Salt River and Tempe Drain Hydraulic Analysis Technical Memorandum

engineering and
environmental design

Salt River and Tempe Drain
Hydraulic Analysis
Technical Memorandum

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1.0 Introduction

The I-10 Corridor Improvement Project will impact the Salt River and Tempe Drain. This technical memorandum documents the existing and proposed conditions of these channels and presents the hydraulic analysis completed for the existing and proposed conditions.

Salt River

Currently, Interstate 10 (I-10) crosses the Salt River, as shown in Figure 1. During the I-10 Corridor Improvement Project, additional lanes will be added to the existing bridge over the Salt River to support the I-10 express lanes, and new eastbound and westbound bridges will be built upstream and downstream of the existing bridge to support the proposed local lanes. New piers for the existing and new bridges will be aligned with the original piers, so impact to the Salt River hydraulics will be minimal. The existing and proposed hydraulic conditions and HEC-RAS models for the Salt River are presented in Section 2.

Tempe Drain

The Tempe Drain is an open channel that begins north of I-10 and south of University Drive at 52nd Street (Figure 1). The Tempe Drain flows west to the Salt River and crosses through several culverts (State Route 143 (SR 143), 32nd Street, etc.). The Tempe Drain collects storm water runoff from the City of Phoenix, City of Tempe, ADOT, and the Town of Gilbert. The channel is adjacent to I-10 (north side) between 32nd Street (University Drive) and the Salt River. It discharges into the Salt River about 170 feet upstream of the existing I-10 bridge structure.

The proposed roadway improvements will encroach into the existing open channel (west of 32nd Street). In order to maintain the existing hydraulic conveyance, a section of the channel will be replaced with a five barrel 12×8-ft reinforced concrete box culvert. A hydraulic analysis was conducted to compare the existing and proposed conditions and determine the appropriate culvert size. This analysis will be reviewed in Section 3.

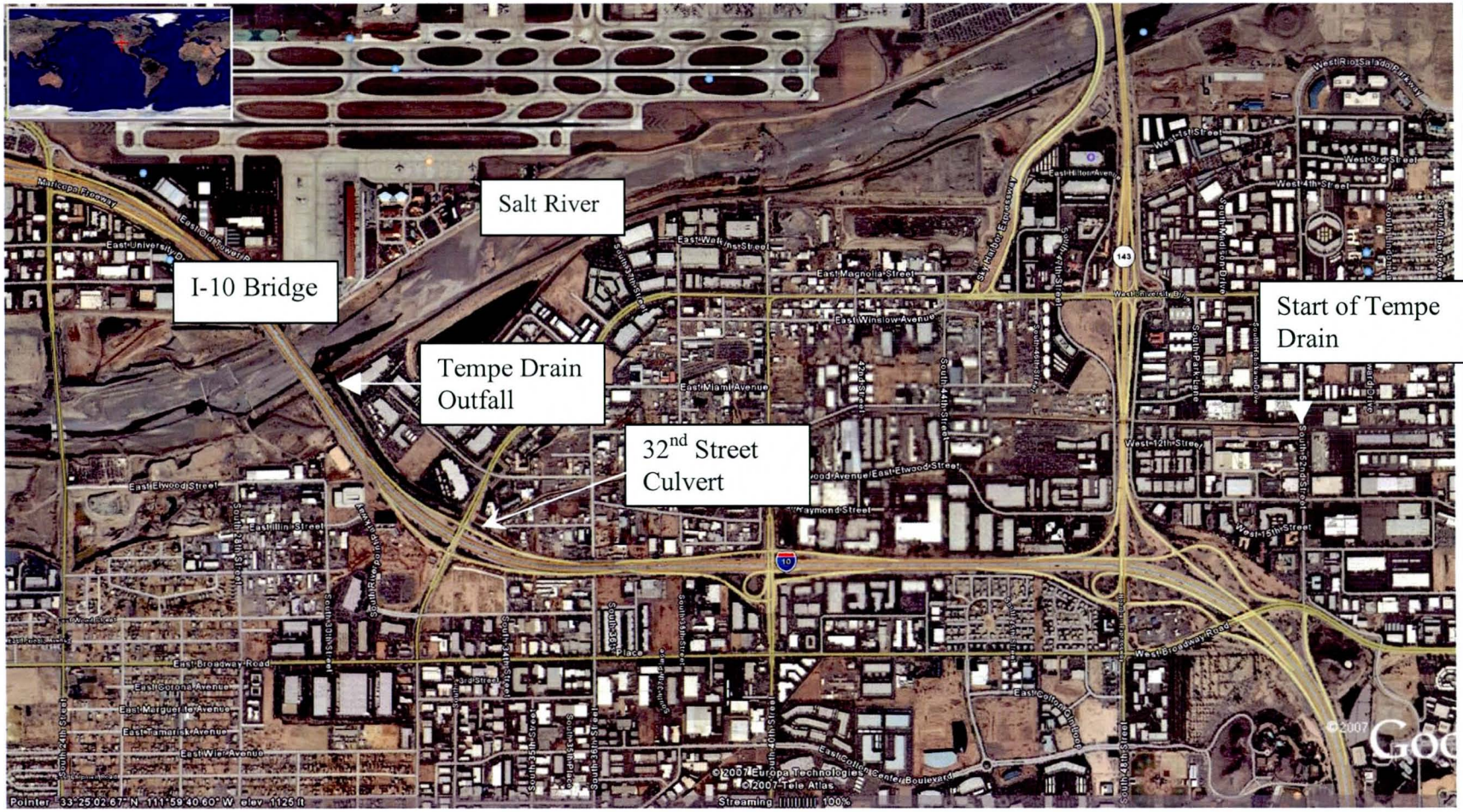


Figure 1 Project Location Map

There are levees on both sides of the river on the upstream side, that belong to City of Phoenix. Were they designed based on 169,000 or some other Q? Does Phoenix want to maintain current capacity?

2.0 Salt River Hydraulic Analysis

The existing condition hydrologic/hydraulic analyses of the Salt River adjacent to the project area are contained in the FEMA Maricopa County, AZ and Incorporated Areas Flood Insurance Study (FIS) revised July 19, 2001.

The discharge data for the Salt River is contained in Table 3 of the Flood Insurance Study. The 100-year peak discharge at the I-10 structure was determined to be 169,000 cfs, as determined at the Mill Avenue Bridge. A copy of this data is included in Figure 2, shown on page 6.

The portion of the Salt River in the project area is contained on FEMA FIRM Panel 04013C2145H effective September 30, 2005. A copy of this FIRM panel is enclosed as Figure 3, shown on page 7.

The I-10 bridge crosses the Salt River between FEMA cross sections AM and AN. The 100-year flood profile for the section of the Salt River is on Panel 282P of the flood insurance study for Maricopa County. A copy of this Flood Profile is shown as Figure 4, shown on page 8.

2.1 Existing Conditions Hydraulic Model

The project area is contained within Reach 4 of the existing FEMA hydraulic model of the Salt River. The FEMA model was run using HEC-RAS version 3.1.3, and it was found to have errors (Appendix A). At RS 224.21 and RS 224.13 (Loop 101 bridge), there were some errors in the deck data. These errors were resolved by doing some minor modification to the model:

- At RS 224.21 (Loop 101 bridge), the distance from the upstream cross section to the upstream face of bridge was set to 1 foot.
- At RS 224.13 (Loop 101 ramp bridge), the distance from cross section 224.14 to 224.12 was changed from 86 feet to 87 feet.
- At RS 220.05 (Priest Road bridge), the distance from the upstream cross section to the bridge was set to 1-foot.

WIDENING OF BRIDGES DOES NOT SIGNIFICANTLY AFFECT CAPACITY
-SLT

Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Skunk Creek					
At New River Road	8.04	--[1]	--[1]	7,800	--[1]
At confluence with Cline Creek	15.76	--[1]	--[1]	11,800	--[1]
At confluence with Rodger Creek	32.67	--[1]	--[1]	24,400	--[1]
At Carefree Highway	40.11	--[1]	--[1]	27,300	--[1]
At Granite Reef Aqueduct	63.49	--[1]	--[1]	26,700	--[1]
At Inflow of Adobe Dam	89.6	15,000	29,000	39,000	85,000
At Outflow of Adobe Dam	0.0	1,370	1,650	1,730	2,000
Above confluence with Scatter Wash	0.9	1,600	2,200	2,600	4,600
Below confluence with Scatter Wash (At 59th Avenue)	0.4	2,000	5,500	8,400	22,000
At confluence with Arizona Canal	19.9	2,200	6,700	11,000	33,000
Buchanan Wash					
800 feet downstream of Central Arizona Project Canal	9.17	1,065	1,253	1,308	1,407
At confluence with Skunk Creek	11.29	1,422	2,005	2,304	3,067
Scatter Wash					
At Mouth	8.5	580	3,500	6,100	17,000
Above Black Canyon Highway (State Highway 17)	6.3	540	3,200	5,700	16,000
Salt River					
At Granite Reef Dam	--[2]	60,000	150,000	175,000	250,000
At Gilbert Road	12,593	58,000	145,000	172,000	246,000
At Mill Avenue Bridge	12,783	55,000	140,000	169,000	243,000
At Central Avenue	12,831	53,000	135,000	166,000	240,000
At 67th Avenue	12,962	51,000	132,000	164,000	237,000
East Fork Cave Creek					
At confluence with Cave Creek	14.4	2,300	6,400	9,000	19,000
Below 7th Avenue Extended	13.8	2,300	6,300	8,900	18,000
Below 7th Street	12.4	2,200	5,900	8,400	17,000
Above 7th Street	10.0	1,900	5,300	7,500	15,200
At Bell Road	3.4	1,100	2,900	4,200	8,200
Below Cave Creek Road	3.0	1,000	2,800	3,900	7,900
At Utopia Road	1.8	800	2,100	3,000	5,800
At Beardsley Road	1.0	600	1,500	2,100	4,300

[1]Data Not Computed
[2]Data Not Available

53

Figure 2 FIS Discharge Table

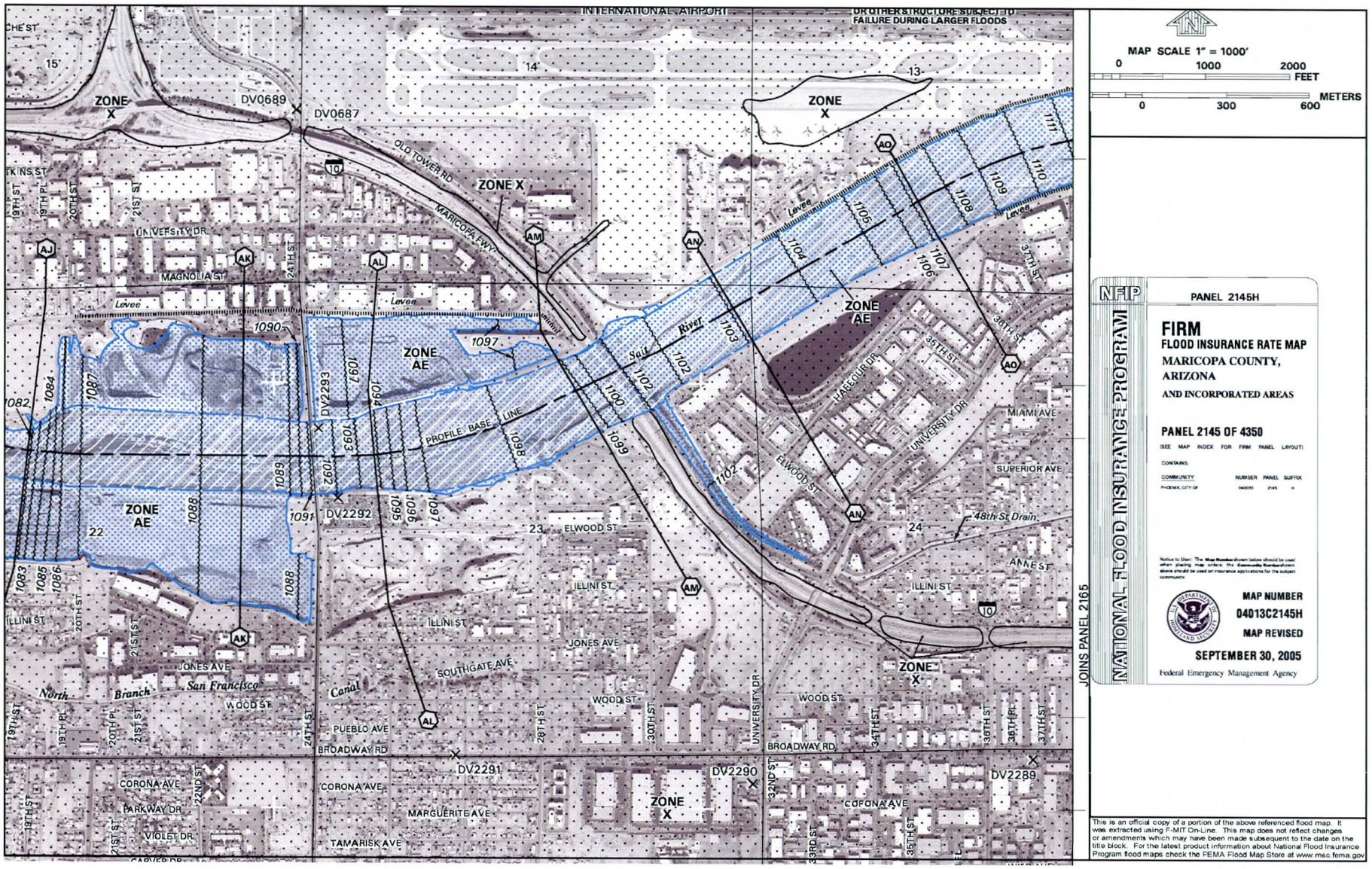


Figure 3 FIRM Panel

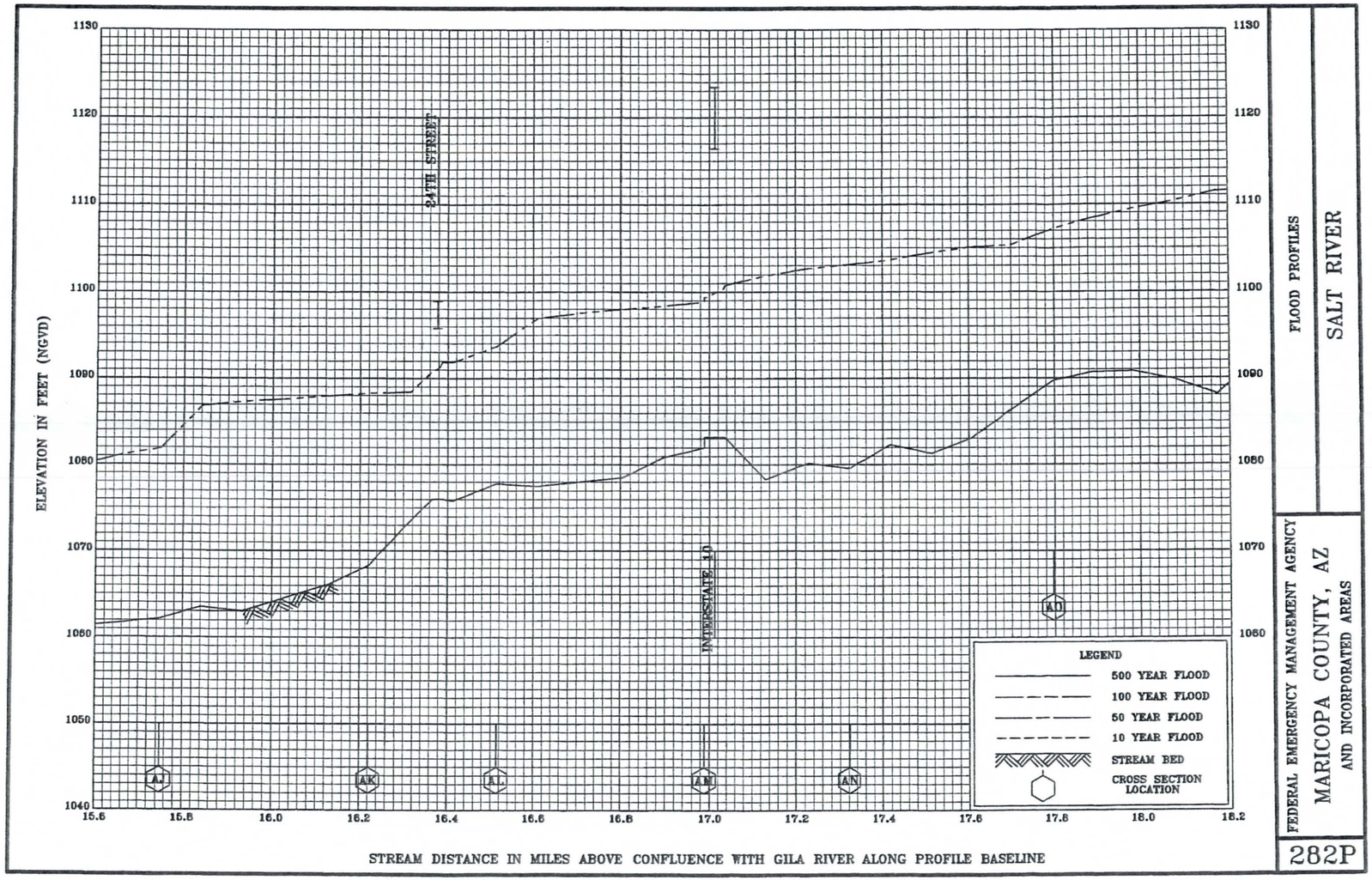


Figure 4 Flood Profile

2.2 *Proposed Conditions Hydraulic Model*

The original HEC-RAS model was modified to account for the additional width needed for the express lanes on the existing bridge and the new bridges being added for the local lanes. The existing bridge is about 210-feet wide. The I-10 Corridor Improvement project will add approximately 61-ft of width to the existing bridge and two 52-ft wide bridges on either side of the existing bridge for the local lanes, as shown on Figure 5. The I-10 bridge in the HEC-RAS model (RS 216.505) was modified to account for these changes.

For the proposed model, two new cross sections were added on either side of the proposed bridge (216.45 and 216.55), and the existing cross sections under the bridge were deleted (216.49 and 216.52). There is only about 55-ft between the existing cross sections (216.49 and 216.52) and new cross sections (216.45 and 216.55) and the channel is relatively uniform in this area, so the existing cross sections were copied and the elevations adjusted slightly based on linear interpolation. In order to compare the water surface elevation between the existing and proposed models, the cross sections at 216.45 and 216.55 that were added to the proposed model were also added to the existing model. All other model parameters remained unchanged (boundary conditions, flow, Manning's roughness coefficient, etc.).

Figure 6 shows a comparison of the water surface elevations at cross sections that are common to both the existing and proposed HEC-RAS models for the 10- and 100-year return periods. Table 1 summarizes the HEC-RAS data for both models under the 10- and 100-year return periods. There is virtually no change in the water surface due to the bridge widening and new bridges. For the 10-year storm, there is a slight decrease (0.05-ft) in the water surface elevation at RS 216.55; for the 100-year storm, there is a slight increase (0.04-ft).

Steve, please check to see if debris loading was/needs to be considered.

RELATIVE INCREASE.
-SLT

Table 1 HEC-RAS results for the Existing and Proposed Models for the 10- and 100-year return periods

River Sta	Distance from Cross Section 216.33	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	Length Chnl
	(ft)		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
Exst 10-yr													
216.33	0	10-yr	55000	1080.80	1089.83	1086.11	1090.56	0.0016	6.87	8004.77	964.55	0.42	490.24
216.42	488.7	10-yr	55000	1082.00	1090.57	1087.50	1091.52	0.0022	7.83	7020.6	885.01	0.49	488.7
216.45	756.95	10-yr	55000	1083.00	1091.11	1088.38	1092.18	0.0025	8.30	6624.48	858.73	0.53	268.25
216.55	1122.95	10-yr	55000	1082.67	1092.48	1088.04	1093.20	0.0013	6.80	8093.41	869.21	0.39	54.5
216.62	1568.16	10-yr	55000	1078.33	1093.10	1087.73	1093.73	0.0010	6.35	8662.99	861.03	0.35	445.21
216.72	2076.55	10-yr	55000	1080.17	1093.66	1087.40	1094.18	0.0007	5.77	9537.59	855.99	0.3	508.39
Proposed 10-yr													
216.33	0	10-yr	55000	1080.80	1089.83	1086.11	1090.56	0.0016	6.87	8004.77	964.55	0.42	490.24
216.42	488.7	10-yr	55000	1082.00	1090.57	1087.50	1091.52	0.0022	7.83	7020.6	885.01	0.49	488.7
216.45	756.95	10-yr	55000	1083.00	1091.11	1088.38	1092.18	0.0025	8.30	6624.48	858.73	0.53	268.25
216.55	1122.95	10-yr	55000	1082.67	1092.43	1088.04	1093.15	0.0013	6.84	8046.62	868.88	0.4	2
216.62	1568.16	10-yr	55000	1078.33	1093.06	1087.73	1093.69	0.0011	6.38	8626.73	860.75	0.35	445.21
216.72	2076.55	10-yr	55000	1080.17	1093.63	1087.40	1094.15	0.0008	5.78	9507.92	855.82	0.31	508.39
Exst 100-yr													
216.33	0	100-yr	169000	1080.80	1098.36	1091.42	1099.99	0.0014	10.25	16490.19	1473.76	0.45	490.24
216.42	488.7	100-yr	169000	1082.00	1098.86	1093.08	1100.93	0.0019	11.56	14613.77	1034.26	0.52	488.7
216.45	756.95	100-yr	169000	1083.00	1099.30	1094.10	1101.58	0.0024	12.11	13950.42	996.83	0.57	268.25
216.55	1122.95	100-yr	169000	1082.67	1101.07	1093.77	1102.79	0.0015	10.53	16051.94	1005.21	0.46	54.5
216.62	1568.16	100-yr	169000	1078.33	1101.81	1093.68	1103.46	0.0014	10.28	16435.26	1119.14	0.45	445.21
216.72	2076.55	100-yr	169000	1080.17	1102.62	1093.19	1104.08	0.0010	9.71	17395.92	899.52	0.39	508.39
Proposed 100-yr													
216.33	0	100-yr	169000	1080.80	1098.36	1091.42	1099.99	0.0014	10.25	16490.19	1473.76	0.45	490.24
216.42	488.7	100-yr	169000	1082.00	1098.86	1093.08	1100.93	0.0019	11.56	14613.77	1034.26	0.52	488.7
216.45	756.95	100-yr	169000	1083.00	1099.30	1094.10	1101.58	0.0024	12.11	13950.42	996.83	0.57	268.25
216.55	1122.95	100-yr	169000	1082.67	1101.11	1093.77	1102.82	0.0015	10.50	16097.72	1005.39	0.46	2
216.62	1568.16	100-yr	169000	1078.33	1101.85	1093.68	1103.49	0.0014	10.26	16475.32	1125.11	0.45	445.21
216.72	2076.55	100-yr	169000	1080.17	1102.65	1093.19	1104.11	0.0010	9.70	17426.78	899.69	0.39	508.39

