vel. (ft/s)	15.79		
Max Chl Dpth (ft)	11.03	Hydr. Depth (ft)	7.74		
Conv. Total (cfs)	343045.1	Conv. (cfs)	343045.1		
Length Wtd. (ft)	105.00	Wetted Per. (ft)	142.03		
Min Ch El (ft)	1283.00	Shear (lb/sq ft)	1.16		
Alpha	1.00	Stream Power (lb/ft s)	18.35		
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	1.30	74.75	
C & E Loss (ft)	2.77	Cum SA (acres)	0.17	11.17	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 15

INPUT
Description: 15, Indian Bend Road Toe of
Slope
1290
-10
1286
50
1285
130
1284
280
1283
338
1282

345
1280
365
1275
375
1274
465
1272
660
1271

```
880
1271
9
            10
1272
1100
1272
1186
1273
1232
1274
1235
1275
1250
128
            0
1268
1281
1358
1283
1410
1284
1472
1285
1520
1286
1578

1287
1610
1290
Station Elevation Data     num=       25
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
  -73.98     1290  -8.704     1286   43.518     1285 113.146     1284    243.7     1283
  294.18     1282 300.273     1280   317.68     1275 326.383     1274 404.715     1272
 574.435     1271 765.913     1271 792.024     1272 957.391     12721032.242     1273
1072.278     12741074.889     12751087.945     12801103.611     12811181.943     1283
1227.202     12841281.163     12851322.941     12861373.421     12871401.273     1290

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
  -73.98      .03  -73.98      .031401.273      .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
        -73.981401.273                  50       50       50             .6       .8
Ineffective Flow      num=       2
```

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Sta L	Sta R	Elev	Permanent
-73.98	478.696	1290	F
913.8741	401.273	1290	F

Skew Angle = 29.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1282.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.030	
W.S. Elev (ft)	1282.27	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	1276.67	Flow Area (sq ft)		4743.73	
E.G. Slope (ft/ft)	*0.000675	Area (sq ft)		8078.40	
Q Total (cfs)	*30000.00	Flow (cfs)		*30000.00	
Top Width (ft)	873.04	Top Width (ft)		873.04	
Vel Total (ft/s)	6.32	Avg. Vel. (ft/s)		6.32	
Max Chl Dpth (ft)	11.27	Hydr. Depth (ft)		10.90	
Conv. Total (cfs)	*1155087.0	Conv. (cfs)		*1155087.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		435.20	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		2.90	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		95.26	
C & E Loss (ft)	0.08	Cum SA (acres)		10.65	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1279.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.		0.030	
W.S. Elev (ft)	1279.01	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	1275.00	Flow Area (sq ft)		3325.36	
E.G. Slope (ft/ft)	*0.000708	Area (sq ft)		5445.00	
Q Total (cfs)	*17000.00	Flow (cfs)		*17000.00	
Top Width (ft)	781.66	Top Width (ft)		781.66	
Vel Total (ft/s)	5.11	Avg. Vel. (ft/s)		5.11	
Max Chl Dpth (ft)	8.01	Hydr. Depth (ft)		7.64	
Conv. Total (cfs)	*638969.0	Conv. (cfs)		*638969.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		435.20	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		1.73	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		68.19	
C & E Loss (ft)	0.04	Cum SA (acres)		10.22	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 14

INPUT
Description: 14, Levee Toe of Slope at Entrance to Indian Wash Inlet
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1294.5	17.407	1294	53.962	1290	91.388	1286	118.368	1285
239.348	1284	292.44	1282	297.662	1280	313.328	1275	348.142	1274
400.363	1272	529.177	1271	863.393	1271	918.225	12721018.316		1273
1061.834	12741066.184		12751086.204		12801092.297		12821114.055		1283
1131.463	12831179.332		12851231.553		12901270.719		1294	1296.83	1294.5
1375.162	12941436.087		1290						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.031436.087		.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
01436.087		115	188	263	.6	.8

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	478.696	1290	F
870.3561436.087		1290	F

Skew Angle = 29.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1282.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.		0.030	
W.S. Elev (ft)	1282.02	Reach Len. (ft)	115.00	188.00	263.00
Crit W.S. (ft)	1276.69	Flow Area (sq ft)		4307.44	
E.G. Slope (ft/ft)	0.000808	Area (sq ft)		7880.50	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	801.03	Top Width (ft)		801.03	
Vel Total (ft/s)	6.96	Avg. Vel. (ft/s)		6.96	
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		11.00	
Conv. Total (cfs)	1055111.0	Conv. (cfs)		1055111.0	
Length Wtd. (ft)	188.00	Wetted Per. (ft)		391.66	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)		3.87	
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)		86.10	

* C & E Loss (ft)	* 1.47	* Cum SA (acres)	*	* 9.69	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 1279.34	* Element	*	* 0.030	*
* Vel Head (ft)	* 0.48	* Wt. n-Val.	*	* 188.00	* 263.00 *
* W.S. Elev (ft)	* 1278.86	* Reach Len. (ft)	* 115.00	* 3069.26	*
* Crit W.S. (ft)	* 1274.92	* Flow Area (sq ft)	*	* 5380.63	*
* E.G. Slope (ft/ft)	*0.000803	* Area (sq ft)	*	*17000.00	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	* 780.43	*
* Top Width (ft)	* 780.43	* Top Width (ft)	*	* 5.54	*
* Vel Total (ft/s)	* 5.54	* Avg. Vel. (ft/s)	*	* 7.84	*
* Max Chl Dpth (ft)	* 7.86	* Hydr. Depth (ft)	*	*599774.4	*
* Conv. Total (cfs)	*599774.4	* Conv. (cfs)	*	* 391.66	*
* Length Wtd. (ft)	* 188.00	* Wetted Per. (ft)	*	* 0.39	*
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 2.18	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 61.98	*
* Frctn Loss (ft)	* 0.35	* Cum Volume (acre-ft)	*	* 9.33	*
* C & E Loss (ft)	* 1.06	* Cum SA (acres)	*		

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13

INPUT
Description: 13, Narrow Point of Indian Bend Wash Inlet Channel

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1294	65	1293	154	1291	193	1290	208	1285
220	1280	233	1275	242	1271	280	1271	425	1271
485	1271	530	1271	545	1275	565	1280	583	1285
602	1290								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	602	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	602	130	130	130 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1280.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	1277.78	Reach Len. (ft)	130.00	130.00	130.00
Crit W.S. (ft)	1277.78	Flow Area (sq ft)		2091.22	
E.G. Slope (ft/ft)	0.007227	Area (sq ft)		2091.22	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	330.32	Top Width (ft)		330.32	
Vel Total (ft/s)	14.35	Avg. Vel. (ft/s)		14.35	
Max Chl Dpth (ft)	6.78	Hydr. Depth (ft)		6.33	
Conv. Total (cfs)	352890.4	Conv. (cfs)		352890.4	
Length Wtd. (ft)	130.00	Wetted Per. (ft)		332.55	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		2.84	
Alpha	1.00	Stream Power (lb/ft s)		40.70	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		64.58	
C & E Loss (ft)	0.68	Cum SA (acres)		7.24	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1277.93	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.25	Wt. n-Val.		0.030		
W.S. Elev (ft)	1275.68	Reach Len. (ft)	130.00	130.00	130.00	
Crit W.S. (ft)	1275.68	Flow Area (sq ft)		1412.43		
E.G. Slope (ft/ft)	0.008089	Area (sq ft)		1412.43		
Q Total (cfs)	17000.00	Flow (cfs)		17000.00		
Top Width (ft)	316.46	Top Width (ft)		316.46		
Vel Total (ft/s)	12.04	Avg. Vel. (ft/s)		12.04		
Max Chl Dpth (ft)	4.68	Hydr. Depth (ft)		4.46		
Conv. Total (cfs)	189013.8	Conv. (cfs)		189013.8		
Length Wtd. (ft)	130.00	Wetted Per. (ft)		318.04		
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		2.24		
Alpha	1.00	Stream Power (lb/ft s)		26.99		
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)		47.32		
C & E Loss (ft)	0.52	Cum SA (acres)		6.96		

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 12

INPUT
Description: 12, Expanding Indian Bend Wash Inlet Channel
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1289	18	1285	38	1280	59	1275	70	1272
80	1271	185	1270	225	1266	392	1266	402	1270
415	1275	440	1280	465	1285	490	1290		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
        0      .03        0      .03      490      .03

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
              0      490                175      175      175             .1       .3
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1279.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.93	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		3877.73	
E.G. Slope (ft/ft)	0.001162	Area (sq ft)		3877.73	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	392.11	Top Width (ft)		392.11	
Vel Total (ft/s)	7.74	Avg. Vel. (ft/s)		7.74	
Max Chl Dpth (ft)	12.93	Hydr. Depth (ft)		9.89	
Conv. Total (cfs)	880118.1	Conv. (cfs)		880118.1	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		395.32	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		5.50	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		55.67	
C & E Loss (ft)	0.13	Cum SA (acres)		6.17	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1277.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.54	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		2968.39	
E.G. Slope (ft/ft)	0.000841	Area (sq ft)		2968.39	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	370.16	Top Width (ft)		370.16	
Vel Total (ft/s)	5.73	Avg. Vel. (ft/s)		5.73	
Max Chl Dpth (ft)	10.54	Hydr. Depth (ft)		8.02	
Conv. Total (cfs)	586210.9	Conv. (cfs)		586210.9	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		372.85	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		2.39	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		40.78	
C & E Loss (ft)	0.07	Cum SA (acres)		5.94	

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 11

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
INPUT
Description: 11, Expanding Indian Bend Wash Inlet Channel
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0    1285      18    1280      40    1275      57    1274      75    1273
      98    1272     112    1271     121    1270     140    1266     409    1266
     422    1270     431    1272     460    1273     560    1274     565    1275
     580    1280     600    1284     612    1285

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
       0     .03        0     .03      612     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0     612               335     335     335            .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1279.58  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.50  * Wt. n-Val.            *          *    0.030  *          *
* W.S. Elev (ft)         * 1279.08  * Reach Len. (ft)       *  335.00  *  335.00  *  335.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          * 5290.37  *          *
* E.G. Slope (ft/ft)     *0.000653  * Area (sq ft)          *          * 5290.37  *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *          *30000.00  *          *
* Top Width (ft)         *  555.17  * Top Width (ft)        *          *  555.17  *          *
* Vel Total (ft/s)       *    5.67  * Avg. Vel. (ft/s)      *          *    5.67  *          *
* Max Chl Dpth (ft)      *   13.08  * Hydr. Depth (ft)      *          *    9.53  *          *
* Conv. Total (cfs)      *1174060.0  * Conv. (cfs)          *          *1174060.0  *          *
* Length Wtd. (ft)       *  335.00  * Wetted Per. (ft)      *          *  557.82  *          *
* Min Ch El (ft)         * 1266.00  * Shear (lb/sq ft)      *          *    0.39  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    2.19  *          *
* Frctn Loss (ft)        *    0.29  * Cum Volume (acre-ft)  *          *   37.26  *          *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)        *          *    4.26  *          *
*************************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1276.87  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.29  * Wt. n-Val.            *          *    0.030  *          *
* W.S. Elev (ft)         * 1276.58  * Reach Len. (ft)       *  335.00  *  335.00  *  335.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          * 3924.66  *          *
* E.G. Slope (ft/ft)     *0.000541  * Area (sq ft)          *          * 3924.66  *          *
* Q Total (cfs)          *17000.00  * Flow (cfs)            *          *17000.00  *          *
* Top Width (ft)         *  536.66  * Top Width (ft)        *          *  536.66  *          *
* Vel Total (ft/s)       *    4.33  * Avg. Vel. (ft/s)      *          *    4.33  *          *
```

* Max Chl Dpth (ft)	* 10.58	* Hydr. Depth (ft)	*	* 7.31	*	*	
* Conv. Total (cfs)	*730617.4	* Conv. (cfs)	*	*730617.4	*	*	
* Length Wtd. (ft)	* 335.00	* Wetted Per. (ft)	*	* 538.62	*	*	
* Min Ch El (ft)	* 1266.00	* Shear (lb/sq ft)	*	* 0.25	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.07	*	*	
* Frctn Loss (ft)	* 0.26	* Cum Volume (acre-ft)	*	* 26.93	*	*	
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	* 4.11	*	*	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 10

INPUT
Description: 10, Most D.S. X-Section, U.S. of East Interceptor Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1283.7	12	1283	25	1280	48	1275	67	1272
145	1271	205	1270	245	1269	295	1268	355	1269
432	1270	495	1271	557	1271	560	1272	572	1275
591	1280	610	1285	625	1286.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	625	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	625	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1279.26	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.72	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1278.54	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 1274.91	* Flow Area (sq ft)	*	* 4398.49	* *
* E.G. Slope (ft/ft)	*0.001201	* Area (sq ft)	*	* 4398.49	* *
* Q Total (cfs)	*30000.00	* Flow (cfs)	*	*30000.00	* *
* Top Width (ft)	* 553.75	* Top Width (ft)	*	* 553.75	* *
* Vel Total (ft/s)	* 6.82	* Avg. Vel. (ft/s)	*	* 6.82	* *
* Max Chl Dpth (ft)	* 10.54	* Hydr. Depth (ft)	*	* 7.94	* *
* Conv. Total (cfs)	*865569.4	* Conv. (cfs)	*	*865569.4	* *

Length Wtd. (ft)		Wetted Per. (ft)		555.42	
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		4.05	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1276.59	Element			
Vel Head (ft)	0.47	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.12	Reach Len. (ft)			
Crit W.S. (ft)	1273.38	Flow Area (sq ft)		3079.67	
E.G. Slope (ft/ft)	0.001202	Area (sq ft)		3079.67	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	533.37	Top Width (ft)		533.37	
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)		5.52	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)		5.77	
Conv. Total (cfs)	490272.7	Conv. (cfs)		490272.7	
Length Wtd. (ft)		Wetted Per. (ft)		534.46	
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		2.39	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Indian Bend Wash

Reach	River Sta.	n1	n2	n3
Indian Bend Road	17	.03	.03	.03
Indian Bend Road	16.75	.03	.03	.03
Indian Bend Road	16.5	.018	.03	.03
Indian Bend Road	15	.03	.03	.03
Indian Bend Road	14	.03	.03	.03
Indian Bend Road	13	.03	.03	.03
Indian Bend Road	12	.03	.03	.03
Indian Bend Road	11	.03	.03	.03
Indian Bend Road	10	.03	.03	.03

SUMMARY OF REACH LENGTHS

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

River: Indian Bend Wash

Reach	River Sta.	Left	Channel	Right
Indian Bend Road	17	470	430	315
Indian Bend Road	16.75	550	30	120
Indian Bend Road	16.5	105	105	105
Indian Bend Road	15	50	50	50
Indian Bend Road	14	115	188	263
Indian Bend Road	13	130	130	130
Indian Bend Road	12	175	175	175
Indian Bend Road	11	335	335	335
Indian Bend Road	10	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Indian Bend Wash

Reach	River Sta.	Contr.	Expan.
Indian Bend Road	17	.1	.3
Indian Bend Road	16.75	.1	.3
Indian Bend Road	16.5	.6	.8
Indian Bend Road	15	.6	.8
Indian Bend Road	14	.6	.8
Indian Bend Road	13	.1	.3
Indian Bend Road	12	.1	.3
Indian Bend Road	11	.1	.3
Indian Bend Road	10	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exst Plan

River: Indian Bend Wash Reach: Indian Bend Road RS: 17 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 17 Profile: PF 2
Warning:Divided flow computed for this cross-section.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Indian Bend Wash Reach: Indian Bend Road RS: 16.75 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Indian Bend Wash Reach: Indian Bend Road RS: 16.75 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

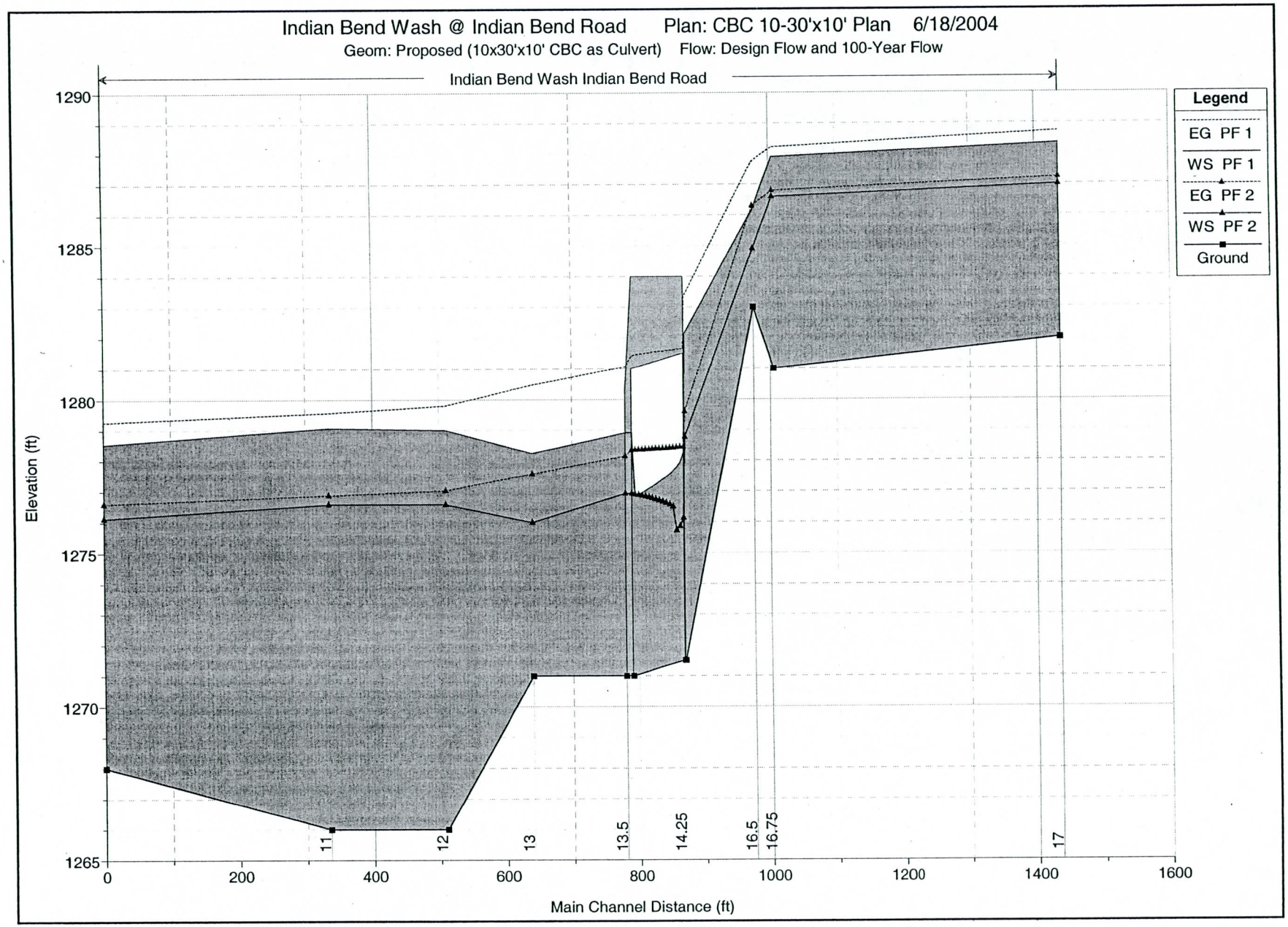
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning:There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

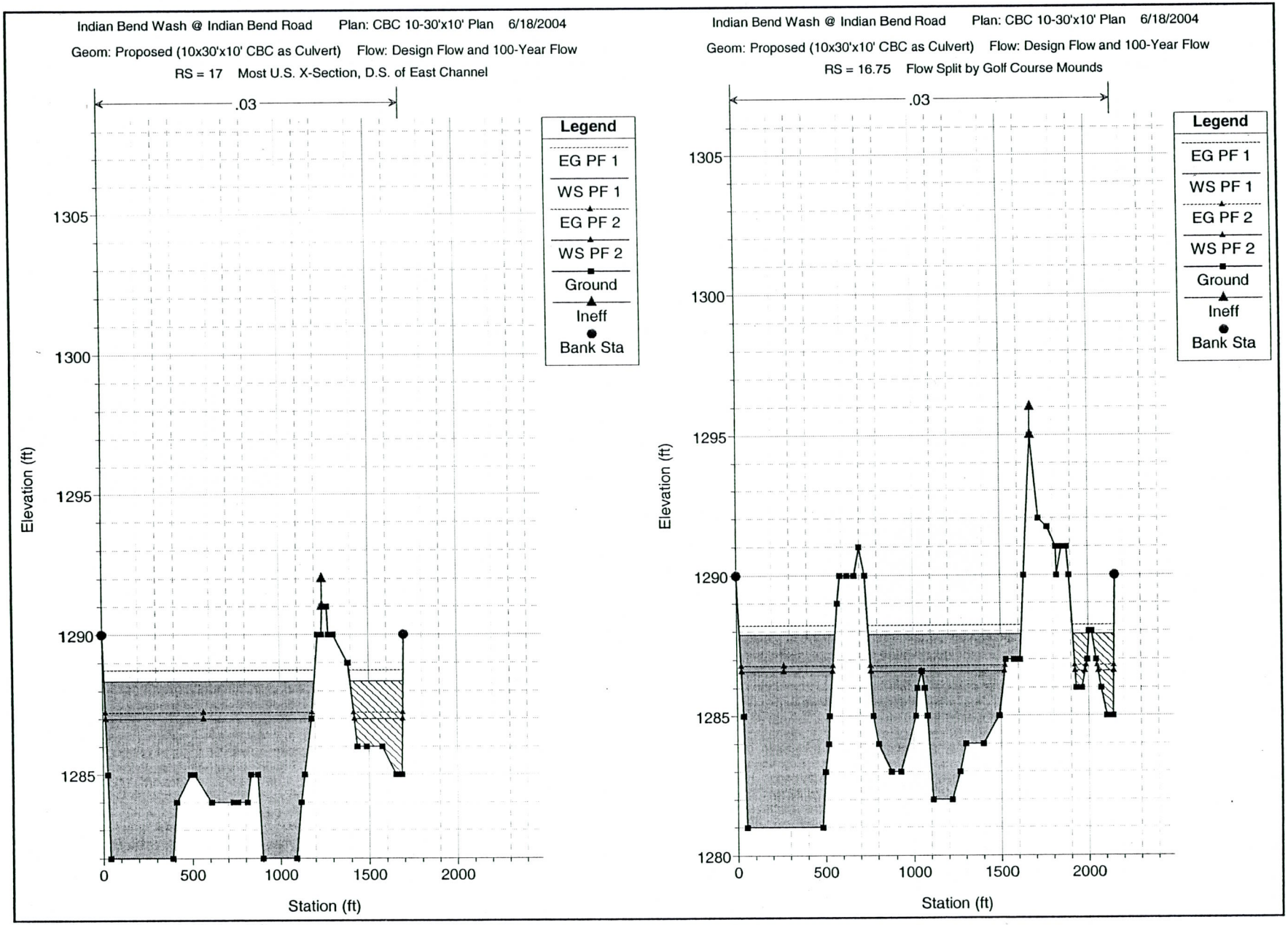
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Indian Bend Wash
Existing Conditions
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

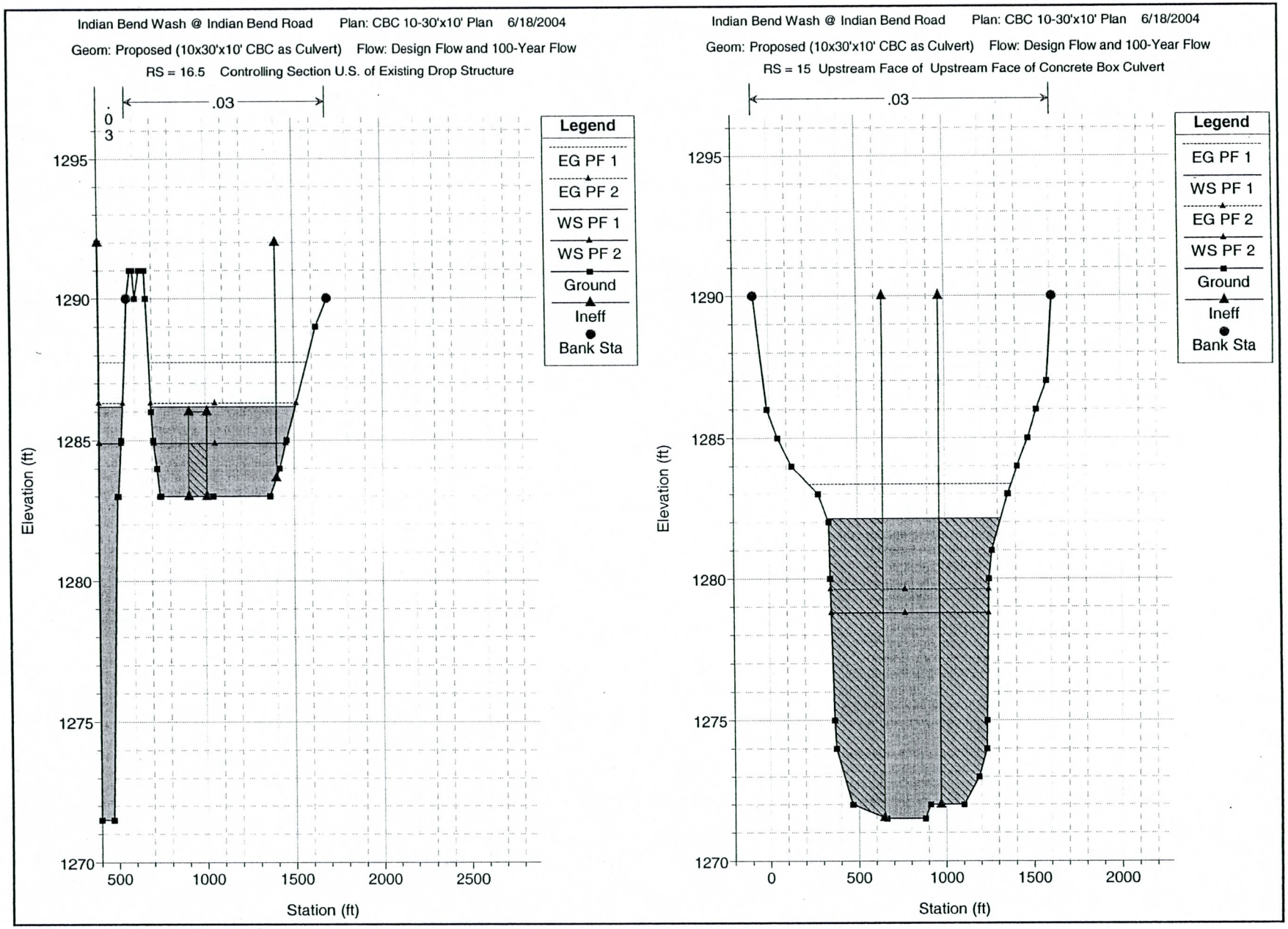
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 14 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 14 Profile: PF 2
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Indian Bend Wash Reach: Indian Bend Road RS: 11 Profile: PF 2
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

APPENDIX H

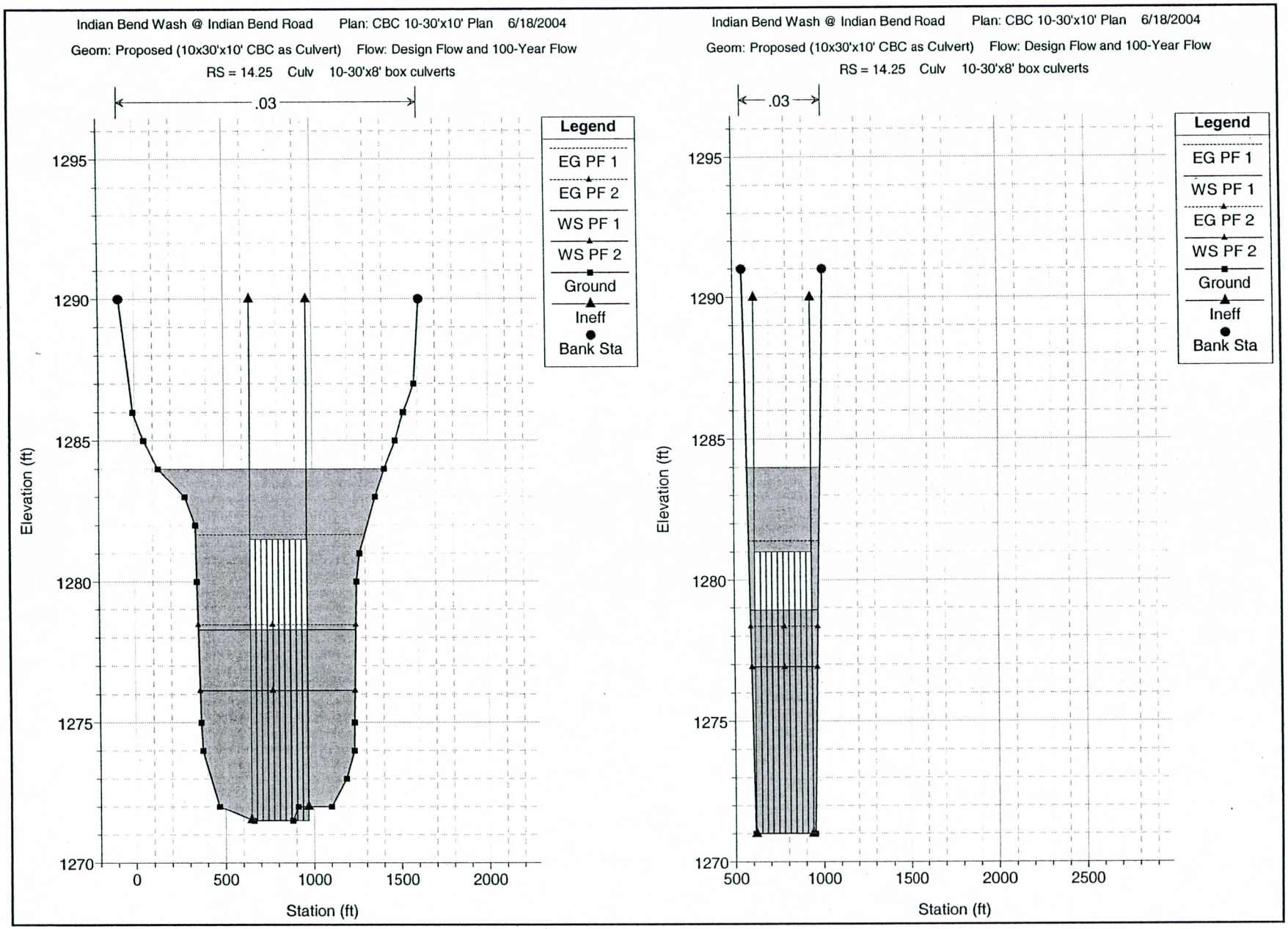

Indian Bend Wash @ Indian Bend Road Plan: CBC 10-30'x10' Plan 6/18/2004
Geom: Proposed (10x30'x10' CBC as Culvert) Flow: Design Flow and 100-Year Flow
Indian Bend Wash Indian Bend Road
Legend
EG PF 1
WS PF 1
EG PF 2
WS PF 2
Ground
Elevation (ft)
1290
1285
1280
1275
1270
1265
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)
11
12
13
13.5
14.25
16.5
16.75
17



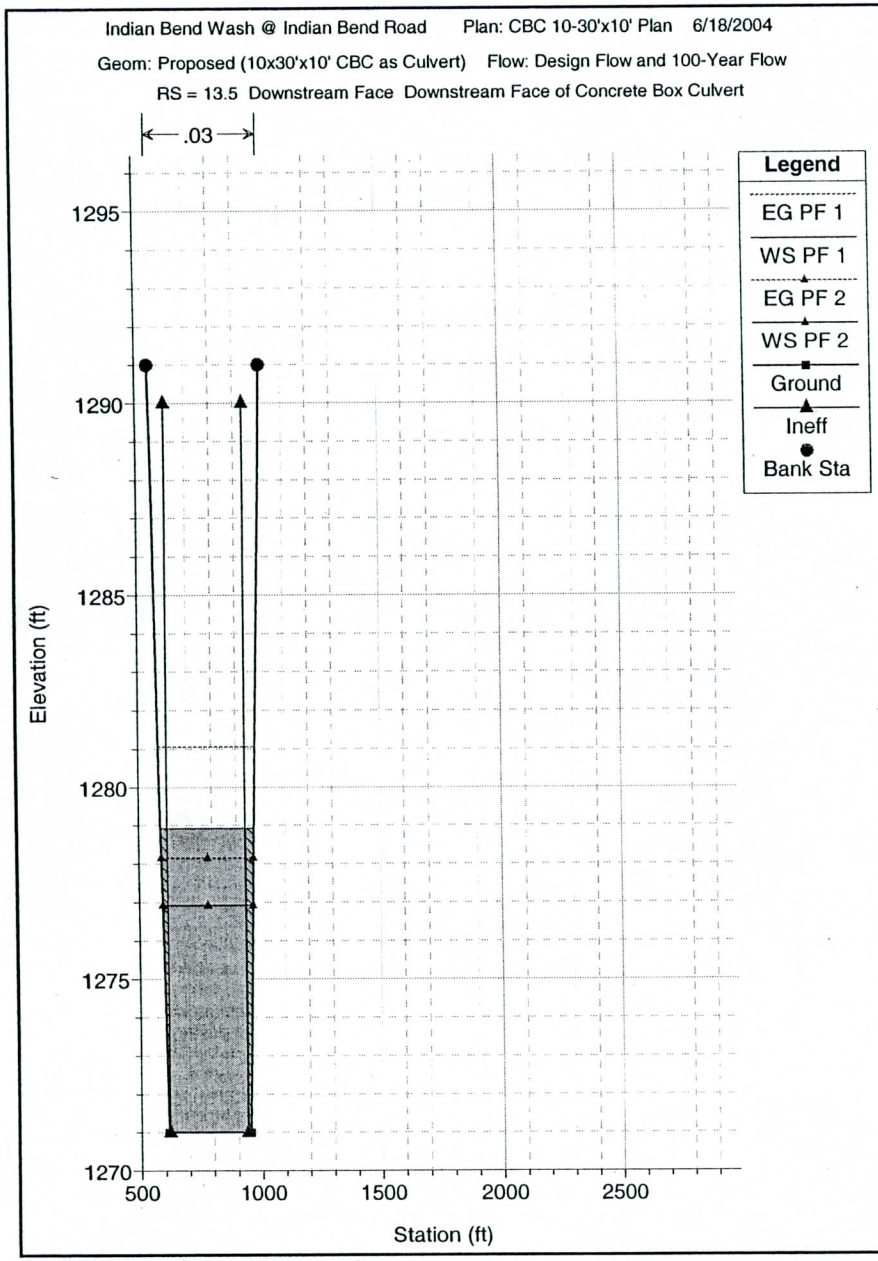
1 in Horiz. = 800 ft 1 in Vert. = 5 ft

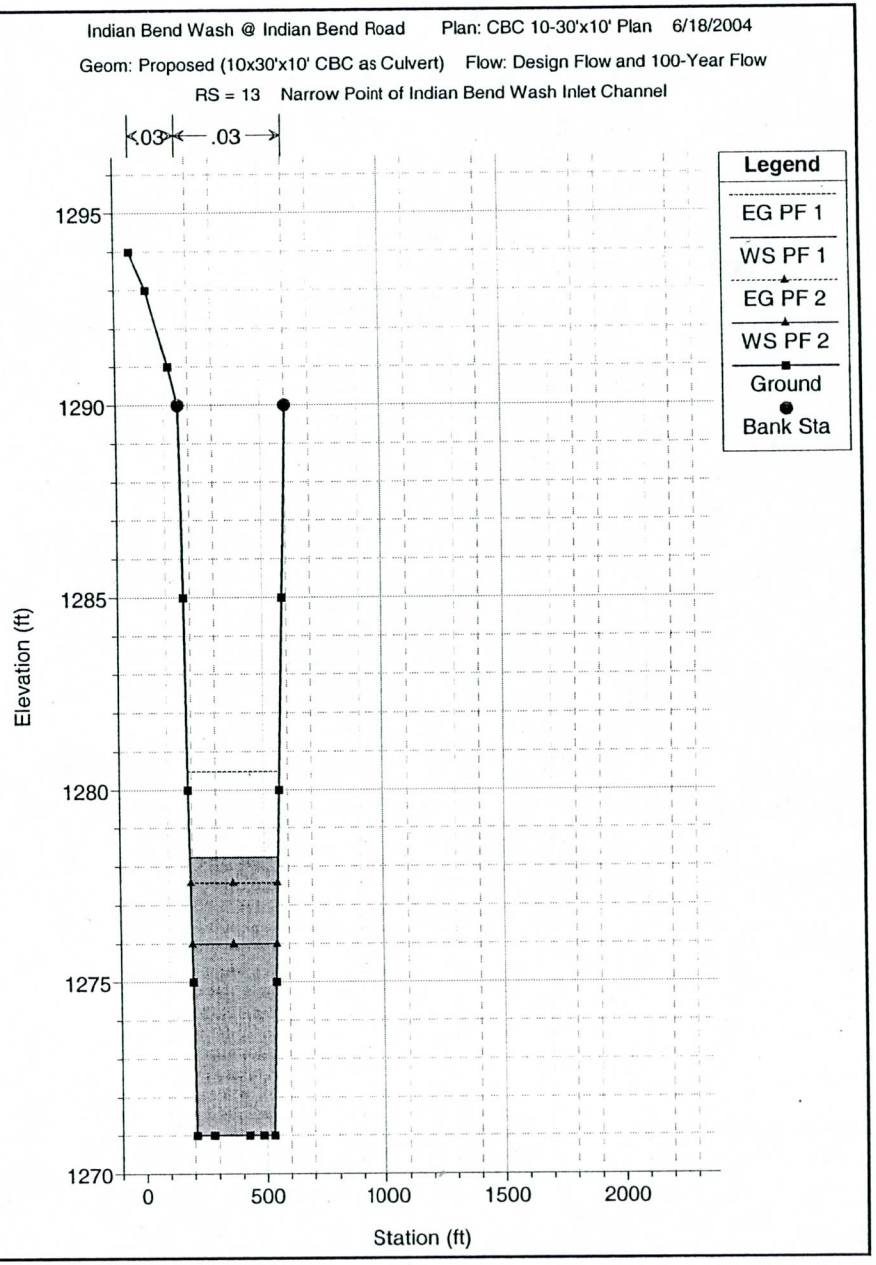


1 in Horiz. = 800 ft 1 in Vert. = 5 ft

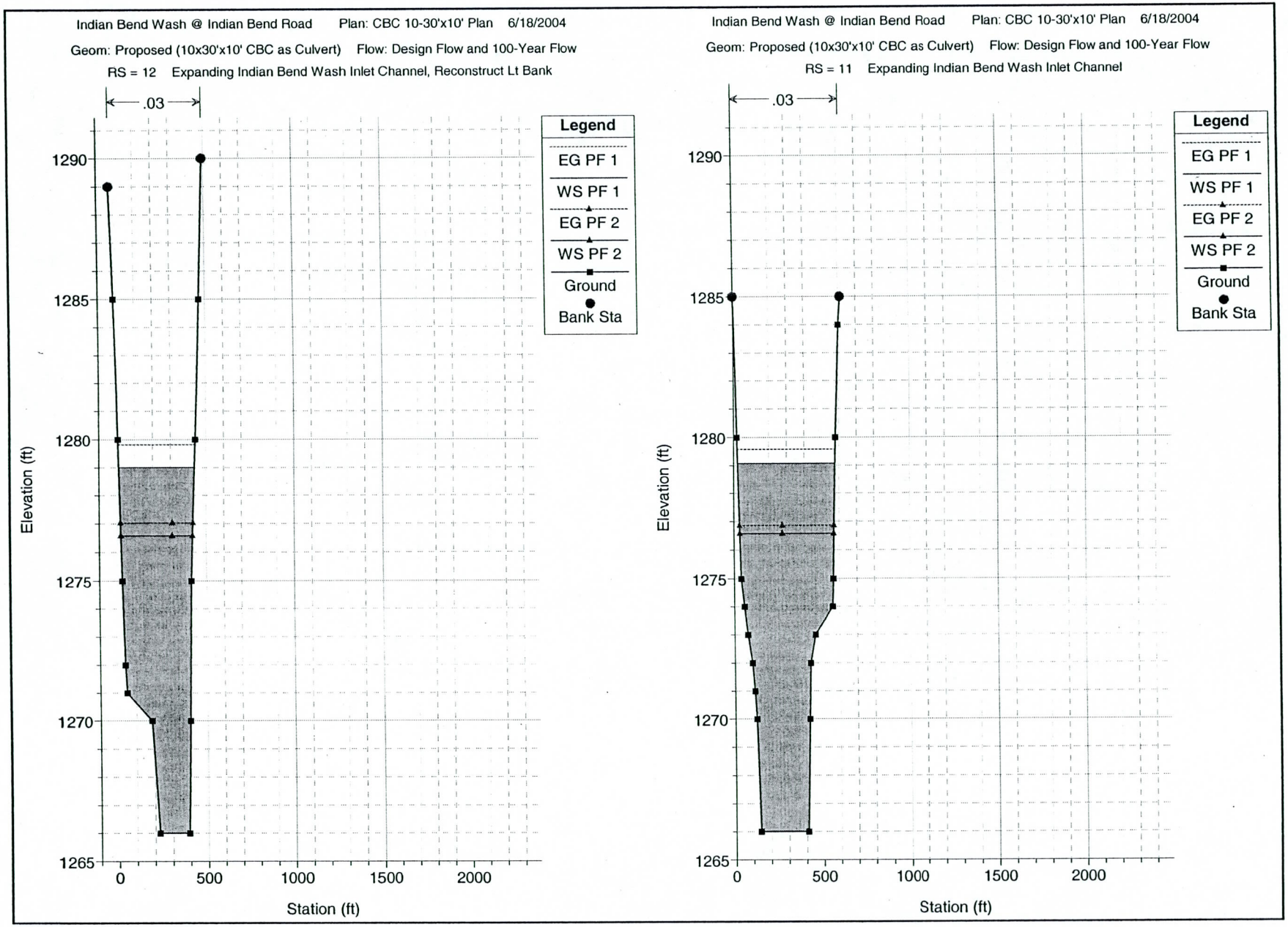


1 in Horiz. = 800 ft 1 in Vert. = 5 ft

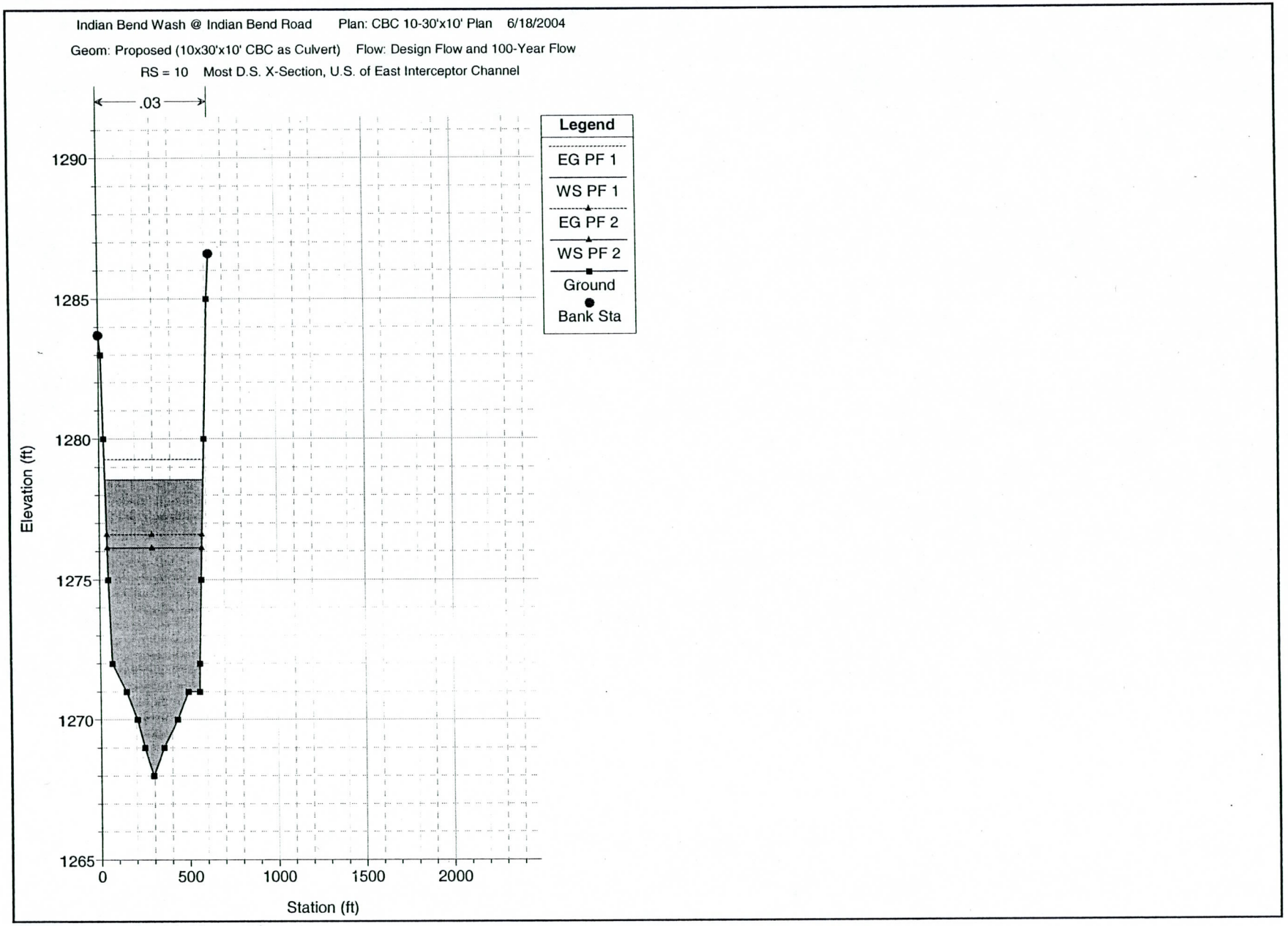




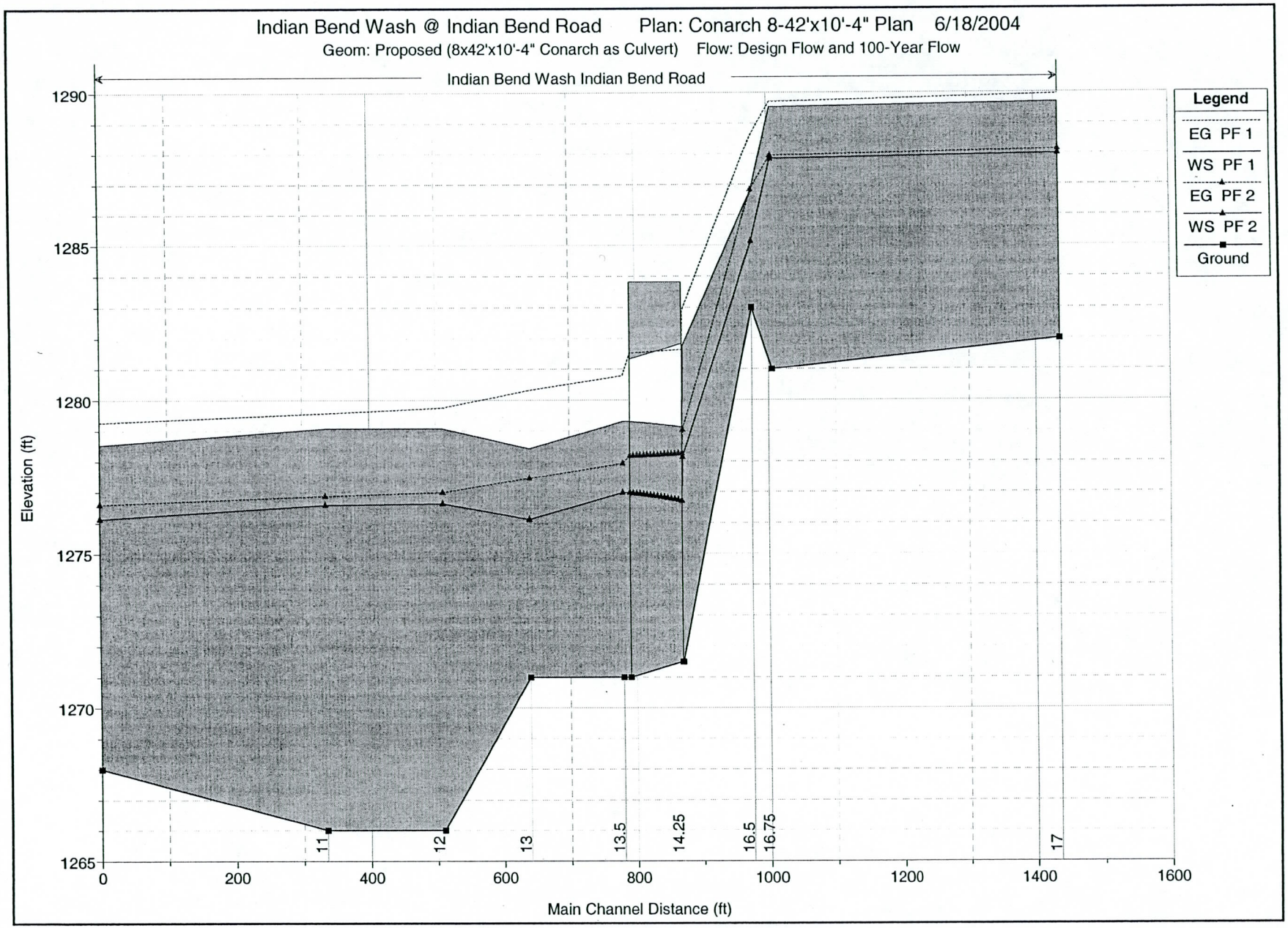
1 in Horiz. = 800 ft 1 in Vert. = 5 ft

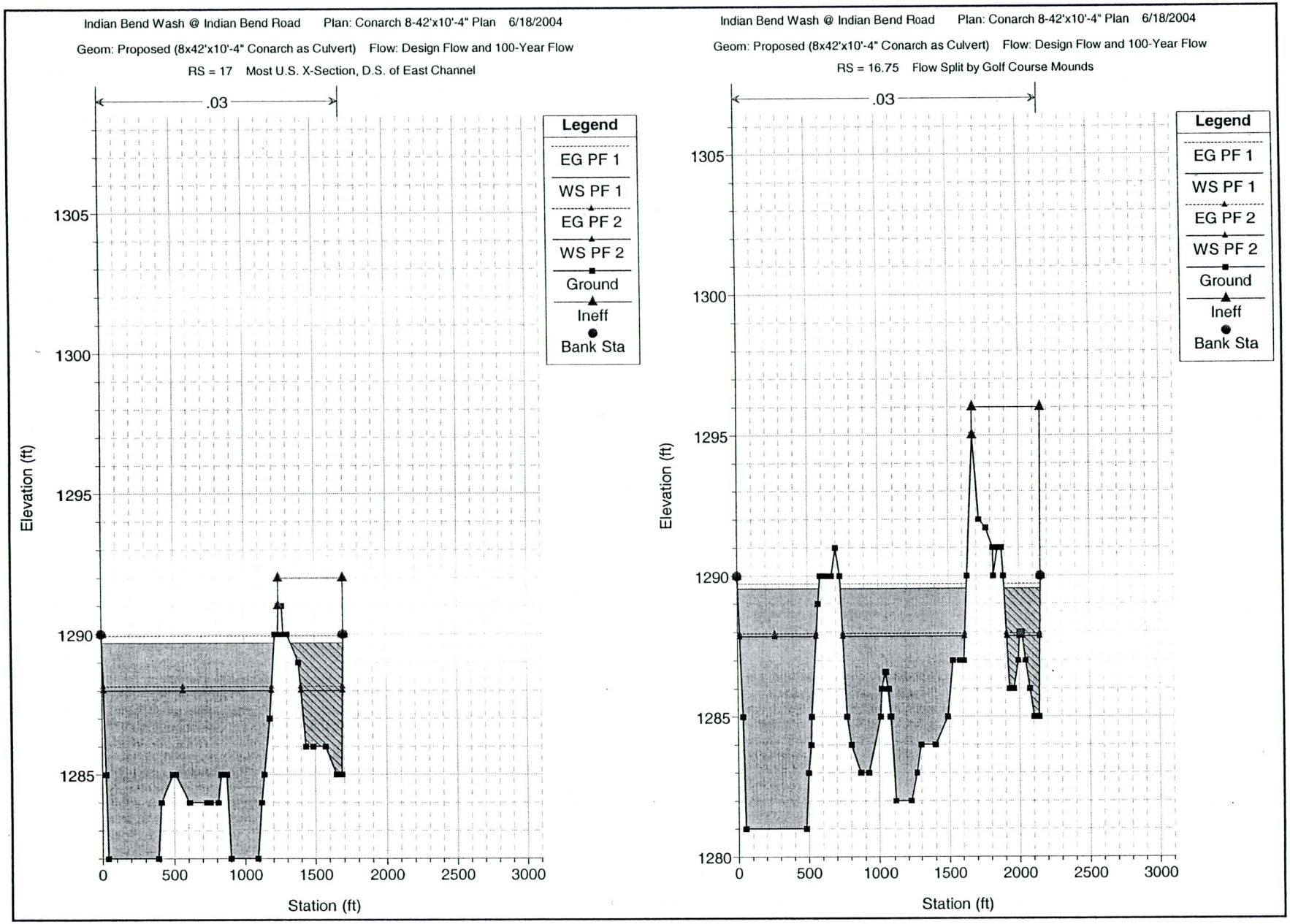


1 in Horiz. = 800 ft 1 in Vert. = 5 ft

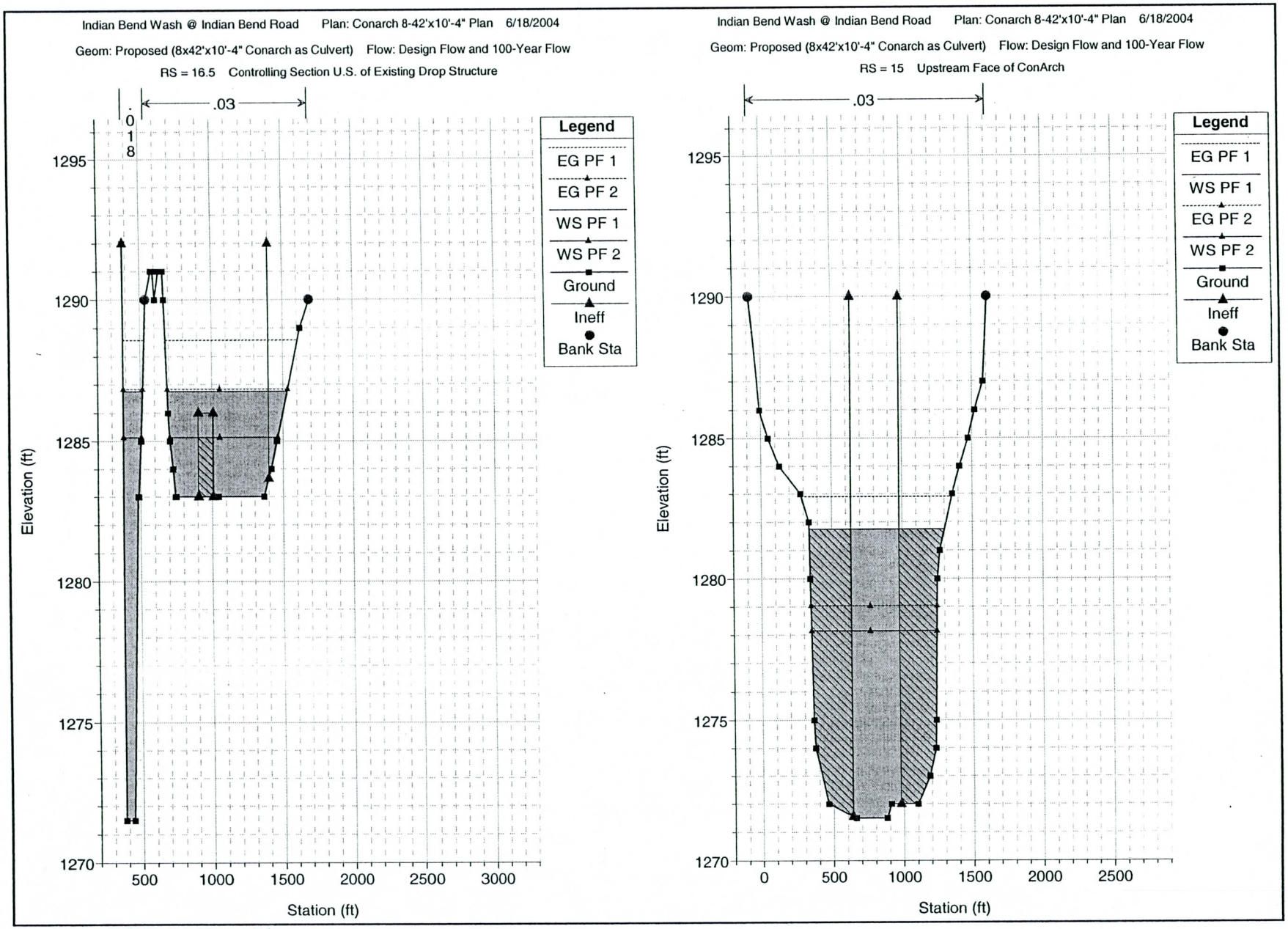


1 in Horiz. = 800 ft 1 in Vert. = 5 ft

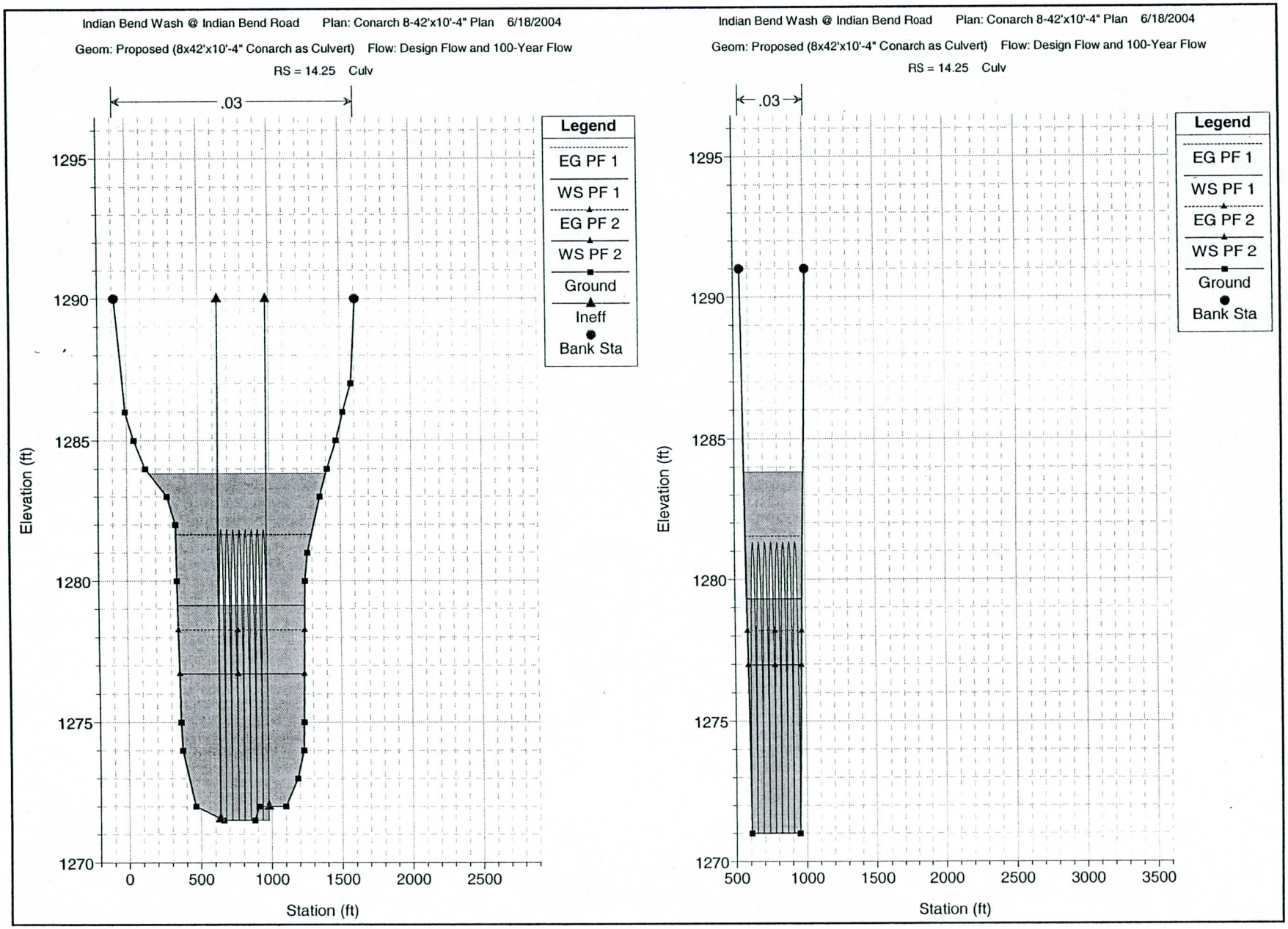

Indian Bend Wash @ Indian Bend Road Plan: Conarch 8-42'x10'-4" Plan 6/18/2004
Geom: Proposed (8x42'x10'-4" Conarch as Culvert) Flow: Design Flow and 100-Year Flow
Indian Bend Wash Indian Bend Road
Legend
EG PF 1
WS PF 1
EG PF 2
WS PF 2
Ground
Elevation (ft)
1290
1285
1280
1275
1270
1265
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)
11
12
13
13.5
14.25
16.5
16.75
17



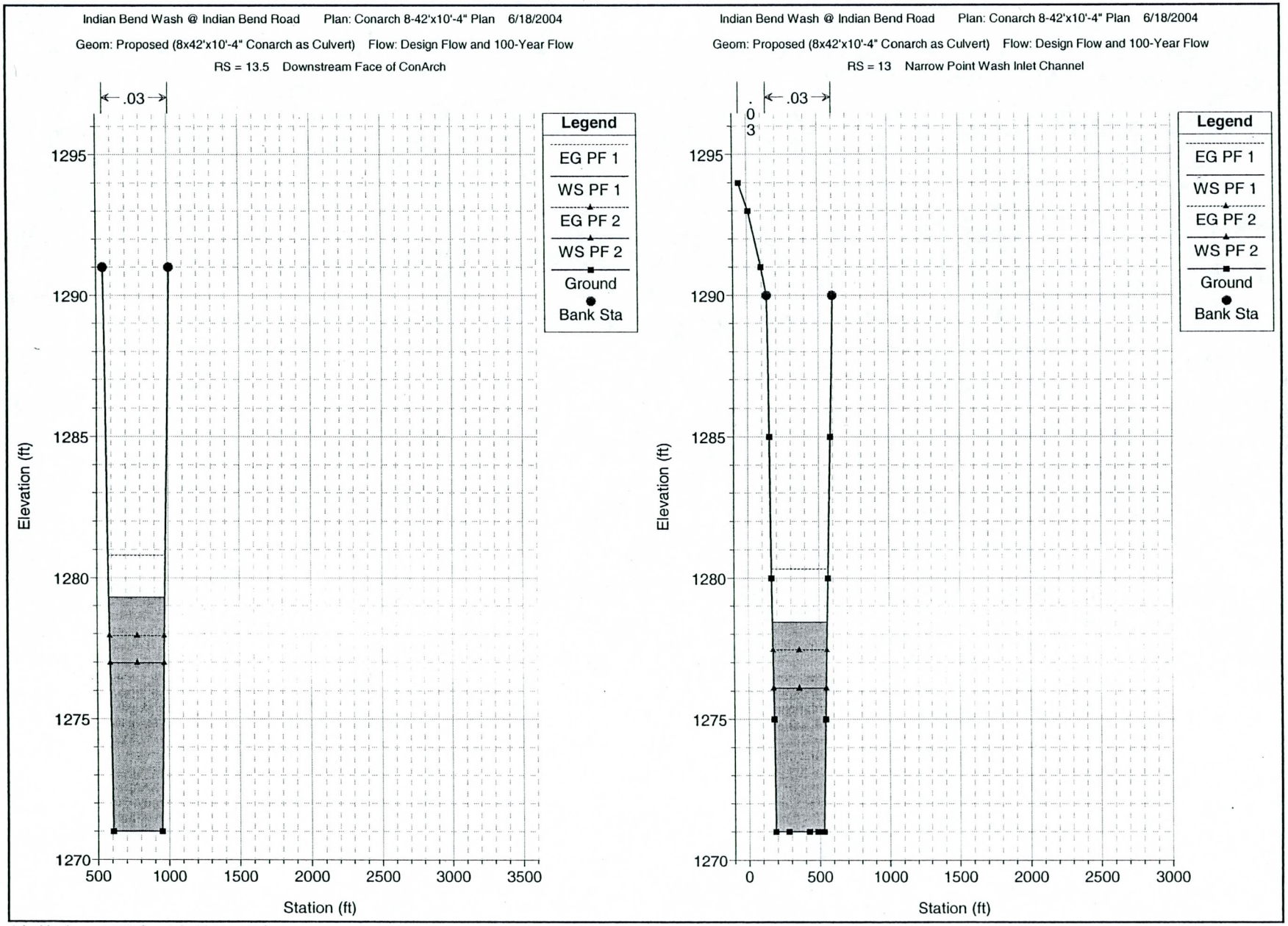
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



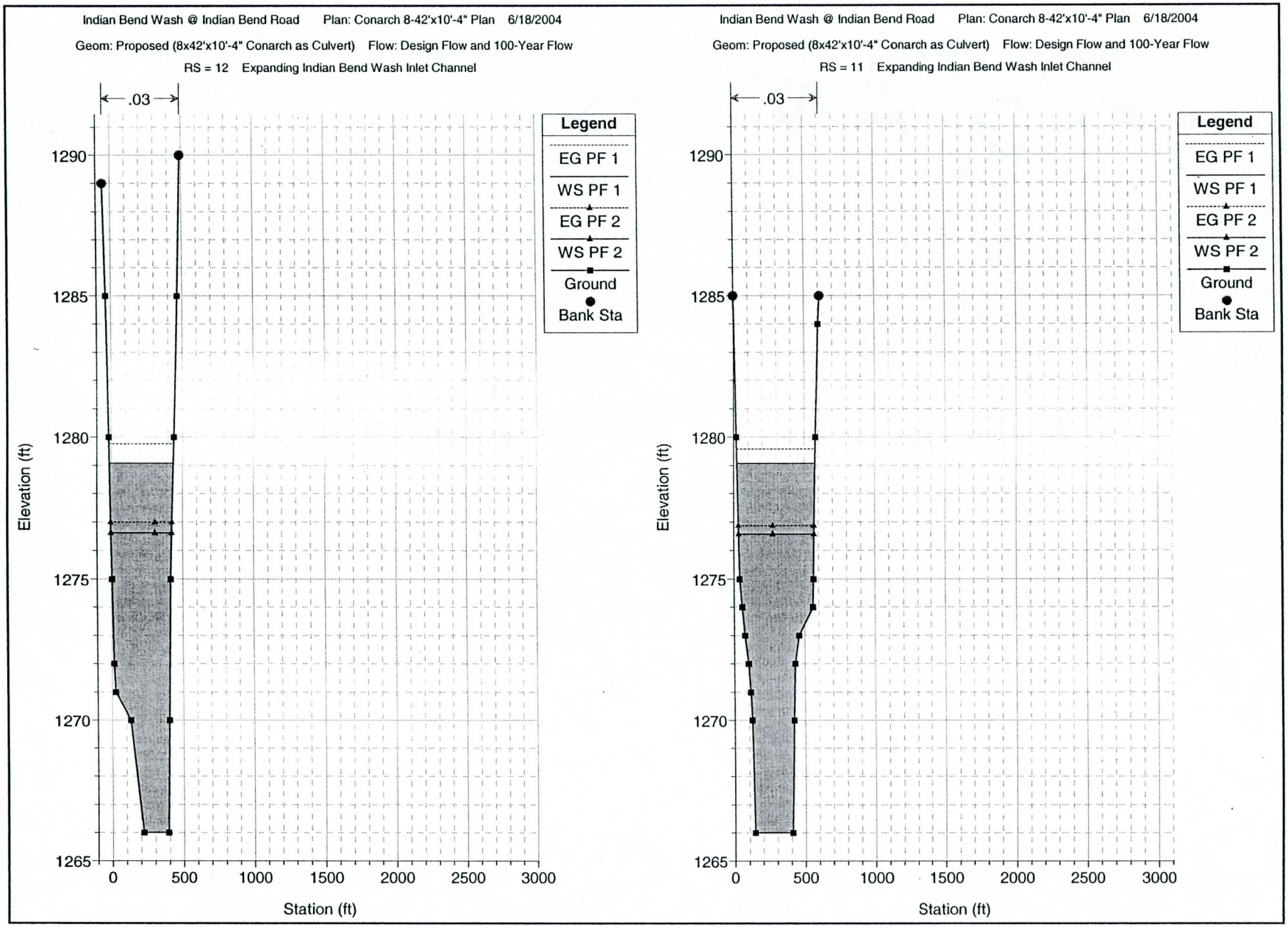
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



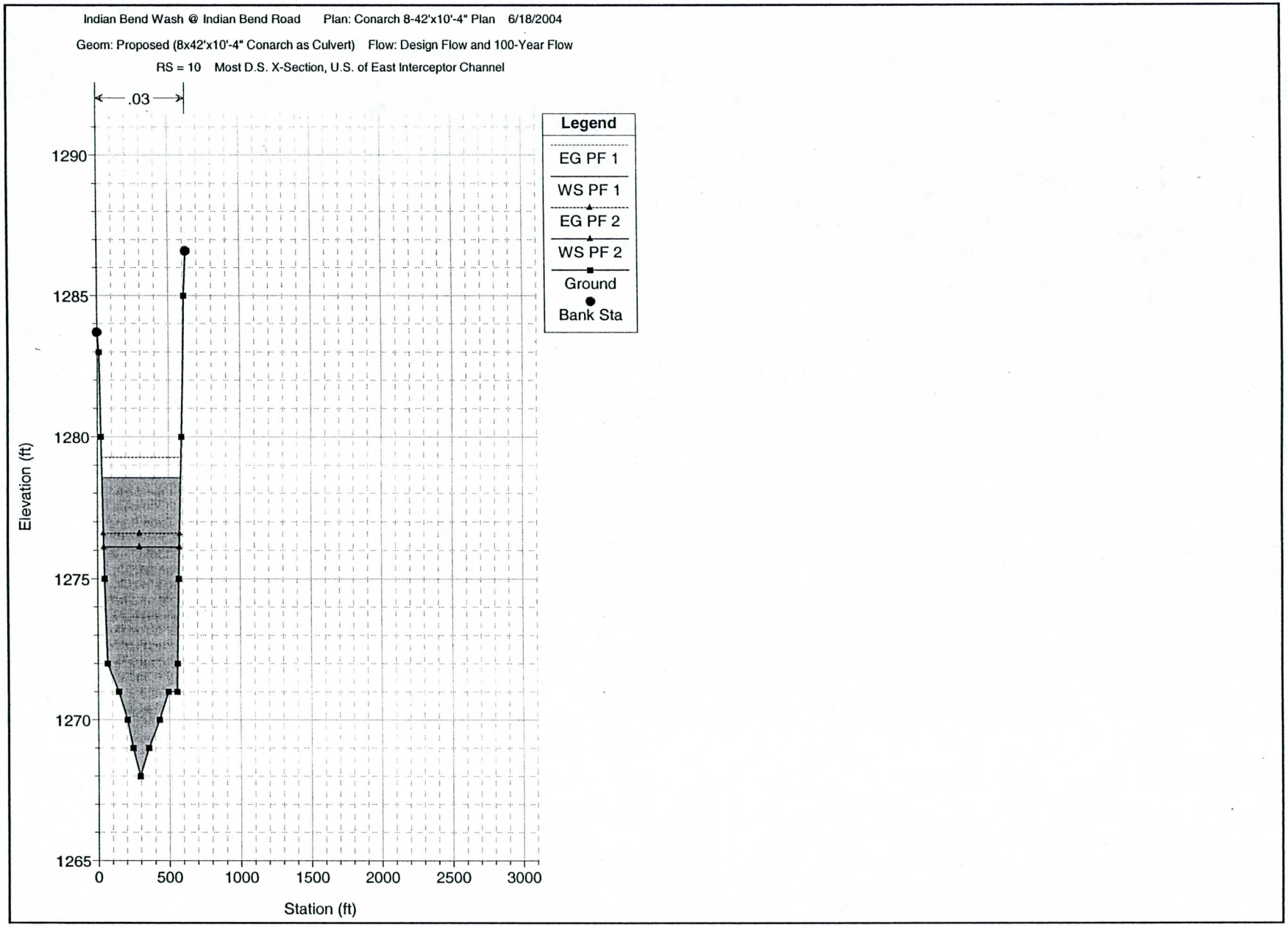
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



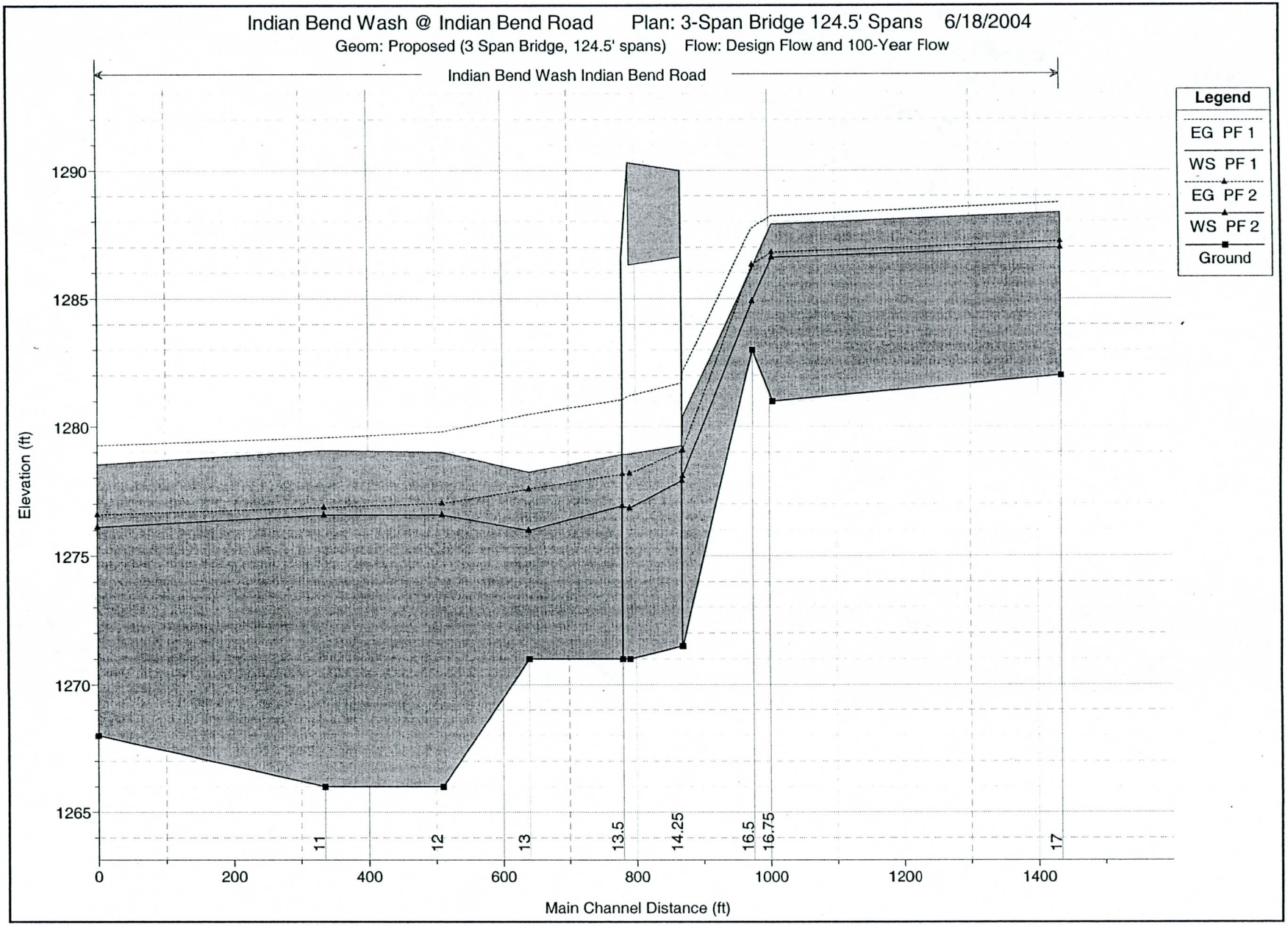
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



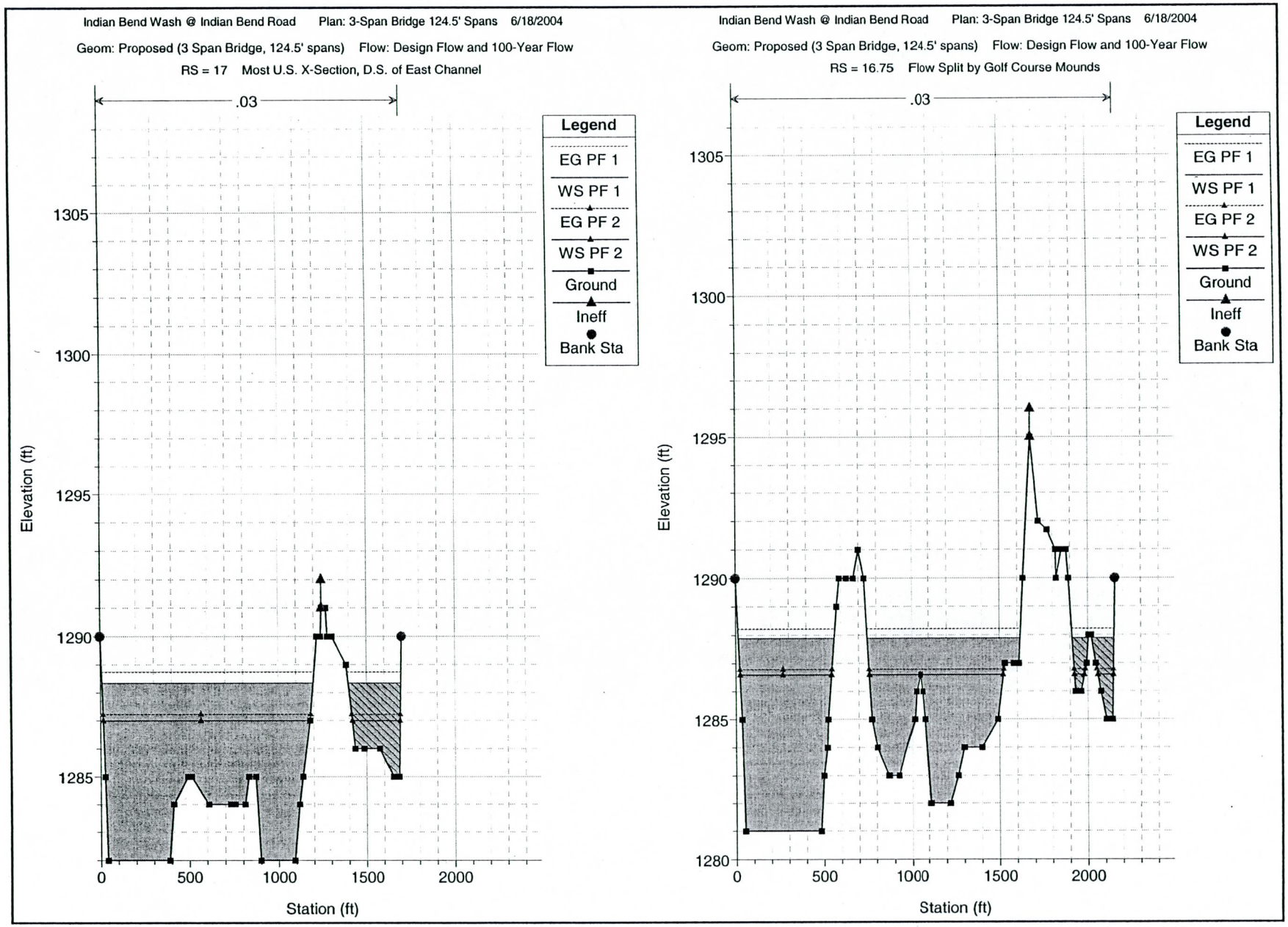
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



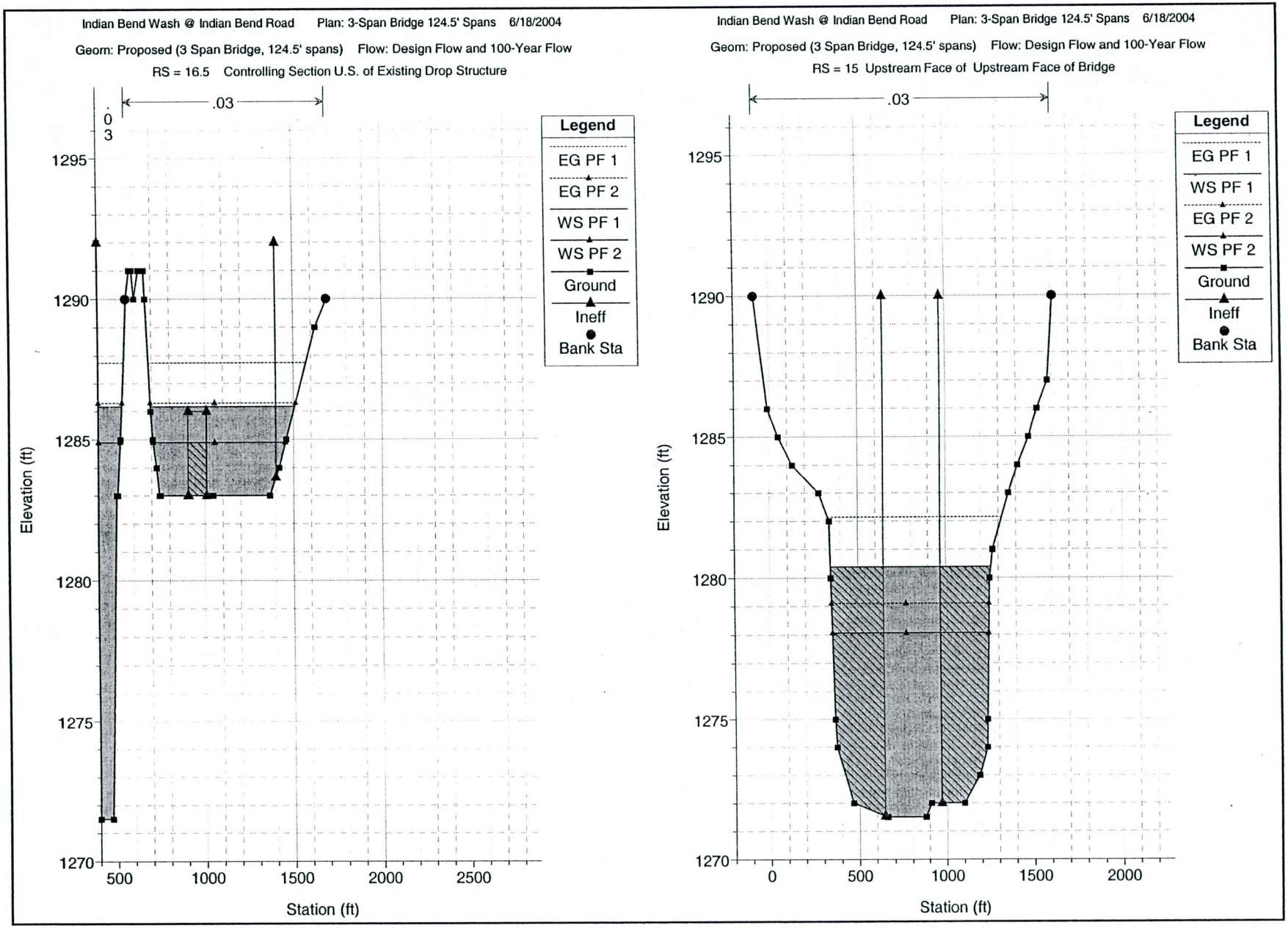
1 in Horiz. = 1000 ft 1 in Vert. = 5 ft



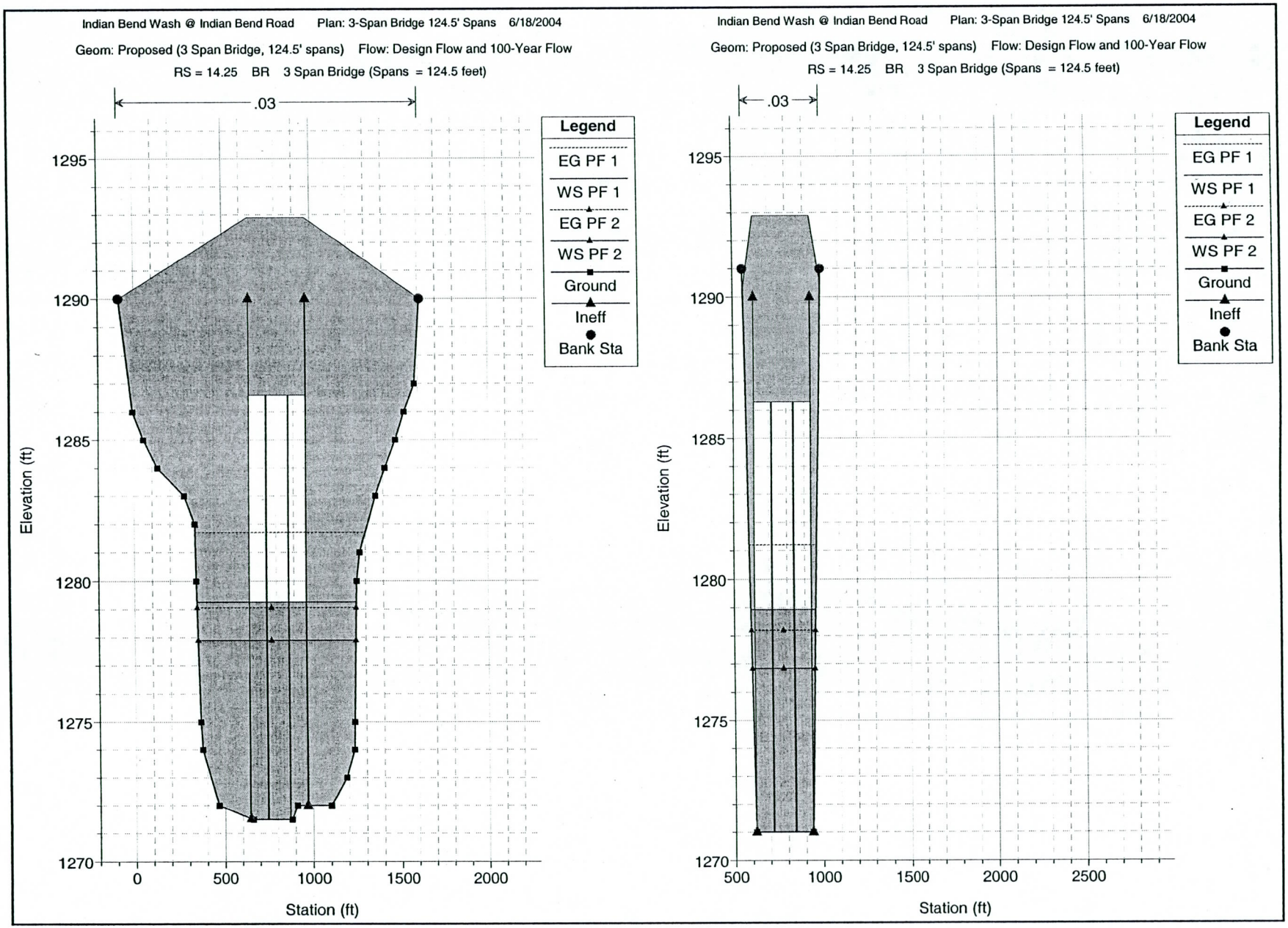
1 in Horiz. = 210.3418 ft 1 in Vert. = 5.494505 ft



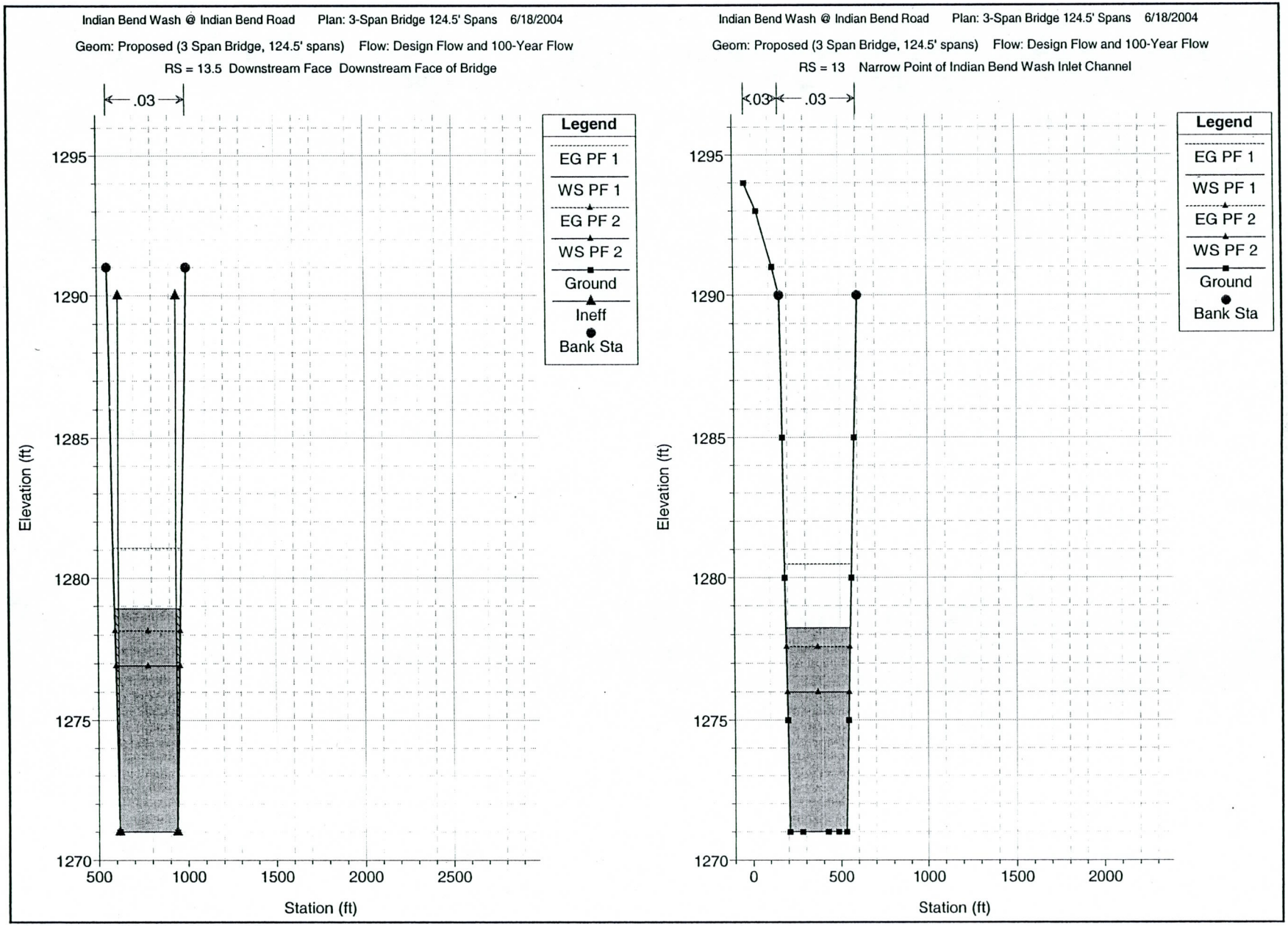
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



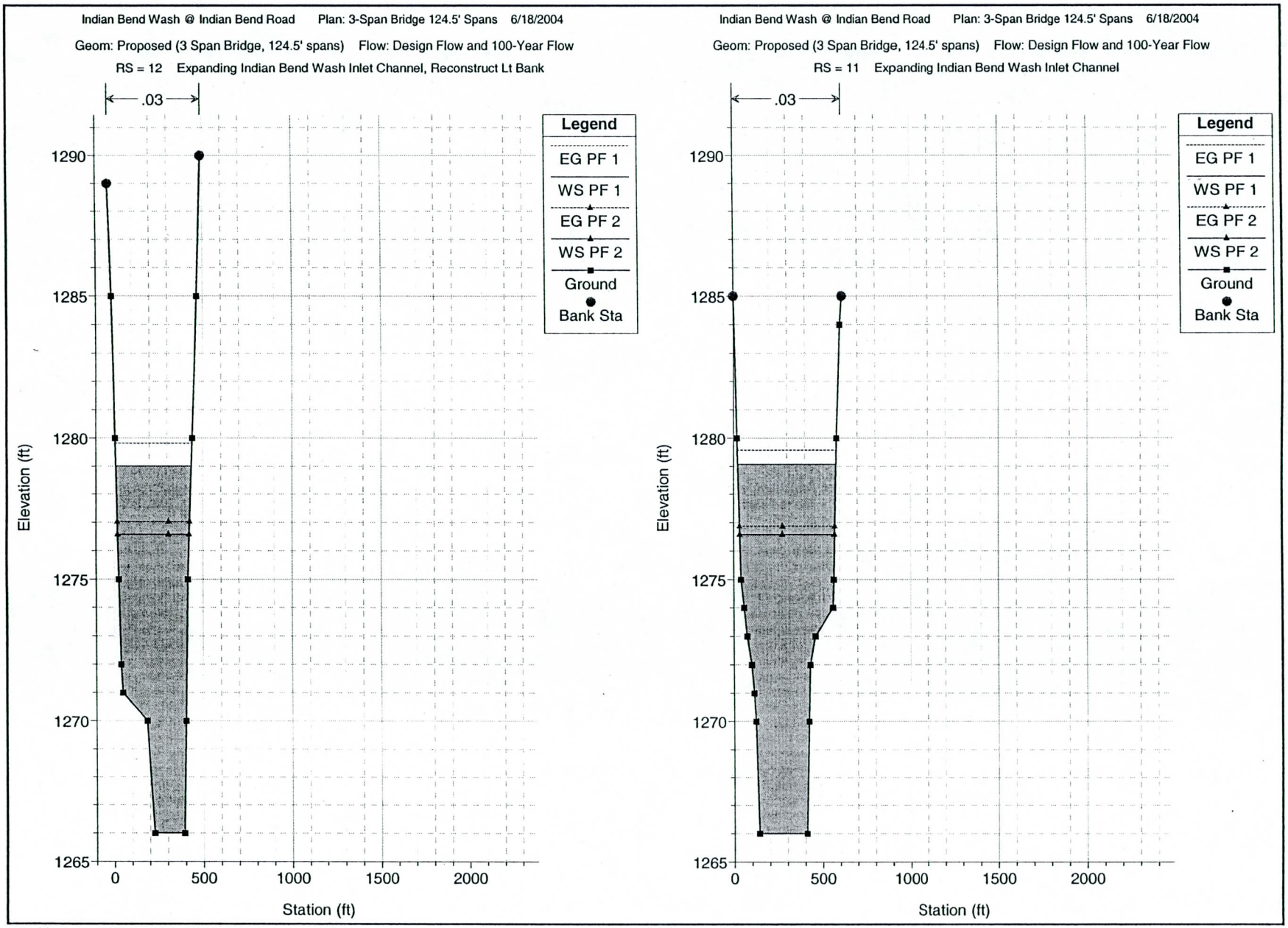
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



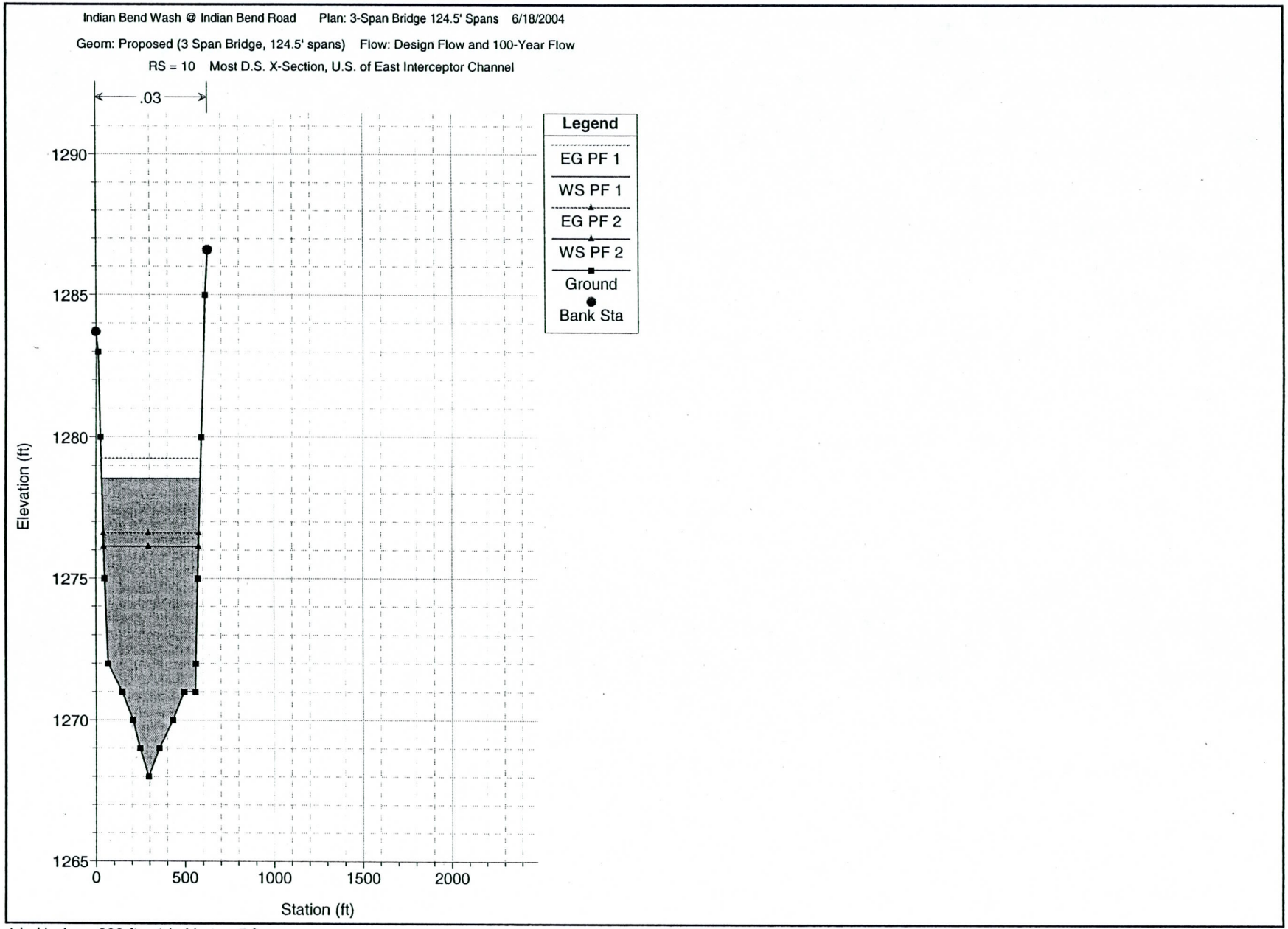
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



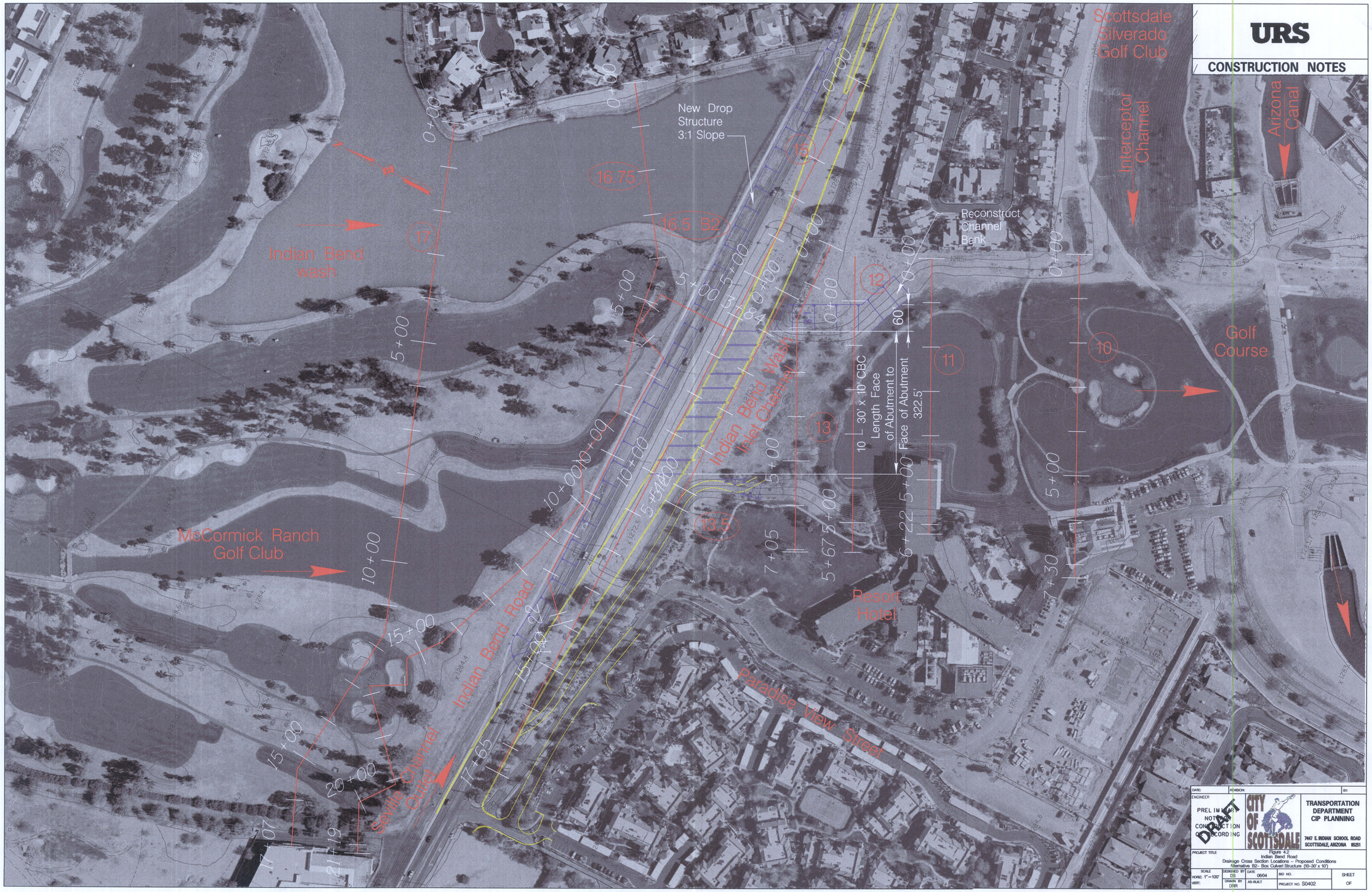
1 in Horiz. = 800 ft 1 in Vert. = 5 ft



1 in Horiz. = 800 ft 1 in Vert. = 5 ft



1 in Horiz. = 800 ft 1 in Vert. = 5 ft



URS

CONSTRUCTION NOTES

DATE:	REVISION:	BY:

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

DRAFT

CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT CIP PLANNING

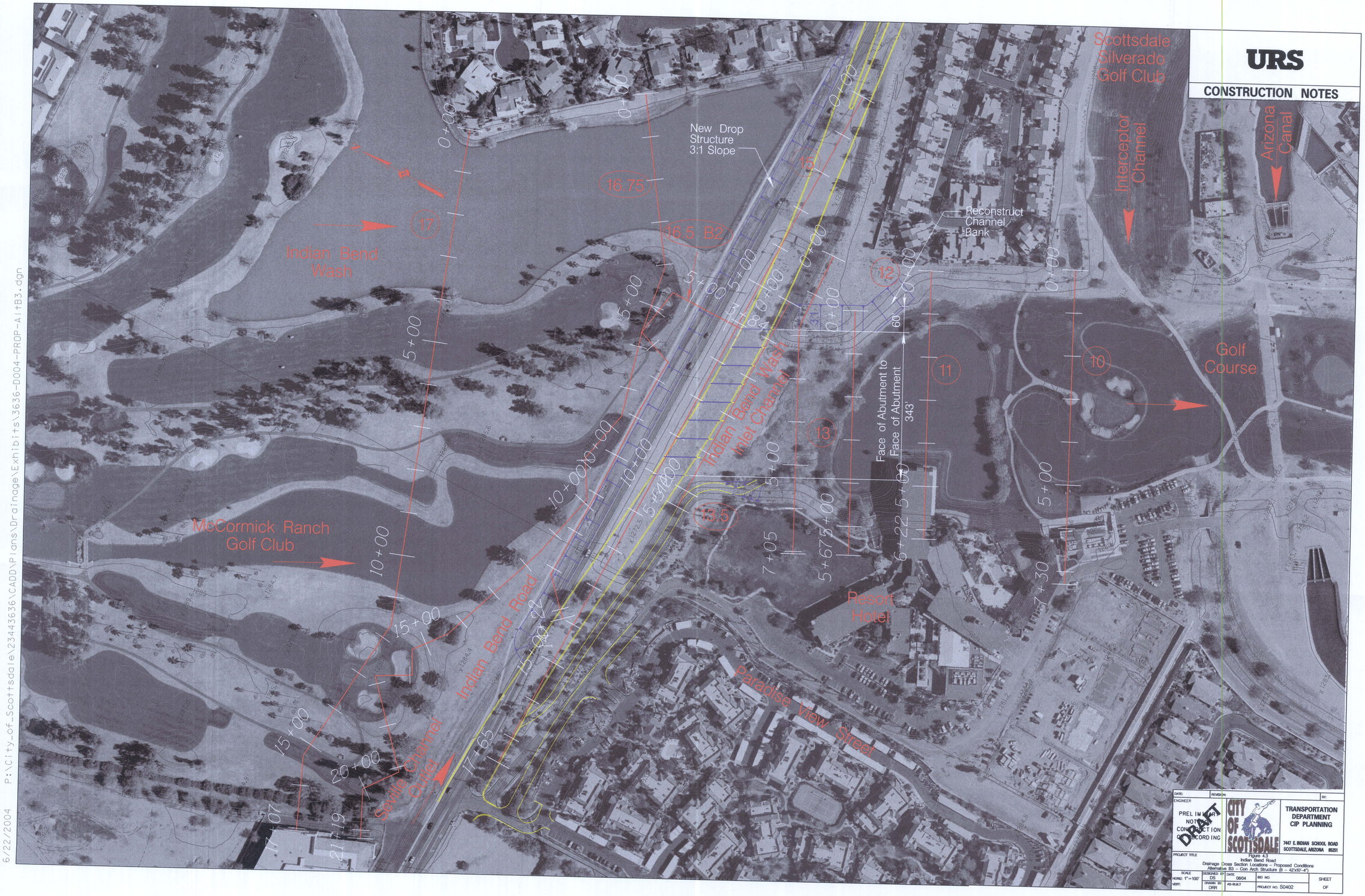
7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE

Figure 4.2
Indian Bend Road
Drainage Cross Section Locations – Proposed Conditions
Alternative B2- Box Culvert Structure (10-30' x 10')

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORIZ. 1"=100'	DS	0604		
VERT:	DRAWN BY	AS-BUILT	PROJECT NO. SD402	OF
	DVR			

6/21/2004 P:\City_of_Scottsdale\2343636\CADD\Plans\Drainage\Exhibits\3636-D003-PROP-Alt+B2.dgn



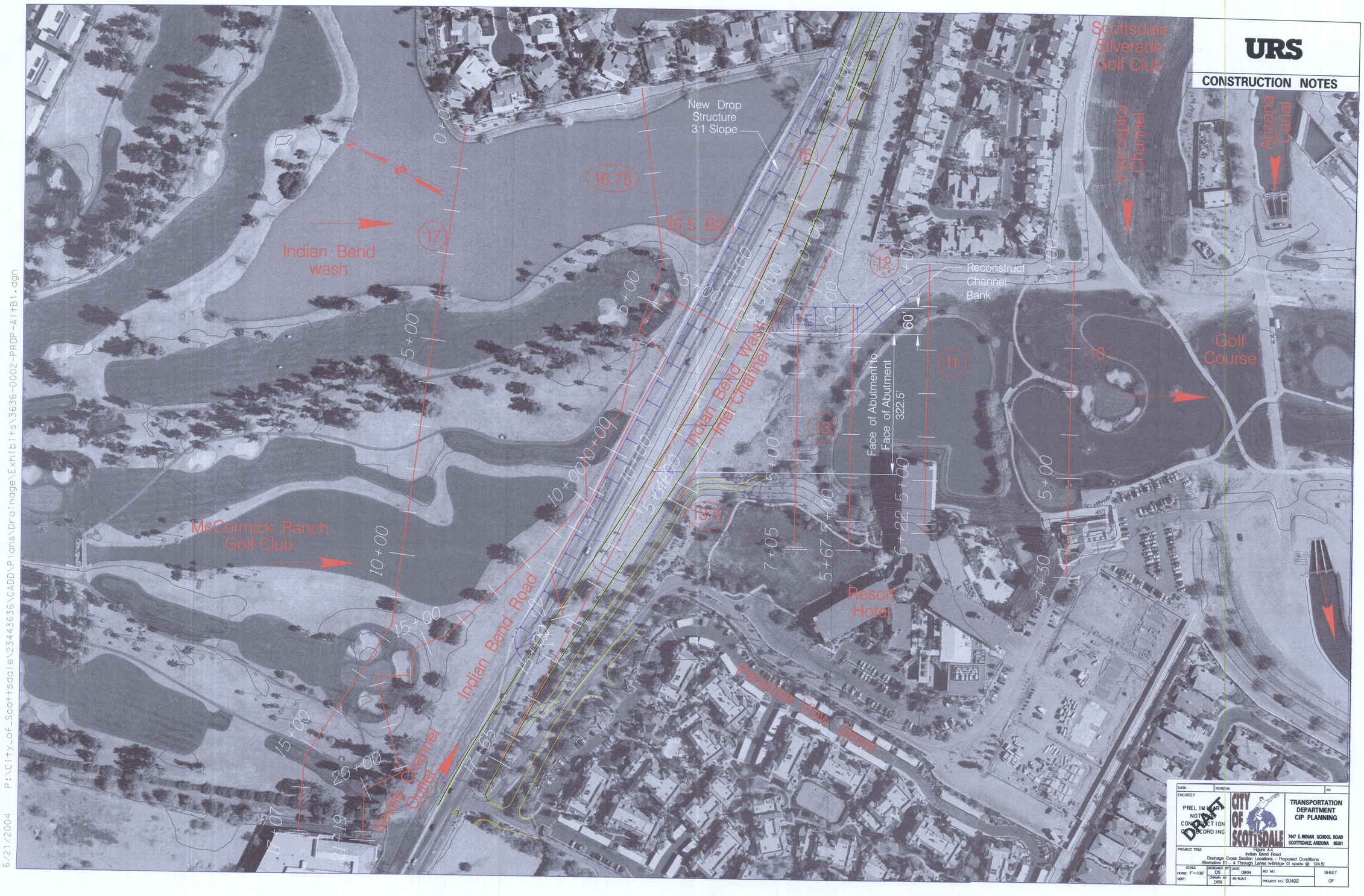
URS

CONSTRUCTION NOTES

DRAFT

DATE:	REVISION: BY:
ENGINEER	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
CITY OF SCOTTSDALE	TRANSPORTATION DEPARTMENT CIP PLANNING 7447 E. INDIAN SCHOOL ROAD SCOTTSDALE, ARIZONA 85251
PROJECT TITLE	Figure 4.3 Indian Bend Road Drainage Cross Section Locations – Proposed Conditions Alternative B3 – Con Arch Structure (8 – 42'x10'-4")
SCALE HORZ: 1"=100' VERT:	DESIGNED BY: DS DRAWN BY: DRR CHECKED BY: DATE: 0604 AS-BUILT
BID NO.	PROJECT NO: 50402
SHEET	OF

6/22/2004 P:\City_of_Scottsdale\23443636\CADD\Plans\Drainage\Exhibits\3636-D004-PROP-AltB3.dgn



URS

CONSTRUCTION NOTES

DATE:	REVISION:	BY:
ENGINEER		

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

DRAFT

CITY OF SCOTTSDALE

TRANSPORTATION DEPARTMENT
CIP PLANNING

7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE

Figure 4.4
Indian Bend Road
Drainage Cross Section Locations – Proposed Conditions
Alternative 01 – 4 Through Lanes w/Bridge (3 spans @ 124.5)

SCALE	DESIGNED BY	DATE	BID NO.	SHEET
HORZ: 1" = 100'	DS	0604		
VERT:	DRAWN BY	AS-BUILT	PROJECT NO. S0402	OF
	DRR			

6/21/2004 P:\City_of_Scottsdale\23443636\CADD\Plans\Drainage\Exhibits\3636-D002-PROP-Alt01.dgn

APPENDIX I

Table 4.1
Water Surface Elevations
Existing versus Proposed Conditions for Design Discharge
Q=30,000 cfs

River Cross-Section	Description of Cross-Section	Existing	Proposed Conarch (8-42'x10'-4")[2]			Proposed Box Culvert (10-30'x10')[3]			Proposed Bridge (3-124.5' Span)[4]		
		Existing	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL
		(msl)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)
10	Most Downstream X-Section, U.S. of East Interceptor Channel	1278.54	1278.54	0.00	1279.26	1278.54	0.00	1279.26	1278.54	0.00	1279.26
11	Expanding Indian Bend Wash Inlet Channel	1279.08	1279.08	0.00	1279.58	1279.08	0.00	1279.58	1279.08	0.00	1279.58
12	Expanding Indian Bend Wash Inlet Channel	1278.93	1279.08	0.15	1279.76	1279.01	0.08	1279.81	1279.01	0.08	1279.81
13	Narrow Point of Indian Bend Wash Inlet Channel	1277.78	1278.42	0.64	1280.32	1278.24	0.46	1280.48	1278.24	0.46	1280.48
14/13.5	Leveee Toe of Slope @ Entrance to Indian Bend Wash Inlet Channel or Downstream Face of Structure	1282.02	1279.30	-2.72	1280.79	1278.92	-3.10	1281.06	1278.92	-3.10	1281.06
15	Indian Bend Road Toe of Slope or Upstream Face of Structure	1282.27	1281.75	-0.52	1282.90	1282.14	-0.13	1283.35	1280.40	-1.87	1282.14
16.5	Controlling Section U.S. of Drop Structure	1285.86	1286.76	0.90	1288.58	1286.17	0.31	1287.74	1286.17	0.31	1287.74
16.75	Flow Split by Golf Course Mounds	1288.10	1289.53	1.43	1289.71	1287.89	-0.21	1288.22	1287.89	-0.21	1288.22
17	Most Upstream X-Section, D.S. of East Channel	1288.92	1289.69	0.77	1289.94	1288.35	-0.57	1288.74	1288.35	-0.57	1288.74

Notes: (1) Δh is the change in water surface elevation (WSE) in relation to existing conditions.
(2) Proposed structure low concrete elevation is 1281.83
(3) Proposed structure low concrete elevation is 1281.5
(4) Proposed structure low concrete elevation is 1286.9.

Table 4.2
Water Surface Elevations
Existing versus Proposed Conditions for 100-Year Flow
Q=17,000 cfs

River Cross-Section	Description of Cross-Section	Existing	Proposed Conarch (8-42'x10'-4")[2]			Proposed Box Culvert (10-30'x10')[3]			Proposed Bridge (3-124.5' Span)[4]		
		Existing	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL	Proposed WSE	$\Delta h^{(1)}$	Proposed EGL
		(msl)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)	(msl)	(ft)	(ft)
10	Most Downstream X-Section, U.S. of East Interceptor Channel	1276.12	1276.12	0.00	1276.59	1276.12	0.00	1276.59	1276.12	0.00	1276.59
11	Expanding Indian Bend Wash Inlet Channel	1276.58	1276.58	0.00	1276.87	1276.58	0.00	1276.87	1276.58	0.00	1276.87
12	Expanding Indian Bend Wash Inlet Channel	1276.54	1276.62	0.08	1276.99	1276.58	0.04	1277.02	1276.58	0.04	1277.02
13	Narrow Point of Indian Bend Wash Inlet Channel	1275.68	1276.10	0.42	1277.45	1275.99	0.31	1277.57	1275.99	0.31	1277.57
14/13.5	Leveee Toe of Slope @ Entrance to Indian Bend Wash Inlet Channel or Downstream Face of Structure	1278.86	1276.97	-1.89	1277.93	1276.92	-1.94	1278.15	1276.92	-1.94	1278.15
15	Indian Bend Road Toe of Slope or Upstream Face of Structure	1279.01	1278.14	-0.87	1279.04	1278.77	-0.24	1279.62	1278.07	-0.94	1279.10
16.5	Controlling Section U.S. of Drop Structure	1282.03	1285.13	3.10	1286.83	1284.89	2.86	1286.30	1284.89	2.86	1286.30
16.75	Flow Split by Golf Course Mounds	1286.77	1287.84	1.07	1287.95	1286.59	-0.18	1286.79	1286.59	-0.18	1286.79
17	Most Upstream X-Section, D.S. of East Channel	1287.51	1288.00	0.49	1288.14	1286.99	-0.52	1287.23	1286.99	-0.52	1287.23

Notes: (1) Δh is the change in water surface elevation (WSE) in relation to existing conditions.
(2) Proposed structure low concrete elevation is 1281.83
(3) Proposed structure low concrete elevation is 1281.5
(4) Proposed structure low concrete elevation is 1286.9.

Table 1
Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road												
Reach	River Sta	Profile	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)	
Indian Bend Road	17	PF 1	30000	1282	1288.35	1285.96	1288.74	0.001206	5.03	5958.68	1487.92	0.4
Indian Bend Road	17	PF 2	17000	1282	1286.99	1285.05	1287.23	0.001066	3.9	4361.7	1437.17	0.35
Indian Bend Road	16.75	PF 1	30000	1281	1287.89	1285.31	1288.22	0.001119	4.59	6531.22	1631.63	0.38
Indian Bend Road	16.75	PF 2	17000	1281	1286.59	1284.31	1286.79	0.000906	3.57	4758.43	1425.98	0.33
Indian Bend Road	16.5	PF 1	30000	1283	1286.17	1286.17	1287.74	0.003235	5.62	3675.28	946.83	0.59
Indian Bend Road	16.5	PF 2	17000	1283	1284.89	1284.89	1286.3	0.002602	3.62	2319.55	869.65	0.49
Indian Bend Road	15 Upstream Face of CBC	PF 1	30000	1271.5	1282.14	1278.09	1283.35	0.001382	8.84	3392.87	989.01	0.48
Indian Bend Road	15 Upstream Face of CBC	PF 2	17000	1271.5	1278.77	1276.05	1279.62	0.001603	7.37	2308.06	896.41	0.49
Indian Bend Road	14.25		Culvert									
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	30000	1271	1278.92	1277.47	1281.06	0.003569	11.75	2552.72	385.49	0.74
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	17000	1271	1276.92	1275.42	1278.15	0.003018	8.9	1909.1	373.52	0.64
Indian Bend Road	13	PF 1	30000	1271	1278.24		1280.48	0.00463	12.02	2495.07	367.88	0.81
Indian Bend Road	13	PF 2	17000	1271	1275.99		1277.57	0.005211	10.1	1683.45	353.02	0.81
Indian Bend Road	12	PF 1	30000	1266	1279.01		1279.81	0.001004	7.17	4182.16	424.87	0.4
Indian Bend Road	12	PF 2	17000	1266	1276.58		1277.02	0.000749	5.35	3177.52	402.52	0.34
Indian Bend Road	11	PF 1	30000	1266	1279.08		1279.58	0.000653	5.67	5290.37	555.17	0.32
Indian Bend Road	11	PF 2	17000	1266	1276.58		1276.87	0.000541	4.33	3924.66	536.66	0.28
Indian Bend Road	10	PF 1	30000	1268	1278.54	1274.91	1279.26	0.001201	6.82	4398.49	553.75	0.43
Indian Bend Road	10	PF 2	17000	1268	1276.12	1273.37	1276.59	0.001202	5.52	3079.74	533.37	0.4

Table 2
Indian Bend Wash
New 10-30'x10' CBC
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road											
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Indian Bend Road	17	PF 1	1288.74	1288.35	0.39	0.5	0.02		30000		1487.92
Indian Bend Road	17	PF 2	1287.23	1286.99	0.24	0.42	0.01		17000		1437.17
Indian Bend Road	16.75	PF 1	1288.22	1287.89	0.33	0.36	0.12		30000		1631.63
Indian Bend Road	16.75	PF 2	1286.79	1286.59	0.2	0.37	0.12		17000		1425.98
Indian Bend Road	16.5	PF 1	1287.74	1286.17	1.57	0.21	0.28	17092.97	12907.03		946.83
Indian Bend Road	16.5	PF 2	1286.3	1284.89	1.41	0.21	0.45	13002.65	3997.35		869.65
Indian Bend Road	15 Upstream Face of CBC	PF 1	1283.35	1282.14	1.21				30000		989.01
Indian Bend Road	15 Upstream Face of CBC	PF 2	1279.62	1278.77	0.84				17000		896.41
Indian Bend Road	14.25		Culvert								
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	1281.06	1278.92	2.14	0.57	0.01		30000		385.49
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	1278.15	1276.92	1.23	0.55	0.04		17000		373.52
Indian Bend Road	13	PF 1	1280.48	1278.24	2.24	0.24	0.43		30000		367.88
Indian Bend Road	13	PF 2	1277.57	1275.99	1.58	0.2	0.34		17000		353.02
Indian Bend Road	12	PF 1	1279.81	1279.01	0.8	0.14	0.09		30000		424.87
Indian Bend Road	12	PF 2	1277.02	1276.58	0.44	0.11	0.05		17000		402.52
Indian Bend Road	11	PF 1	1279.58	1279.08	0.5	0.29	0.02		30000		555.17
Indian Bend Road	11	PF 2	1276.87	1276.58	0.29	0.26	0.02		17000		536.66
Indian Bend Road	10	PF 1	1279.26	1278.54	0.72				30000		553.75
Indian Bend Road	10	PF 2	1276.59	1276.12	0.47				17000		533.37

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
                HEC-RAS Version 3.1.1 May 2003
                 U.S. Army Corp of Engineers
                Hydrologic Engineering Center
                  609 Second Street, Suite D
                  Davis, California 95616-4687
                         (916) 756-1104


          X     X  XXXXXX    XXXX        XXXX        XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
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****

PROJECT DATA
Project Title: Indian Bend Wash @ Indian Bend Road
Project File : IBWexst.prj
Run Date and Time: 6/18/2004 10:05:38 AM

Project in English units

****

PLAN DATA

Plan Title: CBC 10-30'x10' Plan
Plan File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.p04

Geometry Title: Proposed (10x30'x10' CBC as Culvert)
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g16

Flow Title : Design Flow and 100-Year Flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Plan Summary Information:

Number of: Cross Sections	=	9	Mulitple Openings	=	0
Culverts	=	1	Inline Structures	=	0
Bridges	=	0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculaton tolerance = 0.01

```
    Maximum number of interations        =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*******************************************************************************

FLOW DATA

Flow Title: Design Flow and 100-Year Flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Flow Data (cfs)
*******************************************************************************
* River           Reach           RS      *           PF 1           PF 2 *
* Indian Bend WashIndian Bend Road17      *          30000          17000 *
*******************************************************************************

Boundary Conditions
*************************************************************************************************************
* River           Reach           Profile         *           Upstream                  Downstream    *
*************************************************************************************************************
* Indian Bend WashIndian Bend RoadPF 1            *                                Normal S = 0.0012 *
*************************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: Proposed (10x30'x10' CBC as Culvert)
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g16

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 17

INPUT
Description: Most U.S. X-Section, D.S. of East Channel
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
*****************************************************************************
       0    1290       25    1285       40    1282      388    1282      410    1284
     490    1285      510    1285      608    1284      730    1284      755    1284
     810    1284      832    1285      870    1285      898    1282     1090    1282
    1118    1284     1138    1285     1180    1287     1218    1290     1240    1290
    1245    1291     1270    1291     1278    1290     1305    1290     1385    1289
    1435    1286     1486    1286     1575    1286     1650    1285     1685    1285
    1700    1290

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
       0     .03        0     .03     1700     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0    1700                 470     430     315             .1       .3
Ineffective Flow      num=        1
   Sta L    Sta R     Elev  Permanent
    1245     1700     1292        F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************************
* E.G. Elev (ft)          * 1288.74  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.39  * Wt. n-Val.             *          *    0.030 *          *
* W.S. Elev (ft)          * 1288.35  * Reach Len. (ft)       *  470.00  *  430.00  *  315.00  *
* Crit W.S. (ft)          * 1285.96  * Flow Area (sq ft)     *          * 5958.68  *          *
* E.G. Slope (ft/ft)      *0.001206  * Area (sq ft)          *          * 6680.35  *          *
* Q Total (cfs)           *30000.00  * Flow (cfs)            *          *30000.00  *          *
* Top Width (ft)          * 1487.92  * Top Width (ft)        *          * 1487.92  *          *
* Vel Total (ft/s)        *    5.03  * Avg. Vel. (ft/s)      *          *    5.03  *          *
* Max Chl Dpth (ft)       *    6.35  * Hydr. Depth (ft)      *          *    5.01  *          *
* Conv. Total (cfs)       *863877.3  * Conv. (cfs)           *          *863877.3  *          *
* Length Wtd. (ft)        *  430.00  * Wetted Per. (ft)      *          * 1189.89  *          *
* Min Ch El (ft)          * 1282.00  * Shear (lb/sq ft)      *          *    0.38  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    1.90  *          *
* Frctn Loss (ft)         *    0.50  * Cum Volume (acre-ft)  *   11.59  *  170.86  *          *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)        *    1.12  *   28.46  *          *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************************
* E.G. Elev (ft)          * 1287.23  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.24  * Wt. n-Val.             *          *    0.030 *          *
* W.S. Elev (ft)          * 1286.99  * Reach Len. (ft)       *  470.00  *  430.00  *  315.00  *
```

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Crit W.S. (ft)	* 1285.05	* Flow Area (sq ft)	*	* 4361.70	*	*	
* E.G. Slope (ft/ft)	*0.001066	* Area (sq ft)	*	* 4695.54	*	*	
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	*	*	
* Top Width (ft)	* 1437.17	* Top Width (ft)	*	* 1437.17	*	*	
* Vel Total (ft/s)	* 3.90	* Avg. Vel. (ft/s)	*	* 3.90	*	*	
* Max Chl Dpth (ft)	* 4.99	* Hydr. Depth (ft)	*	* 3.74	*	*	
* Conv. Total (cfs)	*520705.0	* Conv. (cfs)	*	*520705.0	*	*	
* Length Wtd. (ft)	* 430.00	* Wetted Per. (ft)	*	* 1165.64	*	*	
* Min Ch El (ft)	* 1282.00	* Shear (lb/sq ft)	*	* 0.25	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.97	*	*	
* Frctn Loss (ft)	* 0.42	* Cum Volume (acre-ft)	*	10.21	*	120.83	* *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	1.04	*	26.47	* *

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.75

INPUT
Description: Flow Split by Golf Course Mounds
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1290	35	1285	50	1281	482	1281	500	1283
520	1284	525	1285	575	1289	590	1290	630	1290
670	1290	700	1291	732	1290	775	1285	805	1284
870	1283	925	1283	1015	1285	1025	1286	1050	1286.6
1065	1286	1080	1285	1110	1282	1220	1282	1265	1283
1300	1284	1400	1284	1490	1285	1530	1287	1580	1287
1610	1287	1635	1290	1675	1295	1720	1292	1770	1291.7
1818	1291	1822	1290	1852	1291	1878	1291	1892	1290
1930	1286	1962	1286	1995	1287	2005	1288	2020	1288
2045	1287	2075	1286	2105	1285	2140	1285	2155	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	2155	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	2155	627	30	120	.1 .3

Ineffective Flow num= 1

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Sta L	Sta R	Elev	Permanent
1675	2155	1296	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1288.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.030	
W.S. Elev (ft)	1287.89	Reach Len. (ft)	627.00	30.00	120.00
Crit W.S. (ft)	1285.31	Flow Area (sq ft)		6531.22	
E.G. Slope (ft/ft)	*0.001119	Area (sq ft)		6896.06	
Q Total (cfs)	*30000.00	Flow (cfs)		*30000.00	
Top Width (ft)	1631.63	Top Width (ft)		1631.63	
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)		4.59	
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)		4.62	
Conv. Total (cfs)	*896623.5	Conv. (cfs)		*896623.5	
Length Wtd. (ft)	200.08	Wetted Per. (ft)		1415.41	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		1.48	
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	11.59	103.85	
C & E Loss (ft)	0.12	Cum SA (acres)	1.12	13.06	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1286.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	1286.59	Reach Len. (ft)	627.00	30.00	120.00
Crit W.S. (ft)	1284.31	Flow Area (sq ft)		4758.43	
E.G. Slope (ft/ft)	*0.000906	Area (sq ft)		4882.55	
Q Total (cfs)	*17000.00	Flow (cfs)		*17000.00	
Top Width (ft)	1425.98	Top Width (ft)		1425.98	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57	
Max Chl Dpth (ft)	5.59	Hydr. Depth (ft)		3.71	
Conv. Total (cfs)	*564836.8	Conv. (cfs)		*564836.8	
Length Wtd. (ft)	258.31	Wetted Per. (ft)		1282.59	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.75	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	10.21	73.56	
C & E Loss (ft)	0.12	Cum SA (acres)	1.04	12.33	

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 16.5

INPUT
Description: Controlling Section U.S. of Existing Drop Structure
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
     400    1292     400  1271.5     469  1271.5     504    1283     509    1283
     525    1285     559    1290     578    1291     592    1291     605    1290
     631    1291     660    1291     666    1290     694    1286     706    1285
     728    1284     745    1283     750    1283    1009    1283    1045    1283
    1365    1283    1419    1284    1458    1285    1624    1289    1690    1290

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
     400     .03     559     .03    1690    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           559    1690              105     105     105             .6       .8
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
     400     400    1292        F
     907    1009    1286        F
    1400    1400    1292        F

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1287.74  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.57  * Wt. n-Val.             *   0.030  *   0.030  *          *
* W.S. Elev (ft)         * 1286.17  * Reach Len. (ft)        *  105.00  *  105.00  *  105.00  *
* Crit W.S. (ft)         * 1286.17  * Flow Area (sq ft)      * 1379.97  * 2295.31  *          *
* E.G. Slope (ft/ft)     *0.003235  * Area (sq ft)           * 1379.97  * 2295.31  *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)             *17092.97  *12907.03  *          *
* Top Width (ft)         *  946.83  * Top Width (ft)        *  132.97  *  813.86  *          *
```

* Vel Total (ft/s)	* 8.16	* Avg. Vel. (ft/s)	* 12.39	* 5.62	*
* Max Chl Dpth (ft)	* 14.67	* Hydr. Depth (ft)	* 10.38	* 2.82	*
* Conv. Total (cfs)	*527416.4	* Conv. (cfs)	*300503.8	*226912.6	*
* Length Wtd. (ft)	* 105.00	* Wetted Per. (ft)	* 149.70	* 814.00	*
* Min Ch El (ft)	* 1283.00	* Shear (lb/sq ft)	* 1.86	* 0.57	*
* Alpha	* 1.52	* Stream Power (lb/ft s)	* 23.06	* 3.20	*
* Frctn Loss (ft)	* 0.21	* Cum Volume (acre-ft)	* 1.66	* 100.68	*
* C & E Loss (ft)	* 0.28	* Cum SA (acres)	* 0.16	* 12.22	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1286.30	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.41	* Wt. n-Val.	* 0.030	* 0.030	* *
* W.S. Elev (ft)	* 1284.89	* Reach Len. (ft)	* 105.00	* 105.00	* 105.00 *
* Crit W.S. (ft)	* 1284.89	* Flow Area (sq ft)	* 1215.47	* 1104.08	* *
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	* 1215.47	* 1297.21	* *
* Q Total (cfs)	*17000.00	* Flow (cfs)	*13002.65	* 3997.35	* *
* Top Width (ft)	* 869.65	* Top Width (ft)	* 124.15	* 745.50	* *
* Vel Total (ft/s)	* 7.33	* Avg. Vel. (ft/s)	* 10.70	* 3.62	* *
* Max Chl Dpth (ft)	* 13.39	* Hydr. Depth (ft)	* 9.79	* 1.72	* *
* Conv. Total (cfs)	*333287.2	* Conv. (cfs)	*254918.6	* 78368.6	* *
* Length Wtd. (ft)	* 105.00	* Wetted Per. (ft)	* 139.50	* 643.57	* *
* Min Ch El (ft)	* 1283.00	* Shear (lb/sq ft)	* 1.42	* 0.28	* *
* Alpha	* 1.69	* Stream Power (lb/ft s)	* 15.14	* 1.01	* *
* Frctn Loss (ft)	* 0.21	* Cum Volume (acre-ft)	* 1.46	* 71.43	* *
* C & E Loss (ft)	* 0.45	* Cum SA (acres)	* 0.15	* 11.59	* *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

```
         This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there is
         not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 15

INPUT
Description: Upstream Face of Concrete Box
             Culvert
1286
50
1285
130
1284
280
1283
338
1282
345
1280

365
1275
375
1274
465
1272
660
1271
880
1271
910
1272

1100
1272
1186
1273
1232
1274
1235
```

```
1275
1250
1280
1268

            1281
1358
1283
1410
1284
1472
1285
1520
1286
1578
1287
1
            610
1290
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
     -85    1290     -10    1286      50    1285     130    1284     280    1283
     338    1282     345    1280     365    1275     375    1274     465    1272
     660  1271.5     880  1271.5     910    1272    1100    1272    1186    1273
    1232    1274    1235    1275    1250    1280    1268    1281    1358    1283
    1410    1284    1472    1285    1520    1286    1578    1287    1610    1290

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
     -85     .03     -85     .03    1610     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -85    1610                90      90      90             .6      .8
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     -85   646.5    1290        F
     969    1610    1290        F

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1283.35  * Element              *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.21  * Wt. n-Val.           *          *    0.030  *          *
* W.S. Elev (ft)         * 1282.14  * Reach Len. (ft)      *   90.00  *   90.00  *   90.00  *
* Crit W.S. (ft)         * 1278.09  * Flow Area (sq ft)    *          * 3392.87  *          *
* E.G. Slope (ft/ft)     *0.001382  * Area (sq ft)         *          * 8979.28  *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)           *          *30000.00  *          *
```

* Top Width (ft)	* 989.01	* Top Width (ft)	*	* 989.01	*	*
* Vel Total (ft/s)	* 8.84	* Avg. Vel. (ft/s)	*	* 8.84	*	*
* Max Chl Dpth (ft)	* 10.64	* Hydr. Depth (ft)	*	* 10.52	*	*
* Conv. Total (cfs)	*806856.0	* Conv. (cfs)	*	*806856.0	*	*
* Length Wtd. (ft)	* 90.00	* Wetted Per. (ft)	*	* 322.50	*	*
* Min Ch El (ft)	* 1271.50	* Shear (lb/sq ft)	*	* 0.91	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 8.03	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	* 87.09	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	* 10.05	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1279.62	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.84	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 1278.77	* Reach Len. (ft)	* 90.00	* 90.00	* 90.00	*
* Crit W.S. (ft)	* 1276.05	* Flow Area (sq ft)	*	* 2308.06	*	*
* E.G. Slope (ft/ft)	*0.001603	* Area (sq ft)	*	* 5873.38	*	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	*	*
* Top Width (ft)	* 896.41	* Top Width (ft)	*	* 896.41	*	*
* Vel Total (ft/s)	* 7.37	* Avg. Vel. (ft/s)	*	* 7.37	*	*
* Max Chl Dpth (ft)	* 7.27	* Hydr. Depth (ft)	*	* 7.16	*	*
* Conv. Total (cfs)	*424548.7	* Conv. (cfs)	*	*424548.7	*	*
* Length Wtd. (ft)	* 90.00	* Wetted Per. (ft)	*	* 322.50	*	*
* Min Ch El (ft)	* 1271.50	* Shear (lb/sq ft)	*	* 0.72	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 5.28	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	* 62.79	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	* 9.61	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CULVERT

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 14.25

INPUT
Description: 10-30'x8' box culverts
Distance from Upstream XS = 1
Deck/Roadway Width = 78
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-85	1284	1610	1284

Upstream Bridge Cross Section Data

Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-85	1290	-10	1286	50	1285	130	1284	280	1283
338	1282	345	1280	365	1275	375	1274	465	1272
660	1271.5	880	1271.5	910	1272	1100	1272	1186	1273
1232	1274	1235	1275	1250	1280	1268	1281	1358	1283
1410	1284	1472	1285	1520	1286	1578	1287	1610	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-85	.03	-85	.03	1610	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
-85	1610	.6	.8

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-85	646.5	1290	F
969	1610	1290	F

Downstream Deck/Roadway Coordinates

num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
552	1284	1010	1284

Downstream Bridge Cross Section Data

Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
552	1291	612	1271	950	1271	1010	1291

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
552	.03	552	.03	1010	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
552	1010	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
     552   616.5    1290       F
     939    1010    1290       F

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins           =    1284
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream     num=        2
    Sta     Elev      Sta     Elev
**********************************
   646.4  1279.5    646.5  1271.5
Downstream     num=        2
     Sta     Elev      Sta     Elev
**********************************
   616.5     1271    616.6     1279

Abutment Data
Upstream     num=        2
     Sta     Elev      Sta     Elev
**********************************
   938.9  1279.5      939  1271.5
Downstream     num=        2
     Sta     Elev      Sta     Elev
**********************************
     909     1271    909.1     1279

Number of Culverts =  1

Culvert Name      Shape       Rise     Span
Culvert #1            Box       10       30
FHWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
FHWA Scale # 1 - Inlet edges chamfered 3/4 inch
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length     Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit Loss Coef
                  2      78      .012      .013         0                    .5                  1
Number of Barrels =  10
Upstream   Elevation =  1271.5
Centerline Stations
    Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.
   661.5   694.25   726.25      759    791.5      824   856.25      889    921.5      954
Downstream Elevation =  1271
```

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
631.5	664.25	696.25	729	761.5	794	826.25	859	891.5	924

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (cfs)	*30000.00	Culv Full Len (ft)	
# Barrels	10	Culv Vel US (ft/s)	14.77
Q Barrel (cfs)	3000.00	Culv Vel DS (ft/s)	12.63
E.G. US. (ft)	1283.35	Culv Inv El Up (ft)	1271.50
W.S. US. (ft)	1282.14	Culv Inv El Dn (ft)	1271.00
E.G. DS (ft)	1281.06	Culv Frctn Ls (ft)	0.26
W.S. DS (ft)	1278.92	Culv Exit Loss (ft)	0.33
Delta EG (ft)	2.29	Culv Entr Loss (ft)	1.69
Delta WS (ft)	3.22	Q Weir (cfs)	
E.G. IC (ft)	1282.60	Weir Sta Lft (ft)	
E.G. OC (ft)	1283.35	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1278.27	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1278.92	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.63	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	6.77	Min El Weir Flow (ft)	1284.01

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (cfs)	*17000.00	Culv Full Len (ft)	
# Barrels	10	Culv Vel US (ft/s)	12.22
Q Barrel (cfs)	1700.00	Culv Vel DS (ft/s)	9.57
E.G. US. (ft)	1279.62	Culv Inv El Up (ft)	1271.50
W.S. US. (ft)	1278.77	Culv Inv El Dn (ft)	1271.00
E.G. DS (ft)	1278.15	Culv Frctn Ls (ft)	0.11
W.S. DS (ft)	1276.92	Culv Exit Loss (ft)	0.19
Delta EG (ft)	1.46	Culv Entr Loss (ft)	1.16
Delta WS (ft)	1.85	Q Weir (cfs)	
E.G. IC (ft)	1279.10	Weir Sta Lft (ft)	
E.G. OC (ft)	1279.62	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1276.14	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1276.92	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.20	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.64	Min El Weir Flow (ft)	1284.01

CROSS SECTION

RIVER: Indian Bend Wash

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

REACH: Indian Bend Road RS: 13.5

INPUT
Description: Downstream Face of Concrete Box Culvert
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
552	1291	612	1271	950	1271	1010	1291

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
552	.03	552	.03	1010	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
552	1010	70	140	235	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
552	616.5	1290	F
939	1010	1290	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1281.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.92	Reach Len. (ft)	70.00	140.00	235.00
Crit W.S. (ft)	1277.47	Flow Area (sq ft)		2552.72	
E.G. Slope (ft/ft)	0.003569	Area (sq ft)		2863.37	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	385.49	Top Width (ft)		385.49	
Vel Total (ft/s)	11.75	Avg. Vel. (ft/s)		11.75	
Max Chl Dpth (ft)	7.92	Hydr. Depth (ft)		7.92	
Conv. Total (cfs)	502179.4	Conv. (cfs)		502179.4	
Length Wtd. (ft)	140.00	Wetted Per. (ft)		322.50	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		1.76	
Alpha	1.00	Stream Power (lb/ft s)		20.73	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)		74.86	
C & E Loss (ft)	0.01	Cum SA (acres)		8.63	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1278.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.23	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.92	Reach Len. (ft)	70.00	140.00	235.00

* Crit W.S. (ft)	* 1275.42	* Flow Area (sq ft)	*	* 1909.10	*	*
* E.G. Slope (ft/ft)	*0.003018	* Area (sq ft)	*	* 2105.98	*	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	*	*
* Top Width (ft)	* 373.52	* Top Width (ft)	*	* 373.52	*	*
* Vel Total (ft/s)	* 8.90	* Avg. Vel. (ft/s)	*	* 8.90	*	*
* Max Chl Dpth (ft)	* 5.92	* Hydr. Depth (ft)	*	* 5.92	*	*
* Conv. Total (cfs)	*309433.3	* Conv. (cfs)	*	*309433.3	*	*
* Length Wtd. (ft)	* 140.00	* Wetted Per. (ft)	*	* 322.50	*	*
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 1.12	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 9.93	*	*
* Frctn Loss (ft)	* 0.55	* Cum Volume (acre-ft)	*	* 54.54	*	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	* 8.30	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13

INPUT
Description: Narrow Point of Indian Bend Wash Inlet Channel
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-34.5	1294	30.5	1293	119.5	1291	158.5	1290	173.5	1285
185.5	1280	198.5	1275	207.5	1271	280	1271	425	1271
485	1271	530	1271	545	1275	565	1280	583	1285
602	1290								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-34.5	.03	158.5	.03	602	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
158.5	602	130	130	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1280.48	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.24	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1278.24	* Reach Len. (ft)	* 130.00	* 130.00	* 130.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 2495.07	* *
* E.G. Slope (ft/ft)	*0.004630	* Area (sq ft)	*	* 2495.07	* *

* Q Total (cfs)	*30000.00	* Flow (cfs)	*	*30000.00	*	*	
* Top Width (ft)	* 367.88	* Top Width (ft)	*	* 367.88	*	*	
* Vel Total (ft/s)	* 12.02	* Avg. Vel. (ft/s)	*	* 12.02	*	*	
* Max Chl Dpth (ft)	* 7.24	* Hydr. Depth (ft)	*	* 6.78	*	*	
* Conv. Total (cfs)	*440907.1	* Conv. (cfs)	*	*440907.1	*	*	
* Length Wtd. (ft)	* 130.00	* Wetted Per. (ft)	*	* 370.25	*	*	
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 1.95	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 23.42	*	*	
* Frctn Loss (ft)	* 0.24	* Cum Volume (acre-ft)	*	* 66.25	*	*	
* C & E Loss (ft)	* 0.43	* Cum SA (acres)	*	* 7.42	*	*	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1277.57	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.58	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 1275.99	* Reach Len. (ft)	* 130.00	* 130.00	* 130.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 1683.45	*	*
* E.G. Slope (ft/ft)	*0.005211	* Area (sq ft)	*	* 1683.45	*	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	*	*
* Top Width (ft)	* 353.02	* Top Width (ft)	*	* 353.02	*	*
* Vel Total (ft/s)	* 10.10	* Avg. Vel. (ft/s)	*	* 10.10	*	*
* Max Chl Dpth (ft)	* 4.99	* Hydr. Depth (ft)	*	* 4.77	*	*
* Conv. Total (cfs)	*235487.7	* Conv. (cfs)	*	*235487.7	*	*
* Length Wtd. (ft)	* 130.00	* Wetted Per. (ft)	*	* 354.70	*	*
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 1.54	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 15.59	*	*
* Frctn Loss (ft)	* 0.20	* Cum Volume (acre-ft)	*	* 48.45	*	*
* C & E Loss (ft)	* 0.34	* Cum SA (acres)	*	* 7.13	*	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 12

INPUT

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Description: Expanding Indian Bend Wash Inlet Channel, Reconstruct Lt Bank

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-32	1289	-14	1285	6	1280	27	1275	38	1272
48	1271	185	1270	225	1266	392	1266	402	1270
415	1275	440	1280	465	1285	490	1290		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-32	.03	-32	.03	490	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-32	490	175	175	175	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1279.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.030	
W.S. Elev (ft)	1279.01	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		4182.16	
E.G. Slope (ft/ft)	0.001004	Area (sq ft)		4182.16	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	424.87	Top Width (ft)		424.87	
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)		7.17	
Max Chl Dpth (ft)	13.01	Hydr. Depth (ft)		9.84	
Conv. Total (cfs)	946644.4	Conv. (cfs)		946644.4	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		428.09	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)		4.39	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		56.28	
C & E Loss (ft)	0.09	Cum SA (acres)		6.23	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1277.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.58	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		3177.52	
E.G. Slope (ft/ft)	0.000749	Area (sq ft)		3177.52	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	402.52	Top Width (ft)		402.52	
Vel Total (ft/s)	5.35	Avg. Vel. (ft/s)		5.35	
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)		7.89	
Conv. Total (cfs)	621192.6	Conv. (cfs)		621192.6	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		405.22	

* Min Ch El (ft)	* 1266.00	* Shear (lb/sq ft)	*	*	0.37	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	1.96	*	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	*	*	41.20	*	*
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	*	*	6.00	*	*

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 11

INPUT
Description: Expanding Indian Bend Wash Inlet Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1285	18	1280	40	1275	57	1274	75	1273
98	1272	112	1271	121	1270	140	1266	409	1266
422	1270	431	1272	460	1273	560	1274	565	1275
580	1280	600	1284	612	1285				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	612	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	612	335	335	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1279.58	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.50	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1279.08	* Reach Len. (ft)	* 335.00	* 335.00	* 335.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 5290.37	* *
* E.G. Slope (ft/ft)	*0.000653	* Area (sq ft)	*	* 5290.37	* *
* Q Total (cfs)	*30000.00	* Flow (cfs)	*	*30000.00	* *
* Top Width (ft)	* 555.17	* Top Width (ft)	*	* 555.17	* *
* Vel Total (ft/s)	* 5.67	* Avg. Vel. (ft/s)	*	* 5.67	* *
* Max Chl Dpth (ft)	* 13.08	* Hydr. Depth (ft)	*	* 9.53	* *
* Conv. Total (cfs)	*1174060.0	* Conv. (cfs)	*	*1174060.0	* *
* Length Wtd. (ft)	* 335.00	* Wetted Per. (ft)	*	* 557.82	* *
* Min Ch El (ft)	* 1266.00	* Shear (lb/sq ft)	*	* 0.39	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.19	* *
* Frctn Loss (ft)	* 0.29	* Cum Volume (acre-ft)	*	* 37.26	* *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	* 4.26	* *

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1276.87	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.29	Wt. n-Val.		0.030		
W.S. Elev (ft)	1276.58	Reach Len. (ft)	335.00	335.00	335.00	
Crit W.S. (ft)		Flow Area (sq ft)		3924.66		
E.G. Slope (ft/ft)	0.000541	Area (sq ft)		3924.66		
Q Total (cfs)	17000.00	Flow (cfs)		17000.00		
Top Width (ft)	536.66	Top Width (ft)		536.66		
Vel Total (ft/s)	4.33	Avg. Vel. (ft/s)		4.33		
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)		7.31		
Conv. Total (cfs)	730617.4	Conv. (cfs)		730617.4		
Length Wtd. (ft)	335.00	Wetted Per. (ft)		538.62		
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.25		
Alpha	1.00	Stream Power (lb/ft s)		1.07		
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)		26.93		
C & E Loss (ft)	0.02	Cum SA (acres)		4.11		

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 10

INPUT
Description: Most D.S. X-Section, U.S. of East Interceptor Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1283.7	12	1283	25	1280	48	1275	67	1272
145	1271	205	1270	245	1269	295	1268	355	1269
432	1270	495	1271	557	1271	560	1272	572	1275
591	1280	610	1285	625	1286.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	625	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	625	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

			Left OB	Channel	Right OB
E.G. Elev (ft)	1279.26	Element			
Vel Head (ft)	0.72	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.54	Reach Len. (ft)			
Crit W.S. (ft)	1274.91	Flow Area (sq ft)		4398.49	
E.G. Slope (ft/ft)	0.001201	Area (sq ft)		4398.49	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	553.75	Top Width (ft)		553.75	
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)		6.82	
Max Chl Dpth (ft)	10.54	Hydr. Depth (ft)		7.94	
Conv. Total (cfs)	865569.4	Conv. (cfs)		865569.4	
Length Wtd. (ft)		Wetted Per. (ft)		555.42	
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		4.05	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1276.59	Element			
Vel Head (ft)	0.47	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.12	Reach Len. (ft)			
Crit W.S. (ft)	1273.37	Flow Area (sq ft)		3079.74	
E.G. Slope (ft/ft)	0.001202	Area (sq ft)		3079.74	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	533.37	Top Width (ft)		533.37	
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)		5.52	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)		5.77	
Conv. Total (cfs)	490289.4	Conv. (cfs)		490289.4	
Length Wtd. (ft)		Wetted Per. (ft)		534.46	
Min Ch El (ft)	1268.00	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		2.39	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Indian Bend Wash

Reach	River Sta.	n1	n2	n3
Indian Bend Road	17	.03	.03	.03
Indian Bend Road	16.75	.03	.03	.03
Indian Bend Road	16.5	.03	.03	.018

Indian Bend Wash
New 10-30'x10' Concrete Box Culvert
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Indian Bend Road	15	*	.03*	.03*	.03*
Indian Bend Road	14.25	*Culvert	*	*	*
Indian Bend Road	13.5	*	.03*	.03*	.03*
Indian Bend Road	13	*	.03*	.03*	.03*
Indian Bend Road	12	*	.03*	.03*	.03*
Indian Bend Road	11	*	.03*	.03*	.03*
Indian Bend Road	10	*	.03*	.03*	.03*

SUMMARY OF REACH LENGTHS

River: Indian Bend Wash

Reach	River Sta.	Left	Channel	Right
Indian Bend Road	17	470*	430*	315*
Indian Bend Road	16.75	627*	30*	120*
Indian Bend Road	16.5	105*	105*	105*
Indian Bend Road	15	90*	90*	90*
Indian Bend Road	14.25	*Culvert	*	*	*
Indian Bend Road	13.5	70*	140*	235*
Indian Bend Road	13	130*	130*	130*
Indian Bend Road	12	175*	175*	175*
Indian Bend Road	11	335*	335*	335*
Indian Bend Road	10	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Indian Bend Wash

Reach	River Sta.	Contr.	Expan.
Indian Bend Road	17	.1*	.3*
Indian Bend Road	16.75	.1*	.3*
Indian Bend Road	16.5	.6*	.8*
Indian Bend Road	15	.6*	.8*
Indian Bend Road	14.25	*Culvert	*	*
Indian Bend Road	13.5	.1*	.3*
Indian Bend Road	13	.1*	.3*
Indian Bend Road	12	.1*	.3*
Indian Bend Road	11	.1*	.3*
Indian Bend Road	10	.1*	.3*

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : CBC 10-30x10

River: Indian Bend Wash  Reach: Indian Bend Road     RS: 17     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 17     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.75     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.75     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.5     Profile: PF 1
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.5     Profile: PF 2
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
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Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13.5 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13.5 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 2
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Wash Reach: Indian Bend Road RS: 11 Profile: PF 2
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Table 1
Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road

Reach	River Sta	Profile	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)	
Indian Bend Road	17	PF 1	30000	1282	1289.69	1285.96	1289.94	0.000556	3.96	7576.19	1582.12	0.28
Indian Bend Road	17	PF 2	17000	1282	1288	1285.05	1288.14	0.000489	3.07	5545.59	1474.91	0.25
Indian Bend Road	16.75	PF 1	30000	1281	1289.53	1285.3	1289.71	0.000422	3.37	8899.09	1731.97	0.24
Indian Bend Road	16.75	PF 2	17000	1281	1287.84	1284.31	1287.95	0.000372	2.63	6459.47	1627.37	0.22
Indian Bend Road	16.5	PF 1	30000	1283	1286.76	1286.76	1288.58	0.00137	4.07	4184.92	979.4	0.39
Indian Bend Road	16.5	PF 2	17000	1283	1285.13	1285.13	1286.83	0.001145	2.59	2448.86	885.1	0.33
Indian Bend Road	15 Upstream Face of CBC	PF 1	30000	1271.5	1281.75	1277.82	1282.9	0.00138	8.61	3483.96	962.97	0.48
Indian Bend Road	15 Upstream Face of CBC	PF 2	17000	1271.5	1278.14	1275.87	1279.04	0.001926	7.58	2241.9	891.99	0.52
Indian Bend Road	14.25		Culvert									
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	30000	1271	1279.3		1280.79	0.002564	9.8	3062.02	393.85	0.62
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	17000	1271	1276.97		1277.93	0.002499	7.87	2161.4	379.88	0.58
Indian Bend Road	13	PF 1	30000	1271	1278.42		1280.32	0.00377	11.05	2715.22	389.64	0.74
Indian Bend Road	13	PF 2	17000	1271	1276.1		1277.45	0.00427	9.29	1829.45	374.34	0.74
Indian Bend Road	12	PF 1	30000	1266	1279.08		1279.76	0.000808	6.58	4562.01	448.61	0.36
Indian Bend Road	12	PF 2	17000	1266	1276.62		1276.99	0.000593	4.88	3484.77	425.95	0.3
Indian Bend Road	11	PF 1	30000	1266	1279.08		1279.58	0.000653	5.67	5290.37	555.17	0.32
Indian Bend Road	11	PF 2	17000	1266	1276.58		1276.87	0.000541	4.33	3924.66	536.66	0.28
Indian Bend Road	10	PF 1	30000	1268	1278.54	1274.91	1279.26	0.001201	6.82	4398.49	553.75	0.43
Indian Bend Road	10	PF 2	17000	1268	1276.12	1273.38	1276.59	0.001202	5.52	3079.74	533.37	0.4

Table 2
Indian Bend Wash
New 8-42'x10'-4" CBC
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road											
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Indian Bend Road	17	PF 1	1289.94	1289.69	0.24	0.21	0.02		30000		1582.12
Indian Bend Road	17	PF 2	1288.14	1288	0.15	0.18	0.01		17000		1474.91
Indian Bend Road	16.75	PF 1	1289.71	1289.53	0.18	0.15	0.98		30000		1731.97
Indian Bend Road	16.75	PF 2	1287.95	1287.84	0.11	0.16	0.95		17000		1627.37
Indian Bend Road	16.5	PF 1	1288.58	1286.76	1.81	0.14	0.53	18683.47	11316.53		979.4
Indian Bend Road	16.5	PF 2	1286.83	1285.13	1.7	0.15	0.64	13737.14	3262.86		885.1
Indian Bend Road	15 Upstream Face of CBC	PF 1	1282.9	1281.75	1.15				30000		962.97
Indian Bend Road	15 Upstream Face of CBC	PF 2	1279.04	1278.14	0.89				17000		891.99
Indian Bend Road	14.25		Culvert								
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	1280.79	1279.3	1.49	0.43	0.04		30000		393.85
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	1277.93	1276.97	0.96	0.45	0.04		17000		379.88
Indian Bend Road	13	PF 1	1280.32	1278.42	1.9	0.2	0.37		30000		389.64
Indian Bend Road	13	PF 2	1277.45	1276.1	1.34	0.16	0.29		17000		374.34
Indian Bend Road	12	PF 1	1279.76	1279.08	0.67	0.13	0.05		30000		448.61
Indian Bend Road	12	PF 2	1276.99	1276.62	0.37	0.1	0.02		17000		425.95
Indian Bend Road	11	PF 1	1279.58	1279.08	0.5	0.29	0.02		30000		555.17
Indian Bend Road	11	PF 2	1276.87	1276.58	0.29	0.26	0.02		17000		536.66
Indian Bend Road	10	PF 1	1279.26	1278.54	0.72				30000		553.75
Indian Bend Road	10	PF 2	1276.59	1276.12	0.47				17000		533.37

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
                    HEC-RAS Version 3.1.1 May 2003
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                      609 Second Street, Suite D
                      Davis, California 95616-4687
                             (916) 756-1104


          X     X  XXXXXX    XXXX         XXXX        XX       XXXX
          X     X  X        X    X       X   X      X  X     X
          X     X  X        X            X   X     X    X    X
          XXXXXXX  XXXX     X       XXX  XXXX      XXXXXX     XXXX
          X     X  X        X            X  X      X    X         X
          X     X  X        X    X       X   X     X    X         X
          X     X  XXXXXX    XXXX        X    X    X    X    XXXXX

*******************************************************************************

PROJECT DATA
Project Title: Indian Bend Wash @ Indian Bend Road
Project File : IBWexst.prj
Run Date and Time: 6/18/2004 9:39:19 AM

Project in English units

*******************************************************************************

PLAN DATA

Plan Title: Conarch 8-42'x10'-4" Plan
Plan File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.p69

          Geometry Title: Proposed (8x42'x10'-4" Conarch as Culvert)
          Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g14

          Flow Title    : Design Flow and 100-Year Flow
          Flow File     : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Plan Summary Information:
Number of:  Cross Sections =    9    Mulitple Openings  =    0
            Culverts       =    1    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
```

```
    Maximum number of interations        =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*******************************************************************************

FLOW DATA

Flow Title: Design Flow and 100-Year Flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Flow Data (cfs)
*******************************************************************************
* River           Reach           RS      *           PF 1           PF 2 *
* Indian Bend WashIndian Bend Road17      *          30000          17000 *
*******************************************************************************

Boundary Conditions
*************************************************************************************************************
* River           Reach           Profile         *           Upstream                 Downstream    *
*************************************************************************************************************
* Indian Bend WashIndian Bend RoadPF 1            *                                Normal S = 0.0012 *
*************************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: Proposed (8x42'x10'-4" Conarch as Culvert)
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g14

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 17

INPUT
Description: Most U.S. X-Section, D.S. of East Channel
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
**********************************************************************************
       0    1290       25    1285       40    1282      388    1282      410    1284
     490    1285      510    1285      608    1284      730    1284      755    1284
     810    1284      832    1285      870    1285      898    1282     1090    1282
    1118    1284     1138    1285     1180    1287     1218    1290     1240    1290
    1245    1291     1270    1291     1278    1290     1305    1290     1385    1289
    1435    1286     1486    1286     1575    1286     1650    1285     1685    1285
    1700    1290

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
       0     .03        0     .03     1700     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
            0    1700                 470     430     315              .1        .3
Ineffective Flow      num=        2
   Sta L   Sta R     Elev  Permanent
       0       0     1290          F
    1245    1700     1292          F

CROSS SECTION OUTPUT  Profile #PF 1
**********************************************************************************************
* E.G. Elev (ft)         * 1289.94  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.24  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 1289.69  * Reach Len. (ft)       *  470.00  *  430.00  *  315.00  *
* Crit W.S. (ft)         * 1285.96  * Flow Area (sq ft)     *          * 7576.19  *          *
* E.G. Slope (ft/ft)     *0.000556  * Area (sq ft)          *          * 8733.93  *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *          *30000.00  *          *
* Top Width (ft)         * 1582.12  * Top Width (ft)       *          * 1582.12  *          *
* Vel Total (ft/s)       *    3.96  * Avg. Vel. (ft/s)     *          *    3.96  *          *
* Max Chl Dpth (ft)      *    7.69  * Hydr. Depth (ft)     *          *    6.25  *          *
* Conv. Total (cfs)      *1272065.0  * Conv. (cfs)          *          *1272065.0  *          *
* Length Wtd. (ft)       *  430.00  * Wetted Per. (ft)     *          * 1213.88  *          *
* Min Ch El (ft)         * 1282.00  * Shear (lb/sq ft)     *          *    0.22  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    0.86  *          *
* Frctn Loss (ft)        *    0.21  * Cum Volume (acre-ft)  *   11.78  *  198.08  *          *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)        *    1.15  *   29.61  *          *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
**********************************************************************************************
* E.G. Elev (ft)         * 1288.14  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.15  * Wt. n-Val.             *          *    0.030  *          *
```

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

W.S. Elev (ft)	1288.00	Reach Len. (ft)	470.00	430.00	315.00
Crit W.S. (ft)	1285.05	Flow Area (sq ft)		5545.59	
E.G. Slope (ft/ft)	0.000489	Area (sq ft)		6164.25	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	1474.91	Top Width (ft)		1474.91	
Vel Total (ft/s)	3.07	Avg. Vel. (ft/s)		3.07	
Max Chl Dpth (ft)	6.00	Hydr. Depth (ft)		4.69	
Conv. Total (cfs)	769063.3	Conv. (cfs)		769063.3	
Length Wtd. (ft)	430.00	Wetted Per. (ft)		1183.69	
Min Ch El (ft)	1282.00	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)		0.44	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	9.98	138.97	
C & E Loss (ft)	0.01	Cum SA (acres)	1.06	27.89	

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.75

INPUT
Description: Flow Split by Golf Course Mounds
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1290	35	1285	50	1281	482	1281	500	1283
520	1284	525	1285	575	1289	590	1290	630	1290
670	1290	700	1291	732	1290	775	1285	805	1284
870	1283	925	1283	1015	1285	1025	1286	1050	1286.6
1065	1286	1080	1285	1110	1282	1220	1282	1265	1283
1300	1284	1400	1284	1490	1285	1530	1287	1580	1287
1610	1287	1635	1290	1675	1295	1720	1292	1770	1291.7
1818	1291	1822	1290	1852	1291	1878	1291	1892	1290
1930	1286	1962	1286	1995	1287	2005	1288	2020	1288
2045	1287	2075	1286	2105	1285	2140	1285	2155	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	2155	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	2155	627	30	120	.6	.8

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	0	1290	F
1675	2155	1296	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1289.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.030	
W.S. Elev (ft)	1289.53	Reach Len. (ft)	627.00	30.00	120.00
Crit W.S. (ft)	1285.30	Flow Area (sq ft)		8899.09	
E.G. Slope (ft/ft)	*0.000422	Area (sq ft)		9667.06	
Q Total (cfs)	*30000.00	Flow (cfs)		*30000.00	
Top Width (ft)	1731.97	Top Width (ft)		1731.97	
Vel Total (ft/s)	3.37	Avg. Vel. (ft/s)		3.37	
Max Chl Dpth (ft)	8.53	Hydr. Depth (ft)		6.03	
Conv. Total (cfs)	*1459567.0	Conv. (cfs)		*1459567.0	
Length Wtd. (ft)	215.90	Wetted Per. (ft)		1476.86	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.54	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	11.78	107.26	
C & E Loss (ft)	0.98	Cum SA (acres)	1.15	13.25	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1287.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.030	
W.S. Elev (ft)	1287.84	Reach Len. (ft)	627.00	30.00	120.00
Crit W.S. (ft)	1284.31	Flow Area (sq ft)		6459.47	
E.G. Slope (ft/ft)	*0.000372	Area (sq ft)		6813.31	
Q Total (cfs)	*17000.00	Flow (cfs)		*17000.00	
Top Width (ft)	1627.37	Top Width (ft)		1627.37	
Vel Total (ft/s)	2.63	Avg. Vel. (ft/s)		2.63	
Max Chl Dpth (ft)	6.84	Hydr. Depth (ft)		4.58	
Conv. Total (cfs)	*881041.1	Conv. (cfs)		*881041.1	
Length Wtd. (ft)	271.21	Wetted Per. (ft)		1413.54	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.11	

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	0.28	*		*
* Frctn Loss (ft)	*	0.16	* Cum Volume (acre-ft)	*	9.98	*	74.92	*		*
* C & E Loss (ft)	*	0.95	* Cum SA (acres)	*	1.06	*	12.58	*		*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.5

INPUT
Description: Controlling Section U.S. of Existing Drop Structure
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
380	1292	380	1271.5	439	1271.5	484	1283	489	1283
505	1285	539	1290	578	1291	592	1291	605	1290
631	1291	660	1291	666	1290	694	1286	706	1285
728	1284	745	1283	750	1283	1009	1283	1045	1283
1365	1283	1419	1284	1458	1285	1624	1289	1690	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
380	.018	539	.03	1690	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
539	1690	105	105	105	.6 .8

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
380	380	1292	F
907	1009	1286	F
1400	1400	1292	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1288.58	* Element	* Left OB	* Channel	* Right OB *

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Vel Head (ft)	* 1.81	* Wt. n-Val.	* 0.018	* 0.030	*	*		
* W.S. Elev (ft)	* 1286.76	* Reach Len. (ft)	* 105.00	* 105.00	* 105.00	*		
* Crit W.S. (ft)	* 1286.76	* Flow Area (sq ft)	* 1401.95	* 2782.97	*	*		
* E.G. Slope (ft/ft)	*0.001370	* Area (sq ft)	* 1401.95	* 2782.97	*	*		
* Q Total (cfs)	*30000.00	* Flow (cfs)	*18683.47	*11316.53	*	*		
* Top Width (ft)	* 979.40	* Top Width (ft)	* 136.98	* 842.42	*	*		
* Vel Total (ft/s)	* 7.17	* Avg. Vel. (ft/s)	* 13.33	* 4.07	*	*		
* Max Chl Dpth (ft)	* 15.26	* Hydr. Depth (ft)	* 10.23	* 3.30	*	*		
* Conv. Total (cfs)	*810423.3	* Conv. (cfs)	*504717.3	*305706.1	*	*		
* Length Wtd. (ft)	* 105.00	* Wetted Per. (ft)	* 153.94	* 842.61	*	*		
* Min Ch El (ft)	* 1283.00	* Shear (lb/sq ft)	* 0.78	* 0.28	*	*		
* Alpha	* 2.27	* Stream Power (lb/ft s)	* 10.38	* 1.15	*	*		
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 1.69	* 102.97	*	*		
* C & E Loss (ft)	* 0.53	* Cum SA (acres)	* 0.17	* 12.37	*	*		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1286.83	* Element	* Left OB	* Channel	* Right OB	*		
* Vel Head (ft)	* 1.70	* Wt. n-Val.	* 0.018	* 0.030	*	*		
* W.S. Elev (ft)	* 1285.13	* Reach Len. (ft)	* 105.00	* 105.00	* 105.00	*		
* Crit W.S. (ft)	* 1285.13	* Flow Area (sq ft)	* 1188.10	* 1260.76	*	*		
* E.G. Slope (ft/ft)	*0.001145	* Area (sq ft)	* 1188.10	* 1478.46	*	*		
* Q Total (cfs)	*17000.00	* Flow (cfs)	*13737.14	* 3262.86	*	*		
* Top Width (ft)	* 885.10	* Top Width (ft)	* 125.91	* 759.18	*	*		
* Vel Total (ft/s)	* 6.94	* Avg. Vel. (ft/s)	* 11.56	* 2.59	*	*		
* Max Chl Dpth (ft)	* 13.63	* Hydr. Depth (ft)	* 9.44	* 1.92	*	*		
* Conv. Total (cfs)	*502287.6	* Conv. (cfs)	*405882.1	* 96405.5	*	*		
* Length Wtd. (ft)	* 105.00	* Wetted Per. (ft)	* 141.13	* 657.27	*	*		
* Min Ch El (ft)	* 1283.00	* Shear (lb/sq ft)	* 0.60	* 0.14	*	*		
* Alpha	* 2.27	* Stream Power (lb/ft s)	* 6.96	* 0.36	*	*		
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 1.43	* 72.06	*	*		
* C & E Loss (ft)	* 0.64	* Cum SA (acres)	* 0.15	* 11.76	*	*		

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 15

INPUT
Description: Upstream Face of
ConArch
1286
50
1285
130
1284
280
1283
338
1282
345
1280

365
1275
375
1274
465
1272
660
1271
880
1271
910
1272

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
1100
1272
1186
1273
1232
1274
1235
1275
1250
1280
1268

          1281
1358
1283
1410
1284
1472
1285
1520
1286
1578
1287
1
          610
1290
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
     -85    1290     -10    1286      50    1285     130    1284     280    1283
     338    1282     345    1280     365    1275     375    1274     465    1272
     660  1271.5     880  1271.5 910.001    1272    1100    1272    1186    1273
    1232    1274    1235    1275    1250    1280    1268    1281    1358    1283
    1410    1284    1472    1285    1520    1286    1578    1287    1610    1290

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
     -85     .03     -85     .03    1610     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -85    1610                90      90      90             .3      .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     -85 635.949    1290        F
 980.001    1610    1290        F

CROSS SECTION OUTPUT  Profile #PF 1
```

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

E.G. Elev (ft)	1282.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.15	Wt. n-Val.		0.030	
W.S. Elev (ft)	1281.75	Reach Len. (ft)	90.00	90.00	90.00
Crit W.S. (ft)	1277.82	Flow Area (sq ft)		3483.96	
E.G. Slope (ft/ft)	0.001380	Area (sq ft)		8605.40	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	962.97	Top Width (ft)		962.97	
Vel Total (ft/s)	8.61	Avg. Vel. (ft/s)		8.61	
Max Chl Dpth (ft)	10.25	Hydr. Depth (ft)		10.13	
Conv. Total (cfs)	807687.9	Conv. (cfs)		807687.9	
Length Wtd. (ft)	90.00	Wetted Per. (ft)		344.06	
Min Ch El (ft)	1271.50	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)		7.51	
Frctn Loss (ft)		Cum Volume (acre-ft)		89.24	
C & E Loss (ft)		Cum SA (acres)		10.19	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1279.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.14	Reach Len. (ft)	90.00	90.00	90.00
Crit W.S. (ft)	1275.87	Flow Area (sq ft)		2241.90	
E.G. Slope (ft/ft)	0.001926	Area (sq ft)		5309.71	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	891.99	Top Width (ft)		891.99	
Vel Total (ft/s)	7.58	Avg. Vel. (ft/s)		7.58	
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		6.52	
Conv. Total (cfs)	387389.3	Conv. (cfs)		387389.3	
Length Wtd. (ft)	90.00	Wetted Per. (ft)		344.06	
Min Ch El (ft)	1271.50	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		5.94	
Frctn Loss (ft)		Cum Volume (acre-ft)		63.88	
C & E Loss (ft)		Cum SA (acres)		9.77	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CULVERT

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 14.25

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
INPUT
Description:
Distance from Upstream XS =        1
Deck/Roadway Width        =       78
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
**************************************************
     -85 1283.83             1610 1283.83

Upstream Bridge Cross Section Data
Station Elevation Data     num=       25
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************************
     -85     1290      -10     1286       50     1285      130     1284      280     1283
     338     1282      345     1280      365     1275      375     1274      465     1272
     660   1271.5      880   1271.5  910.001     1272     1100     1272     1186     1273
    1232     1274     1235     1275     1250     1280     1268     1281     1358     1283
    1410     1284     1472     1285     1520     1286     1578     1287     1610     1290

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
***********************************************
     -85      .03      -85      .03     1610      .03

Bank Sta: Left    Right     Coeff Contr.    Expan.
            -85     1610              .3        .3
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
     -85  635.949     1290        F
 980.001     1610     1290        F

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
**************************************************
     552 1283.83             1010 1283.83

Downstream Bridge Cross Section Data
Station Elevation Data     num=       4
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*************************************************************************
  545.95     1291   605.95     1271      950     1271     1010     1291

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
```

```
*************************************************
  545.95      .03  545.95      .03    1010      .03

Bank Sta: Left    Right     Coeff Contr.    Expan.
        545.95     1010             .1        .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 1283.83
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape       Rise     Span
Culvert #1  Conspan Arch 10.3333       42
FHWA Chart # 61- Span/Rise ratio approximate 4:1
FHWA Scale # 3 - 90 degree wing wall angle
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit Loss Coef
                  1      78     .012      .013        0                  .5                 1
Number of Barrels =  8
Upstream   Elevation =  1271.5
Centerline Stations
    Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.
 656.951    700.1   743.25    786.4   829.55    872.7   915.85      959
Downstream Elevation =  1271
Centerline Stations
    Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.     Sta.
 626.951    670.1   713.25    756.4   799.55    842.7   885.85      929

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1
*********************************************************************
* Q Culv Group (cfs)      *30000.00  * Culv Full Len (ft)     *         *
* # Barrels               *       8  * Culv Vel US (ft/s)     *   12.74  *
* Q Barrel (cfs)          * 3750.00  * Culv Vel DS (ft/s)     *   11.99  *
* E.G. US. (ft)           * 1282.90  * Culv Inv El Up (ft)    * 1271.50  *
* W.S. US. (ft)           * 1281.75  * Culv Inv El Dn (ft)    * 1271.00  *
* E.G. DS (ft)            * 1280.79  * Culv Frctn Ls (ft)     *    0.11  *
* W.S. DS (ft)            * 1279.30  * Culv Exit Loss (ft)    *    0.74  *
* Delta EG (ft)           *    2.11  * Culv Entr Loss (ft)    *    1.26  *
* Delta WS (ft)           *    2.45  * Q Weir (cfs)           *         *
* E.G. IC (ft)            * 1282.36  * Weir Sta Lft (ft)      *         *
* E.G. OC (ft)            * 1282.90  * Weir Sta Rgt (ft)      *         *
* Culvert Control         *  Outlet  * Weir Submerg           *         *
* Culv WS Inlet (ft)      * 1279.12  * Weir Max Depth (ft)    *         *
```

* Culv WS Outlet (ft)	* 1279.30	* Weir Avg Depth (ft)	*
* Culv Nml Depth (ft)	* 4.28	* Weir Flow Area (sq ft)	*
* Culv Crt Depth (ft)	* 6.19	* Min El Weir Flow (ft)	* 1283.84 *

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

* Q Culv Group (cfs)	*17000.00	* Culv Full Len (ft)	*
* # Barrels	* 8	* Culv Vel US (ft/s)	* 10.00 *
* Q Barrel (cfs)	* 2125.00	* Culv Vel DS (ft/s)	* 8.83 *
* E.G. US. (ft)	* 1279.04	* Culv Inv El Up (ft)	* 1271.50 *
* W.S. US. (ft)	* 1278.14	* Culv Inv El Dn (ft)	* 1271.00 *
* E.G. DS (ft)	* 1277.93	* Culv Frctn Ls (ft)	* 0.08 *
* W.S. DS (ft)	* 1276.97	* Culv Exit Loss (ft)	* 0.25 *
* Delta EG (ft)	* 1.10	* Culv Entr Loss (ft)	* 0.78 *
* Delta WS (ft)	* 1.17	* Q Weir (cfs)	*
* E.G. IC (ft)	* 1278.94	* Weir Sta Lft (ft)	*
* E.G. OC (ft)	* 1279.04	* Weir Sta Rgt (ft)	*
* Culvert Control	* Outlet	* Weir Submerg	*
* Culv WS Inlet (ft)	* 1276.71	* Weir Max Depth (ft)	*
* Culv WS Outlet (ft)	* 1276.97	* Weir Avg Depth (ft)	*
* Culv Nml Depth (ft)	* 2.94	* Weir Flow Area (sq ft)	*
* Culv Crt Depth (ft)	* 4.27	* Min El Weir Flow (ft)	* 1283.84 *

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13.5

INPUT
Description: Downstream Face of ConArch
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
545.95	1291	605.95	1271	950	1271	1010	1291

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
545.95	.03	545.95	.03	1010	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
545.95	1010	70	140	235	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

E.G. Elev (ft)	1280.79	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.49	Wt. n-Val.		0.030		
W.S. Elev (ft)	1279.30	Reach Len. (ft)	70.00	140.00	235.00	
Crit W.S. (ft)		Flow Area (sq ft)		3062.02		
E.G. Slope (ft/ft)	0.002564	Area (sq ft)		3062.02		
Q Total (cfs)	30000.00	Flow (cfs)		30000.00		
Top Width (ft)	393.85	Top Width (ft)		393.85		
Vel Total (ft/s)	9.80	Avg. Vel. (ft/s)		9.80		
Max Chl Dpth (ft)	8.30	Hydr. Depth (ft)		7.77		
Conv. Total (cfs)	592509.4	Conv. (cfs)		592509.4		
Length Wtd. (ft)	140.00	Wetted Per. (ft)		396.54		
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		1.24		
Alpha	1.00	Stream Power (lb/ft s)		12.11		
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)		77.19		
C & E Loss (ft)	0.04	Cum SA (acres)		8.79		

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1277.93	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.96	Wt. n-Val.		0.030		
W.S. Elev (ft)	1276.97	Reach Len. (ft)	70.00	140.00	235.00	
Crit W.S. (ft)		Flow Area (sq ft)		2161.40		
E.G. Slope (ft/ft)	0.002499	Area (sq ft)		2161.40		
Q Total (cfs)	17000.00	Flow (cfs)		17000.00		
Top Width (ft)	379.88	Top Width (ft)		379.88		
Vel Total (ft/s)	7.87	Avg. Vel. (ft/s)		7.87		
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)		5.69		
Conv. Total (cfs)	340039.9	Conv. (cfs)		340039.9		
Length Wtd. (ft)	140.00	Wetted Per. (ft)		381.82		
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		0.88		
Alpha	1.00	Stream Power (lb/ft s)		6.95		
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		56.16		
C & E Loss (ft)	0.04	Cum SA (acres)		8.45		

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13

INPUT
Description: Narrow Point Wash Inlet Channel
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-55.05	1294	9.95	1293	98.95	1291	137.95	1290	152.95	1285

```
  164.95    1280  177.95    1275  186.95    1271     280    1271     425    1271
     485    1271     530    1271     545    1275     565    1280     583    1285
     602    1290

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
  -55.05     .03  137.95     .03     602     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        137.95     602              130     130     130             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1280.32  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.90  * Wt. n-Val.            *         *   0.030 *          *
* W.S. Elev (ft)         * 1278.42  * Reach Len. (ft)       * 130.00  * 130.00  * 130.00   *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *         * 2715.22 *          *
* E.G. Slope (ft/ft)     *0.003770  * Area (sq ft)          *         * 2715.22 *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *         *30000.00 *          *
* Top Width (ft)         *  389.64  * Top Width (ft)        *         *  389.64 *          *
* Vel Total (ft/s)       *   11.05  * Avg. Vel. (ft/s)      *         *   11.05 *          *
* Max Chl Dpth (ft)      *    7.42  * Hydr. Depth (ft)      *         *    6.97 *          *
* Conv. Total (cfs)      *488621.6  * Conv. (cfs)           *         *488621.6 *          *
* Length Wtd. (ft)       *  130.00  * Wetted Per. (ft)      *         *  392.07 *          *
* Min Ch El (ft)         * 1271.00  * Shear (lb/sq ft)      *         *    1.63 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   18.01 *          *
* Frctn Loss (ft)        *    0.20  * Cum Volume (acre-ft)  *         *   67.91 *          *
* C & E Loss (ft)        *    0.37  * Cum SA (acres)        *         *    7.53 *          *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 1277.45  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.34  * Wt. n-Val.            *         *   0.030 *          *
* W.S. Elev (ft)         * 1276.10  * Reach Len. (ft)       * 130.00  * 130.00  * 130.00   *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *         * 1829.45 *          *
* E.G. Slope (ft/ft)     *0.004270  * Area (sq ft)          *         * 1829.45 *          *
* Q Total (cfs)          *17000.00  * Flow (cfs)            *         *17000.00 *          *
* Top Width (ft)         *  374.34  * Top Width (ft)        *         *  374.34 *          *
* Vel Total (ft/s)       *    9.29  * Avg. Vel. (ft/s)      *         *    9.29 *          *
* Max Chl Dpth (ft)      *    5.10  * Hydr. Depth (ft)      *         *    4.89 *          *
* Conv. Total (cfs)      *260161.4  * Conv. (cfs)           *         *260161.4 *          *
```

* Length Wtd. (ft)	* 130.00	* Wetted Per. (ft)	*	* 376.05	*	*	
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 1.30	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 12.05	*	*	
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	*	* 49.75	*	*	
* C & E Loss (ft)	* 0.29	* Cum SA (acres)	*	* 7.24	*	*	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 12

INPUT
Description: Expanding Indian Bend Wash Inlet Channel
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-55.05	1289	-37.05	1285	-17.05	1280	3.95	1275	14.95	1272
24.95	1271	129.95	1270	218.95	1266	392	1266	402	1270
415	1275	440	1280	465	1285	490	1290		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-55.05	.03	-55.05	.03	490	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-55.05	490	175	175	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1279.76	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.67	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1279.08	* Reach Len. (ft)	* 175.00	* 175.00	* 175.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 4562.01	* *
* E.G. Slope (ft/ft)	*0.000808	* Area (sq ft)	*	* 4562.01	* *
* Q Total (cfs)	*30000.00	* Flow (cfs)	*	*30000.00	* *
* Top Width (ft)	* 448.61	* Top Width (ft)	*	* 448.61	* *
* Vel Total (ft/s)	* 6.58	* Avg. Vel. (ft/s)	*	* 6.58	* *
* Max Chl Dpth (ft)	* 13.08	* Hydr. Depth (ft)	*	* 10.17	* *
* Conv. Total (cfs)	*1055699.0	* Conv. (cfs)	*	*1055699.0	* *
* Length Wtd. (ft)	* 175.00	* Wetted Per. (ft)	*	* 451.74	* *

* Min Ch El (ft)	* 1266.00	* Shear (lb/sq ft)	*	* 0.51	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.35	*
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	*	* 57.05	*
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	*	* 6.28	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1276.99	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.37	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1276.62	* Reach Len. (ft)	* 175.00	* 175.00	* 175.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 3484.77	* *
* E.G. Slope (ft/ft)	*0.000593	* Area (sq ft)	*	* 3484.77	* *
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	* *
* Top Width (ft)	* 425.95	* Top Width (ft)	*	* 425.95	* *
* Vel Total (ft/s)	* 4.88	* Avg. Vel. (ft/s)	*	* 4.88	* *
* Max Chl Dpth (ft)	* 10.62	* Hydr. Depth (ft)	*	* 8.18	* *
* Conv. Total (cfs)	*697961.5	* Conv. (cfs)	*	*697961.5	* *
* Length Wtd. (ft)	* 175.00	* Wetted Per. (ft)	*	* 428.55	* *
* Min Ch El (ft)	* 1266.00	* Shear (lb/sq ft)	*	* 0.30	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.47	* *
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	*	* 41.82	* *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	* 6.05	* *

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 11

INPUT
Description: Expanding Indian Bend Wash Inlet Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1285	18	1280	40	1275	57	1274	75	1273
98	1272	112	1271	121	1270	140	1266	409	1266
422	1270	431	1272	460	1273	560	1274	565	1275
580	1280	600	1284	612	1285				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	612	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	612	335	335	335 .1	.3

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1279.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.030	
W.S. Elev (ft)	1279.08	Reach Len. (ft)	335.00	335.00	335.00
Crit W.S. (ft)		Flow Area (sq ft)		5290.37	
E.G. Slope (ft/ft)	0.000653	Area (sq ft)		5290.37	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	555.17	Top Width (ft)		555.17	
Vel Total (ft/s)	5.67	Avg. Vel. (ft/s)		5.67	
Max Chl Dpth (ft)	13.08	Hydr. Depth (ft)		9.53	
Conv. Total (cfs)	1174060.0	Conv. (cfs)		1174060.0	
Length Wtd. (ft)	335.00	Wetted Per. (ft)		557.82	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		2.19	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)		37.26	
C & E Loss (ft)	0.02	Cum SA (acres)		4.26	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1276.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.58	Reach Len. (ft)	335.00	335.00	335.00
Crit W.S. (ft)		Flow Area (sq ft)		3924.66	
E.G. Slope (ft/ft)	0.000541	Area (sq ft)		3924.66	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	536.66	Top Width (ft)		536.66	
Vel Total (ft/s)	4.33	Avg. Vel. (ft/s)		4.33	
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)		7.31	
Conv. Total (cfs)	730617.4	Conv. (cfs)		730617.4	
Length Wtd. (ft)	335.00	Wetted Per. (ft)		538.62	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		1.07	
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)		26.93	
C & E Loss (ft)	0.02	Cum SA (acres)		4.11	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 10

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
INPUT
Description: Most D.S. X-Section, U.S. of East Interceptor Channel
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  1283.7      12    1283      25    1280      48    1275      67    1272
     145    1271     205    1270     245    1269     295    1268     355    1269
     432    1270     495    1271     557    1271     560    1272     572    1275
     591    1280     610    1285     625  1286.6

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
       0     .03        0     .03      625     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
             0     625                   0       0       0             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1279.26  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.72  * Wt. n-Val.            *          *    0.030  *          *
* W.S. Elev (ft)         * 1278.54  * Reach Len. (ft)       *          *           *          *
* Crit W.S. (ft)         * 1274.91  * Flow Area (sq ft)     *          * 4398.49   *          *
* E.G. Slope (ft/ft)     *0.001201  * Area (sq ft)          *          * 4398.49   *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *          *30000.00   *          *
* Top Width (ft)         *  553.75  * Top Width (ft)        *          *  553.75   *          *
* Vel Total (ft/s)       *    6.82  * Avg. Vel. (ft/s)      *          *    6.82   *          *
* Max Chl Dpth (ft)      *   10.54  * Hydr. Depth (ft)      *          *    7.94   *          *
* Conv. Total (cfs)      *865569.4  * Conv. (cfs)           *          *865569.4   *          *
* Length Wtd. (ft)       *          * Wetted Per. (ft)      *          *  555.42   *          *
* Min Ch El (ft)         * 1268.00  * Shear (lb/sq ft)      *          *    0.59   *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    4.05   *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)  *          *           *          *
* C & E Loss (ft)        *          * Cum SA (acres)        *          *           *          *
*************************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1276.59  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.47  * Wt. n-Val.            *          *    0.030  *          *
* W.S. Elev (ft)         * 1276.12  * Reach Len. (ft)       *          *           *          *
* Crit W.S. (ft)         * 1273.38  * Flow Area (sq ft)     *          * 3079.74   *          *
* E.G. Slope (ft/ft)     *0.001202  * Area (sq ft)          *          * 3079.74   *          *
* Q Total (cfs)          *17000.00  * Flow (cfs)            *          *17000.00   *          *
* Top Width (ft)         *  533.37  * Top Width (ft)        *          *  533.37   *          *
* Vel Total (ft/s)       *    5.52  * Avg. Vel. (ft/s)      *          *    5.52   *          *
* Max Chl Dpth (ft)      *    8.12  * Hydr. Depth (ft)      *          *    5.77   *          *
```

Indian Bend Wash
New 8-42'x10'-4" ConArch
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Conv. Total (cfs)	*490289.4	* Conv. (cfs)	*	*490289.4	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 534.46	*
* Min Ch El (ft)	* 1268.00	* Shear (lb/sq ft)	*	* 0.43	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.39	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

SUMMARY OF MANNING'S N VALUES

River:Indian Bend Wash

Reach	River Sta.	n1	n2	n3
Indian Bend Road	17	.03	.03	.03
Indian Bend Road	16.75	.03	.03	.03
Indian Bend Road	16.5	.018	.03	.03
Indian Bend Road	15	.03	.03	.03
Indian Bend Road	14.25	Culvert		
Indian Bend Road	13.5	.03	.03	.03
Indian Bend Road	13	.03	.03	.03
Indian Bend Road	12	.03	.03	.03
Indian Bend Road	11	.03	.03	.03
Indian Bend Road	10	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: Indian Bend Wash

Reach	River Sta.	Left	Channel	Right
Indian Bend Road	17	470	430	315
Indian Bend Road	16.75	627	30	120
Indian Bend Road	16.5	105	105	105
Indian Bend Road	15	90	90	90
Indian Bend Road	14.25	Culvert		
Indian Bend Road	13.5	70	140	235
Indian Bend Road	13	130	130	130
Indian Bend Road	12	175	175	175
Indian Bend Road	11	335	335	335
Indian Bend Road	10	0	0	0

```
*******************************************************************************

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Indian Bend Wash

*****************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*****************************************************
*Indian Bend Road*    17        *       .1*       .3*
*Indian Bend Road*    16.75     *       .6*       .8*
*Indian Bend Road*    16.5      *       .6*       .8*
*Indian Bend Road*    15        *       .3*       .3*
*Indian Bend Road*    14.25     *Culvert  *         *
*Indian Bend Road*    13.5      *       .1*       .3*
*Indian Bend Road*    13        *       .1*       .3*
*Indian Bend Road*    12        *       .1*       .3*
*Indian Bend Road*    11        *       .1*       .3*
*Indian Bend Road*    10        *       .1*       .3*
*****************************************************

*******************************************************************************

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Conarch Plan

River: Indian Bend Wash  Reach: Indian Bend Road     RS: 17     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 17     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.75     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 16.75     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
```

the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Wash Reach: Indian Bend Road RS: 13 Profile: PF 2
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Wash Reach: Indian Bend Road RS: 11 Profile: PF 2
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Table 1
Indian Bend Wash
New 3 Span Bridge (Each Span = 124.5')
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road												
Reach	River Sta	Profile	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)	
Indian Bend Road	17	PF 1	30000	1282	1288.35	1285.96	1288.74	0.001206	5.03	5958.68	1487.92	0.4
Indian Bend Road	17	PF 2	17000	1282	1286.99	1285.05	1287.23	0.001066	3.9	4361.7	1437.17	0.35
Indian Bend Road	16.75	PF 1	30000	1281	1287.89	1285.31	1288.22	0.001119	4.59	6531.22	1631.63	0.38
Indian Bend Road	16.75	PF 2	17000	1281	1286.59	1284.31	1286.79	0.000906	3.57	4758.43	1425.98	0.33
Indian Bend Road	16.5	PF 1	30000	1283	1286.17	1286.17	1287.74	0.003235	5.62	3675.28	946.83	0.59
Indian Bend Road	16.5	PF 2	17000	1283	1284.89	1284.89	1286.3	0.002602	3.62	2319.55	869.65	0.49
Indian Bend Road	15 Upstream Face of CBC	PF 1	30000	1271.5	1280.4	1278.09	1282.14	0.002524	10.59	2832.16	913.54	0.63
Indian Bend Road	15 Upstream Face of CBC	PF 2	17000	1271.5	1278.07	1276.05	1279.1	0.002268	8.17	2079.88	891.45	0.57
Indian Bend Road	14.25		Culvert									
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	30000	1271	1278.92	1277.47	1281.06	0.003569	11.75	2552.72	369.99	0.74
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	17000	1271	1276.92	1275.42	1278.15	0.003018	8.9	1909.1	358.02	0.64
Indian Bend Road	13	PF 1	30000	1271	1278.24		1280.48	0.00463	12.02	2495.07	367.88	0.81
Indian Bend Road	13	PF 2	17000	1271	1275.99		1277.57	0.005211	10.1	1683.45	353.02	0.81
Indian Bend Road	12	PF 1	30000	1266	1279.01		1279.81	0.001004	7.17	4182.16	424.87	0.4
Indian Bend Road	12	PF 2	17000	1266	1276.58		1277.02	0.000749	5.35	3177.52	402.52	0.34
Indian Bend Road	11	PF 1	30000	1266	1279.08		1279.58	0.000653	5.67	5290.37	555.17	0.32
Indian Bend Road	11	PF 2	17000	1266	1276.58		1276.87	0.000541	4.33	3924.66	536.66	0.28
Indian Bend Road	10	PF 1	30000	1268	1278.54	1274.91	1279.26	0.001201	6.82	4398.49	553.75	0.43
Indian Bend Road	10	PF 2	17000	1268	1276.12	1273.37	1276.59	0.001202	5.52	3079.74	533.37	0.4

Table 2
Indian Bend Wash
New 3 Span Bridge (Each Span = 124.5')
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

HEC-RAS Plan: CBC 10-30x10 River: Indian Bend Wash Reach: Indian Bend Road											
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Indian Bend Road	17	PF 1	1288.74	1288.35	0.39	0.5	0.02		30000		1487.92
Indian Bend Road	17	PF 2	1287.23	1286.99	0.24	0.42	0.01		17000		1437.17
Indian Bend Road	16.75	PF 1	1288.22	1287.89	0.33	0.36	0.12		30000		1631.63
Indian Bend Road	16.75	PF 2	1286.79	1286.59	0.2	0.37	0.12		17000		1425.98
Indian Bend Road	16.5	PF 1	1287.74	1286.17	1.57	0.3	0.1	17092.97	12907.03		946.83
Indian Bend Road	16.5	PF 2	1286.3	1284.89	1.41	0.25	0.3	13002.65	3997.35		869.65
Indian Bend Road	15 Upstream Face of CBC	PF 1	1282.14	1280.4	1.74	0	0.43		30000		913.54
Indian Bend Road	15 Upstream Face of CBC	PF 2	1279.1	1278.07	1.04				17000		891.45
Indian Bend Road	14.25		Bridge								
Indian Bend Road	13.5 Downstream Face of CBC	PF 1	1281.06	1278.92	2.14	0.57	0.01		30000		369.99
Indian Bend Road	13.5 Downstream Face of CBC	PF 2	1278.15	1276.92	1.23	0.55	0.04		17000		358.02
Indian Bend Road	13	PF 1	1280.48	1278.24	2.24	0.24	0.43		30000		367.88
Indian Bend Road	13	PF 2	1277.57	1275.99	1.58	0.2	0.34		17000		353.02
Indian Bend Road	12	PF 1	1279.81	1279.01	0.8	0.14	0.09		30000		424.87
Indian Bend Road	12	PF 2	1277.02	1276.58	0.44	0.11	0.05		17000		402.52
Indian Bend Road	11	PF 1	1279.58	1279.08	0.5	0.29	0.02		30000		555.17
Indian Bend Road	11	PF 2	1276.87	1276.58	0.29	0.26	0.02		17000		536.66
Indian Bend Road	10	PF 1	1279.26	1278.54	0.72				30000		553.75
Indian Bend Road	10	PF 2	1276.59	1276.12	0.47				17000		533.37

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
                    HEC-RAS Version 3.1.1 May 2003
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                      609 Second Street, Suite D
                      Davis, California 95616-4687
                             (916) 756-1104


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

*******************************************************************************

PROJECT DATA
Project Title: Indian Bend Wash @ Indian Bend Road
Project File : IBWexst.prj
Run Date and Time: 6/18/2004 1:50:06 PM

Project in English units

*******************************************************************************

PLAN DATA

Plan Title: 3-Span Bridge 124.5' Spans
Plan File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.p03

          Geometry Title: Proposed (3 Span Bridge, 124.5' spans)
          Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g16

          Flow Title    : Design Flow and 100-Year Flow
          Flow File     : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Plan Summary Information:
Number of:  Cross Sections =    9    Mulitple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    1    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
```

```
    Maximum number of interations        =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*******************************************************************************

FLOW DATA

Flow Title: Design Flow and 100-Year Flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.f04

Flow Data (cfs)
*******************************************************************************
* River           Reach           RS      *           PF 1           PF 2 *
* Indian Bend WashIndian Bend Road17      *          30000          17000 *
*******************************************************************************

Boundary Conditions
*************************************************************************************************************
* River           Reach           Profile         *           Upstream                  Downstream    *
*************************************************************************************************************
* Indian Bend WashIndian Bend RoadPF 1            *                                Normal S = 0.0012 *
*************************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: Proposed (3 Span Bridge, 124.5' spans)
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Wash\IBWexst.g16

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 17

INPUT
Description: Most U.S. X-Section, D.S. of East Channel
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
**********************************************************************************
       0    1290       25    1285       40    1282      388    1282      410    1284
     490    1285      510    1285      608    1284      730    1284      755    1284
     810    1284      832    1285      870    1285      898    1282     1090    1282
    1118    1284     1138    1285     1180    1287     1218    1290     1240    1290
    1245    1291     1270    1291     1278    1290     1305    1290     1385    1289
    1435    1286     1486    1286     1575    1286     1650    1285     1685    1285
    1700    1290

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
       0     .03        0     .03     1700     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
             0    1700                470      430      315              .1       .3
Ineffective Flow      num=        1
   Sta L    Sta R     Elev  Permanent
    1245     1700     1292          F

CROSS SECTION OUTPUT  Profile #PF 1
**********************************************************************************************
* E.G. Elev (ft)          * 1288.74  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.39  * Wt. n-Val.            *          *   0.030  *          *
* W.S. Elev (ft)          * 1288.35  * Reach Len. (ft)       *  470.00  *  430.00  *  315.00  *
* Crit W.S. (ft)          * 1285.96  * Flow Area (sq ft)     *          * 5958.68  *          *
* E.G. Slope (ft/ft)      *0.001206  * Area (sq ft)          *          * 6680.35  *          *
* Q Total (cfs)           *30000.00  * Flow (cfs)            *          *30000.00  *          *
* Top Width (ft)          * 1487.92  * Top Width (ft)       *          * 1487.92  *          *
* Vel Total (ft/s)        *    5.03  * Avg. Vel. (ft/s)      *          *    5.03  *          *
* Max Chl Dpth (ft)       *    6.35  * Hydr. Depth (ft)      *          *    5.01  *          *
* Conv. Total (cfs)       *863877.3  * Conv. (cfs)           *          *863877.3  *          *
* Length Wtd. (ft)        *  430.00  * Wetted Per. (ft)      *          * 1189.89  *          *
* Min Ch El (ft)          * 1282.00  * Shear (lb/sq ft)      *          *    0.38  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    1.90  *          *
* Frctn Loss (ft)         *    0.50  * Cum Volume (acre-ft)  *    11.59 *  161.64  *          *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)        *     1.12 *   27.59  *          *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
**********************************************************************************************
* E.G. Elev (ft)          * 1287.23  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.24  * Wt. n-Val.            *          *   0.030  *          *
* W.S. Elev (ft)          * 1286.99  * Reach Len. (ft)       *  470.00  *  430.00  *  315.00  *
```