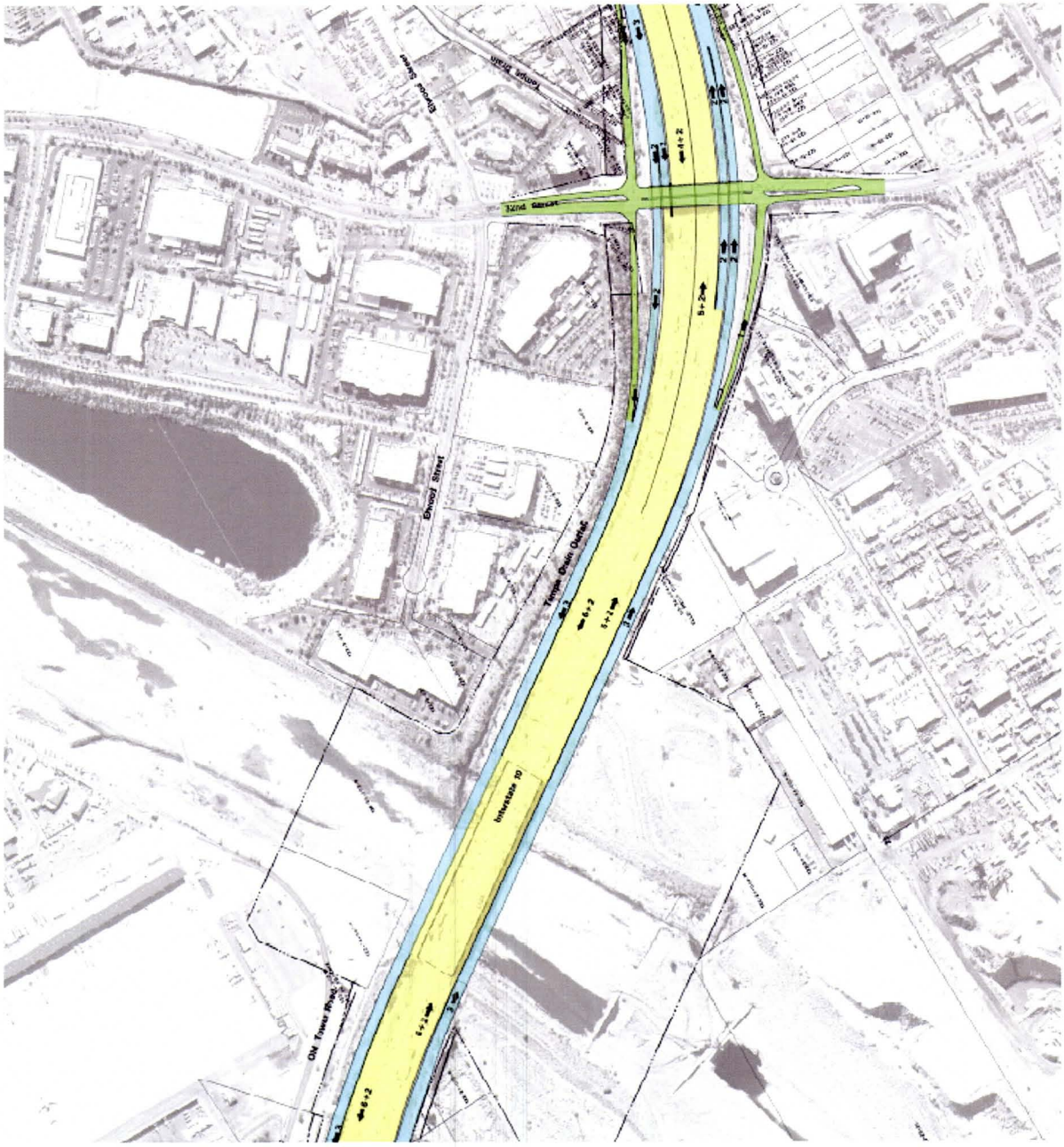


Figure 5 Proposed Bridge and Widening Schematic

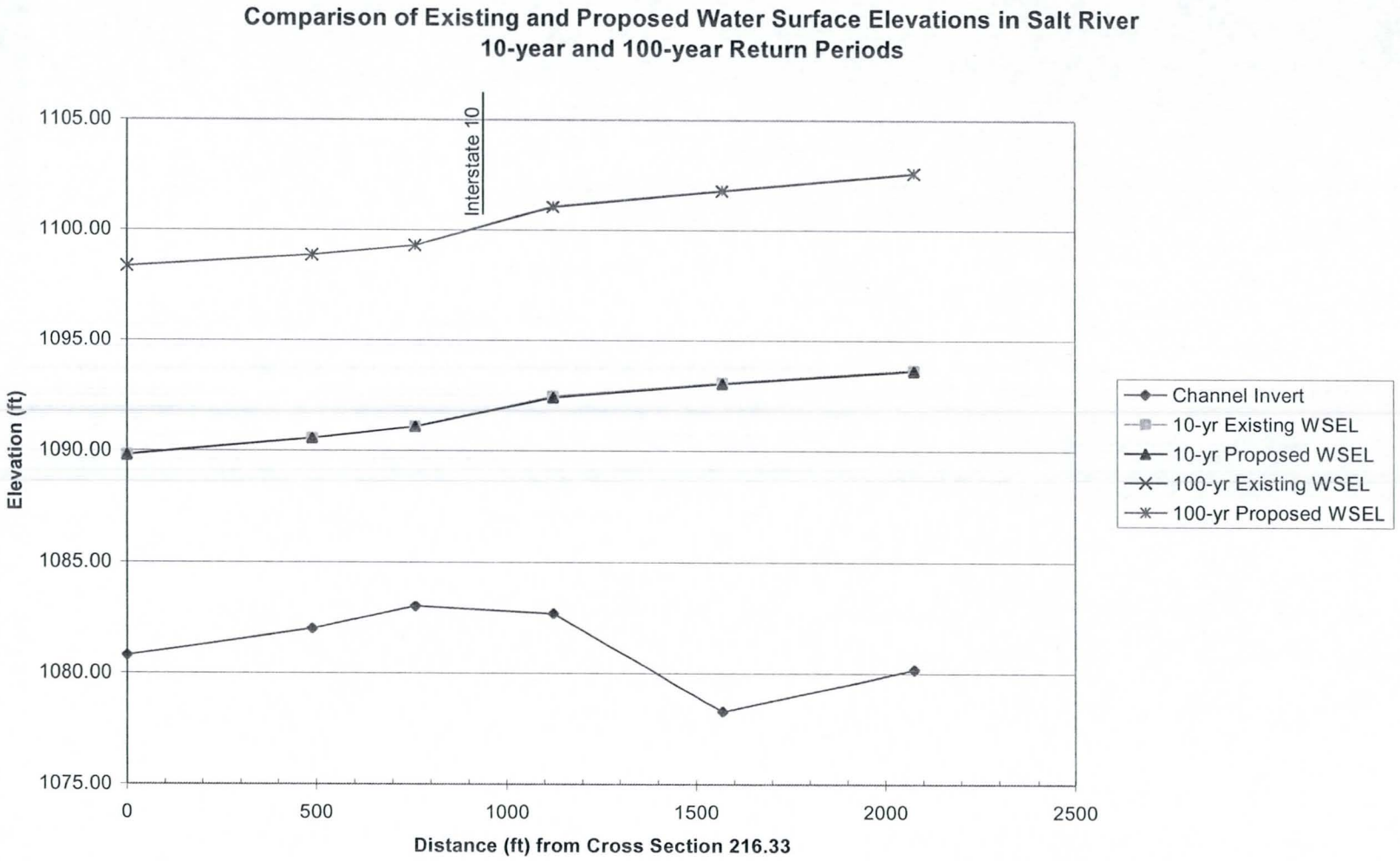


Figure 6 Salt River Existing and Proposed Water Surface Elevations

3.0 Tempe Drain Hydraulic Analysis

The Tempe Drain is an open channel between 52nd Street and the Salt River (Figure 1). The channel is located north of I-10, and it runs adjacent to I-10 between 32nd Street and the Salt River. The Tempe Drain conveys both onsite and offsite storm water.

A hydrologic analysis of the areas contributing to the Tempe Drain was completed by DMJM Harris. This analysis was documented in a report entitled *I-10 Corridor Improvement Study, State Route 51 – Santan Freeway, Pre-Initial Drainage Report, Volumes I and II, August 2003, Revised November 2003.*

The Tempe Drain is responsible for draining a portion of two watersheds, referred to in the DMJM Harris report as the Eastern and Western regions and shown on Figure 7. The Eastern region is bounded on the south by US 60 and on the east by Mill Avenue. The western boundary of the Eastern region is the I-10 and SR 143 corridors. The northern boundary consists of a topographic ridgeline located approximately one-half mile south of and parallel to the Salt River. The Western region is bounded on the south by the peaks of South Mountain and the east by I-10 and SR 143. The western boundary is generally 32nd Street, while the northern boundary is the topographic ridgeline one-half mile south and parallel with the Salt River, west of SR 143.

The Tempe Drain collects and conveys most of the offsite runoff from the Eastern Region; onsite runoff from a significant portion of I-10 between Guadalupe Road and the Salt River, SR 143 south of University Drive, and US 60 west of Priest Drive; offsite runoff collected by the 48th Street storm drain in the Western region and a watershed outside the project area. ?

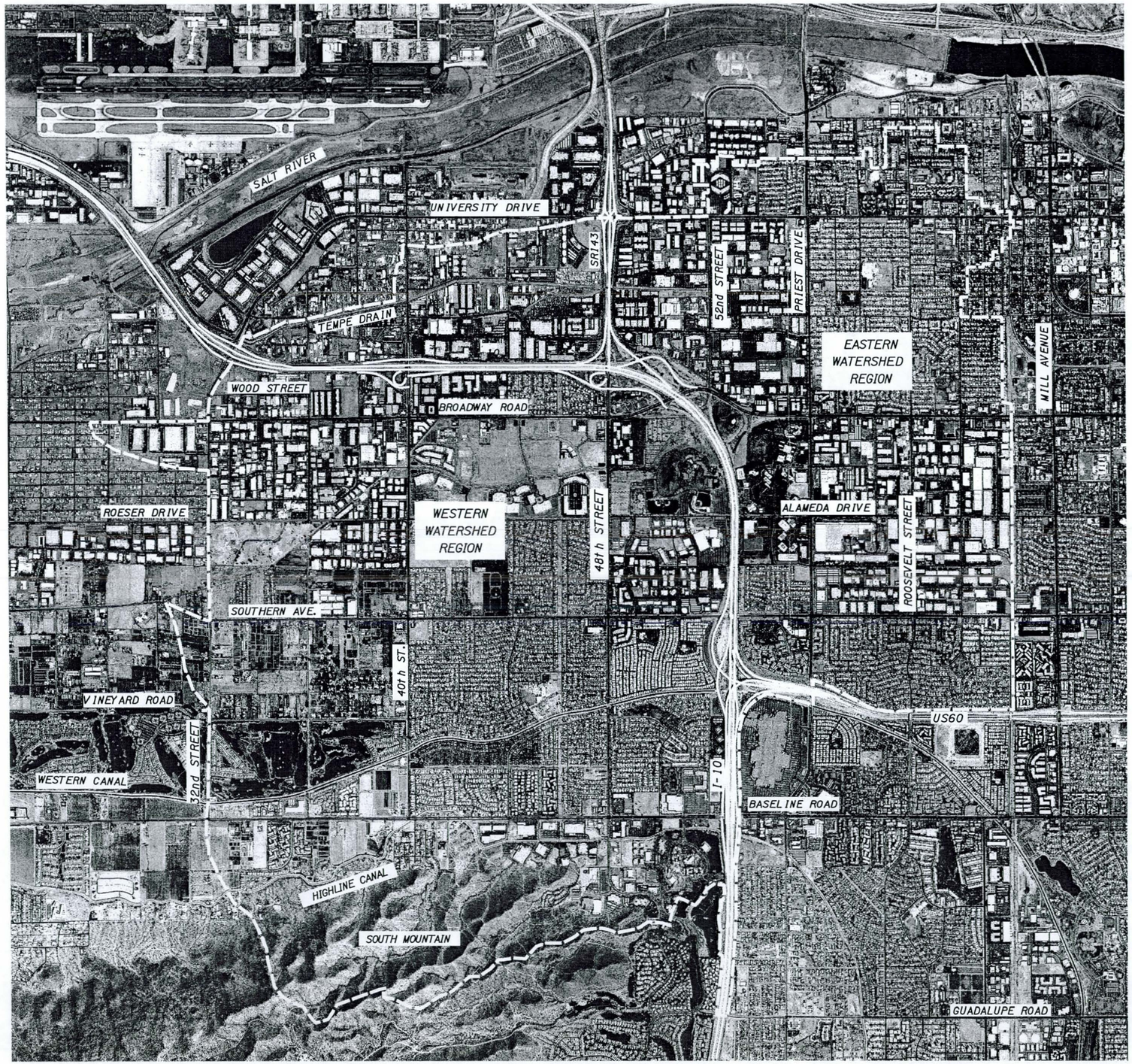
An intergovernmental agreement defines the agency and their flow contribution to the Tempe Drain. The following table summarizes the current discharges permitted into the Tempe Drain.

Table 2 Tempe Drain Flow Contributions

Agency	Discharge (cfs)
ADOT	93.0
Tempe	1268.0
Phoenix	332.0
Association	32.5
	1725.5

During the I-10 Corridor Improvement Study, the westbound 32nd Street on-ramp and a portion of the mainline will encroach onto a portion of the Tempe Drain, as identified in Figure 8. The improvements will be accommodated by containing the open channel in a reinforced concrete box culvert where the proposed lanes will be over the channel.

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



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WATERSHED REGIONS SOUTH OF THE SALT RIVER

Landiscor, June 2002

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES
DESIGN	ABM/CBB	04/03	
DRAWN	CPG	04/03	
CHECKED	JRM	04/03	
DMJM HARRIS 2777 E. CAMELBACK ROAD SUITE 200 PHOENIX, AZ. 85016-4302 (602) 337-2777			WATERSHED REGIONS SOUTH OF THE SALT RIVER
ROUTE I-10	LOCATION I-10 Corridor Improvement Study		DWG. NO.
TRACS NO.		FIGURE 7	___ OF ___

12/21/2007 p:\050048\DMJM\Drainage Report Figures\FIG3-1.DGN

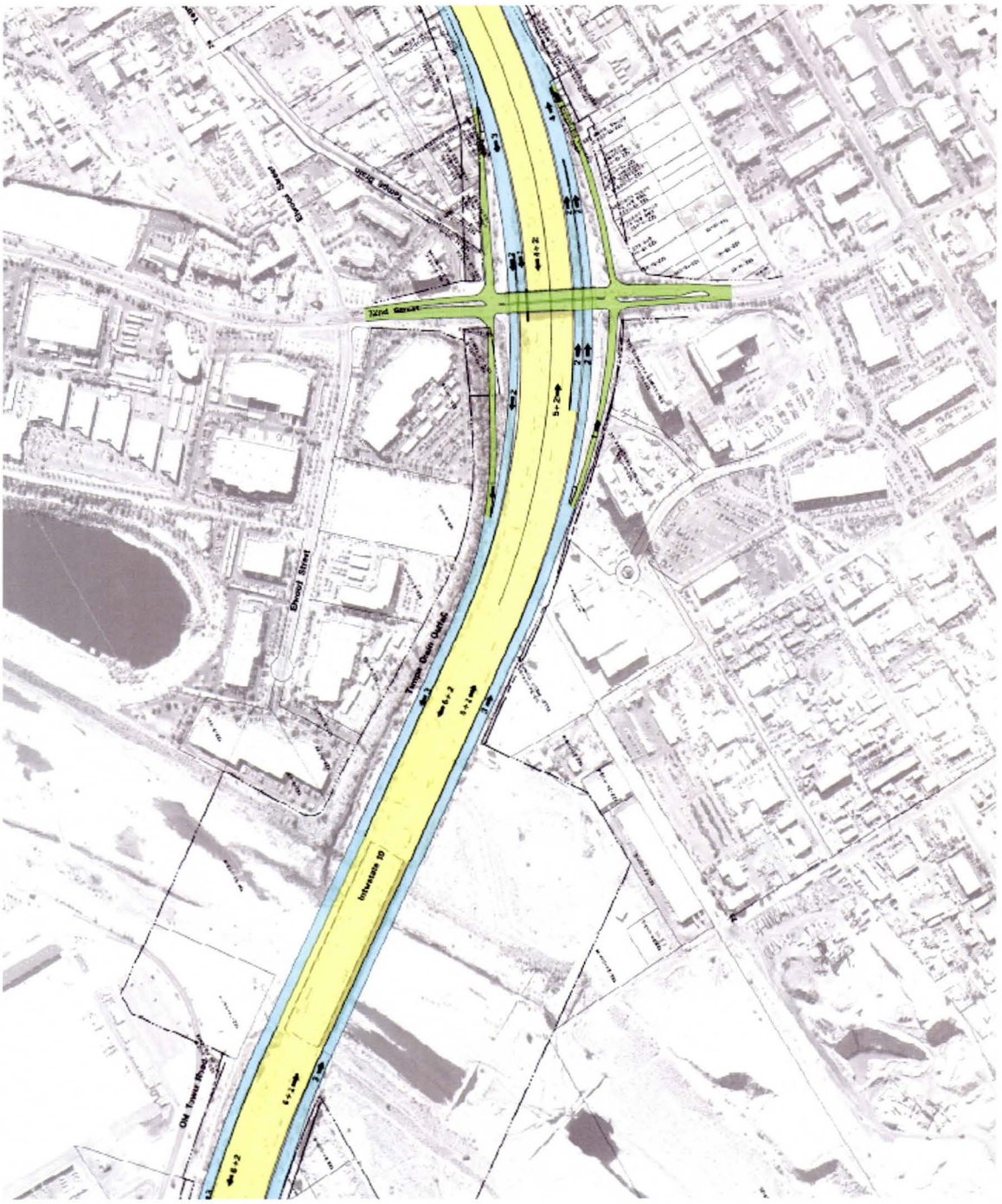


Figure 8 Proposed 32nd Street Configuration and Encroachment onto the Tempe Drain

3.1 Hydrologic Analysis

DMJM Harris obtained the rainfall depths for the hydrology study from the NOAA Atlas 2 and used the PREFRE program to obtain rainfall depths for all return periods. The total watershed area is approximately 12.8 square miles, so an aerial reduction of 0.93 was used. The rainfall data are enclosed in Appendix B.

A HEC-1 schematic is shown in Figure 9, located in a back pocket of this report. The concentration points within the Tempe Drain are denoted on the schematic as "CTDRN#". A HEC-1 analysis was completed for the 10- and 100-year return periods. The HEC-1 output is enclosed in Appendix B. The results of this analysis are summarized below in Table 3:

Table 3 Concentration Points along the Tempe Drain

Concentration Point	Description	Discharge (cfs)	
		10-yr	100-yr
CTDRN3	Tempe Drain East of 32nd Street	2060	3769
CTDRN4	Tempe Drain West of 32nd Street	2286	4174

Flow west of 32nd Street will enter at two locations. The HEC-RAS model has been structured to account for inflows at two locations west of 32nd Street.

The HEC-1 Schematic is enclosed as Figure 13 in a pocket at the back of this memorandum.

3.2 Channel Geometry Upstream (East) of 32nd Street

The upstream portion of the Tempe Drain between the start of the channel at 52nd Street and approximately 32nd Street is a concrete lined channel, as shown in Photo 1. Just upstream of 32nd Street, the channel switches to a riprap lined channel with large cobbles, as shown in Photo 2.

Photo 1 Concrete Section of Tempe Drain

Photo 2 Tempe Drain Downstream of Concrete Section and Upstream (East) of 32nd Street

3.3 Existing Culvert at 32nd Street

There is a four-barrel corrugated metal arch pipe culvert under 32nd Street. Each barrel is 15.33-ft wide by 9.25-ft high. The headwall is flush with the embankments on both the upstream and downstream sides, as shown in Photo 3.

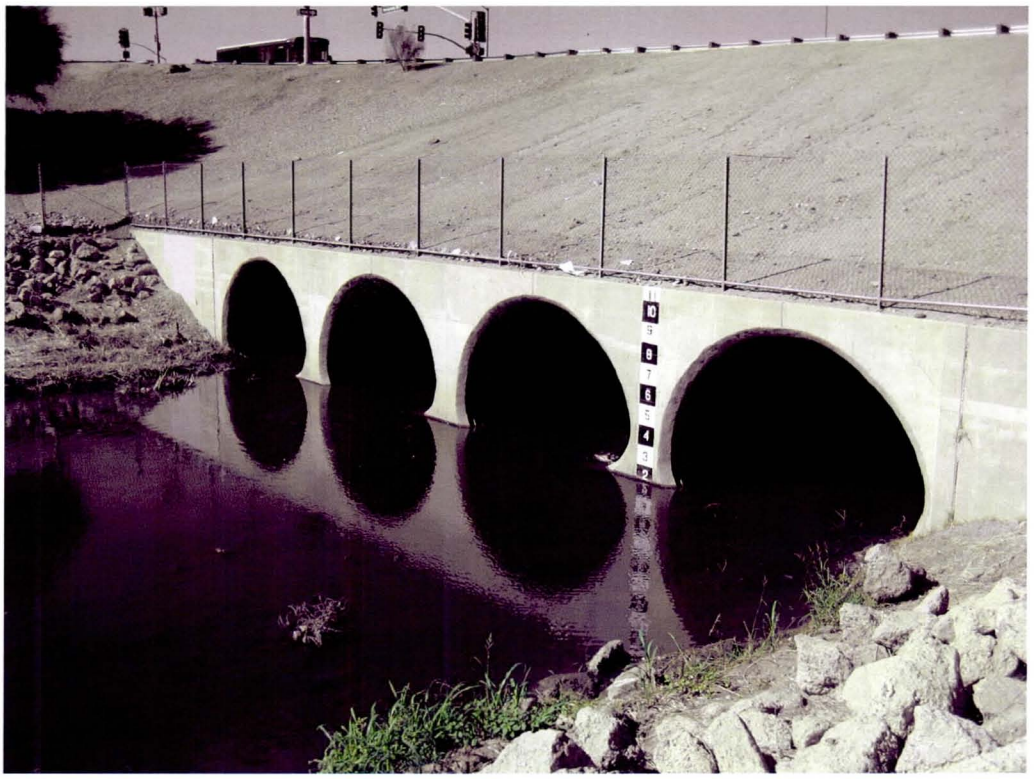


Photo 3 Upstream side of 32nd Street Culvert

3.4 Channel Geometry Downstream (West) of 32nd Street

Downstream (west) of 32nd Street, the channel has large cobbles on the sides of the channel. Currently, the channel is heavily vegetated throughout the length of the channel, as shown in Photos 4 and 5.

Photo 4 Heavy Vegetation in Tempe Drain Downstream of the 32nd Street Culvert

Photo 5 Moderately Heavy Vegetation in Tempe Drain near Channel Outfall to the Salt River

3.5 Selection of Manning's Roughness Coefficients

The HEC-RAS model requires input of Manning's roughness coefficients throughout the channel. The roughness coefficient depends on several factors including the base value, degree of channel irregularity, effects of obstructions, vegetation, variation in channel cross section, and degree of meandering.

Throughout the modeled section, the channel is relatively uniform and straight. For the concrete section of channel with no irregularity, obstructions, vegetation, variation in channel cross section, or meandering, a Manning's roughness coefficient of 0.02 was used for the channel.

Just upstream of 32nd Street, the channel transitions from concrete to riprap. The channel is riprap lined from just east of 32nd Street to the Salt River. The hydraulic capacity analysis of the existing channel assumed a clean channel (vegetation removed). For this portion of the channel there is also minimal irregularity, obstructions, variation in channel cross section, or meandering. Therefore, a Manning's roughness coefficient of 0.040 was selected.

3.6 Boundary Conditions

The HEC-RAS models were run with boundary conditions at the upstream and downstream ends of the channel. At the upstream end of the model, the water surface was assumed to be normal depth with a slope equal to the channel slope (S=0.0049 ft/ft). At the downstream end, the water surface elevation in the Salt River will govern.

Since the times of concentration for the Salt River and Tempe Drain are significantly different, it is assumed that the flood peaks in the Salt River and Tempe Drain will not occur coincidently. First, the model was run using the 100-year water surface elevation in the Salt River with the 10-year discharge in the Tempe Drain. Then, it was run using the 10-year water surface elevation in the Salt River with the 100-year discharge in the Tempe Drain. The greatest water surface elevation produced by either combination was utilized to define the controlling water surface elevation.

3.7 Existing Conditions Hydraulic Model

A HEC-RAS model of the existing condition was developed for the existing channel condition under a clean vegetative condition. A work map showing the HEC-RAS cross sections and topography is shown on Figure 14 (back pocket). The existing conditions model was run using a 10-year flow in the Tempe Drain with a 100-year water surface elevation in the Salt River and a 100-year flow in the Tempe Drain with a 10-year water surface elevation in the Salt River. The results are shown on Figure 9.