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Crit W.S. (ft)	* 1285.05	* Flow Area (sq ft)	*		* 4361.70	*	*
* E.G. Slope (ft/ft)	*0.001066	* Area (sq ft)	*		* 4695.54	*	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*		*17000.00	*	*
* Top Width (ft)	* 1437.17	* Top Width (ft)	*		* 1437.17	*	*
* Vel Total (ft/s)	* 3.90	* Avg. Vel. (ft/s)	*		* 3.90	*	*
* Max Chl Dpth (ft)	* 4.99	* Hydr. Depth (ft)	*		* 3.74	*	*
* Conv. Total (cfs)	*520705.0	* Conv. (cfs)	*		*520705.0	*	*
* Length Wtd. (ft)	* 430.00	* Wetted Per. (ft)	*		* 1165.64	*	*
* Min Ch El (ft)	* 1282.00	* Shear (lb/sq ft)	*		* 0.25	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 0.97	*	*
* Frctn Loss (ft)	* 0.42	* Cum Volume (acre-ft)	*	10.21	* 115.69	*	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	1.04	* 25.79	*	*

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.75

INPUT
Description: Flow Split by Golf Course Mounds
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1290	35	1285	50	1281	482	1281	500	1283
520	1284	525	1285	575	1289	590	1290	630	1290
670	1290	700	1291	732	1290	775	1285	805	1284
870	1283	925	1283	1015	1285	1025	1286	1050	1286.6
1065	1286	1080	1285	1110	1282	1220	1282	1265	1283
1300	1284	1400	1284	1490	1285	1530	1287	1580	1287
1610	1287	1635	1290	1675	1295	1720	1292	1770	1291.7
1818	1291	1822	1290	1852	1291	1878	1291	1892	1290
1930	1286	1962	1286	1995	1287	2005	1288	2020	1288
2045	1287	2075	1286	2105	1285	2140	1285	2155	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	2155	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	2155	627	30	120	.1	.3

Ineffective Flow num= 1

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Sta L	Sta R	Elev	Permanent
1675	2155	1296	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1288.22	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.33	Wt. n-Val.		0.030		
W.S. Elev (ft)	1287.89	Reach Len. (ft)	627.00	30.00	120.00	
Crit W.S. (ft)	1285.31	Flow Area (sq ft)		6531.22		
E.G. Slope (ft/ft)	*0.001119	Area (sq ft)		6896.06		
Q Total (cfs)	*30000.00	Flow (cfs)		*30000.00		
Top Width (ft)	1631.63	Top Width (ft)		1631.63		
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)		4.59		
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)		4.62		
Conv. Total (cfs)	*896623.5	Conv. (cfs)		*896623.5		
Length Wtd. (ft)	200.08	Wetted Per. (ft)		1415.41		
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.32		
Alpha	1.00	Stream Power (lb/ft s)		1.48		
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	11.59	94.63		
C & E Loss (ft)	0.12	Cum SA (acres)	1.12	12.19		

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1286.79	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.20	Wt. n-Val.		0.030		
W.S. Elev (ft)	1286.59	Reach Len. (ft)	627.00	30.00	120.00	
Crit W.S. (ft)	1284.31	Flow Area (sq ft)		4758.43		
E.G. Slope (ft/ft)	*0.000906	Area (sq ft)		4882.55		
Q Total (cfs)	*17000.00	Flow (cfs)		*17000.00		
Top Width (ft)	1425.98	Top Width (ft)		1425.98		
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57		
Max Chl Dpth (ft)	5.59	Hydr. Depth (ft)		3.71		
Conv. Total (cfs)	*564836.8	Conv. (cfs)		*564836.8		
Length Wtd. (ft)	258.31	Wetted Per. (ft)		1282.59		
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.21		
Alpha	1.00	Stream Power (lb/ft s)		0.75		
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	10.21	68.41		
C & E Loss (ft)	0.12	Cum SA (acres)	1.04	11.66		

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 16.5

INPUT
Description: Controlling Section U.S. of Existing Drop Structure
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
400	1292	400	1271.5	469	1271.5	504	1283	509	1283
525	1285	559	1290	578	1291	592	1291	605	1290
631	1291	660	1291	666	1290	694	1286	706	1285
728	1284	745	1283	750	1283	1009	1283	1045	1283
1365	1283	1419	1284	1458	1285	1624	1289	1690	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
400	.03	559	.03	1690	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
559	1690	105	105	105	.6	.8

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
400	400	1292	F
907	1009	1286	F
1400	1400	1292	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1287.74	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.57	Wt. n-Val.	0.030	0.030		
W.S. Elev (ft)	1286.17	Reach Len. (ft)	105.00	105.00	105.00	
Crit W.S. (ft)	1286.17	Flow Area (sq ft)	1379.97	2295.31		
E.G. Slope (ft/ft)	0.003235	Area (sq ft)	1379.97	2295.31		
Q Total (cfs)	30000.00	Flow (cfs)	17092.97	12907.03		
Top Width (ft)	946.83	Top Width (ft)	132.97	813.86		

* Vel Total (ft/s)	*	8.16	* Avg. Vel. (ft/s)	*	12.39	*	5.62	*	*
* Max Chl Dpth (ft)	*	14.67	* Hydr. Depth (ft)	*	10.38	*	2.82	*	*
* Conv. Total (cfs)	*	527416.4	* Conv. (cfs)	*	300503.8	*	226912.6	*	*
* Length Wtd. (ft)	*	105.00	* Wetted Per. (ft)	*	149.70	*	814.00	*	*
* Min Ch El (ft)	*	1283.00	* Shear (lb/sq ft)	*	1.86	*	0.57	*	*
* Alpha	*	1.52	* Stream Power (lb/ft s)	*	23.06	*	3.20	*	*
* Frctn Loss (ft)	*	0.30	* Cum Volume (acre-ft)	*	1.66	*	91.47	*	*
* C & E Loss (ft)	*	0.10	* Cum SA (acres)	*	0.16	*	11.35	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	*	1286.30	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	*	1.41	* Wt. n-Val.	*	0.030	*	0.030	*	*
* W.S. Elev (ft)	*	1284.89	* Reach Len. (ft)	*	105.00	*	105.00	*	105.00 *
* Crit W.S. (ft)	*	1284.89	* Flow Area (sq ft)	*	1215.47	*	1104.08	*	*
* E.G. Slope (ft/ft)	*	0.002602	* Area (sq ft)	*	1215.47	*	1297.21	*	*
* Q Total (cfs)	*	17000.00	* Flow (cfs)	*	13002.65	*	3997.35	*	*
* Top Width (ft)	*	869.65	* Top Width (ft)	*	124.15	*	745.50	*	*
* Vel Total (ft/s)	*	7.33	* Avg. Vel. (ft/s)	*	10.70	*	3.62	*	*
* Max Chl Dpth (ft)	*	13.39	* Hydr. Depth (ft)	*	9.79	*	1.72	*	*
* Conv. Total (cfs)	*	333287.2	* Conv. (cfs)	*	254918.6	*	78368.6	*	*
* Length Wtd. (ft)	*	105.00	* Wetted Per. (ft)	*	139.50	*	643.57	*	*
* Min Ch El (ft)	*	1283.00	* Shear (lb/sq ft)	*	1.42	*	0.28	*	*
* Alpha	*	1.69	* Stream Power (lb/ft s)	*	15.14	*	1.01	*	*
* Frctn Loss (ft)	*	0.25	* Cum Volume (acre-ft)	*	1.46	*	66.29	*	*
* C & E Loss (ft)	*	0.30	* Cum SA (acres)	*	0.15	*	10.91	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 15

INPUT
Description: Upstream Face of
Bridge

1286
50
1285
130
1284
280
1283
338
1282
345
1280

365
1275
375
1274
465
1272
660
1271
880
1271
910
1272

1100

1272
1186
1273
1232
1274
1235
1275
1250
1280
1268

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
1
            281
1358
1283
1410
1284
1472
1285
1520
1286
1578
1287
16
            10
1290
Station Elevation Data     num=       25
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************************
     -85     1290      -10     1286       50     1285      130     1284      280     1283
     338     1282      345     1280      365     1275      375     1274      465     1272
     660   1271.5      880   1271.5      910     1272     1100     1272     1186     1273
    1232     1274     1235     1275     1250     1280     1268     1281     1358     1283
    1410     1284     1472     1285     1520     1286     1578     1287     1610     1290

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
***********************************************
     -85      .03      -85      .03     1610      .03

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
            -85     1610                  90       90       90              .6       .8
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
     -85    646.5     1290          F
     969     1610     1290          F

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1282.14  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.74  * Wt. n-Val.            *          *    0.030 *          *
* W.S. Elev (ft)         * 1280.40  * Reach Len. (ft)       *    1.00  *    1.00  *    1.00  *
* Crit W.S. (ft)         * 1278.09  * Flow Area (sq ft)     *          * 2832.16  *          *
* E.G. Slope (ft/ft)     *0.002524  * Area (sq ft)          *          * 7340.54  *          *
* Q Total (cfs)          *30000.00  * Flow (cfs)            *          *30000.00  *          *
* Top Width (ft)         *  913.54  * Top Width (ft)        *          *  913.54  *          *
* Vel Total (ft/s)       *   10.59  * Avg. Vel. (ft/s)      *          *   10.59  *          *
* Max Chl Dpth (ft)      *    8.90  * Hydr. Depth (ft)      *          *    8.78  *          *
* Conv. Total (cfs)      *597098.9  * Conv. (cfs)           *          *597098.9  *          *
```

* Length Wtd. (ft)	*	1.00	* Wetted Per. (ft)	*		*	322.50	*	
* Min Ch El (ft)	*	1271.50	* Shear (lb/sq ft)	*		*	1.38	*	
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	14.66	*	
* Frctn Loss (ft)	*	0.00	* Cum Volume (acre-ft)	*		*	79.85	*	
* C & E Loss (ft)	*	0.43	* Cum SA (acres)	*		*	9.27	*	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1279.10	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.04	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 1278.07	* Reach Len. (ft)	* 1.00	* 1.00	* 1.00	*
* Crit W.S. (ft)	* 1276.05	* Flow Area (sq ft)	*	* 2079.88	*	*
* E.G. Slope (ft/ft)	*0.002268	* Area (sq ft)	*	* 5240.92	*	*
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	*	*
* Top Width (ft)	* 891.45	* Top Width (ft)	*	* 891.45	*	*
* Vel Total (ft/s)	* 8.17	* Avg. Vel. (ft/s)	*	* 8.17	*	*
* Max Chl Dpth (ft)	* 6.56	* Hydr. Depth (ft)	*	* 6.45	*	*
* Conv. Total (cfs)	*356928.6	* Conv. (cfs)	*	*356928.6	*	*
* Length Wtd. (ft)	* 1.00	* Wetted Per. (ft)	*	* 322.50	*	*
* Min Ch El (ft)	* 1271.50	* Shear (lb/sq ft)	*	* 0.91	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.47	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	* 58.41	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	* 8.94	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 14.25

INPUT
Description: 3 Span Bridge (Spans = 124.5 feet)
Distance from Upstream XS = 1
Deck/Roadway Width = 78
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 4
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

```
**************************************************************************
    -85    1290          646.5  1292.9  1286.6     969  1292.9  1286.6
   1610    1290

Upstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************************************
     -85    1290      -10    1286      50    1285     130    1284     280    1283
     338    1282      345    1280     365    1275     375    1274     465    1272
     660  1271.5      880  1271.5     910    1272    1100    1272    1186    1273
    1232    1274     1235    1275    1250    1280    1268    1281    1358    1283
    1410    1284     1472    1285    1520    1286    1578    1287    1610    1290

Manning's n Values        num=       3
    Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
     -85     .03      -85     .03     1610     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
           -85    1610             .6       .8
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     -85   646.5    1290        F
     969    1610    1290        F

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**************************************************************************
     552    1290          616.5  1292.9  1286.3     939  1292.9  1286.3
    1010    1290

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************
   556.5    1291   616.5    1271     939    1271     999    1291

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
**************************************************
   556.5     .03   556.5     .03     999     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
         556.5     999             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

```
   556.5   616.5    1290       F
     939     999    1290       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =    1284
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream      num=        2
    Sta     Elev      Sta     Elev
*********************************
   646.1  1286.3    646.5  1271.5
Downstream      num=        2
     Sta     Elev      Sta     Elev
*********************************
   616.4  1286.3    616.5     1271

Abutment Data
Upstream      num=        2
     Sta     Elev      Sta     Elev
*********************************
     969  1271.5    969.1  1286.6
Downstream      num=        2
     Sta     Elev      Sta     Elev
*********************************
     939     1271    939.1  1286.6

Number of Piers =  2

Pier Data
Pier Station     Upstream=    745.5    Downstream=    715.5
Upstream      num=        2
    Width    Elev    Width    Elev
*********************************
        5    1271        5    1291
Downstream      num=        2
    Width    Elev    Width    Elev
*********************************
        5    1271        5    1291

Pier Data
Pier Station     Upstream=      870    Downstream=      840
```

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
Upstream      num=        2
    Width    Elev     Width    Elev
*********************************
       5     1271         5     1291
Downstream    num=        2
    Width    Elev     Width    Elev
*********************************
       5     1271         5     1291

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd    =     1.2
       Yarnell                 KVal  =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. US. (ft)          *    1282.14  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *    1280.40  * E.G. Elev (ft)        *    1281.71  *    1281.21  *
* Q Total (cfs)          *   30000.00  * W.S. Elev (ft)        *    1279.25  *    1278.93  *
* Q Bridge (cfs)         *   30000.00  * Crit W.S. (ft)        *    1278.22  *    1277.60  *
* Q Weir (cfs)           *             * Max Chl Dpth (ft)     *       7.75  *       7.93  *
* Weir Sta Lft (ft)      *             * Vel Total (ft/s)      *      12.58  *      12.10  *
* Weir Sta Rgt (ft)      *             * Flow Area (sq ft)     *    2385.67  *    2479.25  *
* Weir Submerg           *             * Froude # Chl          *       0.80  *       0.76  *
* Weir Max Depth (ft)    *             * Specif Force (cu ft)  *   20828.60  *   21108.38  *
* Min El Weir Flow (ft)  *    1290.31  * Hydr Depth (ft)       *       7.63  *       7.93  *
* Min El Prs (ft)        *    1286.60  * W.P. Total (ft)       *     343.52  *     344.23  *
* Delta EG (ft)          *       1.08  * Conv. Total (cfs)     *  430121.9   *  457970.7   *
* Delta WS (ft)          *       1.48  * Top Width (ft)        *     321.17  *     313.30  *
* BR Open Area (sq ft)   *    4681.51  * Frctn Loss (ft)       *       0.36  *       0.04  *
* BR Open Vel (ft/s)     *      12.58  * C & E Loss (ft)       *       0.15  *       0.10  *
* Coef of Q              *             * Shear Total (lb/sq ft) *       2.11  *       1.93  *
```

* Br Sel Method	*Energy only	* Power Total (lb/ft s) *	26.52 *	23.35 *

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE OUTPUT Profile #PF 2

* E.G. US. (ft)	1279.10	* Element	*Inside BR US	*Inside BR DS	*
* W.S. US. (ft)	1278.07	* E.G. Elev (ft)	1279.06	1278.19	*
* Q Total (cfs)	17000.00	* W.S. Elev (ft)	1277.89	1276.84	*
* Q Bridge (cfs)	17000.00	* Crit W.S. (ft)	1276.15	1275.51	*
* Q Weir (cfs)		* Max Chl Dpth (ft)	6.39	5.84	*
* Weir Sta Lft (ft)		* Vel Total (ft/s)	8.67	9.31	*
* Weir Sta Rgt (ft)		* Flow Area (sq ft)	1960.71	1825.83	*
* Weir Submerg		* Froude # Chl	0.61	0.68	*
* Weir Max Depth (ft)		* Specif Force (cu ft)	10734.93	10249.50	*
* Min El Weir Flow (ft)	1290.31	* Hydr Depth (ft)	6.27	5.84	*
* Min El Prs (ft)	1286.60	* W.P. Total (ft)	338.08	335.87	*
* Delta EG (ft)	0.95	* Conv. Total (cfs)	313486.4	279592.8	*
* Delta WS (ft)	1.15	* Top Width (ft)	321.12	313.27	*
* BR Open Area (sq ft)	4681.51	* Frctn Loss (ft)			*
* BR Open Vel (ft/s)	9.31	* C & E Loss (ft)			*
* Coef of Q		* Shear Total (lb/sq ft)	1.06	1.25	*
* Br Sel Method	Momentum	* Power Total (lb/ft s)	9.23	11.68	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13.5

INPUT
Description: Downstream Face of Bridge
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
556.5	1291	616.5	1271	939	1271	999	1291

Manning's n Values num= 3

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

Sta	n Val	Sta	n Val	Sta	n Val
556.5	.03	556.5	.03	999	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
556.5	999	70	140	235	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
556.5	616.5	1290	F
939	999	1290	F

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1281.06	Element			
Vel Head (ft)	2.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.92	Reach Len. (ft)	70.00	140.00	235.00
Crit W.S. (ft)	1277.47	Flow Area (sq ft)		2552.72	
E.G. Slope (ft/ft)	*0.003569	Area (sq ft)		2740.68	
Q Total (cfs)	*30000.00	Flow (cfs)		*30000.00	
Top Width (ft)	369.99	Top Width (ft)		369.99	
Vel Total (ft/s)	11.75	Avg. Vel. (ft/s)		11.75	
Max Chl Dpth (ft)	7.92	Hydr. Depth (ft)		7.92	
Conv. Total (cfs)	*502179.4	Conv. (cfs)		*502179.4	
Length Wtd. (ft)	140.00	Wetted Per. (ft)		322.50	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		1.76	
Alpha	1.00	Stream Power (lb/ft s)		20.73	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)		74.66	
C & E Loss (ft)	0.01	Cum SA (acres)		8.60	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1278.15	Element			
Vel Head (ft)	1.23	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.92	Reach Len. (ft)	70.00	140.00	235.00
Crit W.S. (ft)	1275.42	Flow Area (sq ft)		1909.10	
E.G. Slope (ft/ft)	*0.003018	Area (sq ft)		2014.22	
Q Total (cfs)	*17000.00	Flow (cfs)		*17000.00	
Top Width (ft)	358.02	Top Width (ft)		358.02	
Vel Total (ft/s)	8.90	Avg. Vel. (ft/s)		8.90	
Max Chl Dpth (ft)	5.92	Hydr. Depth (ft)		5.92	
Conv. Total (cfs)	*309433.3	Conv. (cfs)		*309433.3	
Length Wtd. (ft)	140.00	Wetted Per. (ft)		322.50	
Min Ch El (ft)	1271.00	Shear (lb/sq ft)		1.12	
Alpha	1.00	Stream Power (lb/ft s)		9.93	

* Frctn Loss (ft)	* 0.55	* Cum Volume (acre-ft)	*	*	54.40	*	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	*	8.27	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 13

INPUT
Description: Narrow Point of Indian Bend Wash Inlet Channel
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-34.5	1294	30.5	1293	119.5	1291	158.5	1290	173.5	1285
185.5	1280	198.5	1275	207.5	1271	280	1271	425	1271
485	1271	530	1271	545	1275	565	1280	583	1285
602	1290								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-34.5	.03	158.5	.03	602	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
158.5	602	130	130	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1280.48	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 2.24	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 1278.24	* Reach Len. (ft)	* 130.00	* 130.00	* 130.00
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 2495.07	*
* E.G. Slope (ft/ft)	*0.004630	* Area (sq ft)	*	* 2495.07	*
* Q Total (cfs)	*30000.00	* Flow (cfs)	*	*30000.00	*
* Top Width (ft)	* 367.88	* Top Width (ft)	*	* 367.88	*
* Vel Total (ft/s)	* 12.02	* Avg. Vel. (ft/s)	*	* 12.02	*
* Max Chl Dpth (ft)	* 7.24	* Hydr. Depth (ft)	*	* 6.78	*
* Conv. Total (cfs)	*440907.1	* Conv. (cfs)	*	*440907.1	*
* Length Wtd. (ft)	* 130.00	* Wetted Per. (ft)	*	* 370.25	*
* Min Ch El (ft)	* 1271.00	* Shear (lb/sq ft)	*	* 1.95	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 23.42	*
* Frctn Loss (ft)	* 0.24	* Cum Volume (acre-ft)	*	* 66.25	*
* C & E Loss (ft)	* 0.43	* Cum SA (acres)	*	* 7.42	*

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
**********************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 2
**********************************************************************************************
* E.G. Elev (ft)         * 1277.57  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.58  * Wt. n-Val.             *         *   0.030 *          *
* W.S. Elev (ft)         * 1275.99  * Reach Len. (ft)       * 130.00  *  130.00 *  130.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *         * 1683.45 *          *
* E.G. Slope (ft/ft)     *0.005211  * Area (sq ft)           *         * 1683.45 *          *
* Q Total (cfs)          *17000.00  * Flow (cfs)             *         *17000.00 *          *
* Top Width (ft)         *  353.02  * Top Width (ft)        *         *  353.02 *          *
* Vel Total (ft/s)       *   10.10  * Avg. Vel. (ft/s)      *         *   10.10 *          *
* Max Chl Dpth (ft)      *    4.99  * Hydr. Depth (ft)      *         *    4.77 *          *
* Conv. Total (cfs)      *235487.7  * Conv. (cfs)           *         *235487.7 *          *
* Length Wtd. (ft)       *  130.00  * Wetted Per. (ft)      *         *  354.70 *          *
* Min Ch El (ft)         * 1271.00  * Shear (lb/sq ft)      *         *    1.54 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   15.59 *          *
* Frctn Loss (ft)        *    0.20  * Cum Volume (acre-ft)   *         *   48.45 *          *
* C & E Loss (ft)        *    0.34  * Cum SA (acres)         *         *    7.13 *          *
**********************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Indian Bend Wash
REACH: Indian Bend Road   RS: 12

INPUT
Description: Expanding Indian Bend Wash Inlet Channel, Reconstruct Lt Bank
Station Elevation Data    num=      14
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
     -32     1289      -14     1285        6     1280       27     1275       38     1272
      48     1271      185     1270      225     1266      392     1266      402     1270
     415     1275      440     1280      465     1285      490     1290

Manning's n Values        num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
```

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

```
**********************************************
     -32      .03      -32      .03      490      .03

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
           -32      490                175      175      175             .1       .3
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1279.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.030	
W.S. Elev (ft)	1279.01	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		4182.16	
E.G. Slope (ft/ft)	0.001004	Area (sq ft)		4182.16	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	424.87	Top Width (ft)		424.87	
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)		7.17	
Max Chl Dpth (ft)	13.01	Hydr. Depth (ft)		9.84	
Conv. Total (cfs)	946644.4	Conv. (cfs)		946644.4	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		428.09	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)		4.39	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		56.28	
C & E Loss (ft)	0.09	Cum SA (acres)		6.23	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1277.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.58	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)		3177.52	
E.G. Slope (ft/ft)	0.000749	Area (sq ft)		3177.52	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	402.52	Top Width (ft)		402.52	
Vel Total (ft/s)	5.35	Avg. Vel. (ft/s)		5.35	
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)		7.89	
Conv. Total (cfs)	621192.6	Conv. (cfs)		621192.6	
Length Wtd. (ft)	175.00	Wetted Per. (ft)		405.22	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		1.96	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		41.20	
C & E Loss (ft)	0.05	Cum SA (acres)		6.00	

CROSS SECTION

RIVER: Indian Bend Wash

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

REACH: Indian Bend Road RS: 11

INPUT
Description: Expanding Indian Bend Wash Inlet Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1285	18	1280	40	1275	57	1274	75	1273
98	1272	112	1271	121	1270	140	1266	409	1266
422	1270	431	1272	460	1273	560	1274	565	1275
580	1280	600	1284	612	1285				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	612	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	612	335	335	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1279.58	Element			
Vel Head (ft)	0.50	Wt. n-Val.		0.030	
W.S. Elev (ft)	1279.08	Reach Len. (ft)	335.00	335.00	335.00
Crit W.S. (ft)		Flow Area (sq ft)		5290.37	
E.G. Slope (ft/ft)	0.000653	Area (sq ft)		5290.37	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	555.17	Top Width (ft)		555.17	
Vel Total (ft/s)	5.67	Avg. Vel. (ft/s)		5.67	
Max Chl Dpth (ft)	13.08	Hydr. Depth (ft)		9.53	
Conv. Total (cfs)	1174060.0	Conv. (cfs)		1174060.0	
Length Wtd. (ft)	335.00	Wetted Per. (ft)		557.82	
Min Ch El (ft)	1266.00	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		2.19	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)		37.26	
C & E Loss (ft)	0.02	Cum SA (acres)		4.26	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1276.87	Element			
Vel Head (ft)	0.29	Wt. n-Val.		0.030	
W.S. Elev (ft)	1276.58	Reach Len. (ft)	335.00	335.00	335.00
Crit W.S. (ft)		Flow Area (sq ft)		3924.66	
E.G. Slope (ft/ft)	0.000541	Area (sq ft)		3924.66	
Q Total (cfs)	17000.00	Flow (cfs)		17000.00	
Top Width (ft)	536.66	Top Width (ft)		536.66	

Vel Total (ft/s)	4.33	Avg. Vel. (ft/s)			4.33		
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)			7.31		
Conv. Total (cfs)	730617.4	Conv. (cfs)			730617.4		
Length Wtd. (ft)	335.00	Wetted Per. (ft)			538.62		
Min Ch El (ft)	1266.00	Shear (lb/sq ft)			0.25		
Alpha	1.00	Stream Power (lb/ft s)			1.07		
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)			26.93		
C & E Loss (ft)	0.02	Cum SA (acres)			4.11		

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Wash
REACH: Indian Bend Road RS: 10

INPUT
Description: Most D.S. X-Section, U.S. of East Interceptor Channel
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1283.7	12	1283	25	1280	48	1275	67	1272
145	1271	205	1270	245	1269	295	1268	355	1269
432	1270	495	1271	557	1271	560	1272	572	1275
591	1280	610	1285	625	1286.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	625	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	625	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1279.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.030	
W.S. Elev (ft)	1278.54	Reach Len. (ft)			
Crit W.S. (ft)	1274.91	Flow Area (sq ft)		4398.49	
E.G. Slope (ft/ft)	0.001201	Area (sq ft)		4398.49	
Q Total (cfs)	30000.00	Flow (cfs)		30000.00	
Top Width (ft)	553.75	Top Width (ft)		553.75	
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)		6.82	
Max Chl Dpth (ft)	10.54	Hydr. Depth (ft)		7.94	

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

* Conv. Total (cfs)	*865569.4	* Conv. (cfs)	*	*865569.4	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 555.42	*	*
* Min Ch El (ft)	* 1268.00	* Shear (lb/sq ft)	*	* 0.59	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.05	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1276.59	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.47	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1276.12	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 1273.37	* Flow Area (sq ft)	*	* 3079.74	* *
* E.G. Slope (ft/ft)	*0.001202	* Area (sq ft)	*	* 3079.74	* *
* Q Total (cfs)	*17000.00	* Flow (cfs)	*	*17000.00	* *
* Top Width (ft)	* 533.37	* Top Width (ft)	*	* 533.37	* *
* Vel Total (ft/s)	* 5.52	* Avg. Vel. (ft/s)	*	* 5.52	* *
* Max Chl Dpth (ft)	* 8.12	* Hydr. Depth (ft)	*	* 5.77	* *
* Conv. Total (cfs)	*490289.4	* Conv. (cfs)	*	*490289.4	* *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 534.46	* *
* Min Ch El (ft)	* 1268.00	* Shear (lb/sq ft)	*	* 0.43	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.39	* *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	* *
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	* *

SUMMARY OF MANNING'S N VALUES

River:Indian Bend Wash

Reach	River Sta.	n1	n2	n3
Indian Bend Road	17	.03	.03	.03
Indian Bend Road	16.75	.03	.03	.03
Indian Bend Road	16.5	.03	.03	.018
Indian Bend Road	15	.03	.03	.03
Indian Bend Road	14.25	*Bridge		
Indian Bend Road	13.5	.03	.03	.03
Indian Bend Road	13	.03	.03	.03
Indian Bend Road	12	.03	.03	.03
Indian Bend Road	11	.03	.03	.03
Indian Bend Road	10	.03	.03	.03

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

SUMMARY OF REACH LENGTHS

River: Indian Bend Wash

Reach	River Sta.	Left	Channel	Right
Indian Bend Road	17	470	430	315
Indian Bend Road	16.75	627	30	120
Indian Bend Road	16.5	105	105	105
Indian Bend Road	15	90	90	90
Indian Bend Road	14.25	Bridge		
Indian Bend Road	13.5	70	140	235
Indian Bend Road	13	130	130	130
Indian Bend Road	12	175	175	175
Indian Bend Road	11	335	335	335
Indian Bend Road	10	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Indian Bend Wash

Reach	River Sta.	Contr.	Expan.
Indian Bend Road	17	.1	.3
Indian Bend Road	16.75	.1	.3
Indian Bend Road	16.5	.6	.8
Indian Bend Road	15	.6	.8
Indian Bend Road	14.25	Bridge	
Indian Bend Road	13.5	.1	.3
Indian Bend Road	13	.1	.3
Indian Bend Road	12	.1	.3
Indian Bend Road	11	.1	.3
Indian Bend Road	10	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : 3 Span Bridg

River: Indian Bend Wash Reach: Indian Bend Road RS: 17 Profile: PF 1
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Indian Bend Wash
New 3 Span Bridge (124.5 ft Spans)
Design Discharge = 30,000 cfs
100-Year Discharge = 17,000 cfs

River: Indian Bend Wash Reach: Indian Bend Road RS: 17 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.75 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.75 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 16.5 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 15 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 14.25 Profile: PF 1 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash Reach: Indian Bend Road RS: 14.25 Profile: PF 1 Downstream

```
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 14.25     Profile: PF 2 Upstream
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 14.25     Profile: PF 2 Downstream
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 13.5     Profile: PF 1
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 13.5     Profile: PF 2
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 13     Profile: PF 1
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 13     Profile: PF 2
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Indian Bend Wash  Reach: Indian Bend Road     RS: 11     Profile: PF 2
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
```

APPENDIX J

Table 1
Seville Channel
New 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

HEC-RAS Plan: trial River: Indian Bend Rd Reach: Seville Profile: PF 1												
Reach	River Sta & Indian Bend Road Station	Profile	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)	
Seville	10, Entrance 3-10'x6' CBC	PF 1	1073	1291.79	1296.97	1295.35	1297.76	0.000458	7.12	150.6	59.87	0.56
Seville	9.5, Culvert		Culvert									
Seville	9, Outfall 3-10'x6' CBC	PF 1	1073	1290.8	1295.21		1296.31	0.003451	8.43	127.35	54.71	0.72
Seville	8, Entrance to 3-10'x4' CBC	PF 1	1073	1290.17	1295.46	1293.57	1295.9	0.00056	5.33	201.48	71.3	0.56
Seville	7.5, Culvert		Culvert									
Seville	7, 22+75, Outfall 3 10'x4' CBC	PF 1	1073	1290	1293.42	1293.42	1295.13	0.001643	10.49	102.25	80	1
Seville	6, 22+80, Entrance to 2-12'x7' CBC	PF 1	1073	1287	1290.95	1290.95	1292.94	0.001576	11.33	94.71	27	1.01
Seville	5.5, 32+95, Culvert	PF 1	1292	1282.73	1287.54	1287.2	1289.49	0.001177	11.18	115.55	27	0.9
Seville	5.4, 33+65, Culvert	PF 1	1292	1282.5	1287.63		1289.34	0.000955	10.5	123.02	27	0.82
Seville	5, 38+25, Outlet into Indian Bend	PF 1	1292	1281	1287.91		1288.85	0.000353	7.79	165.84	27	0.52
Seville	4, 38+30	PF 1	1292	1282	1286.5	1286.5	1288.72	0.006369	11.97	107.95	431.79	0.99
Seville	3, 39+50	PF 1	1292	1282.5	1286.49	1285.75	1287.15	0.003511	6.52	198.23	69.28	0.68
Seville	2, 43+80	PF 1	1292	1281	1284.12	1284.12	1284.79	0.009752	6.58	196.26	146.3	1

Table 2
Seville Channel
New 2-12'x7' CBC
100-Year Discharge = 1073 to 1292 cfs

HEC-RAS Plan: trial River: Indian Bend Rd Reach: Seville Profile: PF 1											
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Seville	10, Entrance 3-10'x6' CBC	PF 1	1297.76	1296.97	0.79				1073		59.87
Seville	9.5, Culvert		Culvert								
Seville	9, Outfall 3-10'x6' CBC	PF 1	1296.31	1295.21	1.1	0.21	0.2		1073		54.71
Seville	8, Entrance to 3-10'x4' CBC	PF 1	1295.9	1295.46	0.44				1073		71.3
Seville	7.5, Culvert		Culvert								
Seville	7, 22+75, Outfall 3 10'x4' CBC	PF 1	1295.13	1293.42	1.71	0.01	0.03		1073		80
Seville	6, 22+80, Entrance to 2-12'x7' CBC	PF 1	1292.94	1290.95	1.99	1.36	0.02		1073		27
Seville	5.5, 32+95, Culvert	PF 1	1289.49	1287.54	1.94	0.07	0.07		1292		27
Seville	5.4, 33+65,	PF 1	1289.34	1287.63	1.71	0.25	0.23		1292		27
Seville	5, 38+25, Outlet into Indian Bend	PF 1	1288.85	1287.91	0.94	0	0.13		1292		27
Seville	4, 38+30	PF 1	1288.72	1286.5	2.22	0.56	0.47		1292		431.79
Seville	3, 39+50	PF 1	1287.15	1286.49	0.66	2.36	0		1292		69.28
Seville	2, 43+80	PF 1	1284.79	1284.12	0.67				1292		146.3

Seville Channel
Proposed 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

```
                    HEC-RAS Version 3.1.1 May 2003
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                      609 Second Street, Suite D
                      Davis, California 95616-4687
                            (916) 756-1104


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

**********************************************************************************

PROJECT DATA
Project Title: seville
Project File : seville.prj
Run Date and Time: 6/21/2004 2:40:02 PM

Project in English units

**********************************************************************************

PLAN DATA

Plan Title: Plan 03
Plan File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Rd Ditch\seville.p03

          Geometry Title: Seville3
          Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Rd Ditch\seville.g03

          Flow Title    : flow
          Flow File     : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Rd Ditch\seville.f01

Plan Summary Information:
Number of:  Cross Sections =   11    Mulitple Openings  =    0
            Culverts       =    2    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
    Maximum number of interations       =  20
    Maximum difference tolerance        =  0.3
```

```
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*****************************************************************************

FLOW DATA

Flow Title: flow
Flow File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Rd Ditch\seville.f01

Flow Data (cfs)
*****************************************************************
* River           Reach           RS      *            PF 1 *
* Indian Bend Rd  Seville         10      *            1073 *
* Indian Bend Rd  Seville         5.5     *            1292 *
*****************************************************************

Boundary Conditions
*****************************************************************************************************************
* River           Reach           Profile         *           Upstream                 Downstream    *
*****************************************************************************************************************
* Indian Bend Rd  Seville         PF 1            *                                     Critical    *
*****************************************************************************************************************

*****************************************************************************

GEOMETRY DATA

Geometry Title: Seville3
Geometry File : p:\City_of_Scottsdale\23443636\Engr\Drainage\Indian Bend Rd Ditch\seville.g03

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 10

INPUT
Description: Entrance to 3-10'x6' box west of Scottsdale
Station Elevation Data    num=      15
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************
 -29.999 1296.99 -26.667 1295.99 -23.333 1294.99 -19.999 1293.99 -16.667 1292.99
 -13.333 1291.99  -8.667 1291.79       0 1291.79   8.667 1291.79  13.333 1291.99
```

```
  16.667 1292.99  19.999 1293.99  23.333 1294.99  26.667 1295.99  29.999 1296.99

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 -29.999    .013 -29.999    .013  29.999    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -29.999  29.999              145     145     145            .1       .3
Ineffective Flow      num=        4
   Sta L   Sta R    Elev  Permanent
 -29.999 -16.334 1297.79       T
  -6.334      -5 1297.79       T
       5   6.334 1297.79       T
  16.334  29.999 1297.79       T

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************************
* E.G. Elev (ft)         * 1297.76  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.79  * Wt. n-Val.             *         *    0.013 *          *
* W.S. Elev (ft)         * 1296.97  * Reach Len. (ft)        *  145.00 *  145.00 *  145.00  *
* Crit W.S. (ft)         * 1295.35  * Flow Area (sq ft)      *         *  150.60 *          *
* E.G. Slope (ft/ft)     *0.000458  * Area (sq ft)           *         *  219.94 *          *
* Q Total (cfs)          * 1073.00  * Flow (cfs)             *         * 1073.00 *          *
* Top Width (ft)         *   59.87  * Top Width (ft)         *         *   59.87 *          *
* Vel Total (ft/s)       *    7.12  * Avg. Vel. (ft/s)       *         *    7.12 *          *
* Max Chl Dpth (ft)      *    5.18  * Hydr. Depth (ft)       *         *    5.02 *          *
* Conv. Total (cfs)      * 50164.1  * Conv. (cfs)            *         * 50164.1 *          *
* Length Wtd. (ft)       *  145.00  * Wetted Per. (ft)       *         *   30.27 *          *
* Min Ch El (ft)         * 1291.79  * Shear (lb/sq ft)       *         *    0.14 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *    1.01 *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)   *         *   10.44 *          *
* C & E Loss (ft)        *          * Cum SA (acres)         *         *    3.44 *          *
*****************************************************************************************************

CULVERT


RIVER: Indian Bend Rd
REACH: Seville            RS: 9.5

INPUT
Description:
Distance from Upstream XS =     .001
Deck/Roadway Width        = 139.998
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
************************************************
```

```
 -29.9991298.457 1297.79  29.9991298.457 1297.79

Upstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 -29.999 1296.99 -26.667 1295.99 -23.333 1294.99 -19.999 1293.99 -16.667 1292.99
 -13.333 1291.99  -8.667 1291.79       0 1291.79   8.667 1291.79  13.333 1291.99
  16.667 1292.99  19.999 1293.99  23.333 1294.99  26.667 1295.99  29.999 1296.99

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
 -29.999     .013 -29.999     .013  29.999     .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -29.999  29.999            .1       .3
Ineffective Flow     num=       4
   Sta L   Sta R    Elev  Permanent
 -29.999 -16.334 1297.79       T
  -6.334      -5 1297.79       T
       5   6.334 1297.79       T
  16.334  29.999 1297.79       T

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
***********************************************
 -29.9991297.467  1296.8  29.9991297.467  1296.8

Downstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 -29.999    1296 -26.667    1295 -23.333    1294 -19.999    1293 -16.667    1292
 -13.333    1291  -8.667  1290.8       0  1290.8   8.667  1290.8  13.333    1291
  16.667    1292  19.999    1293  23.333    1294  26.667    1295  29.999    1296

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
 -29.999     .027 -29.999     .027  29.999     .027

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -29.999  29.999            .1       .3
Ineffective Flow     num=       4
   Sta L   Sta R    Elev  Permanent
 -29.999 -16.3341297.467       T
  -6.334      -51297.467       T
       5  6.33341297.467       T
```

```
  16.334  29.9991297.467       T

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise     Span
Culvert #1            Box       6       10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length     Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit Loss Coef
              .001 144.998      .013      .013         0                  .5                 1
Number of Barrels =  3
Upstream   Elevation =  1291.79
Centerline Stations
    Sta.     Sta.     Sta.
 -11.334        0   11.334
Downstream Elevation =  1290.8
Centerline Stations
    Sta.     Sta.     Sta.
 -11.334        0   11.334

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1
*****************************************************************************
* Q Culv Group (cfs)      * 1073.00  * Culv Full Len (ft)      *           *
* # Barrels               *       3  * Culv Vel US (ft/s)      *   10.48    *
* Q Barrel (cfs)          *  357.67  * Culv Vel DS (ft/s)      *    7.86    *
* E.G. US. (ft)           * 1297.76  * Culv Inv El Up (ft)     * 1291.79    *
* W.S. US. (ft)           * 1296.97  * Culv Inv El Dn (ft)     * 1290.80    *
* E.G. DS (ft)            * 1296.31  * Culv Frctn Ls (ft)      *    0.60    *
* W.S. DS (ft)            * 1295.21  * Culv Exit Loss (ft)     *    0.00    *
* Delta EG (ft)           *    1.45  * Culv Entr Loss (ft)     *    0.85    *
* Delta WS (ft)           *    1.77  * Q Weir (cfs)            *            *
* E.G. IC (ft)            * 1297.33  * Weir Sta Lft (ft)       *            *
* E.G. OC (ft)            * 1297.76  * Weir Sta Rgt (ft)       *            *
* Culvert Control         *  Outlet  * Weir Submerg            *            *
* Culv WS Inlet (ft)      * 1295.20  * Weir Max Depth (ft)     *            *
* Culv WS Outlet (ft)     * 1295.35  * Weir Avg Depth (ft)     *            *
* Culv Nml Depth (ft)     *    2.64  * Weir Flow Area (sq ft)  *            *
* Culv Crt Depth (ft)     *    3.41  * Min El Weir Flow (ft)   * 1298.47    *
*****************************************************************************

CROSS SECTION
```

Seville Channel
Proposed 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

RIVER: Indian Bend Rd
REACH: Seville RS: 9

INPUT
Description: Exit of 3-10'x6' box east of Scottsdale
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-29.999	1296	-26.667	1295	-23.333	1294	-19.999	1293	-16.667	1292
-13.333	1291	-8.667	1290.8	0	1290.8	8.667	1290.8	13.333	1291
16.667	1292	19.999	1293	23.333	1294	26.667	1295	29.999	1296

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-29.999	.027	-29.999	.027	29.999	.027

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-29.999	29.999	187	187	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-29.999	-16.334	1297.467	T
-6.334	-5	1297.467	T
5	6.33341	1297.467	T
16.334	29.999	1297.467	T

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1296.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.		0.027	
W.S. Elev (ft)	1295.21	Reach Len. (ft)	187.00	187.00	187.00
Crit W.S. (ft)		Flow Area (sq ft)		127.35	
E.G. Slope (ft/ft)	0.003451	Area (sq ft)		175.53	
Q Total (cfs)	1073.00	Flow (cfs)		1073.00	
Top Width (ft)	54.71	Top Width (ft)		54.71	
Vel Total (ft/s)	8.43	Avg. Vel. (ft/s)		8.43	
Max Chl Dpth (ft)	4.41	Hydr. Depth (ft)		4.24	
Conv. Total (cfs)	18264.2	Conv. (cfs)		18264.2	
Length Wtd. (ft)	187.00	Wetted Per. (ft)		30.27	
Min Ch El (ft)	1290.80	Shear (lb/sq ft)		0.91	
Alpha	1.00	Stream Power (lb/ft s)		7.64	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)		9.78	
C & E Loss (ft)	0.20	Cum SA (acres)		3.25	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Rd
REACH: Seville RS: 8

INPUT
Description: Entrance to 3-10'x4' box south of Indian Bend Rd
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-40	1296	-32	1295	-29	1294	-26	1293	-23	1292
-18	1290.17	0	1290.17	18	1290.17	23	1292	26	1293
29	1294	32	1295	40	1296				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-40	.013	-40	.013	40	.013

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-40	40	135	135	135	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-40	-16.334	1294.17	T
-6.334	-5	1294.17	T
5	6.334	1294.17	T
16.334	40	1294.17	T

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1295.90	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.44	Wt. n-Val.		0.013		
W.S. Elev (ft)	1295.46	Reach Len. (ft)	135.00	135.00	135.00	
Crit W.S. (ft)	1293.57	Flow Area (sq ft)		201.48		
E.G. Slope (ft/ft)	0.000560	Area (sq ft)		270.88		
Q Total (cfs)	1073.00	Flow (cfs)		1073.00		
Top Width (ft)	71.30	Top Width (ft)		71.30		
Vel Total (ft/s)	5.33	Avg. Vel. (ft/s)		5.33		
Max Chl Dpth (ft)	5.29	Hydr. Depth (ft)		2.83		
Conv. Total (cfs)	45322.5	Conv. (cfs)		45322.5		
Length Wtd. (ft)	135.00	Wetted Per. (ft)		72.98		
Min Ch El (ft)	1290.17	Shear (lb/sq ft)		0.10		
Alpha	1.00	Stream Power (lb/ft s)		0.51		
Frctn Loss (ft)		Cum Volume (acre-ft)		8.82		
C & E Loss (ft)		Cum SA (acres)		2.98		

Seville Channel
Proposed 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

CULVERT

RIVER: Indian Bend Rd
REACH: Seville RS: 7.5

INPUT
Description:
Distance from Upstream XS = .001
Deck/Roadway Width = 134.998
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-40 1294.84	1294.17	40 1294.84	1294.17

Upstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-40	1296	-32	1295	-29	1294	-26	1293	-23	1292
-18	1290.17	0	1290.17	18	1290.17	23	1292	26	1293
29	1294	32	1295	40	1296				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-40	.013	-40	.013	40	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
-40	40	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-40	-16.334	1294.17	T
-6.334	-5	1294.17	T
5	6.334	1294.17	T
16.334	40	1294.17	T

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-401294.667	1294	401294.667	1294

Downstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-40	1290.47	-8.667	1290	0	1290	8.667	1290	40	1290

Seville Channel
Proposed 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

```
Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************************
     -40    .013      -40    .013       40    .013

Bank Sta: Left   Right    Coeff Contr.    Expan.
           -40      40             .1        .3
Ineffective Flow      num=        4
   Sta L   Sta R    Elev  Permanent
     -40 -16.334    1294        T
  -6.334      -5    1294        T
       5   6.334    1294        T
  16.334      40    1294        T

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow   =     .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise     Span
Culvert #1            Box       4       10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               .001 134.998     .013      .013          0                  .5                 1
Number of Barrels =  3
Upstream   Elevation =  1290.17
Centerline Stations
    Sta.    Sta.    Sta.
 -11.334       0  11.334
Downstream Elevation =  1290
Centerline Stations
    Sta.    Sta.    Sta.
 -11.334       0  11.334

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1
************************************************************************
* Q Culv Group (cfs)     *  881.37  * Culv Full Len (ft)     *  135.00  *
* # Barrels              *       3  * Culv Vel US (ft/s)     *    7.34  *
* Q Barrel (cfs)         *  293.79  * Culv Vel DS (ft/s)     *    7.34  *
* E.G. US. (ft)          * 1295.90  * Culv Inv El Up (ft)    * 1290.17  *
* W.S. US. (ft)          * 1295.46  * Culv Inv El Dn (ft)    * 1290.00  *
* E.G. DS (ft)           * 1295.13  * Culv Frctn Ls (ft)     *    0.35  *
```

W.S. DS (ft)	1293.42	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.77	Culv Entr Loss (ft)	0.42
Delta WS (ft)	2.03	Q Weir (cfs)	191.63
E.G. IC (ft)	1295.67	Weir Sta Lft (ft)	-39.17
E.G. OC (ft)	1295.90	Weir Sta Rgt (ft)	39.17
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1294.17	Weir Max Depth (ft)	1.06
Culv WS Outlet (ft)	1294.30	Weir Avg Depth (ft)	0.94
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	73.98
Culv Crt Depth (ft)	2.99	Min El Weir Flow (ft)	1294.85

Warning: During subcritical analysis, with the exit loss set =1.0, the projected WSEL in culvert has a lower energy than the downstream energy. Most likely, the downstream cross section blocks part of the culvert or the ineffective area is set too far in. Instead of projecting the WSEL, the program did an energy balance to get the WSEL inside the culvert at the downstream end.

CROSS SECTION

RIVER: Indian Bend Rd
REACH: Seville RS: 7

INPUT
Description: Exit of 3-10'x4' box culvert north Indian Bend (22+75)
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-40	1290.47	-8.667	1290	0	1290	8.667	1290	40	1290

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-40	.013	-40	.013	40	.013

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-40	40	5	5	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
-40	-16.334	1294	T
-6.334	-5	1294	T
5	6.334	1294	T
16.334	40	1294	T

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1295.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.71	Wt. n-Val.		0.013	
W.S. Elev (ft)	1293.42	Reach Len. (ft)	5.00	5.00	5.00
Crit W.S. (ft)	1293.42	Flow Area (sq ft)		102.25	

* E.G. Slope (ft/ft)	*0.001643	* Area (sq ft)	*	* 266.48	*	*	
* Q Total (cfs)	* 1073.00	* Flow (cfs)	*	* 1073.00	*	*	
* Top Width (ft)	* 80.00	* Top Width (ft)	*	* 80.00	*	*	
* Vel Total (ft/s)	* 10.49	* Avg. Vel. (ft/s)	*	* 10.49	*	*	
* Max Chl Dpth (ft)	* 3.42	* Hydr. Depth (ft)	*	* 3.41	*	*	
* Conv. Total (cfs)	* 26468.1	* Conv. (cfs)	*	* 26468.1	*	*	
* Length Wtd. (ft)	* 5.00	* Wetted Per. (ft)	*	* 30.00	*	*	
* Min Ch El (ft)	* 1290.00	* Shear (lb/sq ft)	*	* 0.35	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.67	*	*	
* Frctn Loss (ft)	* 0.01	* Cum Volume (acre-ft)	*	* 7.99	*	*	
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	* 2.74	*	*	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Indian Bend Rd
REACH: Seville RS: 6

INPUT
Description: 22+80, Entrance to 2-12'x7' CBC
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1296.32	32	1296.32	32	1298.32	48.667	1298.32	48.667	1287
75.667	1287	75.667	1297.84	76.667	1297.84	76.667	1295.84	82.667	1295.84

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	82.667	.013

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	82.667	1015	1015	.1	.3

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
48.667	49.667	1294.17	T
61.667	62.667	1294.17	T

```
  74.667  75.667 1294.17       T

CROSS SECTION OUTPUT  Profile #PF 1
```

E.G. Elev (ft)	1292.94	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.99	Wt. n-Val.		0.013		
W.S. Elev (ft)	1290.95	Reach Len. (ft)	1015.00	1015.00	1015.00	
Crit W.S. (ft)	1290.95	Flow Area (sq ft)		94.71		
E.G. Slope (ft/ft)	0.001576	Area (sq ft)		106.54		
Q Total (cfs)	1073.00	Flow (cfs)		1073.00		
Top Width (ft)	27.00	Top Width (ft)		27.00		
Vel Total (ft/s)	11.33	Avg. Vel. (ft/s)		11.33		
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)		3.95		
Conv. Total (cfs)	27031.3	Conv. (cfs)		27031.3		
Length Wtd. (ft)	1015.00	Wetted Per. (ft)		24.00		
Min Ch El (ft)	1287.00	Shear (lb/sq ft)		0.39		
Alpha	1.00	Stream Power (lb/ft s)		4.40		
Frctn Loss (ft)	1.36	Cum Volume (acre-ft)		7.97		
C & E Loss (ft)	0.02	Cum SA (acres)		2.74		

```
Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
         This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there is
         not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 5.5

INPUT
Description: 32+95, Inflow from 2-8'x4' CBC
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0 1290.54      32 1290.54      32 1292.54   47.25 1292.54   47.25 1282.73
   74.25 1282.73   74.25 1291.83   75.25 1291.83   75.25 1289.83   81.25 1289.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .027   47.25    .013   74.25    .027

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.25   74.25               70      70      70            .1       .3
```

```
Ineffective Flow      num=       3
   Sta L    Sta R     Elev  Permanent
   47.25    48.25  1289.73       T
   60.25    61.25  1289.73       T
   73.25    74.25  1289.73       T

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1289.49  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.94  * Wt. n-Val.            *         *   0.013 *          *
* W.S. Elev (ft)         * 1287.54  * Reach Len. (ft)       *  70.00   *  70.00 *   70.00  *
* Crit W.S. (ft)         * 1287.20  * Flow Area (sq ft)     *         *  115.55 *          *
* E.G. Slope (ft/ft)     *0.001177  * Area (sq ft)          *         *  129.99 *          *
* Q Total (cfs)          * 1292.00  * Flow (cfs)            *         * 1292.00 *          *
* Top Width (ft)         *   27.00  * Top Width (ft)        *         *   27.00 *          *
* Vel Total (ft/s)       *   11.18  * Avg. Vel. (ft/s)      *         *   11.18 *          *
* Max Chl Dpth (ft)      *    4.81  * Hydr. Depth (ft)      *         *    4.81 *          *
* Conv. Total (cfs)      * 37656.6  * Conv. (cfs)           *         * 37656.6 *          *
* Length Wtd. (ft)       *   70.00  * Wetted Per. (ft)      *         *   24.00 *          *
* Min Ch El (ft)         * 1282.73  * Shear (lb/sq ft)      *         *    0.35 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *    3.96 *          *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)  *         *    5.21 *          *
* C & E Loss (ft)        *    0.07  * Cum SA (acres)        *         *    2.11 *          *
*********************************************************************************************

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 5.4

INPUT
Description: 33+65
Station Elevation Data    num=      10
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
       0 1290.31       32 1290.31       32 1292.31   47.25 1292.31   47.25  1282.5
   74.25  1282.5    74.25  1291.6    75.25  1291.6    75.25  1289.6    81.25  1289.6

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
       0    .027    47.25    .013    74.25    .027

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.25   74.25              460     460     460            .1       .3
Ineffective Flow      num=       3
   Sta L    Sta R     Elev  Permanent
   47.25    48.25  1289.5       T
   60.25    61.25  1289.5       T
```

```
   73.25   74.25  1289.5       T

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1289.34  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.71  * Wt. n-Val.             *         *    0.013 *          *
* W.S. Elev (ft)         * 1287.63  * Reach Len. (ft)        *  460.00 *  460.00  *  460.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *         *  123.02  *          *
* E.G. Slope (ft/ft)     *0.000955  * Area (sq ft)           *         *  138.40  *          *
* Q Total (cfs)          * 1292.00  * Flow (cfs)             *         * 1292.00  *          *
* Top Width (ft)         *   27.00  * Top Width (ft)         *         *   27.00  *          *
* Vel Total (ft/s)       *   10.50  * Avg. Vel. (ft/s)       *         *   10.50  *          *
* Max Chl Dpth (ft)      *    5.13  * Hydr. Depth (ft)       *         *    5.13  *          *
* Conv. Total (cfs)      * 41804.6  * Conv. (cfs)            *         * 41804.6  *          *
* Length Wtd. (ft)       *  460.00  * Wetted Per. (ft)       *         *   24.00  *          *
* Min Ch El (ft)         * 1282.50  * Shear (lb/sq ft)       *         *    0.31  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *    3.21  *          *
* Frctn Loss (ft)        *    0.25  * Cum Volume (acre-ft)   *         *    5.00  *          *
* C & E Loss (ft)        *    0.23  * Cum SA (acres)         *         *    2.07  *          *
*********************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 5

INPUT
Description: 38+25, Discharge of 2-12'x7' CBC into Indian Bend Wash
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1290.98      32 1290.98      32 1292.98   47.25 1292.98   47.25    1281
   74.25    1281   74.25 1292.27   75.25 1292.27   75.25 1290.27   81.25 1290.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .027   47.25    .013   74.25    .027

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          47.25  74.25              5       5     460             .1        .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
   47.25   48.25    1288       T
```

```
   60.25   61.25    1288        T
   73.25   74.25    1288        T

CROSS SECTION OUTPUT  Profile #PF 1
************************************************************************************************
* E.G. Elev (ft)         * 1288.85  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.94  * Wt. n-Val.            *          *    0.013 *          *
* W.S. Elev (ft)         * 1287.91  * Reach Len. (ft)       *    5.00  *     5.00 *  460.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          *  165.84  *          *
* E.G. Slope (ft/ft)     *0.000353  * Area (sq ft)          *          *  186.57  *          *
* Q Total (cfs)          * 1292.00  * Flow (cfs)            *          * 1292.00  *          *
* Top Width (ft)         *   27.00  * Top Width (ft)        *          *   27.00  *          *
* Vel Total (ft/s)       *    7.79  * Avg. Vel. (ft/s)      *          *    7.79  *          *
* Max Chl Dpth (ft)      *    6.91  * Hydr. Depth (ft)      *          *    6.91  *          *
* Conv. Total (cfs)      * 68767.6  * Conv. (cfs)           *          * 68767.6  *          *
* Length Wtd. (ft)       *    5.00  * Wetted Per. (ft)      *          *   24.00  *          *
* Min Ch El (ft)         * 1281.00  * Shear (lb/sq ft)      *          *    0.15  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    1.19  *          *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)  *          *    3.28  *          *
* C & E Loss (ft)        *    0.13  * Cum SA (acres)        *          *    1.78  *          *
************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 4

INPUT
Description: 38+30, New Roadway Ditch within Indian Bend Wash
Station Elevation Data    num=       9
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
       0     1292       27   1291.5   36.667     1287       52     1282       76     1282
      77     1285      100     1285      155     1285      470     1285

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*************************************************
       0    .027        0    .027      470    .027

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.    Expan.
              0     470             120     120     120              .1        .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

```
       0      52    1292       F
      76     470    1292       F

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1288.72  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    2.22  * Wt. n-Val.             *         *   0.027 *          *
* W.S. Elev (ft)         * 1286.50  * Reach Len. (ft)       * 120.00  * 120.00  *  120.00  *
* Crit W.S. (ft)         * 1286.50  * Flow Area (sq ft)     *         * 107.95  *          *
* E.G. Slope (ft/ft)     *0.006369  * Area (sq ft)          *         * 730.71  *          *
* Q Total (cfs)          * 1292.00  * Flow (cfs)            *         *1292.00  *          *
* Top Width (ft)         *  431.79  * Top Width (ft)        *         * 431.79  *          *
* Vel Total (ft/s)       *   11.97  * Avg. Vel. (ft/s)      *         *  11.97  *          *
* Max Chl Dpth (ft)      *    4.50  * Hydr. Depth (ft)      *         *   4.50  *          *
* Conv. Total (cfs)      * 16188.9  * Conv. (cfs)           *         *16188.9  *          *
* Length Wtd. (ft)       *  120.00  * Wetted Per. (ft)      *         *  24.00  *          *
* Min Ch El (ft)         * 1282.00  * Shear (lb/sq ft)      *         *   1.79  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *  21.41  *          *
* Frctn Loss (ft)        *    0.56  * Cum Volume (acre-ft)   *         *   3.23  *          *
* C & E Loss (ft)        *    0.47  * Cum SA (acres)         *         *   1.75  *          *
*********************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
         This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there is
         not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water
         surface was used.

CROSS SECTION


RIVER: Indian Bend Rd
REACH: Seville            RS: 3

INPUT
Description: 39+50, New Roadway Ditch within Indian Bend Wash
Station Elevation Data    num=       9
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
       0  1290.5       27     1290   36.667     1285       55   1282.5       80   1282.5
     106     1287      113     1288      119     1289      130   1289.5

Manning's n Values        num=       3
```

Sta	n Val	Sta	n Val	Sta	n Val
0	.027	0	.027	130	.027

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	130	430	430	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1287.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.027	
W.S. Elev (ft)	1286.49	Reach Len. (ft)	430.00	430.00	430.00
Crit W.S. (ft)	1285.75	Flow Area (sq ft)		198.23	
E.G. Slope (ft/ft)	0.003511	Area (sq ft)		198.23	
Q Total (cfs)	1292.00	Flow (cfs)		1292.00	
Top Width (ft)	69.28	Top Width (ft)		69.28	
Vel Total (ft/s)	6.52	Avg. Vel. (ft/s)		6.52	
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)		2.86	
Conv. Total (cfs)	21804.2	Conv. (cfs)		21804.2	
Length Wtd. (ft)	430.00	Wetted Per. (ft)		70.15	
Min Ch El (ft)	1282.50	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		4.04	
Frctn Loss (ft)	2.36	Cum Volume (acre-ft)		1.95	
C & E Loss (ft)	0.00	Cum SA (acres)		1.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Indian Bend Rd
REACH: Seville RS: 2

INPUT
Description: 43+80, New Roadway Ditch within Indian Bend Wash @ New Drop Structure

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1290.5	15	1285	26	1284	30	1283	33	1281
38	1281	58	1281	122	1284	171	1284		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.027	0	.027	171	.027

Seville Channel
Proposed 2-12'x7' Concrete Box Culvert
100-Year Discharge = 1073 to 1292 cfs

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	171	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1284.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.		0.027	
W.S. Elev (ft)	1284.12	Reach Len. (ft)			
Crit W.S. (ft)	1284.12	Flow Area (sq ft)		196.26	
E.G. Slope (ft/ft)	*0.009752	Area (sq ft)		196.26	
Q Total (cfs)	1292.00	Flow (cfs)		1292.00	
Top Width (ft)	146.30	Top Width (ft)		146.30	
Vel Total (ft/s)	6.58	Avg. Vel. (ft/s)		6.58	
Max Chl Dpth (ft)	3.12	Hydr. Depth (ft)		1.34	
Conv. Total (cfs)	13083.0	Conv. (cfs)		13083.0	
Length Wtd. (ft)		Wetted Per. (ft)		147.23	
Min Ch El (ft)	1281.00	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		5.34	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Indian Bend Rd

Reach	River Sta.	n1	n2	n3
Seville	10	.013	.013	.013
Seville	9.5	Culvert		
Seville	9	.027	.027	.027
Seville	8	.013	.013	.013
Seville	7.5	Culvert		
Seville	7	.013	.013	.013
Seville	6	.013	.013	.013
Seville	5.5	.027	.013	.027
Seville	5.4	.027	.013	.027
Seville	5	.027	.013	.027
Seville	4	.027	.027	.027
Seville	3	.027	.027	.027
Seville	2	.027	.027	.027

SUMMARY OF REACH LENGTHS

River: Indian Bend Rd

Reach	River Sta.	Left	Channel	Right
Seville	10	145	145	145
Seville	9.5	Culvert		
Seville	9	187	187	187
Seville	8	135	135	135
Seville	7.5	Culvert		
Seville	7	5	5	5
Seville	6	1015	1015	1015
Seville	5.5	70	70	70
Seville	5.4	460	460	460
Seville	5	5	5	460
Seville	4	120	120	120
Seville	3	430	430	430
Seville	2	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Indian Bend Rd

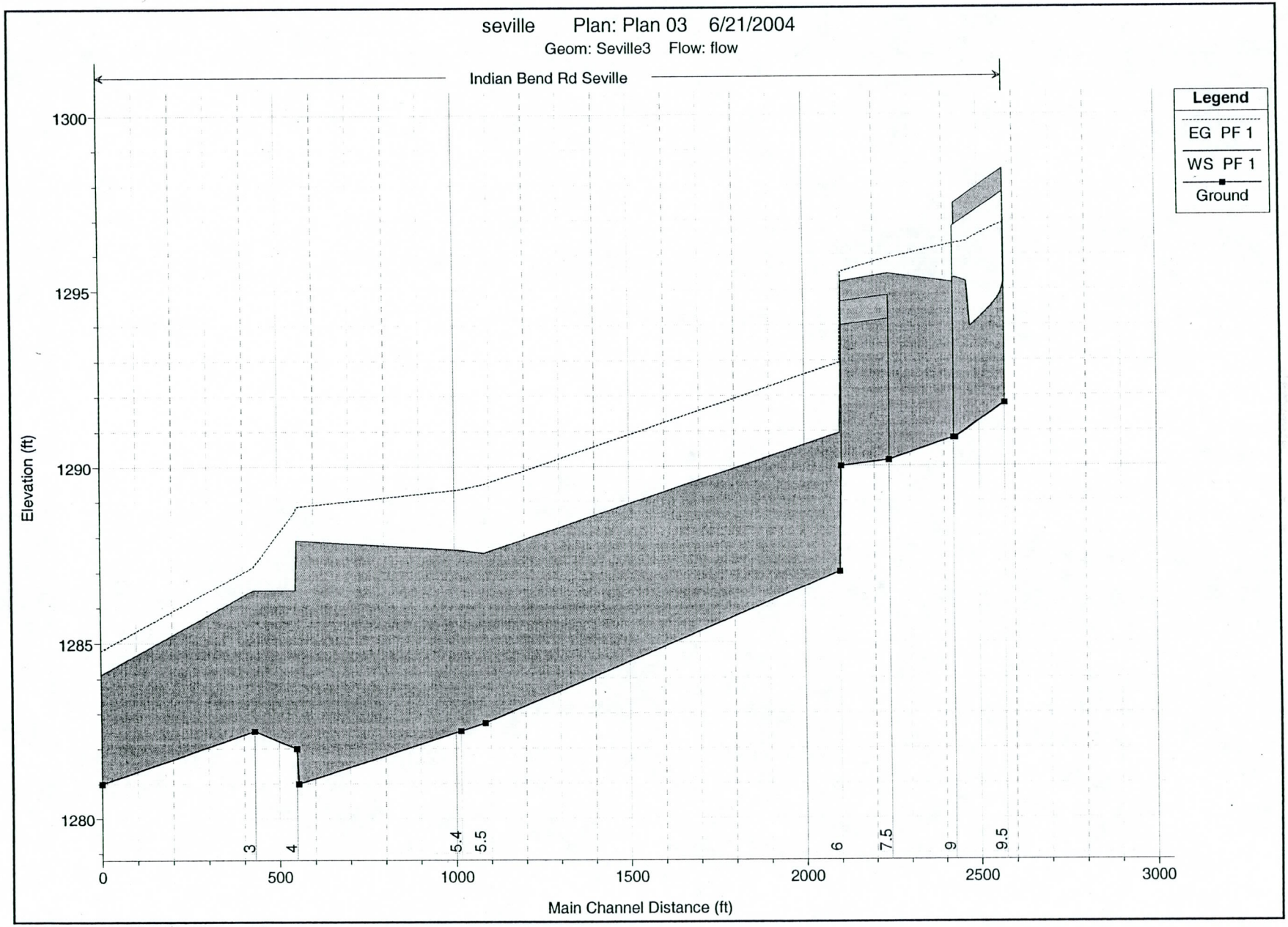
Reach	River Sta.	Contr.	Expan.
Seville	10	.1	.3
Seville	9.5	Culvert	
Seville	9	.1	.3
Seville	8	.1	.3
Seville	7.5	Culvert	
Seville	7	.1	.3
Seville	6	.1	.3
Seville	5.5	.1	.3
Seville	5.4	.1	.3
Seville	5	.1	.3
Seville	4	.1	.3
Seville	3	.1	.3
Seville	2	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : trial

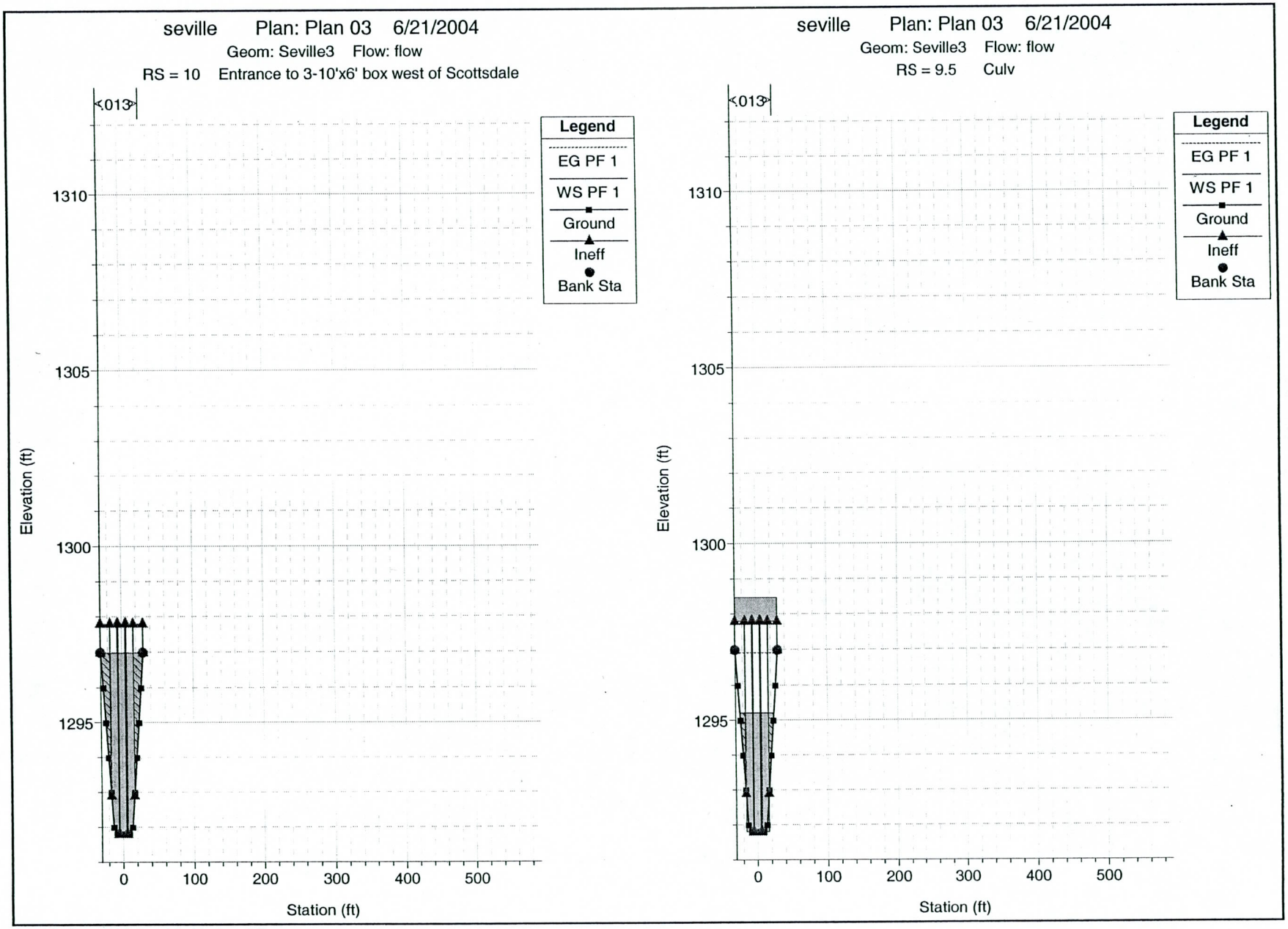
River: Indian Bend Rd Reach: Seville RS: 9 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.
River: Indian Bend Rd Reach: Seville RS: 7.5 Profile: PF 1 Culv: Culvert #1
Warning: During subcritical analysis, with the exit loss set =1.0, the projected WSEL in culvert has a lower energy than the downstream energy. Most likely, the downstream cross section blocks part of the culvert or the ineffective area is set too far in. Instead of projecting the WSEL, the program did an energy balance to get the WSEL inside the culvert at the downstream end.
River: Indian Bend Rd Reach: Seville RS: 7 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
River: Indian Bend Rd Reach: Seville RS: 6 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Indian Bend Rd Reach: Seville RS: 5.4 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Rd Reach: Seville RS: 5 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Indian Bend Rd Reach: Seville RS: 4 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Indian Bend Rd Reach: Seville RS: 3 Profile: PF 1
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

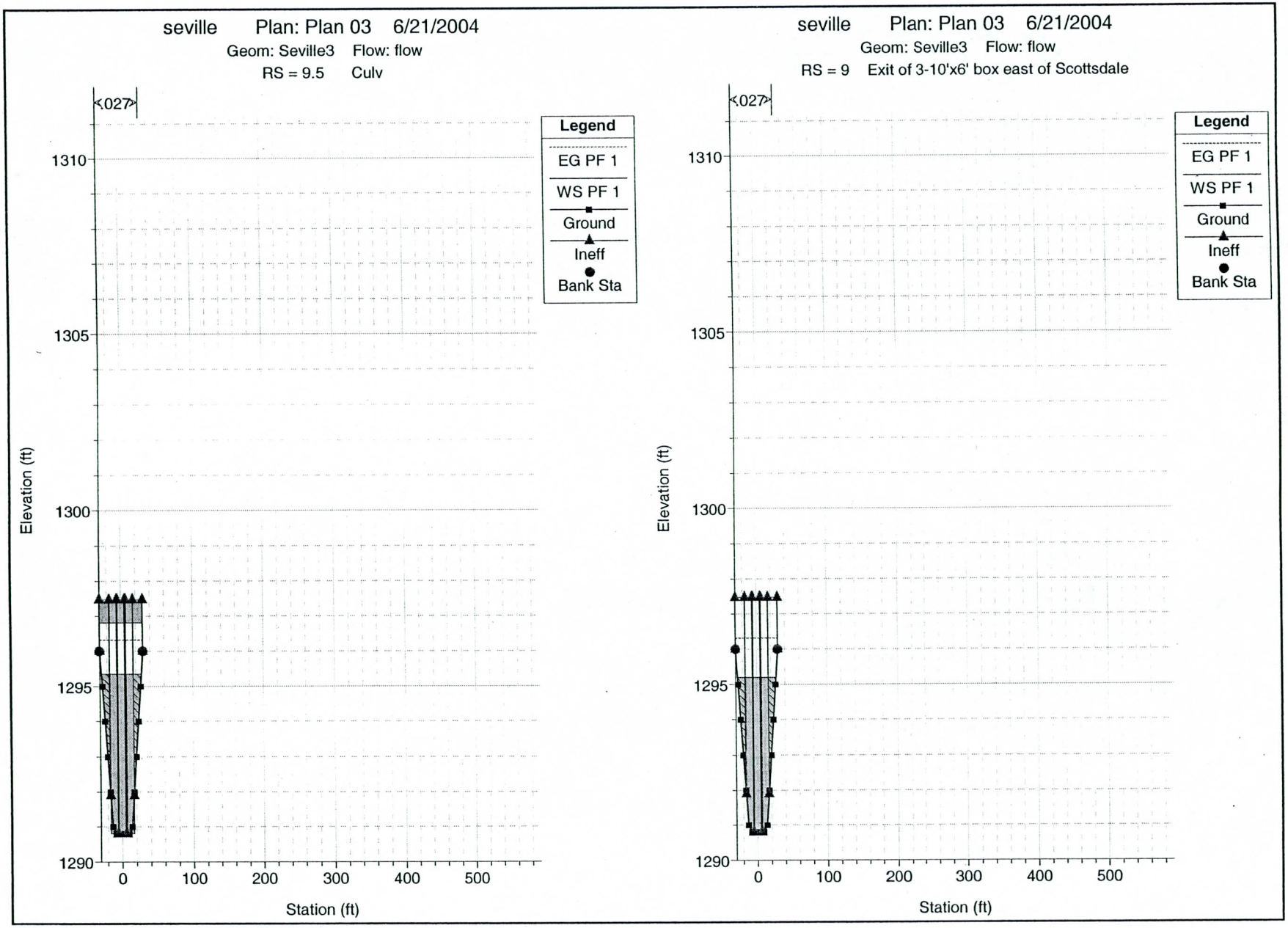
the need for additional cross sections.



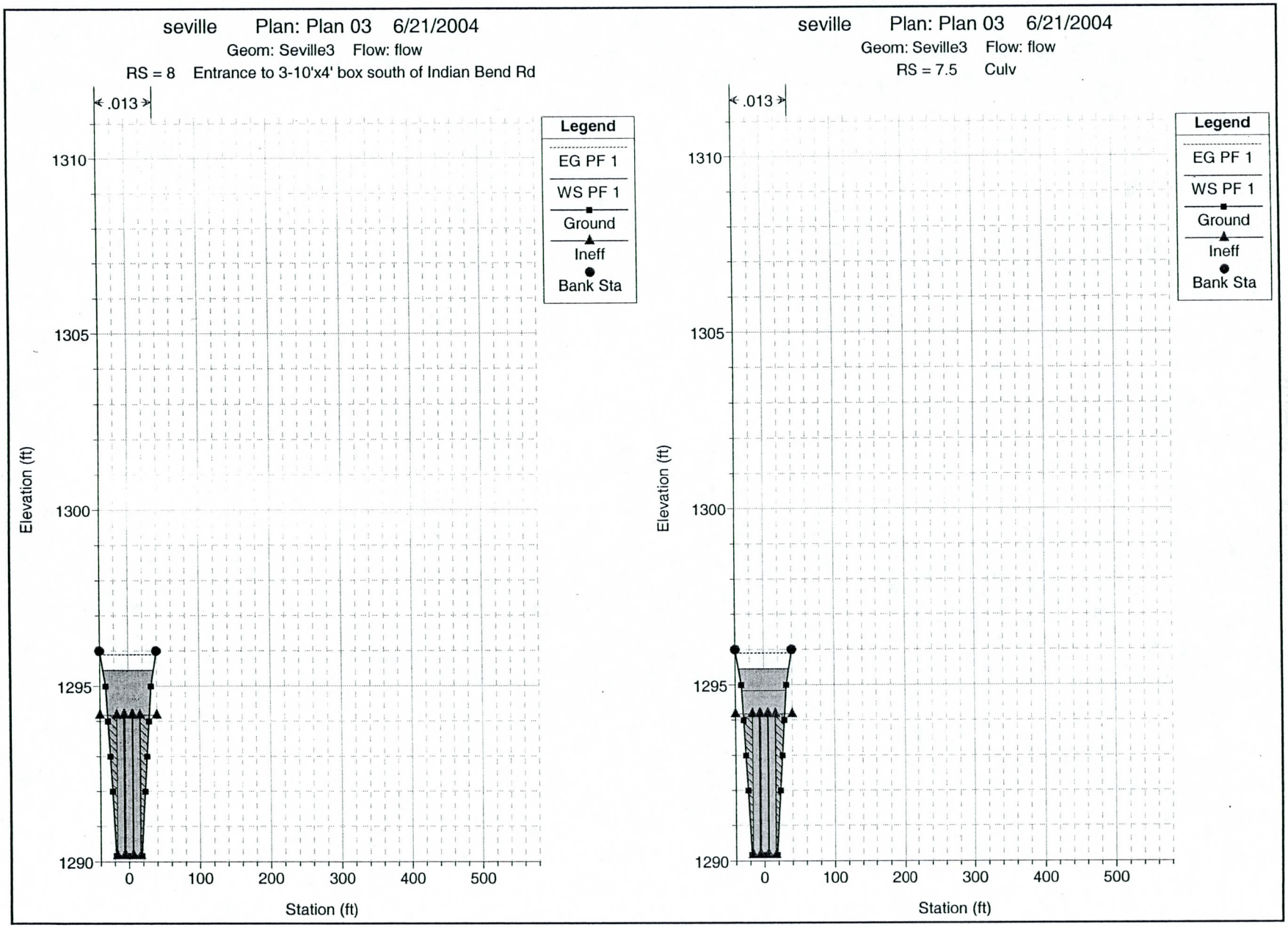
1 in Horiz. = 400 ft 1 in Vert. = 4 ft



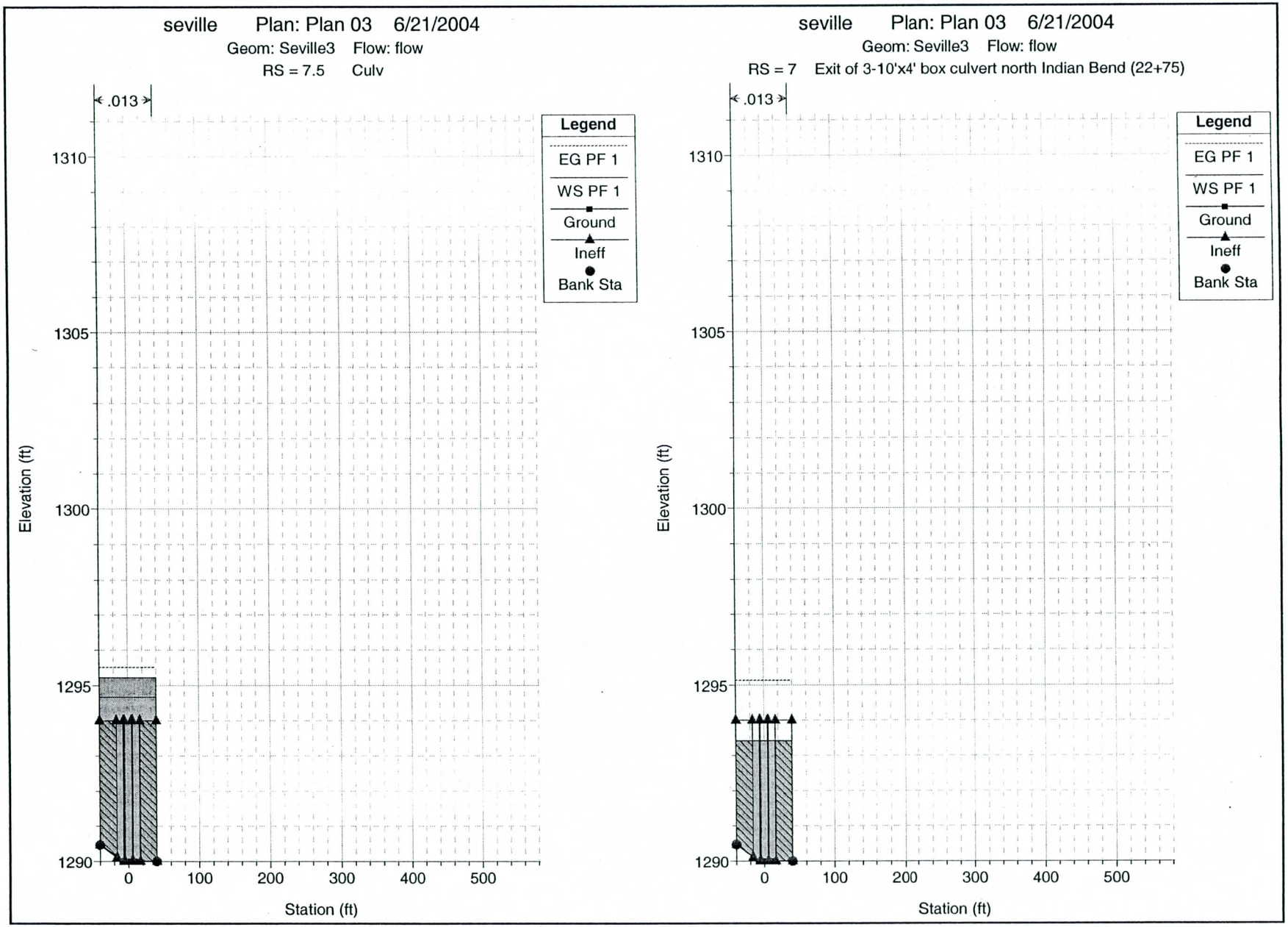
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



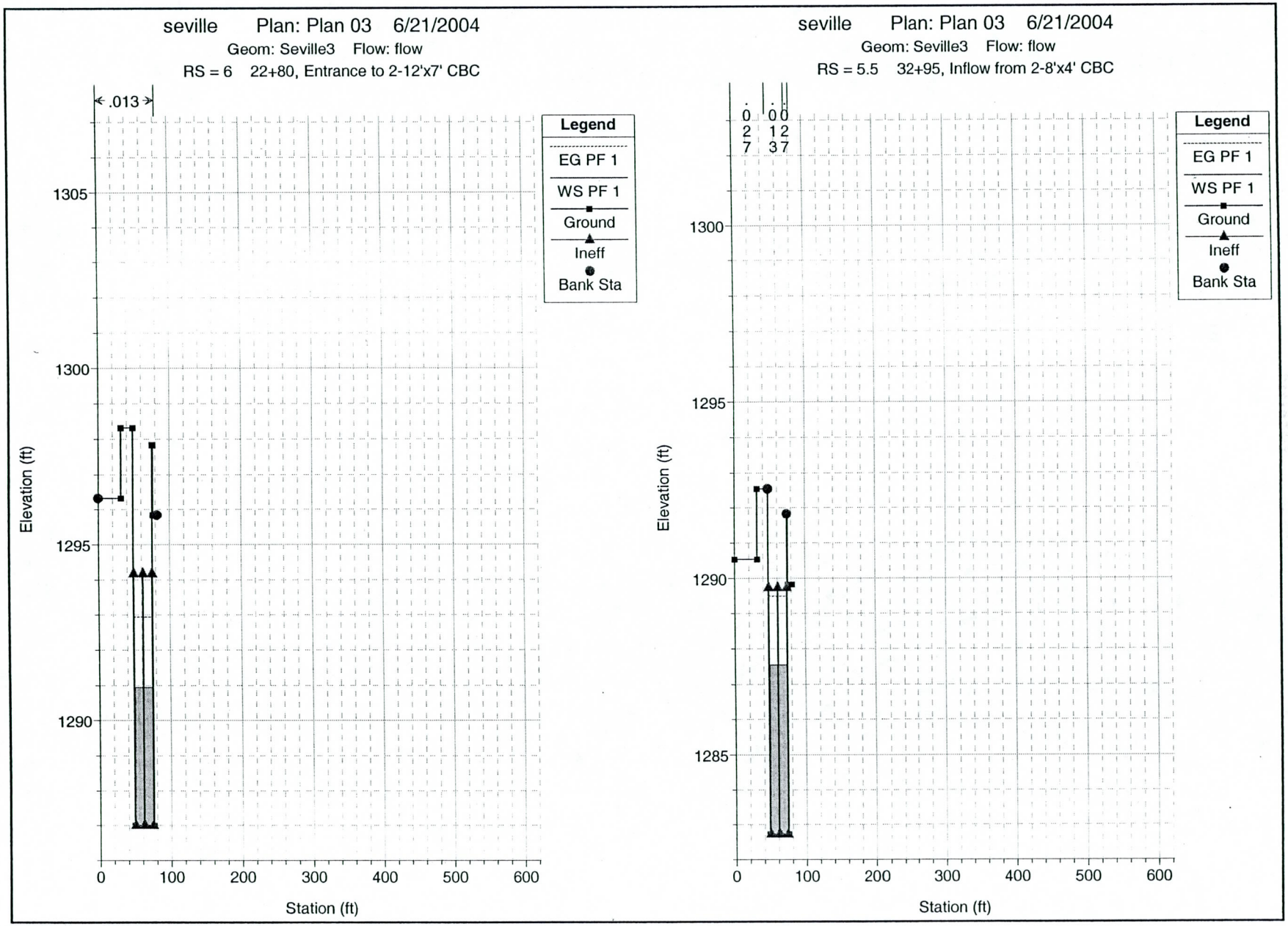
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



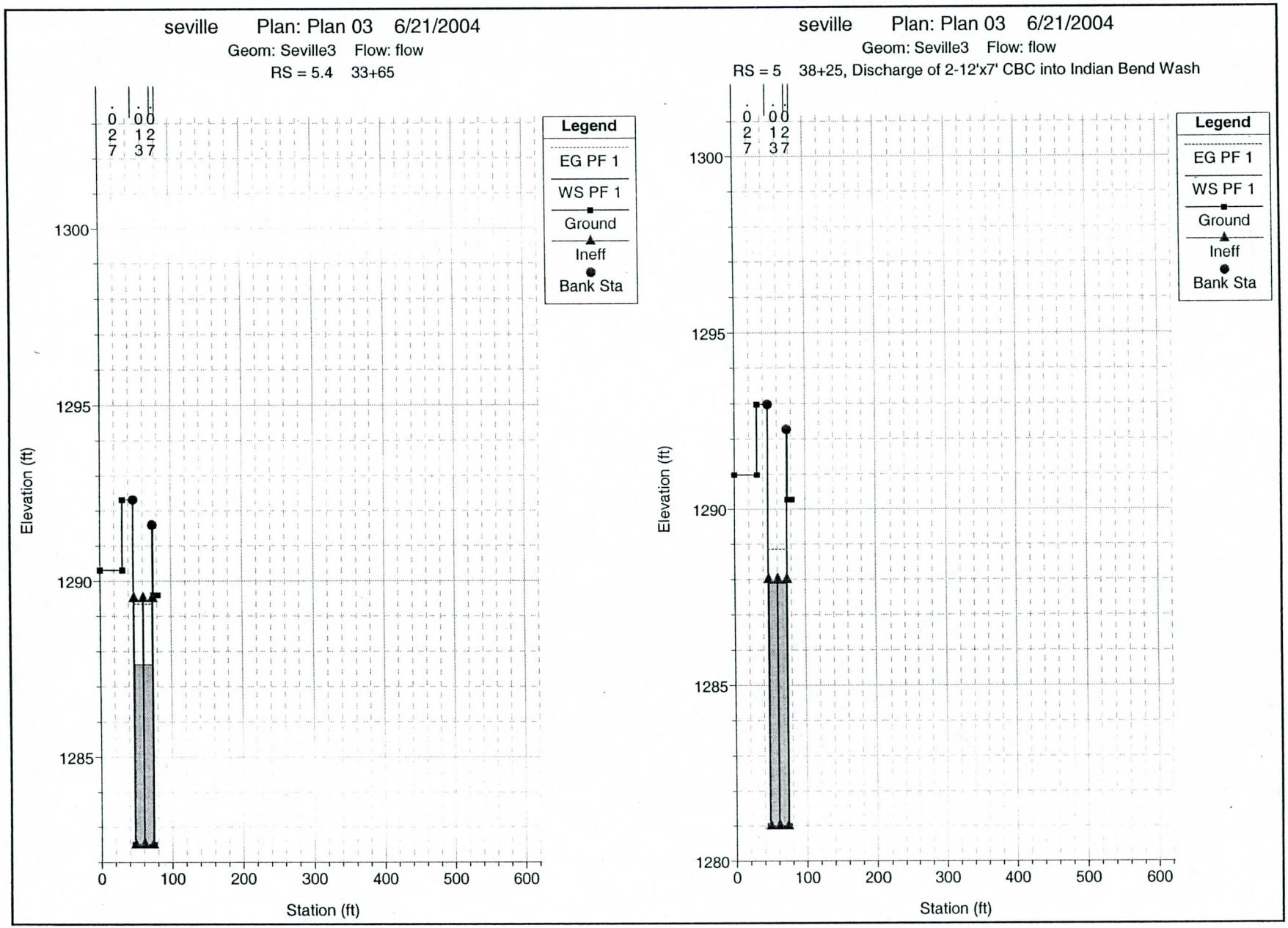
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



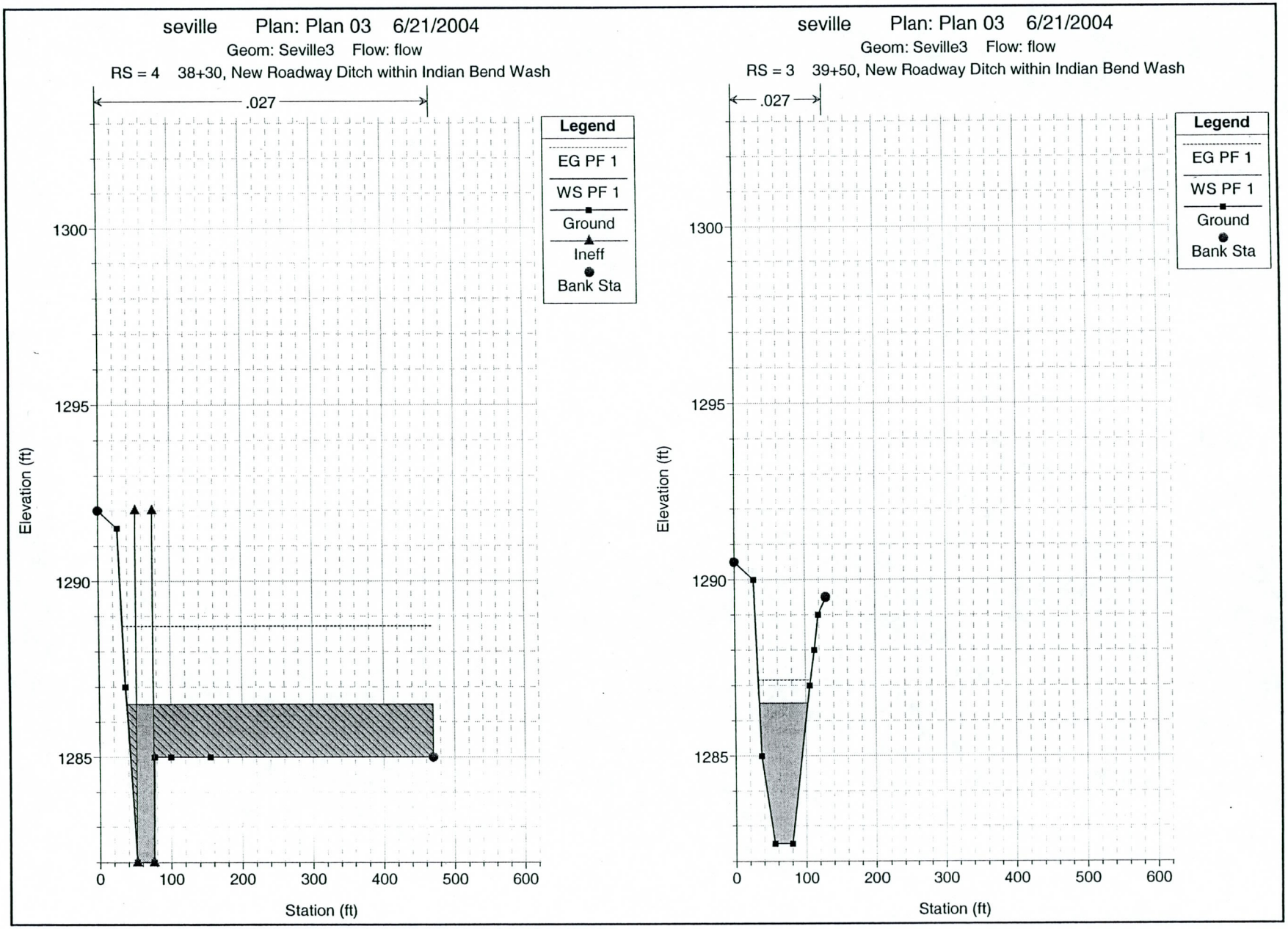
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



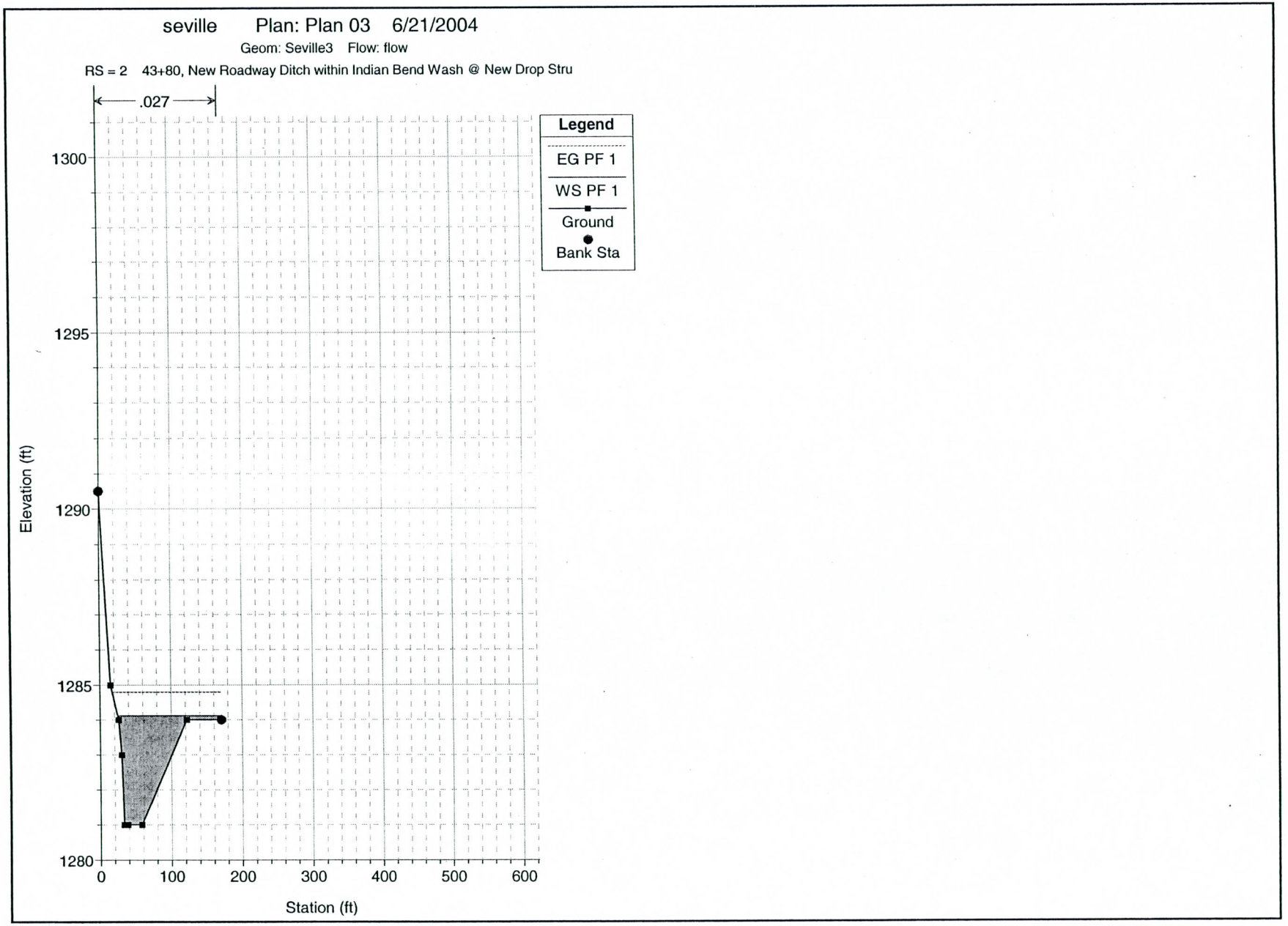
1 in Horiz. = 200 ft 1 in Vert. = 4 ft



1 in Horiz. = 200 ft 1 in Vert. = 4 ft



1 in Horiz. = 200 ft 1 in Vert. = 4 ft



1 in Horiz. = 200 ft 1 in Vert. = 4 ft

APPENDIX K

ARIZONA DEPARTMENT OF TRANSPORTATION
HYDROLOGIC DESIGN DATA

Project No.	S0402	TRACS No.	
Project Name	Indian Bend Road	Date	June 14, 2004
Location	Scottsdale Road to Hayden Road		
Designer	Dave Schaub	Checker	Reza Sheibani

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet

PART A

Determine rainfall depths from the isopluvial maps (Appendix):

2-year, 6-hour		$P_{2,6'}$	=	1.10
2-year, 24-hour		$P_{2,24'}$	=	1.30
100-year, 6-hour		$P_{100,6'}$	=	3.00
100-year, 24-hour		$P_{100,24'}$	=	3.40

PART B

Compute the following:

2-year, 1-hour	-0.011+	$\frac{.942(P_{2,6'})^2}{(P_{2,24'})}$	=	-0.011	+	$\frac{.942\ (\ 1.10\ )^2}{1.30}$	=	0.87		
100-year, 1-hour	0.494+	$\frac{.755(P_{100,6'})^2}{(P_{100,24'})}$	=	0.494	+	$\frac{.755\ (\ 3.00\ )^2}{3.40}$	=	2.49		
2-year, 2-hour	$.341(P_{2,6'}) + .659(P_{2,1'})$		=	0.341	(1.10)	+ 0.659	(0.87)	=	0.95	
2-year, 3-hour	$.569(P_{2,6'}) + .431(P_{2,1'})$		=	0.569	(1.10)	+ 0.431	(0.87)	=	1.00	
2-year, 12-hour	$.500(P_{2,6'}) + .500(P_{2,24'})$		=	0.500	(1.10)	+ 0.500	(1.30)	=	1.20	
100-year, 2-hour	$.341(P_{100,6'}) + .431(P_{100,1'})$		=	0.341	(3.00)	+ 0.659	(2.49)	=	2.67	
100-year, 3-hour	$.569(P_{100,6'}) + .431(P_{100,1'})$		=	0.569	(3.00)	+ 0.431	(2.49)	=	2.78	
100-year, 12-hour	$.500(P_{100,6'}) + .500(P_{100,24'})$		=	0.500	(3.00)	+ 0.500	(3.40)	=	3.20	

Note: 5" denotes 5 mintes, etc; 1' denotes 1 hour, etc.

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet
(Continued)

Part C

Determine the short-duration zone (Figure 1-1):

Zone = 8

Determine the short-duration rainfall ratios (Table 1-1):

Duration (Minutes)	Ratio			
	2-year		100-year	
5	A=	0.34	E=	0.30
10	B=	0.51	F=	0.46
15	C=	0.62	G=	0.59
30	D=	0.82	H=	0.80

Compute the following:

2-year, 5-min	(A) ($P_{2,1'}$)	=	0.34	*	0.87	$P_{2,5'}$ =	0.29
2-year, 10-min	(B) ($P_{2,1'}$)	=	0.51	*	0.87	$P_{2,10'}$ =	0.44
2-year, 15-min	(C) ($P_{2,1'}$)	=	0.62	*	0.87	$P_{2,15'}$ =	0.54
2-year, 30-min	(D) ($P_{2,1'}$)	=	0.82	*	0.87	$P_{2,30'}$ =	0.71
100-year, 5-min	(E) ($P_{100,1'}$)	=	0.30	*	2.49	$P_{100,5'}$ =	0.75
100-year, 10-min	(F) ($P_{100,1'}$)	=	0.46	*	2.49	$P_{100,10'}$ =	1.15
100-year, 15-min	(G) ($P_{100,1'}$)	=	0.59	*	2.49	$P_{100,15'}$ =	1.47
100-year, 30-min	(H) ($P_{100,1'}$)	=	0.80	*	2.49	$P_{100,30'}$ =	1.99

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2

Rainfall Depth-Duration-Frequency (D-D-F) Worksheet

(Continued)

Part D

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t} = (X)\ (P_{2,t}) + (Y)\ (P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected frequency (T-yr) = 5 yr X = 0.674 Y = 0.278

5-min	$(X)\ (P_{2,5'}) + (Y)\ (P_{100,5'})$	=	(	0.674	) (	0.29	) + (	0.278	) (	0.75	)	$P_{5,5'}$	= 0.41
10-min	$(X)\ (P_{2,10'}) + (Y)\ (P_{100,10'})$	=	(	0.674	) (	0.44	) + (	0.278	) (	1.15	)	$P_{5,10'}$	= 0.62
15-min	$(X)\ (P_{2,15'}) + (Y)\ (P_{100,15'})$	=	(	0.674	) (	0.54	) + (	0.278	) (	1.47	)	$P_{5,15'}$	= 0.77
30-min	$(X)\ (P_{2,30'}) + (Y)\ (P_{100,30'})$	=	(	0.674	) (	0.71	) + (	0.278	) (	1.99	)	$P_{5,30'}$	= 1.03
1-hour	$(X)\ (P_{2,1'}) + (Y)\ (P_{100,1'})$	=	(	0.674	) (	0.87	) + (	0.278	) (	2.49	)	$P_{5,1'}$	= 1.28
2-hour	$(X)\ (P_{2,2'}) + (Y)\ (P_{100,2'})$	=	(	0.674	) (	0.95	) + (	0.278	) (	2.67	)	$P_{5,2'}$	= 1.38
3-hour	$(X)\ (P_{2,3'}) + (Y)\ (P_{100,3'})$	=	(	0.674	) (	1.00	) + (	0.278	) (	2.78	)	$P_{5,3'}$	= 1.45
6-hour	$(X)\ (P_{2,6'}) + (Y)\ (P_{100,6'})$	=	(	0.674	) (	1.10	) + (	0.278	) (	3.00	)	$P_{5,6'}$	= 1.58
12-hour	$(X)\ (P_{2,12'}) + (Y)\ (P_{100,12'})$	=	(	0.674	) (	1.20	) + (	0.278	) (	3.20	)	$P_{5,12'}$	= 1.70
24-hour	$(X)\ (P_{2,24'}) + (Y)\ (P_{100,24'})$	=	(	0.674	) (	1.30	) + (	0.278	) (	3.40	)	$P_{5,24'}$	= 1.82

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2

Rainfall Depth-Duration-Frequency (D-D-F) Worksheet

(Continued)

Part D

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t} = (X)\,(P_{2,t}) + (Y)\,(P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected frequency (T-yr) = 10 yr X = 0.496 Y = 0.449

5-min	$(X)\,(P_{2,5'}) + (Y)\,(P_{100,5'})$	=	(	0.496	) (	0.29	) + (	0.449	) (	0.75	)	$P_{10,5'}$ =	0.48
10-min	$(X)\,(P_{2,10'}) + (Y)\,(P_{100,10'})$	=	(	0.496	) (	0.44	) + (	0.449	) (	1.15	)	$P_{10,10'}$ =	0.73
15-min	$(X)\,(P_{2,15'}) + (Y)\,(P_{100,15'})$	=	(	0.496	) (	0.54	) + (	0.449	) (	1.47	)	$P_{10,15'}$ =	0.93
30-min	$(X)\,(P_{2,30'}) + (Y)\,(P_{100,30'})$	=	(	0.496	) (	0.71	) + (	0.449	) (	1.99	)	$P_{10,30'}$ =	1.25
1-hour	$(X)\,(P_{2,1'}) + (Y)\,(P_{100,1'})$	=	(	0.496	) (	0.87	) + (	0.449	) (	2.49	)	$P_{10,1'}$ =	1.55
2-hour	$(X)\,(P_{2,2'}) + (Y)\,(P_{100,2'})$	=	(	0.496	) (	0.95	) + (	0.449	) (	2.67	)	$P_{10,2'}$ =	1.67
3-hour	$(X)\,(P_{2,3'}) + (Y)\,(P_{100,3'})$	=	(	0.496	) (	1.00	) + (	0.449	) (	2.78	)	$P_{10,3'}$ =	1.74
6-hour	$(X)\,(P_{2,6'}) + (Y)\,(P_{100,6'})$	=	(	0.496	) (	1.10	) + (	0.449	) (	3.00	)	$P_{10,6'}$ =	1.89
12-hour	$(X)\,(P_{2,12'}) + (Y)\,(P_{100,12'})$	=	(	0.496	) (	1.20	) + (	0.449	) (	3.20	)	$P_{10,12'}$ =	2.03
24-hour	$(X)\,(P_{2,24'}) + (Y)\,(P_{100,24'})$	=	(	0.496	) (	1.30	) + (	0.449	) (	3.40	)	$P_{10,24'}$ =	2.17

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet
(Continued)

Part D

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t} = (X)\,(P_{2,t}) + (Y)\,(P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected frequency (T-yr) = 25 yr X = 0.293 Y = 0.669

5-min	$(X)\,(P_{2,5'}) + (Y)\,(P_{100,5'})$	=	(	0.293	) (	0.29	) + (	0.669	) (	0.75	)	$P_{25,5'}$ =	0.59
10-min	$(X)\,(P_{2,10'}) + (Y)\,(P_{100,10'})$	=	(	0.293	) (	0.44	) + (	0.669	) (	1.15	)	$P_{25,10'}$ =	0.90
15-min	$(X)\,(P_{2,15'}) + (Y)\,(P_{100,15'})$	=	(	0.293	) (	0.54	) + (	0.669	) (	1.47	)	$P_{25,15'}$ =	1.14
30-min	$(X)\,(P_{2,30'}) + (Y)\,(P_{100,30'})$	=	(	0.293	) (	0.71	) + (	0.669	) (	1.99	)	$P_{25,30'}$ =	1.54
1-hour	$(X)\,(P_{2,1'}) + (Y)\,(P_{100,1'})$	=	(	0.293	) (	0.87	) + (	0.669	) (	2.49	)	$P_{25,1'}$ =	1.92
2-hour	$(X)\,(P_{2,2'}) + (Y)\,(P_{100,2'})$	=	(	0.293	) (	0.95	) + (	0.669	) (	2.67	)	$P_{25,2'}$ =	2.06
3-hour	$(X)\,(P_{2,3'}) + (Y)\,(P_{100,3'})$	=	(	0.293	) (	1.00	) + (	0.669	) (	2.78	)	$P_{25,3'}$ =	2.15
6-hour	$(X)\,(P_{2,6'}) + (Y)\,(P_{100,6'})$	=	(	0.293	) (	1.10	) + (	0.669	) (	3.00	)	$P_{25,6'}$ =	2.33
12-hour	$(X)\,(P_{2,12'}) + (Y)\,(P_{100,12'})$	=	(	0.293	) (	1.20	) + (	0.669	) (	3.20	)	$P_{25,12'}$ =	2.49
24-hour	$(X)\,(P_{2,24'}) + (Y)\,(P_{100,24'})$	=	(	0.293	) (	1.30	) + (	0.669	) (	3.40	)	$P_{25,24'}$ =	2.66

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet
(Continued)

Part D

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t} = (X)\,(P_{2,t}) + (Y)\,(P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected frequency (T-yr) = 50 yr X = 0.146 Y = 0.835

5-min	$(X)\,(P_{2,5'}) + (Y)\,(P_{100,5'})$	=	(	0.146	) (	0.29	) + (	0.835	) (	0.75	)	$P_{50,5'}$ =	0.67
10-min	$(X)\,(P_{2,10'}) + (Y)\,(P_{100,10'})$	=	(	0.146	) (	0.44	) + (	0.835	) (	1.15	)	$P_{50,10'}$ =	1.02
15-min	$(X)\,(P_{2,15'}) + (Y)\,(P_{100,15'})$	=	(	0.146	) (	0.54	) + (	0.835	) (	1.47	)	$P_{50,15'}$ =	1.31
30-min	$(X)\,(P_{2,30'}) + (Y)\,(P_{100,30'})$	=	(	0.146	) (	0.71	) + (	0.835	) (	1.99	)	$P_{50,30'}$ =	1.77
1-hour	$(X)\,(P_{2,1'}) + (Y)\,(P_{100,1'})$	=	(	0.146	) (	0.87	) + (	0.835	) (	2.49	)	$P_{50,1'}$ =	2.21
2-hour	$(X)\,(P_{2,2'}) + (Y)\,(P_{100,2'})$	=	(	0.146	) (	0.95	) + (	0.835	) (	2.67	)	$P_{50,2'}$ =	2.36
3-hour	$(X)\,(P_{2,3'}) + (Y)\,(P_{100,3'})$	=	(	0.146	) (	1.00	) + (	0.835	) (	2.78	)	$P_{50,3'}$ =	2.47
6-hour	$(X)\,(P_{2,6'}) + (Y)\,(P_{100,6'})$	=	(	0.146	) (	1.10	) + (	0.835	) (	3.00	)	$P_{50,6'}$ =	2.67
12-hour	$(X)\,(P_{2,12'}) + (Y)\,(P_{100,12'})$	=	(	0.146	) (	1.20	) + (	0.835	) (	3.20	)	$P_{50,12'}$ =	2.85
24-hour	$(X)\,(P_{2,24'}) + (Y)\,(P_{100,24'})$	=	(	0.146	) (	1.30	) + (	0.835	) (	3.40	)	$P_{50,24'}$ =	3.03

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet
(Continued)

Part D

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t} = (X)\,(P_{2,t}) + (Y)\,(P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected frequency (T-yr) = 500 yr X = -0.337 Y = 1.381

5-min	$(X)\,(P_{2,5'}) + (Y)\,(P_{100,5'})$	=	(	-0.337	) (	0.29	) + (	1.381	) (	0.75	)	$P_{500,5'}$ =	0.93
10-min	$(X)\,(P_{2,10'}) + (Y)\,(P_{100,10'})$	=	(	-0.337	) (	0.44	) + (	1.381	) (	1.15	)	$P_{500,10'}$ =	1.43
15-min	$(X)\,(P_{2,15'}) + (Y)\,(P_{100,15'})$	=	(	-0.337	) (	0.54	) + (	1.381	) (	1.47	)	$P_{500,15'}$ =	1.85
30-min	$(X)\,(P_{2,30'}) + (Y)\,(P_{100,30'})$	=	(	-0.337	) (	0.71	) + (	1.381	) (	1.99	)	$P_{500,30'}$ =	2.51
1-hour	$(X)\,(P_{2,1'}) + (Y)\,(P_{100,1'})$	=	(	-0.337	) (	0.87	) + (	1.381	) (	2.49	)	$P_{500,1'}$ =	3.15
2-hour	$(X)\,(P_{2,2'}) + (Y)\,(P_{100,2'})$	=	(	-0.337	) (	0.95	) + (	1.381	) (	2.67	)	$P_{500,2'}$ =	3.36
3-hour	$(X)\,(P_{2,3'}) + (Y)\,(P_{100,3'})$	=	(	-0.337	) (	1.00	) + (	1.381	) (	2.78	)	$P_{500,3'}$ =	3.50
6-hour	$(X)\,(P_{2,6'}) + (Y)\,(P_{100,6'})$	=	(	-0.337	) (	1.10	) + (	1.381	) (	3.00	)	$P_{500,6'}$ =	3.77
12-hour	$(X)\,(P_{2,12'}) + (Y)\,(P_{100,12'})$	=	(	-0.337	) (	1.20	) + (	1.381	) (	3.20	)	$P_{500,12'}$ =	4.01
24-hour	$(X)\,(P_{2,24'}) + (Y)\,(P_{100,24'})$	=	(	-0.337	) (	1.30	) + (	1.381	) (	3.40	)	$P_{500,24'}$ =	4.26

Note: 5" denotes 5 minutes, etc; 1' denotes 1 hour, etc.

Figure 1-2
Rainfall Depth-Duration-Frequency (D-D-F) Worksheet
(Continued)

Part E

Tabulate the rainfall Depth-Duration-Frequency statistics below:

Duration	Rainfall Depth, in inches Frequency, in Years						
	2	5	10	25	50	100	500
5-min	0.29	0.41	0.48	0.59	0.67	0.75	0.93
10-min *	0.44	0.62	0.73	0.90	1.02	1.15	1.43
15-min	0.54	0.77	0.93	1.14	1.31	1.47	1.85
30-min *	0.71	1.03	1.25	1.54	1.77	1.99	2.51
1-hour	0.87	1.28	1.55	1.92	2.21	2.49	3.15
2-hour	0.95	1.38	1.67	2.06	2.36	2.67	3.36
3-hour	1.00	1.45	1.74	2.15	2.47	2.78	3.50
6-hour	1.10	1.58	1.89	2.33	2.67	3.00	3.77
12-hour	1.20	1.70	2.03	2.49	2.85	3.20	4.01
24-hour	1.30	1.82	2.17	2.66	3.03	3.40	4.26

* Note: 10-min and 30-min values are not coded into the PH record
5" denotes 5 minute, etc; 1' denotes 1 hour, etc.

Rainfall Intensity-Duration-Frequency (D-D-F) Worksheet

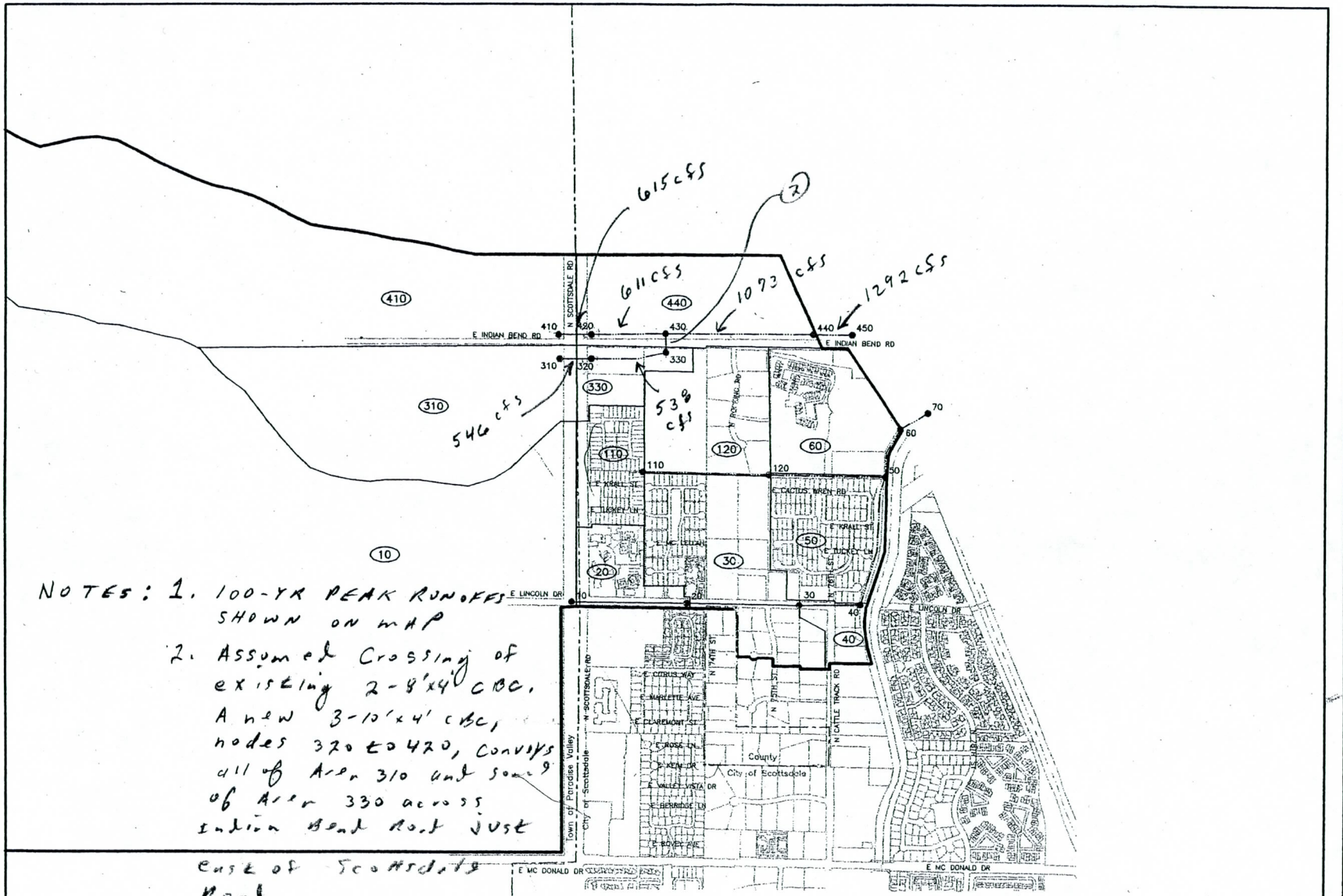
Part F

Tabulate the rainfall Intensity-Duration-Frequency statistics below:

Duration	Rainfall Intensity, in inches/hour Frequency, in Years						
	2	5	10	25	50	100	500
5-min	3.53	4.88	5.78	7.04	8.01	8.97	11.20
10-min	2.65	3.70	4.40	5.38	6.13	6.88	8.61
15-min	2.15	3.08	3.71	4.57	5.23	5.88	7.40
30-min	1.42	2.07	2.50	3.08	3.54	3.99	5.03
1-hour	0.87	1.28	1.55	1.92	2.21	2.49	3.15
2-hour	0.47	0.69	0.83	1.03	1.18	1.33	1.68
3-hour	0.33	0.48	0.58	0.72	0.82	0.93	1.17
6-hour	0.18	0.26	0.32	0.39	0.44	0.50	0.63
12-hour	0.10	0.14	0.17	0.21	0.24	0.27	0.33
24-hour	0.05	0.08	0.09	0.11	0.13	0.14	0.18

* Note: 10-min and 30-min values are not coded into the PH record
5" denotes 5 minute, etc; 1' denotes 1 hour, etc.

APPENDIX L



NOTES: 1. 100-YR PEAK RUNOFFS SHOWN ON MAP

2. Assumed Crossing of existing 2-8'x4' CBC, A new 3-10'x4' CBC, nodes 320 to 420, conveys all of Area 310 and some of Area 330 across Indian Bend Road just east of Scottsdale Road.

3. For Design of Seville Channel / structure, assume design flows of 1073 cfs (Scottsdale Rd to 2-8'x4' CBC) and 1292 cfs (2-8'x4' CBC to Indian Bend Wash).

Sheet 2 of 2

N

0 500 1000

1" = 1000'

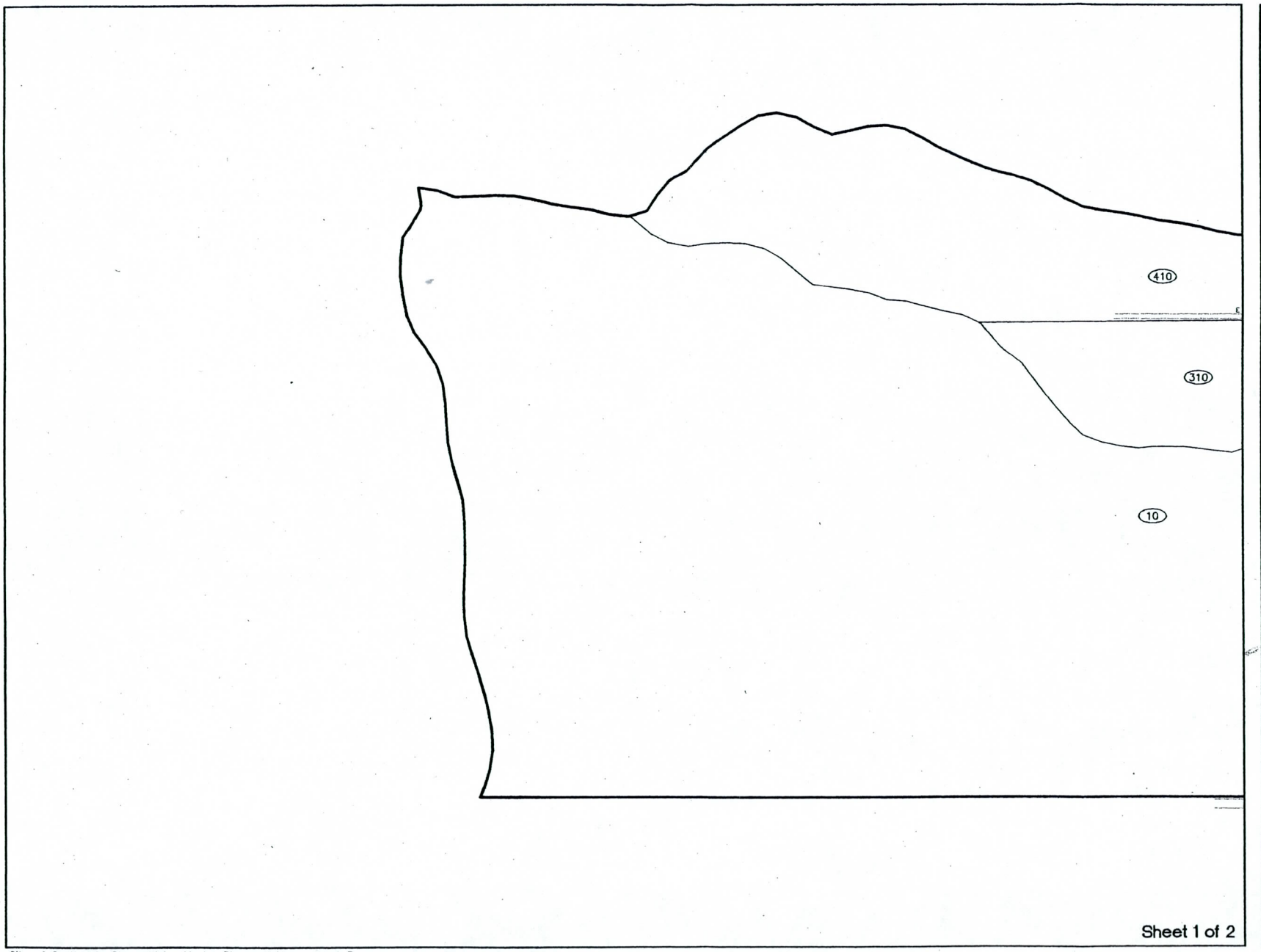
Legend

- 101 Analysis Node
- 101 Storage Basin
- Basin Boundary
- 610 Drainage Area
- Roadway Reach
- Channel
- Pipe/Culvert
- City Boundary

City of Scottsdale

BOYLE ENGINEERING CORPORATION

Basin 20 Indian Bend / Scottsdale Rd. Drainage Map



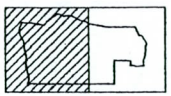
N

0 500 1000

1" = 1000'

Legend

- Analysis Node
- Storage Basin
- Basin Boundary
- Drainage Area
- Roadway Reach
- Channel
- Pipe/Culvert
- City Boundary

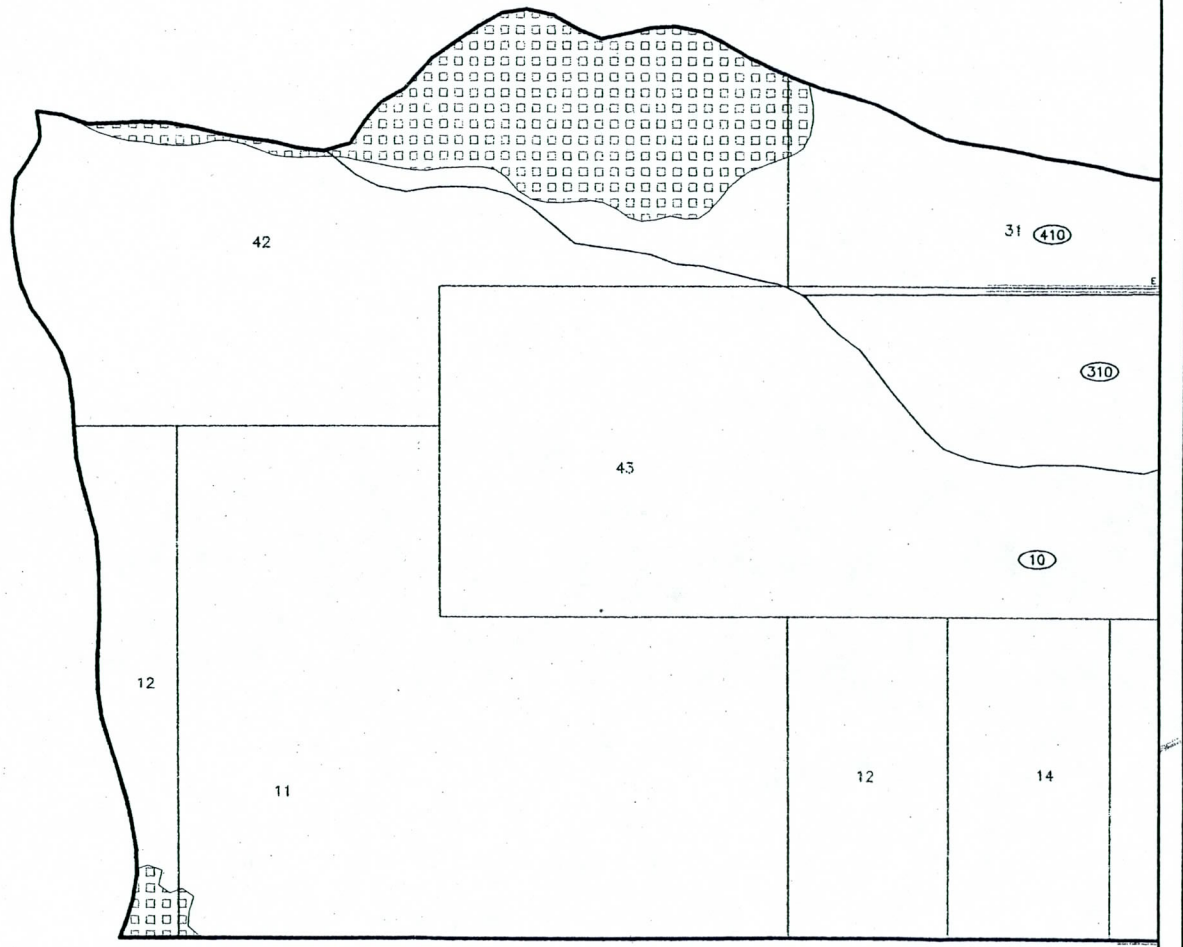


City of Scottsdale

BOYLE ENGINEERING CORPORATION

Basin 20 Indian Bend / Scottsdale Rd. Drainage Map

Sheet 1 of 2



N

0 500 1000

1" = 1000'

Legend

- Basin Boundary
- 610 Drainage Area
- Land Use Boundary
- City Boundary

Land Uses

10 - 1 DU PER 5 ACRES
11 - 1 DU PER 2-3 ACRES
12 - 1 DU PER 1-2 ACRES
13 - 1-2 DU PER ACRE
14 - 2-4 DU PER ACRE
15 - 4-8 DU PER ACRE
16 - 8-12 DU PER ACRE
17 - 12-22 DU PER ACRE
18 - TOURIST ACCOMMODATIONS
19 - LOW INTENSITY RESORT
21 - NEIGHBORHOOD COMMERCIAL
22 - GENERAL COMMERCIAL
31 - MINOR OFFICE
32 - MAJOR OFFICE
33 - MINOR EMPLOYMENT
34 - GENERAL EMPLOYMENT
36 - RESEARCH AND DEVELOPMENT
41 - NATURAL OPEN SPACE
42 - LIMITED USE AREA
43 - DEVELOPED OPEN SPACE
44 - CULTURAL/INSTITUTIONAL
45 - UTILITIES

Soil Group B and Runoff Zone 3 Except where shown

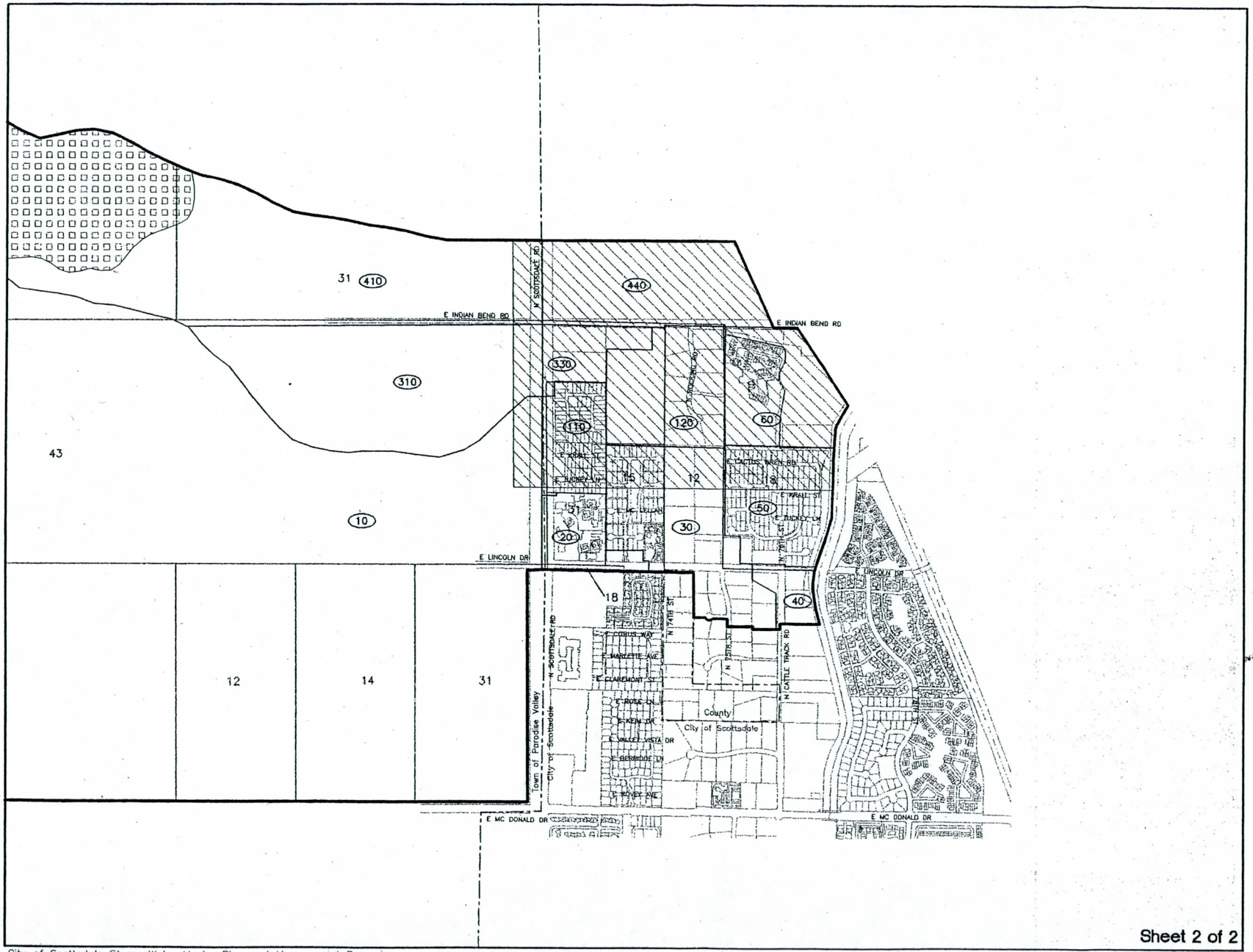
- Soil Group D
- Runoff Zone 2

City of Scottsdale

BOYLE ENGINEERING CORPORATION

Basin 20 Indian Bend / Scottsdale Rd. Land Use Map

Sheet 1 of 2



Sheet 2 of 2

0 500 1000

1" = 1000'

Legend

- Basin Boundary
- (610) Drainage Area
- Land Use Boundary
- City Boundary

Land Uses

10 - 1 DU PER 5 ACRES
11 - 1 DU PER 2-3 ACRES
12 - 1 DU PER 1-2 ACRES
13 - 1-2 DU PER ACRE
14 - 2-4 DU PER ACRE
15 - 4-8 DU PER ACRE
16 - 8-12 DU PER ACRE
17 - 12-22 DU PER ACRE
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44 - CULTURAL/INSTITUTIONAL
45 - UTILITIES

Soil Group B and Runoff Zone 3 Except where shown

- Soil Group D
- Runoff Zone 2

City of Scottsdale

BOYLE ENGINEERING CORPORATION

Basin 20 Indian Bend / Scottsdale Rd. Land Use Map

City of Scottsdale
Storm Water Master Plan and Management Program
PROPOSED CONVEYANCE IMPROVEMENTS COST
20 - INDIAN BEND RD/SCOTTSDALE RD BASIN

12/09/94

ID	Length (ft)	Cost Factor	Pipe ($)	Box ($)	Channel ($)	Contingency @ 20% ($)	ROW ($)	Total ($)
200010-200020	1,180	1.6		926,368		185,274		1,111,642
200020-200030	1,171	1.6		919,303		183,861		1,103,163
200030-200040	622	1.6		488,306		97,661		585,967
200040-200050	600	1.6		490,269		98,054		588,322
200050-200060	956	1.6		781,161		156,232		937,393
200060-200070	329	1.6		268,831		53,766		322,597
200110-200120	1,308	1.6			30,405	6,081		36,486
200120-200050	1,182	1.6			32,142	6,428		38,570
200410-200420	338	1.6	71,855			14,371		86,225
	7,686		71,855	3,874,238	62,547	801,728		4,810,367

ID: 200010-200020

Type: PIPE
Length: 1,180
Upstream Inv Elev: 1288.87
Upstream Grnd Elev: 1302.00

Street Name: E LINCOLN DR
Drawing No(s): 20848-20850
Right of Way: 105
Downstream Inv Elev: 1284.00
Downstream Grnd Elev: 1293.20

Slope: 0.0041

		No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING	Pipe:	1	0.0020	0.013	72						189
	Box:										
	Imp Channel:										
	Nat Channel:										
	Roadway:		0.0075	Equivalent Roadway (%): 100						ROW Capacity:	84
PROPOSED	Pipe:										
	Box:	3	0.0050	0.015		6.0	6.0				991
	Channel:								Lined: N		
Improvement Year:										Section Capacity:	1,181
										ROW+Section Capacity:	1,265

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $926,368
Total Improvements Cost: $1,111,642

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	459	844	1,595	1,999	1,142	1.00	2,449

ID: 200020-200030

Type: PIPE
Length: 1,171
Upstream Inv Elev: 1283.90
Upstream Grnd Elev: 1293.20

Street Name: E LINCOLN DR
Drawing No(s): 20850-20851
Right of Way: 75
Downstream Inv Elev: 1278.50
Downstream Grnd Elev: 1287.00

Slope: 0.0046

		No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING	Pipe:	1	0.0061	0.013	72						331
	Box:										
	Imp Channel:										
	Nat Channel:										
	Roadway:		0.0053	Equivalent Roadway (%): 100						ROW Capacity:	44
PROPOSED	Pipe:										
	Box:	3	0.0050	0.015		6.0	6.0				991
	Channel:								Lined: N		
Improvement Year:										Section Capacity:	1,322
										ROW+Section Capacity:	1,366

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $919,303
Total Improvements Cost: $1,103,163

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	462	854	1,618	2,018	1,155	0.99	2,480

ID: 200030-200040

Type: PIPE
Length: 622
Upstream Inv Elev: 1278.40
Upstream Grnd Elev: 1278.00

Street Name: E LINCOLN DR
Drawing No(s): 20851-20853
Right of Way: 75
Downstream Inv Elev: 1273.20
Downstream Grnd Elev: 1280.00

Slope: 0.0084

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:	1	0.0058	0.013	72						323
Box:										
Imp Channel:										
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:	3	0.0050	0.015		6.0	6.0				991
Channel:								Lined: N		
Improvement Year:									Section Capacity:	1,314
									ROW+Section Capacity:	1,314

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $488,306
Total Improvements Cost: $585,967

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	471	874	1,662	2,073	1,182	0.97	2,553

ID: 200040-200050

Type: IMPROVED CHANNEL
Length: 600
Upstream Inv Elev: 1273.38
Upstream Grnd Elev:

Street Name: ARIZONA CANAL
Drawing No(s): 00015594-00015595
Right of Way: 20
Downstream Inv Elev: 1272.49
Downstream Grnd Elev:

Slope: 0.0015

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0015	0.018		2.5	8.0	1.0			94
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:	3	0.0050	0.015		6.0	6.5				1,103
Channel:								Lined: Y		
Improvement Year:									Section Capacity:	1,197
									ROW+Section Capacity:	1,197

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $490,269
Total Improvements Cost: $588,322

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	471	874	1,660	2,081	1,179	0.96	2,552

ID: 200050-200060

Type: IMPROVED CHANNEL
Length: 956
Upstream Inv Elev: 1272.49
Upstream Grnd Elev:

Street Name: ARIZONA CANAL
Drawing No(s): 00015594-00015595
Right of Way: 20
Downstream Inv Elev: 1270.00
Downstream Grnd Elev:

Slope: 0.0026

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0028	0.018		4.0	15.0	1.0			506
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:	3	0.0050	0.015		6.0	6.5				1,103
Channel:								Lined: N		
Improvement Year:									Section Capacity:	1,608
									ROW+Section Capacity:	1,608

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $781,161
Total Improvements Cost: $937,393

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	499	927	1,766	2,215	1,257	0.96	2,709

ID: 200060-200070

Type: IMPROVED CHANNEL
Length: 329
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: ARIZONA CANAL
Drawing No(s): NONE
Right of Way: 20
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0028	0.018		2.5	15.0	1.0			260
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:	3	0.0050	0.015		6.0	6.5				1,103
Channel:								Lined: N		
Improvement Year:									Section Capacity:	1,362
									ROW+Section Capacity:	1,362

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $268,831
Total Improvements Cost: $322,597

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	510	949	1,810	2,270	1,288	0.96	2,773

ID: 200110-200120

Type: IMPROVED CHANNEL
Length: 1,308
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: EASEMENT
Drawing No(s):
Right of Way: 16
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.017		1.0	5.0	1.0			39
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:										
Channel:		0.0050	0.020		2.0	5.0	1.0	Lined: Y		68
Improvement Year:									Section Capacity:	107
									ROW+Section Capacity:	107

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $30,405
Total Improvements Cost: $36,486

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	29	44	66	77	52	2.71	88

ID: 200120-200050

Type: IMPROVED CHANNEL
Length: 1,182
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: ARIZONA CANAL
Drawing No(s):
Right of Way: 20
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.017		1.0	5.0	1.0			39
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:										
Channel:		0.0050	0.020		2.5	5.0	1.0	Lined: Y		91
Improvement Year:									Section Capacity:	130
									ROW+Section Capacity:	130

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $32,142
Total Improvements Cost: $38,570

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	58	90	143	169	112	1.94	193

ID: 200310-200320

Type: BOX
Length: 327
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: BOX CULVERT
Drawing No(s): NONE
Right of Way: 120
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:	2	0.0071	0.013		6.0	8.0				1,325
Imp Channel:										
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100					ROW Capacity:		
PROPOSED Pipe:										
Box:										
Channel:								Lined: N		
Improvement Year:										

Section Capacity: 1,325
ROW+Section Capacity: 1,325

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	156	248	407	483	313	3.26	546

ID: 200320-200330

Type: IMPROVED CHANNEL
Length: 767
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: GRASS CHANNEL
Drawing No(s):
Right of Way: 65
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.027		5.0	20.0	1.0			1,087
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100					ROW Capacity:		
PROPOSED Pipe:										
Box:										
Channel:								Lined: N		
Improvement Year:										

Section Capacity: 1,087
ROW+Section Capacity: 1,087

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	152	242	396	471	311	3.24	538

ID: 200330-200430

Type: BOX
Length: 190
Upstream Inv Elev: 1284.31
Upstream Grnd Elev:

Street Name: BOX CULVERT
Drawing No(s): 16131
Right of Way: 55
Downstream Inv Elev: 1284.08
Downstream Grnd Elev:

Slope: 0.0012

		No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING	Pipe:										
	Box:	2	0.0023	0.013		4.0	8.0				425
	Imp Channel:										
	Nat Channel:										
	Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED	Pipe:										
	Box:										
	Channel:									Lined: N	
	Improvement Year:									Section Capacity:	425
										ROW+Section Capacity:	425

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	173	275	449	531	351	3.23	607

ID: 200410-200420

Type: PIPE
Length: 338
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: E INDIAN BEND RD
Drawing No(s): 16113
Right of Way: 120
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

		No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING	Pipe:	1	0.0071	0.013	48 *						121
	Box:										
	Imp Channel:										
	Nat Channel:										
	Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED	Pipe:	1	0.0071	0.013	66						283
	Box:										
	Channel:									Lined: N	
	Improvement Year:									Section Capacity:	404
										ROW+Section Capacity:	404

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost: $71,855
Total Improvements Cost: $86,225

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	114	213	401	501	285	1.27	615

ID: 200420-200430

Type: IMPROVED CHANNEL
Length: 759
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: GRASS CHANNEL
Drawing No(s):
Right of Way: 65
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.027		5.0	20.0	1.0			1,087
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:										
Channel:								Lined: N		
Improvement Year:										
									Section Capacity:	1,087
									ROW+Section Capacity:	1,087

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	113	211	397	500	282	1.26	611

ID: 200430-200440

Type: IMPROVED CHANNEL
Length: 1,532
Upstream Inv Elev:
Upstream Grnd Elev:

Street Name: GRASS CHANNEL
Drawing No(s):
Right of Way: 65
Downstream Inv Elev:
Downstream Grnd Elev:

Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.027		5.0	20.0	1.0			1,087
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100						ROW Capacity:	
PROPOSED Pipe:										
Box:										
Channel:								Lined: N		
Improvement Year:										
									Section Capacity:	1,087
									ROW+Section Capacity:	1,087

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	231	407	738	905	546	1.64	1,073

ID: 200440-200450

Street Name: GRASS CHANNEL
Type: IMPROVED CHANNEL
Drawing No(s):
Length: 397
Right of Way: 65
Upstream Inv Elev:
Downstream Inv Elev:
Upstream Grnd Elev:
Downstream Grnd Elev:
Slope:

	No	Slope	Manning's N	Size	Eq Depth	Base Width	Side Slope	Section Area	Wetted Perim	Capacity
EXISTING Pipe:										
Box:										
Imp Channel:		0.0079	0.027		5.0	20.0	1.0			1,087
Nat Channel:										
Roadway:			Equivalent Roadway (%): 100					ROW Capacity:		
PROPOSED Pipe:										
Box:										
Channel:								Lined: N		
Improvement Year:										
								Section Capacity:		1,087
								ROW+Section Capacity:		1,087

COST FACTORS

Utilities	Structural	Property Restoration	Surface Restoration	Traffic Control	Contingency
1.1	1.1	1.1	1.1	1.1	20%

Section Cost:
Total Improvements Cost:

Return Period (Yrs):	2	5	25	50	10	(Q/ac)	100
Design Runoff (cfs):	299	516	914	1,103	675	1.76	1,292

City of Scottsdale
Storm Water Master Plan and Management Program
LAND USE BASIN SUMMARY
20 - INDIAN BEND RD/SCOTTSDALE RD BASIN

Group	Land Use	Code	Area (acres)	Percent Impervious (%)	Impervious Area (acres)
	1 DU PER 2-3 ACRES	11	364.36	15	54.65
	1 DU PER 1-2 ACRES	12	188.28	15	28.24
	2-4 DU PER ACRE	14	77.56	35	27.15
	4-8 DU PER ACRE	15	37.90	54	20.47
	TOURIST ACCOMMODATIONS	18	51.30	85	43.61
TOTAL RESIDENTIAL			719.40	24	174.12
	MINOR OFFICE	31	252.36	85	214.50
TOTAL COMMERCIAL/OFFICE			252.36	85	214.50
	LIMITED USE AREA	42	308.86	1	3.09
	DEVELOPED OPEN SPACE	43	445.35	80	356.28
	UTILITIES	45	2.27	72	1.63
TOTAL OPEN SPACE			756.48	48	361.00
TOTAL 20 - INDIAN BEND RD/SCOTTSDALE RD BASIN			1,728.24	43	749.63

```
ID
IT     2                    300
IO     5
KK200010   BASIN
BA 1.793
PH 0.000   0.000   0.490   0.930   1.560   1.710   1.820   2.010
LS     0      77       0       0      98       0
UK   280  0.0100    0.21      64
UK    93  0.0100    0.10      36
RK  6629  0.0091    0.03            TRAP      41     1.0
RK 12538  0.0091    0.03            TRAP      41     1.0
KK200020     FROM  200010
RK  1180  0.0020   0.013            CIRC     6.0
KK200020   BASIN
BA 0.024
LS     0      77       0       0      98       0
UK   160  0.0100    0.29      19
UK    53  0.0100    0.10      81
RK   704  0.0006    0.02            TRAP      30     1.0
RK  1114  0.0079    0.02            TRAP      60     1.0
KK200020 COMBINE
HC     2
KK200030     FROM  200020
RK  1171  0.0061   0.013            CIRC     6.0
KK200030   BASIN
BA 0.080
LS     0      75       0       0      98       0
UK   242  0.0100    0.24      69
UK    81  0.0100    0.10      31
RK   541  0.0006    0.02            TRAP      38     1.0
RK  2236  0.0079    0.02            TRAP      60     1.0
KK200030 COMBINE
HC     2
KK200040     FROM  200030
RK   622  0.0058   0.013            CIRC     6.0
KK200040   BASIN
BA 0.012
LS     0      77       0       0      98       0
UK   279  0.0100    0.22      75
UK   103  0.0100    0.10      25
RK   533  0.0006    0.02            TRAP      60     1.0
RK   622  0.0079    0.02            TRAP      26     1.0
KK200040 COMBINE
HC     2
KK200050     FROM  200040
RK   600  0.0015   0.018            TRAP     8.0     1.0
KK200110   BASIN
BA 0.030
LS     0      69       0       0      98       0
UK   161  0.0100    0.29      44
UK    54  0.0100    0.10      56
RK   516  0.0006    0.02            TRAP      21     1.0
RK   666  0.0079    0.02            TRAP      15     1.0
KK200120     FROM  200110
RK  1308  0.0079   0.017            TRAP     5.0     1.0
KK200120   BASIN
BA 0.057
LS     0      69       0       0      98       0
UK   298  0.0100    0.20      56
UK    99  0.0100    0.10      44
RK  1336  0.0006    0.02            TRAP      12     1.0
RK  1308  0.0079    0.02            TRAP      12     1.0
KK200120 COMBINE
HC     2
KK200050     FROM  200120
RK  1182  0.0079   0.017            TRAP     5.0     1.0
KK200050   BASIN
BA 0.050
LS     0      74       0       0      98       0
```

```
UK   152  0.0100    0.30      15                                          700
UK    56  0.0100    0.10      85                                          710
RK  1159  0.0079    0.02            TRAP      30     1.0                  720
RK  1332  0.0021    0.03            TRAP      30     1.0                  730
KK200050 COMBINE                                                         740
HC     3                                                                 750
KK200060    FROM  200050                                                 760
RK   956  0.0028   0.018            TRAP    15.0     1.0                  770
KK200060   BASIN                                                         780
BA 0.053                                                                 790
LS     0      69       0       0      98       0                         800
UK   152  0.0100    0.30      16                                          810
UK    53  0.0100    0.10      84                                          820
RK   797  0.0006    0.02            TRAP      30     1.0                  830
RK  1244  0.0079    0.02            TRAP      30     1.0                  840
KK200060 COMBINE                                                         850
HC     2                                                                 860
KK200070    FROM  200060                                                 870
RK   329  0.0028   0.018            TRAP    15.0     1.0                  880
KK200310   BASIN                                                         890
BA 0.149                                                                 900
LS     0      77       0       0      98       0                         910
UK   300  0.0100    0.20      20                                          920
UK   100  0.0100    0.10      80                                          930
RK   656  0.0006    0.02            TRAP      49     1.0                  940
RK  2726  0.0091    0.03            TRAP      49     1.0                  950
KK200320    FROM  200310                                                 960
RK   327  0.0071   0.013            DEEP     8.0                         970
KK200330    FROM  200320                                                 980
RK   767  0.0079   0.027            TRAP    20.0     1.0                  990
KK200330   BASIN                                                         1000
BA 0.021                                                                 1010
LS     0      69       0       0      98       0                         1020
UK   296  0.0100    0.20      21                                          1030
UK    99  0.0100    0.10      79                                          1040
RK   665  0.0006    0.02            TRAP      49     1.0                  1050
RK   890  0.0079    0.03            TRAP      49     1.0                  1060
KK200330 COMBINE                                                         1070
HC     2                                                                 1080
KK200430    FROM  200330                                                 1090
RK   190  0.0023   0.013            DEEP     8.0                         1100
KK200410   BASIN                                                         1110
BA 0.355                                                                 1120
LS     0      81       0       0      98       0                         1130
UK   232  0.0100    0.25      59                                          1140
UK    77  0.0100    0.10      41                                          1150
RK  2044  0.0091    0.03            TRAP      49     1.0                  1160
RK  6898  0.0091    0.03            TRAP      49     1.0                  1170
KK200420    FROM  200410                                                 1180
RK   338  0.0071   0.013            CIRC     4.0                         1190
KK200430    FROM  200420                                                 1200
RK   759  0.0079   0.027            TRAP    20.0     1.0                  1210
KK200430 COMBINE                                                         1220
HC     2                                                                 1230
KK200440    FROM  200430                                                 1240
RK  1532  0.0079   0.027            TRAP    20.0     1.0                  1250
KK200440   BASIN                                                         1260
BA 0.078                                                                 1270
LS     0      69       0       0      98       0                         1280
UK   155  0.0100    0.30      16                                          1290
UK    52  0.0100    0.10      84                                          1300
RK   776  0.0006    0.02            TRAP      49     1.0                  1310
RK  2291  0.0079    0.03            TRAP      49     1.0                  1320
KK200440 COMBINE                                                         1330
HC     2                                                                 1340
KK200450    FROM  200440                                                 1350
RK   397  0.0079   0.027            TRAP    20.0     1.0                  1360
ZZ                                                                       1370
```

BASIN ID: 200010 Area: 1.793 Pervious CN: 77 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	280	0.0100	0.213	64	Collector:	6,629	0.0091	0.030	TRAP	41.3	1.0
Impervious:	93	0.0100	0.100	36	Main:	*,***	0.0091	0.030	TRAP	41.3	1.0

BASIN ID: 200020 Area: 0.024 Pervious CN: 77 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	160	0.0100	0.294	19	Collector:	704	0.0006	0.017	TRAP	30.0	1.0
Impervious:	53	0.0100	0.100	81	Main:	1,114	0.0079	0.017	TRAP	60.0	1.0

BASIN ID: 200030 Area: 0.080 Pervious CN: 75 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	242	0.0100	0.239	69	Collector:	541	0.0006	0.017	TRAP	37.5	1.0
Impervious:	81	0.0100	0.100	31	Main:	2,236	0.0079	0.017	TRAP	60.0	1.0

BASIN ID: 200040 Area: 0.012 Pervious CN: 77 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	279	0.0100	0.216	75	Collector:	533	0.0006	0.017	TRAP	60.0	1.0
Impervious:	103	0.0100	0.100	25	Main:	622	0.0079	0.017	TRAP	26.3	1.0

BASIN ID: 200050 Area: 0.050 Pervious CN: 74 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	152	0.0100	0.300	15	Collector:	1,159	0.0079	0.017	TRAP	30.0	1.0
Impervious:	56	0.0100	0.100	85	Main:	1,332	0.0021	0.030	TRAP	30.0	1.0

BASIN ID: 200060 Area: 0.053 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	152	0.0100	0.299	16	Collector:	797	0.0006	0.017	TRAP	30.0	1.0
Impervious:	53	0.0100	0.100	84	Main:	1,244	0.0079	0.017	TRAP	30.0	1.0

BASIN ID: 200110 Area: 0.030 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	161	0.0100	0.293	44	Collector:	516	0.0006	0.017	TRAP	21.0	1.0
Impervious:	54	0.0100	0.100	56	Main:	666	0.0079	0.017	TRAP	15.0	1.0

BASIN ID: 200120 Area: 0.057 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	298	0.0100	0.201	56	Collector:	1,336	0.0006	0.017	TRAP	12.0	1.0
Impervious:	99	0.0100	0.100	44	Main:	1,308	0.0079	0.017	TRAP	12.0	1.0

BASIN ID: 200310 Area: 0.149 Pervious CN: 77 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	300	0.0100	0.200	20	Collector:	656	0.0006	0.017	TRAP	48.8	1.0
Impervious:	100	0.0100	0.100	80	Main:	2,726	0.0091	0.030	TRAP	48.8	1.0

BASIN ID: 200330 Area: 0.021 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	296	0.0100	0.202	21	Collector:	665	0.0006	0.017	TRAP	48.8	1.0
Impervious:	99	0.0100	0.100	79	Main:	890	0.0079	0.027	TRAP	48.8	1.0

BASIN ID: 200410 Area: 0.355 Pervious CN: 81 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	232	0.0100	0.246	59	Collector:	2,044	0.0091	0.030	TRAP	48.8	1.0
Impervious:	77	0.0100	0.100	41	Main:	6,898	0.0091	0.030	TRAP	48.8	1.0

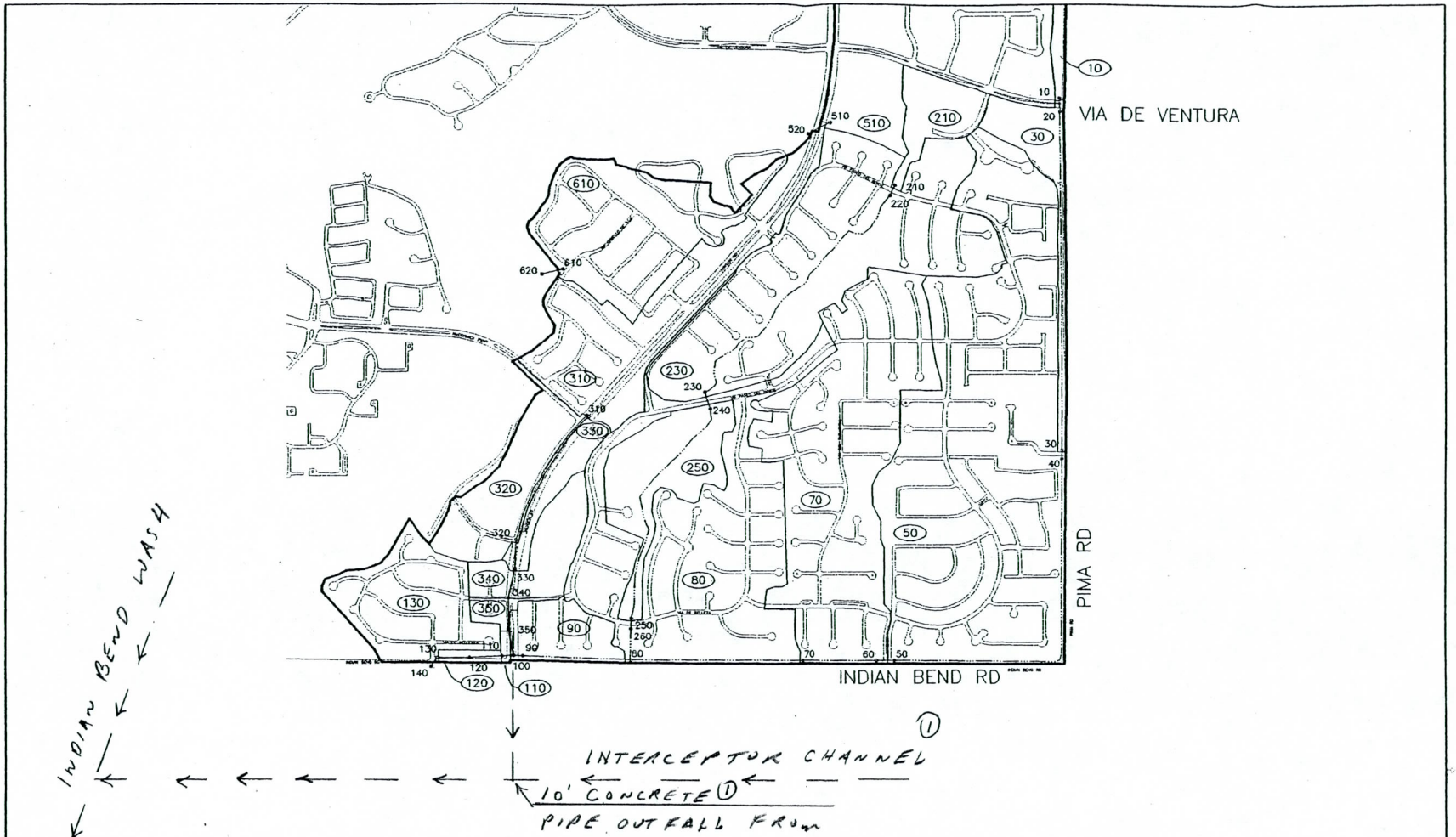
BASIN ID: 200440 Area: 0.078 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Perc't	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	155	0.0100	0.296	16	Collector:	776	0.0006	0.017	TRAP	48.8	1.0
Impervious:	52	0.0100	0.100	84	Main:	2,291	0.0079	0.027	TRAP	48.8	1.0

City of Scottsdale
Storm Water Master Plan and Management Program
RAINFALL DATA
20 - INDIAN BEND RD/SCOTTSDALE RD BASIN

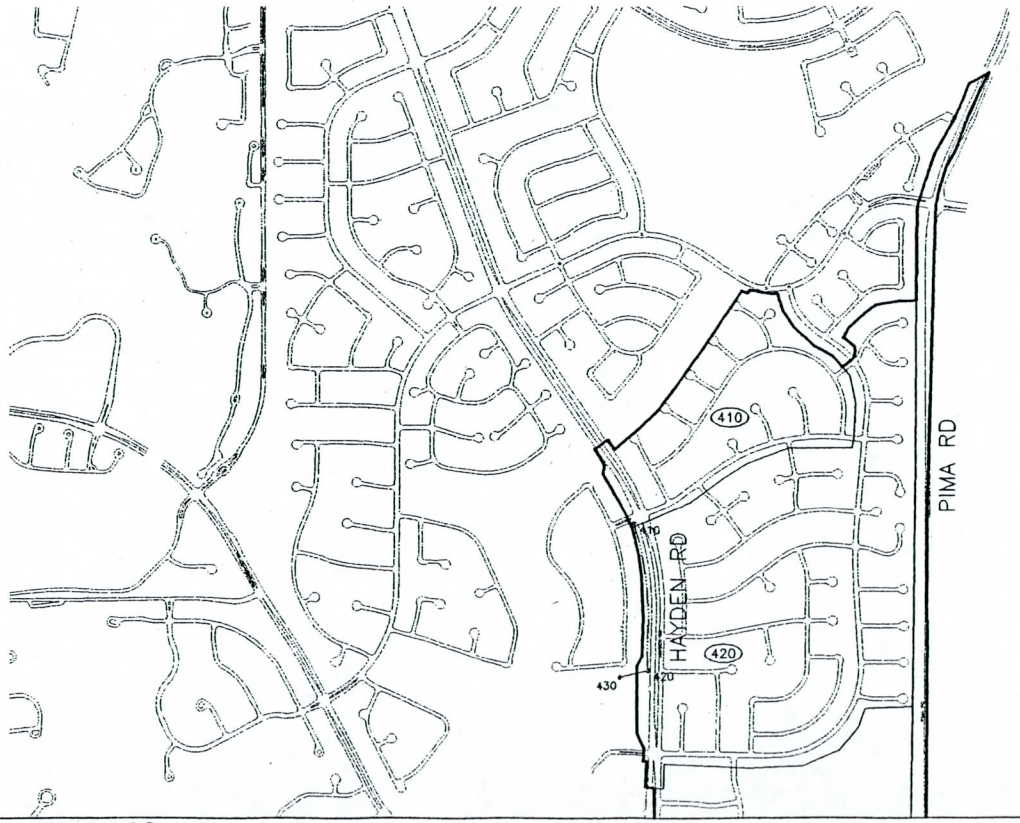
12/09/94

Return Period (years)	RAINFALL DURATION									
	5 min	10 min	15 min	30 min	1 hr	2 hrs	3 hrs	6 hrs	12 hrs	24 hrs
2	0.32	0.48	0.59	0.78	0.95	1.02	1.06	1.15	1.22	1.30
5	0.42	0.64	0.79	1.06	1.31	1.43	1.51	1.67	1.83	1.99
10	0.49	0.74	0.93	1.26	1.56	1.71	1.82	2.01	2.23	2.44
25	0.58	0.89	1.13	1.53	1.90	2.10	2.23	2.48	2.77	3.06
50	0.65	1.00	1.28	1.73	2.16	2.40	2.55	2.84	3.19	3.53
100	0.73	1.12	1.43	1.94	2.43	2.69	2.87	3.20	3.60	4.00



NOTES: 1. Based on June 12, 2004 field review.

2. As-Built Plans show that a manhole has been constructed at analysis node 100. A 66" pipe flows north to south through this manhole. The previously existing 43"x27" CmPA that flows east to west is also connected to this manhole. The flowline elevation of the 43"x27" CmPA is 8.24 ft higher than the flowline elevation of the 66" Pipe



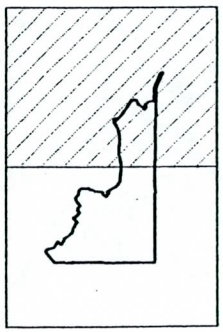
N

0 500 1000

1" = 1000'

Legend

- 101 Analysis Node
- IQ1 Storage Basin
- Basin Boundary
- 610 Drainage Area
- Roadway Reach
- Channel
- Pipe/Culvert
- City Boundary



City of Scottsdale

Basin 22

Drainage Map

Sheet 1 of 2

City of Scottsdale
Stormwater Facilities Management System

Proposed Conveyance Improvements Cost Details

3/ 1/96

ID		Length (ft)	Cost Factor	Conveyance Type	Section Cost ($)	Contingency @ 20%	ROW ($)	Total ($)
Major Basin	**22**	**Pima Road/Indian Bend Road**						
220010-220020		132	1.61	Pipe	10,204	2,041		12,245
220020-220030		3,168	1.61	Pipe	306,126	61,225		367,351
220030-220040		85	1.61	Pipe	8,214	1,643		9,856
220040-220050		3,465	1.61	Pipe	401,790	80,358		482,148
220050-220060		171	1.61	Box	66,707	13,341		80,048
220060-220070		707	1.61	Box	275,800	55,160		330,960
220070-220080		1,632	1.61	Box	779,722	155,944		935,667
220080-220090		1,016	1.61	Box	891,765	178,353		1,070,118
220090-220100		84	1.61	Box	73,729	14,746		88,474
220100-220110		105	1.61	Box	92,161	18,432		110,593
220110-220120		307	1.61	Box	269,460	53,892		323,353
220120-220130		304	1.61	Box	266,827	53,365		320,193
220130-220140		98	1.61	Box	86,017	17,203		103,220
220210-220220		104	1.61	Pipe	12,059	2,412		14,471
220230-220240		165	1.61	Box	43,178	8,636		51,814
220240-220250		2,283	1.61	Improved Channel	38,130	7,626		45,756
220250-220260		94	1.61	Box	24,598	4,920		29,518
220260-220080		296	1.61	Improved Channel	4,944	989		5,932
Total Basin	**22**	**14,216**			**3,651,431**	**730,286**		**4,381,717**
Grand Total		**14,216**			**3,651,431**	**730,286**		**4,381,717**

City of Scottsdale
Stormwater Facilities Management System
Conveyance Facilities

ID: 220010-220020 Length (ft): 132 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0036	0.013	18						6.3
PROPOSED	Pipe	Replace	1	.0036	0.013	24		4.0	1.0			13.6
ROW				.0036				30				32.3
											Total	45.9

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic	Section	$10,204
Design Runoff (cfs):	4.0	7.0	10.0	14.0	18.0	23.0	1.1	1.1	1.1	1.1	1.1	ROW	
												Contingency	$2,041
												Total	$12,245

ID: 220020-220030 Length (ft): 3,168 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,310.0 Downstream Inv Elev: Downstream Grnd Elev: 1,300.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0042	0.035		2.0	2.0	1.0			22.7
PROPOSED	Pipe	New	1	.0042	0.030	30						11.5
ROW				.0036				30				32.3
											Total	66.5

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic	Section	$306,126
Design Runoff (cfs):	4.0	7.0	10.0	14.0	18.0	23.0	1.1	1.1	1.1	1.1	1.1	ROW	
												Contingency	$61,225
												Total	$367,351

ID: 220030-220040 Length (ft): 85 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0036	0.013	18						6.3
PROPOSED	Pipe	New	1	.0036	0.013	30						24.6
ROW				.0036				30				32.3
											Total	63.2

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic	Section	$8,214
Design Runoff (cfs):	9.0	15.0	19.0	24.0	29.0	35.0	1.1	1.1	1.1	1.1	1.1	ROW	
												Contingency	$1,643
												Total	$9,856

ID: 220040-220050 Length (ft): 3,465 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,299.0 Downstream Inv Elev: Downstream Grnd Elev: 1,286.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0015	0.035		1.0	2.0	2.0			4.8
PROPOSED	Pipe	Replace		.0015	0.013	36						25.8
ROW				.0015				30				20.8
											Total	46.7

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic	Section	$401,790
Design Runoff (cfs):	9.0	14.0	18.0	24.0	29.0	35.0	1.1	1.1	1.1	1.1	1.1	ROW	
												Contingency	$80,358
												Total	$482,148

ID: 220050-220060 Length (ft): 171 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0014	0.013	18						3.9
PROPOSED	Box	Replace	2	.0014	0.015		4.0	5.0				159.1
ROW				.0014				25				14.1
											Total	173.1

DESIGN RUNOFF							COST FACTORS					COSTS		
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section	$66,707
Design Runoff (cfs):	75.0	118.0	149.0	193.0	235.0	280.0	1.1	1.1	1.1	1.1	1.1		ROW	
													Contingency	$13,341
													Total	$80,048

ID: 220060-220070 Length (ft): 707 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,285.0 Downstream Inv Elev: Downstream Grnd Elev: 1,284.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0015	0.035		1.0	2.0	2.0			4.8
PROPOSED	Box	None	2	.0015	0.015		4.0	5.0				164.6
ROW				.0015				20				14.6
											Total	184.0

DESIGN RUNOFF							COST FACTORS					COSTS		
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section	$275,800
Design Runoff (cfs):	75.0	117.0	147.0	192.0	233.0	277.0	1.1	1.1	1.1	1.1	1.1		ROW	
													Contingency	$55,160
													Total	$330,960

ID: 220070-220080 Length (ft) 1 632 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,285.0 Downstream Inv Elev: Downstream Grnd Elev: 1,283.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			0015	0.035		2.0	3.0	2.0			25.6
PROPOSED	Box	Replace	2	0015	0.015		5.0	6.0				283.1
ROW				0015				40				26.5
											Total	309.6

DESIGN RUNOFF							COST FACTORS					COSTS		
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section	$779,722
Design Runoff (cfs):	136.0	214.0	270.0	348 0	420.0	495.0	1.1	1.1	1.1	1.1	1.1		ROW	
													Contingency	$155,944
													Total	$935,667

ID: 220080-220090 Length (ft): 1,016 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,284.0 Downstream Inv Elev: Downstream Grnd Elev: 1,283.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0015	0.035		2.0	2.0	2.0			21.0
PROPOSED	Box	Replace	3	.0015	0.015		6.0	7.5				728.2
ROW				.0015				75				23.3
											Total	751.5

DESIGN RUNOFF							COST FACTORS					COSTS		
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section	$891,765
Design Runoff (cfs):	379.0	589.0	731.0	949.0	1,115.0	1,313.0	1.1	1.1	1.1	1.1	1.1		ROW	
													Contingency	$178,353
													Total	$1,070,118

ID: 220090-220100 Length (ft): 84 Street: 18339 Upstream Inv Elev: 1,281.0 Upstream Grnd Elev: Downstream Inv Elev: 1,279.9 Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0131	0.013	36						76.3
PROPOSED	Box	Replace	3	.0015	0.015		6.0	7.5				728.2
ROW				.0131				40				78.2
											Total	806.4

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	381.0	593.0	740.0	958.0	1,129.0	1,326.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$73,729
	ROW	
	Contingency	$14,746
	Total	$88,474

ID: 220100-220110 Length (ft): 105 Street: 15922 Upstream Inv Elev: 1,279.9 Upstream Grnd Elev: Downstream Inv Elev: 1,279.6 Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0028	0.013	36						35.9
PROPOSED	Box	Replace	3	.0028	0.015		6.0	7.5				1,012.6
ROW				.0028				40				36.8
											Total	1,049.4

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	441.0	690.0	858.0	1,115.0	1,315.0	1,546.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$92,161
	ROW	
	Contingency	$18,432
	Total	$110,593

ID: 220110-220120 Length (ft): 307 Street: 15922 Upstream Inv Elev: 1,279.1 Upstream Grnd Elev: 1,284.0 Downstream Inv Elev: 1,277.2 Downstream Grnd Elev: 1,284.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0049	0.013	42						70.4
PROPOSED	Box	Replace	3	.0049	0.015		6.0	7.5				1,316.2
ROW				.0049				40				47.8
											Total	1,364.0

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	438.0	686.0	857.0	1,112.0	1,311.0	1,539.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$269,460
	ROW	
	Contingency	$53,892
	Total	$323,353

ID: 220120-220130 Length (ft): 304 Street: 15922 Upstream Inv Elev: 1,277.2 Upstream Grnd Elev: 1,284.0 Downstream Inv Elev: 1,276.2 Downstream Grnd Elev: 1,284.1

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0049	0.013	42						70.4
PROPOSED	Box	Replace	3	.0049	0.015		6.0	7.5				1,316.2
ROW				.0049				40				47.8
											Total	1,364.0

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	437.0	685.0	856.0	1,108.0	1,311.0	1,530.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$266,827
	ROW	
	Contingency	$53,365
	Total	$320,193

ID: 220130-220140 Length (ft): 98 Street: 15920 Upstream Inv Elev: 1,276.2 Upstream Grnd Elev: Downstream Inv Elev: 1,275.0 Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0049	0.013	42						70.4
PROPOSED	Box	Replace	3	.0049	0.015		6.0	7.5				1,316.2
ROW				.0049				40				47.8
												Total 1,364.0

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	443.0	696.0	870.0	1,124.0	1,337.0	1,554.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS	
Section	$86,017
ROW	
Contingency	$17,203
Total	$103,220

ID: 220210-220220 Length (ft): 104 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0036	0.013	18						6.3
PROPOSED	Pipe	Replace	1	.0036	0.013	36						40.0
ROW				.0036				25				22.6
												Total 62.6

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	19.0	29.0	35.0	45.0	53.0	62.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS	
Section	$12,059
ROW	
Contingency	$2,412
Total	$14,471

ID: 220220-220230 Length (ft): 2,764 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,303.0 Downstream Inv Elev: Downstream Grnd Elev: 1,288.6

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0042	0.035		3.0	3.0	1.0			66.8
PROPOSED	None	None		.0042	0.030							
ROW				.0042				25				0.2
												Total 67.1

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	18.0	28.0	35.0	44.0	52.0	60.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS	
Section	
ROW	
Contingency	
Total	

ID: 220230-220240 Length (ft): 165 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0036	0.013	18						6.3
PROPOSED	Box	Replace	1	.0036	0.015		6.0	6.0				280.4
ROW				.0036				25				22.6
												Total 303.0

DESIGN RUNOFF	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Return Period (Yrs):						
Design Runoff (cfs):	131.0	201.0	249.0	322.0	375.0	432.0

COST FACTORS	Utilities	Structural	Property	Surface	Traffic
	1.1	1.1	1.1	1.1	1.1

COSTS	
Section	$43,178
ROW	
Contingency	$8,636
Total	$51,814

ID: 220240-220250 Length (ft): 2,283 Street: Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0042	0.035		3.0	4.0	2.0			118.6
PROPOSED	Improved Channel	Replace		.0042	0.030		4.0	6.0	2.0			317.3
ROW				.0042				25				0.2
											Total	317.6

DESIGN RUNOFF

Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Design Runoff (cfs):	129.0	199.0	244.0	317.0	369.0	428.0

COST FACTORS

Utilities	Structural	Property	Surface	Traffic
1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$38,130
	ROW	
	Contingency	$7,626
	Total	$45,756

ID: 220250-220260 Length (ft): 94 Street: NONE Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0036	0.013	18						6.3
PROPOSED	Box	Replace	1	.0036	0.015		6.0	6.0				280.4
ROW				.0036				25				22.6
											Total	303.0

DESIGN RUNOFF

Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Design Runoff (cfs):	140.0	217.0	266.0	345.0	404.0	468.0

COST FACTORS

Utilities	Structural	Property	Surface	Traffic
1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$24,598
	ROW	
	Contingency	$4,920
	Total	$29,518

ID: 220260-220080 Length (ft) 296 Street Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			0042	0.035		4.0	3.0	1.0			120.5
PROPOSED	Improved Channel	Replace		0042	0.030		4.0	6.0	2.0			317.3
ROW				0042				25				0.2
											Total	317.6

DESIGN RUNOFF

Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Design Runoff (cfs):	140.0	215.0	265.0	340 0	402.0	463.0

COST FACTORS

Utilities	Structural	Property	Surface	Traffic
1.1	1.1	1.1	1.1	1.1

COSTS		
	Section	$4,944
	ROW	
	Contingency	$989
	Total	$5,932

ID: 220310-220320 Length (ft): 1,378 Street: 18343-18340 Upstream Inv Elev: 1,281.7 Upstream Grnd Elev: 1,288.1 Downstream Inv Elev: 1,278.4 Downstream Grnd Elev: 1,284.7

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0020	0.013	48						64.2
PROPOSED	None	None		.0020	0.013							
ROW				.0025				100				48.4
											Total	112.6

DESIGN RUNOFF

Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Design Runoff (cfs):	46.0	69.0	86.0	110.0	129.0	148.0

COST FACTORS

Utilities	Structural	Property	Surface	Traffic
1.1	1.1	1.1	1.1	1.1

COSTS	
	Section
	ROW
	Contingency
	Total

ID: 220320-220330 Length (ft): 274 Street: 18340A
Upstream Inv Elev: 1,277.4 Upstream Grnd Elev: 1,284.7
Downstream Inv Elev: 1,276.5 Downstream Grnd Elev: 1,284.4

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0028	0.013	60						140.3
PROPOSED	None	None		.0028	0.013							
ROW				.0031				100				53.8
												Total 194.1

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	65.0	100.0	125.0	157.0	187.0	215.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220330-220340 Length (ft): 276 Street: 18340A-18340
Upstream Inv Elev: 1,276.0 Upstream Grnd Elev: 1,284.4
Downstream Inv Elev: 1,275.4 Downstream Grnd Elev: 1,284.7

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0023	0.013	66						161.1
PROPOSED	None	None		.0023	0.013							
ROW				.0020				100				43.2
												Total 204.3

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	72.0	110.0	138.0	173.0	206.0	237.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220340-220350 Length (ft): 302 Street: 18340-18339
Upstream Inv Elev: 1,275.3 Upstream Grnd Elev: 1,284.7
Downstream Inv Elev: 1,274.1 Downstream Grnd Elev: 1,284.2

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0046	0.013	66						227.8
PROPOSED	None	None		.0046	0.013							
ROW				.0040				100				61.2
												Total 289.0

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	87.0	132.0	165.0	206.0	245.0	282.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220350-220100 Length (ft): 250 Street: 18340
Upstream Inv Elev: 1,273.8 Upstream Grnd Elev: 1,284.2
Downstream Inv Elev: 1,272.6 Downstream Grnd Elev: 1,282.9

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Pipe		1	.0046	0.013	66						227.8
PROPOSED	None	None		.0046	0.013							
ROW				.0047				40				46.8
												Total 274.6

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	87.0	133.0	167.0	209.0	247.0	285.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220410-220420 Length (ft): 1,186 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,319.9 Downstream Inv Elev: Downstream Grnd Elev: 1,310.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0042	0.035		4.0	4.0	2.0			223.0
PROPOSED	None	None		.0042	0.030							
ROW				.0042				30				34.9
											Total	257.9

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	38.0	55.0	67.0	85.0	98.0	112.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220420-220430 Length (ft): 244 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,310.0 Downstream Inv Elev: Downstream Grnd Elev: 1,309.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0015	0.035		5.0	20.0	1.0			488.5
PROPOSED	None	None		.0015	0.030							
ROW				.0015				30				20.8
											Total	509.3

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	111.0	169.0	212.0	268.0	320.0	373.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220510-220520 Length (ft): 240 Street: 18350 Upstream Inv Elev: Upstream Grnd Elev: Downstream Inv Elev: Downstream Grnd Elev:

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Box		4	.0014	0.015		4.0	8.0				574.8
PROPOSED	None	None		.0014	0.013							
ROW				.0014				50				33.4
											Total	608.2

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	148.0	217.0	259.0	323.0	367.0	421.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

ID: 220610-220620 Length (ft): 203 Street: Upstream Inv Elev: Upstream Grnd Elev: 1,296.5 Downstream Inv Elev: Downstream Grnd Elev: 1,290.0

	Type	New/Replace	No	Slope	Manning's N	Size (in)	Depth (ft)	Base (ft)	Side Slope	Area (sf)	Wet Perim (ft)	Capacity (cfs)
EXISTING	Improved Channel			.0015	0.018		2.0	4.0	2.0			58.9
PROPOSED	None	None		.0015	0.018							
ROW				.0015				30				20.8
											Total	79.8

DESIGN RUNOFF							COST FACTORS					COSTS	
Return Period (Yrs):	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	Utilities	Structural	Property	Surface	Traffic		Section
Design Runoff (cfs):	43.0	66.0	82.0	105.0	122.0	140.0	1.1	1.1	1.1	1.1	1.1		ROW
													Contingency
													Total

City of Scottsdale
Stormwater Facilities Management System

Land Use Summary

3/ 1/96

		Group	Land Use	Code	Area (acres)	Percent Impervious (%)	Impervious Area (acres)
Major Basin	**22**						
			2-4 DU PER ACRE	14	406.42	35	142.24
			4-8 DU PER ACRE	15	229.21	54	123.77
		1. RESIDENTIAL			635.63		266.02
			GENERAL COMMERCIAL	22	80.80	85	68.68
			MINOR OFFICE	31	69.77	85	59.31
			MAJOR OFFICE	32	10.87	85	9.24
		2. COMMERCIAL/OFFICE			161.45		137.23
			DEVELOPED OPEN SPACE	43	83.93	80	67.14
		3. OPEN SPACE			83.93		67.14
Total Basin	**22**				881.02		470.40
					881.02		470.40

ID									1
IT	2			300					2
IO	5								3
KK	220010	BASIN							4
BA	0.028								5
PH	0.000	0.000	0.490	0.950	1.580	1.760	1.880	2.110	6
LS	0	69	0	0	98	0			7
UK	150	0.0100	0.30	65					8
UK	50	0.0100	0.10	35					9
RK	5701	0.0042	0.03		TRAP	19	1.0		10
KK	220020	FROM	220010						11
RK	500	0.0036	0.013		CIRC	1.5			12
KK	220030	FROM	220020						13
RK	3168	0.0042	0.035		TRAP	2.0	1.0		14
KK	220030	BASIN							15
BA	0.020								16
LS	0	69	0	0	98	0			17
UK	150	0.0100	0.30	46					18
UK	50	0.0100	0.10	54					19
RK	3168	0.0042	0.03		TRAP	19	1.0		20
KK	220030	COMBINE							21
HC	2								22
KK	220040	FROM	220030						23
RK	500	0.0036	0.013		CIRC	1.5			24
KK	220050	FROM	220040						25
RK	3465	0.0015	0.035		TRAP	2.0	2.0		26
KK	220050	BASIN							27
BA	0.230								28
LS	0	69	0	0	98	0			29
UK	150	0.0100	0.30	65					30
UK	50	0.0100	0.10	35					31
RK	6469	0.0042	0.02		TRAP	26	1.0		32
RK	1493	0.0015	0.03		TRAP	23	1.0		33
KK	220050	COMBINE							34
HC	2								35
KK	220060	FROM	220050						36
RK	500	0.0014	0.013		CIRC	1.5			37
KK	220070	FROM	220060						38
RK	707	0.0015	0.035		TRAP	2.0	2.0		39
KK	220070	BASIN							40
BA	0.134								41
LS	0	69	0	0	98	0			42
UK	150	0.0100	0.30	46					43
UK	50	0.0100	0.10	54					44
RK	4514	0.0042	0.02		TRAP	26	1.0		45
RK	707	0.0015	0.03		TRAP	23	1.0		46
KK	220070	COMBINE							47
HC	2								48
KK	220080	FROM	220070						49
RK	1632	0.0015	0.035		TRAP	3.0	2.0		50
KK	220080	BASIN							51
BA	0.126								52
LS	0	69	0	0	98	0			53
UK	20	0.0100	0.40	15					54
UK	200	0.0100	0.10	85					55
RK	3990	0.0042	0.02		TRAP	26	1.0		56
RK	1632	0.0015	0.03		TRAP		1.0		57
KK	220080	COMBINE							58
HC	2								59
KK	220210	BASIN							60
BA	0.017								61
LS	0	69	0	0	98	0			62
UK	20	0.0100	0.40	15					63
UK	200	0.0100	0.10	85					64
RK	1048	0.0042	0.03		TRAP	19	1.0		65

KK	220220	FROM	220210					66
RK	500	0.0036	0.013		CIRC	1.5		67
KK	220230	FROM	220220					68
RK	2764	0.0042	0.035		TRAP	3.0	1.0	69
KK	220230	BASIN						70
BA	0.131							71
LS	0	69	0	0	98	0		72
UK	300	0.0100	0.20	20				73
UK	100	0.0100	0.10	80				74
RK	1650	0.0015	0.03		TRAP	23	1.0	75
RK	2764	0.0042	0.03		TRAP	26	1.0	76
KK	220230	COMBINE						77
HC	2							78
KK	220240	FROM	220230					79
RK	500	0.0036	0.013		CIRC	1.5		80
KK	220250	FROM	220240					81
RK	2283	0.0042	0.035		TRAP	4.0	2.0	82
KK	220250	BASIN						83
BA	0.038							84
LS	0	69	0	0	98	0		85
UK	150	0.0100	0.30	65				86
UK	50	0.0100	0.10	35				87
RK	338	0.0015	0.03		TRAP	19	1.0	88
RK	2283	0.0042	0.03		TRAP	23	1.0	89
KK	220250	COMBINE						90
HC	2							91
KK	220260	FROM	220250					92
RK	500	0.0036	0.013		CIRC	1.5		93
KK	220080	FROM	220260					94
RK	500	0.0042	0.035		TRAP	3.0	1.0	95
KK	220080	COMBINE						96
HC	2							97
KK	220090	FROM	220080					98
RK	1016	0.0015	0.035		TRAP	2.0	2.0	99
KK	220090	BASIN						100
BA	0.019							101
LS	0	69	0	0	98	0		102
UK	150	0.0100	0.30	65				103
UK	50	0.0100	0.10	35				104
RK	527	0.0042	0.02		TRAP	26	1.0	105
RK	1016	0.0015	0.03		TRAP	23	1.0	106
KK	220090	COMBINE						107
HC	2							108
KK	220100	FROM	220090					109
RK	500	0.0131	0.013		CIRC	3.0		110
KK	220310	BASIN						111
BA	0.070							112
LS	0	69	0	0	98	0		113
UK	150	0.0100	0.30	46				114
UK	50	0.0100	0.10	54				115
RK	1028	0.0015	0.02		TRAP	23	1.0	116
RK	3421	0.0042	0.02		TRAP	26	1.0	117
KK	220320	FROM	220310					118
RK	1378	0.0020	0.013		CIRC	4.0		119
KK	220320	BASIN						120
BA	0.034							121
LS	0	69	0	0	98	0		122
UK	150	0.0100	0.30	46				123
UK	50	0.0100	0.10	54				124
RK	745	0.0015	0.02		TRAP	26	1.0	125
RK	1378	0.0042	0.02		TRAP	30	1.0	126
KK	220320	COMBINE						127
HC	2							128
KK	220330	FROM	220320					129
RK	500	0.0029	0.013		CIRC	5.0		130

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KK    220330    BASIN                                                          131
BA     0.012                                                                   132
LS         0        69         0         0      98         0                  133
UK       150    0.0100      0.30        46                                    134
UK        50    0.0100      0.10        54                                    135
RK      1682    0.0042      0.02              TRAP      26       1.0          136
KK    220330    COMBINE                                                        137
HC         2                                                                  138
KK    220340    FROM      220330                                             139
RK       500    0.0023      0.013             CIRC      5.5                  140
KK    220340    BASIN                                                          141
BA     0.022                                                                   142
LS         0        69         0         0      98         0                  143
UK       150    0.0100      0.30        46                                    144
UK        50    0.0100      0.10        54                                    145
RK       343    0.0015      0.02              TRAP      23       1.0          146
RK      1525    0.0042      0.03              TRAP      30       1.0          147
KK    220340    COMBINE                                                        148
HC         2                                                                  149
KK    220350    FROM      220340                                             150
RK       500    0.0046      0.013             CIRC      5.5                  151
KK    220350    BASIN                                                          152
BA     0.004                                                                   153
LS         0        69         0         0      98         0                  154
UK       150    0.0100      0.30        65                                    155
UK        50    0.0100      0.10        35                                    156
RK       343    0.0015      0.02              TRAP      23       1.0          157
RK       302    0.0042      0.02              TRAP      30       1.0          158
KK    220350    COMBINE                                                        159
HC         2                                                                  160
KK    220100    FROM      220350                                             161
RK       500    0.0046      0.013             CIRC      5.5                  162
KK    220100    COMBINE                                                        163
HC         2                                                                  164
KK    220110    FROM      220100                                             165
RK       500    0.0029      0.013             CIRC      3.0                  166
KK    220110    BASIN                                                          167
BA     0.001                                                                   168
LS         0        69         0         0      98         0                  169
UK       150    0.0100      0.30        65                                    170
UK        50    0.0100      0.10        35                                    171
RK       229    0.0042      0.02              TRAP      30       1.0          172
KK    220110    COMBINE                                                        173
HC         2                                                                  174
KK    220120    FROM      220110                                             175
RK       500    0.0049      0.013             CIRC      3.5                  176
KK    220120    BASIN                                                          177
BA     0.002                                                                   178
LS         0        69         0         0      98         0                  179
UK       150    0.0100      0.30        65                                    180
UK        50    0.0100      0.10        35                                    181
RK       277    0.0015      0.02              TRAP      30       1.0          182
KK    220120    COMBINE                                                        183
HC         2                                                                  184
KK    220130    FROM      220120                                             185
RK       500    0.0049      0.013             CIRC      3.5                  186
KK    220130    BASIN                                                          187
BA     0.044                                                                   188
LS         0        69         0         0      98         0                  189
UK       150    0.0100      0.30        65                                    190
UK        50    0.0100      0.10        35                                    191
RK      1876    0.0042      0.02              TRAP      30       1.0          192
KK    220130    COMBINE                                                        193
HC         2                                                                  194
KK    220140    FROM      220130                                             195
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RK	500	0.0049	0.013		CIRC	3.5		196
KK	220410	BASIN						197
BA	0.069							198
LS	0	69	0	0	98	0		199
UK	150	0.0100	0.30	65				200
UK	50	0.0100	0.10	35				201
RK	585	0.0015	0.02		TRAP	15	1.0	202
RK	1930	0.0042	0.02		TRAP	19	1.0	203
KK	220420	FROM	220410					204
RK	1186	0.0042	0.035		TRAP	4.0	2.0	205
KK	220420	BASIN						206
BA	0.199							207
LS	0	69	0	0	98	0		208
UK	150	0.0100	0.30	65				209
UK	50	0.0100	0.10	35				210
RK	5757	0.0042	0.02		TRAP	23	1.0	211
KK	220420	COMBINE						212
HC	2							213
KK	220430	FROM	220420					214
RK	500	0.0015	0.035		TRAP	20.0	1.0	215
KK	220510	BASIN						216
BA	0.109							217
LS	0	69	0	0	98	0		218
UK	150	0.0100	0.30	15				219
UK	50	0.0100	0.10	85				220
RK	2114	0.0015	0.02		TRAP	19	1.0	221
RK	1304	0.0042	0.02		TRAP	23	1.0	222
KK	220520	FROM	220510					223
RK	500	0.0014	0.015		DEEP	8.0		224
KK	220610	BASIN						225
BA	0.066							226
LS	0	69	0	0	98	0		227
UK	150	0.0100	0.30	46				228
UK	50	0.0100	0.10	54				229
RK	2713	0.0015	0.02		TRAP	23	1.0	230
KK	220620	FROM	220610					231
RK	500	0.0015	0.018		TRAP	4.0	2.0	232
ZZ								233

City of Scottsdale
Stormwater Facilities Management System
Drainage Area Factors

3/ 1/96

Basin ID: 220010 Area: 0.028 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:						
Impervious:	50	0.0100	0.100	35	Main:	5,701	0.0042	0.030	TRA	18.7	1.0

Basin ID: 220030 Area: 0.020 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:						
Impervious:	50	0.0100	0.100	54	Main:	3,168	0.0042	0.030	TRA	18.7	1.0

Basin ID: 220050 Area: 0.230 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:	6,469	0.0042	0.017	TRA	26.2	1.0
Impervious:	50	0.0100	0.100	35	Main:	1,493	0.0015	0.030	TRA	22.5	1.0

Basin ID: 220070 Area: 0.134 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:	4,514	0.0042	0.017	TRA	26.2	1.0
Impervious:	50	0.0100	0.100	54	Main:	707	0.0015	0.030	TRA	22.5	1.0

Basin ID: 220080 Area: 0.126 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	20	0.0100	0.400	15	Collector:	3,990	0.0042	0.017	TRA	26.2	1.0
Impervious:	200	0.0100	0.100	85	Main:	1,632	0.0015	0.030	TRA	26.2	1.0

Basin ID: 220090 Area: 0.019 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:	527	0.0042	0.017	TRA	26.2	1.0
Impervious:	50	0.0100	0.100	35	Main:	1,016	0.0015	0.030	TRA	22.5	1.0

Basin ID: 220110 Area: 0.001 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:						
Impervious:	50	0.0100	0.100	35	Main:	229	0.0042	0.017	TRA	30.0	1.0

Basin ID: 220120 Area: 0.002 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:						
Impervious:	50	0.0100	0.100	35	Main:	277	0.0015	0.017	TRA	30.0	1.0

Basin ID: 220130 Area: 0.044 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:						
Impervious:	50	0.0100	0.100	35	Main:	1,876	0.0042	0.017	TRA	30.0	1.0

Basin ID: 220210 Area: 0.017 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	20	0.0100	0.400	15	Collector:						
Impervious:	200	0.0100	0.100	85	Main:	1,048	0.0042	0.030	TRA	18.7	1.0

Drainage Area Factors

Basin ID: 220230 Area: 0.131 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	300	0.0100	0.200	20	Collector:	1,650	0.0015	0.030	TRA	22.5	1.0
Impervious:	100	0.0100	0.100	80	Main:	2,764	0.0042	0.030	TRA	26.2	1.0

Basin ID: 220250 Area: 0.038 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:	338	0.0015	0.030	TRA	18.7	1.0
Impervious:	50	0.0100	0.100	35	Main:	2,283	0.0042	0.030	TRA	22.5	1.0

Basin ID: 220310 Area: 0.070 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:	1,028	0.0015	0.017	TRA	22.5	1.0
Impervious:	50	0.0100	0.100	54	Main:	3,421	0.0042	0.017	TRA	26.2	1.0

Basin ID: 220320 Area: 0.034 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:	745	0.0015	0.017	TRA	26.2	1.0
Impervious:	50	0.0100	0.100	54	Main:	1,378	0.0042	0.017	TRA	30.0	1.0

Basin ID: 220330 Area: 0.012 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:						
Impervious:	50	0.0100	0.100	54	Main:	1,682	0.0042	0.017	TRA	26.2	1.0

Basin ID: 220340 Area: 0.022 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	46	Collector:	343	0.0015	0.017	TRA	22.5	1.0
Impervious:	50	0.0100	0.100	54	Main:	1,525	0.0042	0.027	TRA	30.0	1.0

Basin ID: 220350 Area: 0.004 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:	343	0.0015	0.017	TRA	22.5	1.0
Impervious:	50	0.0100	0.100	35	Main:	302	0.0042	0.017	TRA	30.0	1.0

Basin ID: 220410 Area: 0.069 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:	585	0.0015	0.017	TRA	15.0	1.0
Impervious:	50	0.0100	0.100	35	Main:	1,930	0.0042	0.017	TRA	18.7	1.0

Basin ID: 220420 Area: 0.199 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	65	Collector:						
Impervious:	50	0.0100	0.100	35	Main:	5,757	0.0042	0.017	TRA	22.5	1.0

Basin ID: 220510 Area: 0.109 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Pervious:	150	0.0100	0.300	15	Collector:	2,114	0.0015	0.017	TRA	18.7	1.0
Impervious:	50	0.0100	0.100	85	Main:	1,304	0.0042	0.017	TRA	22.5	1.0

City of Scottsdale
Stormwater Facilities Management System
Drainage Area Factors

3/ 1/96

Basin ID: 220610 Area: 0.066 Pervious CN: 69 Impervious CN: 98

OVERLAND FLOW:	Length	Slope	Rough's	Pct
Pervious:	150	0.0100	0.300	46
Impervious:	50	0.0100	0.100	54

ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
Collector:						
Main:	2,713	0.0015	0.017	TRA	22.5	1.0

Rainfall Data

Return Period (years)	RAINFALL DURATION 5 mins	10 mins	15 mins	30 mins	1 hr	2 hrs	3 hrs	6 hrs	12 hrs	24 hrs
Major Basin 22										
2	0.33	0.50	0.61	0.81	0.98	1.09	1.16	1.30	1.45	1.60
5	0.43	0.65	0.81	1.09	1.34	1.49	1.59	1.78	2.00	2.22
10	0.49	0.75	0.95	1.28	1.58	1.76	1.88	2.11	2.37	2.64
25	0.59	0.90	1.14	1.54	1.92	2.14	2.28	2.55	2.88	3.21
50	0.66	1.01	1.29	1.75	2.18	2.43	2.59	2.90	3.28	3.66
100	0.73	1.12	1.44	1.95	2.44	2.72	2.90	3.25	3.67	4.10

APPENDIX M

Panoramic View of Indian Bend Wash inlet channel. Standing on north side of Indian Bend Road looking southwest toward resort.

Photo 01: Beginning of Seville Channel. Grated inlet to 3-10'x6' CBC located under Scottsdale Road, south of Indian Bend Road intersection.

Photo 02: Same Description as Photo 01, but looking north along the west side of Scottsdale Road.

Photo 03: Outlet of 3-10'x6' CBC located under Scottsdale Road, south of Indian Bend Road intersection.

Photo 04: Seville Channel within McCormick Railroad Park. Looking east from outlet of 3-10'x6' CBC located under Scottsdale Road.

Photo 05: Inlet of 3-10'x4' CBC located under Indian Bend Road, east of the Scottsdale intersection.

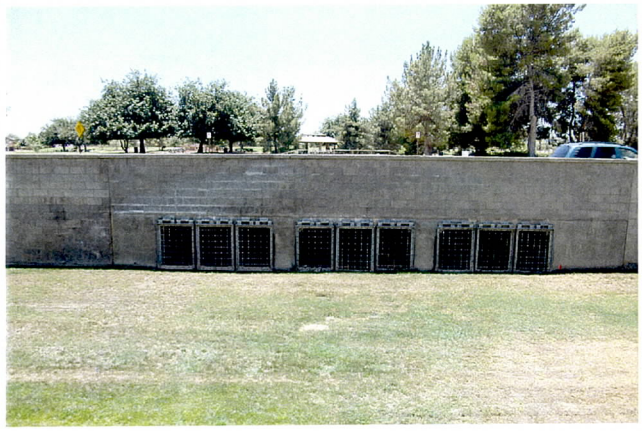


Photo 06: Outlet of 3-10'x4' CBC located under Indian Bend Road, east of the Scottsdale Road. intersection.

Photo 07: Seville Channel at the pedestrian underpass looking west.

Photo 08: Seville Channel at the pedestrian underpass looking east.

Photo 09: Seville Channel at its entrance to Indian Bend Wash. Looking west.

Photo 10: Seville Channel at its entrance to Indian Bend Wash. Looking east into IBW.

Photo 11: Entrance to 36"x22" CMPA that drains east across Scottsdale Road just north of the Indian Bend Road intersection.

Photo 12: Outlet of 36"x22" CMPA that is shown in Photo 11. It drains into the Seville Channel.

Photo 13: Two pipes outlet into the Seville Channel at the NE corner of the Indian Bend/Scottsdale Road intersection. A 36"x22" CMPA under Scottdale Road and a 15" CMP from the Seville parking lot.

Photo 14: Inlet grate to the 15" CMP outlet shown in Photo 13. Inlet is located in the Seville parking lot

Photo 15: Inlet grate in Seville parking lot. Discharge is to the Seville Channel.

Photo 16: Inlet grate in Seville parking lot. The parking lot functions as a detention basin.

Photo 17: Outlet to Seville Channel from one of the inlet grates located in the Seville parking lot.

Photo 18: Indian Bend Road curb opening catch basin that outlets to the Seville Channel located along the north side of Indian Bend Road.

Photo 19: Outlet from Indian Road catch basin shown in Photo 18. The outlet is into the Seville Channel.

Photo 20: Entrance to 2-8'x4' CBC that crosses Indian Bend Road into the Seville Channel. It drains a channel located along the east side of the McCormick Railroad Park.

Photo 21: Outlet of 2-8'x4' CBC shown in Photo 20. Outlet is into the Seville Channel.

Photo 22: Looking south along the channel that drains to the 2-8'x4' CBC shown in Photo 20. This is the south end of the McCormick Railroad Park parking lot.

Photo 23: Location of same channel shown in Photo 22, but looking north toward entrance of 2-8'x4' CBC.

Photo 24: Looking south along channel from entrance to the 2-8'x4' CBC. Red cover is a flap gate on a 16" CIP discharge from a COS well.