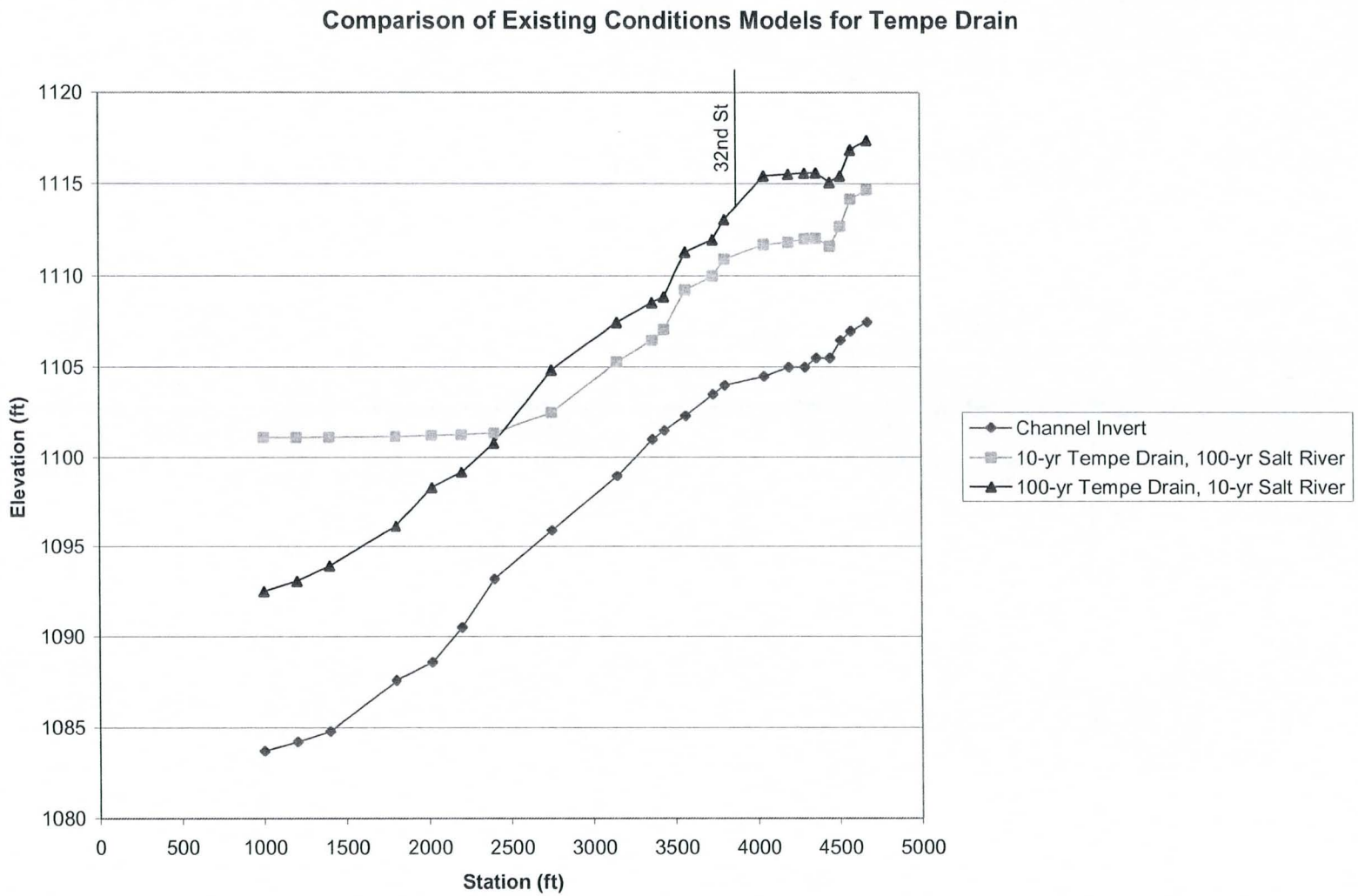


Figure 9 HEC-RAS Model for Existing Conditions

3.8 Proposed Conditions Hydraulic Model

Under the proposed condition, a portion of the Tempe Drain will need to be contained in a box culvert because the roadway improvements will encroach onto the existing channel. The channel between Station 3365 and Station 2020 will be contained in a five barrel 12 × 8-ft reinforced concrete box culvert.

To estimate the appropriate culvert size, the open area of the four barrel corrugated metal pipe arch culvert at 32nd Street and the existing open channel width and depth were utilized. Each barrel of the arch culvert measures a span of 15.33-ft and a rise of 9.25-ft. This provides an open area of 109 square feet per barrel. Since the culvert has four barrels, the 32nd Street culvert has a total open area of 436 square feet.

A five barrel 12 × 8-ft (span by rise) concrete box culvert provides an open area of 480 square feet. The height of the culvert will fit within the depth of the existing channel.

To accommodate this culvert, some modification will need to be completed to the channel downstream of the existing 32nd Street culvert. It is assumed that the channel between the 32nd Street culvert and new culvert and between the outlet of the new culvert and the Salt River will be reconstructed with gunite. The concrete finish will provide the necessary channel capacity and reduce long-term maintenance.

The 32nd Street culvert has a width of 64-ft. The new culvert will also have a width of 64-ft, assuming five 12-ft barrels with a 1-ft wall thickness between each barrel. Transitions will be constructed between the 64-ft wide culverts and a reduced channel width that can fit within the available right-of-way. Between the 32nd Street culvert and the new culvert, the channel will transition from a 64-ft width to a channel having a bottom width of 40-ft, as shown in Figure 10. This is the largest channel that can fit within the available right-of-way. Downstream of the new culvert, the channel will transition from a 64-ft width to a channel having a bottom width of 50-ft. As shown in this figure, a 14-ft maintenance road adjacent to the new retaining wall for the roadway on the south side and a 16-ft maintenance road on the north side of the channel are assumed. The sides slopes of the gunite channel will be 2:1.

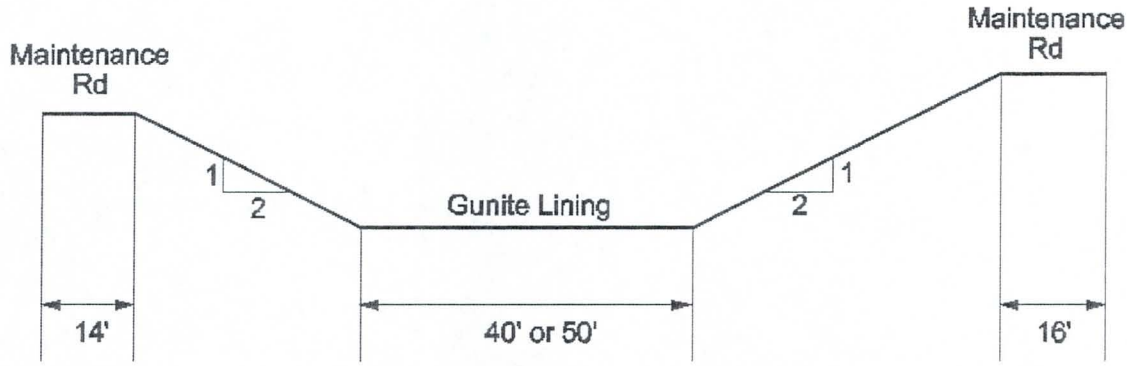


Figure 10 Channel Geometry

Figures 11 and 12 compare the existing and proposed conditions for the 10- and 100-year storm events, respectively.

The water surface elevations at all cross sections common to both the existing and proposed models were compared. As shown in Figures 11 and 12, the water surface elevation for the proposed condition for both the 10- and 100-yr storm events is always less than or equal to the existing condition water surface elevations throughout the length of the channel.

The HEC-RAS model output for the 10- and 100-year storm events is enclosed in Appendix C.

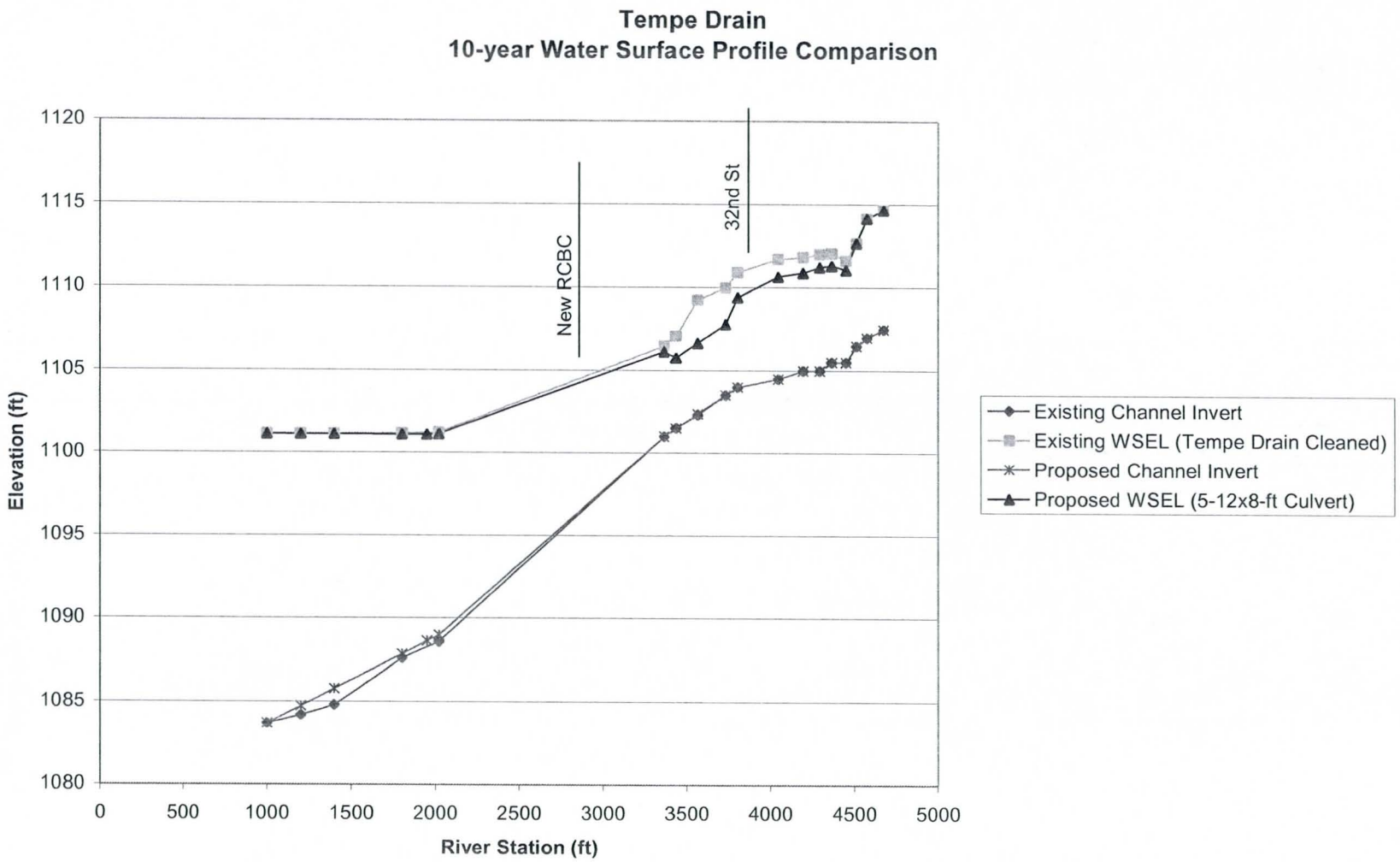


Figure 11 Existing and Proposed Conditions for 10-year storm event for Tempe Drain

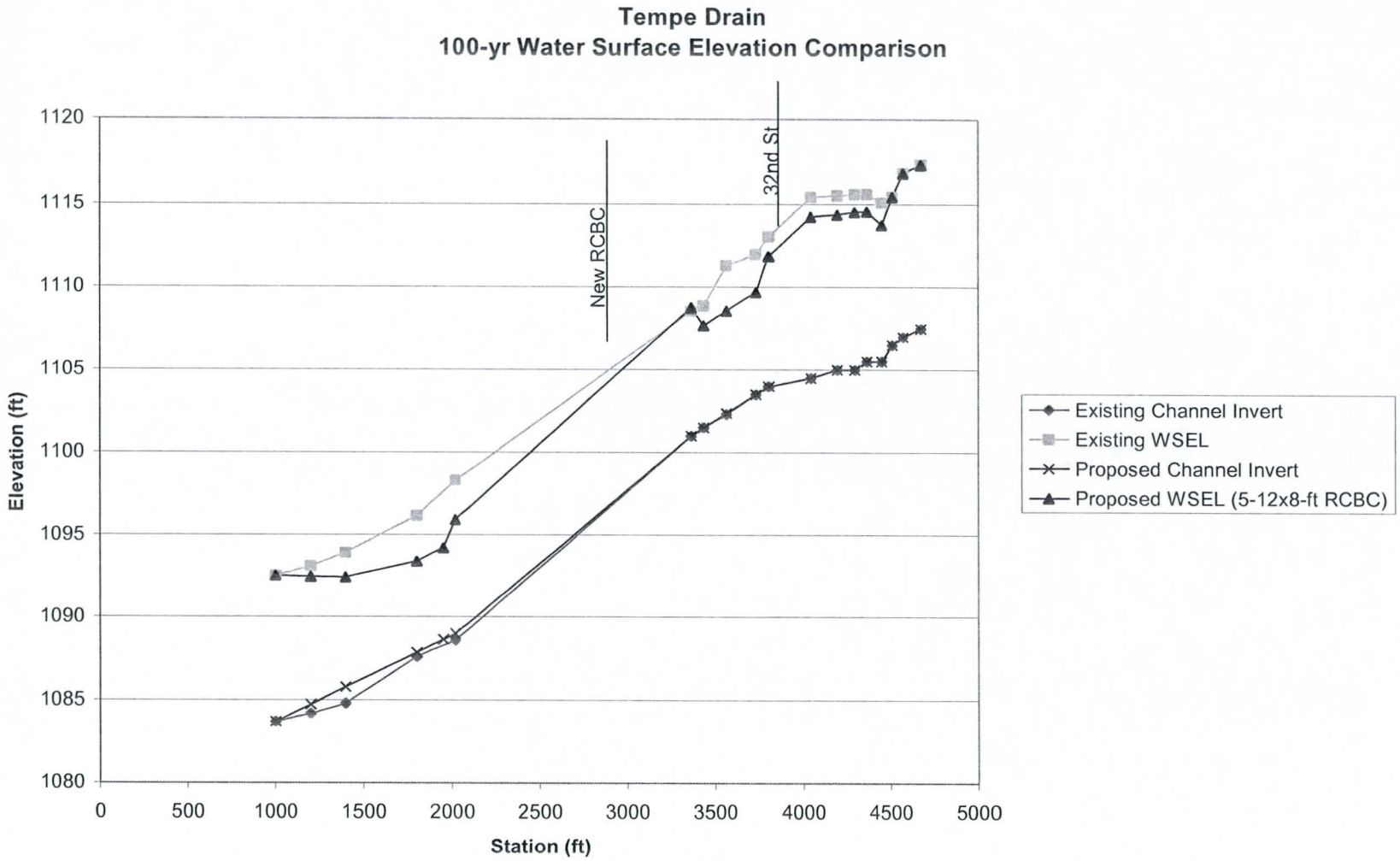


Figure 12 Existing and Proposed Conditions for the 100-year storm event for Tempe Drain

4.0 Conclusion

The width of the existing bridge over the Salt River will be expanded 61 feet. In addition, two new bridges (52-ft wide each) will also be added on either side of the existing bridge to accommodate the proposed local lanes. The piers for the existing bridge expansion and new bridges will be aligned with the existing piers to minimize impact to the river. A HEC-RAS analysis of the Salt River in this area revealed that this additional width has minimal effect the water surface elevations for both the 10- or 100-year storm events.

Due to the proposed roadway widening, the Tempe Drain must be contained within a five-barrel 12 × 8-ft reinforced concrete box culvert for a portion of channel length west of 32nd Street. The channel downstream of the 32nd Street culvert and the Salt River will be modified to accommodate the new culvert, increase capacity, and reduce maintenance.

The existing channel is a riprap lined channel with 3:1 sides slopes and heavy vegetation, which greatly reduces channel capacity. To increase channel conveyance and reduce maintenance, a gunite channel is proposed. Between the 32nd Street culvert and the entrance to the new culvert, the new gunite channel will transition from a 64-ft width at the culvert face to a channel having a 40-ft bottom width, 2:1 side slopes, and maintenance roads on both sides of the channel. Downstream of the new culvert, the new gunite channel will transition from a 64-ft width at the culvert face to a channel having a 50-ft bottom width, 2:1 side slopes, and maintenance roads on both sides of the channel.

Based on the new configuration, the water surface elevations for the 10- and 100-year storm events are equal to or less than the water surface elevations of the existing channel, assuming a clean vegetative condition.

Appendix A

HEC-RAS Model Errors for Salt River

River: "Salt River" Reach: "Reach 4" RS:224.21 BR

- Bridge/Culvert has an upstream distance of zero, HEC-RAS requires a positive distance between the upstream cross section and the face of the bridge. A zero distance was allowed in versions prior to 3.0. A table was added to the geometric data editor to facilitate global editing of bridge distances and widths. Some length will need to be added to the upstream distance column and an amount greater than that will have to be subtracted from the bridge width column.

River: "Salt River" Reach: "Reach 4" RS:224.13 BR

- Bridge/Culvert has an upstream distance of zero, HEC-RAS requires a positive distance between the upstream cross section and the face of the bridge. A zero distance was allowed in versions prior to 3.0. A table was added to the geometric data editor to facilitate global editing of bridge distances and widths. Some length will need to be added to the upstream distance column and an amount greater than that will have to be subtracted from the bridge width column.

River: "Salt River" Reach: "Reach 4" RS:220.05 BR

- Bridge/Culvert has an upstream distance of zero, HEC-RAS requires a positive distance between the upstream cross section and the face of the bridge. A zero distance was allowed in versions prior to 3.0. A table was added to the geometric data editor to facilitate global editing of bridge distances and widths. Some length will need to be added to the upstream distance column and an amount greater than that will have to be subtracted from the bridge width column.

Appendix B

Tempe Drain HEC-1 Analysis

10- and 100-year return periods

and

Rainfall Data

Project:	**I-10 CD Roads**	By:	**ALU**
Location :	**I-10 - Second Segment**	Date:	**Dec-07**
Subject :	**ADOT Hydrology Manual**	Project #:	**5.0048**

RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET
AND INTENSITY-DURATION-FREQUENCY (I-D-F)CURVES

Determine rainfall depths from the isopluvial maps

2-year, 6-hour	P2,6' =	1.2
2-year, 24-hour	P2,24' =	1.4
100-year, 6-hour	P100,6' =	3.3
100-year, 24-hour	P100,24' =	3.8
Short Duration Frequency Zone	Zone =	8

Depth - Duration - Frequency (DDF)

	Rainfall Depth, in inches						
	Frequency, in years						
Duration	**2**	**5**	**10**	**25**	**50**	**100**	**500**
5-min	0.33	0.44	0.52	0.63	0.71	0.80	0.99
10-min	0.49	0.67	0.79	0.96	1.09	1.22	1.52
15-min	0.59	0.84	1.00	1.22	1.40	1.57	1.97
30-min	0.79	1.12	1.34	1.65	1.89	2.13	2.67
1-hour	0.96	1.38	1.67	2.06	2.36	2.66	3.35
2-hour	1.04	1.50	1.81	2.23	2.55	2.88	3.62
3-hour	1.10	1.58	1.90	2.34	2.68	3.02	3.81
6-hour	1.20	1.73	2.08	2.56	2.93	3.30	4.15
12-hour	1.30	1.86	2.24	2.76	3.15	3.55	4.46
24-hour	1.40	2.00	2.40	2.95	3.38	3.80	4.78

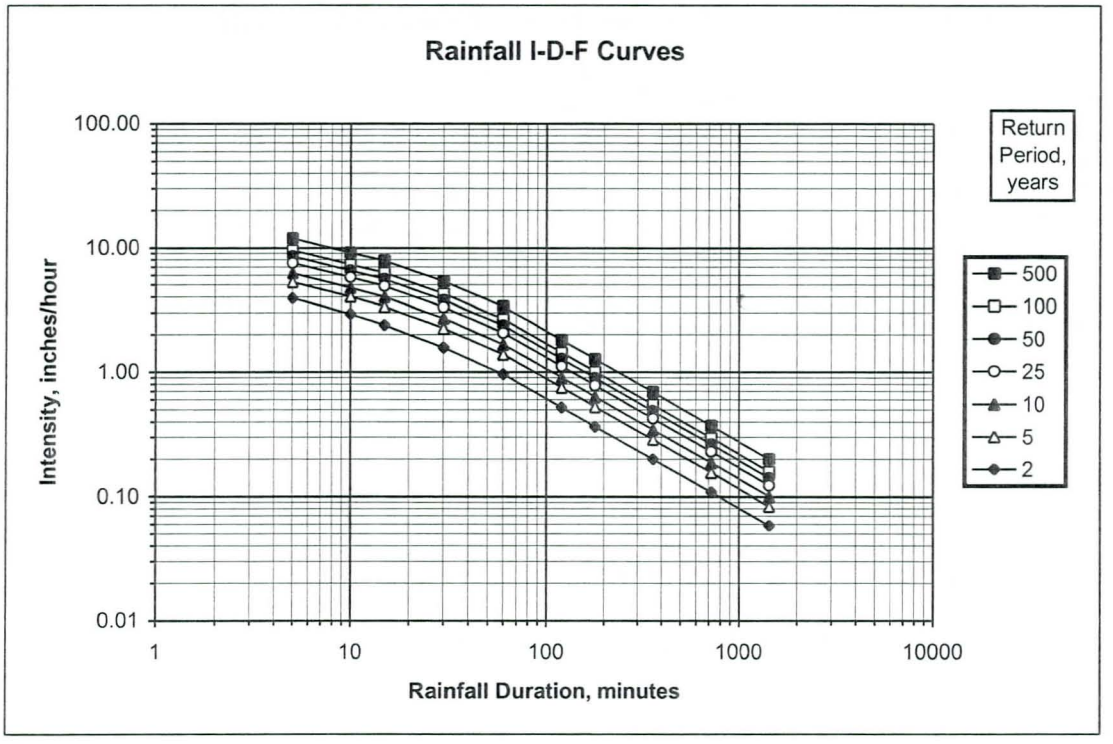
T1N, R3E, Sec. 24

- Total Drainage Area = 12.8 mi^2
  - ↳ use an aerial reduction factor of 0.93

Project:	**I-10 CD Roads**	By:	**ALU**
Location :	**I-10 - Second Segment**	Date:	**Dec-07**
Subject :	**ADOT Hydrology Manual**	Project #:	**5.0048**

Intensity - Duration - Frequency (IDF)

Rainfall Intensity, in inches per hour								
		Frequency, in years						
Duration	**minutes**	**2**	**5**	**10**	**25**	**50**	**100**	**500**
5-min	5	3.91	5.29	6.23	7.55	8.56	9.57	11.90
10-min	10	2.93	4.01	4.75	5.77	6.55	7.34	9.14
15-min	15	2.38	3.34	3.99	4.89	5.58	6.27	7.86
30-min	30	1.57	2.24	2.69	3.31	3.78	4.25	5.34
1-hour	60	0.96	1.38	1.67	2.06	2.36	2.66	3.35
2-hour	120	0.52	0.75	0.90	1.11	1.28	1.44	1.81
3-hour	180	0.37	0.53	0.63	0.78	0.89	1.01	1.27
6-hour	360	0.20	0.29	0.35	0.43	0.49	0.55	0.69
12-hour	720	0.11	0.16	0.19	0.23	0.26	0.30	0.37
24-hour	1440	0.06	0.08	0.10	0.12	0.14	0.16	0.20



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 *              JUN   1998               *                                    *    HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1                *                                    *          609 SECOND STREET            *
 *                                       *                                    *       DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   21NOV07  TIME  16:22:36   *                                    *          (916) 756-1104               *
 *                                       *                                    *                                       *
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                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX        XXX

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT                                                    PAGE  1

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    1           ID   Project ID: I-10 SALT - Major Basin: 01 - Return Period: 100 Years
    2           ID
    3           ID                     I-10 Corridor Improvement Study - Buckeye Road to Baseline Road
    4           ID
    5           ID  ***************************************************************************
    6           ID
    7           ID           Prepared for:
    8           ID
    9           ID                     Arizona Department of Transportation
   10           ID
   11           ID  ***************************************************************************
   12           ID           Prepared by:
   13           ID
   14           ID                     DMJM+HARRIS
   15           ID                     2777 E. Camelback Road, Ste. 200
   16           ID                     Phoenix, AZ  85016-4302
   17           ID                     (602) 337-2777
   18           ID
   19           ID   ===========================================================================
   20           ID   Salt River - Southern Watershed
   21           ID   Existing Conditions
   22           ID   100 Year - 6 Hour Event
   23           ID   Clark Unit Hydrograph
   24           ID   Green-Ampt Precipitation Losses
   25           ID   August 2003
   26           ID   ===========================================================================
   27           ID
   28           ID   File: I10S1006.dat
   29           ID
   30           ID  ***************************************************************************
                *DIAGRAM
   31           IT       2                    1000.
   32           IO       5       0
                *  IO     0       0
   33           IN      15
                *

   34           KK    SW06   BASIN
   35           KM   Runoff from Sub-basin SW06
   36           BA   0.698
   37           PB   3.072
   38           PC   0.000   0.014   0.019   0.029   0.046   0.060   0.072   0.085   0.099   0.112
   39           PC   0.128   0.144   0.167   0.213   0.296   0.469   0.674   0.802   0.873   0.916
   40           PC   0.947   0.960   0.973   0.987   1.000
   41           LG    0.19    0.29    4.60    0.37      54
   42           UC   0.513   0.405
   43           UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
   44           UA     100