Photo 25: City of Scottsdale water facility located in the northeast corner of McCormick Railroad Park.

Photo 26: City of Scottsdale well located in the northeast corner of McCormick Railroad Park.

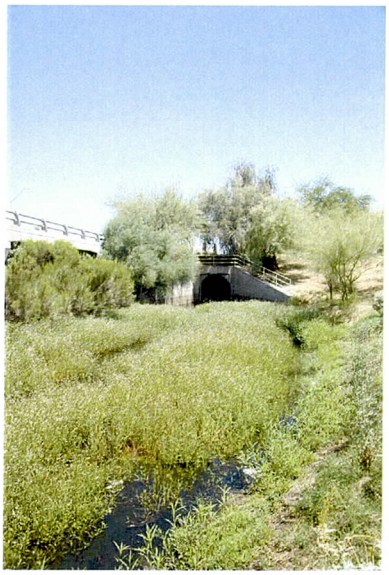


Photo 27: Outlet of 10' pipe from Hayden Rd into interceptor channel.

Photo 28: Inlet to 43"x27" CMPA in northeast corner of Indian Bend/ Hayden Road intersection. Beginning of storm drain that discharges into the IBW inlet channel.

Photo 29: Catch basin on north side of Indian Bend Road, west of Hayden Road. It drains to 42" RCP.

Photo 30: Manhole located in the northeast corner of the 78th Place/ Indian Bend Road intersection. Pipe size increases from 42" to 48" RCP.

Photo 31: Two 21′ long curb opening catch basins capture runoff from the north along 78th Place street.

Photo 32: 21′ curb opening catch basin located on 78th Place street in the northwest corner of the 78th Place/Indian Bend Road intersection.

Photo 33: 21′ curb opening catch basin located on 78th Place street in the NE corner of the 78th Place/ Indian Bend Road intersection.

Photo 34: 48″ RGRCP outlet into the IBW inlet channel. This is the oulet of the pipe system that begins at the Indian Bend Road/ Hayden Road intersection.

Photo 35: Same 48″ outlet shown in Photo 34.

Photo 36: Looking west along the south side of Indian Bend Road within McCormick Railroad Park. The swale within the park drains the park runoff to the east.

Photo 37: Looking east along the south side of Indian Bend Road within McCormick Railroad Park. The swale within the park drains the park runoff to the east.

Photo 38: Looking north along a gated maintenance driveway to the McCormick Railroad Park.

Photo 39: South side of Indian Bend Road looking west within the McCormick Railroad Park. The swale behind the sidewalk drains the park runoff to the east.

Photo 40: Same location as Photo 39, but looking east across the maintenance driveway. Widening of Indian Bend Road will require an offroad catch basin west of this driveway.

Photo 41: East of the driveway shown in Photo 39. Another offroad catch basin will be required near the bush shown in this photo. Looking east.

Photo 42: 2-24" RCP located under the entrance to the McCormick Railroad Park parking lot. Runoff that currently flows through these pipes will be captured by new offroad catch basins.

Photo 43: 6" outlet pipe from McCormick Park parking lot, which functions as a detention basin.

Photo 44: Oulet of 30" pipe with flap gate located just east of and across the road from the resort entrance.

Photo 45: Outlet of 36" RCP, which drains the north roadway ditch of Indian Bend Road. It is located just west of the IBW inlet channel.

Photo 46: Catch Basin of 36" RCP shown in Photo 45. Looking east along north side of Indian Bend Road.

Photo 47: Bee hive catch basin, which maintains the maximum water surface elevation in the west lake.

Photo 48: Outlet of 36" RCP, which drains the north roadway ditch of Indian Bend Road. It is located just east of the IBW inlet channel.

Photo 49: Catch Basin of 36" RCP shown in Photo 48. Looking west along north side of Indian Bend Road.

Photo 50: 6" pipe outlet, which maintains the maximum water surface elevation of the east lake.

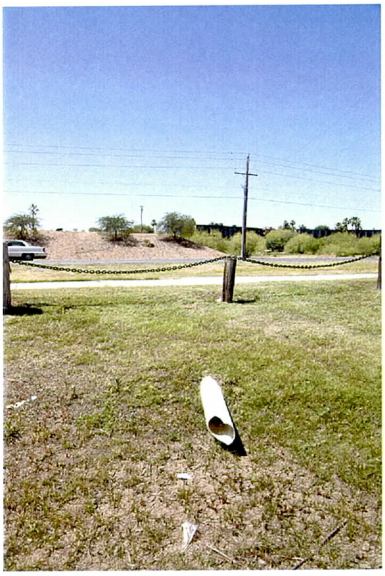


Photo 51: 6" pipe inlet, which maintains the maximum water surface elevation of the east lake.

APPENDIX N

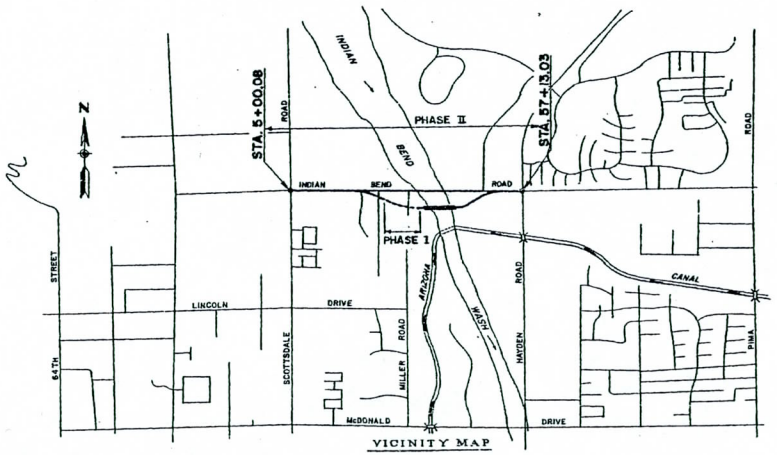
CAPITAL IMPROVEMENTS ENGINEERING

PROJECT NO. B-8105

INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

CITY OF SCOTTSDALE, ARIZONA

INDIAN BEND ROAD, SCOTTSDALE ROAD TO HAYDEN ROAD, PROJECT B-8105



VICINITY MAP

COUNCIL

WILLIAM C. JENKINS (Mayor)

RICHARD CAMPANA
BILLIE GENTRY
HERB DRINKWATER
HEINZ HINK, Ph.D
JEFF SCHUBERT
CHARLIE SMITH

CITY MANAGER - ROY PEDERSON
CITY ATTORNEY - RICHARD FILLER
DEPUTY CITY CLERK - BETTY WARREN

SHEET INDEX

SHEET NO. 1	COVER SHEET
2	TYPICAL SECTIONS
3	SHEET INDEX, GENERAL NOTES & MEDIAN ISLAND DETAILS
4-10	PAVING PLAN SHEETS
11-15	PAVING PROFILE SHEETS
16-19	CATCH BASIN PROFILES
20	EXISTING DITCH & CHANNEL PROFILE & SLOPE LINING DETAILS
21-23	CONCRETE BOX CULVERT DETAILS
24	CATCH BASIN DETAILS
25-30	BRIDGE SHEETS

CAPITAL IMPROVEMENTS ENGINEERING

RAY GARRISON
TRAFFIC ENGINEERING MANAGER

REAL ESTATE SERVICES MANAGER

CALL FOR THE BLUE STAKES 263-1100

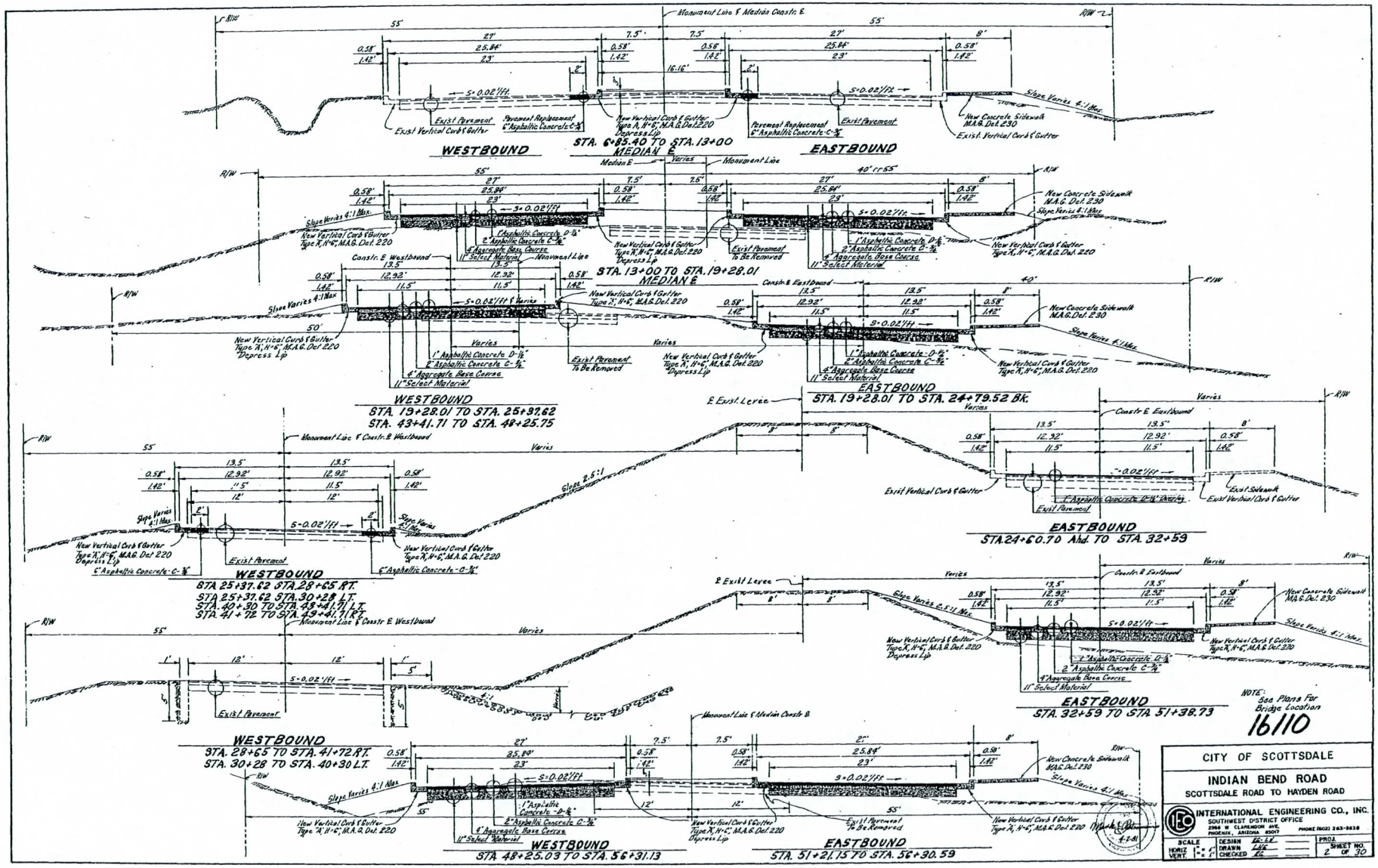
CARL DARDEN
DEPARTMENT HEAD
FOR FIELD OPERATIONS

LENORD DUEKER
ENGINEERING SERVICES DIRECTOR

16109

PROJECT NO. B-8105
SHEET 1 OF 30
FILE NO.

P-048



NOTE: See Plans For Bridge Location

16110

CITY OF SCOTTSDALE

INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

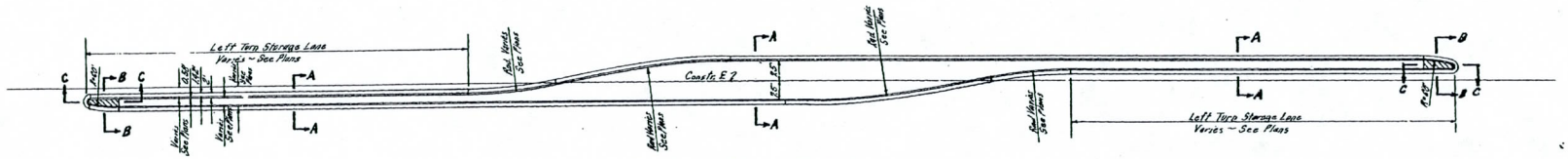
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2968 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8838

SCALE	DESIGN	EC-LK
HORIZ. 1" = 5'	DRAWN	LEC
VERT. 1" = 5'	CHECKED	EC

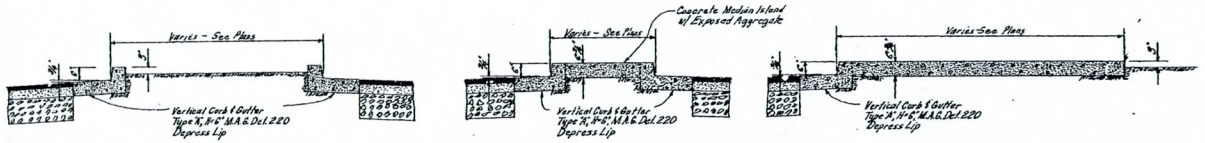
PROJ.

SHEET NO. 2 OF 30

P-048



TYPICAL MEDIAN ISLAND



SECTION 'A-A'

SECTION 'B-B'

SECTION 'C-C'

MEDIAN ISLAND DETAILS

GENERAL NOTES

WHEREVER NECESSARY, DEPRESS BACK OF DRIVEWAY TO A MAXIMUM OF 3" FOR C[illegible]

CORRUGATED METAL PIPE SHALL BE BEDDED WITH SELECT MATERIAL, TYPE "B" PER SECTION 702 IN ACCORDANCE WITH M.A.G. DETAIL 510.

PIPE CONNECTIONS TO NEW AND/OR EXISTING CONCRETE PIPE MAINS SHALL BE MADE IN ACCORDANCE WITH M.A.G. DETAIL 524. CONNECTION TO MAINS SHALL NOT BE LOCATED WITHIN 5' CENTER TO CENTER.

PIPE CONNECTIONS TO NEW AND/OR EXISTING CORRUGATED PIPE MAINS SHALL BE MADE IN ACCORDANCE WITH M.A.G. DETAIL 510.

PIPE CONNECTIONS TO NEW PRECAST CONCRETE PIPE MAINS, SHALL BE MADE WITH FACTORY MADE WYES OR TEES. THE DETAIL OF THE FITTINGS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO MANUFACTURE.

CATCH BASIN CONNECTOR PIPES SHALL BE LAID ON A STRAIGHT ALIGNMENT AND SLOPE UNLESS OTHERWISE SPECIFIED. IF BREAKS IN ALIGNMENT OR SLOPE ARE NECESSARY TO MEET FIELD CONDITIONS, THE MAXIMUM DEFLECTION SHALL BE [illegible]°. THE BEND SHALL BE MADE ACCORDING TO M.A.G. DETAIL 505.

CONNECTION PIPES SHALL CONNECT TO CATCH BASIN WALLS AT AN ANGLE NOT TO EXCEED 22-1/2° FROM PERPENDICULAR.

FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL VERTICAL AND HORIZONTAL CONTROLS, ARE LOCATED ONLY APPROXIMATELY AND TO THE BEST KNOWLEDGE AVAILABLE.

DURING CONSTRUCTION, THE CONTRACTOR SHALL CONTACT BLUESTAKE TO FIND AND FLAG UNDERGROUND UTILITIES.

VERTICAL CONTROL IS BASED ON U.S.C.& G.S. ELEVATION DATUM.

STATIONS SHOWN ON PROFILE ARE ALONG CENTERLINE OF CONDUIT, OR ON A LINE NORMAL TO CENTERLINE OF CONDUIT.

REINFORCED AND NON-REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH DETAIL SHOWN ON THESE PLANS, OR M.A.G. SPECIFICATIONS, WHICHEVER APPLIES.

DIMENSIONS LOCATING CATCH BASINS ARE FROM THE CENTERLINE OF STREET TO CENTERLINE OF CATCH BASIN OR TO FACE OF CURB, UNLESS OTHERWISE SPECIFIED.

ELEVATIONS SHOWN FOR CATCH BASINS ARE AT TOP OF THE PROPOSED CURB AT THE CENTERLINE OF THE CATCH BASIN, UNLESS OTHERWISE SPECIFIED.

ALL EXISTING DRIVEWAYS AND ALL EXISTING ALLEYS SHALL BE GRADED TO MATCH THE NEW WORK IN ACCORDANCE WITH CITY OF PHOENIX SPECIAL DETAIL 164, UNLESS OTHERWISE SPECIFIED. EXISTING SURFACING SHALL BE REMOVED AND REPLACED AS NECESSARY.

UNLESS OTHERWISE PROVIDED ON THE PLANS, EXISTING A.C. OR P.C.C. DRIVEWAYS AND SIDEWALKS WHICH FALL WITHIN OR ABUT THE R/W SHALL BE CONNECTED TO THE NEW WORK AS FOLLOWS:

THE SPACE BETWEEN THE BACK OF NEW DRIVEWAY ENTRANCES AND EXISTING A.C. DRIVEWAYS SHALL BE FILLED WITH A MINIMUM OF 2" A.C.S.C. OR 6" A.B.C. WHERE EXISTING PAVEMENT AND BASE THICKNESS EXCEED THE MINIMUMS, MATCH THE EXISTING.

THE SPACE BETWEEN THE BACK OF NEW SIDEWALKS AND EXISTING PRIVATE SIDEWALKS, AND THE SPACE BETWEEN THE BACK OF NEW DRIVEWAY ENTRANCES AND EXISTING P.C.C. DRIVEWAYS SHALL BE FILLED WITH P.C.C. THE THICKNESS AND CLASS SHALL MATCH THAT OF THE NEW SIDEWALK OR DRIVEWAY SURFACE.

UNLESS OTHERWISE PROVIDED ON THE PLANS, THE SPACE BETWEEN THE BACK OF THE NEW SIDEWALKS, AND EXISTING A.C. PARKING LOTS, WHICH FALL WITHIN OR ABUT THE R/W SHALL BE FILLED WITH 2" A.C.S.C. ON NATIVE SOIL.

EXISTING IRRIGATION BERMS DISTURBED BY NEW CONSTRUCTION SHALL BE RECONSTRUCTED AS SHOWN ON PLANS.

M.A.G. ALLEY ENTRANCE DETAILS 260, 261, 262 AND 263, AND M.A.G. COMMERCIAL AND INDUSTRIAL DRIVEWAY DETAILS 250 AND 251 WHICH ARE INDICATED TO BE TRAFFIC, ON THESE PLANS SHALL BE CONSTRUCTED ACCORDING TO THE DETAIL NUMBER EXCEPT THAT THE SLAB SHALL BE 9" THICK. DRIVEWAYS DESIGNATED ON THE PLANS AS M.A.G. DETAILS 250 AND 251 SHALL BE RESIDENTIAL DRIVEWAYS 6" THICK.

EXISTING TRAFFIC SIGNS SHALL BE HANDLED AS PER SECTION [illegible] OF THE M.A.G. SPECS. IN ADDITION TRAFFIC SIGNS IN CONFLICT WITH THE PROPOSED USE WILL BE DELIVERED TO THE CITY OF SCOTTSDALE STORAGE YARD AT 1227 EAST MCKELLIPS ROAD.

EXISTING BARRICADES AND DELINEATORS WHICH ARE TO BE REMOVED SHALL BE DELIVERED TO THE CITY OF SCOTTSDALE STORAGE YARD AT 1227 EAST MCKELLIPS ROAD.

STRUCTURAL NOTES

CONSTRUCTION - UNIFORM STANDARD SPECIFICATIONS For PUBLIC WORKS CONSTRUCTION - MARICOPA ASSOCIATION OF GOVERNMENTS EDITION OF 1979, REVISED TO DATE

DESIGN - A.A.S.H.T.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES - 1973

LOADING - H520 - 44 AND INTERSTATE ALTERNATE LOADING

STRESSES: CLASS A CONCRETE F_c = 1,000 P.S.I.
REINFORCED STEEL F_s = 20,000 P.S.I.

CONCRETE SHALL BE CLASS A.

REINFORCING STEEL SHALL CONFORM TO A.S.T.M. SPEC. A-615, GRADE NO.

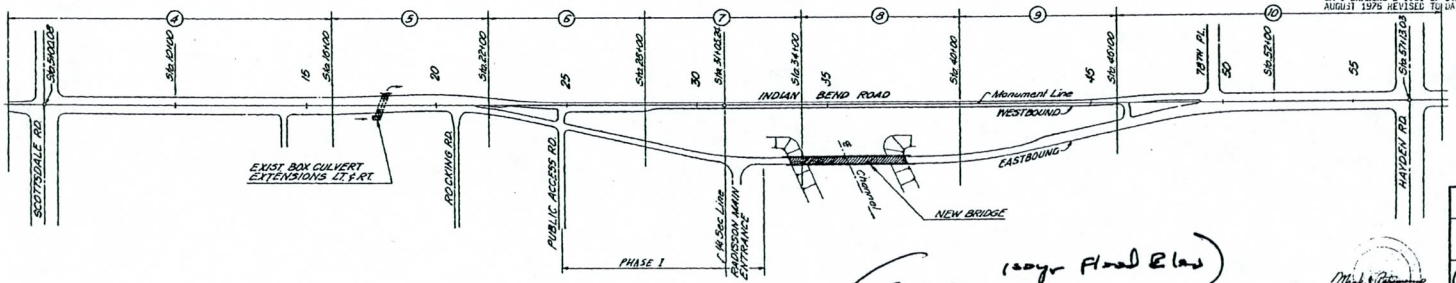
ALL BEND DIMENSIONS ARE OUT TO OUT OF BAR.

ALL REINFORCING STEEL SHALL HAVE 2" CLEAR COVER UNLESS NOTED OTHERWISE.

FINISHING: THE CLASS OF FINISH FOR CONCRETE STRUCTURES SHALL BE IN ACCORDANCE WITH 505.9.5 OF M.A.G. SPECS. ALL EXPOSED EDGES OF CONCRETE SHALL BE BEVELED AT 3/4" OR ROUNDED.

LIGHT NOTE (BOX CULVERT)

ADDITIONAL MISCELLANEOUS DETAILS - APPLICABLE DRAWINGS DETAILED ON STD. DRAWING E-1.01 OF STATE OF ARIZONA DOT STANDARD DRAWING ED OF AUGUST 1979 REVISED TO DATE.



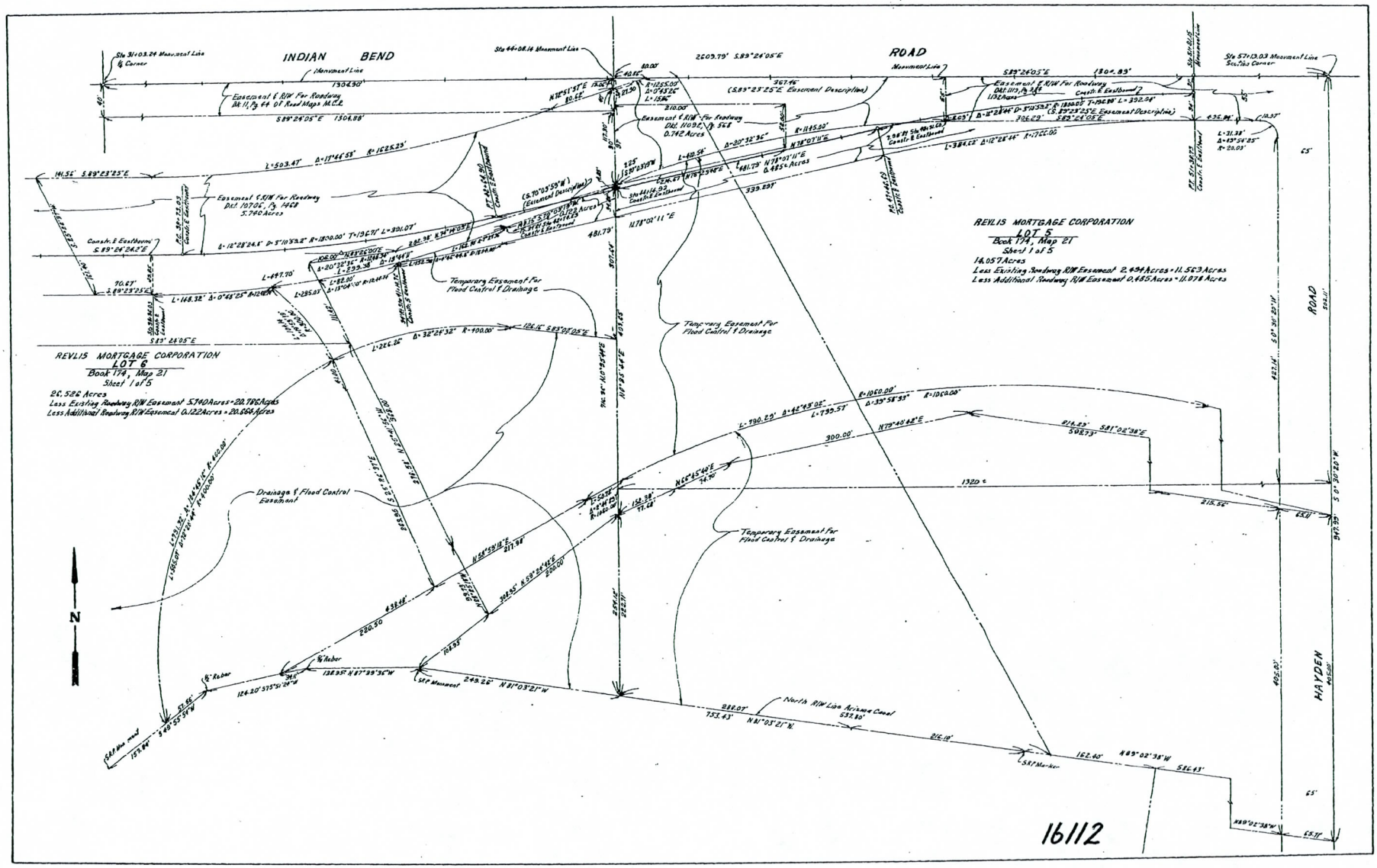
KEY MAP
1"=200'

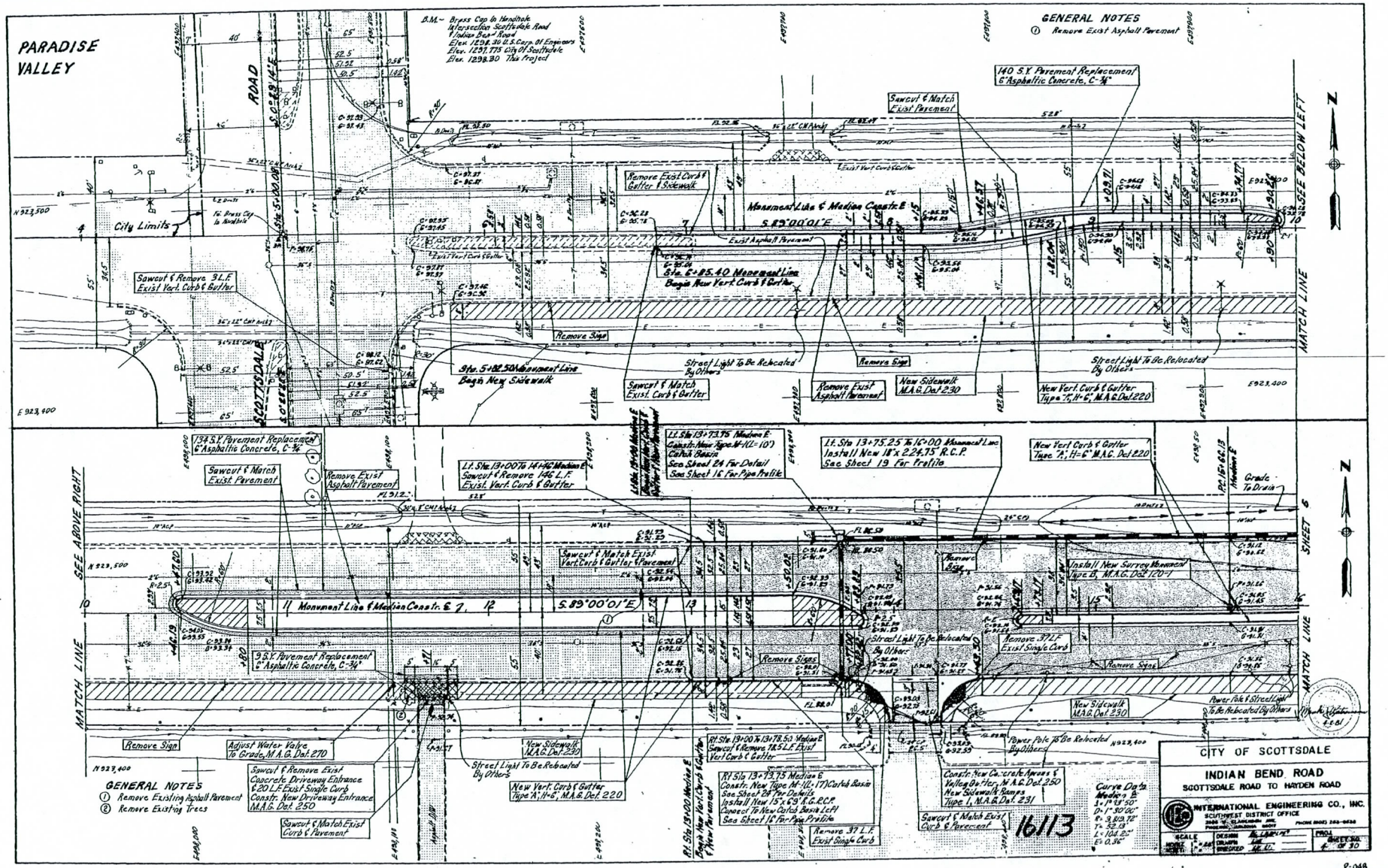
EL 1280.1 (100yr Flood Elev)

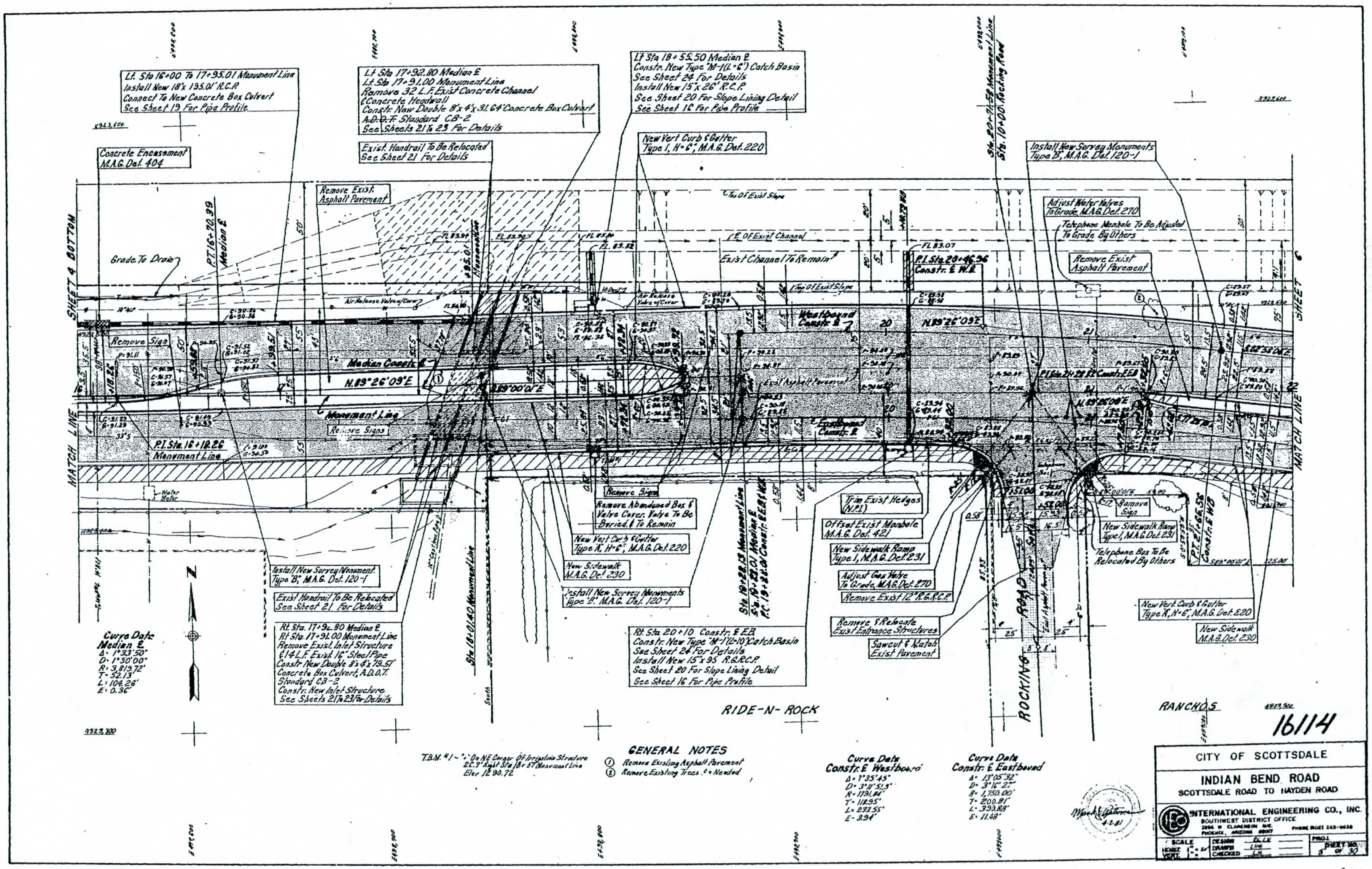
16111

CITY OF SCOTTSDALE	
INDIAN BEND ROAD	
SCOTTSDALE ROAD TO HAYDEN ROAD	
INTERNATIONAL ENGINEERING CO., INC. SOUTHWEST DISTRICT OFFICE 2944 N. CLARENDON AVE. PHOENIX, ARIZONA 85017 PHONE (602) 263-8636	
SCALE HORIZ 1"= VERT 1"=	DESIGN DRAWN CHECKED
PROJ.	SHEET NO. 3 OF 30

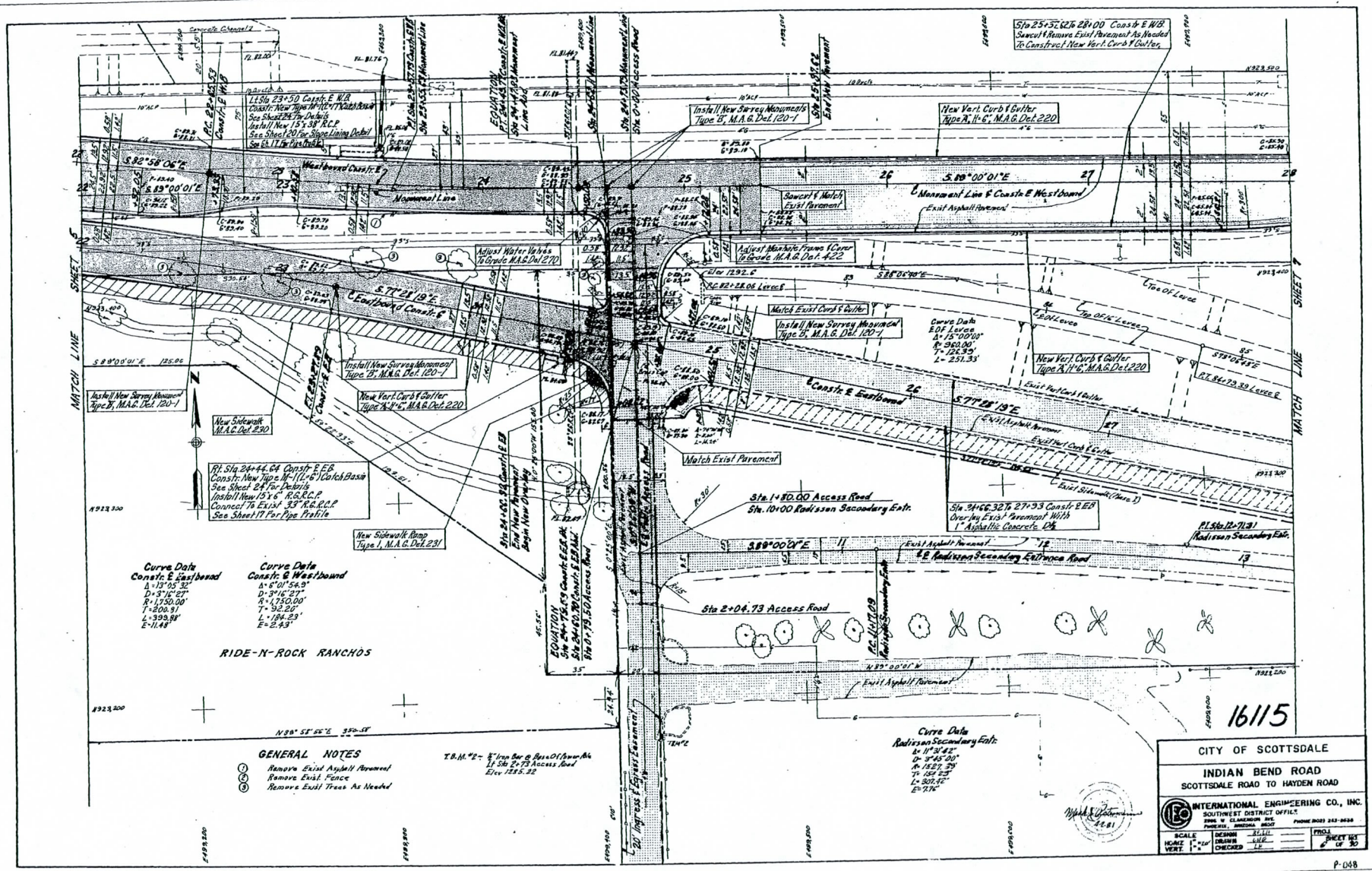
P-048


INDIAN BEND
ROAD
HAYDEN
REVLIS MORTGAGE CORPORATION
LOT 5
Book 174, Map 21
Sheet 1 of 5
14.057 Acres
Less Existing Roadway R/W Easement 2.494 Acres = 11.563 Acres.
Less Additional Roadway R/W Easement 0.485 Acres = 11.078 Acres.
REVLIS MORTGAGE CORPORATION
LOT 6
Book 174, Map 21
Sheet 1 of 5
20.526 Acres
Less Existing Roadway R/W Easement 5.740 Acres = 20.786 Acres
Less Additional Roadway R/W Easement 0.122 Acres = 20.664 Acres
Temporary Easement For Flood Control & Drainage
Drainage & Flood Control Easement
Easement & R/W For Roadway Dkt. 11, Pg 64 Of Road Maps M.C.R.
Easement & R/W For Roadway Dkt. 107.05, Pg 146 B
5.740 Acres
Easement & R/W For Roadway Dkt. 1109, Pg 568
0.742 Acres
Easement & R/W For Roadway Dkt. 1113, Pg 348
1.132 Acres
Easement & R/W For Roadway
0.485 Acres
North R/W Line Arizona Canal
Set P Monument
Set Mag Nail
16112


PARADISE VALLEY
ROAD
SCOTTSDALE
B.M.– Brass Cap in Handhole Intersection Scottsdale Road & Indian Bend Road Elev. 1298.30 U.S. Corp. Of Engineers Elev. 1297.775 City Of Scottsdale Elev. 1298.30 This Project
GENERAL NOTES
① Remove Exist Asphalt Pavement
140 S.Y. Pavement Replacement 6" Asphaltic Concrete, C-3/4"
Sawcut & Match Exist Pavement
Remove Exist Curb & Gutter & Sidewalk
Monument Line & Median Constr. ℄
S 89°00'01"E
City Limits
Sawcut & Remove 31 L.F. Exist Vert. Curb & Gutter
Sta. 5+85.40 Monument Line Begin New Vert. Curb & Gutter
Exist Asphalt Pavement
Remove Sign
Street Light To Be Relocated By Others
Sta. 5+82.50 Monument Line Begin New Sidewalk
Sawcut & Match Exist. Curb & Gutter
Remove Exist Asphalt Pavement
New Sidewalk M.A.G. Det. 230
New Vert. Curb & Gutter Type "A", H=6", M.A.G. Det. 220
MATCH LINE
SEE BELOW LEFT
SEE ABOVE RIGHT
SHEET 5
194 S.Y. Pavement Replacement 6" Asphaltic Concrete, C-3/4"
Sawcut & Match Exist Pavement
Remove Exist Asphalt Pavement
Lt. Sta. 13+00 To 14+46 Median ℄ Sawcut & Remove 146 L.F. Exist. Vert. Curb & Gutter
Lt. Sta. 13+73.75 Median ℄ Constr. New Type M-10-(10) Catch Basin See Sheet 24 For Detail See Sheet 16 For Pipe Profile
Lt. Sta. 13+75.25 To 14+00 Monument Line Install New 18"x 224.75' R.C.P. See Sheet 19 For Profile
New Vert. Curb & Gutter Type "A", H=6" M.A.G. Det. 220
Grade To Drain
Monument Line & Median Constr. ℄
Sawcut & Match Exist Vert. Curb & Gutter & Pavement
Remove Sign
Street Light To Be Relocated By Others
Remove 372 L.F. Exist Single Curb
Remove Signs
Install New Survey Monument Type B, M.A.G. Det 120-1
93 S.Y. Pavement Replacement 6" Asphaltic Concrete, C-3/4"
New Sidewalk M.A.G. Det. 230
Power Pole & Street Light To Be Relocated By Others
Power Pole To Be Relocated By Others
Remove Sign
Adjust Water Valve To Grade, M.A.G. Det. 270
New Sidewalk M.A.G. Det. 230
Rt. Sta. 13+00 To 13+78.50 Median ℄ Sawcut & Remove 78.5 L.F. Exist Vert. Curb & Gutter
Rt. Sta. 13+73.75 Median ℄ Constr. New Type M-10-(17) Catch Basin See Sheet 24 For Details Install New 15'x 4'9" R.C.B.C.P. Connect To New Outlet Bevel (Lt.) See Sheet 16 For Pipe Profile
Constr. New Concrete Aprons & Valley Gutter, M.A.G. Det. 250 New Sidewalk Ramps Type I, M.A.G. Det. 231
Sawcut & Match Exist Curb & Pavement
Street Light To Be Relocated By Others
New Vert. Curb & Gutter Type "A", H=6", M.A.G. Det. 220
Sawcut & Remove Exist Concrete Driveway Entrance & 20 L.F. Exist Single Curb Constr. New Driveway Entrance M.A.G. Det. 250
Sawcut & Match Exist Curb & Pavement
Remove 37 L.F. Exist Single Curb
Rt. Sta. 19+00 Median ℄ Begin New Vert. Curb & Gutter & New Pavement
GENERAL NOTES
① Remove Existing Asphalt Pavement
② Remove Existing Trees
Curve Data
Median ℄
Δ = 1°18'50"
D = 1° 30'00"
R = 3819.72'
T = 32.13'
L = 104.25'
e = 0.3%
16113
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
SCALE
DESIGNED
DRAWN
CHECKED
PROJ.
SHEET NO. 4 OF 30
P-048


Lt. Sta. 16+00 To 17+95.01 Monument Line
Install New 18"x 195.01' R.C.P.
Connect To New Concrete Box Culvert
See Sheet 19 For Pipe Profile
Lt Sta 17+92.80 Median ℄
Lt Sta 17+91.00 Monument Line
Remove 32 L.F. Exist Concrete Channel
& Concrete Headwall
Constr. New Double 8'x 4'x 31.64' Concrete Box Culvert
A.D.O.T. Standard CB-2
See Sheets 21 To 23 For Details
Lt Sta 18+55.50 Median ℄
Constr. New Type "M-1(L=6')" Catch Basin
See Sheet 24 For Details
Install New 15"x 26' R.C.P.
See Sheet 20 For Slope Lining Detail
See Sheet 16 For Pipe Profile
Concrete Encasement
M.A.G. Det. 404
Exist. Handrail To Be Relocated
See Sheet 21 For Details
New Vert Curb & Gutter
Type 1, H=6", M.A.G. Det. 220
Install New Survey Monuments
Type B, M.A.G. Det. 120-1
Remove Exist.
Asphalt Pavement
Adjust Water Valves
To Grade, M.A.G. Det. 270
Telephone Manhole To Be Adjusted
To Grade By Others
Remove Exist
Asphalt Pavement
SHEET 4 BOTTOM
Grade To Drain
P.T. 16+70.39
Median ℄
Exist Channel To Remain
P.I. Sta. 20+46.36
Constr. ℄ W.B.
Westbound
Constr. ℄
N.89°26'09"E
Remove Sign
Median Constr. ℄
N.89°26'09"E
Monument Line
Remove Signs
P.I. Sta 16+18.26
Monument Line
Eastbound
Constr. ℄
P.I. Sta. 21+29.82 Constr. E.B.
MATCH LINE
MATCH LINE
SHEET 6
Remove Sign
Remove Abandoned Box &
Valve Cover. Valve To Be
Buried & To Remain
New Vert Curb & Gutter
Type A, H=6", M.A.G. Det. 220
New Sidewalk
M.A.G. Det. 230
Install New Survey Monuments
Type "B", M.A.G. Det. 120-1
Trim Exist Hedges
(N.P.I.)
Offset Exist Manhole
M.A.G. Det. 421
New Sidewalk Ramp
Type 1, M.A.G. Det. 231
Adjust Gas Valve
To Grade, M.A.G. Det. 270
Remove Exist 12" R.G.R.C.P.
Remove & Relocate
Exist Entrance Structures
Sawcut & Match
Exist Pavement
Remove
Sign
New Sidewalk Ramp
Type 1, M.A.G. Det. 231
Telephone Box To Be
Relocated By Others
New Vert. Curb & Gutter
Type A, H=6", M.A.G. Det. 220
New Sidewalk
M.A.G. Det. 230
Install New Survey Monument
Type "B", M.A.G. Det. 120-1
Exist Handrail To Be Relocated
See Sheet 21 For Details
Rt. Sta. 17+92.80 Median ℄
Rt. Sta. 17+91.00 Monument Line
Remove Exist. Inlet Structure
& 14 L.F. Exist. 16" Steel Pipe
Constr. New Double 8'x 4'x 19.51'
Concrete Box Culvert, A.D.O.T.
Standard CB-2
Constr. New Inlet Structure
See Sheets 21 To 23 For Details
Rt. Sta. 20+10 Constr. ℄ E.B.
Constr. New Type "M-1(L=10')" Catch Basin
See Sheet 24 For Details
Install New 15"x 95' R.G.R.C.P.
See Sheet 20 For Slope Lining Detail
See Sheet 16 For Pipe Profile
Sta. 18+01.40 Monument Line
Sta. 19+22.13 Monument Line
Sta. 19+22.01 Median ℄
P.C. 19+22.01 Constr. ℄ E.B. & W.B.
Sta. 20+71.58 Monument Line
Sta. 10+00 Rocking Road
P.T. 21+66.56
Constr. ℄ W.B.
Curve Data
Median ℄
Δ= 1°33'50"
D= 1°30'00"
R= 3,819.72'
T= 52.13'
L= 104.28'
E= 0.36'
RIDE-N-ROCK
ROCKING ROAD
RANCHOS
16114
T.B.M. #1 - "□" On NE Corner Of Irrigation Structure
Elev 1290.72
GENERAL NOTES
① Remove Existing Asphalt Pavement
② Remove Existing Trees As Needed
Curve Data
Constr. ℄ Westbound
Δ= 1°35'45"
D= 3°16'51.5"
R= 1731.84'
T= 118.95'
L= 237.55'
E= 3.94'
Curve Data
Constr. ℄ Eastbound
Δ= 13°05'32"
D= 3°16'22"
R= 1,750.00'
T= 200.81'
L= 399.88'
E= 11.48'
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
PHOENIX, ARIZONA
SCALE
DESIGN
DRAWN
CHECKED
SHEET NO.
5 OF 30

P-093


Sta 25+32.62 To 29+00 Constr E WB
Sawcut & Remove Exist Pavement As Needed
To Construct New Vert. Curb & Gutter
Lt Sta 23+50 Constr E WB
Constr New Type M-1(L-6) Catch Basin
See Sheet 24 For Details
Install New 15"x38" R.C.P.
See Sheet 20 for Slope Lining Detail
See Sheet 17 for Pipe Profile
Install New Survey Monument
Type B, M.A.G. Det. 120-1
New Vert. Curb & Gutter
Type A, 11"-6", M.A.G. Det. 220
Westbound Constr E
Monument Line
Sawcut & Match
Exist Pavement
Monument Line & Constr E Westbound
Exist Asphalt Pavement
Adjust Water Valves
To Grade M.A.G. Det 270
Adjust Manhole Frame & Cover
To Grade M.A.G. Det. 422
Elev 1292.6
PC 22+28.06 Levee E
Match Exist Curb & Gutter
Eastbound Constr E
Top of Levee
Toe of Levee
Curve Data
E.O.F. Levee
Δ= 15°00'00"
R= 960.00'
T= 126.39'
L= 251.33'
Install New Survey Monument
Type B, M.A.G. Det. 120-1
New Vert. Curb & Gutter
Type A, 11"-6", M.A.G. Det. 220
Exist Vert Curb & Gutter
Exist Asphalt Pavement
Exist Sidewalk (Note 2)
Match Exist Pavement
Sta. 1+80.00 Access Road
Sta. 10+00 Radisson Secondary Entr.
Sta 21+66.32 To 27+93 Constr E EB
Overlay Exist Pavement With
1" Asphaltic Concrete Dik
PI Sta 12+71.31
Radisson Secondary Entr.
Exist Asphalt Pavement
EE Radisson Secondary Entrance Road
Sta 2+04.73 Access Road
PC 14+71.09
Radisson Secondary Entr.
Exist Asphalt Pavement
Curve Data
Radisson Secondary Entr.
Δ= 11°31'42"
D= 3°45'30"
R= 1525.79'
T= 154.93'
L= 307.12'
E= 7.76'
PI Sta 24+44.64 Constr E EB
Constr New Type M-1(L-6) Catch Basin
See Sheet 24 For Details
Install New 15'x6' R.C.B.C.P.
Connect To Exist. 33" R.C.B.C.P.
See Sheet 17 For Pipe Profile
New Sidewalk
M.A.C. Det 230
New Sidewalk Ramp
Type 1, M.A.C. Det. 231
Sta 24+62.33 Constr E EB
End New Driveway
Begin New Driveway
Sta 24+66.32 Constr E EB
Exist Asphalt Pavement
Curve Data
Constr E Eastbound
Δ= 13°05'32"
D= 3°16'27"
R= 1,750.00'
T= 200.91'
L= 399.98'
E= 11.48'
Curve Data
Constr E Westbound
Δ= 6°01'54.9"
D= 3°16'27"
R= 1,750.00'
T= 92.29'
L= 184.23'
E= 2.43'
RIDE-N-ROCK RANCHOS
N 89° 58' 56" E 350.58'
GENERAL NOTES
1 Remove Exist Asphalt Pavement
2 Remove Exist. Fence
3 Remove Exist Trees As Needed
T.B.M. #2 - ½" Iron Bar & Pass Of Sewer Mh
Lt Sta 2+73 Access Road
Elev 1285.32
20' Right of Way Easement
SHEET 5
SHEET 6
MATCH LINE
MATCH LINE
16115
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
SCALE
HORIZ 1"=20'
VERT 1"=2'
DESIGN
DRAWN
CHECKED
PROJ
SHEET NO 6 OF 30

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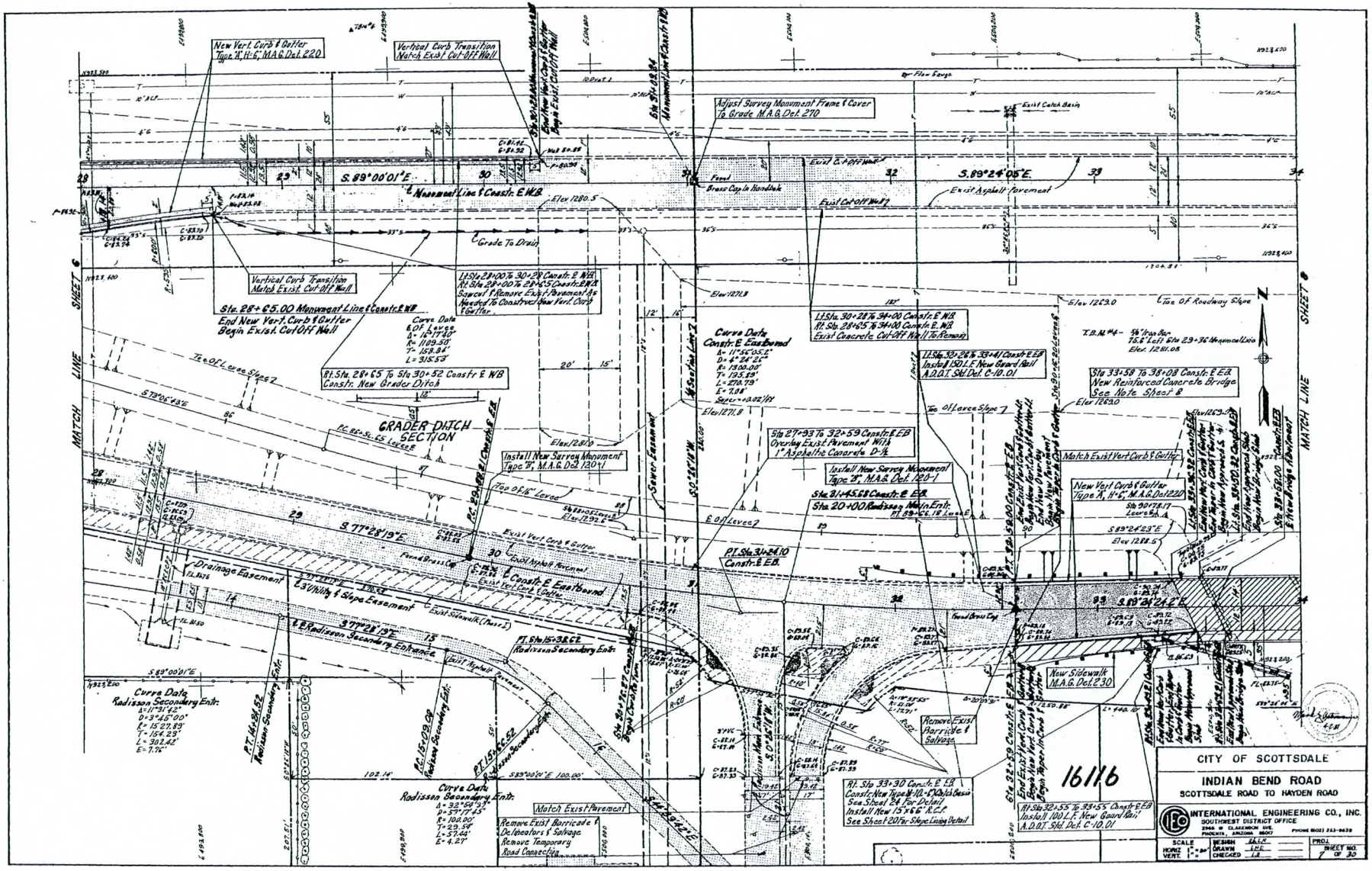
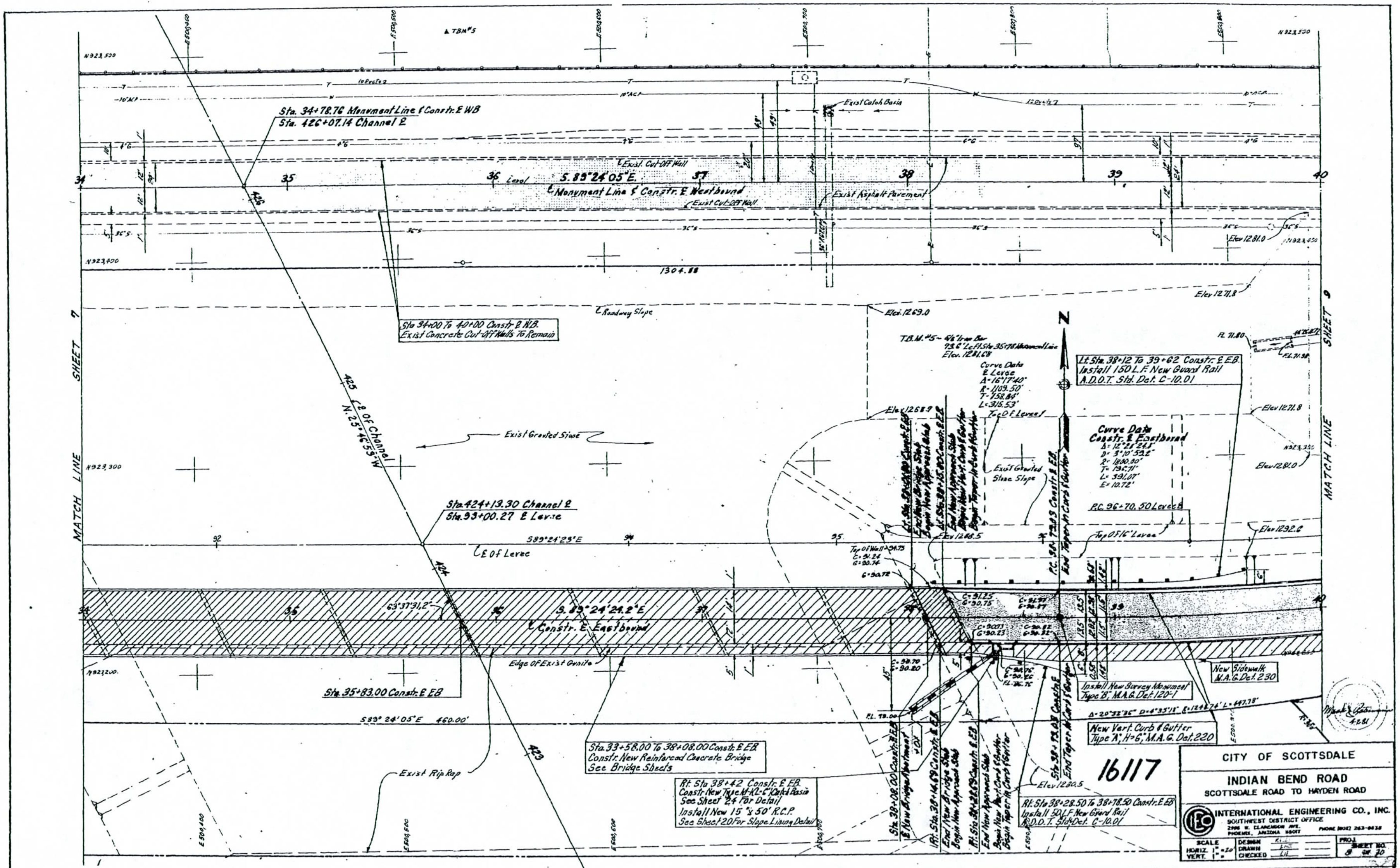
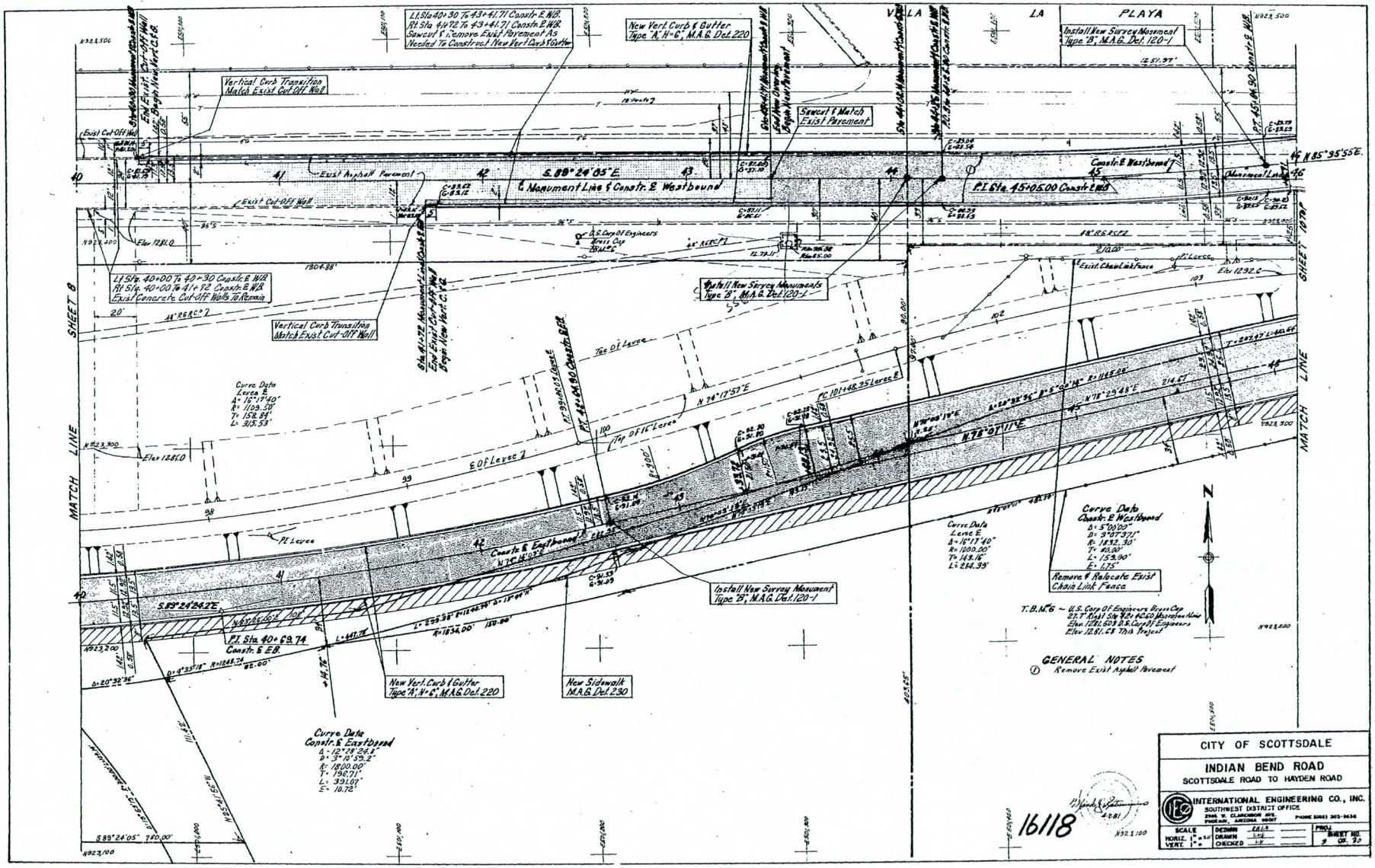

New Vert. Curb & Gutter Type 'A', H=6", M.A.G. Det. 220
Vertical Curb Transition Match Exist. Cut-Off Wall
Adjust Survey Monument Frame & Cover To Grade M.A.G. Det. 270
Exist Catch Basin
Exist C.M.P. Cut-Off Wall
Exist Asphalt Pavement
Exist Cut-Off Wall
Brass Cap in Handhole
S.89°00'01"E.
℄ Monument Line & Constr. E.W.B.
S.89°24'05"E.
Elev 1280.5
Grade To Drain
Vertical Curb Transition Match Exist. Cut-Off Wall
Sta. 28+65.00 Monument Line & Constr. E.W.B.
End New Vert. Curb & Gutter
Begin Exist. Cut Off Wall
Curve Data
℄ Of Lanes
Δ= 16°17'20"
R= 1109.50'
T= 158.84'
L= 315.53'
Elev 1271.8
Elev 1279.0
Top of Levee
Toe of Levee Slope Z
S 79°06'43"E
Rt. Sta. 28+65 To Sta. 30+52 Constr. E.W.B.
Constr. New Grader Ditch
GRADER DITCH SECTION
Install New Survey Monument Type 'B', M.A.G. Det. 120-1
Sewer Easement
S.0°35'11"W.
Lt. Sta. 30+28 To 34+00 Constr. E.W.B.
Rt. Sta. 28+65 To 34+00 Constr. E.W.B.
Exist Concrete Cut-Off Wall To Remove
Curve Data
Constr. E. Eastbound
Δ= 11°56'05.2"
D= 4°24'21"
R= 1300.00'
T= 135.29'
L= 270.79'
E= 7.08'
Super = 4.02%/ft
Lt. Sta. 30+28 To 33+41 Constr. E.E.B.
Install 150 L.F. New Guard Rail
A.D.O.T. Std. Det. C-10.01
Sta. 33+58 To 38+08 Constr. E.E.B.
New Reinforced Concrete Bridge
See Note Sheet 8
T.B.M. #4 - 5/8" Iron Bar 75.6' Left Sta. 29+36 Hayden Loop Elev. 1281.08
Top Of Roadway Slope
Elev 1269.0
Elev 1283.0
Sta. 27+93 To 32+59 Constr. E.E.B.
Overlay Exist. Pavement With 1" Asphaltic Concrete D-½
Match Exist Vert. Curb & Gutter
Install New Survey Monument Type 'A', M.A.G. Det. 120-1
Sta. 31+45.58 Constr. E.E.B.
Sta. 20+00 Radisson Main Ent.
Pt. Sta. 31+24.10 Constr. E.B.
New Vert. Curb & Gutter Type 'A', H=6", M.A.G. Det. 220
Sta. 30+78.17 Leave E.B.A.
Sta. 32+58.00 Constr. E.E.B.
End New Vert. Curb & Gutter
Begin New Vert. Curb & Gutter
Sta. 32+58.00 Constr. E.E.B.
End New Vert. Curb & Gutter
Begin New Vert. Curb & Gutter
S.89°24'23"E
Elev 1288.5
S.89°24'24"E
New Sidewalk M.A.G. Det. 230
Remove Exist. Barricade & Salvage
Rt. Sta. 33+30 Constr. E.E.B.
Constr. New Type 'A' H-6" Curb & Gutter
See Sheet 24 For Detail
Install New 15'x66' R.C.P.
See Sheet 20 For Slope Lining Detail
Rt. Sta. 32+55 To 33+55 Constr. E.E.B.
Install 100 L.F. New Guard Rail
A.D.O.T. Std. Det. C-10.01
Drainage Easement
℄ V-Ditch & Slope Easement
℄ E.B. Radisson Secondary Entrance
Exist Sidewalk (Thurs.)
Exist Asphalt Pavement
Exist Vert. Curb & Gutter
Found Brass Cap
℄ Constr. E. Eastbound
Pt. Sta. 15+38.62 E.E. Radisson Secondary Ent.
S.89°00'01"E
Curve Data
Radisson Secondary Ent.
Δ= 1°31'42"
D= 3°45'00"
R= 1527.89'
T= 154.29'
L= 302.42'
E= 7.72'
P.T. 14+84.52 Radisson Secondary Ent.
P.C. 15+02.94 Radisson Secondary Ent.
P.T. 15+55.52 Radisson Secondary Ent.
S.0°35'11"W.
102.14'
S.89°00'01"E 100.00'
Curve Data
Radisson Secondary Ent.
Δ= 32°59'43"
D= 57°17'45"
R= 100.00'
T= 29.59'
L= 57.58'
E= 4.27'
Match Exist Pavement
Remove Exist Barricade & Delineators & Salvage
Remove Temporary Road Connection
S.89°24'24"E
Toe of Levee Slope Z
Elev 1271.8
Elev 1269.0
Sta. 30+78.17 Leave E.B.A.
Sta. 32+58.00 Constr. E.E.B.
End New Vert. Curb & Gutter
Begin New Vert. Curb & Gutter
Sta. 32+58.00 Constr. E.E.B.
End New Vert. Curb & Gutter
Begin New Vert. Curb & Gutter
Sta. 32+58.00 Constr. E.E.B.
E. Riverbank Abutment
MATCH LINE
SHEET 6
SHEET 8
N
16116
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2146 E. CLARENDON AVE.
PHOENIX, ARIZONA 85016
PHONE (602) 263-8639
SCALE HORIZ 1"=20'
VERT
DESIGN
DRAWN
CHECKED
PROJ.
SHEET NO 7 OF 30

P-048

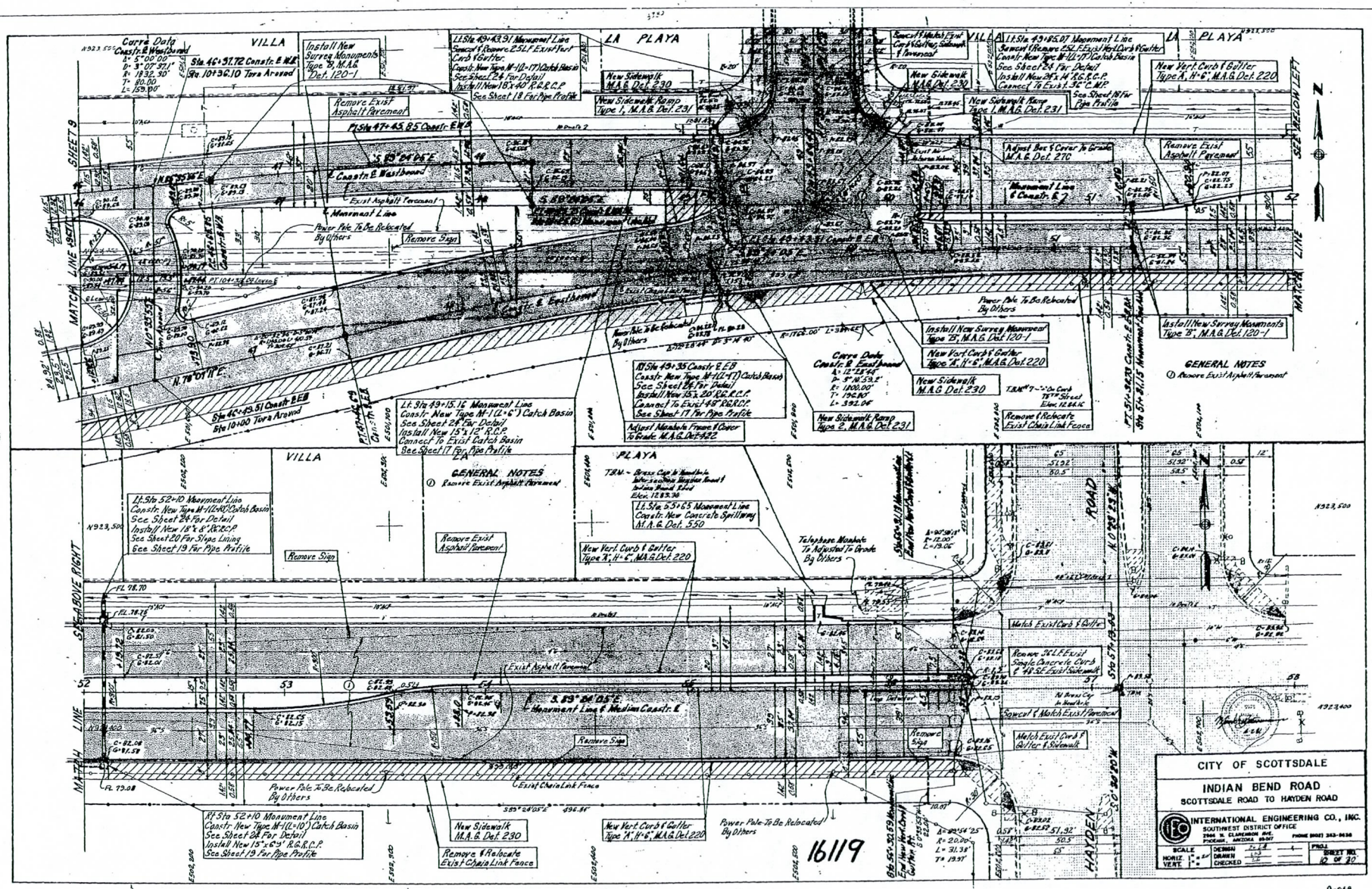


MATCH LINE SHEET 7
MATCH LINE SHEET 9
TBM #5
Sta. 34+78.76 Monument Line & Constr. E WB
Sta. 426+07.14 Channel E
S. 89°24'05" E.
E Monument Line & Constr. E Westbound
Exist. Cut-Off Wall
Exist Catch Basin
Exist Asphalt Pavement
1304.88
E Roadway Slope
Sta 34+00 To 40+00 Constr. E W.B.
Exist Concrete Cut-Off Walls To Remain
Elev 1269.0
Elev 1271.8
Elev 1281.0
T.B.M. #5
Curve Data
E Levee
Lt Sta 38+12 To 39+62 Constr. E EB.
Install 150 L.F. New Guard Rail
A.D.O.T. Std. Det. C-10.01
Curve Data
Constr. E Eastbound
Exist Graded Slope
Exist Graded Slope
E Of Channel
N. 25°45'53" W
Sta. 424+19.30 Channel E
Sta. 93+00.27 E Levee
S89°24'29" E
E Of Levee
Top Of 16' Levee
Elev 1292.0
S. 89°24'24.2" E
E Constr. E Eastbound
Edge Of Exist Gunite
Sta. 35+83.00 Constr. E EB
S 89°24'05" E 460.00'
New Sidewalk M.A.G. Det. 230
Install New Survey Monument Type 'B', M.A.G. Det. 120-1
New Vert. Curb & Gutter Type 'A', H=6", M.A.G. Det. 220
Sta. 33+58.00 To 38+08.00 Constr. E EB.
Constr. New Reinforced Concrete Bridge
See Bridge Sheets
Exist Rip Rap
Rt. Sta 38+42 Constr. E EB.
Constr. New Type M-KL-5 Catch Basin
See Sheet 24 For Detail
Install New 15" x 50" R.C.P.
See Sheet 20 For Slope Lining Detail
Elev 1230.5
Rt. Sta 38+28.50 To 38+78.50 Constr. E EB
Install 50 L.F. New Guard Rail
A.D.O.T. Std. Det. C-10.01
16117
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
PHOENIX, ARIZONA
SCALE
HORIZ. 1" = 20'
VERT. 1" =
DESIGN
DRAWN
CHECKED
PROJ.
SHEET NO.
8 OF 20

P-048

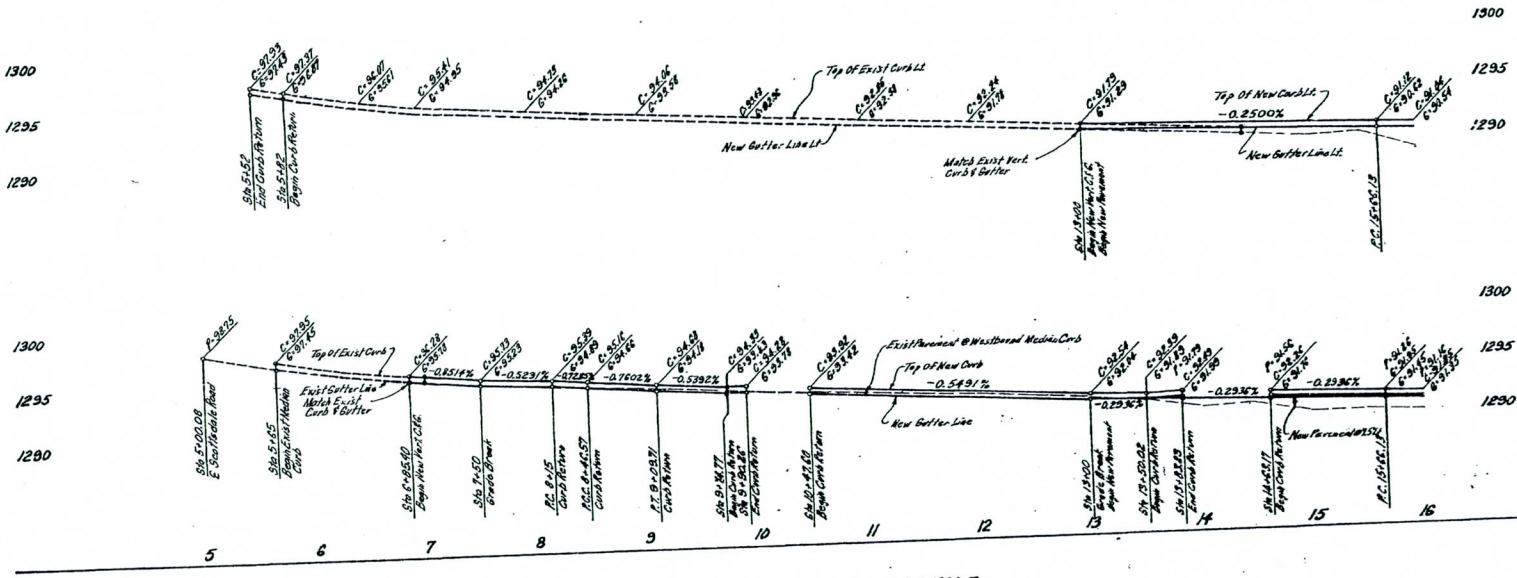

LA PLAYA
VILLA
Install New Survey Monument Type 'B', M.A.G. Std. 120-1
New Vert. Curb & Gutter Type 'A', H=6', M.A.G. Std. 220
Vertical Curb Transition Match Exist Cut Off Wall
Sawcut & Match Exist Pavement
Exist Asphalt Pavement
Exist Cut-OFF Wall
℄ Monument Line & Constr. E Westbound
S 89°24'05"E
Pt Sta. 45+05.00 Constr. E WB
N 85°55'55"E
Constr. E Westbound
Monument Line
Exist Chain Link Fence
Elev 1232.6
Elev 1281.0
Top of Levee
E Of Levee E
Pt Levee
N 76°17'57"E
N 78°07'11"E
N 78°03'48"E
Curve Data Levee E Δ= 16°17'40" R= 1109.50' T= 158.89' L= 315.53'
Curve Data Levee E Δ= 5°00'20" D= 3°07'37" R= 1832.30' T= 80.01' L= 159.90' E= 1.75'
Curve Data Levee E Δ= 16°17'40" R= 1080.00' T= 154.16' L= 284.39'
Curve Data Constr. E Eastbound Δ= 12°28'24.2" D= 3°10'59.2" R= 1800.00' T= 196.71' L= 391.07' E= 10.72'
Pt Sta 40+69.74 Constr. E EB
S 89°24'24.2"E
N 76°15'33"E
Remove & Relocate Exist Chain Link Fence
Install New Survey Monument Type 'B', M.A.G. Std. 120-1
New Vert. Curb & Gutter Type 'A', H=6', M.A.G. Std. 220
New Sidewalk M.A.G. Std. 230
T.B.M. #6 ~ U.S. Corp Of Engineers Brass Cap 23.7' West of Sta 82+40 Centerline Elev. 1281.03 U.S. Corps of Engineers Elev 1281.03 This Project
GENERAL NOTES
① Remove Exist Asphalt Pavement
MATCH LINE
SHEET 8
SHEET 10
N
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
16118

P-048

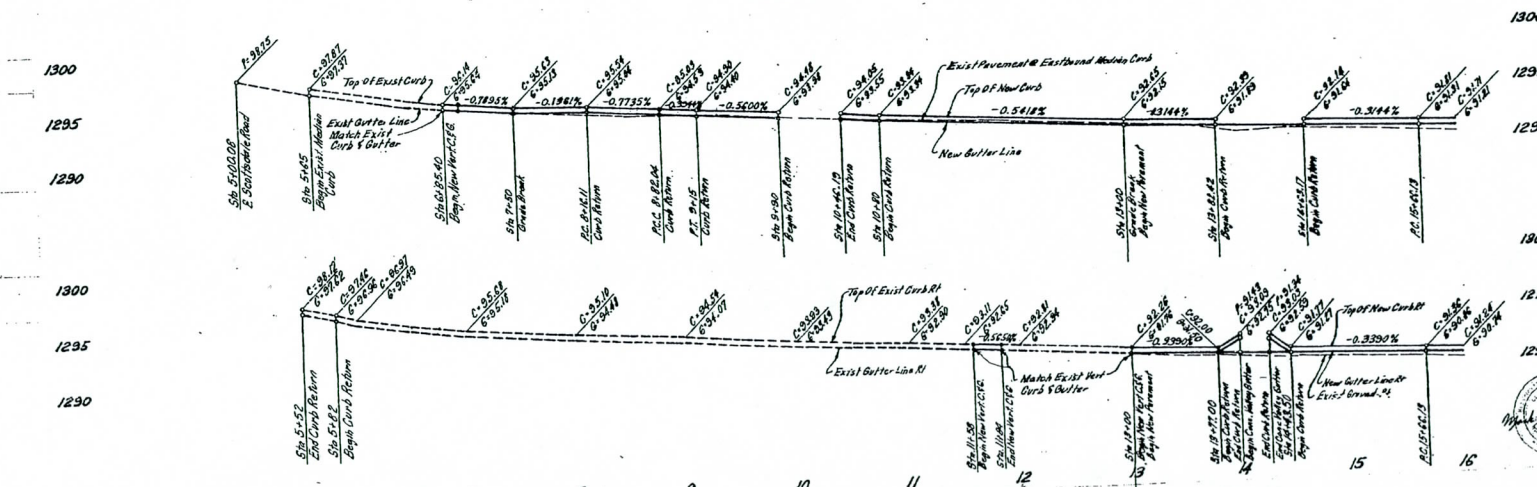

VILLA
LA PLAYA
Curve Data
Sta 46+31.72 Constr. E W.B.
Sta 101+30.10 Tons Around
Install New Survey Monuments Type "B", M.A.G. Std. 120-1
Remove Exist Asphalt Pavement
Sta 47+45.85 Constr. E W.B.
S 89°24'05" E
Constr. E Westbound
Exist Asphalt Pavement
℄ Monument Line
Power Pole To Be Relocated By Others
Remove Sign
Exist Asphalt Pavement
Constr. E Eastbound
N 78°01'11" E
129.90'
Sta 46+49.51 Constr. E.E.B.
Sta 101+00 Tons Around
Lt. Sta 49+43.31 Monument Line
Remove & Remove 25 L.F. Exist Vert. Curb & Gutter
Constr. New Type M-1(2-17) Catch Basin
See Sheet 24 For Detail
Install New 18"x 40" R.C.P.C.P.
See Sheet 18 For Pipe Profile
New Sidewalk M.A.G. Std. 230
New Sidewalk Ramp Type 1, M.A.G. Std. 231
Lt. Sta 49+15.16 Monument Line
Constr. New Type M-1(2-6') Catch Basin
See Sheet 24 For Detail
Install New 15"x 12" R.C.P.
Connect To Exist Catch Basin
See Sheet 17 For Pipe Profile
Adjust Manhole Frame & Cover To Grade M.A.G. Std. 422
Lt. Sta 49+35 Constr. E.E.B.
Constr. New Type M-1(2-17) Catch Basin
See Sheet 24 For Detail
Install New 15"x 20" R.C.P.
Connect To Exist 48" R.C.P.
See Sheet 17 For Pipe Profile
Curve Data
Constr. E Eastbound
Δ = 12°28'46"
D = 5°43'59.2"
R = 1000.00'
T = 196.80'
L = 390.06'
New Sidewalk Ramp Type 2, M.A.G. Std. 231
Lt. Sta 49+85.07 Monument Line
Remove & Remove 25 L.F. Exist Vert. Curb & Gutter
Constr. New Type M-1(2-17) Catch Basin
See Sheet 24 For Detail
Install New 36"x 36" C.M.P.
Connect To Exist 36" C.M.P.
See Sheet 18 For Pipe Profile
New Vert. Curb & Gutter Type A, H=6", M.A.G. Std. 220
Adjust Box & Cover To Grade M.A.G. Std. 270
Remove Exist Asphalt Pavement
Monument Line & Constr. ℄
Power Pole To Be Relocated By Others
Install New Survey Monument Type "B", M.A.G. Std. 120-1
New Vert. Curb & Gutter Type A, H=6", M.A.G. Std. 220
New Sidewalk M.A.G. Std. 230
Remove & Relocate Exist Chain Link Fence
Sta 51+81.13 Monument Line
Ft. Sta 51+82.53 Constr. E.E.B.
GENERAL NOTES
① Remove Exist Asphalt Pavement
GENERAL NOTES
① Remove Exist Asphalt Pavement
TBM - Brass Cap in Handhole Intersection Hayden Road & Indian Bend Road
Elev. 1283.38
Lt. Sta 5.5+65 Monument Line
Constr. New Concrete Spillway M.A.G. Std. 550
Lt. Sta 52+10 Monument Line
Constr. New Type M-1(2-10') Catch Basin
See Sheet 24 For Detail
Install New 18"x 8' R.C.P.
See Sheet 20 For Slope Lining
See Sheet 19 For Pipe Profile
Remove Sign
Remove Exist Asphalt Pavement
New Vert. Curb & Gutter Type A, H=6", M.A.G. Std. 220
Telephone Manhole To Adjusted To Grade By Others
Exist Asphalt Pavement
S 89° 24' 05" E
℄ Monument Line & Median Constr. ℄
Remove Sign
Exist Chain Link Fence
Power Pole To Be Relocated By Others
Rt. Sta 52+10 Monument Line
Constr. New Type M-1(2-10') Catch Basin
See Sheet 24 For Detail
Install New 15"x 6'9" R.G.R.C.P.
See Sheet 19 For Pipe Profile
New Sidewalk M.A.G. Std. 230
Remove & Relocate Exist Chain Link Fence
New Vert. Curb & Gutter Type A, H=6", M.A.G. Std. 220
Power Pole To Be Relocated By Others
496.84'
S 89° 24' 05" E
Sta 51+82.59 Monument Line End New Vert. Curb & Gutter Rt.
S 16° 57' 52" E
Δ = 92°54'25"
R = 20.00'
L = 31.38'
T = 19.97'
51.92'
Remove 36 L.F. Exist Single Concrete Curb & 48 S.F. Exist Sidewalk
Match Exist Curb & Gutter
Sawcut & Match Exist Pavement
Match Exist Curb & Gutter & Sidewalk
Remove & Relocate Exist Chain Link Fence
ROAD
HAYDEN
N 16° 57' 52" W
SEE BELOW LEFT
SEE ABOVE RIGHT
MATCH LINE
SHEET 9
16119
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
SCALE HORIZ 1"=40' VERT 1"=4'
DESIGN
DRAWN
CHECKED
PROJ.
SHEET NO. 12 OF 20

P-048

WESTBOUND PROFILE



EASTBOUND PROFILE



16120

CITY OF SCOTTSDALE

INDIAN BEND ROAD

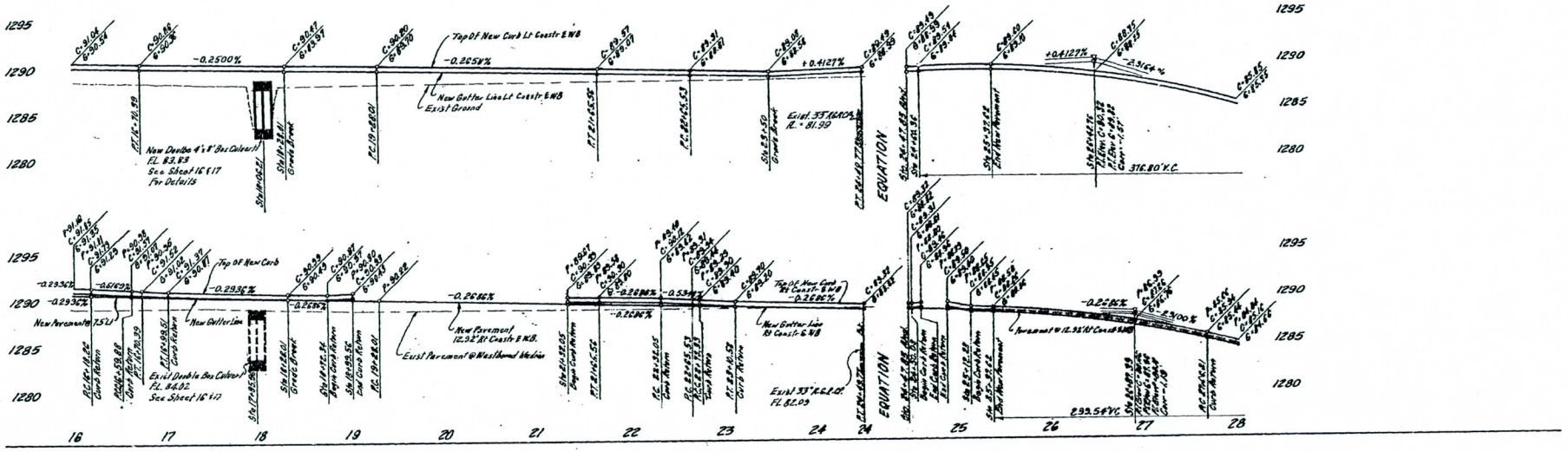
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3946 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 265-8836

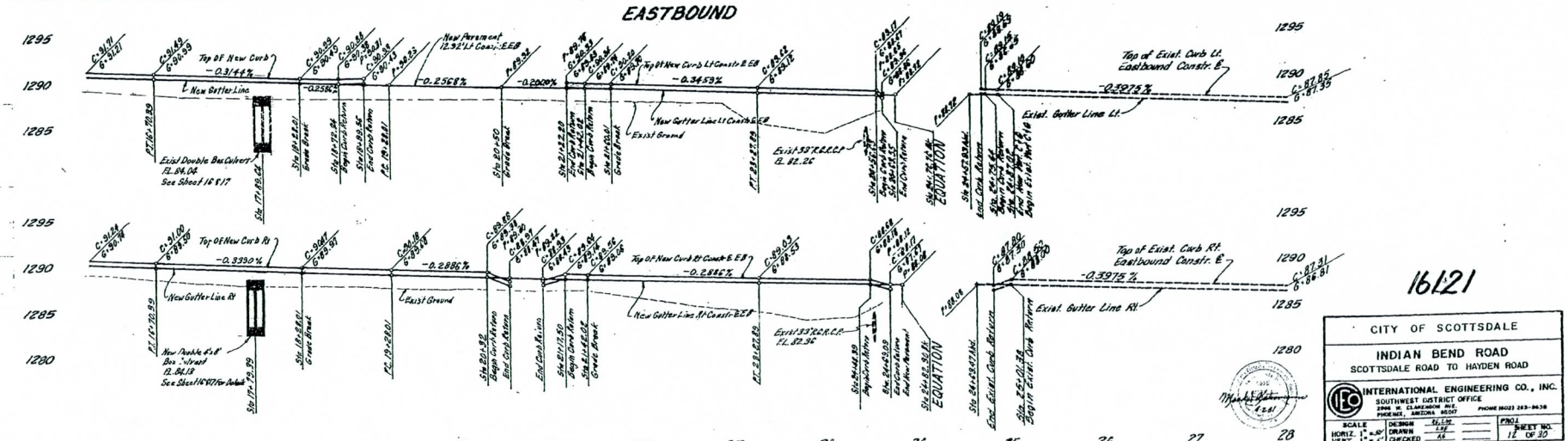
SCALE	DESIGN	CLAW	PROJ.
HORIZ. 1" = 50'	DRAWN	AJC	SHEET NO. 11 OF 20
VERT. 1" = 5'	CHECKED	CW	

P-048

WESTBOUND



EASTBOUND



16121

CITY OF SCOTTSDALE

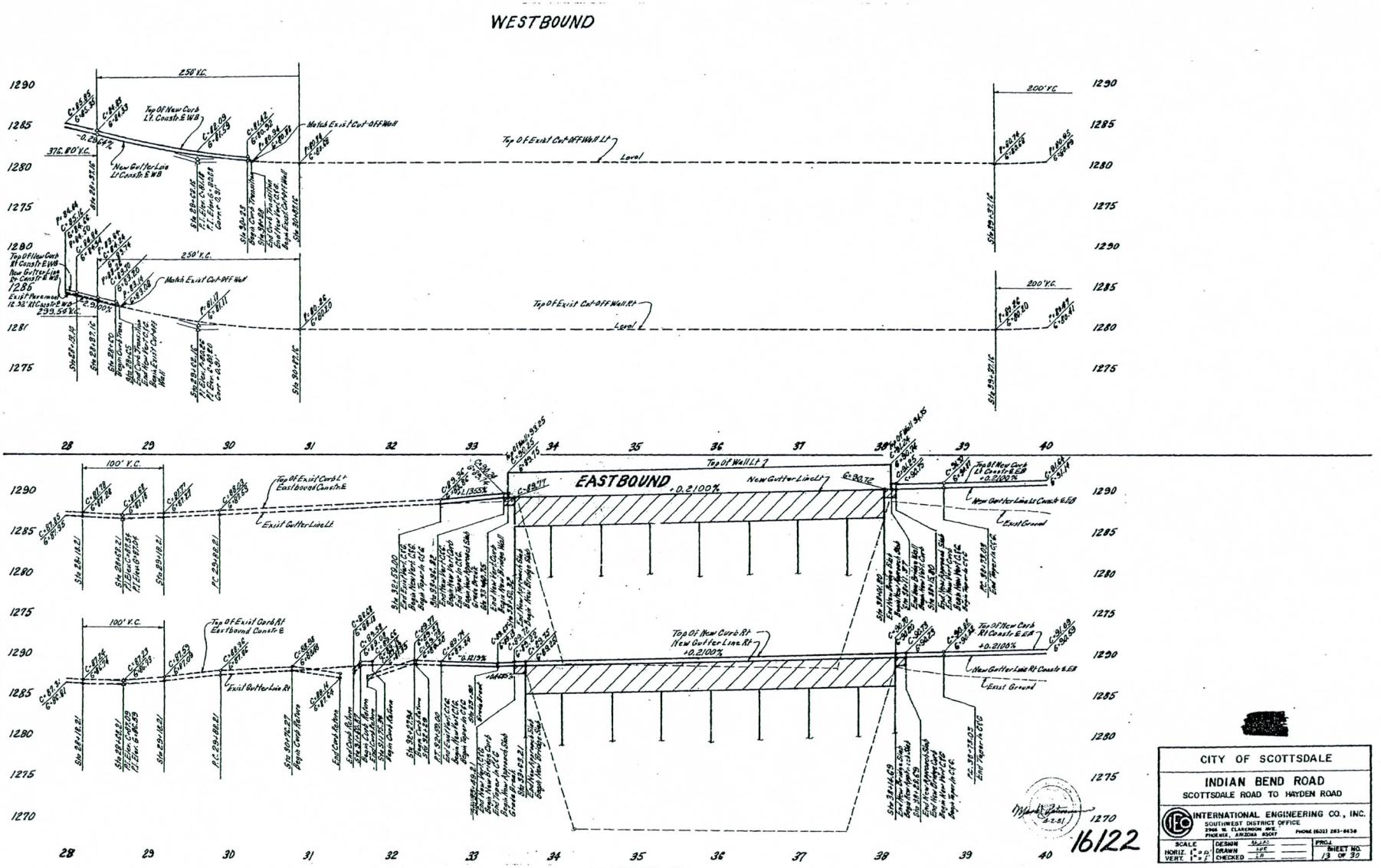
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2946 N. CLARENDON AVE. PHONE (602) 263-8638
PHOENIX, ARIZONA 85017

SCALE	DESIGN	EE, LS, PE	PROJ.
HORIZ. 1" = 40'	DRAWN	LHF	SHEET NO. 12 OF 30
VERT. 1" = 4'	CHECKED	AS	

P-048



CITY OF SCOTTSDALE

INDIAN BEND ROAD

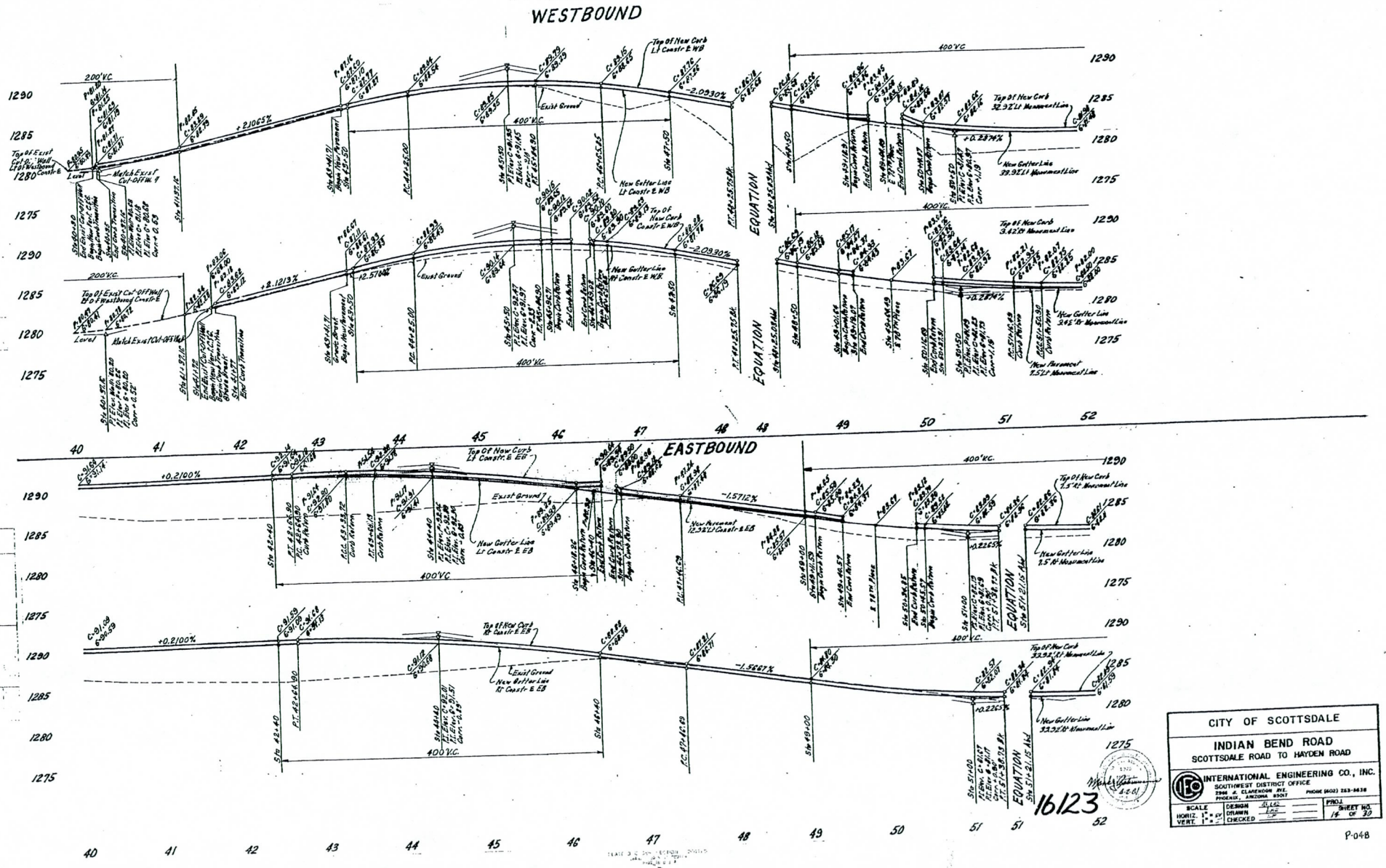
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2944 N. CLASSIC BLVD.
PHOENIX, ARIZONA 85007
PHONE (602) 265-6438

SCALE	DESIGN	PROJ.
HORIZ. 1"=20'	DRAWN	SHEET NO. 13 OF 30
VERT. 1"=2'	CHECKED	

16122

P-048

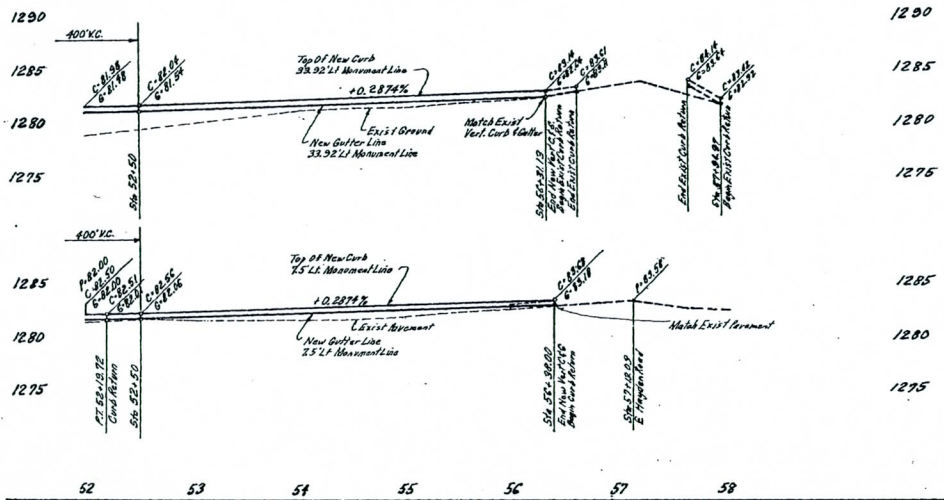


CITY OF SCOTTSDALE			
INDIAN BEND ROAD			
SCOTTSDALE ROAD TO HAYDEN ROAD			
INTERNATIONAL ENGINEERING CO., INC. SOUTHWEST DISTRICT OFFICE 2946 E. CLARENDON AVE. PHOENIX, ARIZONA 85017 PHONE (602) 263-8636			
SCALE HORIZ. 1" = 40' VERT. 1" = 4'	DESIGN JLLG	PROJ.	
	DRAWN LAS	SHEET NO. 14 OF 30	
	CHECKED JF		

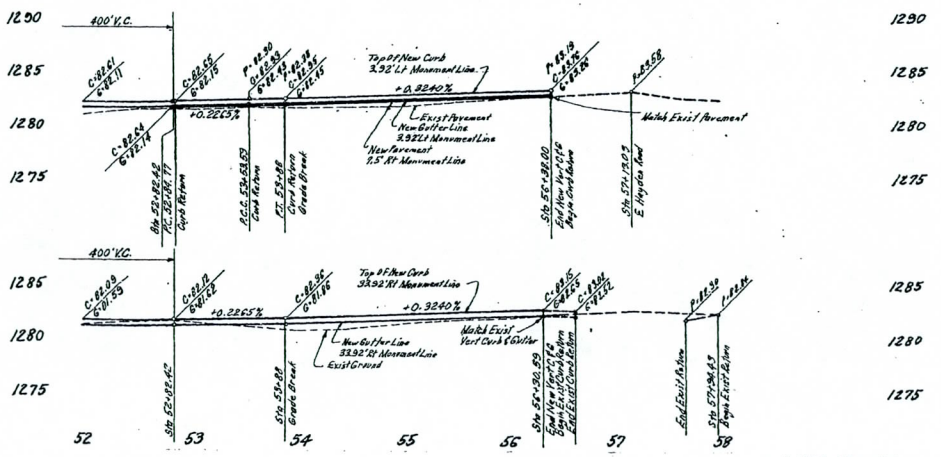
16123

P-048

WESTBOUND



EASTBOUND



16124

CITY OF SCOTTSDALE

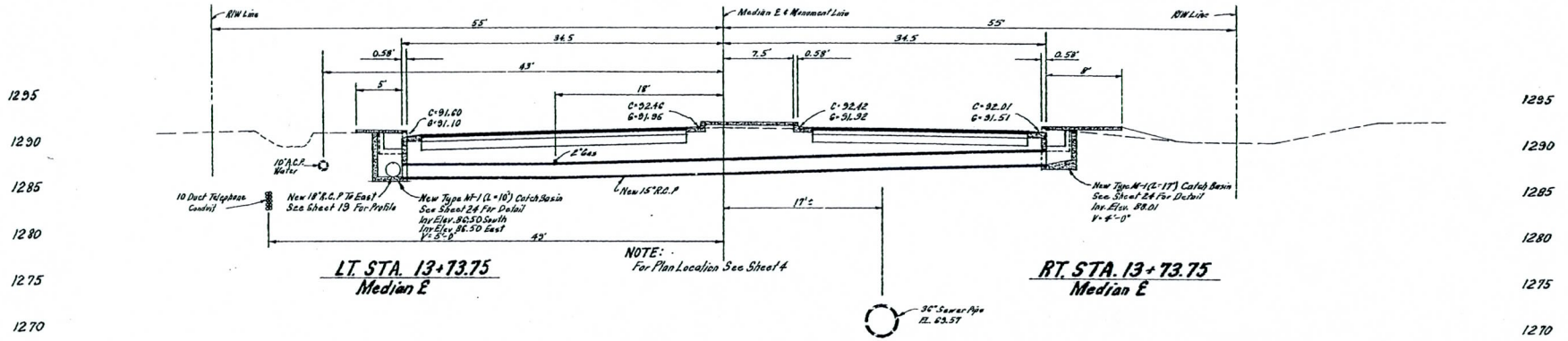
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3346 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-9636

SCALE		DESIGN		PROJ.
HORIZ.	1" = 50'	DRAWN		SHEET NO.
VERT.	1" = 5'	CHECKED		15 OF 30

P-048

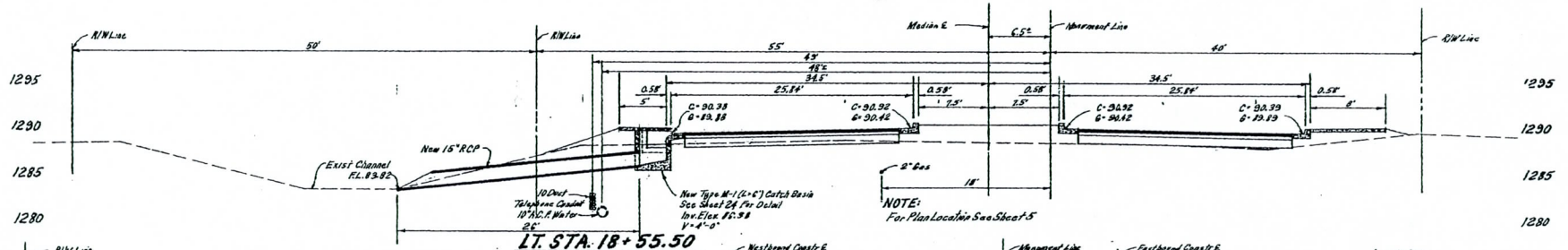


LT. STA. 13+73.75
Median E

NOTE:
For Plan Location See Sheet 4

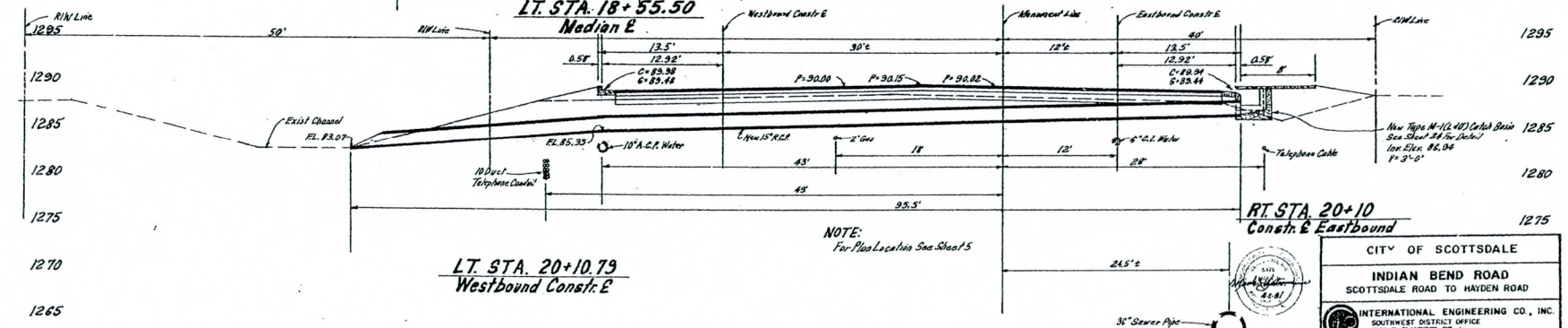
RT. STA. 13+73.75
Median E

36" Sewer Pipe
FL. 69.57



LT. STA. 18+55.50
Median E

NOTE:
For Plan Location See Sheet 5



LT. STA. 20+10.79
Westbound Constr E

NOTE:
For Plan Location See Sheet 5

RT. STA. 20+10
Constr E Eastbound

36" Sewer Pipe
FL. 62.50

16125

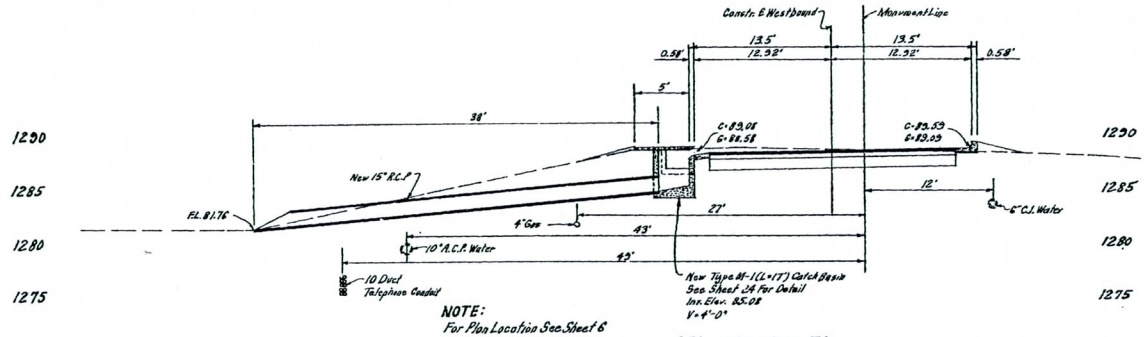
CITY OF SCOTTSDALE

INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3003 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8656

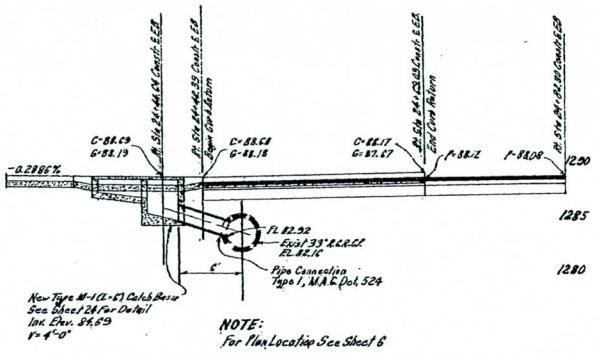
SCALE	DESIGN	PROJ.
HORIZ. 1"=	DRAWN	SHEET NO.
VERT. 1"=	CHECKED	16 OF 30

P-048



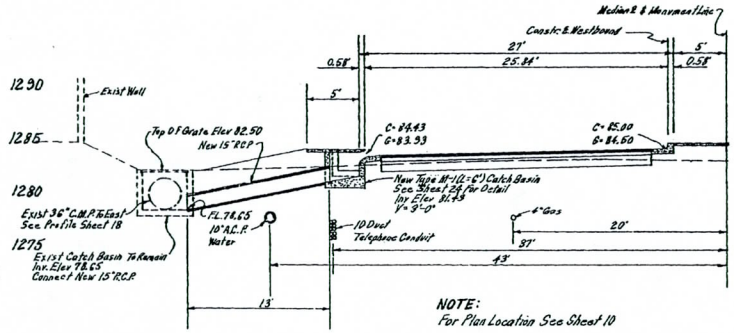
NOTE:
For Plan Location See Sheet 6

LT. STA. 23+50
Constr. E Westbound



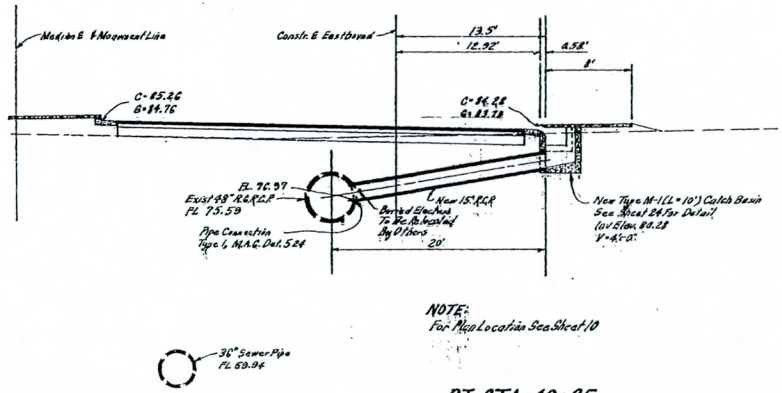
NOTE:
For Plan Location See Sheet 6

RT. STA. 24+44.64
Constr. E Eastbound



NOTE:
For Plan Location See Sheet 10

LT. STA. 49+15.16
Median E



STA. 49+00
Median E

NOTE:
For Plan Location See Sheet 10

RT. STA. 49+35
Constr. E Eastbound

CITY OF SCOTTSDALE

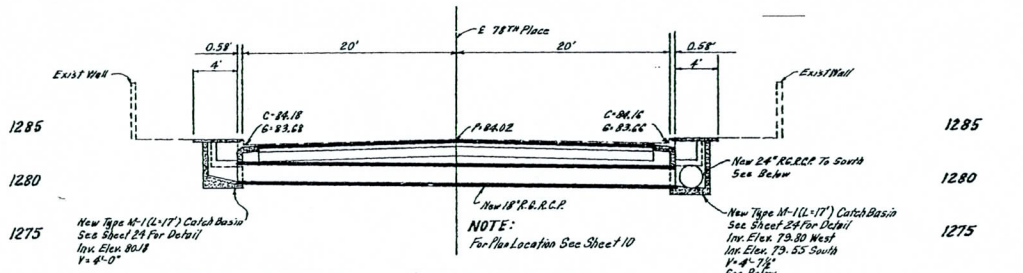
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3004 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 265-8650

SCALE	DESIGN	PROJ.
HORIZ 1"=	DRAWN	SHEET NO.
VERT 1"=	CHECKED	17 OF 20

16126

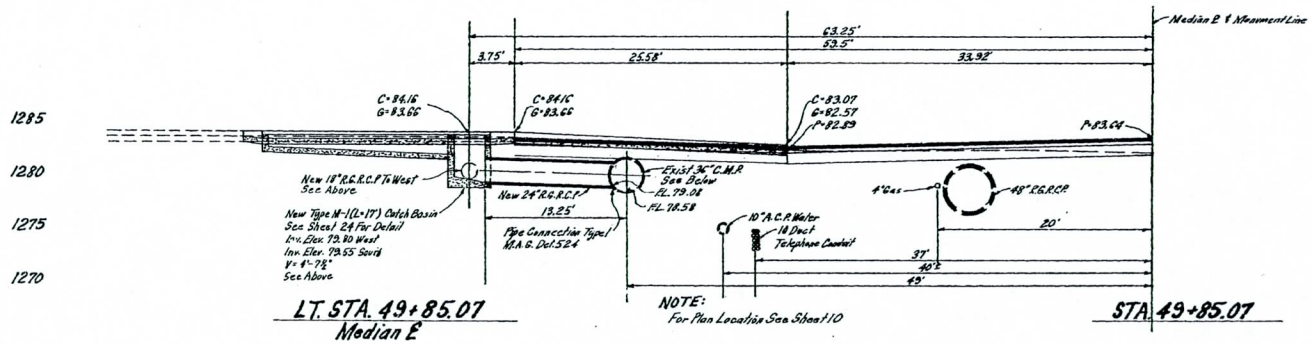
P-048



LT. STA. 49+43.31
Median ℄

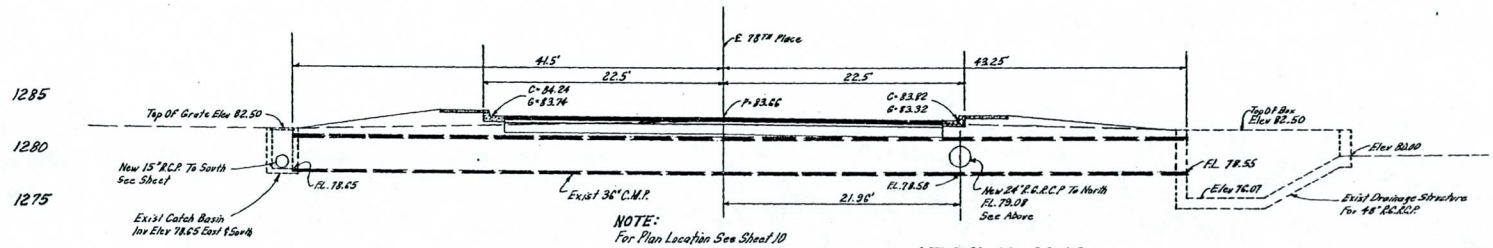
LT. STA. 49+64.49
Median ℄

LT. STA. 49+85.07
Median ℄



LT. STA. 49+85.07
Median ℄

STA. 49+85.07



LT. STA. 49+22.99
Median ℄

LT. STA. 49+64.49
Median ℄

LT. STA. 49+86.45
Median ℄

LT. STA. 50+07.74
Median ℄

16127

CITY OF SCOTTSDALE

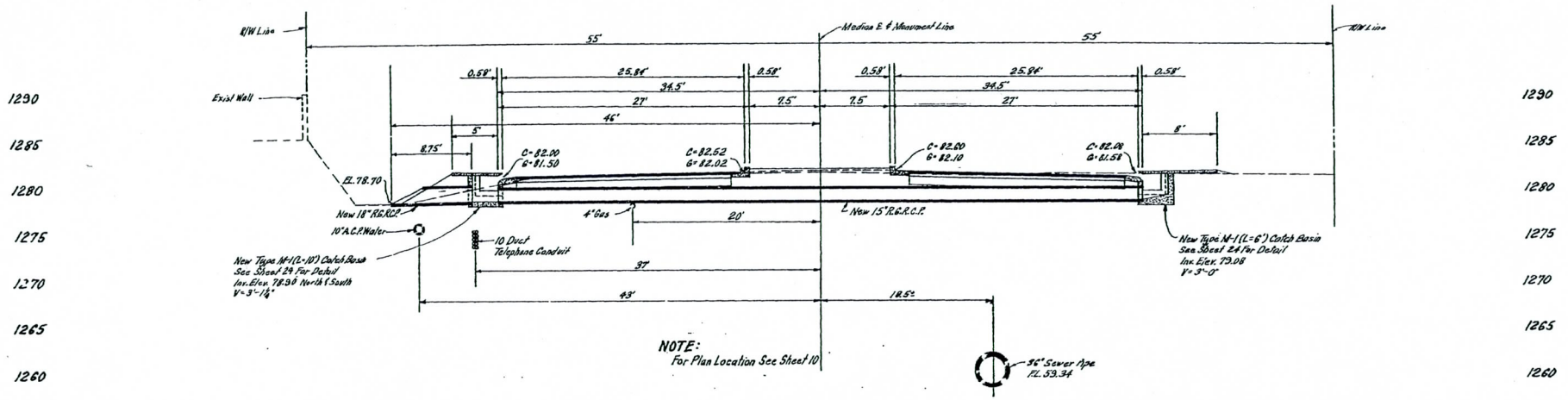
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2044 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8636

SCALE		DESIGN		PROJ.
HORIZ 1"=		DRAWN		SHEET NO. 18 OF 30
VERT 1"=		CHECKED		

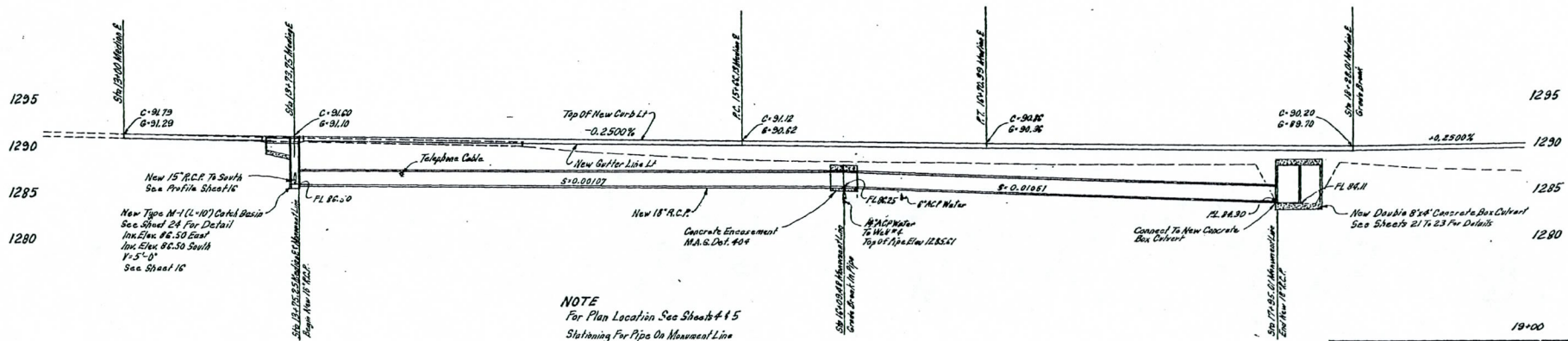
P-048



LT. STA. 52+10
Median ℄

STA. 52+10
Median ℄

RT. STA. 52+10
Median ℄



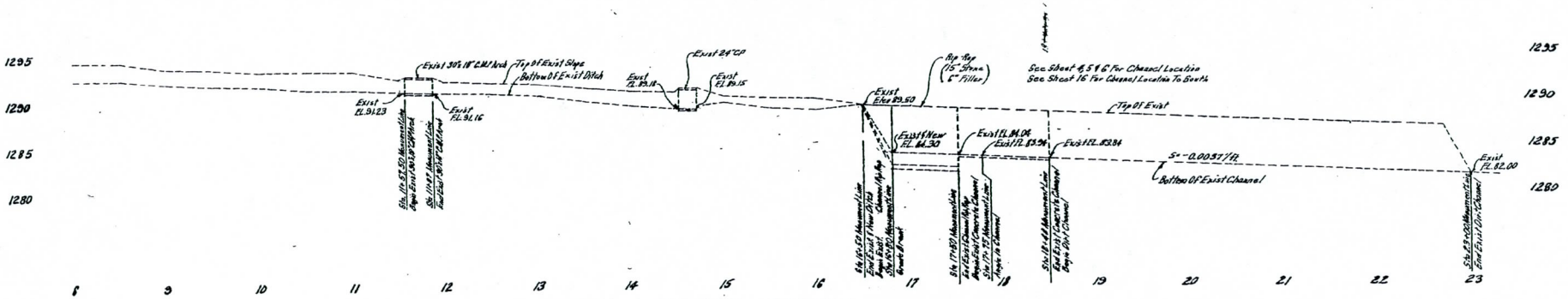
NOTE
For Plan Location See Sheets 4 & 5
Stationing For Pipe On Monument Line

NEW 18" R.C.P.
35.5' LT. STA. 13+75.25 TO STA. 17+95.01
Monument Line

16128

CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
SCALE HORIZ 1"= VERT 1"=
DESIGN
DRAWN
CHECKED
PROJ.
SHEET NO. 13 OF 30

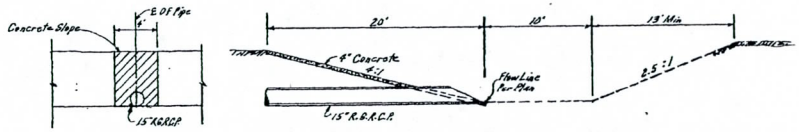
P-048



DITCH & CHANNEL PROFILE.

LT. STA. 11+87.00 MONUMENT LINE TO LT. STA. 23+00 MONUMENT LINE

SLOPE LINING @ DITCHES



SLOPE LINING @ CHANNEL

16129

CITY OF SCOTTSDALE

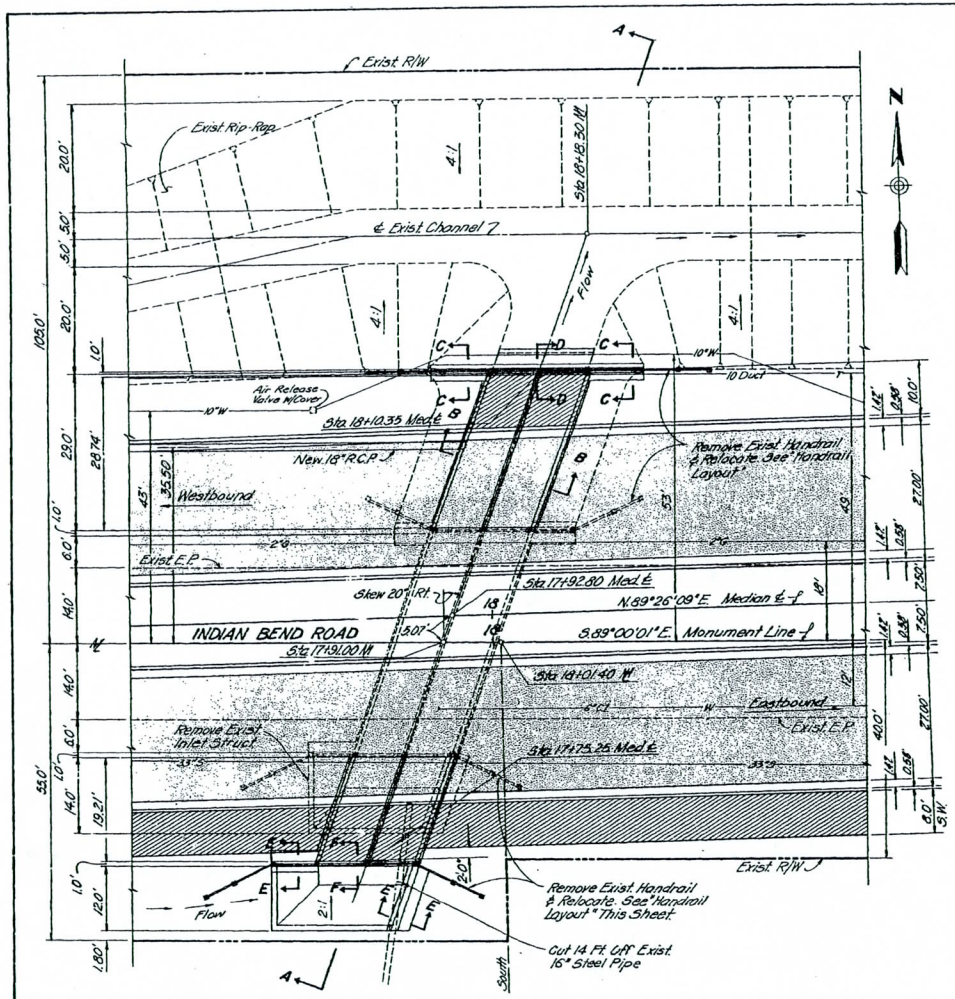
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

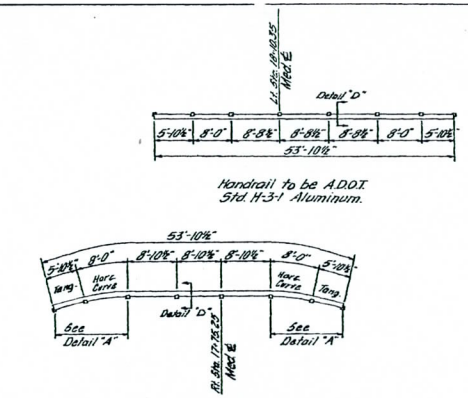
INTERNATIONAL ENGINEERING CO., INC.
PHOENIX AREA OFFICE
2748 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8438

SCALE	DESIGN	PROJ.
HORIZ. 1" =	DRAWN	SHEET NO. 20 OF 30
VERT. 1" =	CHECKED	

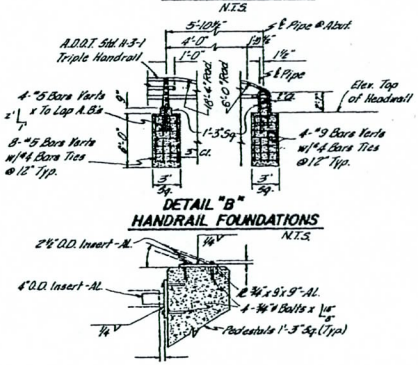
P-048



LOCATION PLAN
2-DOUBLE 8'X4' CONC. BOX CULVERT
A.D.O.T. STD. CB-2
1"=10'-0"

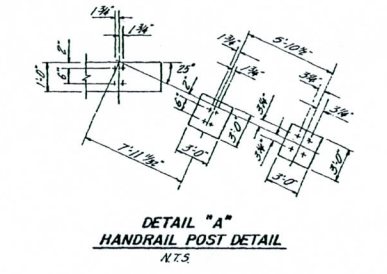


HANDRAIL LAYOUT
N.T.S.

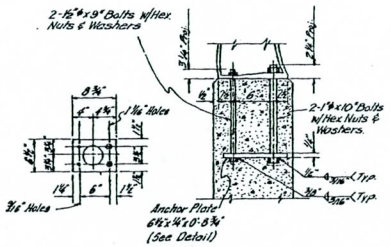


DETAIL "B"
HANDRAIL FOUNDATIONS
N.T.S.

DETAIL "C"
HANDRAIL CONCRETE PEDESTAL
N.T.S.



DETAIL "A"
HANDRAIL POST DETAIL
N.T.S.



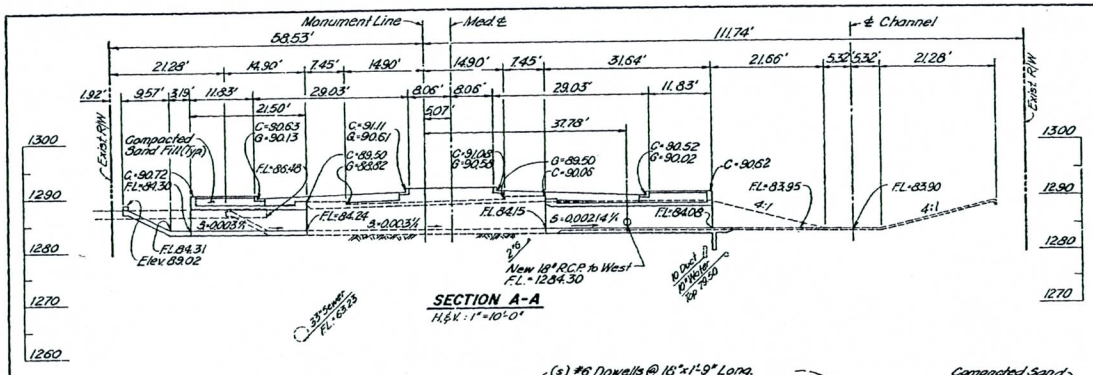
DETAIL "D"
HANDRAIL POST ANCHOR BOLT ASSEMBLY
N.T.S.

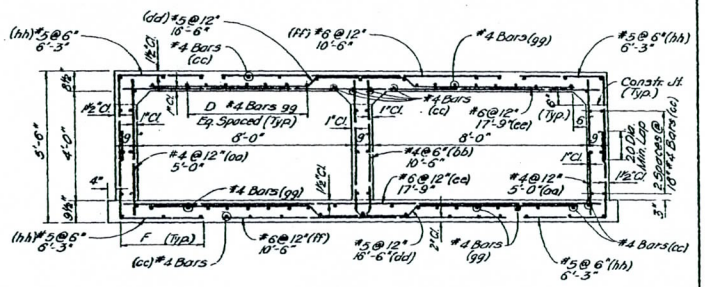
16130

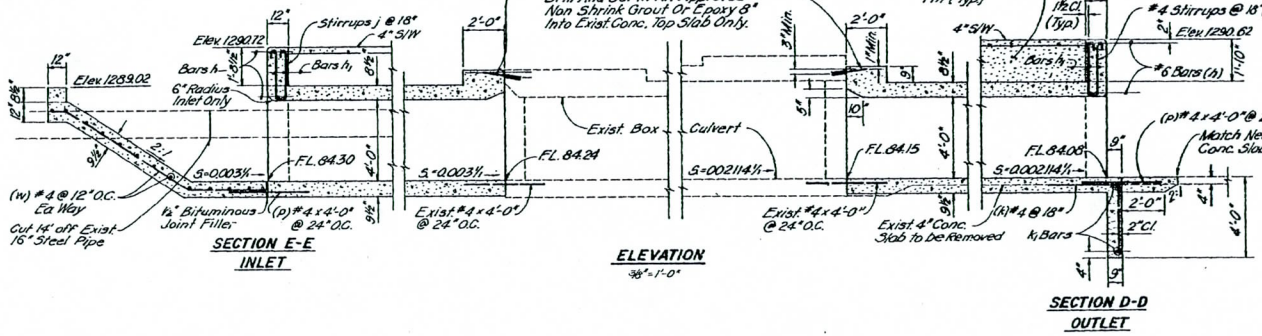
CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

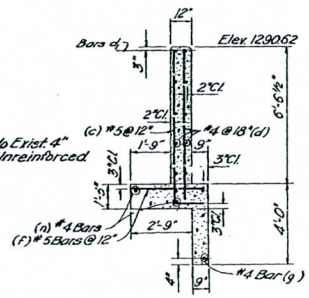
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2366 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8838

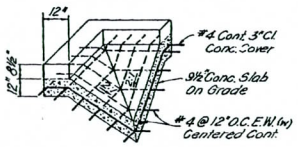
SCALE		DESIGN	E.I.C.T.D.	PROJ.
HORIZ.	1"=	DRAWN	EJ	SHEET NO.
VERT.	1"=	CHECKED	RP	21 OF 30











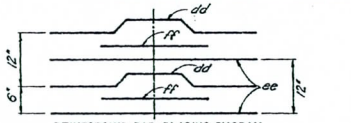
CORNER DETAIL
N.T.S.

BARREL STEEL LIST

aa			bb			cc	dd				ee			ff			gg	hh		
Size	Spacing	Length	Size	Spacing	Length	Number*	Size	Spacing	Length	A	B	C	Size	Spacing	Length	Size	Spacing	Length	Number*	D	Size	Spacing	Length	F
#4	12"	5'-0"	#4	6"	10'-5"	54	#5	12"	16'-6"	5'-10"	3'-4"	6"	#6	12"	17'-9"	#6	12"	10'-6"	28	8'-5"	#5	6"	6'-3"	3'-1"

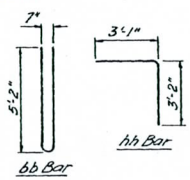
* Total Number of Bars in the Cross-Section

Mark	Bend	No.	Size	Length
p	Str.	18	#4	4'-0"
g	Str.	26	#6	1'-9"
w	V	40	#4	Varies



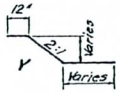
REINFORCING BAR PLACING DIAGRAM

dd Bar



bb Bar

hh Bar



BENDS

16131

CITY OF SCOTTSDALE

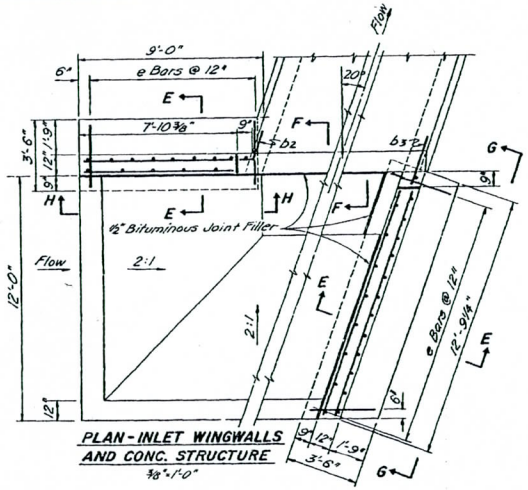
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

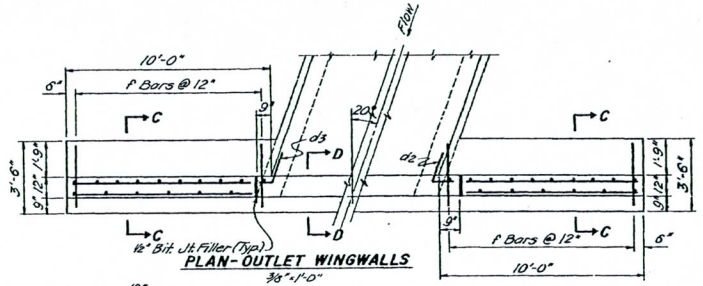
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2936 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8436

SCALE	DESIGN	PROJ.
HORIZ 1" =	DRAWN	SHEET NO. 22 OF 30
VERT. 1" =	CHECKED	

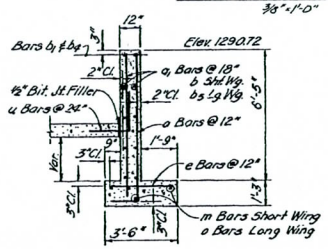
P-048



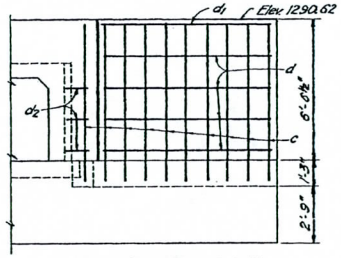
PLAN - INLET WINGWALLS AND CONC. STRUCTURE
3/8"=1'-0"



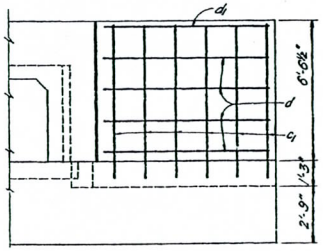
PLAN - OUTLET WINGWALLS
3/8"=1'-0"



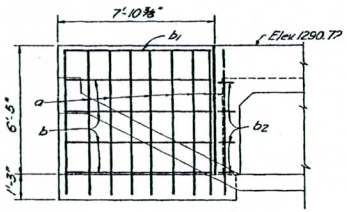
SECTION E-E
INLET WING WALL
3/8"=1'-0"



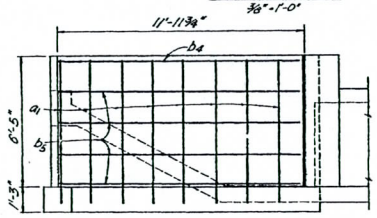
ELEVATION (Back Face Reinf.)
OUTLET WINGWALL(2)
3/8"=1'-0"



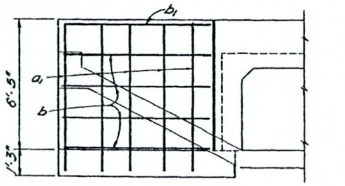
ELEVATION (Front Face Reinf.)
OUTLET WINGWALL (2)
3/8"=1'-0"



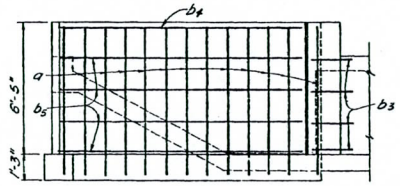
ELEVATION (Back Face Reinf.)
SECTION H-H
3/8"=1'-0"



SECTION G-G
ELEVATION (Front Face Reinf.)
3/8"=1'-0"



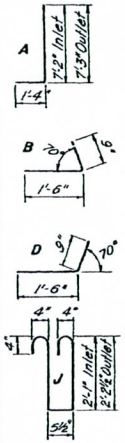
ELEVATION (Front Face Reinf.)
SECTION H-H
3/8"=1'-0"

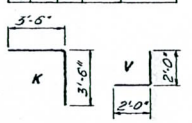


SECTION G-G
ELEVATION (Back Face Reinf.)
3/8"=1'-0"

WING STEEL LIST

Mark	Bend	No	Size	Length
INLET WINGS				
a	A	22	#5	8'-6"
a1	Str.	13	#4	7'-2"
b	Str.	8	#4	7'-7"
b1	Str.	2	#6	7'-7"
b2	D	4	#4	2'-3"
b3	Str.	4	#4	2'-3"
b4	Str.	2	#6	11'-8"
b5	Str.	8	#4	11'-9"
e	Str.	22	#5	3'-0"
m	Str.	4	#4	8'-4"
o	Str.	4	#4	12'-5"
u	V	9	#4	4'-0"
OUTLET WINGS				
c1	Str.	12	#4	7'-3"
d	Str.	18	#4	8'-11"
d1	Str.	4	#6	8'-11"
d2	B	3	#4	2'-3"
d3	D	3	#4	2'-3"
f	Str.	20	#5	3'-0"
g	Str.	2	#4	10'-10"
n	Str.	8	#4	9'-8"
c	A	20	#5	8'-7"





BENDS

CURB & CUT-OFF WALL STEEL LIST

Mark	Bend	No	Size	Length
INLET				
h	Str.	4	#6	19'-5"
h1	Str.	2	#4	19'-5"
j	J	13	#4	5'-11½"
OUTLET				
h	Str.	4	#6	20'-2"
h1	Str.	2	#4	20'-2"
j	J	14	#4	6'-2½"
k	K	14	#4	7'-0"
k1	Str.	2	#4	20'-2"

APPROXIMATE QUANTITIES

ITEM	CONCRETE	REINF. STEEL
UNIT	C.Y.	LBS.
Box Culvert Extensions	73.61	13,125
Inlet Structure	20.45	1,300
Outlet Structure	14.65	825
TOTALS	108.71	15,250

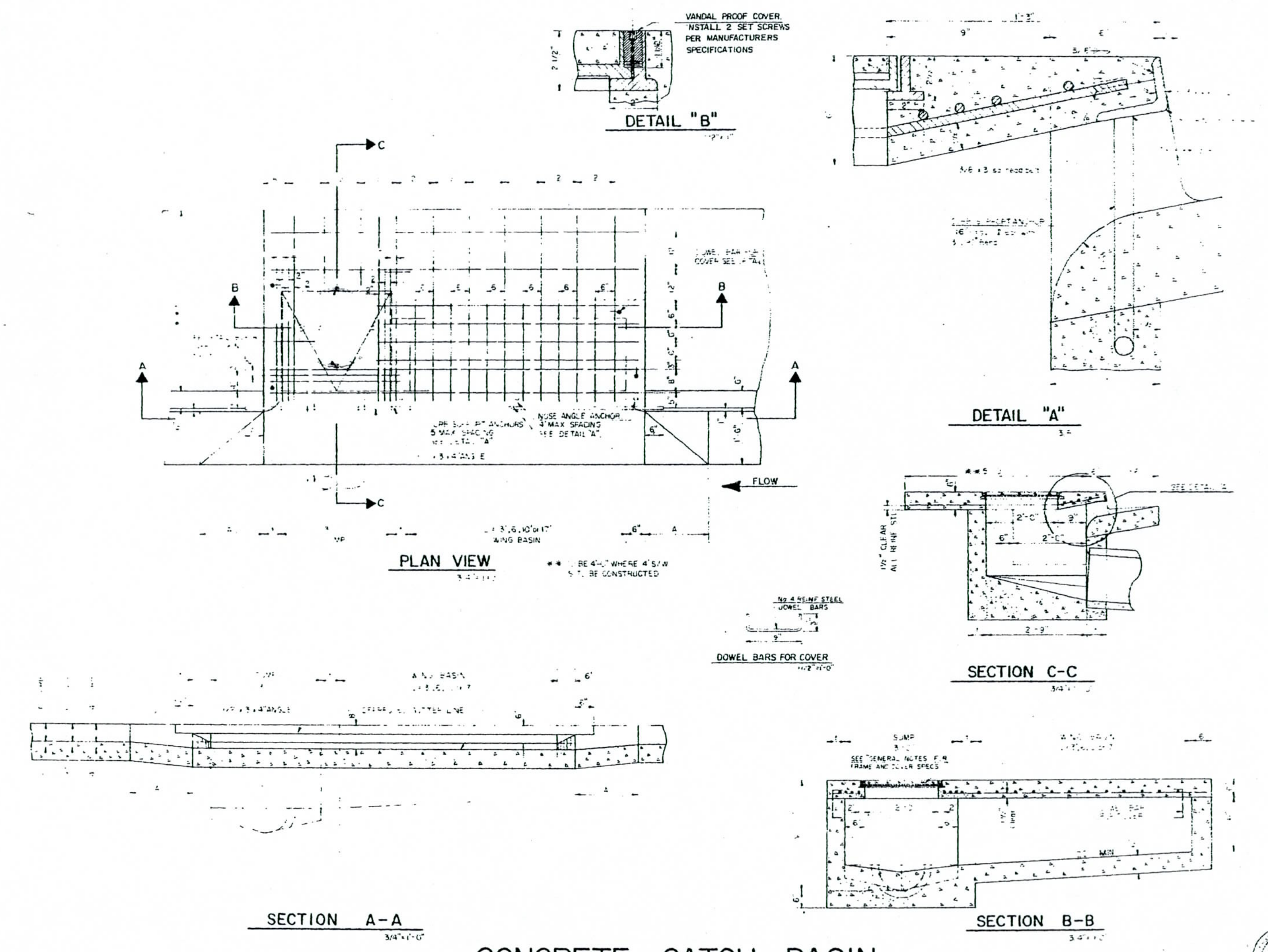
16132

CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3008 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-9626

SCALE: HORIZ 1"= VERT 1"=
DESIGN R.G.
DRAWN S.T.A.
CHECKED R.G.
PROJ.
SHEET NO. 23 OF 30

P-048



GENERAL NOTES

Concrete to be class A per M.A.G. specifications. Class ... A.D.O.T. specifications.

Reinforcing bars shall be No 4 deformed and shall conform to A.S.T.M. Specification 615

Structural steel shall conform to A.S.T.M. Specification A 36

Nose angle, frame, cover and support anchors shall be painted one shop coat ... paint and two field coats of ... paint (A.D.O.T. standard specification sections 604 and 718)

Welding shall be in accordance with Standard Welding Specifications

C.M.P. drain to be installed in accordance with Standard Detail 209

Pipes can be placed in any wall except the wall adjacent to the wing basin

Floor of sump shall have a wood trowel finish and a minimum slope of ... in all directions toward outlet pipe

Outlet pipe shall be trimmed to final shape and length before concrete is poured

See project plans for inlet details and depth of paving

TYPE M-1 Catch Basin illustrated ... sump with wing basin upstream

"V" and "L" dimensions to be specified on plans

Frame and cover to be Alhambra Foundry Co. plate no A-1533 or equal. Cover shall be filled with conc. and broom finished. 2 set screws shall be installed in frame and cover, per detail "B" this sheet.

VARIABLE DIMENSIONS

CATCH BASIN DEPTH
V = 3'-6" min when L = 3'
V = 3'-8" min when L = 6'
V = 4'-0" min when L = 10'
V = 4'-0" min when L = 17'
Minimum depth to be used with 15" diameter connector pipe

CATCH BASIN WALL THICKNESS
t = 6" if V = 5' or less
t = 8" if V = 5' to 10'
(If V exceeds 10', special design is required)

GUTTER TRANSITION	
CURB HEIGTH	DIM. A
4"	3'-3"
5"	2'-6"
6"	1'-9"

CONCRETE CATCH BASIN

TYPE M-1

16133

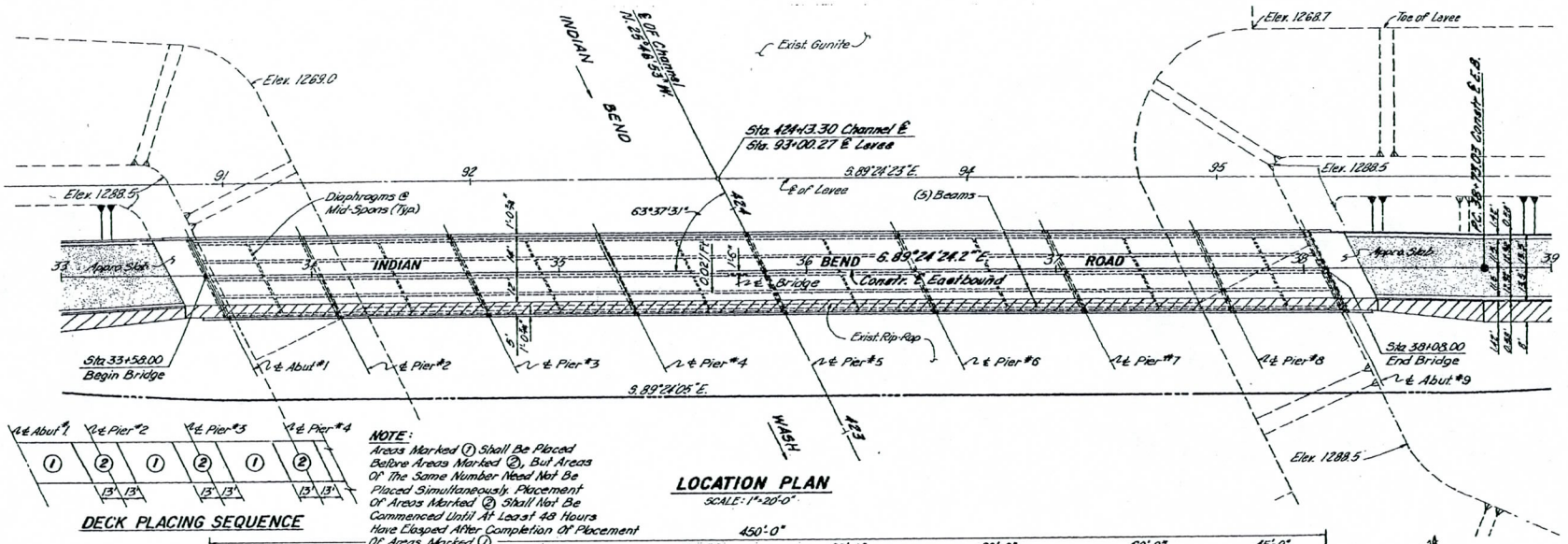
CITY OF SCOTTSDALE

INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2066 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8638

SCALE		PROJ.
HORIZ 1" =	DESIGN LW	
VERT. 1" =	DRAWN STL	SHEET NO. 24 OF 30
	CHECKED EG	

[redacted] P-048

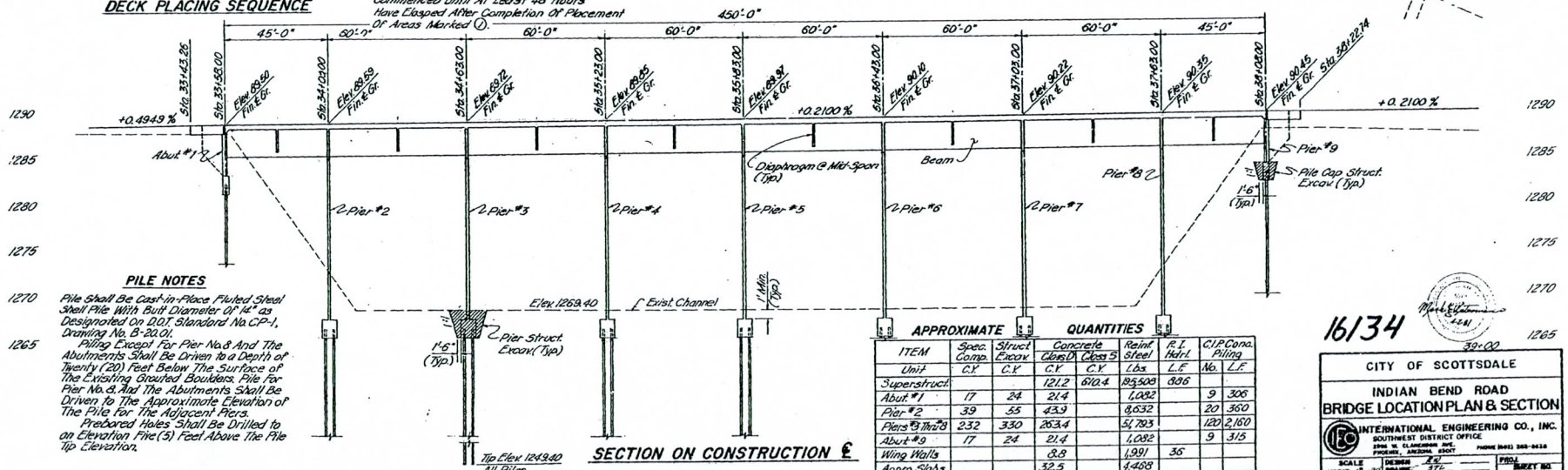


LOCATION PLAN

SCALE: 1"=20'-0"

DECK PLACING SEQUENCE

NOTE:
Areas Marked (1) Shall Be Placed Before Areas Marked (2), But Areas Of The Same Number Need Not Be Placed Simultaneously. Placement Of Areas Marked (2) Shall Not Be Commenced Until At Least 48 Hours Have Elapsed After Completion Of Placement Of Areas Marked (1).



PILE NOTES

Pile Shall Be Cast-in-Place Fluted Steel Shell Pile With Butt Diameter Of 14" as Designated on D.O.T. Standard No. CP-1, Drawing No. B-20.01.

Piling Except For Pier No. 8 And The Abutments Shall Be Driven To a Depth of Twenty (20) Feet Below The Surface of The Existing Grouted Boulders. Pile For Pier No. 8 And The Abutments Shall Be Driven To The Approximate Elevation of The Pile For The Adjacent Piers.

Prebored Holes Shall Be Drilled to an Elevation Five (5) Feet Above The Pile Tip Elevation.

SECTION ON CONSTRUCTION ℄

APPROXIMATE QUANTITIES

ITEM	Spec. Comp.	Struct Excav.	Concrete Class D	Concrete Class S	Reinf. Steel	R.I. Metl.	C.I.P. Conc. Piling	
Unit	C.Y.	C.Y.	C.Y.	C.Y.	Lbs.	L.F.	No.	L.F.
Superstruct.			121.2	610.4	183,508	886		
Abut. #1	17	24	21.4		1,082		9	306
Pier #2	39	55	43.9		8,632		20	360
Piers #3 Thru #8	232	330	263.4		51,793		120	2,160
Abut. #9	17	24	21.4		1,082		9	315
Wing Walls			8.8		1,991	36		
Appro. Slabs			32.5		4,488			
Totals	305	433	512.6	610.4	264,556	922	158	3,141

16134

CITY OF SCOTTSDALE

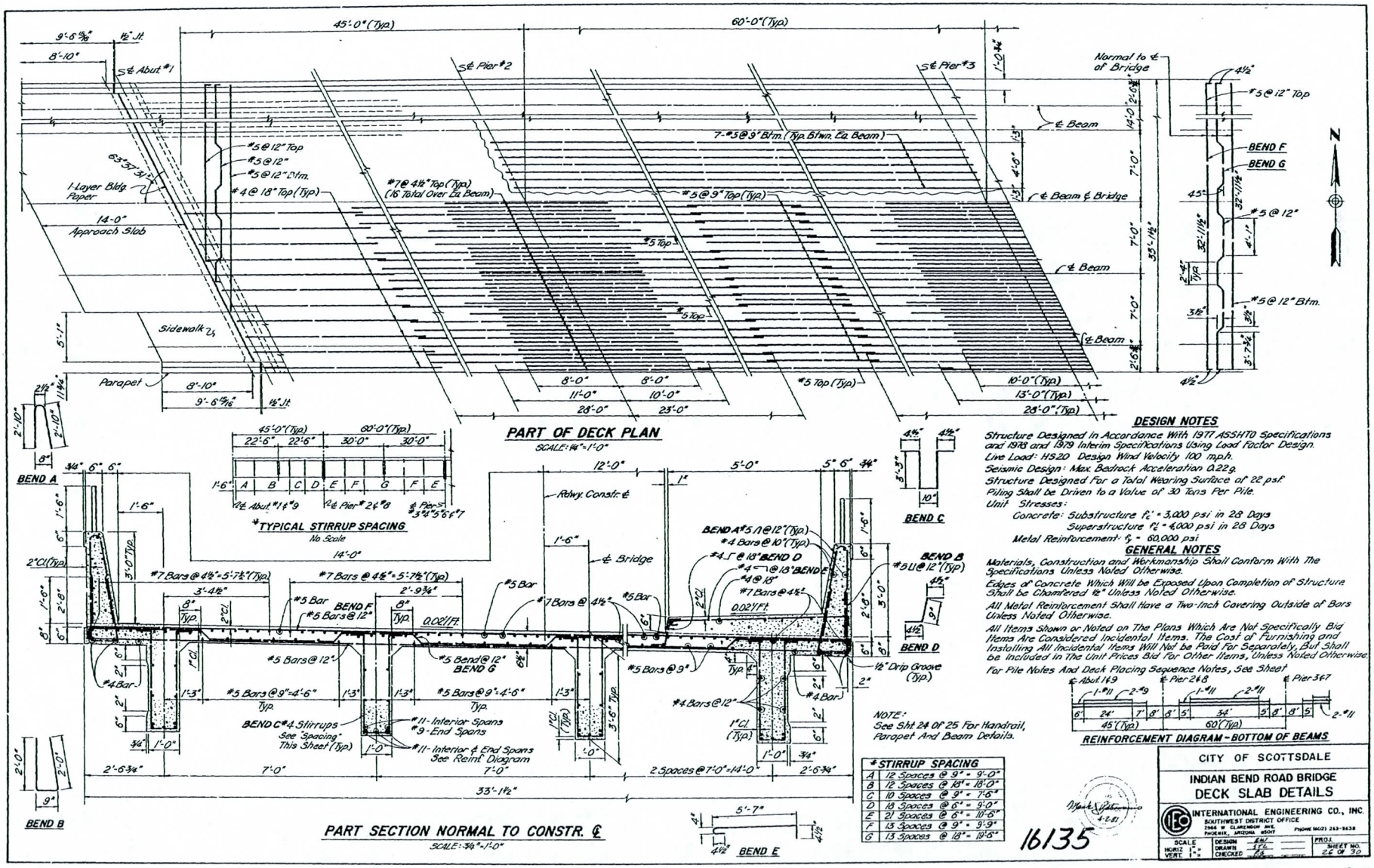
INDIAN BEND ROAD

BRIDGE LOCATION PLAN & SECTION

INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2999 W. CLANCHMAN AVE.
PHOENIX, ARIZONA 85017 PHONE (602) 265-8638

SCALE	DESIGN	PROJ.
HORIZ. 1"=20'	DRAWN	SHEET NO.
VERT. 1"=5'	CHECKED	2.5 OF 30

P-098



DESIGN NOTES

Structure Designed in Accordance With 1977 AASHTO Specifications and 1978 and 1979 Interim Specifications Using Load Factor Design.
Live Load: HS20 Design Wind Velocity 100 m.p.h.
Seismic Design: Max. Bedrock Acceleration 0.22g.
Structure Designed For a Total Wearing Surface of 22 psf.
Piling Shall be Driven to a Value of 30 Tons Per Pile.
Unit Stresses:
Concrete: Substructure f'_c = 3,000 psi in 28 Days
Superstructure f'_c = 4,000 psi in 28 Days
Metal Reinforcement: f_y = 60,000 psi

GENERAL NOTES

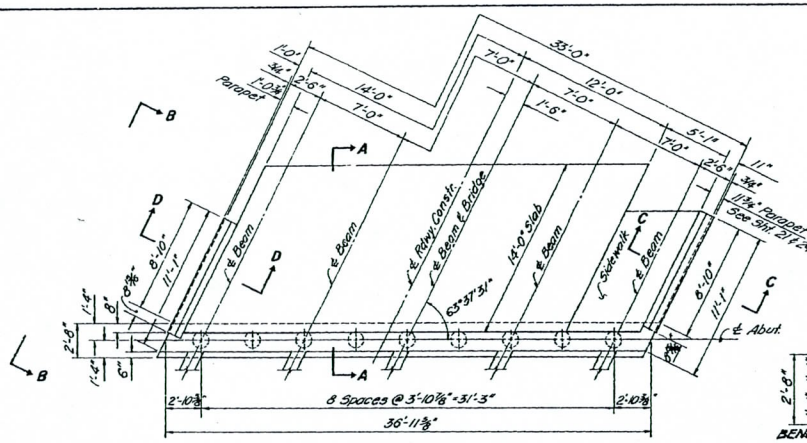
Materials, Construction and Workmanship Shall Conform With The Specifications Unless Noted Otherwise.
Edges of Concrete Which Will be Exposed Upon Completion of Structure Shall be Chamfered ¾" Unless Noted Otherwise.
All Metal Reinforcement Shall Have a Two-Inch Covering Outside of Bars Unless Noted Otherwise.
All Items Shown or Noted on The Plans Which Are Not Specifically Bid Items Are Considered Incidental Items. The Cost of Furnishing and Installing All Incidental Items Will Not be Paid For Separately, But Shall be Included in The Unit Prices Bid For Other Items, Unless Noted Otherwise.
For Pile Notes And Deck Placing Sequence Notes, See Sheet

# STIRRUP SPACING	
A	12 Spaces @ 9" = 9'-0"
B	12 Spaces @ 18" = 18'-0"
C	10 Spaces @ 9" = 7'-6"
D	18 Spaces @ 6" = 9'-0"
E	21 Spaces @ 6" = 10'-6"
F	13 Spaces @ 9" = 9'-9"
G	13 Spaces @ 18" = 19'-6"

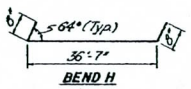
16135

CITY OF SCOTTSDALE
INDIAN BEND ROAD BRIDGE
DECK SLAB DETAILS
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
7944 E. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-9438
SCALE HORIZ. 1" = VERT. 1" =
DESIGN RBJ
DRAWN LTS
CHECKED RB
PROJ.
SHEET NO. 25 OF 30

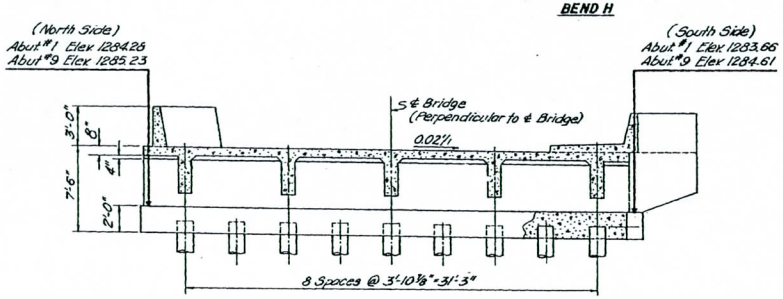
P-048



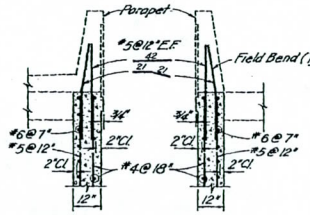
ABUTMENT PLAN
SCALE: 1/4" = 1'-0"



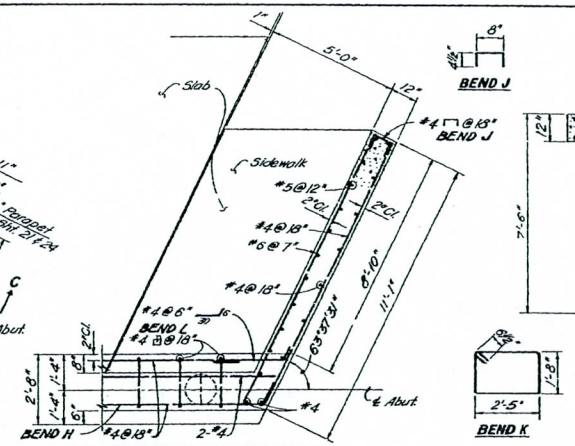
BEND H



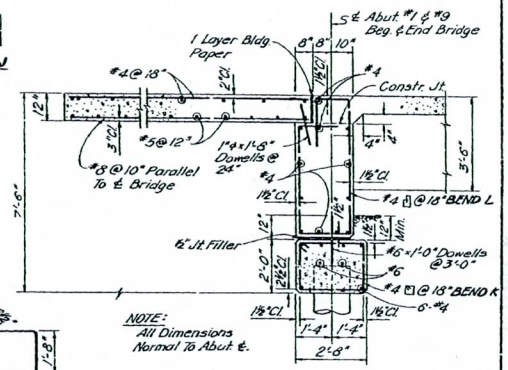
ABUTMENT ELEVATION
(LOOKING AHEAD)



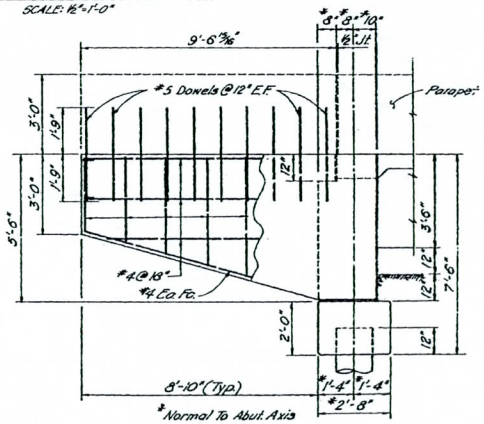
SECTION C-C **SECTION D-D**
PART WING WALL DETAIL
SCALE: 1/2" = 1'-0"



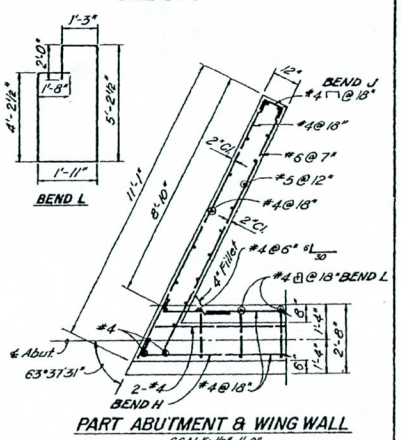
PART ABUTMENT & WING WALL
SCALE: 1/2" = 1'-0"



SECTION A-A
APPROACH SLAB & ABUTMENT DETAIL
SCALE: 1/2" = 1'-0"



SECTION B-B
WING WALL DETAIL & ABUTMENT
SCALE: 1/2" = 1'-0"



PART ABUTMENT & WING WALL
SCALE: 1/2" = 1'-0"

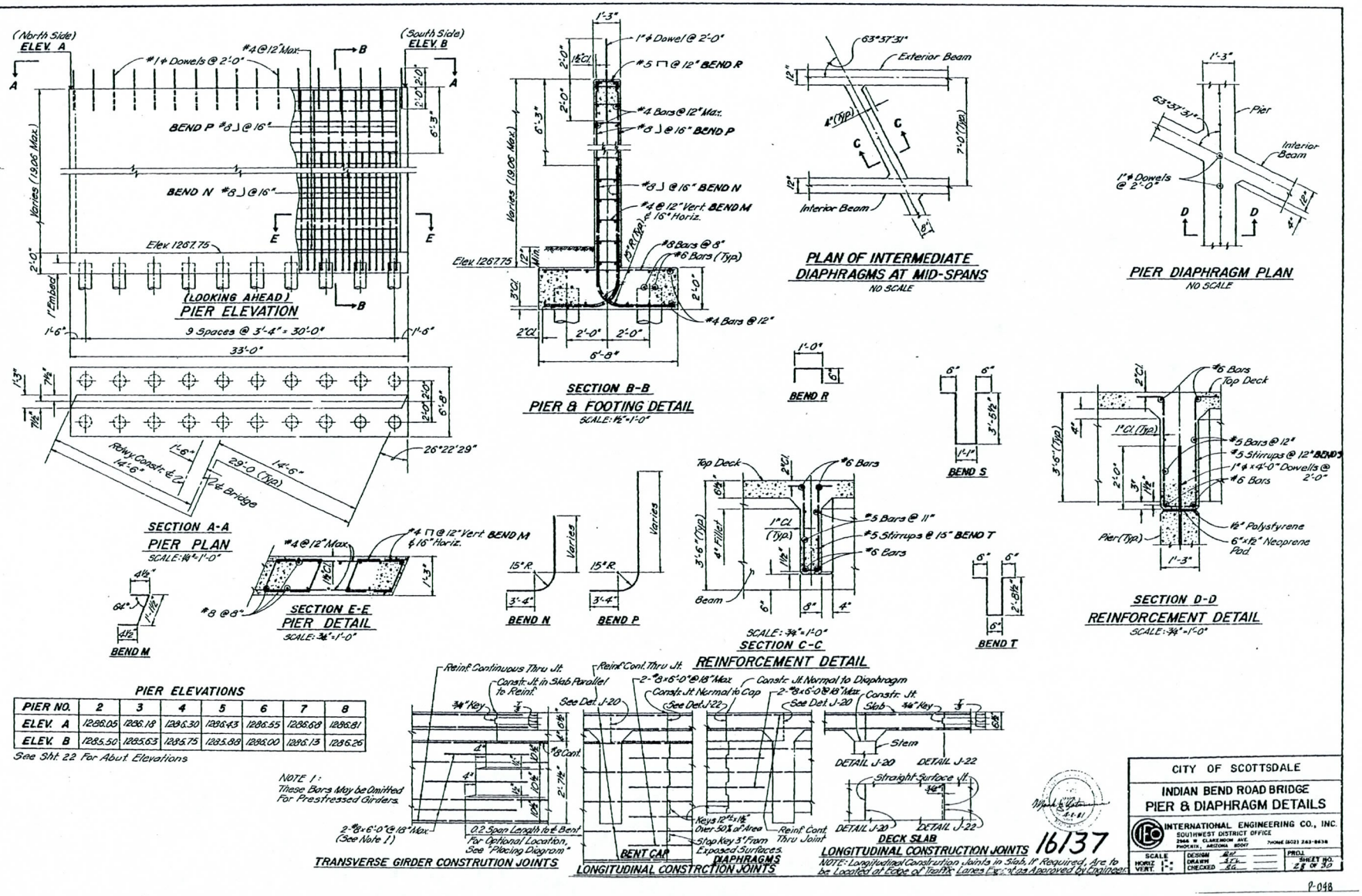
16136

CITY OF SCOTTSDALE
INDIAN BEND ROAD BRIDGE
ABUTMENT & WING WALL DETAILS

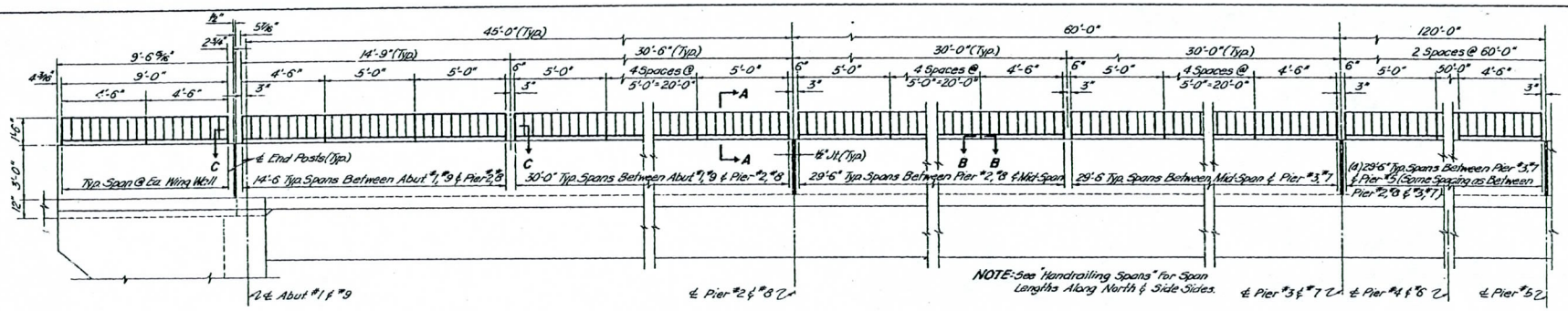
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2946 N. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8636

SCALE	DESIGN	AM	PROJ.
HORIZ. 1" =	DRAWN	STL	SHEET NO. 27 OF 30
VERT. 1" =	CHECKED	AG	

P-048


(North Side) ELEV. A
(South Side) ELEV. B
#1 ϕ Dowels @ 2'-0"
#4 @ 12" Max.
BEND P #8 ⌋ @ 16"
BEND N #8 ⌋ @ 16"
Varies (19.06 Max.)
Elev. 1287.75
1" Embed
9 Spaces @ 3'-4" = 30'-0"
33'-0"
(LOOKING AHEAD)
PIER ELEVATION
SECTION A-A
PIER PLAN
SCALE: 1/8" = 1'-0"
Roadway Constr. ℄
Ctr. of Bridge
29'-0 (Typ.)
26°22'29"
#4 @ 12" Max.
#4 ⊓ @ 12" Vert. BEND M
℄ 16" Horiz.
#8 @ 8"
SECTION E-E
PIER DETAIL
SCALE: 3/4" = 1'-0"
BEND M
1# Dowel @ 2'-0"
#5 ⊓ @ 12" BEND R
#4 Bars @ 12" Max.
#8 ⌋ @ 16" BEND P
#8 ⌋ @ 16" BEND N
#4 @ 12" Vert. BEND M
℄ 16" Horiz.
#8 Bars @ 8"
#6 Bars (Typ.)
#4 Bars @ 12"
SECTION B-B
PIER & FOOTING DETAIL
SCALE: 1/2" = 1'-0"
BEND N
BEND P
BEND R
BEND S
BEND T
Top Deck
#6 Bars
#5 Bars @ 11"
#5 Stirrups @ 15" BEND T
Beam
SCALE: 3/4" = 1'-0"
SECTION C-C
63°37'31"
Exterior Beam
Interior Beam
PLAN OF INTERMEDIATE
DIAPHRAGMS AT MID-SPANS
NO SCALE
Pier
#6 Bars Top Deck
#5 Bars @ 12"
#5 Stirrups @ 12" BEND S
1# x 4'-0" Dowels @ 2'-0"
#6 Bars
1/2" Polystyrene
6" x 1/2" Neoprene Pad
Pier (Typ.)
SECTION D-D
REINFORCEMENT DETAIL
SCALE: 3/4" = 1'-0"
PIER ELEVATIONS
PIER NO. | 2 | 3 | 4 | 5 | 6 | 7 | 8
ELEV. A | 1286.05 | 1286.18 | 1286.30 | 1286.43 | 1286.55 | 1286.68 | 1286.81
ELEV. B | 1285.50 | 1285.63 | 1285.75 | 1285.88 | 1286.00 | 1286.13 | 1286.26
See Sht. 22 For Abut. Elevations
NOTE 1: These Bars May be Omitted For Prestressed Girders.
2-#8 x 6'-0" @ 18" Max. (See Note 1)
0.2 Span Length to ℄ Bent. For Optional Location, See "Placing Diagram"
TRANSVERSE GIRDER CONSTRUTION JOINTS
REINFORCEMENT DETAIL
Reinf. Continuous Thru Jt.
Constr. Jt. in Slab Parallel to Reinf.
Reinf. Cont. Thru Jt.
2-#8 x 6'-0" @ 18" Max.
Constr. Jt. Normal to Cap
Constr. Jt. Normal to Diaphragm
See Det. J-20
See Det. J-22
3/4" Key
#8 Cont.
Keys 12" x 1 1/2" Over 50% of Area
Stop Key 3" From Exposed Surfaces.
Reinf. Cont. Thru Joint
BENT CAP DIAPHRAGMS
LONGITUDINAL CONSTRCTION JOINTS
Slab
Stem
DETAIL J-20
DETAIL J-22
Straight Surface
DECK SLAB
LONGITUDINAL CONSTRUCTION JOINTS
NOTE: Longitudinal Construction Joints in Slab, If Required, Are to be Located at Edge of Traffic Lanes Except as Approved by Engineer.
16137
CITY OF SCOTTSDALE
INDIAN BEND ROAD BRIDGE
PIER & DIAPHRAGM DETAILS
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
2566 W. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8636
SCALE HORIZ. 1"=
VERT. 1"=
DESIGN
DRAWN
CHECKED
PROJ.
SHEET NO. 28 OF 30

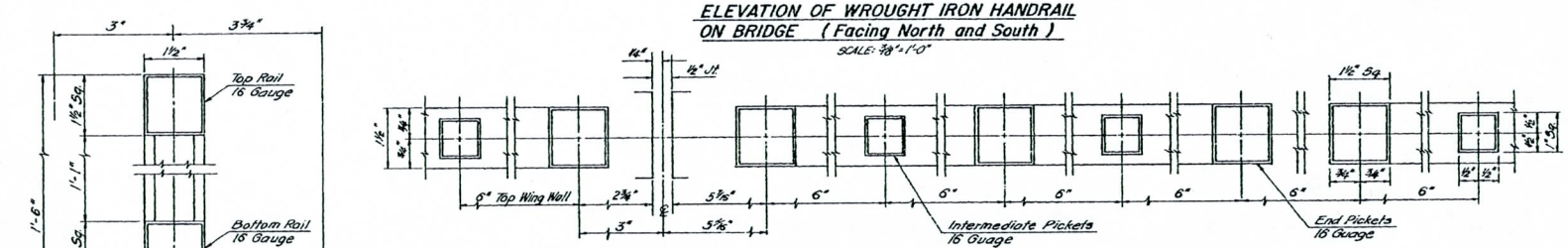
P-048



NOTE: See "Handrailing Spans" for Span Lengths Along North & South Sides.

ELEVATION OF WROUGHT IRON HANDRAIL ON BRIDGE (Facing North and South)

SCALE: ⅜" = 1'-0"



SECTION A-A
SCALE: 3" = 0'-1"

SECTION B-B
SCALE: 3" = 0'-1"

SECTION C-C
SCALE: 3" = 0'-1"

HANDRAILING SPANS

LOCATION	NO. OF SPANS	LENGTHS	L.F.
Top of Wing Walls	(2)	9'-0"	18'-0" L.F.
Deck End Spans	(2)	14'-6"	29'-0" L.F.
Intermediate Spans	(2)	30'-0"	60'-0" L.F.
Intermediate Spans	(12)	29'-6"	354'-0" L.F.
North Side Total			*461'-0" L.F.
South Side Total			461'-0" L.F.
Total			922'-0" L.F.

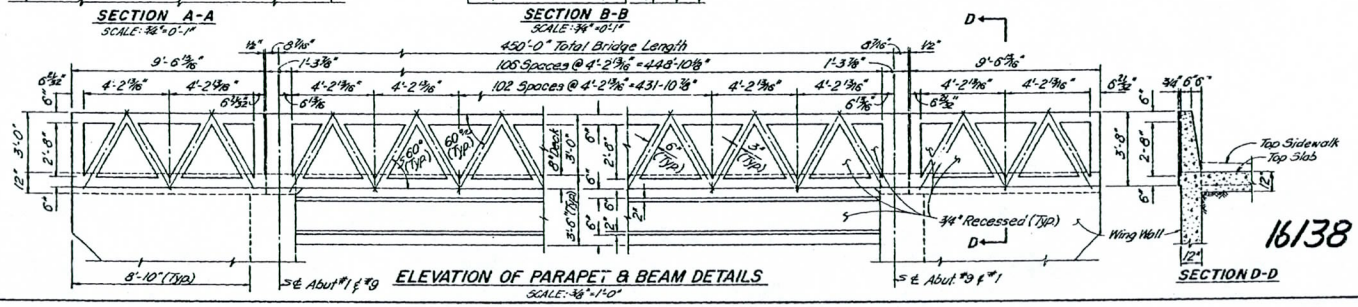
*North Side Spans Same As South Side.

NOTES:

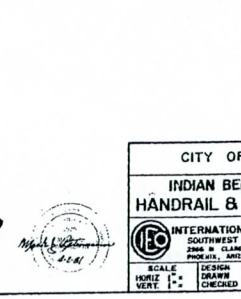
All Parts Shall Be Fabricated From Wrought Iron (ASTM A-207 & ASTM A-42)

Each Section Shall Be Dipped in Sherwin Williams Zinc Chromate Primer or Equal and Then Dipped in Kem Lustral Flat Black Industrial Enamel or Equal.

Weld All Intermediate Pickets to Top and Bottom Rails and All Top and Bottom Rails to the End Pickets By Means of Arc-Gas Welds.



ELEVATION OF PARAPET & BEAM DETAILS
SCALE: ⅜" = 1'-0"



SECTION D-D

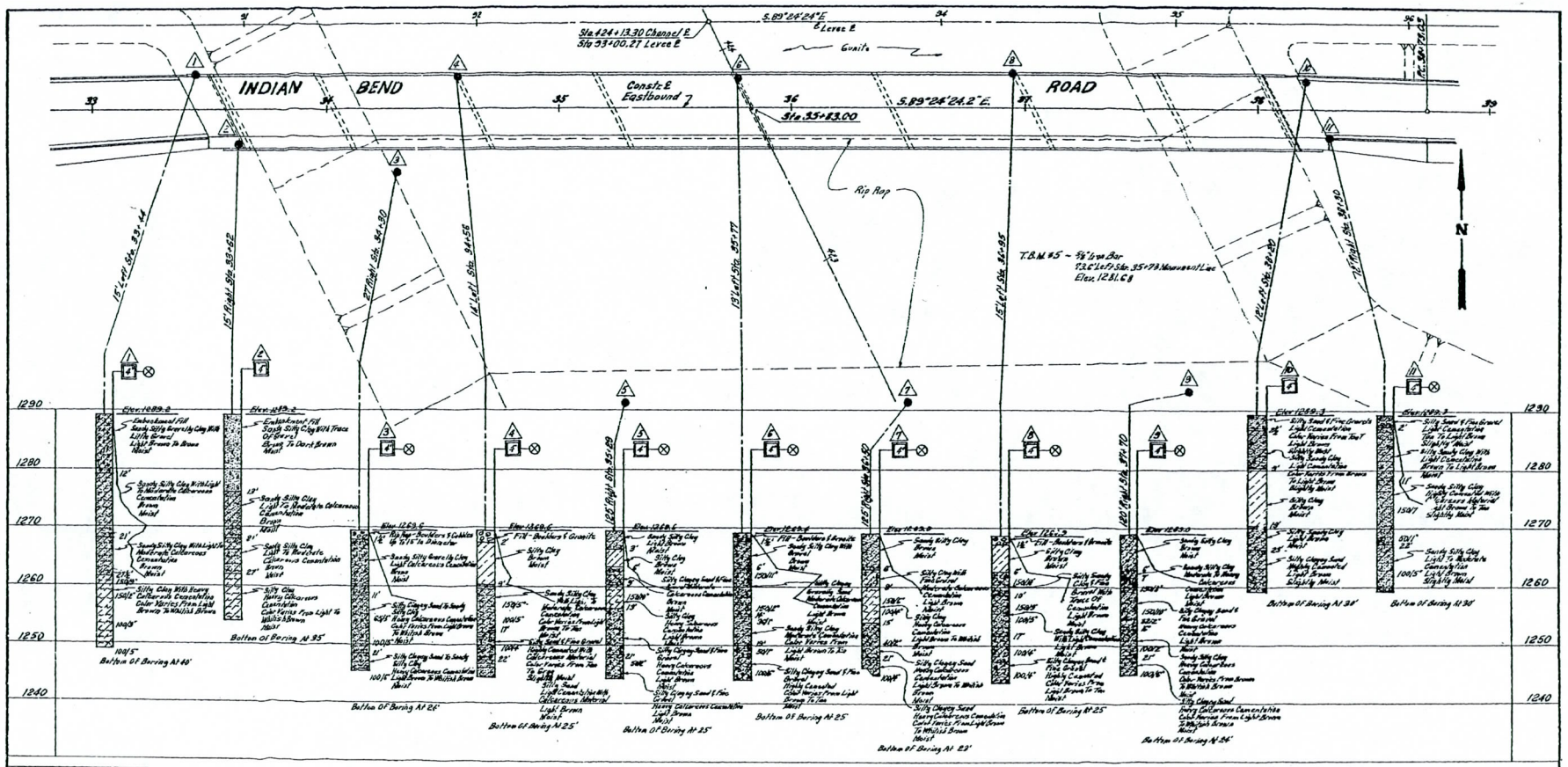
16138

CITY OF SCOTTSDALE
INDIAN BEND ROAD BRIDGE
HANDRAIL & PARAPET DETAILS

INTERNATIONAL ENGINEERING CO., INC
SOUTHWEST DISTRICT OFFICE
2986 N. CLARENDON AVE. PHOENIX, ARIZONA 85017 PHONE (602) 263-8436

SCALE		DESIGN		PROJ.
HORIZ.	1" =	DRAWN	STC	SHEET NO. 23 OF 32
VERT.	1" =	CHECKED	AE	

P-048



LEGEND OF EARTH MATERIALS

- COBBLES or BOULDERS
- GRAVEL
- SAND
- SILT
- CLAY
- LIME
- FILLED MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- " " PENETROMETER
- CASING
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- BORING NUMBER
- CORE BORING

ELEV. LOCATION

CASING

CASING SHOE

BLOWS / FT. WITH 30 1.4" DRIVE SAMPLER

EXPLORATION WITH 2" BULL NOSE PENETROMETER

DATE

2"

DESCRIPTION OF MATERIAL

BLOW COUNT ON CASING

CONFORMABLE MATERIAL CHANGE

ESTIMATED MATERIAL CHANGE

UNCONFORMABLE MATERIAL CHANGE

BLOW COUNT ON 2" PENETROMETER

GENERAL NOTES

INFORMATION CONTAINED ON THIS SHEET IS MADE AVAILABLE TO PROSPECTIVE BIDDERS FOR INFORMATION ONLY AND IS NOT TO BE CONSIDERED A PART OF THE CONTRACT PAPERS.

CLASSIFICATION OF MATERIALS IS IN ACCORDANCE WITH AASHTO. "MANUAL ON FOUNDATION INVESTIGATIONS." CLASSIFICATION OF EARTH MATERIALS IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS.

THE ABSENCE OF A GROUND WATER INDICATION DOES NOT CONSTITUTE A REPRESENTATION THAT GROUND WATER WILL NOT BE PRESENT DURING CONSTRUCTION. GROUND WATER IS INDICATED ONLY WHEN FOUND DURING THE FOUNDATION INVESTIGATION AND REPRESENTS THAT CONDITION ONLY ON THE DATE OF THE INVESTIGATION.

INFORMATION IS DEVELOPED AS ACCURATELY AS POSSIBLE BY THE METHODS UTILIZED, HOWEVER, THE ENGINEER ACCEPTS NO RESPONSIBILITY FOR ANY CONDITIONS ENCOUNTERED WHICH MAY BE AT VARIANCE FROM INFORMATION CONTAINED HEREIN.

NX CASING IS DRIVEN WITH 342 LB. HAMMER, 30" FREE FALL, NO CUSHION. BX CASING AND 2" PENETROMETER ARE DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL, NO CUSHION.

BLOW COUNT GRAPHS FOR 2" PENETROMETER & NX CASING ARE PLOTTED TO SCALE OF 1"=100 BLOWS HORIZ. MATERIAL NOTED IN ORDER OF DESCENDING PERCENTAGEE.

16139

CITY OF SCOTTSDALE, ARIZONA
LOW FLOOD CHANNEL BRIDGE
INDIAN BEND ROAD

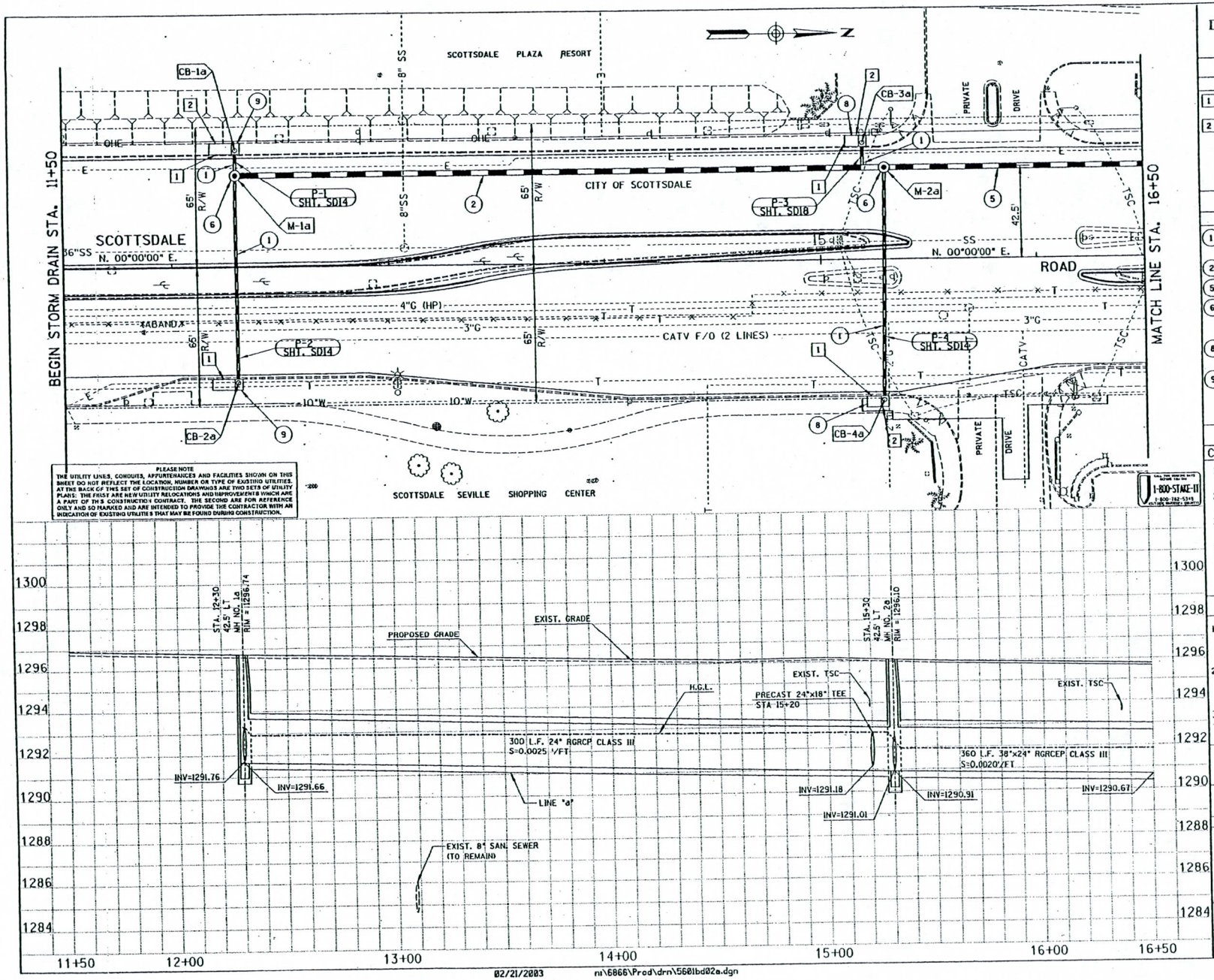
SCALE 5ft. = 1" Horiz. 5ft. = 1" Vert. | FOUNDATION DATA | DRAWN BY LEE | DATE | REVISED

ATL
TESTING LABORATORIES Phoenix, Arizona

DRAWING NUMBER 30 of 30

P-048

APPENDIX O



02/21/2003 n:\6866\Prod\drn\560lbd02a.dgn

DMJM+HARRIS AN AECOM COMPANY
2777 E. CAMELE
SUITE 200
PHOENIX, AZ. 8
(602) 337-2777

REMOVAL NOTES

	Description	Ur
1	Sawcut & Remove Curb and Gutter	
2	Sawcut & Remove Conc. Sidewalk	

CONSTRUCTION NOTI

	Description	Ur
1	Install 18" RGRCP Connector Lateral	
2	Install 24" RGRCP	
5	Install 38"x24" RGRCEP	
6	Install Storm Drain Manhole per MAG Det 520 & 522 Shallow	
8	Install Type M-1, L=6' Catch Basin per COP Det P-1569	
9	Install Type M-1, L=10' Catch Basin per COP Det P-1569	

CATCH BASINS

CB#	Station	Type
1a	12+30	P-1569 M-1, L=10'
2a	12+30	P-1569 M-1, L=10'
3a	15+20	P-1569 M-1, L=6'
4a	15+30	P-1569 M-1, L=6'

SHEET NOTES

1. All Lateral connections to be Prefabricated Tees for Pipe Less Than 42 Inch.
2. Catch Basin Offsets are from Construction Centerline to Ba of Curb.
3. For Utility Relocation Details, See Utility Plans.

SCALES
HORZ. 1"=20'
VERT. 1"=2'

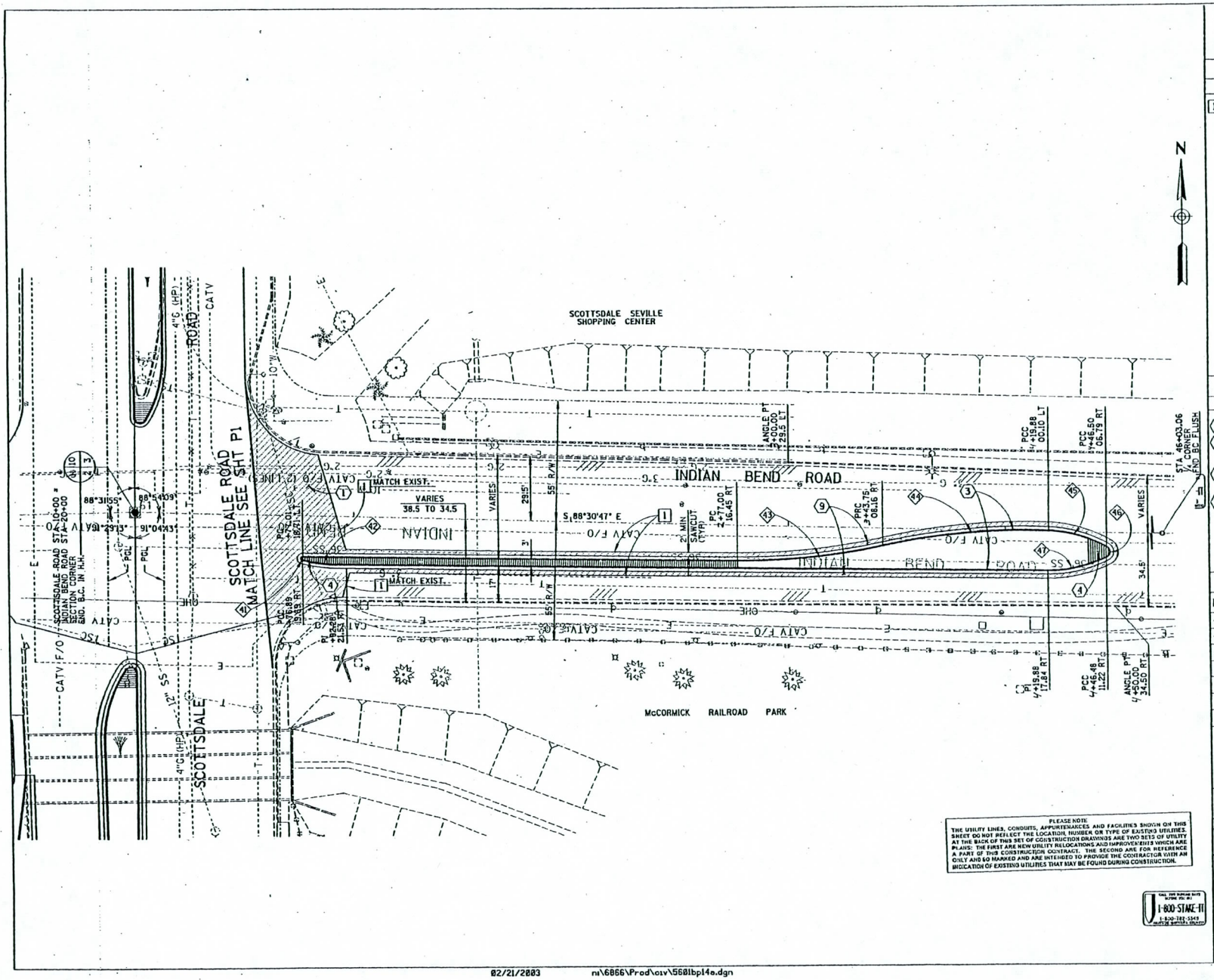
STORM DRAIN PLAN AND PROFILE
STA. 11+50 TO STA 16+50

DATE EXECUTED | REVISION

MUNICIPAL DEPA
CAPITA MAN
3939 CIVIC C SCOTTSDALE, A

PROJECT TITLE
SCOTTSDALE ROAD IMPROVEMENT
INDIAN BEND ROAD TO McCORMICK PA

SCALE	DESIGNED BY	DATE	SHEET NO.
HORZ. 1"=20' VERT. 1"=2"	DBL	05-08-03	
	DRAWN BY JG		PROJECT NO. 5-2701



PLEASE NOTE:
THE UTILITY LINES, CONDUITS, APPURTENANCES AND FACILITIES SHOWN ON THIS SHEET DO NOT REFLECT THE LOCATION, NUMBER OR TYPE OF EXISTING UTILITIES. AT THE BACK OF THIS SET OF CONSTRUCTION DRAWINGS ARE TWO SETS OF UTILITY PLANS: THE FIRST ARE NEW UTILITY RELOCATIONS AND IMPROVEMENTS WHICH ARE A PART OF THIS CONSTRUCTION CONTRACT. THE SECOND ARE FOR REFERENCE ONLY AND SO MARKED AND ARE INTENDED TO PROVIDE THE CONTRACTOR WITH AN INDICATION OF EXISTING UTILITIES THAT MAY BE FOUND DURING CONSTRUCTION.