   45           KK    DW06
   46           KM   Diversion for Retention in SW06
   47           KM   16% of Sub-basin Area Drains to Retention Basins
   48           DT  RETW06   11.31
   49           DI       0   10000
   50           DQ       0    1600
1                                                HEC-1 INPUT                                                    PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  51          KK   DW06C
  52          KM   Diversion for Retention in Western and Highline Canals
  53          KM   Western Canal - L=2850', W=50', H=2.1', Volume = 6.87 ac-ft.
  54          KM   Highline Canal - L=3600', W=20', H=1.3', Volume = 2.15 ac-ft.
  55          DT   RW06C    9.02
  56          DI       0   10000
  57          DQ       0   10000

  58          KK  DSW06N
  59          KM   Diversion of Runoff from SW06 East to 48th St. via 60" RCP @ 0.68% (233 cfs)
  60          DT  DSW06E
  61          DI       0     233   10000
  62          DQ       0     233     233

  63          KK  RSW06N
  64          KM   Route Flow from SW06 to CSO40
  65          RS      17    FLOW      -1
  66          RC    .025    .016    .025    7200   .0039
  67          RX       0       1      15      16      84      85      99     100
  68          RY       4       1      .5       0       0      .5       1       4

  69          KK    SW08   BASIN
  70          KM   Runoff from Sub-basin SW08
  71          BA   0.591
  72          LG    0.19    0.31    4.80    0.30      44
  73          UC   0.433   0.327
  74          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  75          UA     100

  76          KK    DW08
  77          KM   Diversion for Retention in SW08
  78          KM   14% of Sub-basin Area Drains to Retention Basins
  79          DT  RETW08    5.50
  80          DI       0   10000
  81          DQ       0    1400

  82          KK   DW08C
  83          KM   Diversion for Retention in Western and Highline Canals
  84          KM   Western Canal - L=2750', W=50', H=2.1', Volume = 6.63 ac-ft.
  85          KM   Highline Canal - L=3100', W=20', H=1.3', Volume = 1.85 ac-ft.
  86          DT   RW08C    8.48
  87          DI       0   10000
  88          DQ       0   10000

  89          KK  RW8TSO
  90          KM   Route Flow from SW08 to CSO40
  91          RS      13    FLOW      -1
  92          RC    .025    .016    .025    5700   .0044
  93          RX       0       1      15      16      84      85      99     100
  94          RY       4       1      .5       0       0      .5       1       4
1                                          HEC-1 INPUT                                                PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  95          KK    SW14   BASIN
  96          KM   Runoff from Sub-basin SW14
  97          BA   0.564
  98          LG    0.28    0.26    4.70    0.36      15
  99          UC   1.000   0.660
 100          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 101          UA     100

 102          KK    DW14
 103          KM   Diversion for Retention in SW14
              *  *** Estimated Volume ***
 104          DT  RETW14     .23
 105          DI       0   10000
 106          DQ       0     100

 107          KK   CSO40
 108          KM   Combine Hydrographs from RWC2N and RWC3N
 109          HC       3

 110          KK  DSO40N
 111          KM   Diversion of Runoff from CSO40 West to CSO32
 112          KM   Storm Drain to North - 60" RCP @ 0.50% (200 cfs); Remainder is split 45% West
 113          DT  DSO40W
 114          DI       0     200    1000
 115          DQ       0       0     360

 116          KK  R40TBW
 117          KM  Route Flow from along 40th St from Southern to Broadway
 118          RS      13    FLOW      -1
 119          RC    .025    .016    .025    5280   .0036
 120          RX       0       1      15      16      84      85      99     100
 121          RY       4       1      .5       0       0      .5       1       4
              *

 122          KK    SW24   BASIN
 123          KM   Runoff from Sub-basin SW24
 124          BA   0.105
```

```
 125          LG    0.16    0.17    8.40    0.09      64
 126          UC   0.283   0.268
 127          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 128          UA     100

 129          KK    DW24
 130          KM   Diversion for Retention in SW24
 131          KM   Sub-basin Area Retention (0.44) and Simulation of Detention in ADOT ROW (4.87
 132          DT  RETW24    5.31
 133          DI       0   10000
 134          DQ       0    5700
              *
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 135          KK    SE18   BASIN
 136          KM   Runoff from Sub-basin SE18
 137          BA   0.183
 138          LG    0.17    0.16    8.00    0.11      55
 139          UC   0.779   0.517
 140          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 141          UA     100

 142          KK    DE18
 143          KM   Diversion for Retention in SE18
 144          KM   35% of Sub-basin Area Drains to Retention Basins
 145          DT  RETE18    3.72
 146          DI       0   10000
 147          DQ       0    3800

 148          KK   SE18N
 149          KM   Diversion West for Storm Drains crossing I-10 at Fairmont
 150          KM   Storm Drain - 30" RCP @ 0.20% (18 cfs)
 151          DT  DSE18W
 152          DI       0      18    1000
 153          DQ       0      18      18

 154          KK  RSE18N
 155          KM   Route SE18 from Alameda to Broadway via Storm Drain
 156          RD    3000   .0027    .013            CIRC     4.5

 157          KK    SE20   BASIN
 158          KM   Runoff from Sub-basin SE20
 159          BA   0.167
 160          LG    0.19    0.22    7.00    0.15      51
 161          UC   0.625   0.421
 162          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 163          UA     100

 164          KK   DSE20
 165          KM   Diversion for Retention in SE20
 166          KM   80% of Sub-basin Area Drains to Retention Basins
 167          DT  RETE20   11.89
 168          DI       0   10000
 169          DQ       0    8600

 170          KK  CBWPRW
 171          KM   Combine Hydrographs at Broadway West of Priest
 172          HC       2
              *

 173          KK    SE19   BASIN
 174          KM   Runoff from Sub-basin SE19
 175          BA   0.238
 176          LG    0.18    0.26    4.55    0.45      47
 177          UC   0.713   1.018
 178          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 179          UA     100
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 180          KK    DE19
 181          KM   Diversion for Retention in SE19
 182          KM   Simulation of Existing Detention in ADOT ROW(original design volumes)
 183          DT  RETE19   88.85
 184          DI       0   10000
 185          DQ       0    5000

 186          KK  R19T21
 187          KM   Route SE19 along I-10 to CBW52A via Storm Drain
 188          RD    6100   .0023    .013            CIRC     5.0

 189          KK    SE21   BASIN
 190          KM   Runoff from Sub-basin SE21
 191          BA   0.114
 192          LG    0.14    0.17    6.80    0.18      82
 193          UC   0.608   0.805
 194          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 195          UA     100

 196          KK  CBW52A
```

```
 197          KM   Combine Hydrographs from SE19 and SE21
 198          HC       2

 199          KK    DE21
 200          KM   Diversion for Retention in SE21
 201          KM   Preliminary Simulation of Existing Detention (original design storage volume)
 202          DT  RETE21   17.66
 203          DI       0   10000
 204          DQ       0    5000

 205          KK  CBW52B
 206          KM   Combine Hydrographs from CBW52A and CBWPRW
 207          HC       2
              *

 208          KK  RBW52W
 209          KM   Route CBW52 from 52nd Street at Broadway west to Highway 143 via Storm Drain
 210          RD    2700   .0027    .013            CIRC     4.5

 211          KK    SE22   BASIN
 212          KM   Runoff from Sub-basin SE22
 213          BA   0.137
 214          LG    0.15    0.15    8.80    0.08      58
 215          UC   1.500   2.705
 216          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 217          UA     100

 218          KK    DE22
 219          KM   Diversion for Retention in SE22
 220          KM   Simulation of Detention in Adot ROW
              *  *** Estimated Volume ***
 221          DT  RETE22       5
 222          DI       0   10000
 223          DQ       0    5000
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 224          KK   CBWTI
 225          KM   Combine Flows from Broadway Storm Drain and SE22
 226          HC       2

 227          KK  C143TI
 228          KM   Combine Hydrographs from SW24 and CBWTI
 229          HC       2
              *
              *
              * ****** EXCERPT FROM GUADALUPE FRS DAMBREAK HYDROLOGY ******
              *            Prepared by Greiner, Inc., August 1989
              *

 230          KK    QDA1
 231          KM    CALCULATE RUNOFF FROM DA1
 232          BA    0.55
 233          LS              95
 234          UD    0.60

 235          KK    QDA2
 236          KM    CALCULATE RUNOFF FROM DA2
 237          BA    0.36
 238          LS              95
 239          UD    0.44

 240          KK      C1
 241          KM    COMBINE HYDROGRAPHS QDA1 AND QDA2
 242          HC       2

 243          KK     RC1
 244          KM    ROUTE HYDROGRAPH C1 THRU DA3
              *  RM     3    0.07    0.20
              *  **** Revised NSTPS to avoid Error Message ****
 245          RM       5    0.07    0.20

 246          KK    QDA3
 247          KM    CALCULATE RUNOFF FROM DA3
 248          BA    0.37
 249          LS              95
 250          UD    0.53

 251          KK    QDA4
 252          KM    CALCULATE RUNOFF FROM DA4
 253          BA    0.14
 254          LS              95
 255          UD    0.28

 256          KK      C2
 257          KM    COMBINE HYDROGRAPHS RC1, QDA3 AND QDA4
 258          HC       3
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 259          KK     RC2
```

```
 260          KM    ROUTE HYDROGRAPH C2 THRU DA5
 261          RM       1    0.06    0.20

 262          KK    QDA5
 263          KM    CALCULATE RUNOFF FROM DA5
 264          BA    0.05
 265          LS              95
 266          UD    0.14

 267          KK      C3
 268          KM    COMBINE HYDROGRAPHS C2 & QDA5--TOTAL PIMA WASH FLOW AT 48TH STREET
 269          HC       2

 270          KK     RC3
 271          KM    ROUTE HYDROGRAPH C3 THRU DA6
              *   RM      1    0.05    0.25
              *  **** Revised NSTPS to avoid Error Message ****
 272          RM       3    0.05    0.25

 273          KK    QDA6
 274          KM    CALCULATE RUNOFF FROM DA6
 275          BA    0.07
 276          LS            93.3
 277          UD    0.10

 278          KK      C4
 279          KM    COMBINE HYDROGRAPHS C3 AND QDA6--TOTAL PIMA WASH FLOW INTO FRS
 280          HC       2

 281          KK    QDA7
 282          KM    CALCULATE RUNOFF FROM DA7
 283          BA    0.12
 284          LS              94
 285          UD    0.20

 286          KK    QDA8
 287          KM    CALCULATE RUNOFF FROM DA8
 288          BA    0.09
 289          LS           81.4
 290          UD    0.16

 291          KK      C5
 292          KM    COMBINE HYDROGRAPHS C4, QDA7 & QDA8--TOTAL FLOW INTO FRS N. OF GUADALUPE RD.
 293          HC       3

 294          KK    QDA9
 295          KM    CALCULATE RUNOFF FROM DA9
 296          BA    0.06
 297          LS              85
 298          UD    0.10
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 299          KK      C6
 300          KM    COMBINE HYDROGRAPHS C5 AND QDA9--TOTAL FRS INFLOW
 301          HC       2
              *
              * ****** EXCERPT FROM GUADALUPE FRS DAMBREAK HYDROLOGY ******
              *
              *  *** Following not used and substituted with FRS Hydrology ***
              *  KK  SW02
              *  KM Runoff from Sub-basin SW02
              *  BA     3
              *  LG   .29     .25     4.1     .57      31
              *  UC    .6      .6
              *

 302          KK    DFRS
 303          KM   Guadalupe Flood Retardant Structure
 304          DT  RETFRS
 305          DI       0   10000
 306          DQ       0   10000
              *  *** Reservoir Routing not necessary Due to FRS capacity for 50% PMF ***
              *  RS          STOR
              *  SV
              *  SQ

 307          KK   RTFRS
 308          KM   Route Flow from FRS to CWC1
 309          RS       6    FLOW      -1
 310          RC    .025    .016    .025    5900   .0088
 311          RX       0       1      15      16      84      85      99     100
 312          RY       4       1      .5       0       0      .5       1       4

 313          KK    SW04   BASIN
 314          KM   Runoff from Sub-basin SW04
 315          BA   0.689
 316          LG    0.21    0.27    4.25    0.50      43
 317          UC   0.488   0.294
 318          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 319          UA     100

 320          KK    DW04
```

```
 321          KM   Diversion for Retention in SW04
 322          KM   8% of Sub-basin Area Drains to Retention Basins
 323          DT  RETW04    3.85
 324          DI       0   10000
 325          DQ       0     800

 326          KK   DW04C
 327          KM   Diversion for Retention in Western and Highline Canals
 328          KM   Western Canal - L=3050', W=50', H=2.1', Volume = 7.35 ac-ft.
 329          KM   Highline Canal - L=3050', W=20', H=1.3', Volume = 1.82 ac-ft.
 330          DT   RW04C    9.17
 331          DI       0   10000
 332          DQ       0   10000
1                                        HEC-1 INPUT                                                    PAGE  9

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 333          KK    CWC1
 334          KM   Combine Hydrographs from RTFRS and SW04
 335          HC       2

 336          KK  RSW06E
 337          KM   Retrieve Hydrograph from Diversion DSW06
 338          DR  DSW06E

 339          KK    CWC2
 340          KM   Combine Hydrographs from CWC1 and DSW06
 341          HC       2

 342          KK  R48TBW
 343          KM   Route Flow from CWC2 along 48th St to Broadway
 344          RS      15    FLOW      -1
 345          RC    .025    .016    .025    7300   .0051
 346          RX       0       1      15      16      84      85      99     100
 347          RY       4       1      .5       0       0      .5       1       4

 348          KK    SW12   BASIN
 349          KM   Runoff from Sub-basin SW12
 350          BA   0.733
 351          LG    0.18    0.22    6.60    0.18      51
 352          UC   0.892   0.655
 353          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 354          UA     100

 355          KK    DW12
 356          KM   Diversion for Retention in SW12
 357          KM   75% of Sub-basin Area Drains to Retention Basins
 358          DT  RETW12   45.02
 359          DI       0   10000
 360          DQ       0    8400

 361          KK  RSE18W
 362          KM   Retrieve Hydrograph from Diversion DSE18W
 363          DR  DSE18W

 364          KK  RTE18W
 365          KM   Route Flow from I-10 West and North to Broadway and 48th St. (CBW48)
 366          KM   Travel Time Estimated using average slope
 367          RD    7340   .0038    .013            CIRC       4

 368          KK   CBW48
 369          KM   Combine Flows from Broadway Road and 48th Street Storm Drains
 370          HC       3

 371          KK  DBW48N
 372          KM   Diversion of Runoff from CBW48 West along Broadway
 373          KM   Remainder is Conveyed North via Storm Drain - 90" RCP @ 0.08% (217 cfs)
 374          DT  DBW48W
 375          DI       0     217     218    1000
 376          DQ       0       0       1     783
1                                        HEC-1 INPUT                                                    PAGE 10

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 377          KK  R48TTI
 378          KM   Route Flow from 48th St North to I-10 via 90" RCP @ 0.08%
 379          RD    2625   .0008    .013            CIRC     7.5

 380          KK  C143NE
 381          KM   Combine Flows from Broadway Road and 48th Street Storm Drains
 382          HC       2

 383          KK  RC143N
 384          KM   Route Flow from C143NE North to Tempe Drain - CTDRN2 via 102" RCP
 385          RD     825   .0008    .013            CIRC     8.5
              *

 386          KK    SE02   BASIN
 387          KM   Runoff from Sub-basin SE02
 388          BA   0.537
 389          LG    0.24    0.15    7.00    0.14      38
 390          UC   1.500   1.113
 391          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
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```
 392          UA     100

 393          KK    DE02
 394          KM   Diversion for Retention in SE02
 395          KM   33% of Sub-basin Area Drains to Retention Basins
 396          DT  RETE02    8.86
 397          DI       0   10000
 398          DQ       0    3600
 399          IN      47
              *  IN     6

 400          KK    PR60                          3
 401          KM   Hydrograph from Areas South of US60 at Preist
 402          KM   Storm Drain Flowing North - 66" RCP @ 0.55% (Capacity = 270 cfs)
 403          KM   Hydrograph developed with design Tc (1.23 hr.)
              *  KM Hydrograph developed with design Tc (1.23 hr.) and TR55, then lagged 2 hou
 404          BA    0.01
 405          QI       0     270     270     270     270     270     270     270     270     270
 406          QI     270     270     270     270     270     270     270     135       0       0
              *  BA     3
              *  QI     0       0       0       0       0       0       0       0       0
              *  QI     0       0       0       0       0       0       0       0       0
              *  QI   8.7     9.5    10.4    11.3    12.7    14.2    15.6    17.7    19.7    2
              *  QI  25.2    33.0    46.9    70.3   102.4   141.5   184.9   222.3   246.6   25
              *  QI 270.0   250.5   230.9   207.5   184.1   162.8   141.5   126.8   112.0   10
              *  QI  90.3    82.8    75.2    67.7    62.8    57.9    53.0    49.9    46.9    4
              *  QI  40.8    39.1    37.3    35.6    33.9    32.1    31.1    30.0    29.0    2
              *  QI  26.9    26.2    25.5    24.8    24.1    23.4    22.9    22.4    21.9    2
              *  QI  20.8    20.5    20.1    19.8    19.4    19.1    18.8    18.4    18.1    1
              *  QI  17.4    17.2    17.0    16.8    16.7    16.5    16.3    16.1    16.0    1
              *  QI  15.6    15.5    15.3    15.1    14.9    14.8    14.6    14.4    14.2    1
              *  QI  13.9    13.7    13.5    13.4    13.2    13.0    12.8    12.7    12.5    1
              *  QI  12.2    12.0    11.8    11.6    11.5    11.3    11.1    10.9    10.8    1
              *  QI  10.4    10.2     9.9     9.7     9.5     9.2     9.0     8.7     8.5
              *  QI   8.0     7.8     7.3     7.3     7.1     6.8     6.6     6.4     6.1
              *  QI   5.6     5.4     5.2     4.9     4.7     4.4     4.2     4.0     3.7
              *  QI   3.3     3.0     2.8     2.5     2.3     2.1     1.8     1.6     1.3
              *  QI   0.9     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
1                                          HEC-1 INPUT                                          PAGE 11

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 407          IN      15

 408          KK   RPR60
 409          KM   Route PR60 from US60 to CPRBW via Storm Drain
 410          RD    1725   .0055    .013            CIRC     5.5

 411          KK   CPRSO
 412          KM   Combine Hydrographs from SE02 and PR60
 413          HC       2

 414          KK  RSOTAL
 415          KM   Route CPRSO from Southern to Alameda along Priest Drive
 416          RS       7    FLOW      -1
 417          RC    .025    .016    .025    2600   .0031
 418          RX       0       1      15      16      84      85      99     100
 419          RY       4       1      .5       0       0      .5       1       4

 420          KK    SE04   BASIN
 421          KM   Runoff from Sub-basin SE04
 422          BA   0.481
 423          LG    0.13    0.15    9.70    0.07      66
 424          UC   0.804   0.570
 425          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 426          UA     100

 427          KK    DE04
 428          KM   Diversion for Retention in SE04
 429          KM   57% of Sub-basin Area Drains to Retention Basins
 430          DT  RETE04   20.06
 431          DI       0   10000
 432          DQ       0    5700

 433          KK   CPRAL
 434          KM   Combine Hydrographs from CPRSO and SE04
 435          HC       2

 436          KK  RALTBW
 437          KM   Route CPRAL from Alameda to Broadway along Priest Drive
 438          RS       7    FLOW      -1
 439          RC    .025    .016    .025    2600   .0031
 440          RX       0       1      15      16      84      85      99     100
 441          RY       4       1      .5       0       0      .5       1       4

 442          KK    SE06   BASIN
 443          KM   Runoff from Sub-basin SE06
 444          BA   0.745
 445          LG    0.18    0.15    9.70    0.06      47
 446          UC   0.896   0.561
 447          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 448          UA     100
1                                          HEC-1 INPUT                                          PAGE 12

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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449          KK    DE06
450          KM   Diversion for Retention in SE06
451          KM   38% of Sub-basin Area Drains to Retention Basins
452          DT  RETE06   20.87
453          DI       0   10000
454          DQ       0    3800
455          IN      50
             *  IN     6

456          KK    RRBW
457          KM   Hydrograph from Areas East of Railroad at Broadway
458          KM   Existing Storm Drain - 63" RCP @ 0.27% (Capacity = 167 cfs)
459          KM   Hydrograph developed with design Tc (1.54 hr.)
             *  KM Hydrograph developed with design Tc (1.54 hr.) and TR55, then lagged 2 hou
460          BA    0.01
461          QI       0     167     167     167     167     167     167     167     167     167
462          QI     167     167     167     167     167     167     167      83       0       0
             *  BA     2
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI   0.0     0.5     1.1     1.6     2.2     2.7     3.3     3.8     4.4
             *  QI   5.5     5.9     6.3     6.7     7.5     8.3     9.1    10.3    11.5     1
             *  QI  15.2    18.8    24.9    35.2    49.8    68.0    89.3   111.7   131.2    14
             *  QI 154.9   160.9   167.0   155.2   143.3   131.8   120.2   108.4    96.6     8
             *  QI  78.3    72.1    65.8    59.5    55.1    50.6    46.2    43.3    40.4     3
             *  QI  34.6    32.9    31.2    29.5    27.8    26.1    25.1    24.2    23.2     2
             *  QI  21.3    20.6    20.0    19.4    18.8    18.2    17.6    17.0    16.4     1
             *  QI  15.2    14.9    14.7    14.5    14.2    14.0    13.7    13.5    13.2     1
             *  QI  12.8    12.6    12.4    12.2    12.0    11.8    11.7    11.5    11.3     1
             *  QI  10.9    10.8    10.7    10.6    10.4    10.3    10.2    10.1    10.0
             *  QI   9.7     9.6     9.5     9.4     9.2     9.1     9.0     8.9     8.7
             *  QI   8.5     8.4     8.3     8.1     8.0     7.9     7.8     7.7     7.5
             *  QI   7.3     7.1     6.9     6.7     6.6     6.4     6.2     6.0     5.8
             *  QI   5.5     5.3     5.1     4.9     4.7     4.6     4.4     4.2     4.0
             *  QI   3.6     3.5     3.3     3.1     2.9     2.7     2.6     2.4     2.2
             *  QI   1.8     1.6     1.5     1.3     1.1     0.9     0.7     0.5     0.4
             *  QI   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
463          IN      15

464          KK   RRRBW
465          KM   Route RRBW from Railroad to CPRBW via Storm Drain
466          RD    2700    .003    .013            CIRC       7

467          KK   CPRBW
468          KM   Combine Hydrographs from CPRAL and SE06
469          HC       3

470          KK   DPRBW
471          KM   Diversion for Existing Storm Drain - 102" RCP @ 0.22% (Capacity = 574 cfs)
472          DT   DIVSD
473          DI       0     574    2000
474          DQ       0     574     574
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

475          KK  RPRT52
476          KM   Route DPRBW Overland Flow from Priest and Broadway to 52nd Street
477          RS      12    FLOW      -1
478          RC    .025    .016    .025    5850   .0043
479          RX       0       1      15      16      84      85      99     100
480          RY       4       1      .5       0       0      .5       1       4

481          KK    SE08   BASIN
482          KM   Runoff from Sub-basin SE08
483          BA   0.425
484          LG    0.27    0.26    5.80    0.22      20
485          UC   1.038   0.682
486          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
487          UA     100

488          KK    DE08
489          KM   Diversion for Retention in SE08
490          KM   24% of Sub-basin Area Drains to Retention Basins
491          DT  RETE08    4.85
492          DI       0   10000
493          DQ       0    2400

494          KK   RSE08
495          KM   Route SE08 from Priest to C52DRN via Storm Drain
496          RD    2700   .0019    .013            CIRC       3

497          KK  RDIVSD
498          KM   Retrieve Hydrograph for Storm Drain at CPRBW
499          DR   DIVSD

500          KK  RSDT52
501          KM   Route DIVSD from Priest to C52DRN via Storm Drain
502          RD    5100    .003    .016            CIRC     8.5

503          KK    SE16   BASIN
504          KM   Runoff from Sub-basin SE16
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 505          BA   0.362
 506          LG    0.11    0.15    8.40    0.10      76
 507          UC   0.642   0.420
 508          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 509          UA     100

 510          KK    DE16
 511          KM   Diversion for Retention in SE16
 512          KM   23% of Sub-basin Area Drains to Retention Basins
 513          DT  RETE16    5.37
 514          DI       0   10000
 515          DQ       0    2400
1                                          HEC-1 INPUT                                          PAGE 14

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 516          KK  C52DRS
 517          KM   Combine South Hydrographs at Tempe Drain and 52nd Street
 518          HC       4

 519          KK    SE10   BASIN
 520          KM   Runoff from Sub-basin SE10
 521          BA   0.561
 522          LG    0.25    0.16    8.80    0.07      29
 523          UC   0.958   0.510
 524          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 525          UA     100

 526          KK    DE10
 527          KM   Diversion for Retention in SE10
 528          KM   22% of Sub-basin Area Drains to Retention Basins
 529          DT  RETE10    6.65
 530          DI       0   10000
 531          DQ       0    2200
 532          IN      37
              *  IN     6