1-800-STAKE-IT

02/21/2003 ni\6866\Prod\civ\568lbpl4e.dgn

DMJM+HARRIS
AN AECOM COMPANY
2777 E. CAMEL
SUITE 200
PHOENIX, AZ,
(602) 337-277

REMOVAL NOTES

Description
[1] Sawcut and Remove Existing Asphalt Concrete Pavement

CONSTRUCTION NO

Description
(1) Construct New A.C. Pavement
(3) Construct New Vertical Curb & Gutter, Per COS Dtl 2220, Type "A"
(4) Construct New Median Nose Paving Per Landscape Plans
(9) Pavement Replacement, COS 2200

CURVE DATA

NO.	Δ	R	T
41	165°02'20"	0.50'	3.81'
42	14°57'40"	59.50'	7.81'
43	12°52'24"	300.00'	33.85'
44	14°39'55"	300.00'	38.60'
45	26°43'25"	59.50'	14.13'
46	124°50'59"	2.50'	4.79'
47	26°38'06"	59.50'	14.08'

SCALES
HORZ. 1"=20' 20 0 20

PLAN
INDIAN BEND ROAD
STA. 20+00 TO STA 25+00

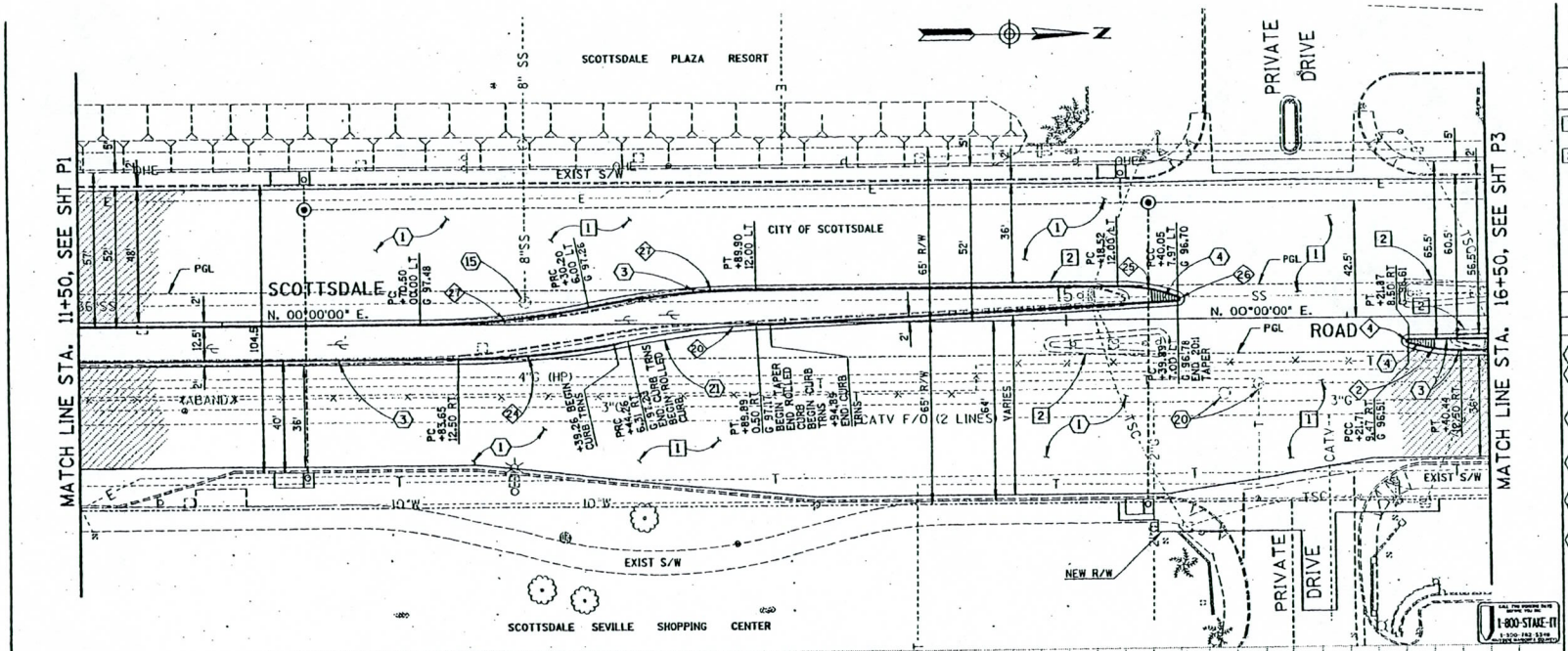
DATE	REVISION

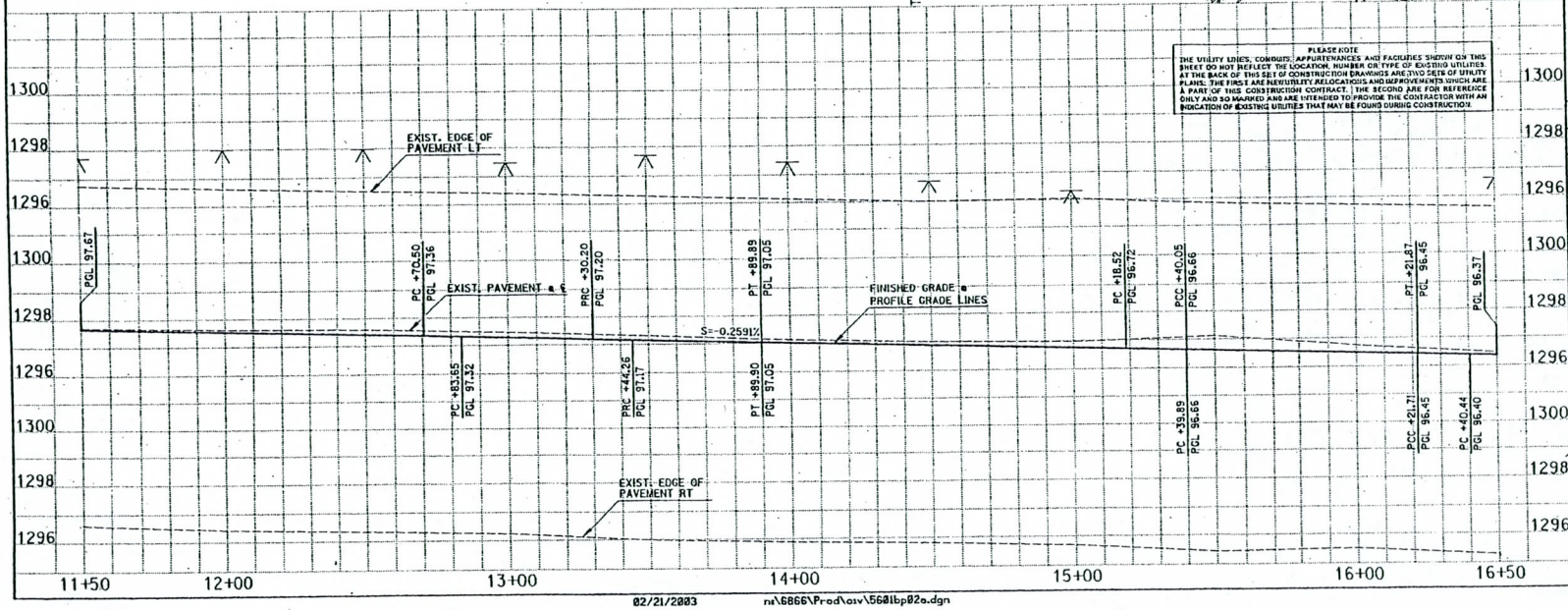
ENGINEER
22899 THOMAS P. O'REILLY
REGISTERED PROFESSIONAL ENGINEER ARIZONA U.S.A.

MUNICIPA
DEPA
CAPITA
MAN
3939 CIVIC
SCOTTSDALE,

PROJECT TITLE
SCOTTSDALE ROAD IMPROVEMENT
INDIAN BEND ROAD TO McCORMICK PA

SCALE	DESIGNED BY	DATE	CD NO.
HORZ. 1"=20'	CB	FEB 03	
VERT. 1"=2'	DRAWN BY RS	AS-BUILT	PROJECT NO. S-2707





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DMJM+HARRIS AN AECOM COMPANY
2777 E. CAMELE
SUITE 200
PHOENIX, AZ. 8
(602) 337-2777

REMOVAL NOTES

	Description	Ur
1	Sawcut and Remove Asphalt Concrete Pavement	S
2	Remove Curb & Gutter	L

CONSTRUCTION NOT

	Description	Ur
1	Construct New A.C. Pavement	S
3	Construct New Vertical Curb & Gutter, Per COS Dtl 2220, Type "A"	L
4	Construct New Median Nose Paving Per Landscape Plans	S
15	Adjust Manhole Frame and Cover Per COS Dtl 2270	E
20	Adjust Telephone Manhole & Cover By Others	E
21	Construct New Rolled Curb & Gutter Per MAG Dtl 220, Type "D" See Sht PD3 For Transition Dtl	L

CURVE DATA

NO.	Δ	R	T
2	18°20'59"	59.50'	9.61'
4	161°39'01"	0.50'	3.10'
20	8°47'39"	300.00'	23.07'
24	11°39'25"	300.00'	30.62'
25	21°13'09"	59.50'	11.15'
26	155°55'06"	0.50'	2.34'
27	11°28'42"	300.00'	30.15'

SCALES
HORZ. 1"=20'
VERT. 1"=2'

PAVING PLAN AND PROFILE
STA. 11+50 TO STA 16+50

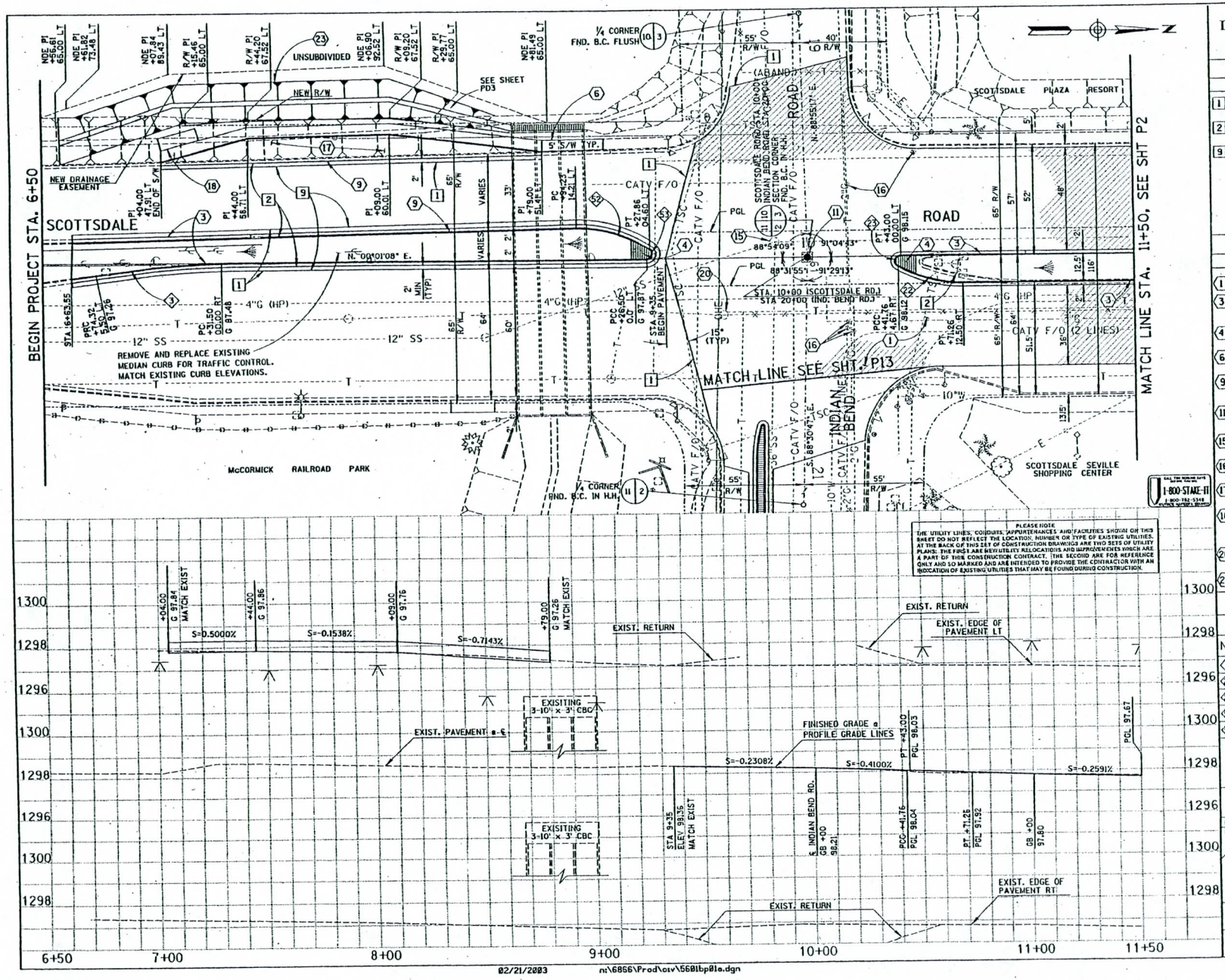
DATE | REVISION

ENGINEER
22859 THOMAS P. O'REILLY REGISTERED PROFESSIONAL ENGINEER ARIZONA U.S.A.

MUNICIPAL DEPAR
CAPITAL MANA
3939 CIVIC C
SCOTTSDALE, A

PROJECT TITLE: SCOTTSDALE ROAD IMPROVEMENTS
INDIAN BEND ROAD TO McCORMICK PAR

SCALE	DESIGNED BY	DATE	ED NO.
HORIZ. 1"=20'	CB	12 03	
VERT. 1"=2'	DRAWN BY RS	AS-BUILT	PROJECT NO. S-2707



PLEASE NOTE
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DMJM+HARRIS AN AECOM COMPANY
2777 E. CAMEL
SUITE 200
PHOENIX, AZ, E
(602) 337-277

REMOVAL NOTES

	Description
1	Sawcut and Remove Asphalt Concrete Pavement
2	Remove Curb & Gutter
9	Sawcut & Remove Curb & Gutter

CONSTRUCTION NO

	Description
1	Construct New A.C. Pavement
3	Construct New Vertical Curb & Gutter, Per COS Dtl 2220, Type "A"
4	Construct New Median Nose. Paving Per Landscape plans
6	Construct Concrete Sidewalk, Per MAG Dtl 230
9	Pavement Replacement Per COS Detail 2200
11	Install Survey Monument, Per MAG Dtl 120, Type "A"
15	Adjust Manhole Frame and Cover Per COS Dtl 2270
16	Adjust Gas Valve Box and Cover By Others
17	Construct New Bus Bay Per COS Dtl 2266-1
18	Construct New Bus Shelter Pad, Per COS Dtl 2269 - Modified, See Sht PD3 For Detail.
20	Adjust Telephone Manhole & Cover by Others
23	New Channel Per Detail PD4

CURVE DATA

NO.	Δ	R	T
1	10°59'17"	414.28'	28.86'
22	29°43'28"	59.5'	15.79'
23	150°16'32"	2.5'	9.42'
52	34°11'32"	59.50'	18.30'
53	146°57'12"	2.5'	8.43'

SCALES
HORZ.: 1"=20'
VERT.: 1"=2'

PAVING PLAN AND PROFILE
STA. 6+50 TO STA 11+50

DATE | REVISION

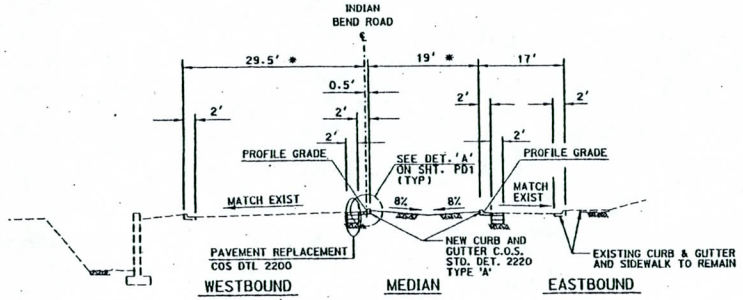
ENGINEER: 22839 THOMAS P. O'REILLY

MUNICIPA
DEPA
CAPITA
MAN
3939 CIVIC
SCOTTSDALE,

PROJECT TITLE: SCOTTSDALE ROAD IMPROVEMENT
INDIAN BEND ROAD TO McCORMICK PA

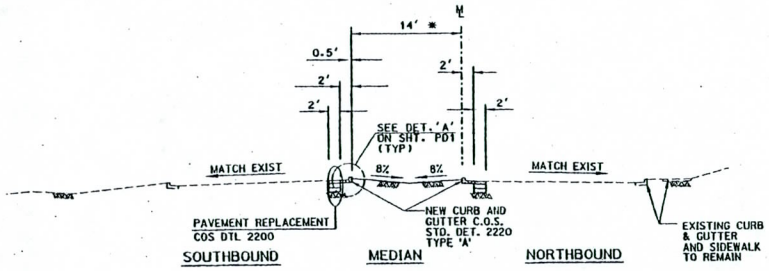
SCALE	DESIGNED BY	DATE	AS-BUILT	AS NO.
HORIZ. 1"=20' VERT. 1"=2"	CB DRAWN BY RS	FEB 03		PROJECT NO. S-2707

DMJM+HARRIS
AN AECOM COMPANY
2777 E. CAMEL
SUITE 200
PHOENIX, AZ. 8
(602) 337-277



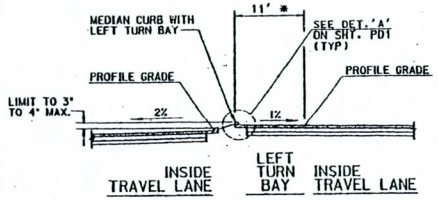
TYPICAL ROADWAY SECTION
INDIAN BEND ROAD
STA. 20+75± TO STA. 24+48±

* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.



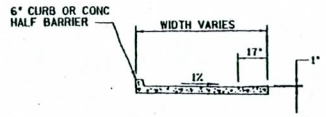
TYPICAL ROADWAY SECTION
SCOTTSDALE ROAD
STA. 6+36.55 TO STA. 9+30.36 AND
STA 61+90± TO STA 65+85

* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.

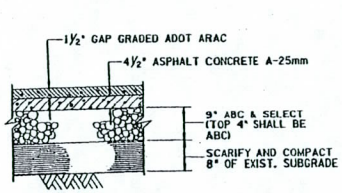


TYPICAL LEFT TURN BAY
SCOTTSDALE ROAD

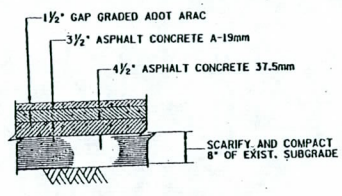
* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.



TYPICAL VARIABLE WIDTH GUTTER WITH CURB/ HALF BARRIER
SEE PLANS FOR LOCATIONS

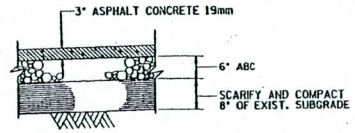


PAVEMENT SECTION 1

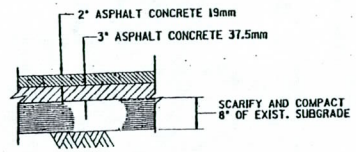


FULL DEPTH ALTERNATIVE

SCOTTSDALE ROAD

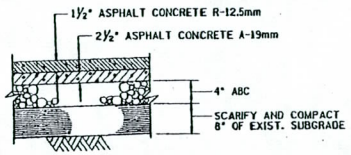


PAVEMENT SECTION 2

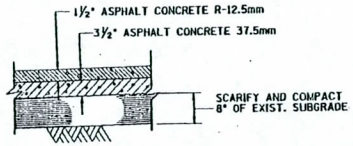


FULL DEPTH ALTERNATIVE

TEMPORARY PAVEMENT SECTION
FOR TRAFFIC CONTROL

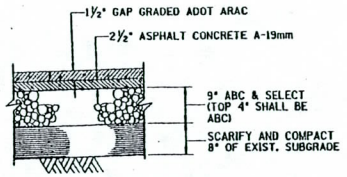


PAVEMENT SECTION 3

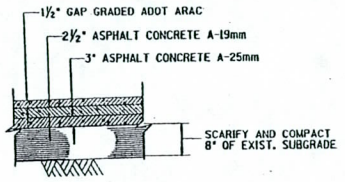


FULL DEPTH ALTERNATIVE

DRIVEWAY PAVEMENT SECTION



PAVEMENT SECTION 4



FULL DEPTH ALTERNATIVE

McCORMICK PARKWAY

TYPICAL ROADWAY SECTIONS & PAVEMENT SECTIONS

DATE | REVISION

ENGINEER

22939
THOMAS P.
O'REILLY

CITY OF SCOTTSDALE
ARIZONA

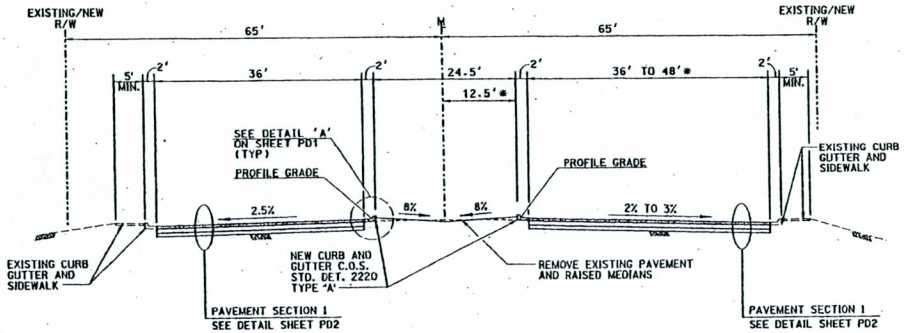
MUNICIPAL
DEPA
CAPITA
MAN.
3939 CIVIC
SCOTTSDALE,

PROJECT TITLE: SCOTTSDALE ROAD IMPROVEMENT
INDIAN BEND ROAD TO McCORMICK PA

SCALE	DESIGNED BY	DATE	C.O. NO.
AS NOTED	CB	MAY 01	
	DRAWN BY JG	AS-BUILT	PROJECT NO. 5-2107

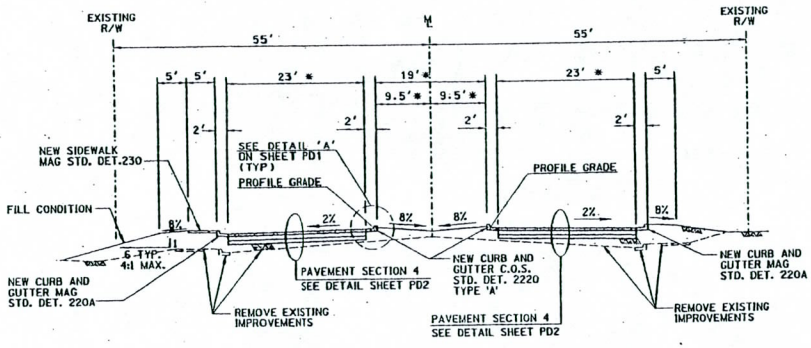
02/24/2003 n:\6866\Prod\gen\560ldab3a.dgn

DMJM+HARRIS
AN AECOM COMPANY
2777 E. CAMELE
SUITE 200
PHOENIX, AZ. 8
(602) 337-2177



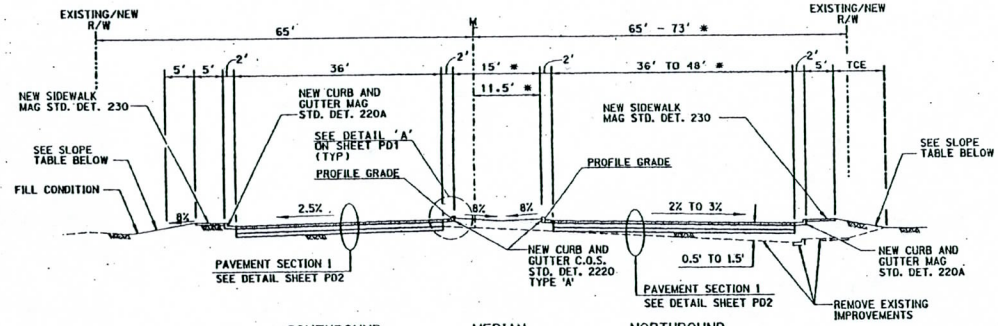
TYPICAL ROADWAY SECTION
SCOTTSDALE ROAD
INDIAN BEND ROAD TO HUMMINGBIRD LANE
STA. 10+00± TO STA. 22+50±

* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.



TYPICAL ROADWAY SECTION
McCORMICK PARKWAY
STA. 20+89.22 TO STA. 24+50

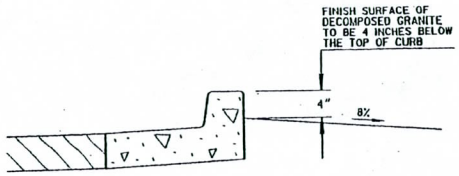
* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.



TYPICAL ROADWAY SECTION
SCOTTSDALE ROAD
HUMMINGBIRD LANE TO INDIAN BEND WASH
STA. 22+50± TO STA. 62+00±

* DIMENSION VARIES - SEE PLAN AND PROFILE SHEETS FOR LOCATION AND DIMENSIONS.

SLOPE TABLE, STATION 22+50 TO 62+00					
RT	STA	22+50	TO	45+00	SLOPE 4:1 MIN.
RT	STA	45+50	TO	61+00	SLOPE 5:1 MIN.
LT	STA	22+50	TO	50+00	SLOPE 4:1 MIN.
LT	STA	50+00	TO	51+00	TRNS FROM 4:1 TO 3:1 MIN.
LT	STA	51+00	TO	62+00	SLOPE 3:1 MIN.
RT	STA	22+50	TO	45+00	SLOPE 4:1 MIN.



DETAIL 'A'
N.T.S.

NOTE:
FOR PAVEMENT SECTIONS SEE SHT. PD2

TYPICAL ROADWAY SECTIONS

DATE	REVISION
ENGINEER	

22859 THOMAS P. O'REILLY

CITY OF SCOTTSDALE ARIZONA

MUNICIPAL DEPA
CAPITA MAN
3939 CIVIC C
SCOTTSDALE, A

PROJECT TITLE: SCOTTSDALE ROAD IMPROVEMENT
INDIAN BEND ROAD TO McCORMICK PA

SCALE	DESIGNED BY	DATE	BB NO.
AS NOTED	CB	MAR 01	
	DRAWN BY	AS BUILT	PROJECT NO.
	JJG		S-2101

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL

MARY MANROSS, MAYOR
CYNTHIA LUCAS
NED O'HEARN
DAVID ORTEGA
ROBERT W. LITTLEFIELD
TOM SILVERMAN
WAYNE ECTON

CITY MANAGER

JAN DOLAN

CITY ATTORNEY

DAVID A. PENNARTZ

CITY CLERK

SONIA ROBERTSON

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

FIRE DEPT.		GRADING & DRAINAGE	
PLANNING		WATER & SEWER	
TRAFFIC		PAVING	
APPROVED BY:		BUILDING STRUCTURAL	

ENGINEERING COORDINATION MANAGER OR (DESIGNEE) _____ DATE _____

Two working days before you dig CALL FOR THE BLUE STAKES 263-1100 Blue Stake Center CALL COLLECT

ENGINEER
DMJM ARIZONA, INC.
PLANNING ARCHITECTURE ENGINEERING LANDSCAPE--ARCHITECTURE

CONTACT PERSON
WADE GENDREAU
PHONE: (602) 337-2777
FAX: (602) 337-2620

2777 EAST CAMELBACK
SUITE 200
PHOENIX, AZ. 85016-4320
(602) 337-2777

SCOTTSDALE ROAD IMPROVEMENTS
INDIAN BEND ROAD TO McCORMICK PARKWAY
PROJECT NO. S 2707 – BID CALL 03PB073

BASIS OF BEARING

AN ASSUMED BEARING OF N 89° 59' 59" E WAS ASSIGNED TO THE SECTION LINE BETWEEN INDIAN BEND ROAD AND CHENEY DRIVE.

BENCH MARK

INTERSECTION OF INDIAN BEND ROAD AND SCOTTSDALE ROAD - B.C. IN HJL DISK "29 ELEV. = 1297.576 FT.(COS DATUM - NAVD '88 ELEV. = 1294.327 FT.

INTERSECTION OF CHENEY DRIVE AND SCOTTSDALE ROAD - B.C. FLUSH DISK "29 ELEV. = 1293.168 FT.(COS DATUM - NAVD '88 ELEV. = 1295.188 FT.

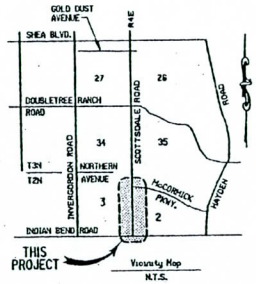
INTERSECTION OF EASTWOOD LANE AND SCOTTSDALE ROAD - B.C. IN HJL DISK "29 ELEV. = 1307.648 FT.(COS DATUM - NAVD '88 ELEV. = 1309.494 FT.

INTERSECTION OF DOUBLETREE RANCH ROAD AND SCOTTSDALE ROAD - B.C. IN HJL DISK "29 ELEV. = 1328.628 FT.(COS DATUM - NAVD '88 ELEV. = 1332.486 FT.

THE ELEVATIONS ON THESE SCOTTSDALE ROAD SOUTH PHASE PLANS WERE BASED ON FIELD SURVEY DATA PERFORMED IN 1992, WHICH UTILIZED THE NGVD '29 AS THE BASIS OF VERTICAL DATUM. BEGINNING IN 1995 THE CITY OF SCOTTSDALE ELECTED TO CONFORM TO THE NAVD '88 AS THE BASIS OF ALL PUBLISHED VERTICAL DATUM IN THE CITY.

USE THE NGVD '29 BENCHMARKS PROVIDED ABOVE WHEN SURVEYING ELEVATIONS SHOWN ON THESE PLANS.

I HEREBY CERTIFY THAT ALL ELEVATIONS REPRESENTED ON THIS PLAN ARE BASED ON THE ELEVATION DATUM FOR THE CITY OF SCOTTSDALE BENCHMARK PROVIDED ABOVE.



Vicinity Map
N.T.S.

Sheet Index

Sht.	Sht. No.	Description
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G2	2	GENERAL NOTES, LEGEND, ABBREVIATIONS & KEY NOTES
G3	3	PAVING QUANTITY SHEET
G4	4	STORM DRAIN QUANTITY SHEET
G5	5	ALTERNATE PIPE MATERIAL SHEET
P01	6	TYPICAL ROADWAY SECTIONS
P02	7	TYPICAL ROADWAY & PAVEMENT SECTIONS
P03	8	PAVING DETAIL SHEET
P04	9	CHANNEL REALIGNMENT
GD1	10	GRADING AND DRAINAGE FOR INDIAN BEND WASH
GD1A	11	PLAN AND PROFILE, SIDEWALK DETAIL
GD2	12	GRADING AND DRAINAGE FOR MUMMY MT WASH
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	29-32	SHEETS NOT USED
TL1	33	PEDESTRIAN BRIDGE LIGHTING
SD41-SD43	34-36	STORM DRAIN DETAILS
SD1-SD21	37-58	STORM DRAIN PLAN & PROFILE
UD1	59	UTILITY RELOCATION DETAIL
UL-UL6A	60-76	UTILITY PLAN AND PROFILE
TS1-TS4	77-80	TRAFFIC SURVEY SHEETS
TS5-TS8	81-84	TRAFFIC SIGNAL PLANS
TS9-TS14	85-91	TRAFFIC MARKINGS & SIGNS SHEETS
TS15-TS35	92-111	TRAFFIC MAINT & PROTECTION & CTRL SHTS
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S2	113	BRIDGE GENERAL PLAN AND ELEVATION
S3	114	TYPICAL BRIDGE SECTION
S4	115	BORING LOCATIONS & BORING NOTES
S5-S6	116-117	BORING LOGS
S7	118	BRIDGE FOUNDATION PLANS
S8	119	BRIDGE FOUNDATION DETAILS
S9	120	PRESTRESSED CONCRETE BOX GIRDER PLAN
S10	121	BOX GIRDER DETAILS
S11	122	BOX GIRDER DIAPHRAGM DETAILS
S12	123	DETAILS
S13	124	BEARING PAD ELEVATION SCHEDULES
S14-S15	125-126	ABUTMENT PLANS - WEST CONSTRUCTION
S16	127	PIER CAP PLANS - WEST & EAST CONSTRUCTION
S17-S18	128-129	ABUTMENT ELEVATIONS NO.1 & NO.2
S19	130	TYP PIER CAP ELEVATIONS (WEST & EAST CONST)
S20-S21	131-132	ABUTMENT & PIER CAP DETAILS
S22	133	ABUTMENT DETAILS
S23	134	WINGWALL ELEVATIONS AND DETAILS
S24	135	CONCRETE DECK- REINFORCING AND POUR SCHEDULE
S25	136	MISC DETAILS
S25A	137	SIDEWALK PARTIAL PLAN AND ELEVATIONS
S25B	138	RAILING DETAILS
S25C	139	TRELLIS DETAILS
S26	140	HEADWALL PLAN & DETAILS
S27	141	RETAINING WALL ELEVATION & DETAILS
S28-S30	142-144	BRIDGE AESTHETIC TREATMENTS
S31	145	LOCATION PLAN, GENERAL NOTES & INDEX
S32	146	HEADWALL PLANS
S33-S34	147-148	DETAILS
NP1-NP3	149-151	NATIVE PLANT SURVEY
L1.1-L1.10	152-161	LANDSCAPE PLANS
L2.1-L2.11	162-171	HARDSCAPE DETAILS & PLANS
L3.1-L3.11	172-181	IRRIGATION PLANS
		UTILITY PLANS FOR CONSTRUCTION
	1-15	APS
	1-3	QWEST
		UTILITY PLANS FOR REFERENCE
	58-144	APS, QWEST, COX, SVG

NO CONFLICT SIGNATURE BLOCK

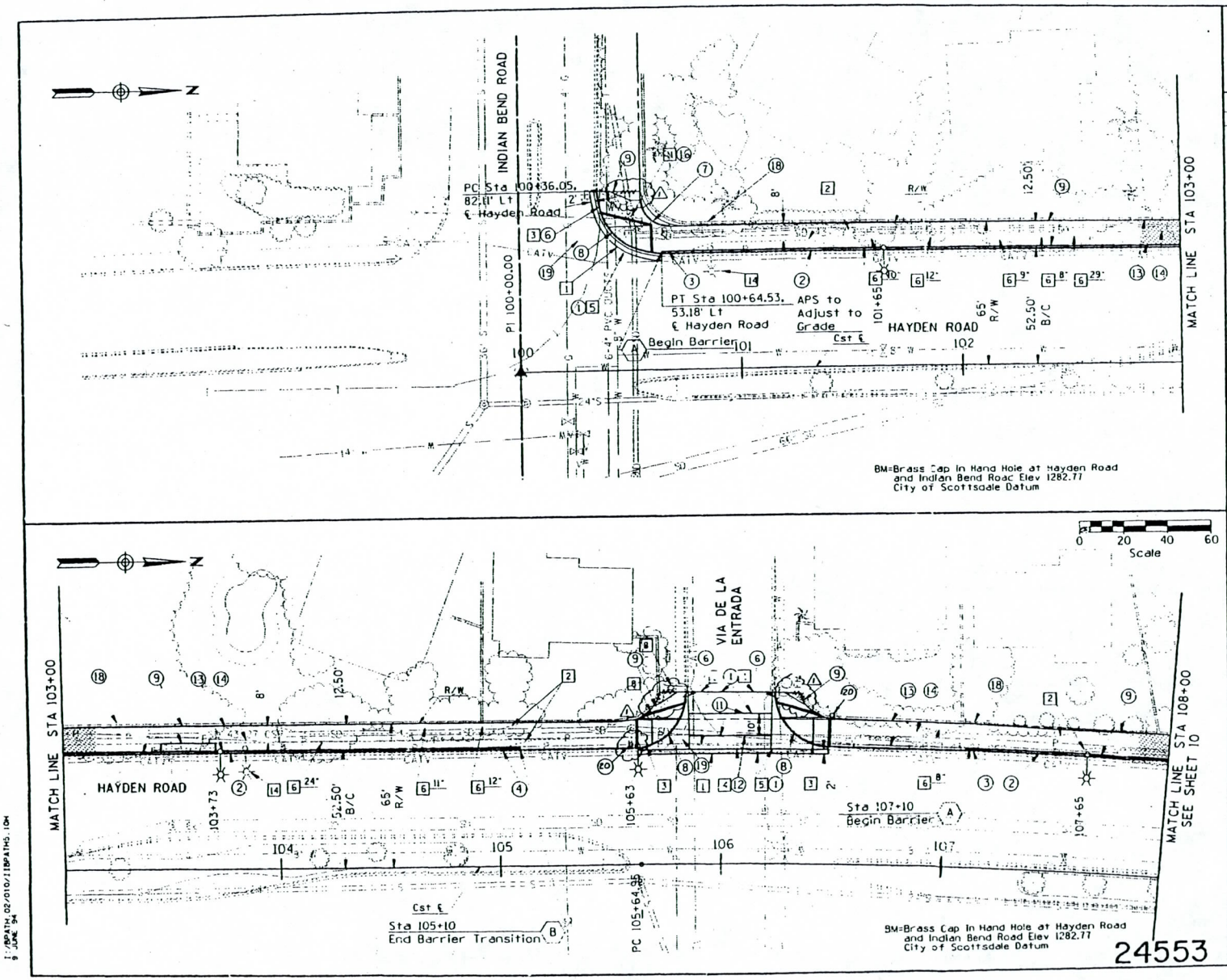
UTILITY	UTILITY COMPANY	NAME OF COMPANY REPRESENTATIVE	TELEPHONE NUMBER	DATE SIGNED
SANITARY SEWER	CITY OF SCOTTSDALE	GREG CROSSMAN	480-312-5319	
WATER	CITY OF SCOTTSDALE	CHUCK HILL	602-541-5469	
ELECTRIC	APS	JOHN RAEL	602-371-6945	
TELEPHONE	QWEST	TOM MEADOR	480-768-4284	
NATURAL GAS	SOUTHWEST GAS	VIVIAN HUNSAKER	602-484-5277	
CABLE TV	COX COMMUNICATION	ROGER YENSEN	623-322-8524	
IRRIGATION	CITY OF SCOTTSDALE	DAVID GRAY	480-312-2188	
OTHER				

ENGINEER'S CERTIFICATION

I _____, being the person responsible for designing the facilities necessary to serve this development, hereby certify that all of the utility companies listed above have reviewed this project proposal and all conflicts have been resolved at this point. "No Conflict" Forms have been obtained from each utility company and are included in this submittal. I also certify that all onsite transformers, cable boxes and any other public/private utility appurtenances are placed such that they do not negatively impact the use or intended use of any dedicated easements or facilities developed with this project including but not limited to stormwater storage basins, sight distance easements and HAUS or other open space easements.

SIGNATURE _____ DATE _____

SCOTTSDALE RD. IMPROVEMENT – INDIAN BEND RD. TO McCORMICK PARKWAY



CRSS

Civil Engineers Inc.

Phoenix, Arizona

REMOVAL NOTES

	Description	Unit	Quan.
1	Sawcut & Match Existing	LF	195
2	Remove Concrete Sidewalk	SF	6552
3	Remove Vertical Curb & Gutter	LF	126
4	Remove Concrete Valley Gutter	SF	358
5	Remove AC Pavement	SY	28
6	Remove Tree (Size as noted)	EA	9
8	Relocate Sign	EA	2
11	Remove Pullbox	EA	1
14	Remove Light Pole	EA	2

CONSTRUCTION NOTES:

	Description	Unit	Quan.
1	Asphaltic Concrete Pvmt C.O.S. 2200	SY	73
2	Concrete Barrier, See Detail Sheets 6 & 7	LF	503
3	Concrete Barrier Transition See Detail A, Sheet 6	EA	2
4	Concrete Barrier Transition See Detail B, Sheet 6	EA	1
6	Vertical Curb & Gutter, MAG 220 Type A	LF	126
7	Concrete Mason Unit Wall See Detail Sheet 5	SUM	1
8	Concrete Sidewalk Ramp See Detail Sheet 5	EA	3
9	5" Concrete Multi-Use Path MAG 230	SF	8216
11	8" PCC Pavement	SY	42
12	Concrete Valley Gutter C.O.S. 2240	SF	518
13	4" White Stripe (Paint) See Sheet 13	LF	1306
14	4" Yellow Stripe (Paint) See Sheet 13	LF	163
16	No. 7 Pullbox ADOT Std T.S. 1-3	EA	1
18	Wall Modification See Detail Sheet 5	LF	678
19	12" White Stripe (Thermo)	LF	178
20	18"x18" R1-2 YIELD SIGN	EA	2

⚠ AS-BUILT 4-6-95

DATE | REVISION | BY

ENGINEER

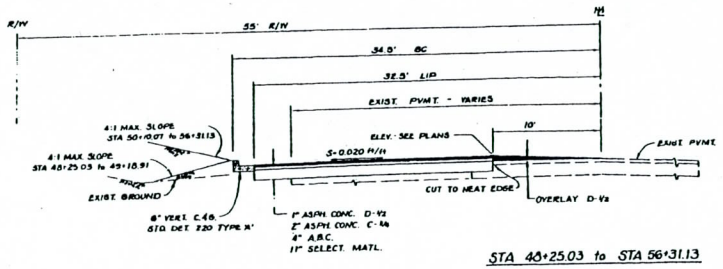
DEPARTMENT
CAPITAL PROJECT MANAGEMENT
3939 CIVIC CENTER BLVD.
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE
INDIAN BEND WASH
MULTI-USE PATH IMPROVEMENTS SITE II

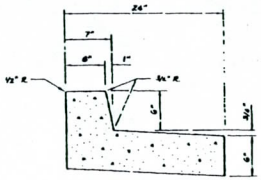
SCALE	DESIGNED	DRAWN	DATE	BID NO.	SHT. NO.
HORIZ 20 VERT. NA	JES	JES	9 JUN 94	95-11	9
	CHECKED	AS-BUILT	PROJECT NO.	P1705	9 OF 24

119-DR-93 428 E 94

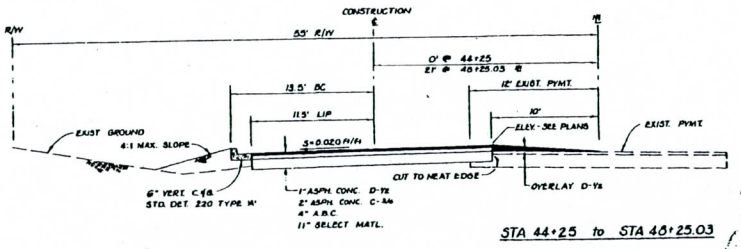
I:\PATH\02/010/11PATH5.ION
9 JUNE 94



STA 46+25.03 to STA 56+31.13



6" VERTICAL CURB & GUTTER W/ DEPRESSED LIP
STD. DET. 220 TYPE 'A' MOD.
1½" = 1'-0"



STA 44+25 to STA 46+25.03

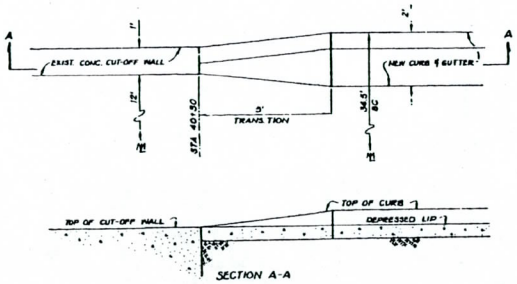
AS BUILT CERTIFICATION

THE DRAINAGE STRUCTURES WERE AS BUILT AS HEREON SHOWN.

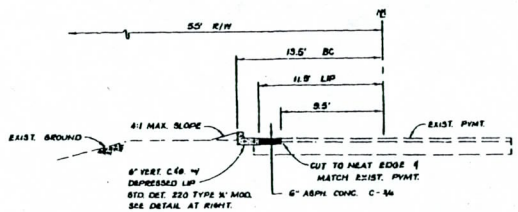
Richard G. Clark

RICHARD G. CLARK R.L.S. DATE 2/14/91

CITY OF SCOTTSDALE ARIZONA



5' CURB TRANSITION @ STA 40+30
½" = 1'-0"



STA 40+30 to STA 44+25

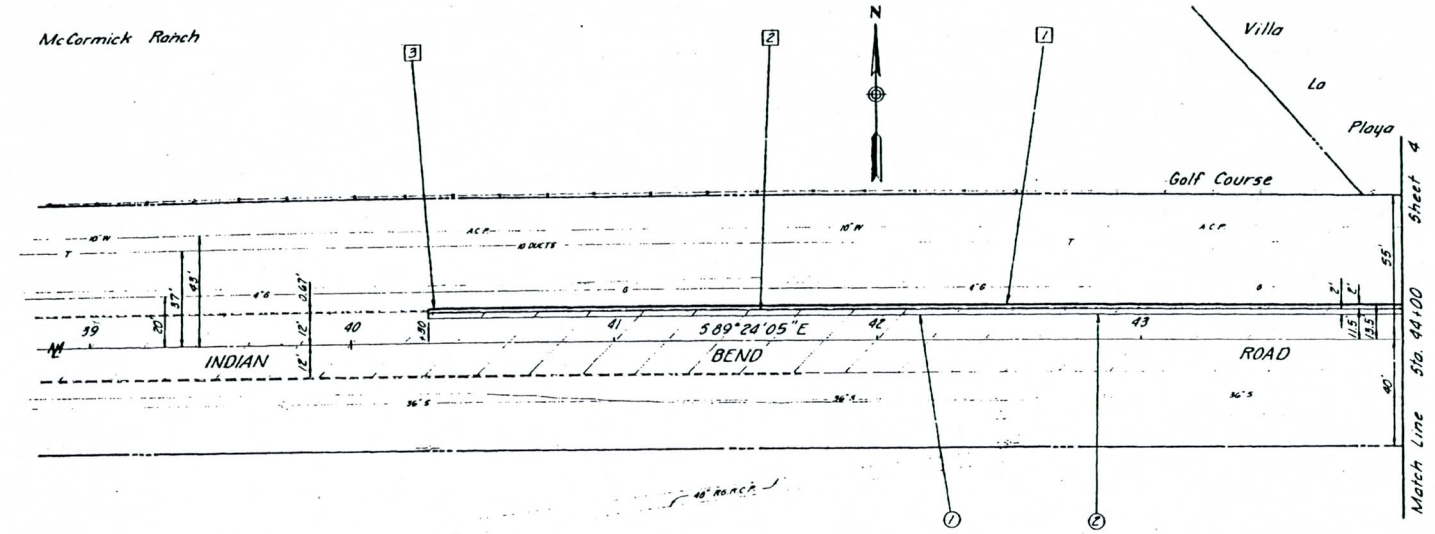
19272

DATE | REVISION | BY

CITY OF SCOTTSDALE ARIZONA
COMMUNITY DEVELOPMENT
DEPARTMENT
CAPITAL IMPROVEMENTS
ENGINEERING
1939 C.I.S. Center Place
Scottsdale Arizona 85251

INDIAN BEND ROAD WIDENING
@ VILLA LA PLAYA

SCALE	PROJECT NO	SHEET 2 OF	AS BUILT
H: 1"=5' V: 1"=5'	8661	DESIGN BY DMP DRAWN BY WM CHK BY	DATE
		FILE NO	By



CONSTRUCTION NOTES

REMOVE

(1) Sawcut 372 L.F. Existing A.C. Pvmt.

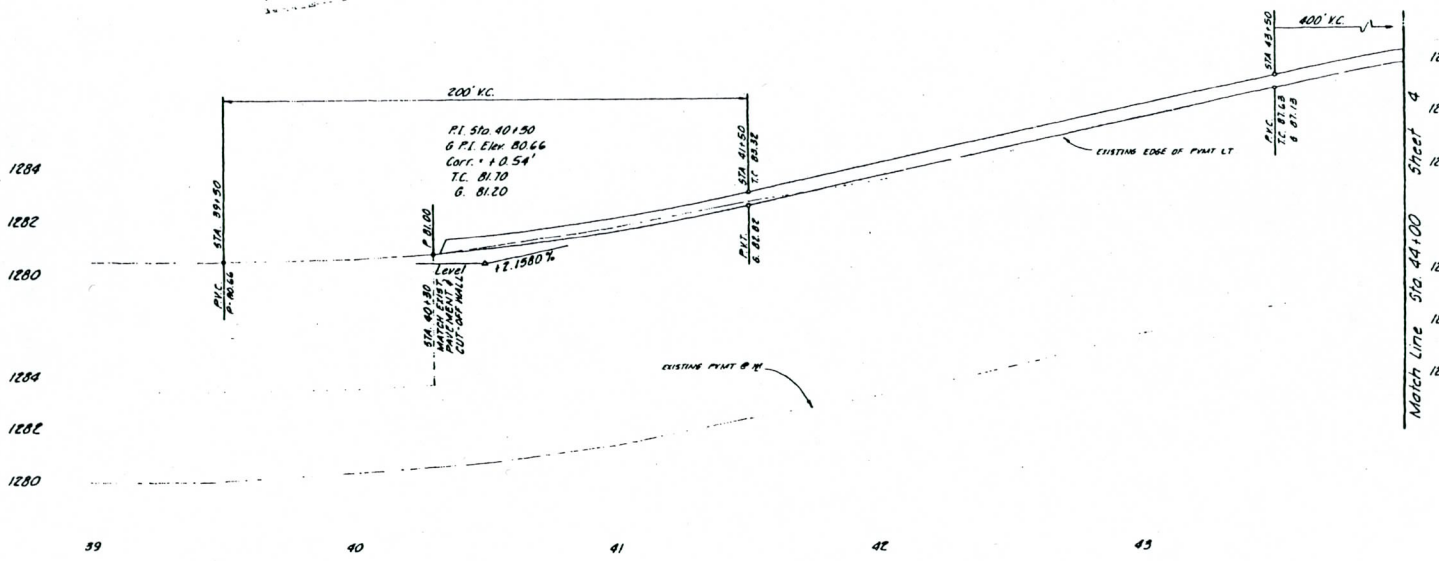
(2) Remove 103 S.Y. Existing A.C. Pvmt.

INSTALL

(1) Install 370 L.F. New V.C.&G. Std. Det. 220 Type 'A'

(2) Install 82 S.Y. New A.C. Pvmt.

(3) Transition From Existing Flush Cul Off Wall to New V.C.&G. in 5', See Detail Sheet 2



19273

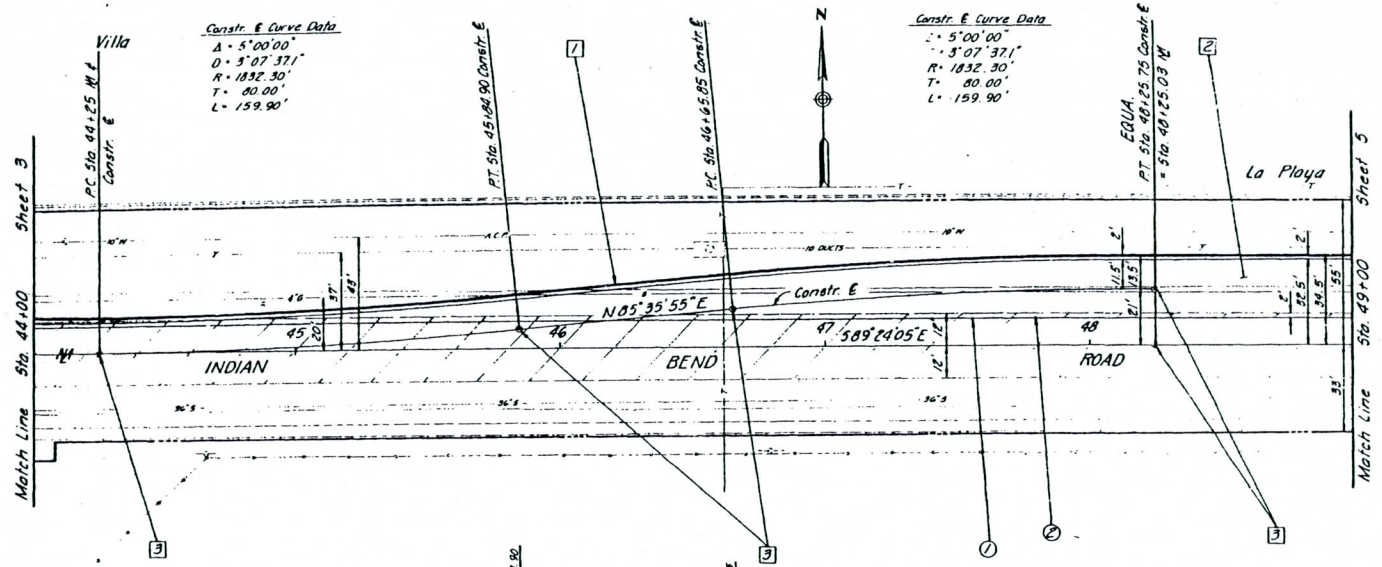
CITY OF SCOTTSDALE ARIZONA

CAPITAL IMPROVEMENTS ENGINEERING

3939 Civic Center Plaza Scottsdale, Arizona 85251

INDIAN BEND ROAD WIDENING @ VILLA LA PLAYA

SCALE	PROJECT NO	SHEET 3 OF 43 SHTS
HOR. 1"=20' VERT. 1"=2'	8661	DWN BY DRM CHK BY WKH FILE NO.



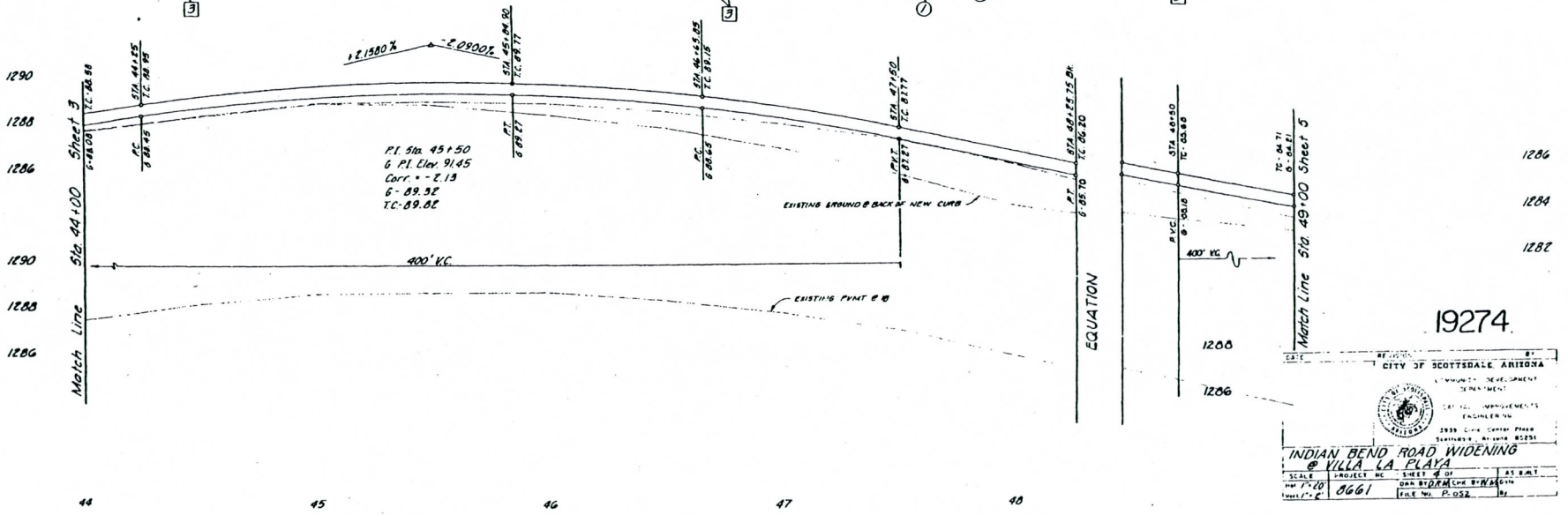
CONSTRUCTION NOTES

REMOVE

1. Sawcut 500 L.F. Existing A.C. Pvmt.
2. Remove 115 S.Y. Existing A.C. Pvmt.

INSTALL

1. Install 501 L.F. New V.C. & G Std. Det. 220, Type 'A'
2. Install 740 S.Y. New A.C. Pvmt.
3. Install New Survey Monument Std. Det. 120-1, Type 'B'. 5 Ea.

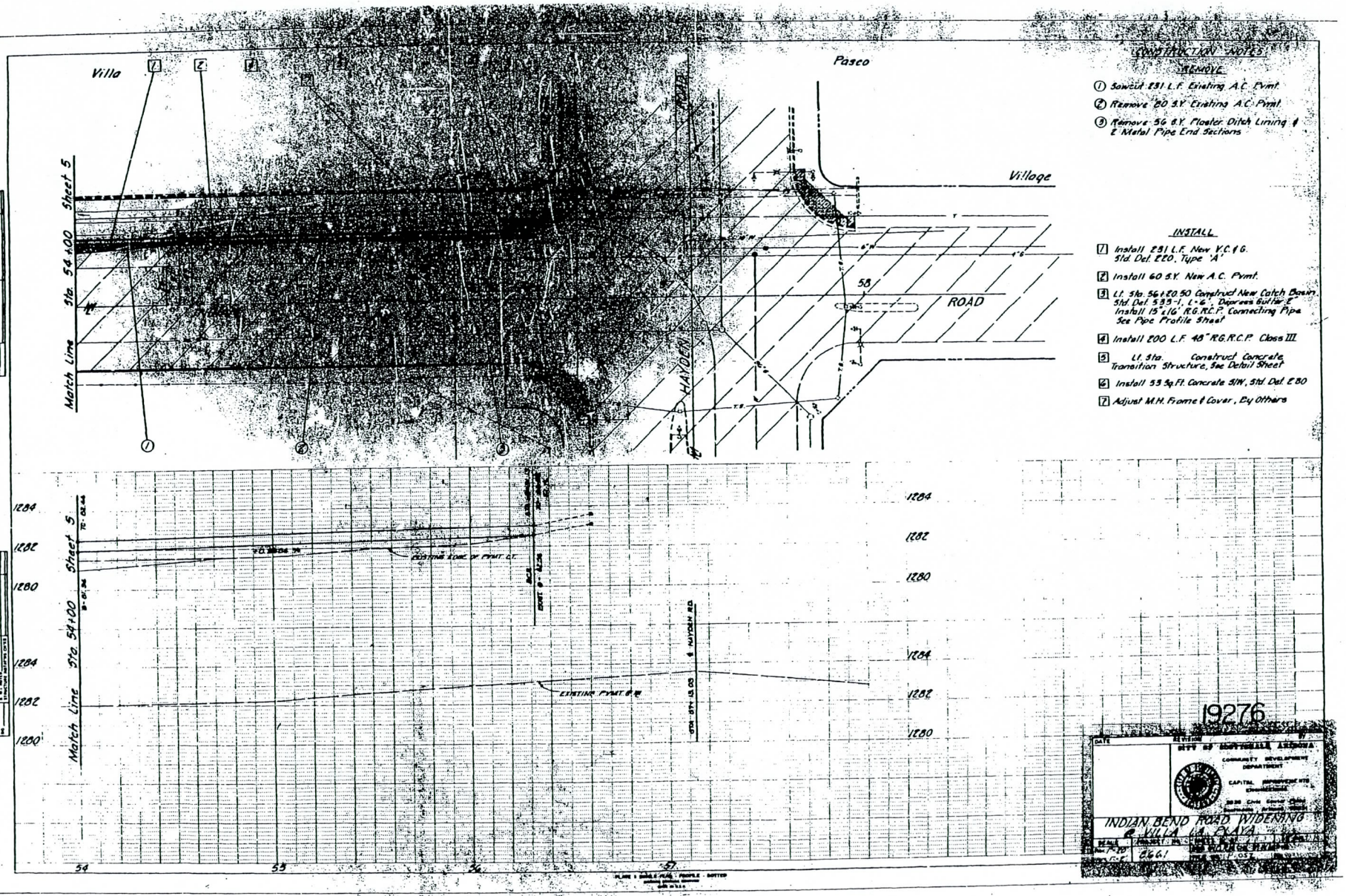


19274

CITY OF SCOTTSDALE, ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL IMPROVEMENTS ENGINEERING
3939 Civic Center Plaza
Scottsdale, Arizona 85251

INDIAN BEND ROAD WIDENING
@ VILLA LA PLAYA

SCALE	PROJECT NO.	SHEET # OF	AS BUILT
Hor 1"=20' Vert 1"=2'	8661	DRN BY DRM CHK BY RMH	DATE
		FILE NO. P-052	BY



CONSTRUCTION NOTES

REMOVE

(1) Sawcut 231 L.F. Existing A.C. Pvmt.

(2) Remove 20 S.Y. Existing A.C. Pvmt.

(3) Remove 56 S.Y. Plaster Ditch Lining & 2 Metal Pipe End Sections

INSTALL

(1) Install 231 L.F. New V.C. & G. Std. Det. 220, Type 'A'

(2) Install 60 S.Y. New A.C. Pvmt.

(3) L.I. Sta. 56+20.50 Construct New Catch Basin, Std. Det. 535-1, L-6', Depress Gutter 2" Install 15"x16' R.G.R.C.P. Connecting Pipe See Pipe Profile Sheet

(4) Install 200 L.F. 18" R.G.R.C.P. Class III

(5) L.I. Sta. Construct Concrete Transition Structure, See Detail Sheet

(6) Install 53 Sq Ft. Concrete S/W, Std. Det. 230

(7) Adjust M.H. Frame & Cover, By Others

19276

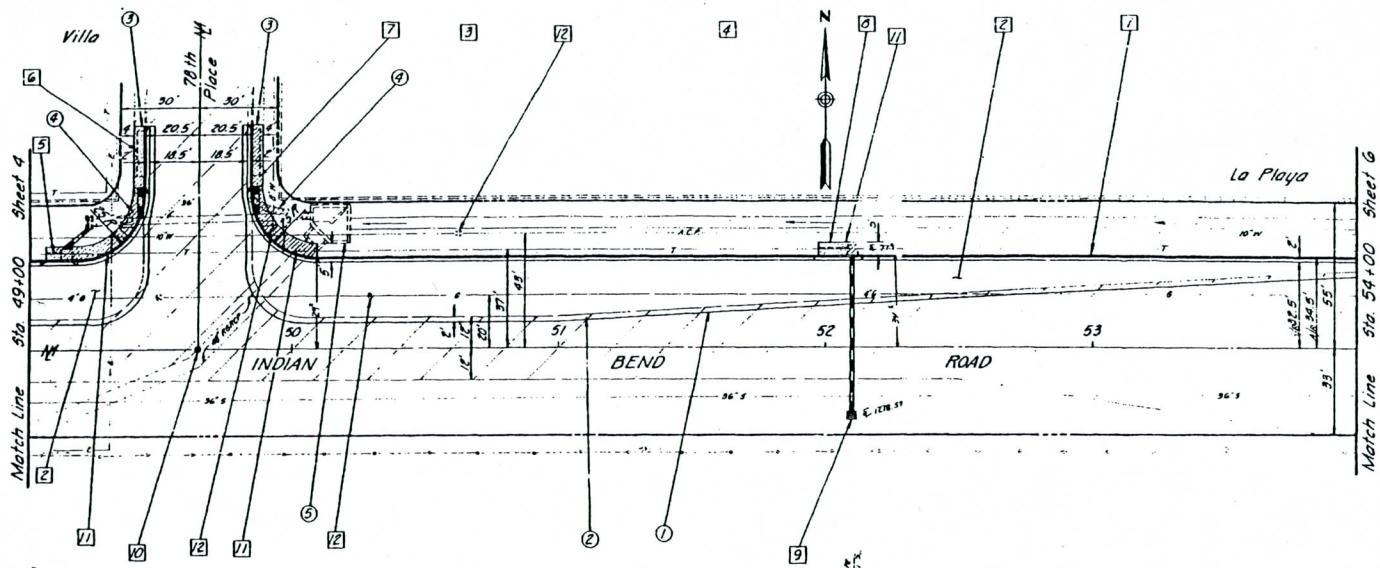
CITY OF SCOTTSDALE, ARIZONA

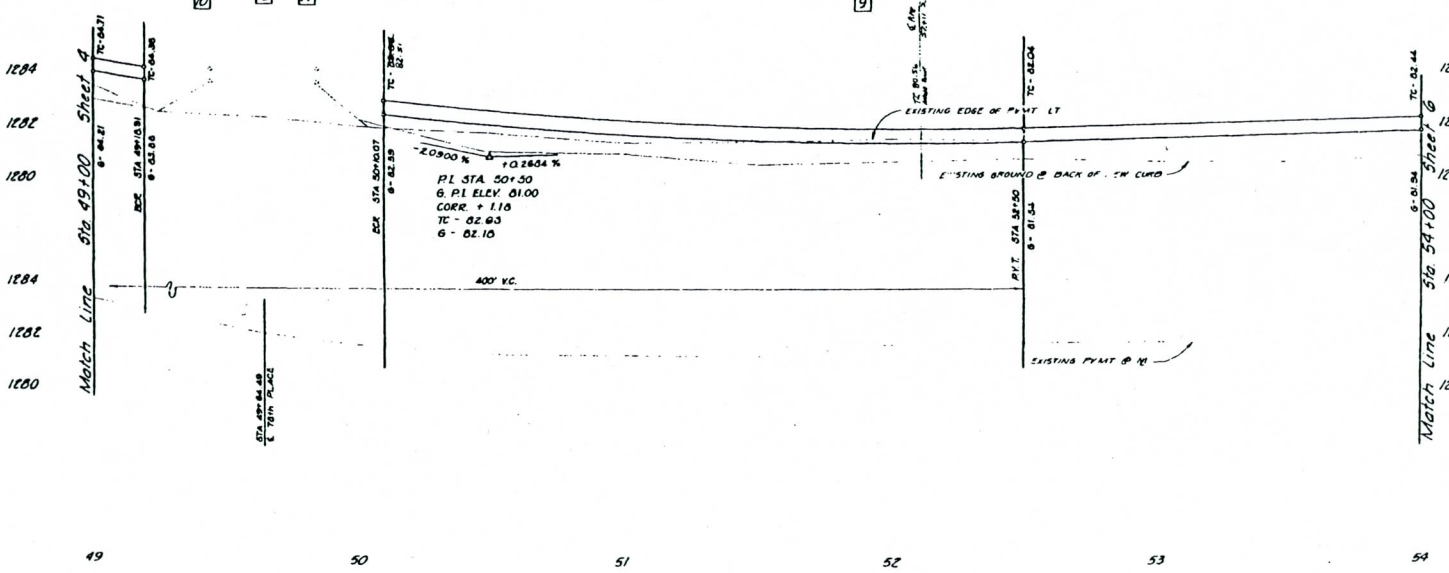
COMMUNITY DEVELOPMENT DEPARTMENT

CAPITAL IMPROVEMENTS ENGINEERING

INDIAN BEND ROAD WIDENING @ VILLA DE PAYA

2661





CONSTRUCTION NOTES

REMOVE

1. Sawcut 600 L.F. Existing A.C. Pvmt.
2. Remove 133 S.Y. Existing A.C. Pvmt.
3. Remove 50 L.F. V.G. & G. and 200 Sq. Ft. S/W
4. Remove 115 Y. Plaster Lined Drainage Swale
5. Remove Existing Concrete Inlet Structure

INSTALL

1. Install 524 L.F. New V.C. & G. Std. Det. 220 Type 'A'
2. Install 974 S.Y. New A.C. Pvmt.
3. Lt. Sta. Construct New Concrete Transition Structure, See Detail Sheet
4. Install 380 L.F. 48" RGRCP Class III
5. Lt. Sta. 49+15.16 Construct New Catch Basin Std. Det. 533-1, L=6', Depress Gutter 2" Install 15'x12" R.C.P. Connecting Pipe to Existing Catch Basin, See Pipe Profile Sheet
6. Lt. Sta 49+43.91 Construct New Catch Basin Std. Det. 533-1, L=17', Depress Gutter 2" Install 18'x 40' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet
7. Lt. Sta 49+85.07 Construct New Catch Basin Std. Det. 533-1, L=17', Depress Gutter 2" Install 24'x 14' R.G.R.C.P. Connecting Pipe to Existing 36" C.M.P. See Pipe Profile Sheet
8. Lt. Sta. 52+10. Construct New Catch Basin Std. Det. 533-1, L=10', Depress Gutter 2" Install 18"x 10' R.G.R.C.P. Connecting Pipe See Pipe Profile Sheet
9. 24' Rt. Sta 52+10 Construct New Catch Basin Std. Det. 537, Install 15'x 59' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet
10. Install New Survey Monument Std. Det. 120-1, Type 'B'
11. Install 656 Sq. Ft. New Concrete S/W, Std. Det. 230 & S/W Ramps Std. Det. 231, Type I
12. Adjust Valve Frame & Cover, Std. Det. 270

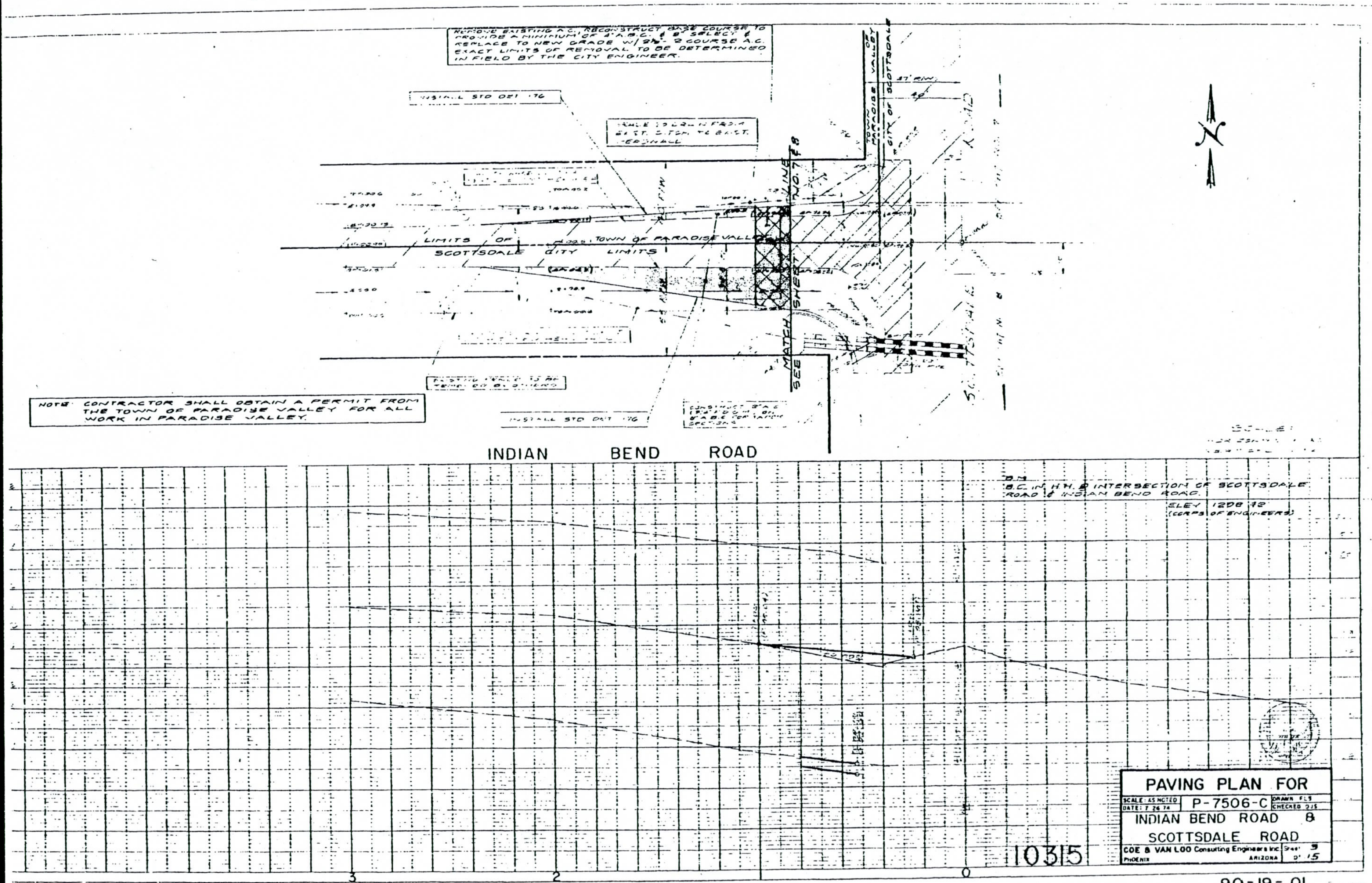
19275

DATE	REVISION	BY

CITY OF SCOTTSDALE, ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL IMPROVEMENTS ENGINEERING
3939 Civic Center Plaza
Scottsdale, Arizona 85251

INDIAN BEND ROAD WIDENING @ VILLA LA PLAYA

SCALE	PROJECT NO	SHEET 5 OF	AS BUILT
Hor. 1"=20'	8661	DWN. BY DRH CHK. BY RW DATE	
Ver. 1"=2'		FILE NO. T-252	BY


REMOVE EXISTING A.C., RECONSTRUCT BASE COURSE TO PROVIDE A MINIMUM OF 4" A.B.C. & 8" SELECT & REPLACE TO NEW GRADE W/ 2½" 2 COURSE A.C. EXACT LIMITS OF REMOVAL TO BE DETERMINED IN FIELD BY THE CITY ENGINEER.
TOWN OF PARADISE VALLEY
CITY OF SCOTTSDALE
LIMITS OF SCOTTSDALE CITY LIMITS
TOWN OF PARADISE VALLEY
SEE MATCH SHEET NO. 7 & 8
NOTE: CONTRACTOR SHALL OBTAIN A PERMIT FROM THE TOWN OF PARADISE VALLEY FOR ALL WORK IN PARADISE VALLEY.
INDIAN BEND ROAD
B.M. B.C. IN H.H. @ INTERSECTION OF SCOTTSDALE ROAD & INDIAN BEND ROAD.
ELEV 1208.12 (CORPS OF ENGINEERS)
PAVING PLAN FOR
SCALE: AS NOTED
DATE: 7 26 74
P-7506-C
DRAWN FLS
CHECKED DJS
INDIAN BEND ROAD &
SCOTTSDALE ROAD
COE & VAN LOO Consulting Engineers Inc
PHOENIX ARIZONA
Sheet 9 of 15
10315
3
2
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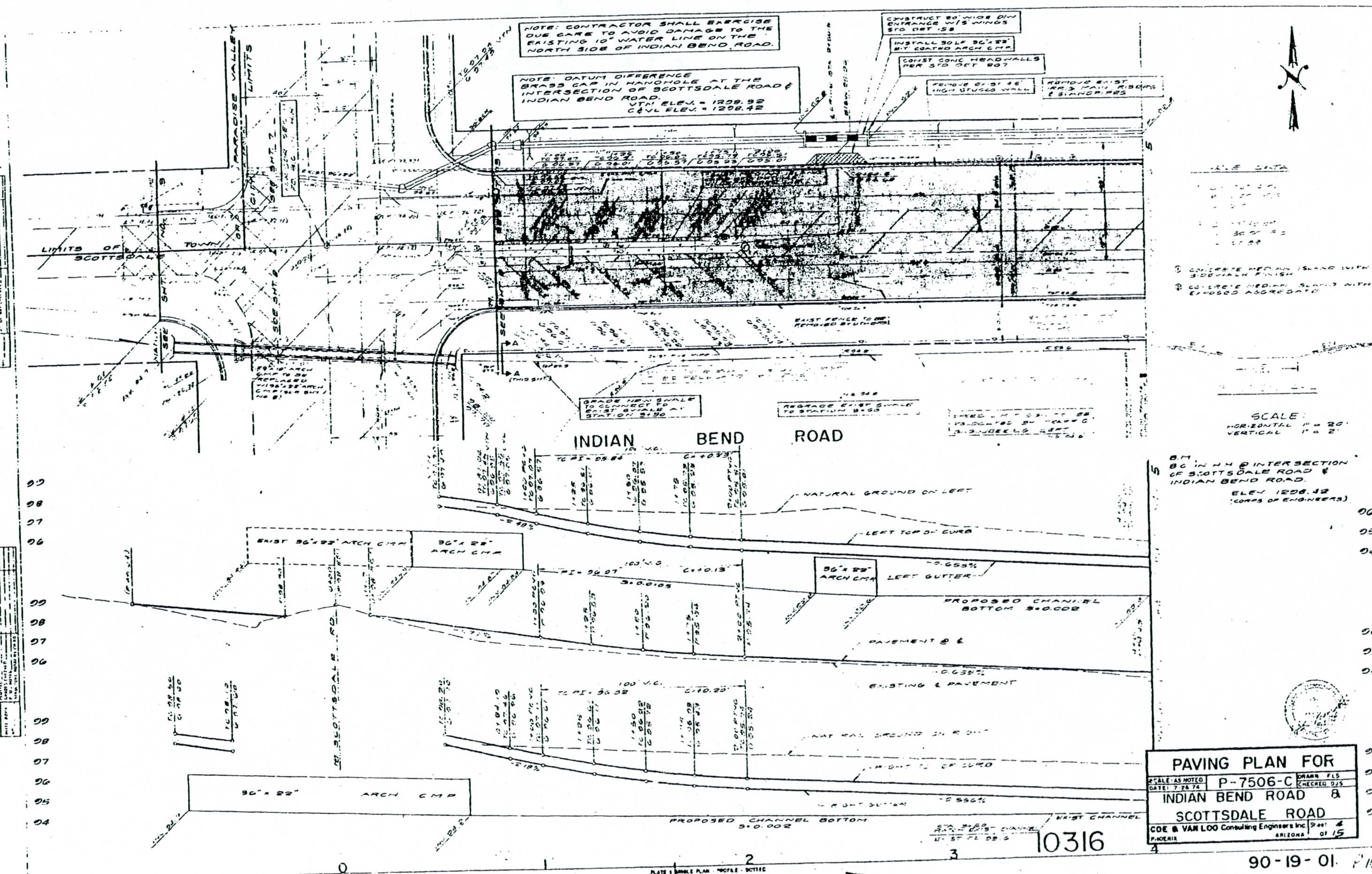
90-19-01


NOTE: CONTRACTOR SHALL EXERCISE DUE CARE TO AVOID DAMAGE TO THE EXISTING 10" WATER LINE ON THE NORTH SIDE OF INDIAN BEND ROAD.
NOTE: DATUM DIFFERENCE BRASS CAP IN HANDHOLE AT THE INTERSECTION OF SCOTTSDALE ROAD & INDIAN BEND ROAD.
VTN ELEV. = 1298.92
C&VL ELEV. = 1298.42
CONSTRUCT 20' WIDE DW ENTRANCE W/S WINGS STD DET 158
INSTALL 30 LF 36"x22" BIT COATED ARCH CMP
CONST CONC HEADWALLS PER STD DET 907
PARADISE VALLEY LIMITS
LIMITS OF SCOTTSDALE TOWN
INDIAN BEND ROAD
SCALE:
HORIZONTAL 1" = 20'
VERTICAL 1" = 2'
B.M.
BC IN HH @ INTERSECTION OF SCOTTSDALE ROAD & INDIAN BEND ROAD.
ELEV 1298.42
(CORPS OF ENGINEERS)
NATURAL GROUND ON LEFT
LEFT TOP OF CURB
LEFT GUTTER
EXIST 36"x22" ARCH CMP
36"x22" ARCH CMP
PROPOSED CHANNEL BOTTOM S=0.002
PAVEMENT @ ℄
EXISTING ℄ PAVEMENT
SCOTTSDALE RD.
36"x22" ARCH CMP
PROPOSED CHANNEL BOTTOM S=0.002
EXIST CHANNEL
PROFILE
PAVING PLAN FOR
P-7506-C
INDIAN BEND ROAD & SCOTTSDALE ROAD
COE & VAN LOO Consulting Engineers Inc
PHOENIX ARIZONA
Sheet 4 of 15
10316
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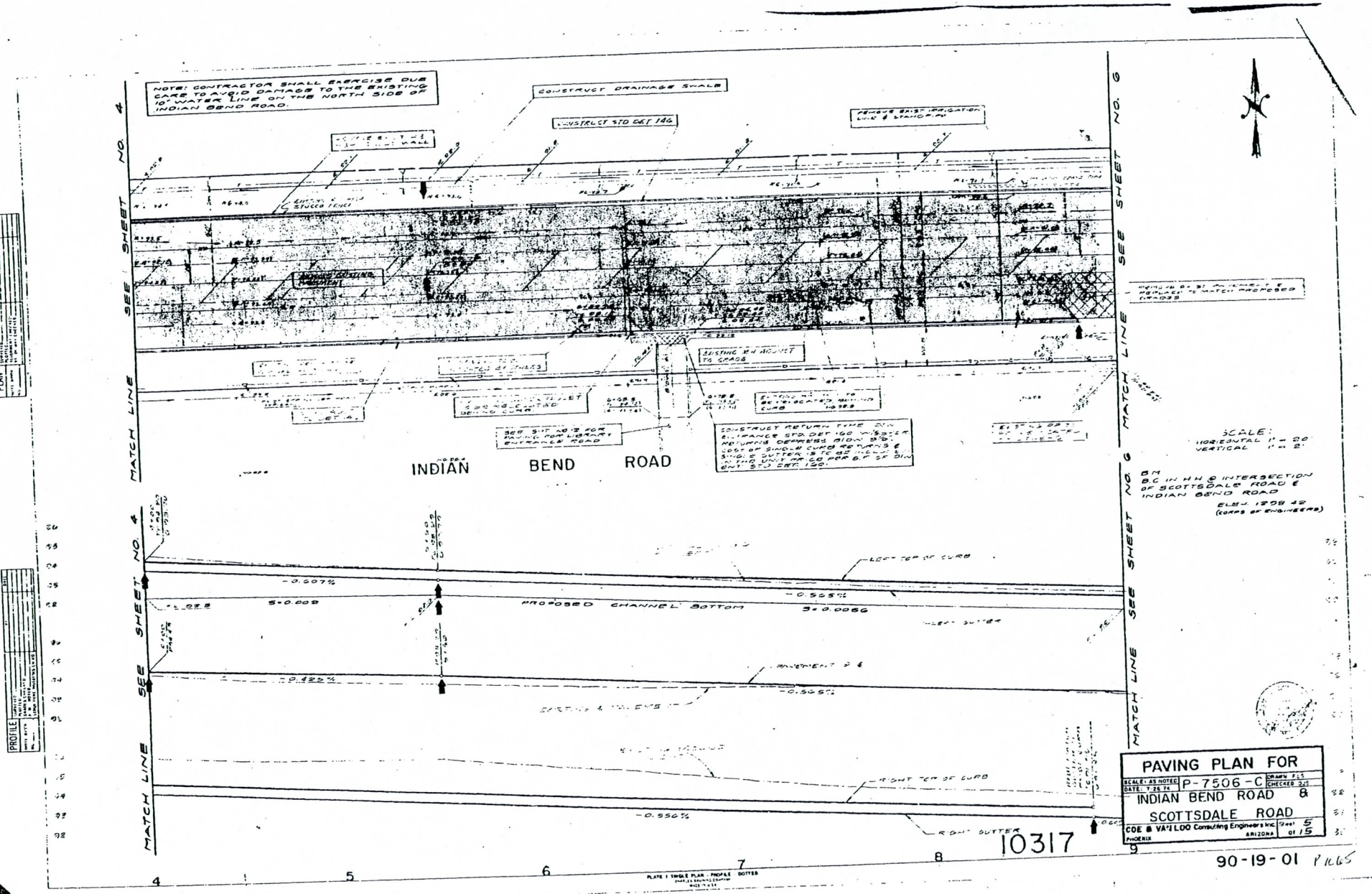
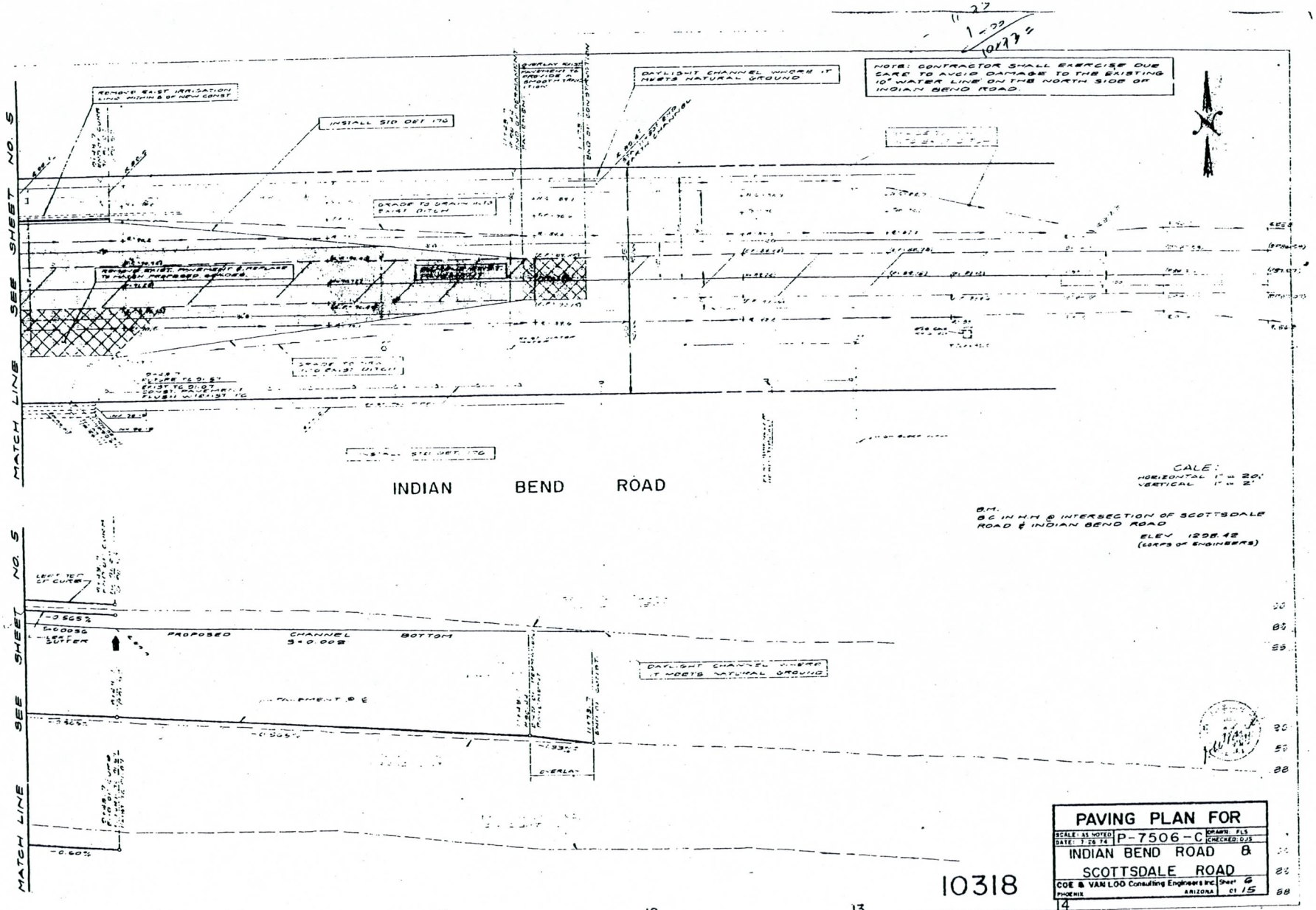
90-19-01.


NOTE: CONTRACTOR SHALL EXERCISE DUE CARE TO AVOID DAMAGE TO THE EXISTING 10" WATER LINE ON THE NORTH SIDE OF INDIAN BEND ROAD.
CONSTRUCT DRAINAGE SWALE
CONSTRUCT STD DET 146
REMOVE EXIST IRRIGATION LINE & STANDPIPE
MATCH LINE SEE SHEET NO. 4
MATCH LINE SEE SHEET NO. 6
INDIAN BEND ROAD
CONSTRUCT RETURN TYPE DIP ENTRANCE STD DET 160 W/SLOPE
PROPOSED CHANNEL BOTTOM
LEFT TOP OF CURB
RIGHT TOP OF CURB
RIGHT GUTTER
SCALE:
HORIZONTAL 1" = 20'
VERTICAL 1" = 2'
BM
B.C. IN H.H. @ INTERSECTION OF SCOTTSDALE ROAD & INDIAN BEND ROAD
ELEV. 1208.12
(CORPS OF ENGINEERS)
PAVING PLAN FOR
P-7506-C
INDIAN BEND ROAD & SCOTTSDALE ROAD
COE & VAN LOO Consulting Engineers Inc.
PHOENIX ARIZONA
10317
90-19-01



PAVING PLAN FOR

SCALE: AS NOTED	P-7506-C
DATE: 7 26 74	DRAWN: FLS
	CHECKED: D/S

INDIAN BEND ROAD & SCOTTSDALE ROAD

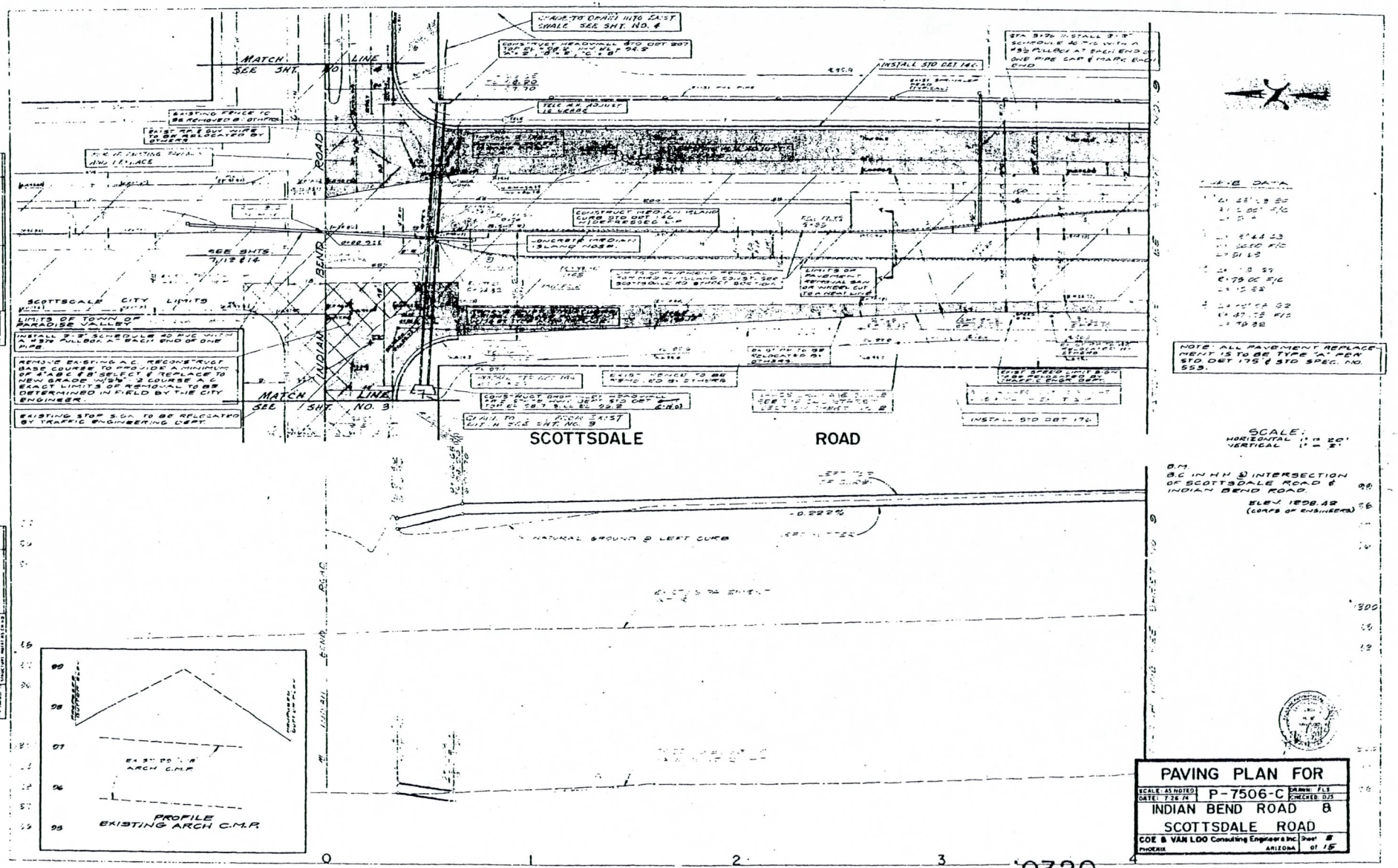
COE & VAN LOO Consulting Engineers Inc. PHOENIX ARIZONA

Sheet 6 of 15

10318

PLATE 1 SINGLE TAN - PROFILE - DOTTED

90-19-01



PAVING PLAN FOR

SCALE: AS NOTED | P-7506-C | DRAWN: FLS
DATE: 7-26-74 | CHECKED: DJS

INDIAN BEND ROAD & SCOTTSDALE ROAD

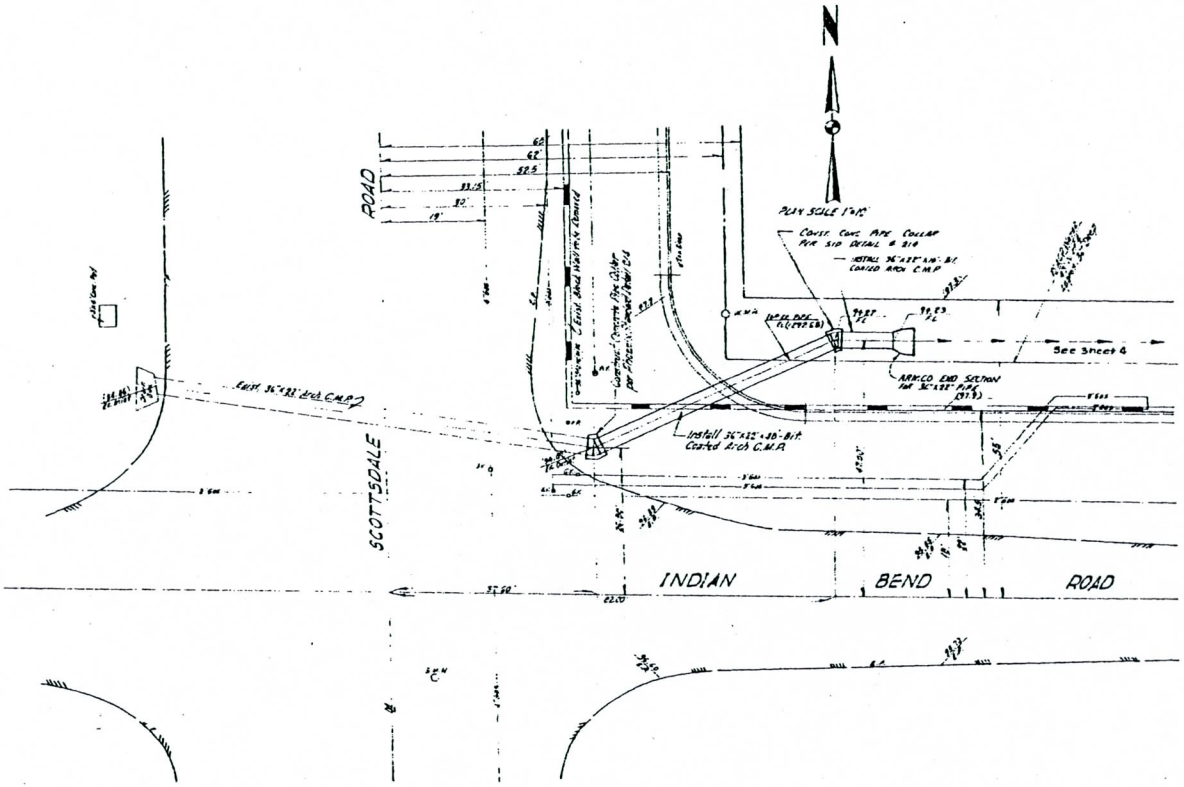
COE & VAN LOO Consulting Engineers Inc.
PHOENIX ARIZONA

Sheet 8 of 15

0320

90-19-01 P.1164

NOTE: COST OF CONCRETE PIPE COLLARS SHOWN NOT REQUIRED IS TO BE INCLUDED IN THE UNIT PRICE PER L.F. OF 30"x 78" ARCH C.M.P. & CONCRETE PIPE COLLARS.



10327

OFFSITE PAVING & STRIPING PLANS

CITY OF SCOTTSDALE
OF
THE COURTYARDS

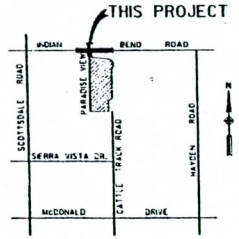
CITY OF SCOTTSDALE

GENERAL CONSTRUCTION NOTES
FOR PUBLIC WORKS CONSTRUCTION

1. All construction in the public rights-of-way or in easements granted for public use must conform to the latest Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details for Public Works Construction as amended by the latest version of the City of Scottsdale (COS) Supplemental Standard Specifications and Supplemental Standard Details. If there is a conflict, the latter shall govern.
2. The engineering designs on these plans are only approved by the City in scope and not in detail. If construction quantities are shown on these plans, they are not verified by the City.
3. Approval of plans is valid for six (6) months. If an encroachment permit for the construction has not been issued within six months, the plans shall be resubmitted to the City for re-approval.
4. A Public Works Inspector will inspect all works within the City of Scottsdale rights-of-way and in easements. Notify Inspection Services 24 hours prior to starting of construction. (Telephone 391-5750).
5. Whenever excavation is to be done, call the "Blue Stake Center", 263-1100, two working days before excavation is to begin. The Center will see that the location of the underground utility lines is identified for the project. Call collect if necessary.
6. Encroachment permits are required for all work in public rights-of-way and easements granted for public purposes. An encroachment permit will be issued by the City upon receipt of payment of a base fee plus a fee for inspection services to be provided by the City. Copies of all permits shall be retained on-site and shall be available for inspection at all times. Failure to produce the required permits will result in immediate work stoppage until the proper permit documentation is obtained.
7. All excavation and grading which is not in the public rights-of-way or not in easements granted for public use must conform to Chapter 70, Excavation and Grading, of the latest edition of the Uniform Building Code prepared by and the International Conference of Building Officials. A permit for this grading must be secured from the City for a fee established by the Uniform Building Code.

UTILITIES:

WATER------PARADISE VALLEY WATER CO.
SEWER-------CITY OF SCOTTSDALE
ELECTRIC-----ARIZONA PUBLIC SERVICE
TELEPHONE----US WEST
CABLE--------UNITED CABLE
GAS ---------SOUTHWEST GAS



VICINITY MAP
N T S

APPROXIMATE QUANTITIES
FOR ESTIMATING ONLY, ENGINEER MAKES NO GUARANTEE OF ACCURACY

ITEM	DESCRIPTION	QUANTITY	UNIT
(1)	4"AC/6"ABC/3"SELECT	702	S.Y.
(2)	6" VERT. CURB/GUTTER	530	L.F.
(3)	CONCRETE SIDEWALK	80	S.F.
(4)	SAWCUT & REMOVE EXIST. PAVEMENT	615	S.Y.
(5)	ADJUST MANHOLE TO GRADE	1	EA.

SIGNING & STRIPING QUANTITIES

(1)	4" WHITE STRIPE	602	L.F.
(2)	8" WHITE STRIPE	220	L.F.
(3)	18" WHITE STRIPE	35	L.F.
(4)	4" DOUBLE YELLOW STRIPE	291	L.F.
(5)	TYPE "D" MARKERS	34	EA.
(6)	TYPE "E" MARKERS	25	EA.
(7)	SIGN & POST (NEW)	5	EA.
(8)	SIGN & POST (FROM SALVAGE)	1	EA.
(9)	OBLITERATE EXIST. STRIPE	96	L.F.

LEGEND

- SURVEY MONUMENT STD. DTL. 120-1, TYPE "A"
- SURVEY MONUMENT STD. DTL. 120-1, TYPE "B"
- EXISTING ASPHALT PAVEMENT
- PROPOSED PAVEMENT
- STANDARD DETAIL NUMBER
- TC=510.58 / G=510.00 — TOP CURB ELEVATION & GUTTER ELEVATION

DEVELOPER

EVANS WITHYCOMB, INC.
6991 E. CAMELBACK ROAD, STE. A-200
SCOTTSDALE, ARIZONA 85251
PHONE: (602) 840-1040 CURTIS BOHN

BENCH MARK

BRASS CAP IN HANDHOLE AT THE INTERSECTION OF INDIAN BEND RD. AND HAYDEN RD.
ELEV. = 1282.79 (CITY OF SCOTTSDALE DATUM)

TEMP. B.M.