 533          KK    RRUN
 534          KM   Hydrograph from Areas East of Railroad at University
 535          KM   Existing Storm Drain - 30" RCP @ 0.13% (Capacity = 16 cfs)
 536          KM   Hydrograph developed with design Tc
              *  KM Hydrograph developed with design Tc and TR55, then lagged 2 hours.
 537          BA    0.01
 538          QI       0      16      16      16      16      16      16      16      16       0
 539          QI      16      16      16      16      16      16      16    10.4     2.4       0
 540          QI       0       0       0       0       0       0       0       0       0       0
              *  QI     0       0       0       0       0       0       0       0       0
              *  QI     0       0       0       0       0       0       0       0       0
              *  QI   0.0     0.0     0.1     0.1     0.2     0.2     0.3     0.3     0.4
              *  QI   0.5     0.5     0.6     0.6     0.7     0.8     0.9     2.0     3.1
              *  QI   8.1    14.8    16.0     9.6     5.0     3.3     2.6     2.0     1.7
              *  QI   1.4     1.3     1.2     1.2     1.1     1.0     1.0     0.9     0.9
              *  QI   0.8     0.8     0.7     0.7     0.7     0.7     0.7     0.6     0.6
              *  QI   0.6     0.6     0.6     0.6     0.6     0.5     0.5     0.5     0.5
              *  QI   0.5     0.5     0.5     0.4     0.4     0.4     0.4     0.4     0.4
              *  QI   0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4
              *  QI   0.4     0.4     0.4     0.3     0.3     0.3     0.3     0.3     0.3
              *  QI   0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3
              *  QI   0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3
              *  QI   0.3     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
              *  QI   0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
              *  QI   0.2     0.2     0.2     0.2     0.2     0.2     0.1     0.1     0.1
              *  QI   0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
              *  QI   0.1     0.1     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *  QI   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 541          IN      15
1                                          HEC-1 INPUT                                          PAGE 15

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 542          KK   RRRUN
 543          KM   Route RRUN from Railroad to CPRBW via Storm Drain
 544          RD    5300   .0025    .013            CIRC    3.25

 545          KK  CPRUN
 546          KM  Combine Hydrographs at Priest and University
 547          HC       2

 548          KK  RCPRUN
 549          KM   Route CPRUN from Priest and University to C52DRN
 550          RS      18    FLOW      -1
 551          RC    .025    .016    .025    4650   .0015
 552          RX       0       1      15      16      84      85      99     100
 553          RY       4       1      .5       0       0      .5       1       4

 554          KK    SE12   BASIN
 555          KM   Runoff from Sub-basin SE12
 556          BA   0.328
 557          LG    0.19    0.16    9.70    0.06      45
 558          UC   0.946   0.709
 559          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 560          UA     100
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```
 561          KK    DE12
 562          KM   Diversion for Retention in SE12
 563          KM   17% of Sub-basin Area Drains to Retention Basins
 564          DT  RETE12    3.97
 565          DI       0   10000
 566          DQ       0    1700

 567          KK  C52DRN
 568          KM   Combine Hydrographs at Tempe Drain and 52nd Street
 569          HC       2

 570          KK  C52DRW
 571          KM   Total Combined Hydrographs at Tempe Drain and 52nd Street
 572          HC       2

 573          KK  R52DRW
 574          KM   Route C52DRW from 52nd Street West to SR143
 575          RD    2700    .002    .016            TRAP      10    1.25

 576          KK    SE14   BASIN
 577          KM   Runoff from Sub-basin SE14
 578          BA   0.257
 579          LG    0.12    0.16    8.00    0.12      75
 580          UC   0.917   0.573
 581          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 582          UA     100
1                                        HEC-1 INPUT                                          PAGE 16

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 583          KK    DE14
 584          KM   Diversion for Retention in SE14
 585          KM   39% of Sub-basin Area Drains to Retention Basins
 586          DT  RETE14    6.45
 587          DI       0   10000
 588          DQ       0    4400

 589          KK  CTDRN1
 590          KM   Combine Hydrographs at Tempe Drain and SR143
 591          HC       2
              *

 592          KK  CTDRN2
 593          KM   Combine Flow from 48th St Storm Drain (RC143N) and Tempe Drain
 594          HC       2
              *

 595          KK  DTDRN2
 596          KM   Diversion of Total Hydrograph for Later Retrieval
 597          DT    DRN2
 598          DI       0   10000
 599          DQ       0   10000
              *

 600          KK    SW18   BASIN
 601          KM   Runoff from Sub-basin SW18
 602          BA   0.992
 603          LG    0.26    0.22    7.60    0.11      20
 604          UC   1.050   0.634
 605          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 606          UA     100

 607          KK    DW18
 608          KM   Diversion for Retention in SW18
 609          DT  RETW18   23.91
 610          DI       0   10000
 611          DQ       0    2300

 612          KK  RBW48W
 613          KM   Retrieve Hydrograph from Diversion DBW48
 614          DR  DBW48W

 615          KK  BW48SW
 616          KM   Diversion of Surface Runoff from CBW48 Northwest toward SW26
 617          KM   Flows Split 61% West, 39% North
 618          DT  DBWNW1
 619          DI       0    1000
 620          DQ       0     390
1                                        HEC-1 INPUT                                          PAGE 17

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 621          KK  RBWT40
 622          KM   Route Flow from DBW48 along Broadway to CBW40
 623          RS      12    FLOW      -1
 624          RC    .025    .016    .025    5280   .0023
 625          RX       0       1      15      16      84      85      99     100
 626          RY       4       1      .5       0       0      .5       1       4

 627          KK   CBW40
 628          KM   Combine Hydrographs from RBWT40 and R40TBW and SW18
 629          HC       4
```

```
630          KK   DBW40
631          KM   Diversion of Runoff from CBW40 West to CBW32 along Broadway
632          KM   Storm Drain to West - 78" RCP @ 0.11% (161 cfs); Remainder is split 62% West
633          DT  DBW40W
634          DI       0    161     1000
635          DQ       0    161      839

636          KK    SW26   BASIN
637          KM   Runoff from Sub-basin SW26
638          BA   0.187
639          LG    0.20    0.15    9.70    0.06      50
640          UC   0.879   0.880
641          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
642          UA     100

643          KK    DW26
644          KM   Diversion for Retention in SW26
645          KM   69% of Sub-basin Area Drains to Retention Basins
646          DT  RETW26   16.45
647          DI       0   10000
648          DQ       0    6900

649          KK  RBWNW1
650          KM   Retrieve Hydrograph from Diversion DBWNW1
651          DR  DBWNW1

652          KK   RTNW1
653          KM   Route Flow from BW48 to CWO40
654          RS      14    FLOW      -1
655          RC    .025    .016    .025    5600   .0022
656          RX       0       1      15      16      84      85      99     100
657          RY       4       1      .5       0       0      .5       1       4

658          KK   CSW26
659          KM   Combine Hydrographs from DBWNW1 and SW26
660          HC       2
             *
1                                        HEC-1 INPUT                                          PAGE 18

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

661          KK  DSW26W
662          KM   Diversion of Runoff from SW26 North to I-10
             *  **** Assumed 70% Drains North ****
663          DT  DSW26N
664          DI       0   1000
665          DQ       0    700
             *

666          KK   CWO40
667          KM   Combine Hydrographs from CBW40 and SW26W
668          HC       2

669          KK  RWOT32
670          KM   Route Flow from CI1040 to CI1032 along Wood
671          RS      17    FLOW      -1
672          RC    .025    .016    .025    5800   .0036
673          RX       0       1      15      16      84      85      99     100
674          RY       4       1      .5       0       0      .5       1       4

675          KK    SW28   BASIN
676          KM   Runoff from Sub-basin SW28
677          BA   0.206
678          LG    0.21    0.20    8.40    0.09      45
679          UC   0.913   0.868
680          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
681          UA     100

682          KK    DW28
683          KM   Diversion for Retention in SW28
684          DT  RETW28   10.03
685          DI       0   10000
686          DQ       0    5100

687          KK   CSW28
688          KM   Combine Hydrographs from SW28 and RWOT32
689          HC       2
             *

690          KK  DSW28W
691          KM   Diversion of Runoff from SW28 North to I-10
             *  **** Assumed 35% Drains North to I-10 ****
692          DT  DSW28N
693          DI       0   1000
694          DQ       0    350
             *

695          KK    SW10   BASIN
696          KM   Runoff from Sub-basin SW10
697          BA   0.713
698          LG    0.30    0.29    4.70    0.36      33
699          UC   0.383   0.171
700          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
701          UA     100
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 702          KK    DW10
 703          KM   Diversion for Retention in SW08
 704          KM   19% of Sub-basin Area Drains to Retention Basins
 705          DT  RETW10   12.77
 706          DI       0   10000
 707          DQ       0    1900

 708          KK   DW10C
 709          KM   Diversion for Retention in Western and Highline Canals
 710          KM   Western Canal - L=5480', W=50', H=2.1', Volume = 13.21 ac-ft.
 711          KM   Highline Canal - L=5700', W=20', H=1.3', Volume = 3.40 ac-ft.
 712          DT   RW10C   16.61
 713          DI       0   10000
 714          DQ       0   10000

 715          KK  RSW10N
 716          KM   Route Flow from SW10 North to CSO32
 717          RS       3    FLOW      -1
 718          RC    .025    .016    .025    4200   .0095
 719          RX       0       1      15      16      84      85      99     100
 720          RY       4       1      .5       0       0      .5       1       4

 721          KK    SW16   BASIN
 722          KM   Runoff from Sub-basin SW16
 723          BA   0.890
 724          LG    0.32    0.26    4.50    0.46       8
 725          UC   1.500   0.908
 726          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 727          UA     100

 728          KK    DW16
 729          KM   Diversion for Retention in SW16
 730          KM   37% of Sub-basin Area Drains to Retention Basins
 731          DT  RETW16   11.60
 732          DI       0   10000
 733          DQ       0    3700

 734          KK  RSO40W
 735          KM   Retrieve Hydrograph from Diversion DSO40W
 736          DR  DSO40W

 737          KK  R40T32
 738          KM   Route Flow from DSO40W to CSO32
 739          RS      14    FLOW      -1
 740          RC    .025    .016    .025    5330   .0031
 741          RX       0       1      15      16      84      85      99     100
 742          RY       4       1      .5       0       0      .5       1       4

 743          KK   CSO32
 744          KM   Combine Hydrographs from DSO40W, RWC4N and SW16
 745          HC       3
```



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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 746          KK   DSO32
 747          KM   Diversion of Runoff from CSO32 Overland to the Northwest
 748          KM   Divert Total Flow Less Exist. Storm Drain - 32nd St. 60" RCP @ 0.62%(222 cfs)
 749          DT  DSO32W
 750          DI       0     222    1000
 751          DQ       0       0     778

 752          KK  R32TBW
 753          KM   Route Flow from CSO32 North to CBW32 via Storm Drain
 754          RD    5200   .0046    .013            CIRC     2.5

 755          KK    SW20   BASIN
 756          KM   Runoff from Sub-basin SW20
 757          BA   0.992
 758          LG    0.22    0.17    8.00    0.11      36
 759          UC   0.988   0.584
 760          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 761          UA     100

 762          KK    DW20
 763          KM   Diversion for Retention in SW20
              *  *** Estimated Volume ***
 764          DT  RETW20   64.95
 765          DI       0   10000
 766          DQ       0    7100

 767          KK  RBW40W
 768          KM   Retrieve Hydrograph from Diversion DBW40W
 769          DR  DBW40W

 770          KK  RBWT32
 771          KM   Route Flow from CBW40 West to CBW32 along Broadway
 772          RS       7    FLOW      -1
 773          RC    .025    .016    .025    5280   .0028
```

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 774          RX       0       1      15      16      84      85      99     100
 775          RY       4       1      .5       0       0      .5       1       4

 776          KK   CBW32
 777          KM   Combine Hydrographs from DBWT32, RSO32N and SW20
 778          HC       3

 779          KK  DBW32N
 780          KM   Diversion of Runoff from CBW32 West to CBW30
 781          KM   Storm Drain to West - 96" RCP @ 0.28% (530 cfs); Remainder is split 69% West
 782          DT  DBW32W
 783          DI       0     483    2000
 784          DQ       0     483    1530

 785          KK   CWO32
 786          KM   Combine Hydrographs from DBW32N and SW28W
 787          HC       2
1                                          HEC-1 INPUT                                          PAGE 21

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 788          KK  DWO32W
 789          KM   Diversion of Runoff from CWO32 North to I-10 (30" RCP @ 0.791%, Q = 37 cfs)
 790          DT  DWO32N
 791          DI       0      37    2000
 792          DQ       0      37      37

 793          KK    SW22   BASIN
 794          KM   Runoff from Sub-basin SW22
 795          BA   0.141
 796          LG    0.25    0.23    7.30    0.13      29
 797          UC   0.550   0.361
 798          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 799          UA     100

 800          KK    DW22
 801          KM   Diversion for Retention in SW22
              *  *** Estimated Volume ***
 802          DT  RETW22       1
 803          DI       0   10000
 804          DQ       0   10000

 805          KK  RBW32W
 806          KM   Retrieve Hydrograph from Diversion DBW32W
 807          DR  DBW32W

 808          KK  RBWT30
 809          KM   Route Flow from CBW32 to CBW30 along Broadway
 810          RS       4    FLOW      -1
 811          RC    .025    .016    .025    1320   .0023
 812          RX       0       1      15      16      84      85      99     100
 813          RY       4       1      .5       0       0      .5       1       4

 814          KK   CBW30
 815          KM   Combine Hydrographs from DBW32W, RBWT30 and SW22
 816          HC       2

 817          KK   DBW30
 818          KM   Diversion of Runoff from CBW30 North to Salt River via 96" RCP @ 0.28%
 819          DT  DWO30N
 820          DI       0     483    2000
 821          DQ       0     483     483
              *

 822          KK   RDRN2
 823          KM   Retrieve Hydrograph from Diversion
 824          DR    DRN2
              *

 825          KK  RTDRN2
 826          KM   Route Tempe Drain CTDRN2 from SR143 to 32nd Street
 827          RD   10200    .002    .016            TRAP      10    1.25
1                                          HEC-1 INPUT                                          PAGE 22

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 828          KK    SW30   BASIN
 829          KM   Runoff from Sub-basin SW30
 830          BA   0.812
 831          LG    0.17    0.17    8.40    0.09      47
 832          UC   1.500   1.232
 833          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 834          UA     100

 835          KK    DW30
 836          KM   Diversion for Retention in SW30
              *  *** Estimated Volume ***
 837          DT  RETW30       5
 838          DI       0   10000
 839          DQ       0   10000
              *

 840          KK  DSW30W
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 841          KM   Diversion of Runoff from SW30 South to I-10
              *  **** Assumed 20% Drains South ****
 842          DT  DSW30S
 843          DI       0  10000
 844          DQ       0   2000
              *

 845          KK  CTDRN3
 846          KM   Combine Hydrographs from RTDRN2 - Tempe Drain and SW30
 847          HC       2

 848          KK  RWO32N
 849          KM   Retrieve Hydrograph from Diversion DW3O32
 850          DR  DWO32N

 851          KK    SW27   BASIN
 852          KM   Runoff from Sub-basin SW27
 853          BA   0.227
 854          LG    0.16    0.17    7.60    0.13      53
 855          UC   1.500   2.749
 856          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 857          UA     100

 858          KK   DSW27
 859          KM   Diversion for Retention in SW27
 860          KM   Simulation of Existing Detention in ADOT ROW(original design volumes)
 861          KM   Existing Detention 2.2 ac-ft West of 48th St, 6.53 ac-ft West of 40th St
 862          DT  RETW27    8.73
 863          DI       0   10000
 864          DQ       0    5000

 865          KK  RSW30S
 866          KM   Retrieve Hydrograph from Diversion DSW30S
 867          DR  DSW30S
1                                                HEC-1 INPUT                                          PAGE 23

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 868          KK  RSW26N
 869          KM   Retrieve Hydrograph from Diversion DSW26N
 870          DR  DSW26N

 871          KK  RSW28N
 872          KM   Retrieve Hydrograph from Diversion DSW28N
 873          DR  DSW28N

 874          KK  CI1032
 875          KM   Combine Hydrographs from Storm Drain Systems within ADOT ROW
 876          HC       4

 877          KK  CTDRN4
 878          KM   Combine Hydrographs from Tempe Drain and Storm Drain West of 32nd St.
 879          HC       3
 880          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    34        SW06
                 .
                 .
    48           .-------> RETW06
    45        DW06
                 .
                 .
    55           .------->  RW06C
    51       DW06C
                 .
                 .
    60           .-------> DSW06E
    58      DSW06N
                 V
                 V
    63      RSW06N
                 .
                 .
    69           .        SW08
                 .           .
                 .           .
    79           .           .-------> RETW08
    76           .        DW08
                 .           .
                 .           .
    86           .           .------->  RW08C
    82           .       DW08C
                 .           V
                 .           V
    89           .      RW8TSO
                 .           .
                 .           .
    95           .           .        SW14
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                .          .          .
                .          .          .
104             .          .          .-------> RETW14
102             .          .       DW14
                .          .          .
                .          .          .
107         CSO40......................
                .
                .
113             .-------> DSO40W
110         DSO40N
                V
                V
116         R40TBW
                .
                .
122             .       SW24
                .          .
                .          .
132             .          .-------> RETW24
129             .       DW24
                .          .
                .          .
135             .          .       SE18
                .          .          .
                .          .          .
145             .          .          .-------> RETE18
142             .          .       DE18
                .          .          .
                .          .          .
151             .          .          .-------> DSE18W
148             .          .      SE18N
                .          .          V
                .          .          V
154             .          .     RSE18N
                .          .          .
                .          .          .
157             .          .          .       SE20
                .          .          .          .
                .          .          .          .
167             .          .          .          .-------> RETE20
164             .          .          .      DSE20
                .          .          .          .
                .          .          .          .
170             .          .     CBWPRW...........
                .          .          .
                .          .          .
173             .          .          .       SE19
                .          .          .          .
                .          .          .          .
183             .          .          .          .-------> RETE19
180             .          .          .       DE19
                .          .          .          V
                .          .          .          V
186             .          .          .     R19T21
                .          .          .          .
                .          .          .          .
189             .          .          .          .       SE21
                .          .          .          .          .
                .          .          .          .          .
196             .          .          .     CBW52A...........
                .          .          .          .
                .          .          .          .
202             .          .          .          .-------> RETE21
199             .          .          .       DE21
                .          .          .          .
                .          .          .          .
205             .          .     CBW52B...........
                .          .          V
                .          .          V
208             .          .     RBW52W
                .          .          .
                .          .          .
211             .          .          .       SE22
                .          .          .          .
                .          .          .          .
221             .          .          .          .-------> RETE22
218             .          .          .       DE22
                .          .          .          .
                .          .          .          .
224             .          .      CBWTI...........
                .          .          .
                .          .          .
227             .      C143TI...........
                .          .
                .          .
230             .          .       QDA1
                .          .          .
                .          .          .
235             .          .          .       QDA2
                .          .          .          .
                .          .          .          .
240             .          .         C1...........
                .          .          V
                .          .          V
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243          .           .        RC1
             .           .          .
             .           .          .
246          .           .          .       QDA3
             .           .          .          .
             .           .          .          .
251          .           .          .          .       QDA4
             .           .          .          .          .
             .           .          .          .          .
256          .           .         C2.......................
             .           .          V
             .           .          V
259          .           .        RC2
             .           .          .
             .           .          .
262          .           .          .       QDA5
             .           .          .          .
             .           .          .          .
267          .           .         C3............
             .           .          V
             .           .          V
270          .           .        RC3
             .           .          .
             .           .          .
273          .           .          .       QDA6
             .           .          .          .
             .           .          .          .
278          .           .         C4............
             .           .          .
             .           .          .
281          .           .          .       QDA7
             .           .          .          .
             .           .          .          .
286          .           .          .          .       QDA8
             .           .          .          .          .
             .           .          .          .          .
291          .           .         C5.......................
             .           .          .
             .           .          .
294          .           .          .       QDA9
             .           .          .          .
             .           .          .          .
299          .           .         C6............
             .           .          .
             .           .          .
304          .           .          .-------> RETFRS
302          .           .      DFRS
             .           .          V
             .           .          V
307          .           .     RTFRS
             .           .          .
             .           .          .
313          .           .          .       SW04
             .           .          .          .
             .           .          .          .
323          .           .          .          .-------> RETW04
320          .           .          .       DW04
             .           .          .          .
             .           .          .          .
330          .           .          .          .-------> RW04C
326          .           .          .     DW04C
             .           .          .          .
             .           .          .          .
333          .           .      CWC1............
             .           .          .
             .           .          .
338          .           .          .          .<------- DSW06E
336          .           .          .    RSW06E
             .           .          .          .
             .           .          .          .
339          .           .      CWC2............
             .           .          V
             .           .          V
342          .           .    R48TBW
             .           .          .
             .           .          .
348          .           .          .       SW12
             .           .          .          .
             .           .          .          .
358          .           .          .          .-------> RETW12
355          .           .          .       DW12
             .           .          .          .
             .           .          .          .
363          .           .          .          .          .<------- DSE18W
361          .           .          .          .    RSE18W
             .           .          .          .          V
             .           .          .          .          V
364          .           .          .          .    RTE18W
             .           .          .          .          .
             .           .          .          .          .
368          .           .     CBW48.......................
             .           .          .
             .           .          .
374          .           .          .-------> DBW48W
371          .           .    DBW48N
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                 .          .          V
                 .          .          V
377              .          .     R48TTI
                 .          .          .
                 .          .          .
380              .     C143NE...........
                 .          V
                 .          V
383              .     RC143N
                 .          .
                 .          .
386              .          .       SE02
                 .          .          .
                 .          .          .
396              .          .          .-------> RETE02
393              .          .       DE02
                 .          .          .
                 .          .          .
400              .          .          .       PR60
                 .          .          .          V
                 .          .          .          V
408              .          .          .      RPR60
                 .          .          .          .
                 .          .          .          .
411              .          .     CPRSO............
                 .          .         V
                 .          .         V
414              .          .    RSOTAL
                 .          .          .
                 .          .          .
420              .          .          .       SE04
                 .          .          .          .
                 .          .          .          .
430              .          .          .          .-------> RETE04
427              .          .          .       DE04
                 .          .          .          .
                 .          .          .          .
433              .          .     CPRAL............
                 .          .         V
                 .          .         V
436              .          .    RALTBW
                 .          .          .
                 .          .          .
442              .          .          .       SE06
                 .          .          .          .
                 .          .          .          .
452              .          .          .          .-------> RETE06
449              .          .          .       DE06
                 .          .          .          .
                 .          .          .          .
456              .          .          .          .       RRBW
                 .          .          .          .          V
                 .          .          .          .          V
464              .          .          .          .      RRRBW
                 .          .          .          .          .
                 .          .          .          .          .
467              .          .     CPRBW........................
                 .          .         .
                 .          .         .
472              .          .         .-------> DIVSD
470              .          .     DPRBW
                 .          .         V
                 .          .         V
475              .          .    RPRT52
                 .          .          .
                 .          .          .
481              .          .          .       SE08
                 .          .          .          .
                 .          .          .          .
491              .          .          .          .-------> RETE08
488              .          .          .       DE08
                 .          .          .          V
                 .          .          .          V
494              .          .          .      RSE08
                 .          .          .          .
                 .          .          .          .
499              .          .          .          .          .<-------  DIVSD
497              .          .          .          .     RDIVSD
                 .          .          .          .          V
                 .          .          .          .          V
500              .          .          .          .     RSDT52
                 .          .          .          .          .
                 .          .          .          .          .
503              .          .          .          .          .       SE16
                 .          .          .          .          .          .
                 .          .          .          .          .          .
513              .          .          .          .          .          .-------> RETE16
510              .          .          .          .          .       DE16
                 .          .          .          .          .          .
                 .          .          .          .          .          .
516              .          .    C52DRS...................................
                 .          .          .
                 .          .          .
519              .          .          .       SE10
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          .          .          .          .
529       .          .          .          .-------> RETE10
526       .          .          .       DE10
          .          .          .          .
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533       .          .          .          .       RRUN
          .          .          .          .          V
          .          .          .          .          V
542       .          .          .          .      RRRUN
          .          .          .          .          .
          .          .          .          .          .
545       .          .          .     CPRUN ...........
          .          .          .          V
          .          .          .          V
548       .          .          .     RCPRUN
          .          .          .          .
          .          .          .          .
554       .          .          .          .       SE12
          .          .          .          .          .
          .          .          .          .          .
564       .          .          .          .          .-------> RETE12
561       .          .          .          .       DE12
          .          .          .          .          .
          .          .          .          .          .
567       .          .          .     C52DRN...........
          .          .          .          .
          .          .          .          .
570       .          .     C52DRW...........
          .          .          V
          .          .          V
573       .          .     R52DRW
          .          .          .
          .          .          .
576       .          .          .       SE14
          .          .          .          .
          .          .          .          .
586       .          .          .          .-------> RETE14
583       .          .          .       DE14
          .          .          .          .
          .          .          .          .
589       .          .     CTDRN1...........
          .          .          .
          .          .          .
592       .     CTDRN2...........
          .          .
          .          .
597       .          .------->    DRN2
595       .     DTDRN2
          .          .
          .          .
600       .          .       SW18
          .          .          .
          .          .          .
609       .          .          .-------> RETW18
607       .          .       DW18
          .          .          .
          .          .          .
614       .          .          .          .<-------  DBW48W
612       .          .          .     RBW48W
          .          .          .          .
          .          .          .          .
618       .          .          .          .-------> DBWNW1
615       .          .          .     BW48SW
          .          .          .          V
          .          .          .          V
621       .          .          .     RBWT40
          .          .          .          .
          .          .          .          .
627    CBW40...................................
          .
          .
633       .-------> DBW40W
630    DBW40
          .
          .
636       .       SW26
          .          .
          .          .
646       .          .-------> RETW26
643       .       DW26
          .          .
          .          .
651       .          .          .<-------  DBWNW1
649       .          .     RBWNW1
          .          .          V
          .          .          V
652       .          .      RTNW1
          .          .          .
          .          .          .
658       .      CSW26...........
          .          .
          .          .
663       .          .-------> DSW26N
661       .     DSW26W
          .          .
```