BRASS CAP (FLUSH) AT THE INTERSECTION OF INDIAN BEND RD. AND 75TH ST. ALIGNMENT
ELEV. = 1288.35

SUBMITTED BY: _____ REGISTERED CIVIL ENGINEER — DATE: 11-16-92

ABBREVIATIONS

A.C.P.	ASBESTOS CEMENT PIPE	HDW.	HANDHOLE
A.D.O.T.	ARIZONA DEPT. OF TRANSPORTATION	L.F.	LINEAR FEET
A.N.S.I.	AMERICAN NATIONAL STANDARDS INSTITUTE	LT.	LEFT
A.W.W.A.	AMERICAN WATER WORKS ASSOC.	M.A.G.	MARICOPA ASSOC. OF GOVERNMENTS
AUTO.	AUTOMATIC	M.C.D.O.T.	MARICOPA COUNTY DEPT. OF TRANSPORTATION
BLVD.	BLVD. OF TURN	M.C.R.D.	MARICOPA COUNTY RECORDER
C.F.	CUBIC FEET	MH.	MANHOLE
C.F.S.	CUBIC FEET PER SECOND	MON.	MONUMENT
C.M.P.	CORRUGATED METAL PIPE	N.T.S.	NOT TO SCALE
C.M.P.A.	CORRUGATED METAL PIPE ARCH	P.C.	POINT OF CURVATURE
C.M.P.S.	CORRUGATED METAL PIPE SEWER	P.I.	POINT OF INTERSECTION
C.Y.	CUBIC YARDS	P.L.	PROPERTY LINE
CL.	CENTERLINE	P.M.H.	MANHOLE W/ S.D. PIPE ENTERING MANH.
CONC.	CONCRETE	P.P.C.	PUBLIC UTILITY EASEMENT
C.P.	CONCRETE PIPE	P.R.C.	PROPERTY LINE CURVE
D.E.	DRAINAGE EASEMENT	P.S.E.	PUBLIC SERVICE EASEMENT
DIA.	DIAMETER	P.V.C.	POLYVINYL CHLORIDE PIPE
DR.	DRIVE	R.C.P.	REINFORCED CONCRETE PIPE
ELEV.	ELEVATION	R.C.P.A.	REINF. CONCRETE ARCH PIPE
EQ.	EQUAL	R.C.P.E.	REINF. CONCRETE ELLIP. PIPE
EXIST.	EXISTING	R.D.	ROOF DRAIN
F.H.	FIRE HYDRANT	R.P.	RADIUS POINT
FT.	FEET	R.W.	RIGHT-OF-WAY
G.B.	GRADE BREAK	S.D.	STORM DRAIN
G.E.	GAS EASEMENT	S.D.E.	STORM DRAIN EASEMENT
GAL.	GALLON	S.D.M.H.	STORM DRAIN MANHOLE
GALV.	GALVANIZED	S.E.	SLOPE EASEMENT
H.W.	HEADWALL	S.S.D.	SEWER SERVICE DROP
I.E.	INVERT ELEVATION	STA.	STATION
		STD.	STANDARD
		T.C.	TANGENT CURVE
		T.E.	TANGENT LINE
		T.S.E.	TEMP. SLOPE EASEMENT
		U.G.E.	UTILITY EASEMENT
		V.C.	VERTICAL CURVE
		V.C.P.	VITRIFIED CLAY PIPE
		W.L.	WATER LINE
		W.M.P.	WELDED WIRE FABRIC
		X-SLOPE	CROSS SLOPE
		X.W.	CROSSWALK EASEMENT

SPECIAL NOTES

Any questions raised relative to the accuracy of improvement installation shall not be raised subsequent to completion of the work unless all survey stakes are maintained intact. Should such stakes not be present and verified as to their origin, no claim for additional compensation for correction shall be presented to any party and such work shall be corrected by the Contractor at his expense.

It is the Contractor's responsibility to locate all underground pipelines, telephone and electric conduits and structures in advance of any construction and will observe all possible precautions to avoid any damage to such. The Engineer and/or Owner will not guarantee any locations as shown on these plans, or those omitted from same. The Contractor shall follow the guidelines and regulations as set forth by OSHA.

The design of these plans are only approved in scope and not in detail.

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION OR AS NOTED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED CIVIL ENGINEER — DATE
24384

CITY OF SCOTTSDALE

REVIEW & RECOMMENDED APPROVAL BY:

FIRE DEPT.	N/A	GRADING & DRAINAGE	N/A
LANDSCAPING & PLANNING	N/A	WATER & SEWER	N/A
TRAFFIC	12-3-92	PAVING	12-3-92

APPROVED BY: _____ PROJECT REVIEW SR. ENGINEER — 12-3-92 DATE

263-1100
1-800-STAKE-IT

REVISIONS			
NO.	DESCRIPTION	DATE	APP.

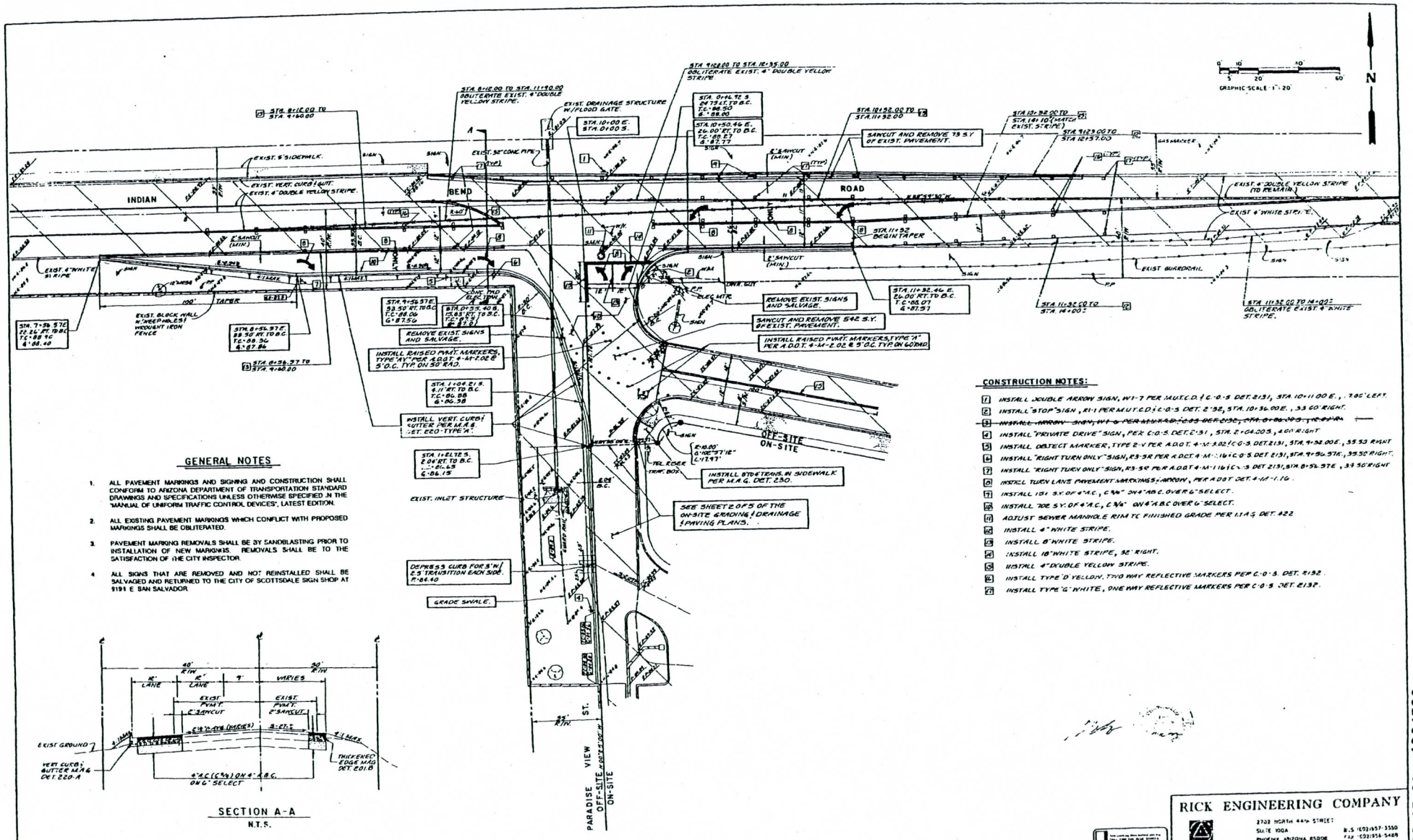
RICK ENGINEERING COMPANY
2620 NORTH 44th STREET
SUITE 100
PHOENIX, ARIZONA 85008
BUS (602) 957-3350
FAX (602) 956-5488

THE COURTYARDS

OFFSITE PAVING & STRIPING PLANS

DESIGNED: BR	SHEET 1 OF 2
DRAWN: DF	
CHECKED: RM	
DATE: NOV. 1992	PROJECT NO. 1403-C

63-DR-92 1264E92



GENERAL NOTES

1. ALL PAVEMENT MARKINGS AND SIGNING AND CONSTRUCTION SHALL CONFORM TO ARIZONA DEPARTMENT OF TRANSPORTATION STANDARD DRAWINGS AND SPECIFICATIONS UNLESS OTHERWISE SPECIFIED IN THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. ALL EXISTING PAVEMENT MARKINGS WHICH CONFLICT WITH PROPOSED MARKINGS SHALL BE OBLITERATED.
3. PAVEMENT MARKING REMOVALS SHALL BE BY SANDBLASTING PRIOR TO INSTALLATION OF NEW MARKINGS. REMOVALS SHALL BE TO THE SATISFACTION OF THE CITY INSPECTOR.
4. ALL SIGNS THAT ARE REMOVED AND NOT REINSTALLED SHALL BE SALVAGED AND RETURNED TO THE CITY OF SCOTTSDALE SIGN SHOP AT 9191 E BAN SALVADOR.

CONSTRUCTION NOTES:

1. INSTALL DOUBLE ARROW SIGN, W1-7 PER M.U.T.C.D. & C-0-5 DET. 2131, STA. 10+11.00 E., 7.00' LEFT.
2. INSTALL "STOP" SIGN, R1-1 PER M.U.T.C.D. & C-0-5 DET. 2'32, STA. 10+36.00 E., 33.00' RIGHT.
3. ~~INSTALL ARROW SIGN, W1-6 PER M.U.T.C.D. & C-0-5 DET. 2132, STA. 0+00.00 S., 12.00' LT.~~
4. INSTALL "PRIVATE DRIVE" SIGN, PER C-0-5 DET. 2'31, STA. 2+04.20 S., 4.00' RIGHT
5. INSTALL OBJECT MARKER, TYPE 2-V PER A.D.O.T. 4-M-3.02 & C-0-5 DET. 2131, STA. 9+38.00 E., 35.33 RIGHT
6. INSTALL "RIGHT TURN ONLY" SIGN, R3-5R PER A.D.O.T. 4-M-1.16 & C-0-5 DET. 2131, STA. 9+34.37 E., 39.50' RIGHT.
7. INSTALL "RIGHT TURN ONLY" SIGN, R3-5R PER A.D.O.T. 4-M-1.16 & C-0-5 DET. 2131, STA. 8+36.27 E., 39.50' RIGHT
8. INSTALL TURN LANE PAVEMENT MARKINGS & ARROW, PER A.D.O.T. DET. 4-M-1.16.
9. INSTALL 151 S.Y. OF 4" A.C., C ¾" ON 4" A.B.C. OVER 6" SELECT.
10. INSTALL 706 S.Y. OF 4" A.C., C ¾" ON 4" A.B.C. OVER 6" SELECT.
11. ADJUST SEWER MANHOLE RIM TO FINISHED GRADE PER L.I.A.G. DET. 422
12. INSTALL 4" WHITE STRIPE.
13. INSTALL 8" WHITE STRIPE.
14. INSTALL 18" WHITE STRIPE, 32' RIGHT.
15. INSTALL 4" DOUBLE YELLOW STRIPE.
16. INSTALL TYPE 'D' YELLOW, TWO WAY REFLECTIVE MARKERS PER C-0-5 DET. R132.
17. INSTALL TYPE 'G' WHITE, ONE WAY REFLECTIVE MARKERS PER C-0-5 DET. 2132.

SECTION A-A
N.T.S.

24385

RICK ENGINEERING COMPANY
2703 NORTH 44th STREET
SUITE 100A
PHOENIX, ARIZONA 85008
BUS (602) 957-3350
FAX (602) 956-5489

DATE: 11/92	PROJECT NO. 1403-C	D.S.R.

63-DR-92 1264E92

OFF-SITE PAVING AND STRIPING PLANS · THE COURTYARDS · SHEET 2 OF 2

CITY OF SCOTTSDALE

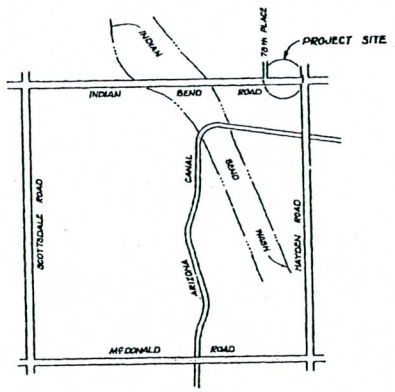
CAPITAL IMPROVEMENTS ENGINEERING

INDIAN BEND ROAD STORM DRAIN

AT VILLA LA PLAYA

PROJECT NO. 8661

BID CALL 82-91



Vicinity Map

COUNCIL

HERB DRINKWATER (Mayor)
JIM BRUNER
BILLIE AXLINE GENTRY
DIANE D. CUSACK
JEAN L. BLACK
JEFF SCHUBERT
CHARLIE SMITH

CITY MANAGER

ROY PEDERSON

CITY ATTORNEY

RICHARD FILLER

CITY CLERK

ROY PEDERSON

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	PLAN SHEET & TYPICAL CROSS SECTIONS
3	PLAN SHEET
4	PIPE PROFILES
5	DETAILS

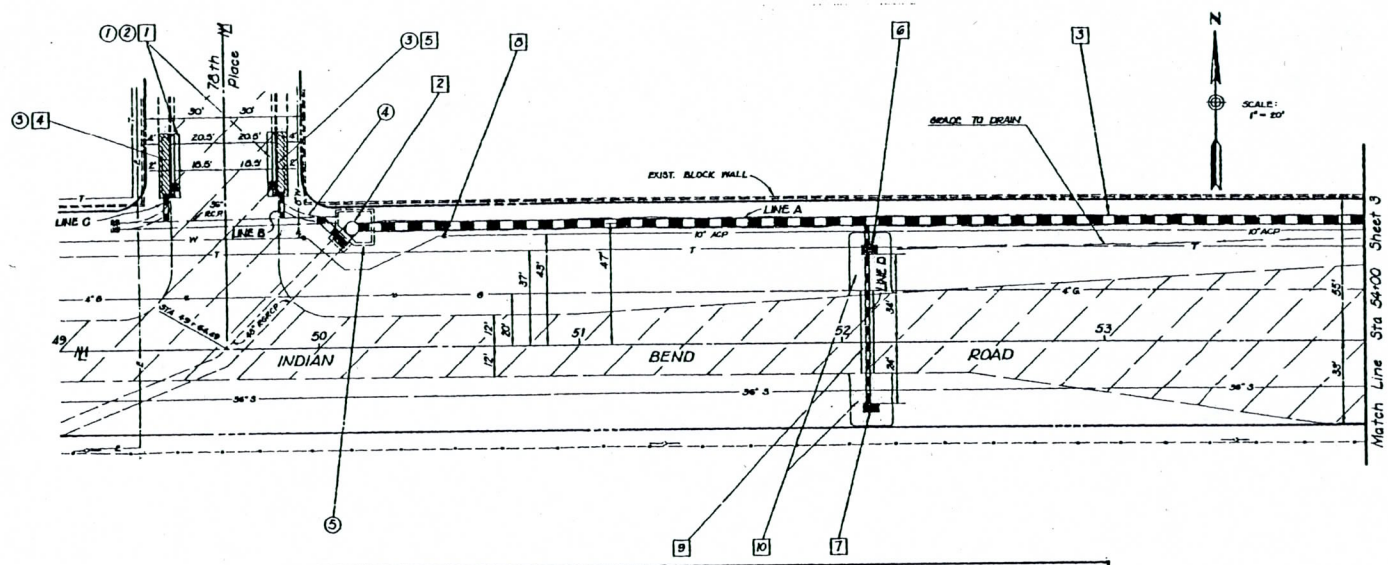
Reviewed By		Recommended Approval By
Fire Department	Private Development Engineering	CAPITAL IMPROVEMENTS ENGINEERING MANAGER — DATE 5/24/82
Traffic Engineering	Planning Department	
Field Services	Municipal Utilities Department	Approved By — ENGINEERING SERVICES — DATE 5/27/82
Parks Department	Capital Improvements	

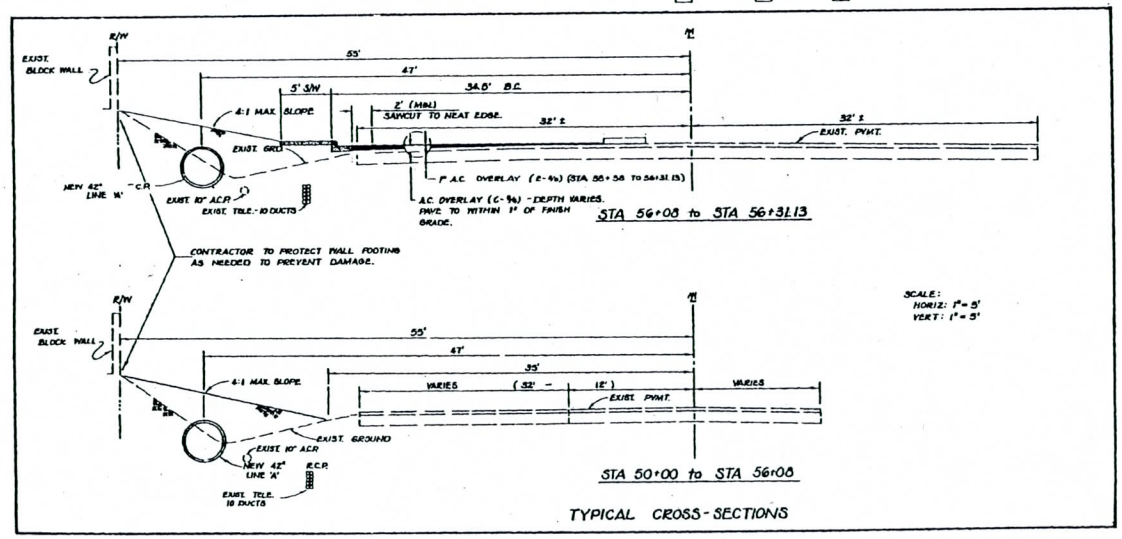
PROJECT NO. 8661
INDIAN BEND ROAD STORM DRAIN AT VILLA LA PLAYA

5/24/82
1988

15919

PROJECT NO. 8661
SHEET 1 OF 5
FILE NO. FC-052





CONSTRUCTION NOTES

REMOVE

(1) Sawcut 50 L.F. Existing A.C. Pvmt.

(2) Remove 12 S.Y. Existing A.C. Pvmt.

(3) Remove 50 L.F. V.C.G. and 200 Sq. Ft. S/W.

(4) Remove 6 S.Y. Plaster-lined Drainage Swale.

(5) Remove Existing Concrete Drop Structure.

INSTALL

[1] Install 12 S.Y. New A.C. Pvmt. Std. Det. 200-1"

[2] Sta. 50+13 - Construct New Storm Drain Structures. See Detail Sheet 5.

[3] Install 387 L.F. 42" R.C.P. Class III. See Pipe Profile Sheet 4.

[4] Sta 49+43.91 - Construct New Catch Basin Std. Det. 533-1, L=17', Depress Gutter 2". Install 18" x 9' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet 4.

[5] Sta 49+85.07 - Construct New Catch Basin Std. Det. 533-1, L=17', Depress Gutter 2". Install 18" x 9' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet 4.

[6] Sta 52+10 - Construct New Catch Basin Std. Det. 536 - Double. Install 18" x 9' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet 4.

[7] Sta 52+10 - Construct New Catch Basin Std. Det. 537 - Double. Install 18" x 55' R.G.R.C.P. Connecting Pipe. See Pipe Profile Sheet 4.

[8] Adjust Valve (Air Release) Box & Cover. (Std. Det. 314 & 320).

[9] Install 14 S.Y. A.C. Pavement Replacement Std. Det. 200 - 1" Top - Match exist. pavement.

[10] Install 76 S.Y. A.C. Pavement Apron. 2" thick with thickened edge over compacted subgrade.

15920

BENCH MARK
BRASS CAP IN HANDHOLE @ INTERSECTION OF HAYDEN RD. & INDIAN BEND RD.
ELEV. 1153.80.

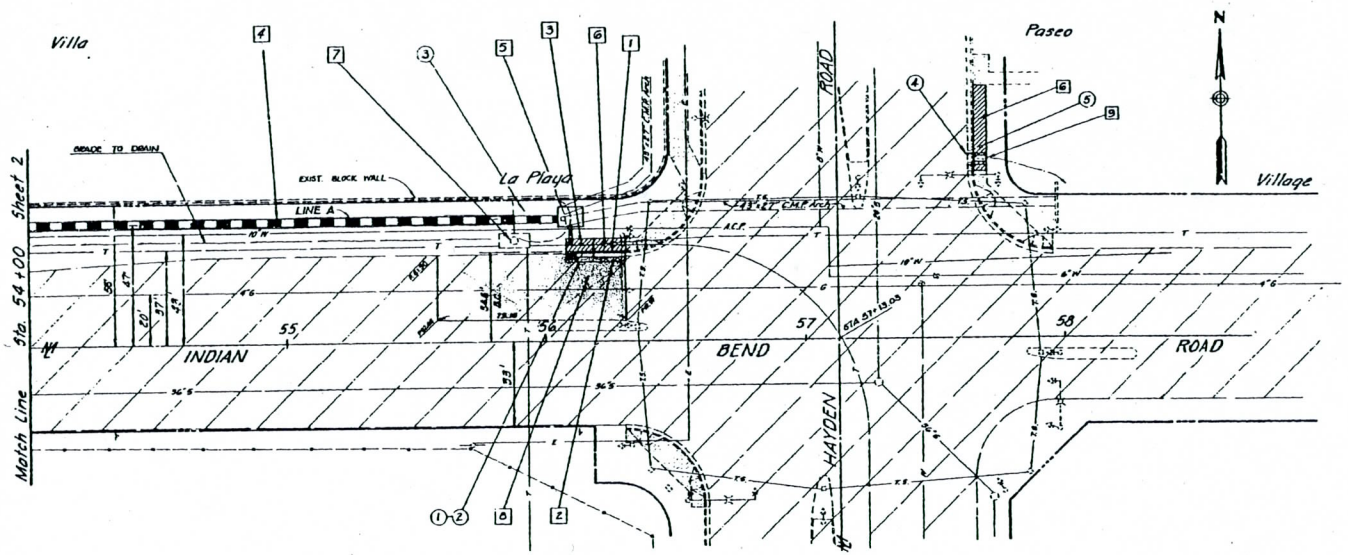
DATE	REVISION	BY

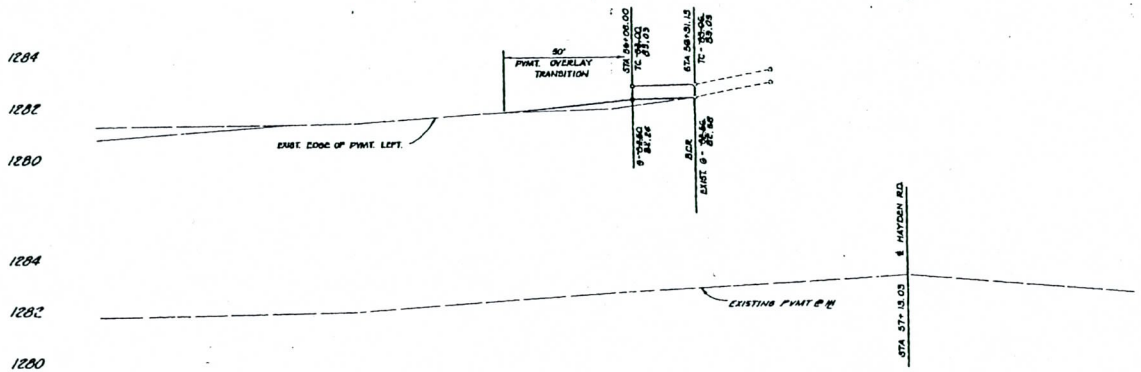
CITY OF SCOTTSDALE, ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL IMPROVEMENTS ENGINEERING
3939 Civic Center Plaza
Scottsdale, Arizona 85251

INDIAN BEND ROAD STORM DRAIN @ VILLA LA PLAYA

SCALE	PROJECT NO.	SHEET 2 OF 5	AS BUILT
Hor. 1" Vert. NOTED	8661	DWN BY DMP CHK BY MM	Date 8-8-83
		FILE NO. IR-052	By A.A.

1981





CONSTRUCTION NOTES

REMOVE

(1) Sawcut 15 L.F. Existing A.C. Pvmt.

(2) Remove 5 S.Y. Existing A.C. Pvmt.

(3) Remove 56 S.Y. Plaster Ditch Lining, 2 Metal Pipe End Sections, & 14 L.F. (total) of 43" - 27" CMP Arch (see Detail Sheet 3.)

(4) Remove 6 L.F. Existing Depressed Curb (Drainage opening).

(5) Existing abandoned power cable to be removed by A.P.S.

INSTALL

[1] Install 13 L.F. New V.C. & G. Std. Det. 220, Type 'A'

[2] Install 5 S.Y. New A.C. Pvmt. Std. Det. 200-2".

[3] Lt. Sta. 56+10.0 Construct New Catch Basin Std. Det. 533-1, L-6". Depress Gutter 2" Install 30" ϕ R.G.R.C.P. Connecting Pipe See Pipe Profile Sheet.

[4] Install 205 L.F. 42" R.C.P. Class III.

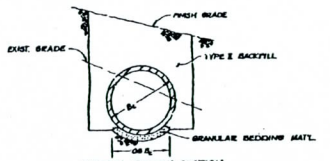
[5] 44' Lt. Sta 56+05 Construct Concrete Junction Box. See Detail Sheet 5.

[6] Install 303 Sq. Ft. Concrete S/W, Std. Det. 230

[7] Adjust M.H. Frame & Cover. By Others.

[8] Install 203 S.Y. New A.C. Overlay.

[9] Construct Scupper, Std. Det. .03 (90° to curb; A= 2'6"). Match scupper lf. to exist. swale @ back of S/W.



TYPICAL TRENCH SECTION
NO SCALE

15921

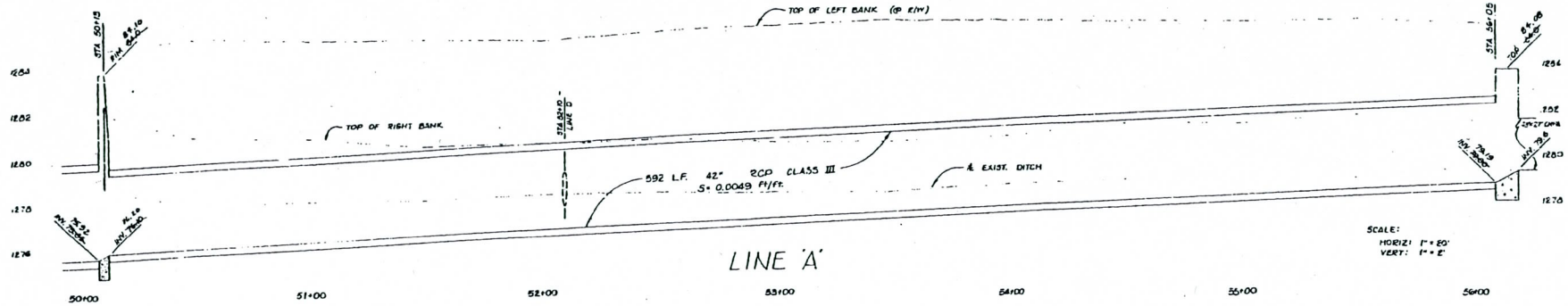
BENCH MARK
BRASS CAP IN HANDHOLE @ INTERSECTION OF HAYDEN RD. & INDIAN BEND RD.
ELEV. 1205.30.

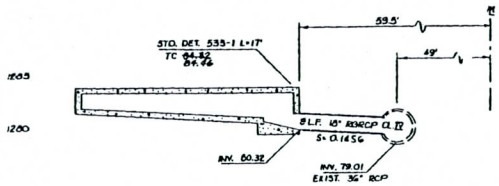
DATE	REVISION	BY

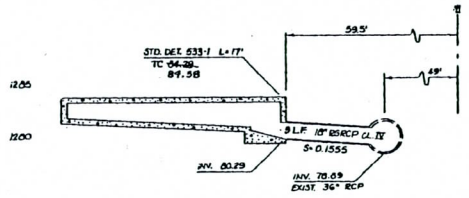
CITY OF SCOTTSDALE, ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL IMPROVEMENTS ENGINEERING
3939 Civic Center Plaza
Scottsdale, Arizona 85251

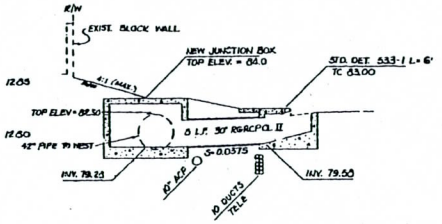
INDIAN BEND ROAD STORM DRAIN
@ VILLA LA PLAYA

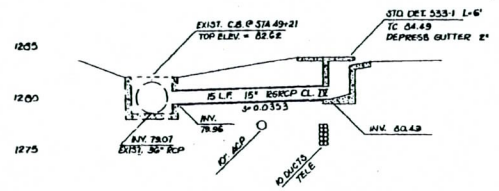
SCALE	PROJECT NO.	SHEET 3 OF 5	AS BUILT
Hor. 1"=10' Vert. 1"=5'	8661	DWN BY (DWD) CHK BY MM	Date 8-8-85
		FILE NO. FC-052	By E.B.

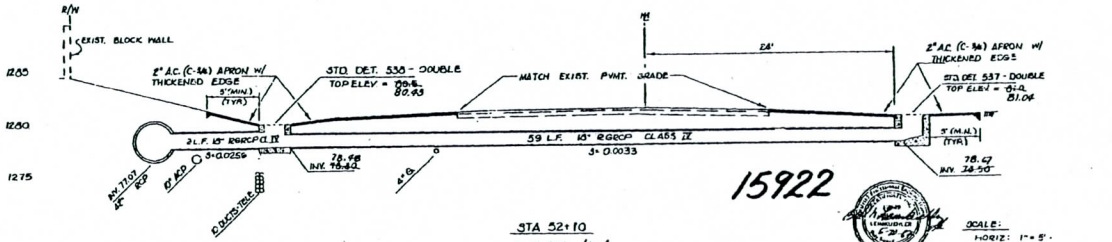










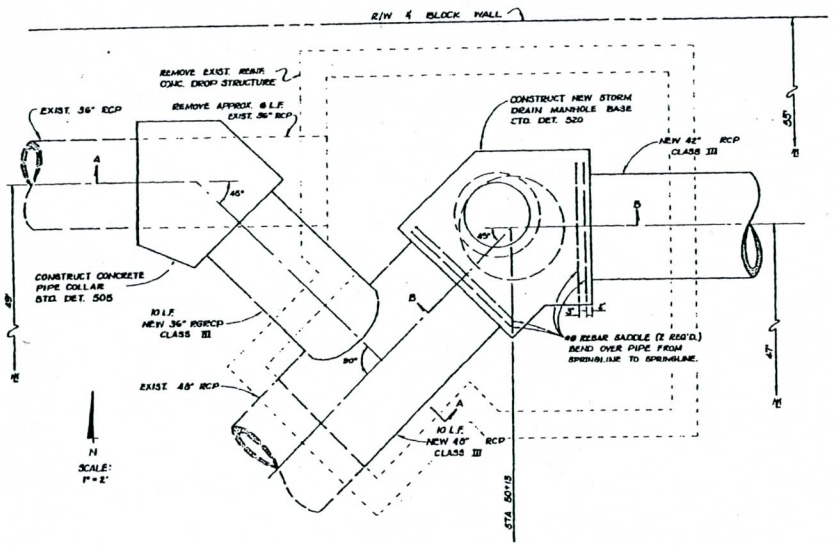


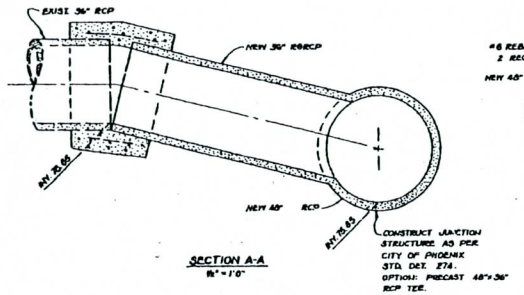
INDIAN BEND ROAD STORM DRAIN @ VILLA LA PLAYA PROJ. NO. 8661 SHT. 4 OF 5

FILE FC-052

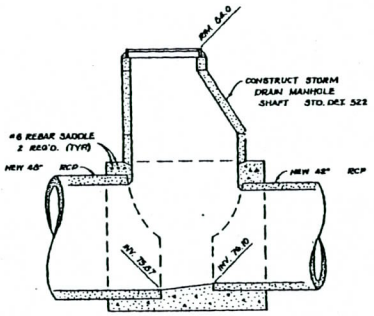
8661

6



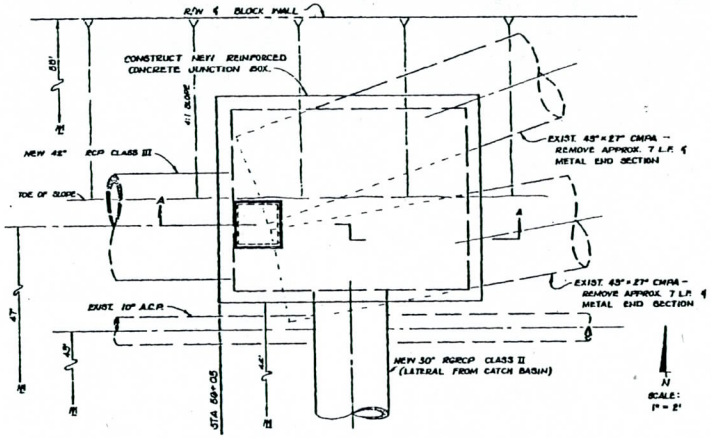


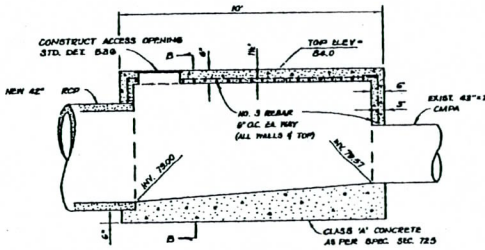
SECTION A-A
1/2" = 1'0"



SECTION B-B
1/2" = 1'0"

STORM DRAIN STRUCTURES
@ STA 50+13





SECTION A-A
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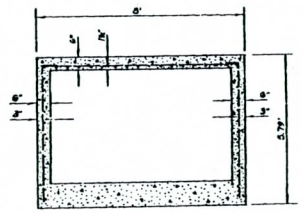


SECTION B-B
1/2" = 1'0"

JUNCTION BOX
@ STA 5G+05

15923

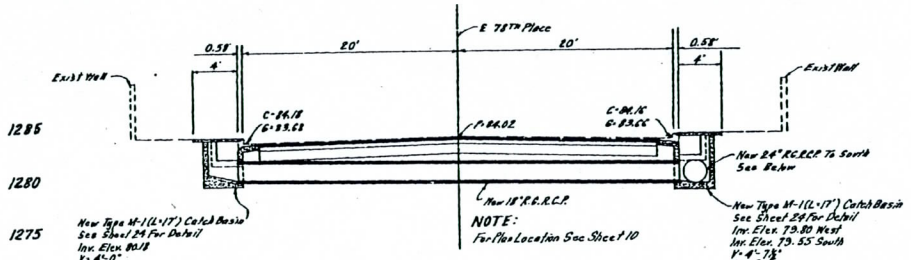
DATE	REVISION	BY

CITY OF SCOTTSDALE ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL IMPROVEMENTS ENGINEERING
3939 Civic Center Plaza
Scottsdale, Arizona 85251

INDIAN BEND ROAD STORM DRAIN
@ VILLA LA PLAYA

SCALE	PROJECT NO.	SHEET 8 OF 8	AS BUILT
Hor. AS Vert. NOTED	8661	DWG NO. STORM CIVIL L.W.M.	DATE 8-8-83
		FILE NO. FC-052	BY E.S.

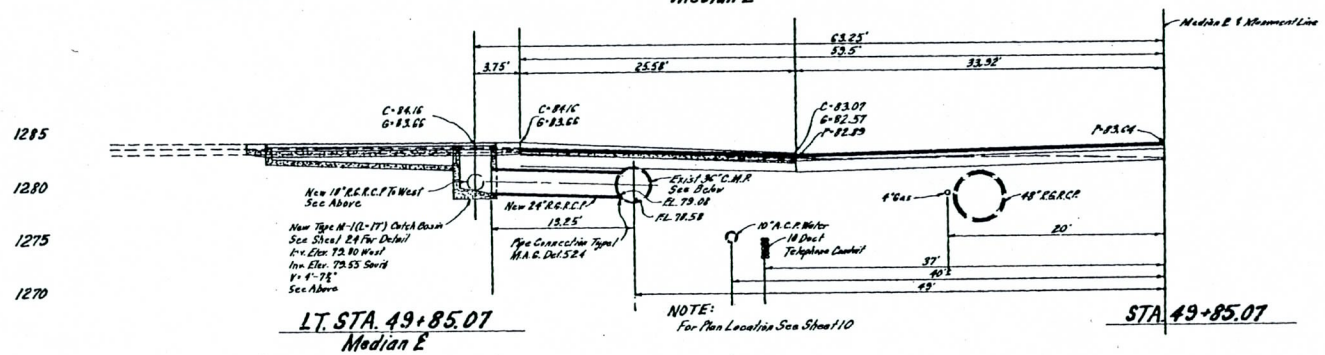
8661



LT. STA. 49+43.91
Median E

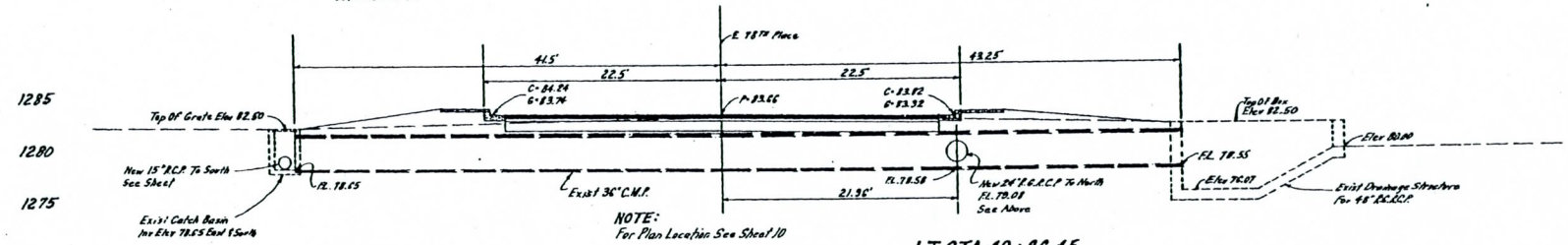
LT. STA. 49+64.49
Median E

LT. STA. 49+85.07
Median E



LT. STA. 49+85.07
Median E

STA. 49+85.07



LT. STA. 49+22.99
Median E

LT. STA. 49+64.49
Median E

LT. STA. 49+86.45
Median E

LT. STA. 50+07.74
Median E

16127

CITY OF SCOTTSDALE

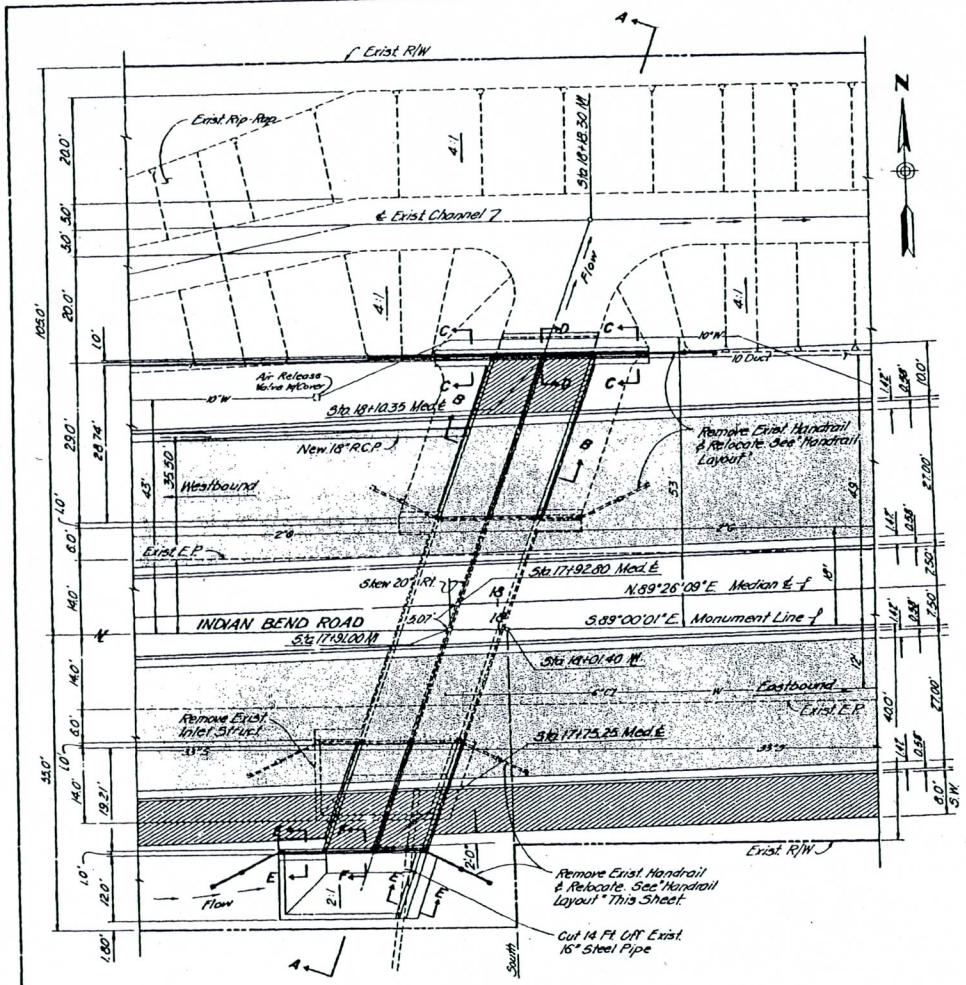
INDIAN BEND ROAD

SCOTTSDALE ROAD TO HAYDEN ROAD

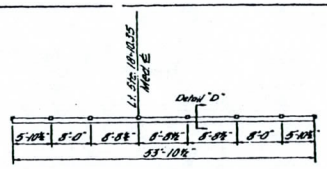
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
3006 E. CLARENDON AVE.
PHOENIX, ARIZONA 85017
PHONE (602) 263-8450

SCALE	DESIGN	PROJ.
HORIZ 1" =	DRAWN	SHEET NO. 18
VERT 1" =	CHECKED	OF 30

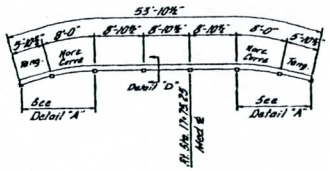
P-048



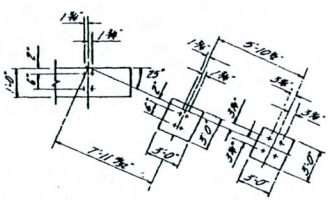
LOCATION PLAN
2-DOUBLE 8'X4' CONC. BOX CULVERT
A.D.O.T. STD. CB-2
1"=10'-0"



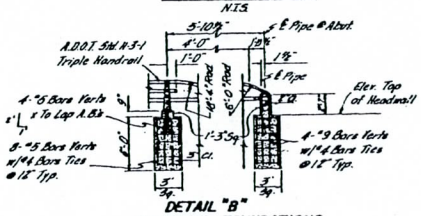
Handrail to be A.D.O.T. Std H-3-1 Aluminum.



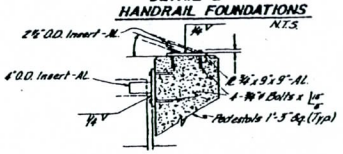
HANDRAIL LAYOUT
N.T.S.



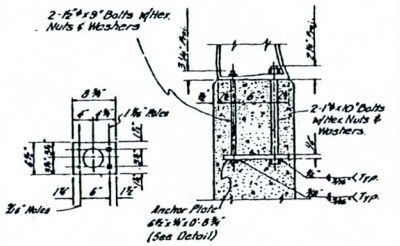
DETAIL "A"
HANDRAIL POST DETAIL
N.T.S.



DETAIL "B"
HANDRAIL FOUNDATIONS
N.T.S.



DETAIL "C"
HANDRAIL CONCRETE PEDESTAL
N.T.S.



DETAIL "D"
HANDRAIL POST ANCHOR BOLT ASSEMBLY
N.T.S.

16130

CITY OF SCOTTSDALE
INDIAN BEND ROAD
SCOTTSDALE ROAD TO HAYDEN ROAD
INTERNATIONAL ENGINEERING CO., INC.
SOUTHWEST DISTRICT OFFICE
SCALE HORIZ 1"= VERT. 1"=
DESIGN
DRAWN
CHECKED
PROJ.
SHEET No. 21 OF 30

P-048

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL

HERB DRINKWATER (Mayor)
ROSS DEAN
SAM KATHRYN CAMPANA
MYRON R. DEIBEL
BILL SODERQUIST
WILLIAM N. WALTON
SUSAN BITTER SMITH

CITY MANAGER

THOMAS J. WILSON (ACTING)

CITY ATTORNEY

THOMAS J. WILSON

CITY CLERK

RICHARD A. BOWERS (ACTING)

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED CIVIL ENGINEER _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED & RECOMMENDED APPROVAL BY:

FIRE DEPT.	5/18/88	CIVIL	5/19/88
WATER & SEWER	5/19/88	PLANNING	5/19/88

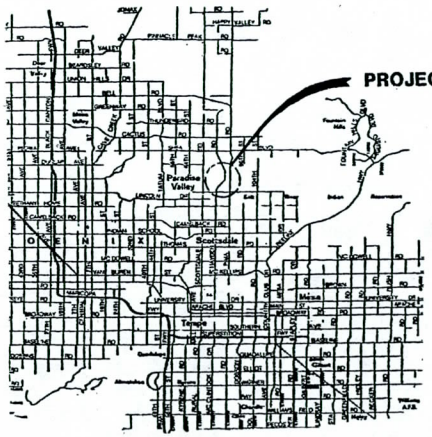
APPROVED BY:

PROJECT REVIEW MANAGER _____ DATE 5/19/88

263-1100
CALL BEFORE YOU DIG

HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

PROJECT NO. S-8503
BID CALL 88-99



VICINITY MAP
NO SCALE

Bench Mark
Found Brass Cap In Handhole At Intersection Of Indian Bend Road & Hayden Road.
Elev. 1282.77 C.O.S. Oct., 1987.

"AS BUILT CERTIFICATION"

This project was staked for construction by the City of Scottsdale survey unit and all items are per plan except for some minor grade changes.

Richard G. Clark
RICHARD G. CLARK, R.L.S.

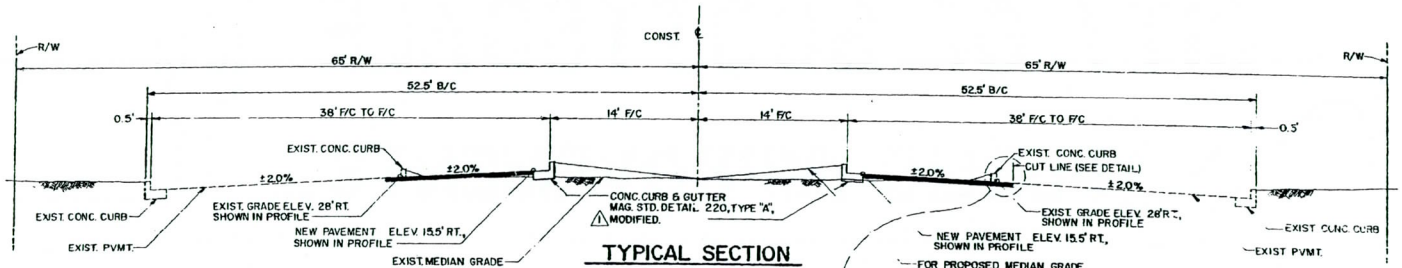
6-29-88
DATE

SHEET INDEX

SHEET NO.	DESCRIPTION
1	COVER SHEET/VICINITY MAP
2	TYPICAL SECTION & MEDIAN DETAILS
3	GENERAL NOTES
4	LEGEND, SYMBOLS, QUANTITIES & MISC. DTLS.
5-21	PAVING AND PROFILE PLANS
22	DECELERATION LANE
23-24	STRIPING AND SIGNAGE
25-27	CONNECTOR PIPE PROFILE
CS 1	COVER SHEET
L1-L16	BIKE PATH & LANDSCAPING
L17	LEGEND
L18	BIKE PATH SECTION
L19-L36	IRRIGATION PLANS
L37-L37A	DETAILS

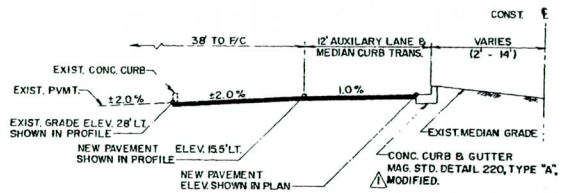
MATHEWS, KESSLER & ASSOCIATES INC.
Engineers · Architects · Planners
MKa 18334
3333 NORTH 44 STREET
PHOENIX, ARIZONA 85018
PHONE: (602) 840-0878

BID CALL 88-99
PROJECT NO. S-8503



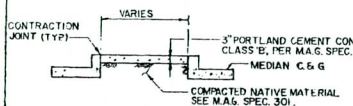
TYPICAL SECTION

Sta. 100+00 to Sta. 168+03.28

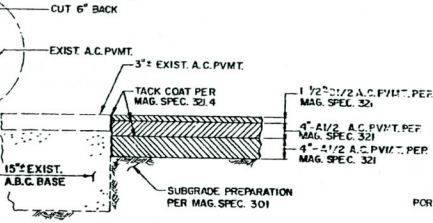


TYPICAL AUXILARY LANE SECTION

LEFT SIDE SHOWN (RIGHT SIDE SIMILIAR)



SECTION A-A
SEE DETAILS A, C, D, E



TYPICAL PAVEMENT SECTION

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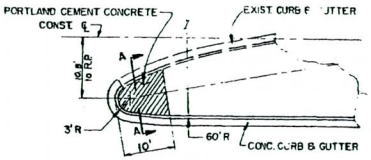
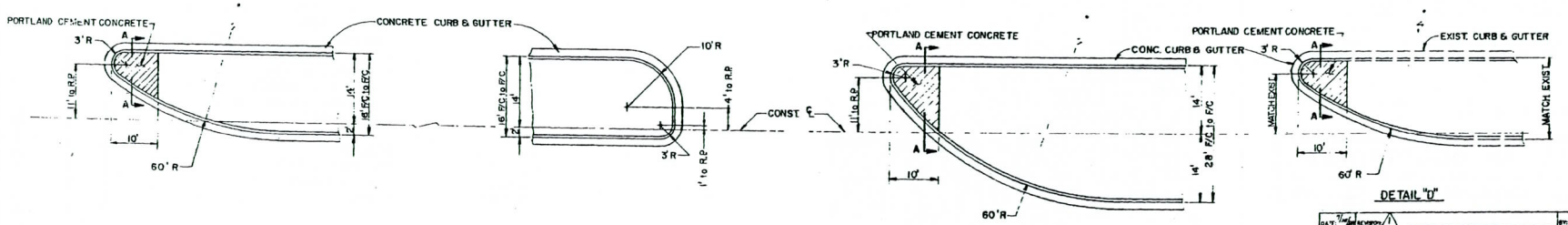


DETAIL "E"



DETAIL "A"

DETAIL "B"

DETAIL "C"

DETAIL "D"

MEDIAN ISLAND ENDS

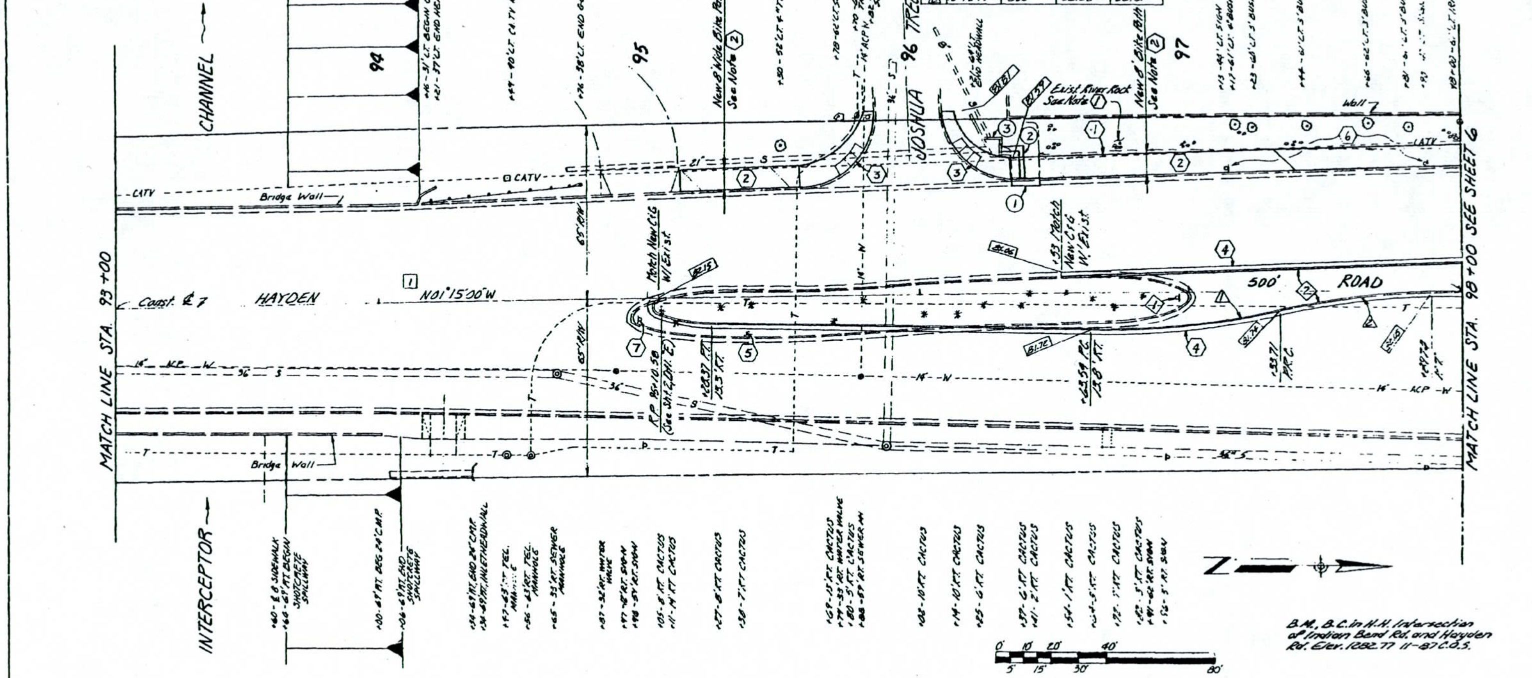
1"=10'-0"

18335

DATE: 7/99	REVISION: ⚠		BY: RLS
CONSULTANT FIRM: MATHEWS, KESSLER & ASSOCIATES INC.			
DESIGNED:			
COMMUNITY DEVELOPMENT DEPARTMENT			
CAPITAL ENGINEERING			
3939 CIVIC CENTER PLAZA SCOTTSDALE, ARIZONA 85251			
PROJECT TITLE: HAYDEN ROAD ARIZONA CANAL to VIA DE VENTURA			
SCALE: HORIZ. 1"= VERT. AS NOTED	DESIGNED BY: JSB/RLS; DRAWN BY: MSJ	DATE: AS-BUILT	BID NO. 85-99; PROJECT NO. S-8503
SHT. 2 OF 64			

S-8503

CURVE DATA				
No.	Δ	R	L	T
1	15°30'31"	300'	70.75'	35.53'
2	10°48'19"	300'	56.58'	28.57'



REMOVAL NOTES

ITEM	STA. TO STA.	LT./RT.	DESCRIPTION	QUAN.
1	96-96	Rt.	Sign	1 Ea.
2	94-90 to 98+00	Lt. & Rt.	Asphalt Pvmt. & Base Removal	280 S.Y.

NEW CONSTRUCTION

1. Sta. 95+11 To Sta. 98+00 Lt. Match Exist River Rock to Back of Bike Path.
2. Sta. 95+11 To Sta. 98+00, Lt. 1624 S.F. New Concrete Bike Path. See Detail Sht. 4.
3. Sta. 95+76, 50' Lt., Sta. 96+18, 51' Lt. New Sidewalk Ramps Per M.A.G. Std. Dtl. 231 Type 1, See Sht. 4.
4. Sta. 95+06 To 98+00, Lt. & Rt. 456 L.F. OF New Vertical Curb & Gutter Per M.A.G. Dtl. 220 Type 'A'.
5. Sta. 95+06 To 98+00 Lt. & Rt. 48 S.Y. Of A.C. Pvmt. See Typical Pavement Section On Sheet No. 2.
6. Sta. 97+13, 44' Lt., Sta. 97+90, 47' Lt. Relocate Signs to 1' Behind Bikepath.
7. Sta. 94+97, 12' RT. Relocate Sign to Radius Point Behind Bullnose.

DRAINAGE CONSTRUCTION

1. Sta. 96+40, 40' Lt. Type 'E' Catch Basin No. 12 Per M.A.G. Dtl. 534-1.
2. Sta. 96+27 To 96+39, Lt. 22 L.F. Of New 21" R.G.R.C.P.
3. Sta. 96+27, 50' Lt. New Conc. Block Junction Box See Dtl. Sht. 4.

283-1600

18338

DATE: 7/15/88 REVISION: 1 BY: RLS

CONSULTANT FIRM: MATHEWS, KESSLER & ASSOCIATES INC.

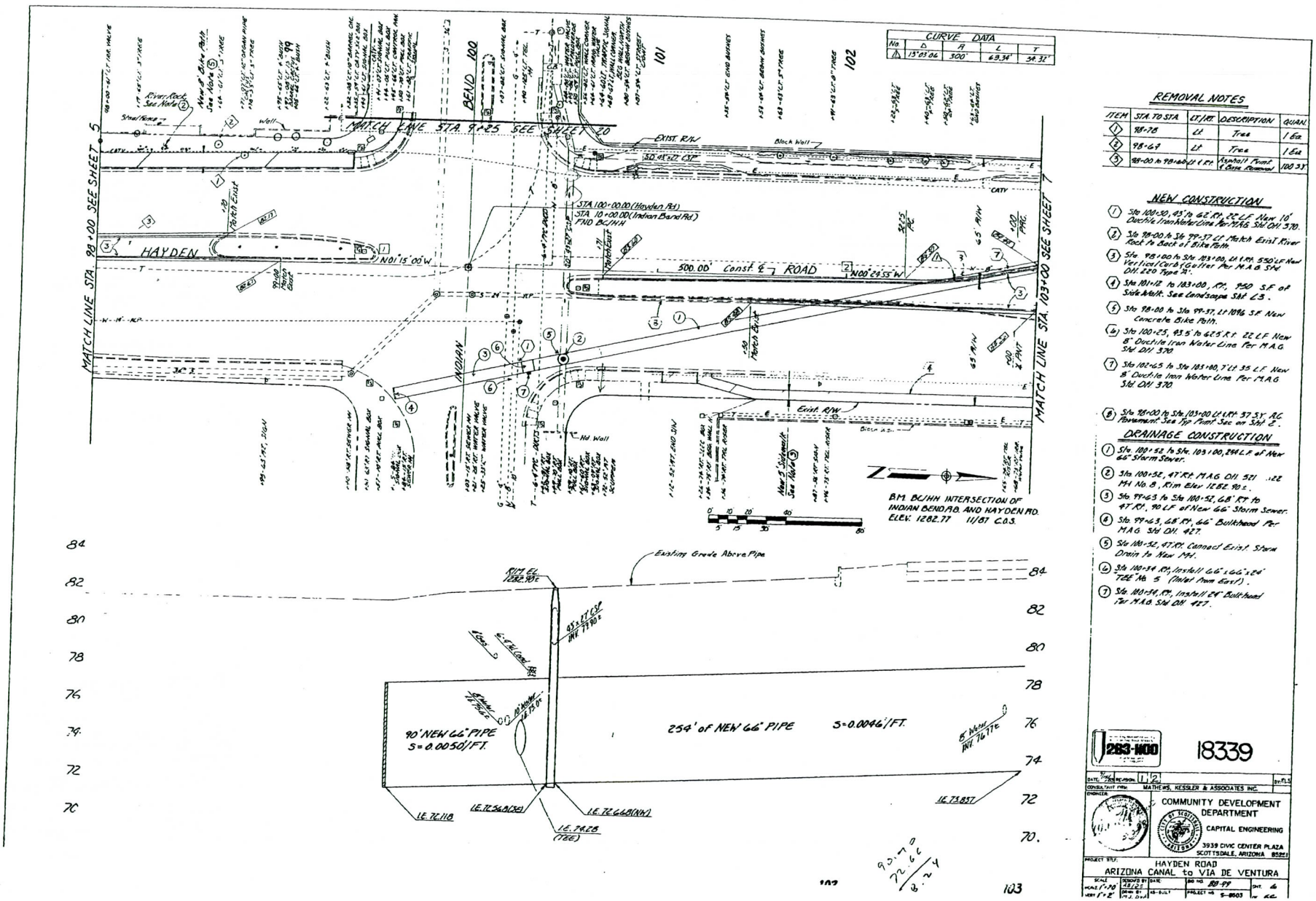
ENGINEER:

COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE: HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

SCALE: HORIZ: 1"=20' VERT: —	DESIGNED BY: RB/DE DRAWN BY: MJ/DVA	DATE: AS-BUILT	BID NO. 88-99 PROJECT NO. S-8503	SHT. 5 OF 64

S-8503



REMOVAL NOTES

ITEM	STA. TO STA	LT./RT.	DESCRIPTION	QUAN.
1	98+78	Lt	Tree	1 Ea.
2	98+69	Lt	Tree	1 Ea.
3	98+00 to 98+68	Lt	Asphalt Pvmt. & Curb Removal	100 S.Y.

NEW CONSTRUCTION

1. Sta 100+30, 45' Rt to 62' Rt, 22 L.F. New 10" Ductile Iron Water Line Per M.A.G. Std Dtl 370.
2. Sta 98+00 to Sta 99+37 Lt Match Exist River Rock to Back of Bike Path.
3. Sta 98+00 to Sta 103+00, Lt 1.0ft. 550 L.F. New Vertical Curb & Gutter Per M.A.G. Std Dtl 220 Type 'A'.
4. Sta 101+12 to 103+00, Rt, 950 S.F. of Side Walk. See Landscape Sht L-3.
5. Sta 98+00 to Sta 99+37, Lt 10ft 6 S.F. New Concrete Bike Path.
6. Sta 100+25, 93.5' Rt to 62.5' Rt. 22 L.F. New 8" Ductile Iron Water Line Per M.A.G. Std Dtl 370.
7. Sta 102+65 to Sta 103+00, 7' Lt 35 L.F. New 8" Ductile Iron Water Line Per M.A.G. Std Dtl 370.
8. Sta 98+00 to Sta 103+00 Lt 1.0ft 37.3 S.Y. AC Pavement. See Typ Pvmt Sec on Sht 2.

DRAINAGE CONSTRUCTION

1. Sta 100+52 to Sta 103+00, 248 L.F. of New 66" Storm Sewer.
2. Sta 100+52, 47' Rt. M.A.G. Dtl 521 .12E MH No. 8, Rim Elev 1282.70±.
3. Sta 99+63 to Sta 100+52, 68' Rt to 47' Rt, 90 L.F. of New 66" Storm Sewer.
4. Sta 99+63, 68' Rt, 66" Bulkhead Per M.A.G. Std Dtl 427.
5. Sta 100+52, 47' Rt. Connect Exist. Storm Drain to New MH.
6. Sta 100+34 Rt, Install 66"x66"x24" TEE No. 5 (Inlet from East).
7. Sta 100+34, Rt, Install 24" Bulkhead Per M.A.G. Std Dtl 427.

283-1100

18339

DATE	BY	REVISION	BY-FLS
11/2			

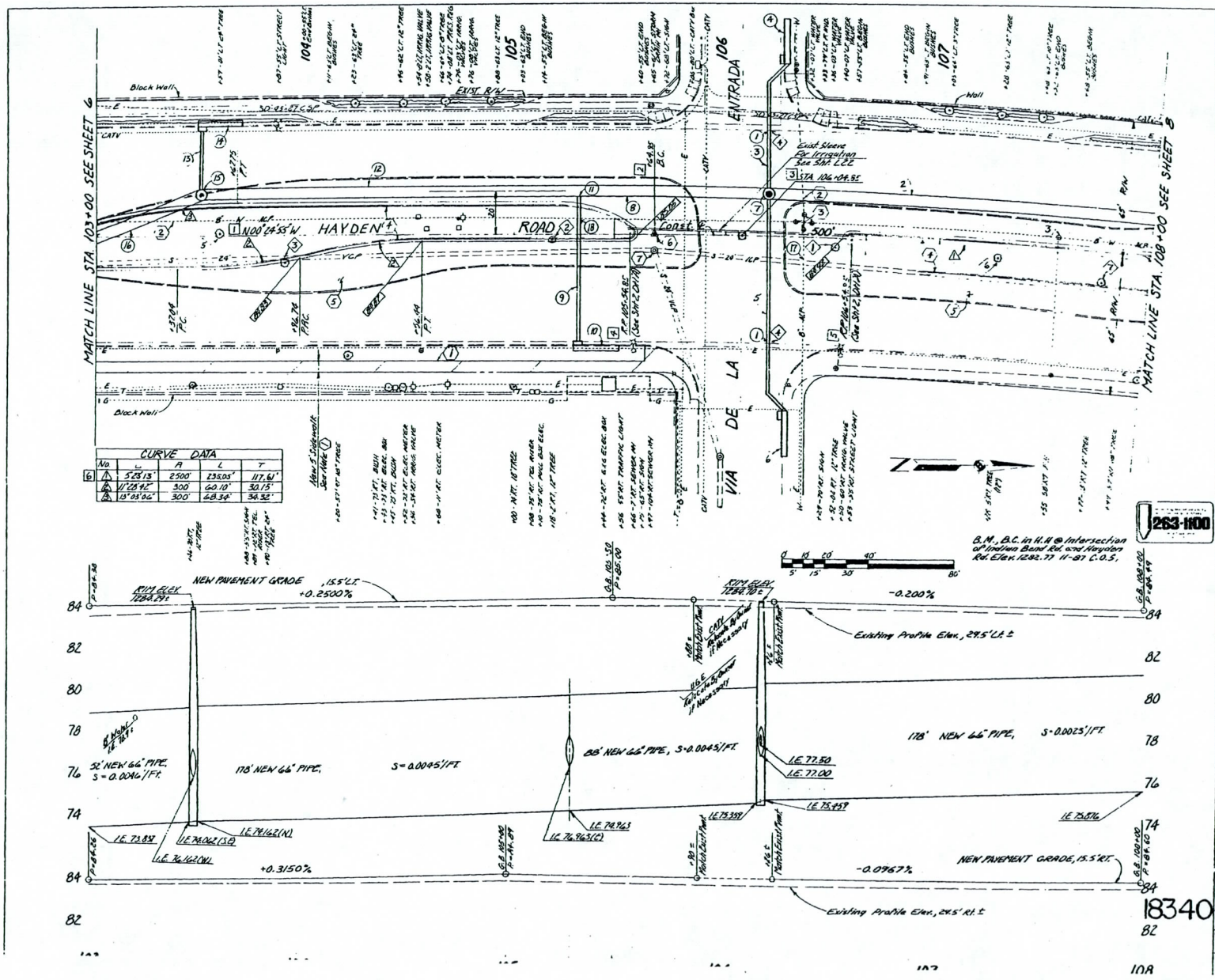
CONSULTANT FIRM: MATHEWS, KESSLER & ASSOCIATES INC.

ENGINEER

COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

PROJECT STR.: HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

SCALE	DESIGNED BY	DATE	BID NO.	SHT.
HOR. 1"=10	2/1/87		88-99	6
VERT. 1"=2	DRAWN BY	CHECKED BY	PROJECT NO.	OF
			S-8603	22



CURVE DATA				
No.	Δ	R	L	T
6	5°28'13"	2500'	238.05'	119.16'
	1°28'42"	300'	60.10'	30.15'
	13°03'04"	300'	68.34'	34.32'

REMOVAL NOTES

ITEM	STA. TO STA.	LT./RT.	DESCRIPTION	QUAN.
1	104+52	RT.	Tree	1 Ea.
2	105+18	RT.	Tree	1 Ea.
3	103+90	RT.	Tree	1 Ea.
4	106+18-106+24	LT./RT.	Conc. V. G.	21 S.F.
5	103+54	Lt.	Tree	1 Ea.
6	107+28	Rt.	Tree	1 Ea.
7	107+77	Rt.	Tree	1 Ea.

NEW CONSTRUCTION

1. Sta 103+00 to 105+90 Rt. 1500 S.F. of New 5' Sidewalk. See Landscape Sht. L4
2. Sta 103+00 to Sta 103+45, 7'Lt. & 5 L.F. and Sta 106+36 107+28 to 25'Lt. 20 L.F. New 8" Ductile Iron Waterline Per M.A.G. Std. Dtl. 370.
3. Sta. 106+32, 07'Lt., Sta. 106+36, 03'Lt. Sta. 106+40, 07'Lt., Sta. 106+36, 10'Lt. and Sta. 107+56, 07'Lt., Adjust Watervalve Per M.A.G. Dtl. 391.1
4. Sta. 103+00 to Sta. 108+00, Lt. & Rt. 8'0 L.F. New Vertical Curb & Gutter Per M.A.G. Std. Dtl. 220 Type 'A'.
5. Sta. 103+00 to Sta. 108+00, Lt. & Rt. 45' 3" A.C. Pavement. See Typ. Pavement Section on Sheet 2.
6. Sta. 105+69.35, & New Survey Marker Per M.A.G. Std. Dtl. 120-1 Type 'B'.
7. Sta. 105+66, 07'Rt. Adjust Sanitary Sewer Manhole Rim to Grade.

DRAINAGE CONSTRUCTION

1. Sta. 106+14 to Sta. 106+24, 21'Rt. 21.5' of New V.G. Per M.A.G. Dtl. 220.
2. Sta. 106+20 to Sta. 108+00, 178 L.F. of New 66" Storm Sewer.
3. Sta. 106+20 Lt., 65 L.F. of New 18" Connector Pipe. See Sheet 26.
4. Sta. 106+25, 85 Lt. IL-17 M.A.G. Dtl. 533-1 Type 'D' Catch Basin No. 8. See Sht. 26.
5. Sta. 106+20 Rt., 108 L.F. of New 18" Connector Pipe See Sht. 25.
6. Sta. 106+25, 85 Rt. IL-17 M.A.G. Dtl. 533-1 Type 'D' Catch Basin No. 9 See Sht. 25.
7. Sta. 106+20, 20'Ct., M.A.G. Dtl. 521 & 522 MH No. 6, Rim Elev. 1284.70 ±.
8. Sta. 105+30 to 106+20, 88 L.F. of New 66" Storm Sewer.
9. Sta. 105+30 Rt., 69 L.F. of New 18" Connector Pipe. See Sht. 25.
10. Sta. 105+20, 52' Rt. IL-17 M.A.G. Dtl. 533-1 Type 'D' Catch Basin No. 10 See Sht. 25.
11. Sta. 104+30 Lt. Pipe 'Tee' No. 4.
12. Sta. 103+50 to 105+30, 178 L.F. of New 66" Storm Sewer.
13. Sta. 103+50 Lt., 29 L.F. of New 18" Connector Pipe See Sht. 25
14. Sta. 103+50, 52' Lt., IL-17 M.A.G. Dtl. 533-1 Type 'D' Catch Basin No. 11 See Sht. 25
15. Sta. 103+50, 20' Lt. M.A.G. Dtl. 521 & 522 Manhole No. 7, Rim Elev. 1284.29 ±
16. Sta. 103+00 to 103+50 52 L.F. of New 66" Storm Sewer.
17. Sta. 106+25, 7' Lt., New Pipe Cutter No. 3 M.A.G. Std. Dtl. 305
18. Sta. 105+30, 8' Lt., New Pipe Cutter No. 4 M.A.G. Std. Dtl. 305

REVISION	1	2	3	4	5	6
BY:						
DATE:						

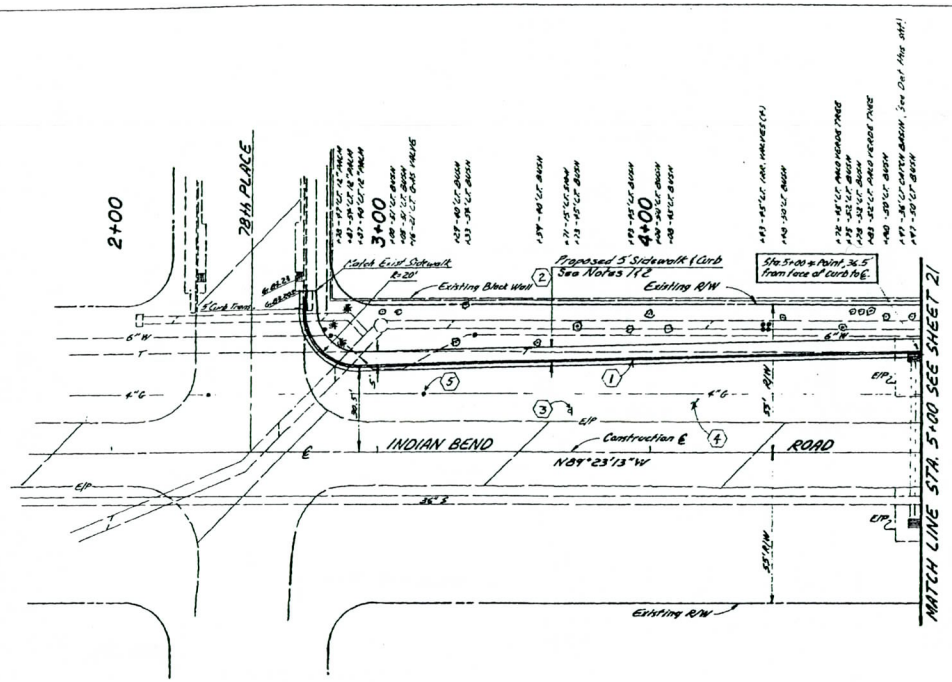
CONSULTANT (Title): MATHEWS, KESSLER & ASSOCIATES INC.
ENGINEER

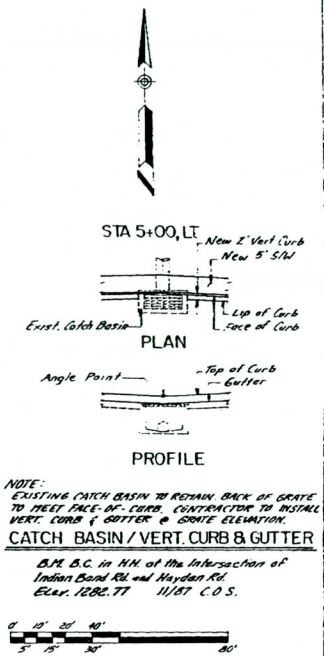
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE: HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

SCALE: HORIZ. 1"=50' VERT. 1"=5'	DESIGNED BY: K.M.Cox	DRAWN BY: K.M.Cox	CHECKED BY:	DATE:	AS-BUILT
BID NO. 88-99	SHT. 7
PROJECT NO. S-8503	OF 64

S-8503





NOTE:
EXISTING CATCH BASIN TO REMAIN. BACK OF GRATE TO MEET FACE-OF-CURB. CONTRACTOR TO INSTALL VERT. CURB & GUTTER @ GRATE ELEVATION.

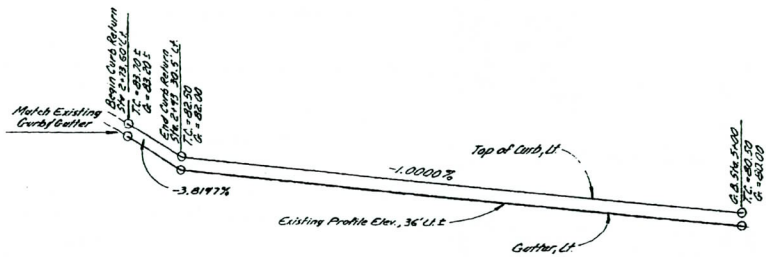
CATCH BASIN / VERT. CURB & GUTTER

B.M. B.C. in H.H. at the Intersection of Indian Bend Rd. and Hayden Rd.
Elev. 1282.77 11/87 C.O.S.

0 10' 20' 40'
5' 15' 30' 80'

NEW CONSTRUCTION

1. 298 L.F. New Concrete Curb Per Dtl Sht 4.
2. 1240 S.F. New 5' Concrete Sidewalk Per Dtl Sht 4.
3. Sta 3+71 16' Lt, Relocate Sign to 1 Ft Back of Walk, Same Station.
4. Sta 2+73, Lt. to Sta 5+00 Lt. 510 S.Y. of New Asphalt Pavement See Detail Sht 4.
5. Sta. 3+16, 21' Lt. Adjust Gas Valve By Owner



263-1800
Arizona Blue Stake, Inc.

18352

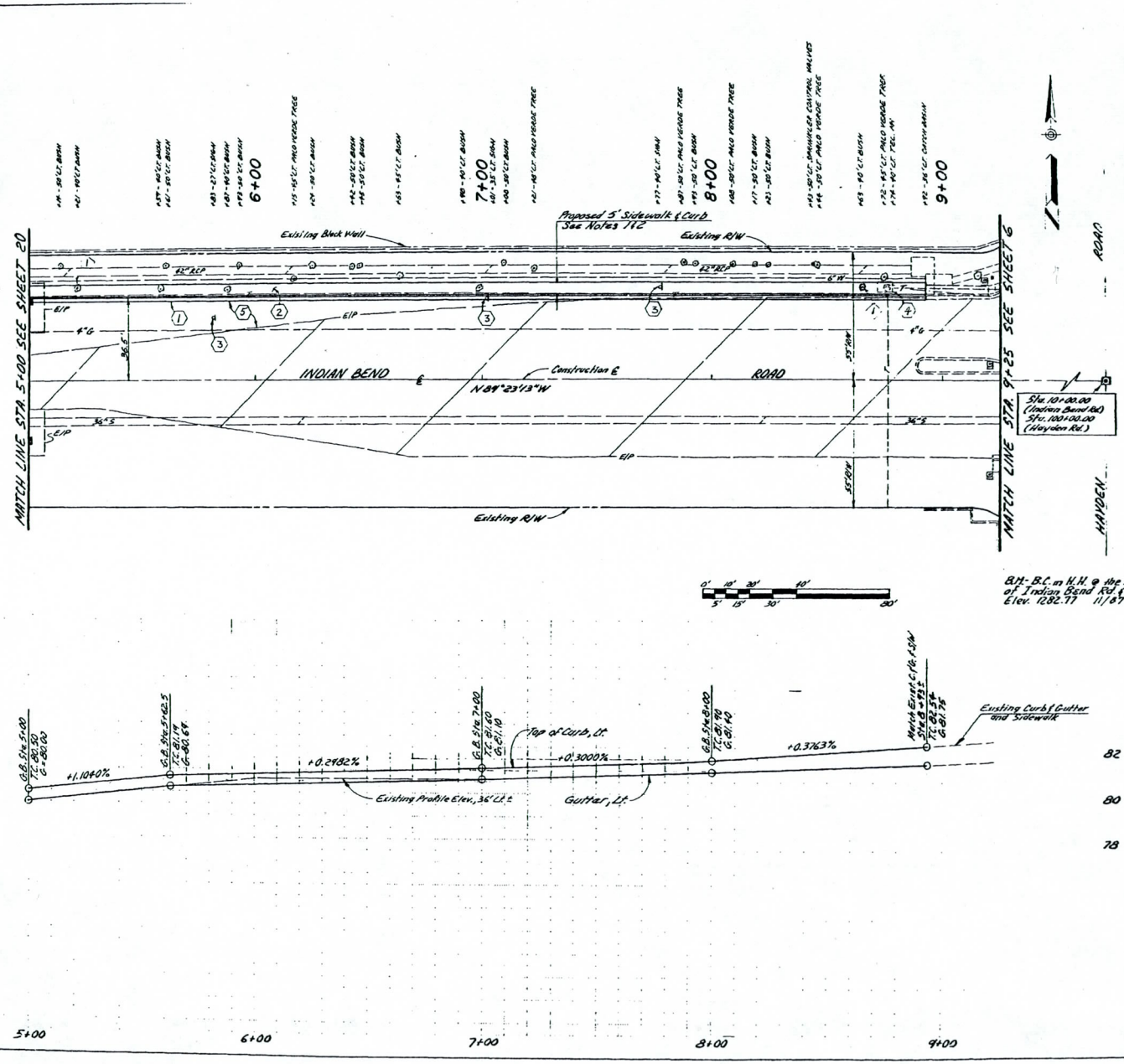
MATHEWS, KESSLER & ASSOCIATES INC.

COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

H: 1"=20'	DESIGNED	DRAWN	DATE 10-89	SHT. 20
V: 1"=2'	CHECKED D.V.A.		S-8503	OF 64

S-8503



REMOVAL NOTES

ITEM	STA. TO STA.	LT./RT.	DESCRIPTION	QUAN.
1	5+21 to 8+63	Lt.	MISC. REMOVAL QUANTITIES	L.S.

Note: Contractor is responsible for all removals necessary to construct improvements along Indian Bend Road.

NEW CONSTRUCTION

1. 393 L.F. New Vert. C.&G. per Detail, Sht. 4.
2. 1965 S.F. New 5' Concrete Sidewalk Detail Sht. 4
3. Sta. 5+83.27' Lt. Sta. 7+01.35' Lt. Sta. 7+77.40' Lt. Relocate Signs to 1' Back of walk same sta location
4. Sta 8+74 40' Lt. Adjust Mt. Bell Manhole Rim Elev. By Owner.
5. Sta. 5+00, Lt. to Sta. 8+43 Lt. 380 S.Y. of New Asphalt Pavement See Detail Sht. 4

263-1100

18353

DATE	REVISION

CONSULTANT FIRM: MATHEWS, KESSLER & ASSOCIATES INC.

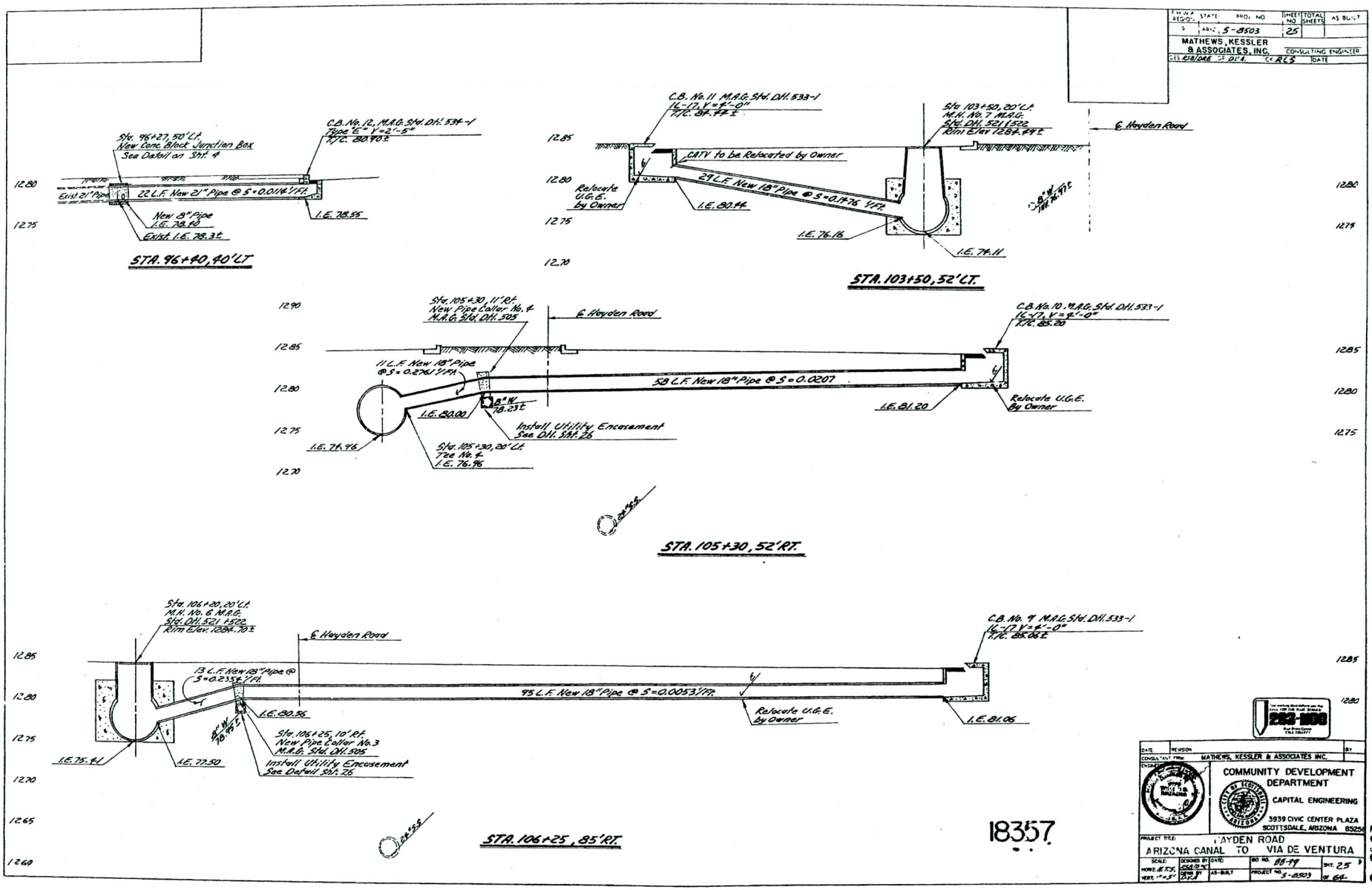
ENGINEER

COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

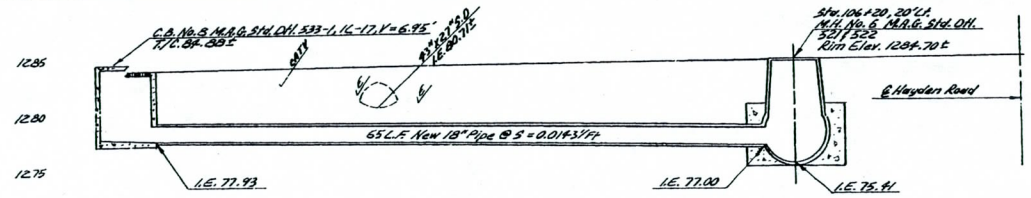
PROJECT TITLE: HAYDEN ROAD
ARIZONA CANAL to VIA DE VENTURA

SCALE	DESIGNED BY	DATE	BID NO. 88-99	SHT. 21
HORIZ. 1"=40'	DRAWN BY	AS-BUILT	PROJECT NO. S-8503	OF 64
VERT. 1"=4'	CHECKED BY			

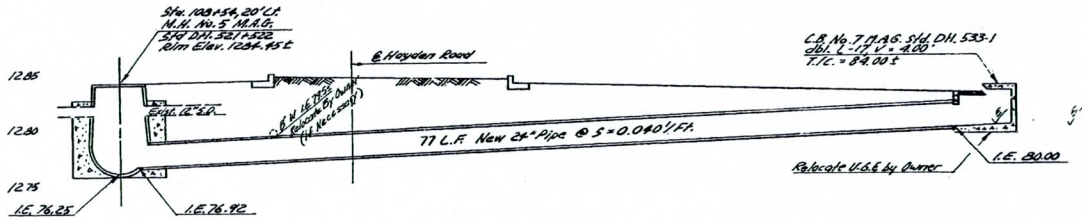
S-8503


Sta. 96+27, 50' Lt.
New Conc. Block Junction Box
See Detail on Sht. 4
C.B. No. 12, M.A.G. Std. Dtl. 534-1
Type "C" V=2'-5"
T/C. 80.90±
Exist 21" Pipe
22 L.F. New 21" Pipe @ S=0.0116 ft/ft.
New 8" Pipe
I.E. 78.80
Exist I.E. 78.32±
I.E. 78.56
STA. 96+40, 40' LT.
C.B. No. 11 M.A.G. Std. Dtl. 533-1
(L-1) V=4'-0"
T/C. 84.77 I
Sta 103+50, 20' Lt.
M.H. No. 7 M.A.G.
Std. Dtl. 521 Type
Rim Elev 1284.77±
℄ Hayden Road
CATV to be Relocated by Owner
Relocate U.G.E. by Owner
27 L.F. New 18" Pipe @ S=0.1476 ft/ft.
I.E. 80.44
I.E. 76.16
I.E. 74.11
STA. 103+50, 52' LT.
Sta. 105+30, 11' Rt.
New Pipe Collar No. 4
M.A.G. Std. Dtl. 505
℄ Hayden Road
11 L.F. New 18" Pipe
@ S=0.2761 ft/ft
8" W
78.23±
I.E. 80.00
I.E. 74.96
Install Utility Encasement
See Dtl. Std. Pl. 26
Sta. 105+30, 20' Lt.
Tee No. 4
I.E. 76.96
58 L.F. New 18" Pipe @ S=0.0207
C.B. No. 10, M.A.G. Std. Dtl. 533-1
(L-1) V=4'-0"
T/C. 85.20
I.E. 81.20
Relocate U.G.E.
By Owner
STA. 105+30, 52' RT.
Sta. 106+20, 20' Lt.
M.H. No. 6 M.A.G.
Std. Dtl. 521 Type
Rim Elev. 1284.70±
℄ Hayden Road
13 L.F. New 18" Pipe @
S=0.2354 ft/ft.
I.E. 80.86
8" W
78.93±
I.E. 75.86
I.E. 77.50
Sta. 106+25, 10' Rt.
New Pipe Collar No. 3
M.A.G. Std. Dtl. 505
Install Utility Encasement
See Detail Sht. 26
95 L.F. New 18" Pipe @ S=0.0053 ft/ft.
C.B. No. 9 M.A.G. Std. Dtl. 533-1
(L-1) V=4'-0"
T/C. 85.06±
I.E. 81.06
Relocate U.G.E.
by Owner
STA. 106+25, 85' RT.
12.80
12.75
12.70
12.85
12.90
12.65
12.60
MATHEWS, KESSLER & ASSOCIATES, INC.
COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251
PROJECT TITLE: HAYDEN ROAD
ARIZONA CANAL TO VIA DE VENTURA
S-8503

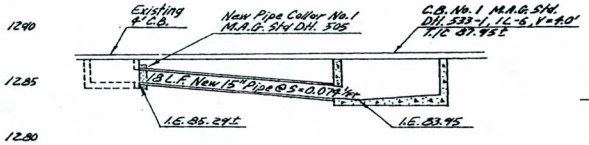
18357



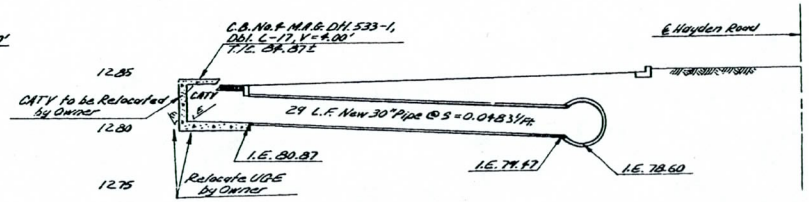
STA. 106+25 85' C.T.



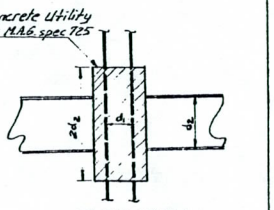
STA. 108+82, 52' RT.



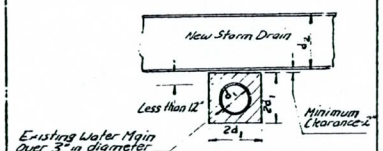
STA. 125+30 TO STA. 125+50, 52' RT.



STA. 112+25, 52' LT.



PLAN VIEW



PROFILE VIEW

UTILITY ENCASEMENT DETAIL (NTS)

Note: If Concrete Utility Encasement Will Not Provide a Minimum 2" Clearance as shown then Utility is to be relocated prior to backfill operations

263-1100

FHWA REGION	STATE: ARIZ.	PROJ NO S-8503	SHEET NO 26	TOTAL SHEETS	AS BUILT

MATHEWS, KESSLER & ASSOCIATES, INC. — CONSULTING ENGINEER

DES. RSA/DGE — DR DVA — CK R.L.S. — DATE

DATE | REVISION | BY

CONSULTANT FIRM: MATHEWS, KESSLER & ASSOCIATES INC.

ENGINEER

COMMUNITY DEVELOPMENT DEPARTMENT
CAPITAL ENGINEERING
3939 CIVIC CENTER PLAZA
SCOTTSDALE, ARIZONA 85251

PROJECT TITLE: HAYDEN ROAD
ARIZONA CANAL TO VIA DE VENTURA

SCALE: HORIZ. N.T.S. VERT. 1"=5'	DESIGNED BY: RSA/DGE	DRAWN BY: DVA	DATE: AS-BUILT	JOB NO. 88-99	PROJECT NO. S-8503	SHT. 26 OF 64

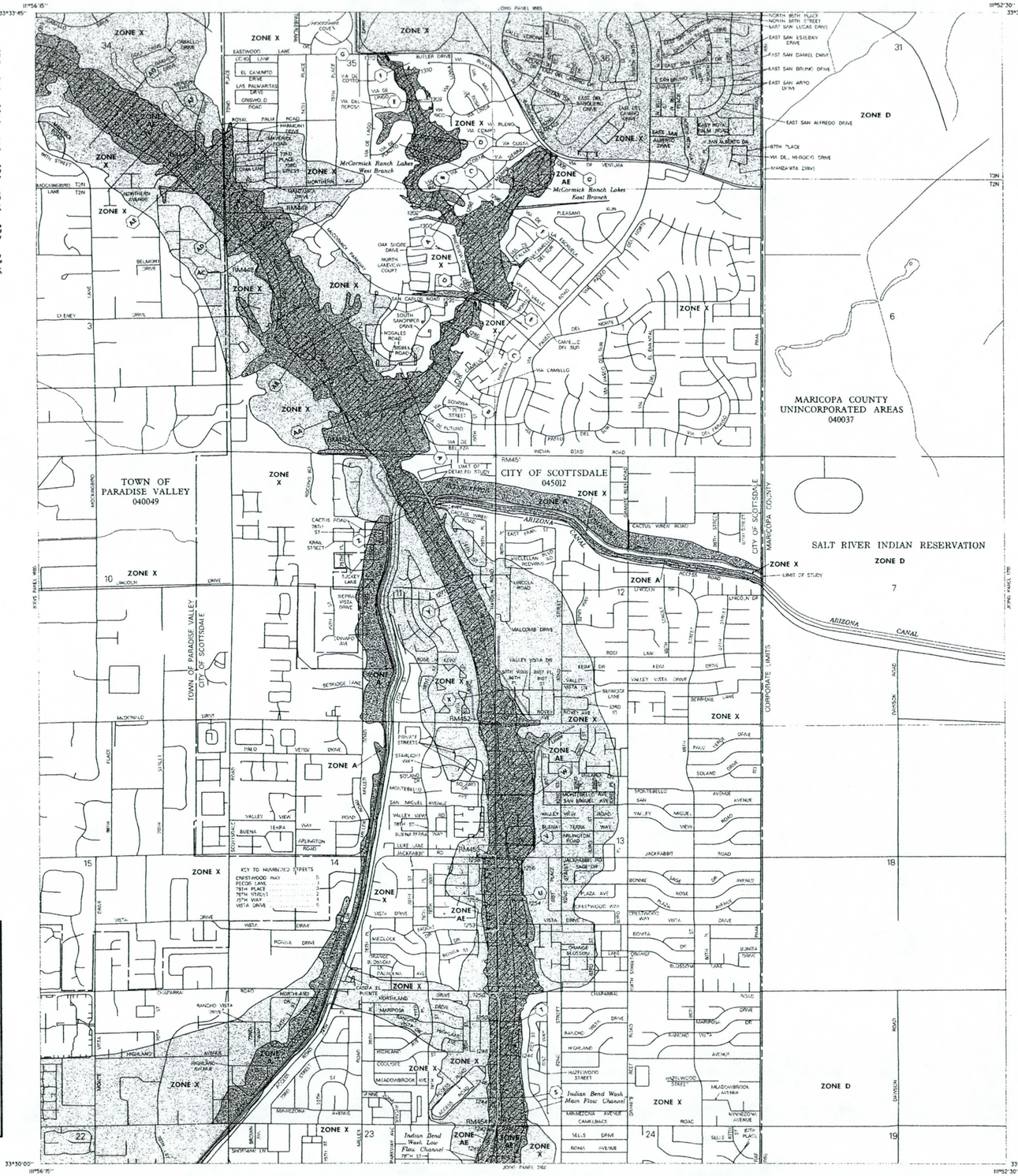
18358

8503

APPENDIX P

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM447	1298.69	A brass cap set flush with pavement on centerline at point of curvature on Gail Drive south of Indian Bend Wash, established by Planning Research Corporation.
RM448	1295.87	A cotton spindle, set flush with pavement on McCormick Parkway, east of Scottsdale Road, established by Planning Research Corporation.
RM449	1294.73	A cotton spindle, set flush with pavement on Goldwater Boulevard, 0.5 mile south of McCormick Parkway, established by Planning Research Corporation.
RM450	1288.34	A brass cap in well at centerline of Indian Bend Road, 0.5 mile west of Scottsdale Road, established by
RM451	1282.80	A brass cap in well at centerline of Indian Bend Road, established by Planning Research Corporation.
RM452	1264.77	A brass cap set flush with pavement at centerline of intersection of Hayden Road and McDowell Drive, established by Planning Research Corporation.
RM453	1258.41	A brass cap in well at centerline of intersection of Hayden and Jackrabbit Roads, established by Planning Research Corporation.
RM454	1243.74	A brass cap set flush with pavement in southbound lane of Hayden Road at intersection of Camelback Road, established by Planning Research Corporation.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A — No base flood elevation 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 flood 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 floodplain.
- ZONE D — Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified (1982) — Identified (1990) — Otherwise Protected Area

Coastal barrier areas are normally located within or adjacent to special Flood Hazard Areas.

- Floodplain 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 (EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum
- D-D — Cross Section Line
- RM7 × — Elevation Reference Mark
- M2 • — River Mile

97°07'30", 32°22'30" — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27), Projection

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. The community map repository should be consulted for more detailed data on BFEs and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard 100-year flood include Zones A, AE, AH, A30, AR, AO, A99, V, VE and V1-V30.

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. Refer to Floodway Data Tables where floodway width is shown as 120 ft.

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 this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and the Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

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

For adjacent map panels and base map scales see decimal-printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1983

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:
DECEMBER 3, 1990, SEPTEMBER 30, 1992

Map revised July 19, 2001 to update corporate limits, to change base flood elevations, to add base flood elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to update map format, to add roads, and road names, and to incorporate previously issued Letters of Map Revision.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

LEGEND

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations and therefore may be somewhat greater or less than the exact elevation presented in the FIS. BFEs shown on this FIRM are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

FIRMs developed later or in a map cycle subsequent to this one based on hydrologic/hydraulic analyses performed at that time may reflect different flood elevations and flood hazard areas. Boundaries of the 100- and 500-year floodplains and floodways may change as a result of these analyses. Therefore, prospective developers and/or property owners should always consult their local community officials prior to any development of the property.

Coastal BFEs shown on this map apply only landward of 0.0' NGVD. Users of this FIRM should also consult the Coastal Flood Hazard Area data provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1695 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1695	G
PARADISE VALLEY, TOWN OF	040049	1695	G
SCOTTSDALE, CITY OF	045012	1695	G

MAP NUMBER
04013C1695 G

MAP REVISED:
JULY 19, 2001

Federal Emergency Management Agency