```
                .          .
666       CWO40............
              V
              V
669      RWOT32
              .
              .
675           .        SW28
              .           .
              .           .
684           .           .-------> RETW28
682           .        DW28
              .           .
              .           .
687       CSW28............
              .
              .
692           .-------> DSW28N
690      DSW28W
              .
              .
695           .        SW10
              .           .
              .           .
705           .           .-------> RETW10
702           .        DW10
              .           .
              .           .
712           .           .------->  RW10C
708           .       DW10C
              .           V
              .           V
715           .      RSW10N
              .           .
              .           .
721           .           .        SW16
              .           .           .
              .           .           .
731           .           .           .-------> RETW16
728           .           .        DW16
              .           .           .
              .           .           .
736           .           .           .          .<-------  DSO40W
734           .           .           .     RSO40W
              .           .           .          V
              .           .           .          V
737           .           .           .     R40T32
              .           .           .           .
              .           .           .           .
743           .       CSO32........................
              .           .
              .           .
749           .           .-------> DSO32W
746           .       DSO32
              .           V
              .           V
752           .      R32TBW
              .           .
              .           .
755           .           .        SW20
              .           .           .
              .           .           .
764           .           .           .-------> RETW20
762           .           .        DW20
              .           .           .
              .           .           .
769           .           .           .          .<-------  DBW40W
767           .           .           .     RBW40W
              .           .           .          V
              .           .           .          V
770           .           .           .     RBWT32
              .           .           .           .
              .           .           .           .
776           .      CBW32........................
              .           .
              .           .
782           .           .-------> DBW32W
779           .      DBW32N
              .           .
              .           .
785      CWO32............
              .
              .
790           .-------> DWO32N
788      DWO32W
              .
              .
793           .        SW22
              .           .
              .           .
802           .           .-------> RETW22
800           .        DW22
              .           .
              .           .
807           .           .          .<-------  DBW32W
```

```
805          .          .      RBW32W
             .          .          V
             .          .          V
808          .          .      RBWT30
             .          .          .
             .          .          .
814          .      CBW30...........
             .          .
             .          .
819          .          .-------> DWO30N
817          .      DBW30
             .          .
             .          .
824          .          .          .<-------    DRN2
822          .          .      RDRN2
             .          .          V
             .          .          V
825          .          .      RTDRN2
             .          .          .
             .          .          .
828          .          .          .        SW30
             .          .          .          .
             .          .          .          .
837          .          .          .          .-------> RETW30
835          .          .          .        DW30
             .          .          .          .
             .          .          .          .
842          .          .          .          .-------> DSW30S
840          .          .          .      DSW30W
             .          .          .          .
             .          .          .          .
845          .          .      CTDRN3...........
             .          .          .
             .          .          .
850          .          .          .          .<-------  DWO32N
848          .          .          .      RWO32N
             .          .          .          .
             .          .          .          .
851          .          .          .          .        SW27
             .          .          .          .          .
             .          .          .          .          .
862          .          .          .          .          .-------> RETW27
858          .          .          .          .       DSW27
             .          .          .          .          .
             .          .          .          .          .
867          .          .          .          .          .          .<-------  DSW30S
865          .          .          .          .          .     RSW30S
             .          .          .          .          .          .
             .          .          .          .          .          .
870          .          .          .          .          .          .          .<-------  DSW26N
868          .          .          .          .          .          .      RSW26N
             .          .          .          .          .          .          .
             .          .          .          .          .          .          .
873          .          .          .          .          .          .          .          .<-------  DSW28N
871          .          .          .          .          .          .          .      RSW28N
             .          .          .          .          .          .          .          .
             .          .          .          .          .          .          .          .
874          .          .          .          .      CI1032.................................
             .          .          .          .          .
             .          .          .          .          .
877          .          .      CTDRN4......................
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ************************************
*                                        *                                    *                                  *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                    *   U.S. ARMY CORPS OF ENGINEERS   *
*              JUN   1998                *                                    *   HYDROLOGIC ENGINEERING CENTER  *
*           VERSION 4.1                  *                                    *         609 SECOND STREET        *
*                                        *                                    *      DAVIS, CALIFORNIA 95616     *
*  RUN DATE   21NOV07  TIME  16:22:36    *                                    *          (916) 756-1104          *
*                                        *                                    *                                  *
****************************************                                    ************************************
```

Project ID: I-10 SALT - Major Basin: 01 - Return Period: 100 Years

I-10 Corridor Improvement Study - Buckeye Road to Baseline Road

****

Prepared for:

Arizona Department of Transportation

****

Prepared by:

DMJM+HARRIS
2777 E. Camelback Road, Ste. 200
Phoenix, AZ 85016-4302
(602) 337-2777

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                    ==============================================================================
                    Salt River - Southern Watershed
                    Existing Conditions
                    100 Year - 6 Hour Event
                    Clark Unit Hydrograph
                    Green-Ampt Precipitation Losses
                    August 2003
                    ==============================================================================

                    File: I10S1006.dat

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

  32 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0918  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .03 HOURS
                      TOTAL TIME BASE   33.30 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RC1.
      ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RC3.
      ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
1
                                                RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES

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

          HYDROGRAPH AT
+                           SW06      634.    4.33         155.        39.         28.       .70
          DIVERSION TO
+                          RETW06      101.    4.33          23.         6.          4.       .70
          HYDROGRAPH AT
+                           DW06      533.    4.33         132.        33.         24.       .70
          DIVERSION TO
+                          RW06C       92.    4.33          18.         5.          3.       .70
          HYDROGRAPH AT
+                          DW06C      533.    4.33         116.        29.         21.       .70
          DIVERSION TO
+                          DSW06E     233.    4.33          80.        20.         14.       .70
          HYDROGRAPH AT
+                          DSW06N     300.    4.33          35.         9.          6.       .70
          ROUTED TO
+                          RSW06N     292.    4.63          35.         9.          6.       .70
+                                                                                                .82        4.63
          HYDROGRAPH AT
+                           SW08      569.    4.27         122.        31.         22.       .59
          DIVERSION TO
+                          RETW08      80.    4.27          11.         3.          2.       .59
          HYDROGRAPH AT
+                           DW08      490.    4.27         111.        28.         20.       .59
          DIVERSION TO
+                          RW08C      139.    4.27          17.         4.          3.       .59
          HYDROGRAPH AT
+                          DW08C      490.    4.27          95.        24.         17.       .59
          ROUTED TO
+                          RW8TSO     485.    4.47          95.        24.         17.       .59
+                                                                                               1.06        4.47
```

	HYDROGRAPH AT								
+		SW14	299.	4.57	77.	19.	14.	.56	
	DIVERSION TO								
+		RETW14	3.	4.57	0.	0.	0.	.56	
	HYDROGRAPH AT								
+		DW14	296.	4.57	76.	19.	14.	.56	
	3 COMBINED AT								
+		CSO40	1050.	4.57	206.	52.	37.	1.85	
	DIVERSION TO								
+		DSO40W	382.	4.57	54.	14.	10.	1.85	
	HYDROGRAPH AT								
+		DSO40N	667.	4.57	152.	38.	28.	1.85	
	ROUTED TO								
+		R40TBW	665.	4.73	152.	38.	28.	1.85	
+									1.33 4.73
	HYDROGRAPH AT								
+		SW24	133.	4.10	29.	7.	5.	.10	
	DIVERSION TO								
+		RETW24	76.	4.40	11.	3.	2.	.10	
	HYDROGRAPH AT								
+		DW24	106.	4.40	19.	5.	3.	.10	
	HYDROGRAPH AT								
+		SE18	171.	4.43	48.	12.	9.	.18	
	DIVERSION TO								
+		RETE18	65.	4.43	8.	2.	1.	.18	
	HYDROGRAPH AT								
+		DE18	171.	4.43	40.	10.	7.	.18	
	DIVERSION TO								
+		DSE18W	18.	4.43	13.	3.	2.	.18	
	HYDROGRAPH AT								
+		SE18N	153.	4.43	28.	7.	5.	.18	
	ROUTED TO								
+		RSE18N	150.	4.60	28.	7.	5.	.18	
	HYDROGRAPH AT								
+		SE20	164.	4.33	41.	10.	7.	.17	
	DIVERSION TO								
+		RETE20	141.	4.73	24.	6.	4.	.17	
	HYDROGRAPH AT								
+		DSE20	119.	4.73	17.	4.	3.	.17	
	2 COMBINED AT								
+		CBWPRW	259.	4.73	45.	11.	8.	.35	
	HYDROGRAPH AT								
+		SE19	131.	4.50	46.	12.	9.	.24	
	DIVERSION TO								
+		RETE19	65.	4.50	23.	6.	4.	.24	
	HYDROGRAPH AT								
+		DE19	65.	4.50	23.	6.	4.	.24	
	ROUTED TO								
+		R19T21	65.	4.73	23.	6.	4.	.24	
	HYDROGRAPH AT								
+		SE21	95.	4.43	33.	9.	6.	.11	
	2 COMBINED AT								
+		CBW52A	156.	4.57	55.	15.	10.	.35	
	DIVERSION TO								
+		RETE21	78.	4.57	28.	7.	5.	.35	
	HYDROGRAPH AT								
+		DE21	78.	4.57	28.	7.	5.	.35	
	2 COMBINED AT								
+		CBW52B	335.	4.73	72.	19.	13.	.70	
	ROUTED TO								
+		RBW52W	311.	4.83	72.	18.	13.	.70	
	HYDROGRAPH AT								
+		SE22	52.	5.23	31.	9.	7.	.14	
	DIVERSION TO								

+		RETE22	26.	6.50	10.	3.	2.	.14	
	HYDROGRAPH AT								
+		DE22	39.	6.50	22.	7.	5.	.14	
	2 COMBINED AT								
+		CBWTI	335.	4.83	92.	25.	18.	.84	
	2 COMBINED AT								
+		C143TI	386.	4.83	109.	30.	21.	.94	
	HYDROGRAPH AT								
+		QDA1	567.	4.50	149.	37.	27.	.55	
	HYDROGRAPH AT								
+		QDA2	416.	4.33	97.	24.	18.	.36	
	2 COMBINED AT								
+		C1	966.	4.43	246.	62.	44.	.91	
	ROUTED TO								
+		RC1	965.	4.50	246.	62.	44.	.91	
	HYDROGRAPH AT								
+		QDA3	400.	4.43	100.	25.	18.	.37	
	HYDROGRAPH AT								
+		QDA4	183.	4.17	38.	9.	7.	.14	
	3 COMBINED AT								
+		C2	1500.	4.43	384.	96.	69.	1.42	
	ROUTED TO								
+		RC2	1493.	4.50	384.	96.	69.	1.42	
	HYDROGRAPH AT								
+		QDA5	73.	4.03	14.	3.	2.	.05	
	2 COMBINED AT								
+		C3	1525.	4.50	398.	100.	72.	1.47	
	ROUTED TO								
+		RC3	1524.	4.57	398.	100.	72.	1.47	
	HYDROGRAPH AT								
+		QDA6	101.	4.00	18.	4.	3.	.07	
	2 COMBINED AT								
+		C4	1562.	4.53	415.	104.	75.	1.54	
	HYDROGRAPH AT								
+		QDA7	164.	4.10	31.	8.	6.	.12	
	HYDROGRAPH AT								
+		QDA8	80.	4.10	14.	3.	2.	.09	
	3 COMBINED AT								
+		C5	1694.	4.50	460.	115.	83.	1.75	
	HYDROGRAPH AT								
+		QDA9	67.	4.03	11.	3.	2.	.06	
	2 COMBINED AT								
+		C6	1723.	4.50	471.	118.	85.	1.81	
	DIVERSION TO								
+		RETFRS	1723.	.00	471.	118.	85.	1.81	
	HYDROGRAPH AT								
+		DFRS	0.	.00	0.	0.	0.	1.81	
	ROUTED TO								
+		RTFRS	0.	.00	0.	0.	0.	1.81	
+									.00 5.13
	HYDROGRAPH AT								
+		SW04	613.	4.27	129.	33.	23.	.69	
	DIVERSION TO								
+		RETW04	49.	4.27	8.	2.	1.	.69	
	HYDROGRAPH AT								
+		DW04	564.	4.27	121.	31.	22.	.69	
	DIVERSION TO								
+		RW04C	124.	4.27	18.	5.	3.	.69	
	HYDROGRAPH AT								
+		DW04C	564.	4.27	104.	26.	19.	.69	
	2 COMBINED AT								
+		CWC1	564.	4.27	104.	26.	19.	2.50	
	HYDROGRAPH AT								
+		RSW06E	233.	3.87	80.	20.	14.	.00	

	2 COMBINED AT								
+		CWC2	797.	4.27	184.	46.	33.	2.50	
	ROUTED TO								
+		R48TBW	793.	4.47	184.	46.	33.	2.50	
+									1.33 4.47
	HYDROGRAPH AT								
+		SW12	577.	4.53	173.	44.	32.	.73	
	DIVERSION TO								
+		RETW12	485.	4.93	91.	23.	16.	.73	
	HYDROGRAPH AT								
+		DW12	473.	4.93	85.	22.	16.	.73	
	HYDROGRAPH AT								
+		RSE18W	18.	3.57	13.	3.	2.	.00	
	ROUTED TO								
+		RTE18W	18.	3.87	13.	3.	2.	.00	
	3 COMBINED AT								
+		CBW48	1072.	4.93	281.	71.	51.	3.23	
	DIVERSION TO								
+		DBW48W	855.	4.00	165.	41.	30.	3.23	
	HYDROGRAPH AT								
+		DBW48N	217.	4.00	117.	30.	21.	3.23	
	ROUTED TO								
+		R48TTI	217.	5.47	116.	30.	21.	3.23	
	2 COMBINED AT								
+		C143NE	602.	4.83	224.	59.	43.	4.18	
	ROUTED TO								
+		RC143N	594.	4.83	224.	59.	43.	4.18	
	HYDROGRAPH AT								
+		SE02	304.	4.93	119.	31.	23.	.54	
	DIVERSION TO								
+		RETE02	109.	5.03	18.	4.	3.	.54	
	HYDROGRAPH AT								
+		DE02	301.	5.03	103.	27.	19.	.54	
	HYDROGRAPH AT								
+		PR60	270.	.80	270.	204.	184.	.01	
	ROUTED TO								
+		RPR60	270.	.87	270.	204.	184.	.01	
	2 COMBINED AT								
+		CPRSO	571.	5.03	373.	231.	203.	.55	
	ROUTED TO								
+		RSOTAL	569.	5.17	373.	231.	203.	.55	
+									1.27 5.17
	HYDROGRAPH AT								
+		SE04	453.	4.47	135.	35.	25.	.48	
	DIVERSION TO								
+		RETE04	258.	4.63	40.	10.	7.	.48	
	HYDROGRAPH AT								
+		DE04	433.	4.63	96.	24.	18.	.48	
	2 COMBINED AT								
+		CPRAL	872.	4.63	466.	256.	220.	1.03	
	ROUTED TO								
+		RALTBW	875.	4.77	466.	256.	219.	1.03	
+									1.62 4.77
	HYDROGRAPH AT								
+		SE06	678.	4.50	195.	49.	36.	.75	
	DIVERSION TO								
+		RETE06	258.	4.77	42.	11.	8.	.75	
	HYDROGRAPH AT								
+		DE06	615.	4.77	153.	39.	28.	.75	
	HYDROGRAPH AT								
+		RRBW	167.	.83	167.	129.	116.	.01	
	ROUTED TO								
+		RRRBW	167.	1.03	167.	129.	115.	.01	
	3 COMBINED AT								

+		CPRBW	1657.	4.77	784.	423.	363.	1.78	
	DIVERSION TO								
+		DIVSD	574.	4.77	544.	363.	320.	1.78	
	HYDROGRAPH AT								
+		DPRBW	1083.	4.77	240.	60.	43.	1.78	
	ROUTED TO								
+		RPRT52	1039.	4.97	240.	60.	43.	1.78	
+									1.62 4.97
	HYDROGRAPH AT								
+		SE08	261.	4.60	71.	18.	13.	.43	
	DIVERSION TO								
+		RETE08	63.	4.93	10.	2.	2.	.43	
	HYDROGRAPH AT								
+		DE08	224.	4.93	62.	16.	11.	.43	
	ROUTED TO								
+		RSE08	205.	5.00	61.	16.	11.	.43	
	HYDROGRAPH AT								
+		RDIVSD	574.	3.63	544.	363.	320.	.00	
	ROUTED TO								
+		RSDT52	574.	4.13	544.	363.	319.	.00	
	HYDROGRAPH AT								
+		SE16	390.	4.33	106.	27.	19.	.36	
	DIVERSION TO								
+		RETE16	92.	4.33	11.	3.	2.	.36	
	HYDROGRAPH AT								
+		DE16	390.	4.33	95.	24.	17.	.36	
	4 COMBINED AT								
+		C52DRS	2042.	4.97	938.	463.	390.	2.57	
	HYDROGRAPH AT								
+		SE10	499.	4.50	132.	33.	24.	.56	
	DIVERSION TO								
+		RETE10	110.	4.60	13.	3.	2.	.56	
	HYDROGRAPH AT								
+		DE10	493.	4.60	119.	30.	22.	.56	
	HYDROGRAPH AT								
+		RRUN	16.	.63	14.	6.	5.	.01	
	ROUTED TO								
+		RRRUN	16.	1.03	14.	6.	5.	.01	
	2 COMBINED AT								
+		CPRUN	509.	4.60	133.	36.	26.	.57	
	ROUTED TO								
+		RCPRUN	490.	4.87	133.	36.	26.	.57	
+									1.43 4.87
	HYDROGRAPH AT								
+		SE12	268.	4.57	84.	21.	15.	.33	
	DIVERSION TO								
+		RETE12	46.	4.90	8.	2.	1.	.33	
	HYDROGRAPH AT								
+		DE12	238.	4.90	76.	19.	14.	.33	
	2 COMBINED AT								
+		C52DRN	728.	4.90	209.	56.	40.	.90	
	2 COMBINED AT								
+		C52DRW	2741.	4.97	1146.	519.	431.	3.47	
	ROUTED TO								
+		R52DRW	2720.	5.00	1146.	519.	430.	3.47	
	HYDROGRAPH AT								
+		SE14	238.	4.53	74.	19.	14.	.26	
	DIVERSION TO								
+		RETE14	103.	4.53	13.	3.	2.	.26	
	HYDROGRAPH AT								
+		DE14	238.	4.53	61.	16.	11.	.26	
	2 COMBINED AT								
+		CTDRN1	2901.	5.00	1207.	534.	441.	3.73	
	2 COMBINED AT								

+		CTDRN2	3461.	5.00	1429.	593.	484.	7.90	
+	DIVERSION TO	DRN2	3461.	.00	1429.	593.	484.	7.90	
+	HYDROGRAPH AT	DTDRN2	0.	.00	0.	0.	0.	7.90	
+	HYDROGRAPH AT	SW18	725.	4.60	199.	50.	36.	.99	
+	DIVERSION TO	RETW18	167.	4.60	46.	12.	8.	.99	
+	HYDROGRAPH AT	DW18	558.	4.60	153.	39.	28.	.99	
+	HYDROGRAPH AT	RBW48W	855.	4.93	165.	41.	30.	.00	
+	DIVERSION TO	DBWNW1	333.	4.93	64.	16.	12.	.00	
+	HYDROGRAPH AT	BW48SW	522.	4.93	100.	25.	18.	.00	
+	ROUTED TO	RBWT40	462.	5.23	100.	25.	18.	.00	
+									1.23 5.23
+	4 COMBINED AT	CBW40	1625.	4.70	404.	102.	74.	10.75	
+	DIVERSION TO	DBW40W	1610.	4.70	404.	102.	74.	10.75	
+	HYDROGRAPH AT	DBW40	15.	4.70	0.	0.	0.	10.75	
+	HYDROGRAPH AT	SW26	141.	4.57	48.	13.	9.	.19	
+	DIVERSION TO	RETW26	97.	4.57	33.	8.	6.	.19	
+	HYDROGRAPH AT	DW26	44.	4.57	16.	4.	3.	.19	
+	HYDROGRAPH AT	RBWNW1	333.	4.93	64.	16.	12.	.00	
+	ROUTED TO	RTNW1	290.	5.30	64.	16.	12.	.00	
+									.96 5.30
+	2 COMBINED AT	CSW26	321.	5.30	80.	20.	15.	.19	
+	DIVERSION TO	DSW26N	224.	5.30	56.	14.	10.	.19	
+	HYDROGRAPH AT	DSW26W	96.	5.30	24.	6.	4.	.19	
+	2 COMBINED AT	CWO40	106.	4.70	24.	6.	4.	10.93	
+	ROUTED TO	RWOT32	92.	5.63	24.	6.	4.	10.93	
+									.43 5.63
+	HYDROGRAPH AT	SW28	148.	4.60	50.	13.	9.	.21	
+	DIVERSION TO	RETW28	76.	5.67	20.	5.	4.	.21	
+	HYDROGRAPH AT	DW28	73.	5.67	30.	8.	6.	.21	
+	2 COMBINED AT	CSW28	164.	5.67	54.	14.	10.	11.14	
+	DIVERSION TO	DSW28N	57.	5.67	19.	5.	4.	11.14	
+	HYDROGRAPH AT	DSW28W	106.	5.67	35.	9.	7.	11.14	
+	HYDROGRAPH AT	SW10	733.	4.17	124.	31.	22.	.71	
+	DIVERSION TO	RETW10	139.	4.17	24.	6.	4.	.71	

	HYDROGRAPH AT								
+		DW10	594.	4.17	101.	25.	18.	.71	
	DIVERSION TO								
+		RW10C	478.	4.17	33.	8.	6.	.71	
	HYDROGRAPH AT								
+		DW10C	594.	4.17	68.	17.	12.	.71	
	ROUTED TO								
+		RSW10N	574.	4.30	68.	17.	12.	.71	
+									.93 4.30
	HYDROGRAPH AT								
+		SW16	293.	4.77	91.	23.	17.	.89	
	DIVERSION TO								
+		RETW16	108.	4.77	23.	6.	4.	.89	
	HYDROGRAPH AT								
+		DW16	184.	4.77	68.	17.	13.	.89	
	HYDROGRAPH AT								
+		RSO40W	382.	4.57	54.	14.	10.	.00	
	ROUTED TO								
+		R40T32	377.	4.80	54.	14.	10.	.00	
+									1.01 4.80
	3 COMBINED AT								
+		CSO32	827.	4.70	190.	48.	35.	1.60	
	DIVERSION TO								
+		DSO32W	605.	4.13	94.	24.	17.	1.60	
	HYDROGRAPH AT								
+		DSO32	222.	4.13	96.	24.	17.	1.60	
	ROUTED TO								
+		R32TBW	222.	4.60	95.	24.	17.	1.60	
	HYDROGRAPH AT								
+		SW20	815.	4.57	229.	58.	42.	.99	
	DIVERSION TO								
+		RETW20	579.	5.40	131.	33.	24.	.99	
	HYDROGRAPH AT								
+		DW20	404.	5.40	100.	25.	18.	.99	
	HYDROGRAPH AT								
+		RBW40W	1610.	4.67	404.	102.	74.	.00	
	ROUTED TO								
+		RBWT32	1605.	4.83	404.	102.	74.	.00	
+									2.35 4.83
	3 COMBINED AT								
+		CBW32	2039.	4.83	598.	152.	109.	2.59	
	DIVERSION TO								
+		DBW32W	1557.	4.83	495.	126.	91.	2.59	
	HYDROGRAPH AT								
+		DBW32N	482.	4.83	102.	26.	18.	2.59	
	2 COMBINED AT								
+		CWO32	535.	5.00	137.	35.	25.	13.74	
	DIVERSION TO								
+		DWO32N	37.	5.00	23.	6.	4.	13.74	
	HYDROGRAPH AT								
+		DWO32W	498.	5.00	114.	29.	21.	13.74	
	HYDROGRAPH AT								
+		SW22	139.	4.27	30.	7.	5.	.14	
	DIVERSION TO								
+		RETW22	8.	4.27	2.	1.	0.	.14	
	HYDROGRAPH AT								
+		DW22	139.	4.27	28.	7.	5.	.14	
	HYDROGRAPH AT								
+		RBW32W	1557.	4.83	495.	126.	91.	.00	
	ROUTED TO								
+		RBWT30	1556.	4.87	495.	126.	91.	.00	
+									2.44 4.87
	2 COMBINED AT								
+		CBW30	1632.	4.83	523.	133.	96.	.14	
	DIVERSION TO								

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+                        DWO30N      483.   4.83        277.        72.        52.       .14

         HYDROGRAPH AT
+                         DBW30     1149.   4.83        246.        61.        44.       .14

         HYDROGRAPH AT
+                         RDRN2     3461.   5.00       1429.       593.       484.       .00

         ROUTED TO
+                        RTDRN2     3403.   5.13       1429.       593.       482.       .00

         HYDROGRAPH AT
+                          SW30      465.   4.97        195.        52.        38.       .81

         DIVERSION TO
+                        RETW30       39.   4.97         10.         3.         2.       .81

         HYDROGRAPH AT
+                          DW30      465.   4.97        195.        50.        36.       .81

         DIVERSION TO
+                        DSW30S       93.   4.97         39.        10.         7.       .81

         HYDROGRAPH AT
+                        DSW30W      372.   4.97        156.        40.        29.       .81

         2 COMBINED AT
+                        CTDRN3     3769.   5.10       1581.       633.       511.       .81

         HYDROGRAPH AT
+                        RWO32N       37.   4.20         23.         6.         4.       .00

         HYDROGRAPH AT
+                          SW27       80.   5.23         48.        14.        10.       .23

         DIVERSION TO
+                        RETW27       40.   6.97         18.         4.         3.       .23

         HYDROGRAPH AT
+                          DSW27      51.   6.97         32.        10.         7.       .23

         HYDROGRAPH AT
+                        RSW30S       93.   4.97         39.        10.         7.       .00

         HYDROGRAPH AT
+                        RSW26N      224.   5.30         56.        14.        10.       .00

         HYDROGRAPH AT
+                        RSW28N       57.   5.67         19.         5.         4.       .00

         4 COMBINED AT
+                        CI1032      400.   5.27        144.        39.        28.       .23

         3 COMBINED AT
+                        CTDRN4     4174.   5.13       1745.       678.       543.      1.04
1
                                   SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                       (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                          INTERPOLATED TO
                                                                       COMPUTATION INTERVAL
          ISTAQ    ELEMENT      DT        PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                     PEAK                                              PEAK

                              (MIN)      (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)

          RSE18N   MANE        2.00     149.84    276.00      1.41      2.00    149.84    276.00       1.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1380E+02 EXCESS= .0000E+00 OUTFLOW= .1377E+02 BASIN STORAGE= .5794E-03 PERCENT ERROR=    .2

          R19T21   MANE        2.00      64.87    284.00       .94      2.00     64.87    284.00        .94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1200E+02 EXCESS= .0000E+00 OUTFLOW= .1199E+02 BASIN STORAGE= .1216E-02 PERCENT ERROR=    .1

          RBW52W   MANE        2.00     310.55    290.00       .98      2.00    310.55    290.00        .98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3671E+02 EXCESS= .0000E+00 OUTFLOW= .3666E+02 BASIN STORAGE= .5028E-03 PERCENT ERROR=    .2

          RTE18W   MANE        2.00      18.12    232.00     -1.00      2.00     18.12    232.00      -1.00

          R48TTI   MANE        2.00     217.00    356.00       .34      2.00    217.00    356.00        .34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5913E+02 EXCESS= .0000E+00 OUTFLOW= .5872E+02 BASIN STORAGE= .1153E-02 PERCENT ERROR=    .7

          RC143N   MANE        1.69     594.91    290.37       .53      2.00    594.20    290.00        .53
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CONTINUITY SUMMARY (AC-FT) - INFLOW= .1179E+03 EXCESS= .0000E+00 OUTFLOW= .1177E+03 BASIN STORAGE= .2371E-03 PERCENT ERROR=    .2

            RPR60  MANE         2.00    270.26     52.00    949.73      2.00    270.26     52.00      949.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5072E+03 EXCESS= .0000E+00 OUTFLOW= .5067E+03 BASIN STORAGE= .4721E+00 PERCENT ERROR=    .0

            RRRBW  MANE         2.00    167.00     64.00    595.35      2.00    167.00     64.00      595.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3182E+03 EXCESS= .0000E+00 OUTFLOW= .3176E+03 BASIN STORAGE= .6180E+00 PERCENT ERROR=    .0

            RSE08  MANE         2.00    205.06    300.00      1.37      2.00    205.06    300.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3108E+02 EXCESS= .0000E+00 OUTFLOW= .3095E+02 BASIN STORAGE= .7050E-03 PERCENT ERROR=    .4

           RSDT52  MANE         2.00    574.00    252.00     -1.00      2.00    574.00    252.00       -1.00

            RRRUN  MANE         1.90     16.00     64.60     24.13      2.00     16.00     66.00       24.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1288E+02 EXCESS= .0000E+00 OUTFLOW= .1287E+02 BASIN STORAGE= .1110E-02 PERCENT ERROR=    .1

           R52DRW  MANE         2.00   2719.85    300.00      6.40      2.00   2719.85    300.00        6.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1186E+04 EXCESS= .0000E+00 OUTFLOW= .1184E+04 BASIN STORAGE= .2227E+01 PERCENT ERROR=    .0

           R32TBW  MANE         2.00    222.00    282.00       .56      2.00    222.00    282.00         .56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4813E+02 EXCESS= .0000E+00 OUTFLOW= .4798E+02 BASIN STORAGE= .9745E-03 PERCENT ERROR=    .3

           RTDRN2  MANE         2.00   3403.27    308.00     -1.00      2.00   3403.27    308.00       -1.00


*** NORMAL END OF HEC-1 ***
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                    ==========================================================================
                    Salt River - Southern Watershed
                    Existing Conditions
                    10 Year - 6 Hour Event
                    Clark Unit Hydrograph
                    Green-Ampt Precipitation Losses
                    August 2003
                    ==========================================================================

                    File: I10S106.dat

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

  32 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN          2  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ       1000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME       0918  ENDING TIME
                       ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE   33.30 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RC1.
      ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RC3.
      ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
1
                                                  RUNOFF SUMMARY
                                            FLOW IN CUBIC FEET PER SECOND
                                          TIME IN HOURS,  AREA IN SQUARE MILES

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

          HYDROGRAPH AT
+                           SW06     325.    4.33          84.         21.         15.       .70
          DIVERSION TO
+                          RETW06     52.    4.33          13.          3.          2.       .70
          HYDROGRAPH AT
+                           DW06     273.    4.33          71.         18.         13.       .70
          DIVERSION TO
+                          RW06C     159.    4.33          18.          5.          3.       .70
          HYDROGRAPH AT
+                          DW06C     273.    4.33          53.         13.         10.       .70
          DIVERSION TO
+                         DSW06E     233.    4.33          51.         13.          9.       .70
          HYDROGRAPH AT
+                         DSW06N      40.    4.33           2.          1.          0.       .70
          ROUTED TO
+                         RSW06N      19.    5.27           2.          1.          0.       .70
+                                                                                                .14        5.27
          HYDROGRAPH AT
+                           SW08     282.    4.27          63.         16.         11.       .59
          DIVERSION TO
+                          RETW08      39.    4.27           9.          2.          2.       .59
          HYDROGRAPH AT
+                           DW08     242.    4.27          54.         14.         10.       .59
          DIVERSION TO
+                          RW08C     176.    4.27          17.          4.          3.       .59
          HYDROGRAPH AT
+                          DW08C     242.    4.27          38.          9.          7.       .59
          ROUTED TO
+                         RW8TSO     239.    4.50          38.          9.          7.       .59
+                                                                                                .70        4.50
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+	HYDROGRAPH AT	SW14	102.	4.57	28.	7.	5.	.56	
+	DIVERSION TO	RETW14	1.	4.57	0.	0.	0.	.56	
+	HYDROGRAPH AT	DW14	101.	4.57	28.	7.	5.	.56	
+	3 COMBINED AT	CSO40	339.	4.50	67.	17.	12.	1.85	
+	DIVERSION TO	DSO40W	62.	4.50	4.	1.	1.	1.85	
+	HYDROGRAPH AT	DSO40N	276.	4.50	63.	16.	11.	1.85	
+	ROUTED TO	R40TBW	272.	4.77	63.	16.	11.	1.85	.80 4.77
+									
+	HYDROGRAPH AT	SW24	80.	4.10	17.	4.	3.	.10	
+	DIVERSION TO	RETW24	45.	4.10	10.	2.	2.	.10	
+	HYDROGRAPH AT	DW24	34.	4.10	7.	2.	1.	.10	
+	HYDROGRAPH AT	SE18	99.	4.43	27.	7.	5.	.18	
+	DIVERSION TO	RETE18	38.	5.00	8.	2.	1.	.18	
+	HYDROGRAPH AT	DE18	65.	5.00	20.	5.	4.	.18	
+	DIVERSION TO	DSE18W	18.	5.00	11.	3.	2.	.18	
+	HYDROGRAPH AT	SE18N	47.	5.00	9.	2.	2.	.18	
+	ROUTED TO	RSE18N	43.	5.13	9.	2.	2.	.18	
+	HYDROGRAPH AT	SE20	91.	4.33	23.	6.	4.	.17	
+	DIVERSION TO	RETE20	78.	4.33	19.	5.	4.	.17	
+	HYDROGRAPH AT	DSE20	13.	4.33	3.	1.	1.	.17	
+	2 COMBINED AT	CBWPRW	55.	4.50	13.	3.	2.	.35	
+	HYDROGRAPH AT	SE19	63.	4.53	24.	6.	5.	.24	
+	DIVERSION TO	RETE19	32.	4.53	12.	3.	2.	.24	
+	HYDROGRAPH AT	DE19	32.	4.53	12.	3.	2.	.24	
+	ROUTED TO	R19T21	31.	4.77	12.	3.	2.	.24	
+	HYDROGRAPH AT	SE21	58.	4.43	20.	5.	4.	.11	
+	2 COMBINED AT	CBW52A	86.	4.57	32.	8.	6.	.35	
+	DIVERSION TO	RETE21	43.	4.57	16.	4.	3.	.35	
+	HYDROGRAPH AT	DE21	43.	4.57	16.	4.	3.	.35	
+	2 COMBINED AT	CBW52B	98.	4.50	28.	7.	5.	.70	
+	ROUTED TO	RBW52W	98.	4.60	28.	7.	5.	.70	
+	HYDROGRAPH AT	SE22	30.	5.20	18.	5.	4.	.14	
	DIVERSION TO								

+		RETE22	15.	5.20	9.	3.	2.	.14	
+	HYDROGRAPH AT	DE22	15.	5.20	9.	3.	2.	.14	
+	2 COMBINED AT	CBWTI	110.	4.63	36.	10.	7.	.84	
+	2 COMBINED AT	C143TI	131.	4.53	43.	12.	9.	.94	
+	HYDROGRAPH AT	QDA1	328.	4.53	84.	21.	15.	.55	
+	HYDROGRAPH AT	QDA2	241.	4.37	55.	14.	10.	.36	
+	2 COMBINED AT	C1	560.	4.47	139.	35.	25.	.91	
+	ROUTED TO	RC1	559.	4.53	139.	35.	25.	.91	
+	HYDROGRAPH AT	QDA3	232.	4.47	56.	14.	10.	.37	
+	HYDROGRAPH AT	QDA4	107.	4.17	21.	5.	4.	.14	
+	3 COMBINED AT	C2	869.	4.47	217.	54.	39.	1.42	
+	ROUTED TO	RC2	865.	4.53	217.	54.	39.	1.42	
+	HYDROGRAPH AT	QDA5	43.	4.03	8.	2.	1.	.05	
+	2 COMBINED AT	C3	884.	4.53	224.	56.	40.	1.47	
+	ROUTED TO	RC3	883.	4.57	224.	56.	40.	1.47	
+	HYDROGRAPH AT	QDA6	58.	4.03	10.	2.	2.	.07	
+	2 COMBINED AT	C4	905.	4.57	234.	59.	42.	1.54	
+	HYDROGRAPH AT	QDA7	94.	4.10	17.	4.	3.	.12	
+	HYDROGRAPH AT	QDA8	34.	4.10	6.	1.	1.	.09	
+	3 COMBINED AT	C5	975.	4.53	257.	64.	46.	1.75	
+	HYDROGRAPH AT	QDA9	31.	4.03	5.	1.	1.	.06	
+	2 COMBINED AT	C6	990.	4.53	262.	65.	47.	1.81	
+	DIVERSION TO	RETFRS	990.	.00	262.	65.	47.	1.81	
+	HYDROGRAPH AT	DFRS	0.	.00	0.	0.	0.	1.81	
+	ROUTED TO	RTFRS	0.	.00	0.	0.	0.	1.81	.00 4.83
+									
+	HYDROGRAPH AT	SW04	276.	4.27	65.	16.	12.	.69	
+	DIVERSION TO	RETW04	22.	4.27	5.	1.	1.	.69	
+	HYDROGRAPH AT	DW04	254.	4.27	60.	15.	11.	.69	
+	DIVERSION TO	RW04C	172.	4.27	18.	5.	3.	.69	
+	HYDROGRAPH AT	DW04C	254.	4.27	42.	10.	8.	.69	
+	2 COMBINED AT	CWC1	254.	4.27	42.	10.	8.	2.50	
+	HYDROGRAPH AT	RSW06E	233.	4.13	51.	13.	9.	.00	

+	2 COMBINED AT	CWC2	487.	4.27	93.	23.	17.	2.50	
+	ROUTED TO	R48TBW	483.	4.53	93.	23.	17.	2.50	1.01 4.53
+									
+	HYDROGRAPH AT	SW12	316.	4.53	96.	25.	18.	.73	
+	DIVERSION TO	RETW12	265.	4.53	80.	21.	15.	.73	
+	HYDROGRAPH AT	DW12	51.	4.53	15.	4.	3.	.73	
+	HYDROGRAPH AT	RSE18W	18.	3.77	11.	3.	2.	.00	
+	ROUTED TO	RTE18W	18.	4.10	11.	3.	2.	.00	
+	3 COMBINED AT	CBW48	551.	4.53	118.	30.	22.	3.23	
+	DIVERSION TO	DBW48W	334.	4.33	39.	10.	7.	3.23	
+	HYDROGRAPH AT	DBW48N	217.	4.33	79.	20.	15.	3.23	
+	ROUTED TO	R48TTI	217.	5.47	79.	20.	14.	3.23	
+	2 COMBINED AT	C143NE	336.	4.70	122.	32.	23.	4.18	
+	ROUTED TO	RC143N	332.	4.73	122.	32.	23.	4.18	
+	HYDROGRAPH AT	SE02	163.	4.90	63.	17.	12.	.54	
+	DIVERSION TO	RETE02	59.	4.90	18.	4.	3.	.54	
+	HYDROGRAPH AT	DE02	104.	4.90	46.	12.	9.	.54	
+	HYDROGRAPH AT	PR60	270.	.80	270.	204.	184.	.01	
+	ROUTED TO	RPR60	270.	.87	270.	204.	184.	.01	
+	2 COMBINED AT	CPRSO	374.	4.90	316.	217.	193.	.55	
+	ROUTED TO	RSOTAL	374.	5.00	316.	217.	192.	.55	1.01 5.00
+									
+	HYDROGRAPH AT	SE04	272.	4.47	81.	21.	15.	.48	
+	DIVERSION TO	RETE04	155.	4.47	40.	10.	7.	.48	
+	HYDROGRAPH AT	DE04	117.	4.47	41.	10.	8.	.48	
+	2 COMBINED AT	CPRAL	472.	4.70	356.	227.	200.	1.03	
+	ROUTED TO	RALTBW	472.	4.80	356.	227.	199.	1.03	1.15 4.80
+									
+	HYDROGRAPH AT	SE06	396.	4.50	112.	28.	20.	.75	
+	DIVERSION TO	RETE06	150.	4.50	42.	11.	8.	.75	
+	HYDROGRAPH AT	DE06	245.	4.50	70.	18.	13.	.75	
+	HYDROGRAPH AT	RRBW	167.	.83	167.	129.	116.	.01	
+	ROUTED TO	RRRBW	167.	1.03	167.	129.	115.	.01	
	3 COMBINED AT								

+		CPRBW	872.	4.60	592.	374.	327.	1.78	
+	DIVERSION TO	DIVSD	574.	4.60	528.	358.	316.	1.78	
+	HYDROGRAPH AT	DPRBW	298.	4.60	64.	16.	11.	1.78	
+	ROUTED TO	RPRT52	295.	4.87	64.	16.	11.	1.78	.80 4.87
+	HYDROGRAPH AT	SE08	112.	4.60	31.	8.	6.	.43	
+	DIVERSION TO	RETE08	27.	4.60	7.	2.	1.	.43	
+	HYDROGRAPH AT	DE08	85.	4.60	24.	6.	4.	.43	
+	ROUTED TO	RSE08	84.	4.67	23.	6.	4.	.43	
+	HYDROGRAPH AT	RDIVSD	574.	3.87	528.	358.	316.	.00	
+	ROUTED TO	RSDT52	574.	4.40	528.	358.	315.	.00	
+	HYDROGRAPH AT	SE16	237.	4.33	64.	16.	12.	.36	
+	DIVERSION TO	RETE16	57.	4.33	11.	3.	2.	.36	
+	HYDROGRAPH AT	DE16	180.	4.33	53.	14.	10.	.36	
+	4 COMBINED AT	C52DRS	1118.	4.80	667.	393.	340.	2.57	
+	HYDROGRAPH AT	SE10	277.	4.53	71.	18.	13.	.56	
+	DIVERSION TO	RETE10	61.	4.53	13.	3.	2.	.56	
+	HYDROGRAPH AT	DE10	216.	4.53	57.	14.	10.	.56	
+	HYDROGRAPH AT	RRUN	16.	.63	14.	6.	5.	.01	
+	ROUTED TO	RRRUN	16.	1.03	14.	6.	5.	.01	
+	2 COMBINED AT	CPRUN	232.	4.53	72.	21.	15.	.57	
+	ROUTED TO	RCPRUN	230.	4.80	71.	21.	15.	.57	.94 4.80
+	HYDROGRAPH AT	SE12	155.	4.57	48.	12.	9.	.33	
+	DIVERSION TO	RETE12	26.	4.57	8.	2.	1.	.33	
+	HYDROGRAPH AT	DE12	129.	4.57	40.	10.	7.	.33	
+	2 COMBINED AT	C52DRN	352.	4.73	111.	31.	22.	.90	
+	2 COMBINED AT	C52DRW	1468.	4.80	778.	424.	363.	3.47	
+	ROUTED TO	R52DRW	1460.	4.83	778.	424.	362.	3.47	
+	HYDROGRAPH AT	SE14	143.	4.53	44.	11.	8.	.26	
+	DIVERSION TO	RETE14	63.	4.97	13.	3.	2.	.26	
+	HYDROGRAPH AT	DE14	111.	4.97	31.	8.	6.	.26	
+	2 COMBINED AT	CTDRN1	1535.	4.97	809.	432.	368.	3.73	
	2 COMBINED AT								

+		CTDRN2	1860.	4.83	930.	464.	391.	7.90	
+	DIVERSION TO	DRN2	1860.	.00	930.	464.	391.	7.90	
+	HYDROGRAPH AT	DTDRN2	0.	.00	0.	0.	0.	7.90	
+	HYDROGRAPH AT	SW18	362.	4.60	96.	24.	18.	.99	
+	DIVERSION TO	RETW18	83.	4.60	22.	6.	4.	.99	
+	HYDROGRAPH AT	DW18	279.	4.60	74.	19.	13.	.99	
+	HYDROGRAPH AT	RBW48W	334.	4.53	39.	10.	7.	.00	
+	DIVERSION TO	DBWNW1	130.	4.53	15.	4.	3.	.00	
+	HYDROGRAPH AT	BW48SW	204.	4.53	24.	6.	4.	.00	
+	ROUTED TO	RBWT40	196.	4.87	24.	6.	4.	.00	.75 4.87
+	4 COMBINED AT	CBW40	716.	4.83	159.	41.	29.	10.75	
+	DIVERSION TO	DBW40W	716.	.00	159.	41.	29.	10.75	
+	HYDROGRAPH AT	DBW40	0.	.00	0.	0.	0.	10.75	
+	HYDROGRAPH AT	SW26	82.	4.57	28.	7.	5.	.19	
+	DIVERSION TO	RETW26	57.	4.57	19.	5.	4.	.19	
+	HYDROGRAPH AT	DW26	26.	4.57	9.	2.	2.	.19	
+	HYDROGRAPH AT	RBWNW1	130.	4.53	15.	4.	3.	.00	
+	ROUTED TO	RTNW1	122.	4.97	15.	4.	3.	.00	.58 4.97
+	2 COMBINED AT	CSW26	145.	4.97	24.	6.	4.	.19	
+	DIVERSION TO	DSW26N	101.	4.97	17.	4.	3.	.19	
+	HYDROGRAPH AT	DSW26W	43.	4.97	7.	2.	1.	.19	
+	2 COMBINED AT	CWO40	43.	4.97	7.	2.	1.	10.93	
+	ROUTED TO	RWOT32	33.	5.60	7.	2.	1.	10.93	.23 5.60
+	HYDROGRAPH AT	SW28	83.	4.60	27.	7.	5.	.21	
+	DIVERSION TO	RETW28	42.	4.60	14.	4.	3.	.21	
+	HYDROGRAPH AT	DW28	41.	4.60	13.	3.	3.	.21	
+	2 COMBINED AT	CSW28	53.	5.60	20.	5.	4.	11.14	
+	DIVERSION TO	DSW28N	19.	5.60	7.	2.	1.	11.14	
+	HYDROGRAPH AT	DSW28W	35.	5.60	13.	3.	2.	11.14	
+	HYDROGRAPH AT	SW10	312.	4.17	57.	14.	10.	.71	
+	DIVERSION TO	RETW10	59.	4.17	11.	3.	2.	.71	

+	HYDROGRAPH AT	DW10	252.	4.17	46.	12.	8.	.71		
+	DIVERSION TO	RW10C	252.	4.47	33.	8.	6.	.71		
+	HYDROGRAPH AT	DW10C	166.	4.47	13.	3.	2.	.71		
+	ROUTED TO	RSW10N	99.	4.77	13.	3.	2.	.71		
+									.32	4.77
+	HYDROGRAPH AT	SW16	65.	4.77	23.	6.	4.	.89		
+	DIVERSION TO	RETW16	24.	4.77	8.	2.	2.	.89		
+	HYDROGRAPH AT	DW16	41.	4.77	14.	4.	3.	.89		
+	HYDROGRAPH AT	RSO40W	62.	4.50	4.	1.	1.	.00		
+	ROUTED TO	R40T32	45.	5.07	4.	1.	1.	.00		
+									.28	5.07
+	3 COMBINED AT	CSO32	146.	5.03	32.	8.	6.	1.60		
+	DIVERSION TO	DSO32W	0.	5.03	0.	0.	0.	1.60		
+	HYDROGRAPH AT	DSO32	146.	5.03	32.	8.	6.	1.60		
+	ROUTED TO	R32TBW	141.	5.13	32.	8.	6.	1.60		
+	HYDROGRAPH AT	SW20	444.	4.57	122.	31.	22.	.99		
+	DIVERSION TO	RETW20	315.	4.57	87.	22.	16.	.99		
+	HYDROGRAPH AT	DW20	129.	4.57	35.	9.	6.	.99		
+	HYDROGRAPH AT	RBW40W	716.	4.83	159.	41.	29.	.00		
+	ROUTED TO	RBWT32	693.	5.03	159.	41.	29.	.00		
+									1.46	5.03
+	3 COMBINED AT	CBW32	923.	5.03	225.	58.	42.	2.59		
+	DIVERSION TO	DBW32W	787.	5.03	212.	54.	39.	2.59		
+	HYDROGRAPH AT	DBW32N	136.	5.03	13.	3.	2.	2.59		
+	2 COMBINED AT	CWO32	162.	5.03	26.	7.	5.	13.74		
+	DIVERSION TO	DWO32N	37.	5.03	15.	4.	3.	13.74		
+	HYDROGRAPH AT	DWO32W	125.	5.03	11.	3.	2.	13.74		
+	HYDROGRAPH AT	SW22	72.	4.27	15.	4.	3.	.14		
+	DIVERSION TO	RETW22	19.	4.27	2.	1.	0.	.14		
+	HYDROGRAPH AT	DW22	72.	4.27	13.	3.	2.	.14		
+	HYDROGRAPH AT	RBW32W	787.	5.03	212.	54.	39.	.00		
+	ROUTED TO	RBWT30	786.	5.07	212.	54.	39.	.00		
+									1.66	5.07
+	2 COMBINED AT	CBW30	809.	5.07	225.	58.	41.	.14		
	DIVERSION TO									

+		DWO30N	483.	5.07	192.	50.	36.	.14
+	HYDROGRAPH AT	DBW30	326.	5.07	32.	8.	6.	.14
+	HYDROGRAPH AT	RDRN2	1860.	4.83	930.	464.	391.	.00
+	ROUTED TO	RTDRN2	1850.	5.00	930.	464.	388.	.00
+	HYDROGRAPH AT	SW30	263.	4.93	110.	29.	21.	.81
+	DIVERSION TO	RETW30	60.	4.93	10.	3.	2.	.81
+	HYDROGRAPH AT	DW30	263.	4.93	106.	27.	19.	.81
+	DIVERSION TO	DSW30S	53.	4.93	21.	5.	4.	.81
+	HYDROGRAPH AT	DSW30W	210.	4.93	85.	21.	15.	.81
+	2 COMBINED AT	CTDRN3	2060.	5.00	1011.	485.	404.	.81
+	HYDROGRAPH AT	RWO32N	37.	4.73	15.	4.	3.	.00
+	HYDROGRAPH AT	SW27	45.	5.20	27.	8.	6.	.23
+	DIVERSION TO	RETW27	22.	5.20	13.	4.	3.	.23
+	HYDROGRAPH AT	DSW27	22.	5.20	13.	4.	3.	.23
+	HYDROGRAPH AT	RSW30S	53.	4.93	21.	5.	4.	.00
+	HYDROGRAPH AT	RSW26N	101.	4.97	17.	4.	3.	.00
+	HYDROGRAPH AT	RSW28N	19.	5.60	7.	2.	1.	.00
+	4 COMBINED AT	CI1032	190.	4.97	58.	15.	11.	.23
+	3 COMBINED AT	CTDRN4	2286.	4.97	1083.	505.	418.	1.04

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
RSE18N	MANE	2.00	43.45	308.00	.47	2.00	43.45	308.00	.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4645E+01 EXCESS= .0000E+00 OUTFLOW= .4634E+01 BASIN STORAGE= .9116E-03 PERCENT ERROR= .2

R19T21	MANE	2.00	31.43	286.00	.49	2.00	31.43	286.00	.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6236E+01 EXCESS= .0000E+00 OUTFLOW= .6232E+01 BASIN STORAGE= .1201E-02 PERCENT ERROR= .0

RBW52W	MANE	2.00	97.99	276.00	.39	2.00	97.99	276.00	.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1448E+02 EXCESS= .0000E+00 OUTFLOW= .1446E+02 BASIN STORAGE= .5233E-03 PERCENT ERROR= .1

RTE18W	MANE	2.00	18.10	246.00	-1.00	2.00	18.10	246.00	-1.00
R48TTI	MANE	2.00	216.99	328.00	.23	2.00	216.99	328.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4007E+02 EXCESS= .0000E+00 OUTFLOW= .3970E+02 BASIN STORAGE= .8104E-03 PERCENT ERROR= .9

RC143N	MANE	1.90	332.56	284.62	.28	2.00	332.46	284.00	.28

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6351E+02 EXCESS= .0000E+00 OUTFLOW= .6341E+02 BASIN STORAGE= .2633E-03 PERCENT ERROR=    .2

            RPR60  MANE         2.00    270.26     52.00    949.73      2.00    270.26     52.00      949.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5072E+03 EXCESS= .0000E+00 OUTFLOW= .5067E+03 BASIN STORAGE= .4721E+00 PERCENT ERROR=    .0

            RRRBW  MANE         2.00    167.00     64.00    595.35      2.00    167.00     64.00      595.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3182E+03 EXCESS= .0000E+00 OUTFLOW= .3176E+03 BASIN STORAGE= .6180E+00 PERCENT ERROR=    .0

            RSE08  MANE         2.00     84.24    280.00       .53      2.00     84.24    280.00         .53

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1194E+02 EXCESS= .0000E+00 OUTFLOW= .1191E+02 BASIN STORAGE= .6944E-03 PERCENT ERROR=    .3

           RSDT52  MANE         2.00    574.00    266.00     -1.00      2.00    574.00    266.00       -1.00

            RRRUN  MANE         1.90     16.00     64.60     24.13      2.00     16.00     66.00       24.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1288E+02 EXCESS= .0000E+00 OUTFLOW= .1287E+02 BASIN STORAGE= .1110E-02 PERCENT ERROR=    .1

           R52DRW  MANE         2.00   1459.73    290.00      5.38      2.00   1459.73    290.00        5.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9982E+03 EXCESS= .0000E+00 OUTFLOW= .9964E+03 BASIN STORAGE= .2227E+01 PERCENT ERROR=    .0

           R32TBW  MANE         2.00    141.06    308.00       .19      2.00    141.06    308.00         .19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1605E+02 EXCESS= .0000E+00 OUTFLOW= .1601E+02 BASIN STORAGE= .8859E-03 PERCENT ERROR=    .3

           RTDRN2  MANE         2.00   1849.95    300.00     -1.00      2.00   1849.95    300.00       -1.00


*** NORMAL END OF HEC-1 ***
```

Appendix C

HEC-RAS Model Output for Tempe Drain

Existing (Clean) Condition

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   06DEC07  TIME  15:51:55  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Project ID: I-10 SALT - Major Basin: 01 - Return Period: 100 Years
  2           ID
  3           ID                    I-10 Corridor Improvement Study - Buckeye Road to Baseline Road
  4           ID
  5           ID  ***************************************************************************
  6           ID
  7           ID           Prepared for:
  8           ID
  9           ID                    Arizona Department of Transportation
 10           ID
 11           ID  ***************************************************************************
 12           ID           Prepared by:
 13           ID
 14           ID                    DMJM+HARRIS
 15           ID                    2777 E. Camelback Road, Ste. 200
 16           ID                    Phoenix, AZ  85016-4302
 17           ID                    (602) 337-2777
 18           ID
 19           ID   ==========================================================================
 20           ID   Salt River - Southern Watershed
 21           ID   Existing Conditions
 22           ID   10 Year - 6 Hour Event
 23           ID   Clark Unit Hydrograph
 24           ID   Green-Ampt Precipitation Losses
 25           ID   August 2003
 26           ID   ==========================================================================
 27           ID
 28           ID   File: I10S106.dat
 29           ID
 30           ID  ***************************************************************************
              *DIAGRAM
 31           IT       2                    1000
 32           IO       5       0
              *  IO     0       0
 33           IN      15
              *

 34           KK    SW06   BASIN
 35           KM   Runoff from Sub-basin SW06
 36           BA   0.698
 37           PB   1.934
 38           PC   0.000   0.014   0.019   0.029   0.046   0.060   0.072   0.085   0.099   0.112
 39           PC   0.128   0.144   0.167   0.213   0.296   0.469   0.674   0.802   0.873   0.916
 40           PC   0.947   0.960   0.973   0.987   1.000
 41           LG    0.19    0.29    4.60    0.37      54
 42           UC   0.513   0.405
 43           UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 44           UA     100

 45           KK    DW06
 46           KM   Diversion for Retention in SW06
 47           KM   16% of Sub-basin Area Drains to Retention Basins
 48           DT  RETW06   11.31
 49           DI       0   10000
 50           DQ       0    1600
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 51           KK   DW06C
 52           KM   Diversion for Retention in Western and Highline Canals
 53           KM   Western Canal - L=2850', W=50', H=2.1', Volume = 6.87 ac-ft.
 54           KM   Highline Canal - L=3600', W=20', H=1.3', Volume = 2.15 ac-ft.
 55           DT   RW06C    9.02
 56           DI       0   10000
 57           DQ       0   10000

 58           KK  DSW06N
 59           KM   Diversion of Runoff from SW06 East to 48th St. via 60" RCP @ 0.68% (233 cfs)
 60           DT  DSW06E
 61           DI       0     233   10000
 62           DQ       0     233     233

 63           KK  RSW06N
 64           KM   Route Flow from SW06 to CSO40
 65           RS      17    FLOW      -1
 66           RC    .025    .016    .025    7200   .0039
 67           RX       0       1      15      16      84      85      99     100
 68           RY       4       1      .5       0       0      .5       1       4

 69           KK    SW08   BASIN
 70           KM   Runoff from Sub-basin SW08
 71           BA   0.591
 72           LG    0.19    0.31    4.80    0.30      44
 73           UC   0.433   0.327
 74           UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 75           UA     100

 76           KK    DW08
 77           KM   Diversion for Retention in SW08
 78           KM   14% of Sub-basin Area Drains to Retention Basins
 79           DT  RETW08    5.50
 80           DI       0   10000
 81           DQ       0    1400

 82           KK   DW08C
 83           KM   Diversion for Retention in Western and Highline Canals
 84           KM   Western Canal - L=2750', W=50', H=2.1', Volume = 6.63 ac-ft.
 85           KM   Highline Canal - L=3100', W=20', H=1.3', Volume = 1.85 ac-ft.
 86           DT   RW08C    8.48
 87           DI       0   10000
 88           DQ       0   10000

 89           KK  RW8TSO
 90           KM   Route Flow from SW08 to CSO40
 91           RS      13    FLOW      -1
 92           RC    .025    .016    .025    5700   .0044
 93           RX       0       1      15      16      84      85      99     100
 94           RY       4       1      .5       0       0      .5       1       4
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 95           KK    SW14   BASIN
 96           KM   Runoff from Sub-basin SW14
 97           BA   0.564
 98           LG    0.28    0.26    4.70    0.36      15
 99           UC   1.000   0.660
100           UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
101           UA     100

102           KK    DW14
103           KM   Diversion for Retention in SW14
              *  *** Estimated Volume ***
104           DT  RETW14     .23
105           DI       0   10000
106           DQ       0     100

107           KK   CSO40
108           KM   Combine Hydrographs from RWC2N and RWC3N
109           HC       3

110           KK  DSO40N
111           KM   Diversion of Runoff from CSO40 West to CSO32
112           KM   Storm Drain to North - 60" RCP @ 0.50% (200 cfs); Remainder is split 45% West
113           DT  DSO40W
114           DI       0     200    1000
115           DQ       0       0     360

116           KK  R40TBW
117           KM  Route Flow from along 40th St from Southern to Broadway
118           RS      13    FLOW      -1
119           RC    .025    .016    .025    5280   .0036
120           RX       0       1      15      16      84      85      99     100
121           RY       4       1      .5       0       0      .5       1       4
              *

122           KK    SW24   BASIN
123           KM   Runoff from Sub-basin SW24
124           BA   0.105
```

```
125          LG    0.16    0.17    8.40    0.09      64
126          UC   0.283   0.268
127          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
128          UA     100

129          KK    DW24
130          KM   Diversion for Retention in SW24
131          KM   Sub-basin Area Retention (0.44) and Simulation of Detention in ADOT ROW (4.87
132          DT  RETW24    5.31
133          DI       0   10000
134          DQ       0    5700
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

135          KK    SE18   BASIN
136          KM   Runoff from Sub-basin SE18
137          BA   0.183
138          LG    0.17    0.16    8.00    0.11      55
139          UC   0.779   0.517
140          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
141          UA     100

142          KK    DE18
143          KM   Diversion for Retention in SE18
144          KM   35% of Sub-basin Area Drains to Retention Basins
145          DT  RETE18    3.72
146          DI       0   10000
147          DQ       0    3800

148          KK   SE18N
149          KM   Diversion West for Storm Drains crossing I-10 at Fairmont
150          KM   Storm Drain - 30" RCP @ 0.20% (18 cfs)
151          DT  DSE18W
152          DI       0      18    1000
153          DQ       0      18      18

154          KK  RSE18N
155          KM   Route SE18 from Alameda to Broadway via Storm Drain
156          RD    3000   .0027    .013            CIRC     4.5

157          KK    SE20   BASIN
158          KM   Runoff from Sub-basin SE20
159          BA   0.167
160          LG    0.19    0.22    7.00    0.15      51
161          UC   0.625   0.421
162          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
163          UA     100

164          KK   DSE20
165          KM   Diversion for Retention in SE20
166          KM   80% of Sub-basin Area Drains to Retention Basins
167          DT  RETE20   11.89
168          DI       0   10000
169          DQ       0    8600

170          KK  CBWPRW
171          KM   Combine Hydrographs at Broadway West of Priest
172          HC       2
             *

173          KK    SE19   BASIN
174          KM   Runoff from Sub-basin SE19
175          BA   0.238
176          LG    0.18    0.26    4.55    0.45      47
177          UC   0.713   1.018
178          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
179          UA     100
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

180          KK    DE19
181          KM   Diversion for Retention in SE19
182          KM   Simulation of Existing Detention in ADOT ROW(original design volumes)
183          DT  RETE19   88.85
184          DI       0   10000
185          DQ       0    5000

186          KK  R19T21
187          KM   Route SE19 along I-10 to CBW52A via Storm Drain
188          RD    6100   .0023    .013            CIRC     5.0

189          KK    SE21   BASIN
190          KM   Runoff from Sub-basin SE21
191          BA   0.114
192          LG    0.14    0.17    6.80    0.18      82
193          UC   0.608   0.805
194          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
195          UA     100

196          KK  CBW52A
```

```
197          KM   Combine Hydrographs from SE19 and SE21
198          HC       2

199          KK    DE21
200          KM   Diversion for Retention in SE21
201          KM   Preliminary Simulation of Existing Detention (original design storage volume)
202          DT  RETE21   17.66
203          DI       0   10000
204          DQ       0    5000

205          KK  CBW52B
206          KM   Combine Hydrographs from CBW52A and CBWPRW
207          HC       2
             *

208          KK  RBW52W
209          KM   Route CBW52 from 52nd Street at Broadway west to Highway 143 via Storm Drain
210          RD    2700   .0027    .013            CIRC     4.5

211          KK    SE22   BASIN
212          KM   Runoff from Sub-basin SE22
213          BA   0.137
214          LG    0.15    0.15    8.80    0.08      58
215          UC   1.500   2.705
216          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
217          UA     100

218          KK    DE22
219          KM   Diversion for Retention in SE22
220          KM   Simulation of Detention in Adot ROW
             *  *** Estimated Volume ***
221          DT  RETE22        5
222          DI       0   10000
223          DQ       0    5000
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

224          KK   CBWTI
225          KM   Combine Flows from Broadway Storm Drain and SE22
226          HC       2

227          KK  C143TI
228          KM   Combine Hydrographs from SW24 and CBWTI
229          HC       2
             *
             *
             * ****** EXCERPT FROM GUADALUPE FRS DAMBREAK HYDROLOGY ******
             *            Prepared by Greiner, Inc., August 1989
             *

230          KK    QDA1
231          KM    CALCULATE RUNOFF FROM DA1
232          BA    0.55
233          LS              95
234          UD    0.60

235          KK    QDA2
236          KM    CALCULATE RUNOFF FROM DA2
237          BA    0.36
238          LS              95
239          UD    0.44

240          KK      C1
241          KM    COMBINE HYDROGRAPHS QDA1 AND QDA2
242          HC       2

243          KK     RC1
244          KM    ROUTE HYDROGRAPH C1 THRU DA3
             *  RM     3    0.07    0.20
             *  **** Revised NSTPS to avoid Error Message ****
245          RM       5    0.07    0.20

246          KK    QDA3
247          KM    CALCULATE RUNOFF FROM DA3
248          BA    0.37
249          LS              95
250          UD    0.53

251          KK    QDA4
252          KM    CALCULATE RUNOFF FROM DA4
253          BA    0.14
254          LS              95
255          UD    0.28

256          KK      C2
257          KM    COMBINE HYDROGRAPHS RC1, QDA3 AND QDA4
258          HC       3
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

259          KK     RC2
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```
260          KM    ROUTE HYDROGRAPH C2 THRU DA5
261          RM       1    0.06    0.20

262          KK    QDA5
263          KM    CALCULATE RUNOFF FROM DA5
264          BA    0.05
265          LS              95
266          UD    0.14

267          KK      C3
268          KM    COMBINE HYDROGRAPHS C2 & QDA5--TOTAL PIMA WASH FLOW AT 48TH STREET
269          HC       2

270          KK     RC3
271          KM    ROUTE HYDROGRAPH C3 THRU DA6
             *   RM     1    0.05    0.25
             *  **** Revised NSTPS to avoid Error Message ****
272          RM       3    0.05    0.25

273          KK    QDA6
274          KM    CALCULATE RUNOFF FROM DA6
275          BA    0.07
276          LS            93.3
277          UD    0.10

278          KK      C4
279          KM    COMBINE HYDROGRAPHS C3 AND QDA6--TOTAL PIMA WASH FLOW INTO FRS
280          HC       2

281          KK    QDA7
282          KM    CALCULATE RUNOFF FROM DA7
283          BA    0.12
284          LS              94
285          UD    0.20

286          KK    QDA8
287          KM    CALCULATE RUNOFF FROM DA8
288          BA    0.09
289          LS            81.4
290          UD    0.16

291          KK      C5
292          KM    COMBINE HYDROGRAPHS C4, QDA7 & QDA8--TOTAL FLOW INTO FRS N. OF GUADALUPE RD.
293          HC       3

294          KK    QDA9
295          KM    CALCULATE RUNOFF FROM DA9
296          BA    0.06
297          LS              85
298          UD    0.10
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

299          KK      C6
300          KM    COMBINE HYDROGRAPHS C5 AND QDA9--TOTAL FRS INFLOW
301          HC       2
             *
             * ****** EXCERPT FROM GUADALUPE FRS DAMBREAK HYDROLOGY ******
             *
             *  *** Following not used and substituted with FRS Hydrology ***
             *  KK  SW02
             *  KM Runoff from Sub-basin SW02
             *  BA     3
             *  LG   .29     .25     4.1     .57      31
             *  UC    .6      .6
             *

302          KK    DFRS
303          KM   Guadalupe Flood Retardant Structure
304          DT  RETFRS
305          DI       0   10000
306          DQ       0   10000
             *  *** Reservoir Routing not necessary Due to FRS capacity for 50% PMF ***
             *  RS          STOR
             *  SV
             *  SQ

307          KK   RTFRS
308          KM   Route Flow from FRS to CWC1
309          RS       6    FLOW      -1
310          RC    .025    .016    .025    5900   .0088
311          RX       0       1      15      16      84      85      99     100
312          RY       4       1      .5       0       0      .5       1       4

313          KK    SW04   BASIN
314          KM   Runoff from Sub-basin SW04
315          BA   0.689
316          LG    0.21    0.27    4.25    0.50      43
317          UC   0.488   0.294
318          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
319          UA     100

320          KK    DW04
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 321          KM   Diversion for Retention in SW04
 322          KM   8% of Sub-basin Area Drains to Retention Basins
 323          DT  RETW04    3.85
 324          DI       0   10000
 325          DQ       0     800

 326          KK   DW04C
 327          KM   Diversion for Retention in Western and Highline Canals
 328          KM   Western Canal - L=3050', W=50', H=2.1', Volume = 7.35 ac-ft.
 329          KM   Highline Canal - L=3050', W=20', H=1.3', Volume = 1.82 ac-ft.
 330          DT   RW04C    9.17
 331          DI       0   10000
 332          DQ       0   10000
1                                          HEC-1 INPUT                                          PAGE  9

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 333          KK    CWC1
 334          KM   Combine Hydrographs from RTFRS and SW04
 335          HC       2

 336          KK  RSW06E
 337          KM   Retrieve Hydrograph from Diversion DSW06
 338          DR  DSW06E

 339          KK    CWC2
 340          KM   Combine Hydrographs from CWC1 and DSW06
 341          HC       2

 342          KK  R48TBW
 343          KM   Route Flow from CWC2 along 48th St to Broadway
 344          RS      15    FLOW      -1
 345          RC    .025    .016    .025    7300   .0051
 346          RX       0       1      15      16      84      85      99     100
 347          RY       4       1      .5       0       0      .5       1       4

 348          KK    SW12   BASIN
 349          KM   Runoff from Sub-basin SW12
 350          BA   0.733
 351          LG    0.18    0.22    6.60    0.18      51
 352          UC   0.892   0.655
 353          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 354          UA     100

 355          KK    DW12
 356          KM   Diversion for Retention in SW12
 357          KM   75% of Sub-basin Area Drains to Retention Basins
 358          DT  RETW12   45.02
 359          DI       0   10000
 360          DQ       0    8400

 361          KK  RSE18W
 362          KM   Retrieve Hydrograph from Diversion DSE18W
 363          DR  DSE18W

 364          KK  RTE18W
 365          KM   Route Flow from I-10 West and North to Broadway and 48th St. (CBW48)
 366          KM   Travel Time Estimated using average slope
 367          RD    7340   .0038    .013            CIRC       4

 368          KK   CBW48
 369          KM   Combine Flows from Broadway Road and 48th Street Storm Drains
 370          HC       3

 371          KK  DBW48N
 372          KM   Diversion of Runoff from CBW48 West along Broadway
 373          KM   Remainder is Conveyed North via Storm Drain - 90" RCP @ 0.08% (217 cfs)
 374          DT  DBW48W
 375          DI       0     217     218    1000
 376          DQ       0       0       1     783
1                                          HEC-1 INPUT                                          PAGE 10

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 377          KK  R48TTI
 378          KM   Route Flow from 48th St North to I-10 via 90" RCP @ 0.08%
 379          RD    2625   .0008    .013            CIRC     7.5

 380          KK  C143NE
 381          KM   Combine Flows from Broadway Road and 48th Street Storm Drains
 382          HC       2

 383          KK  RC143N
 384          KM   Route Flow from C143NE North to Tempe Drain - CTDRN2 via 102" RCP
 385          RD     825   .0008    .013            CIRC     8.5
              *

 386          KK    SE02   BASIN
 387          KM   Runoff from Sub-basin SE02
 388          BA   0.537
 389          LG    0.24    0.15    7.00    0.14      38
 390          UC   1.500   1.113
 391          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
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392          UA     100

393          KK    DE02
394          KM   Diversion for Retention in SE02
395          KM   33% of Sub-basin Area Drains to Retention Basins
396          DT  RETE02    8.86
397          DI       0   10000
398          DQ       0    3600
399          IN      47
             *  IN     6

400          KK    PR60                          3
401          KM   Hydrograph from Areas South of US60 at Preist
402          KM   Storm Drain Flowing North - 66" RCP @ 0.55% (Capacity = 270 cfs)
403          KM   Hydrograph developed with design Tc (1.23 hr.)
             *  KM Hydrograph developed with design Tc (1.23 hr.) and TR55, then lagged 2 hou
404          BA    0.01
405          QI       0     270     270     270     270     270     270     270     270     270
406          QI     270     270     270     270     270     270     270     135       0       0
             *  BA     3
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI   8.7     9.5    10.4    11.3    12.7    14.2    15.6    17.7    19.7     2
             *  QI  25.2    33.0    46.9    70.3   102.4   141.5   184.9   222.3   246.6    25
             *  QI 270.0   250.5   230.9   207.5   184.1   162.8   141.5   126.8   112.0    10
             *  QI  90.3    82.8    75.2    67.7    62.8    57.9    53.0    49.9    46.9     4
             *  QI  40.8    39.1    37.3    35.6    33.9    32.1    31.1    30.0    29.0     2
             *  QI  26.9    26.2    25.5    24.8    24.1    23.4    22.9    22.4    21.9     2
             *  QI  20.8    20.5    20.1    19.8    19.4    19.1    18.8    18.4    18.1     1
             *  QI  17.4    17.2    17.0    16.8    16.7    16.5    16.3    16.1    16.0     1
             *  QI  15.6    15.5    15.3    15.1    14.9    14.8    14.6    14.4    14.2     1
             *  QI  13.9    13.7    13.5    13.4    13.2    13.0    12.8    12.7    12.5     1
             *  QI  12.2    12.0    11.8    11.6    11.5    11.3    11.1    10.9    10.8     1
             *  QI  10.4    10.2     9.9     9.7     9.5     9.2     9.0     8.7     8.5
             *  QI   8.0     7.8     7.3     7.3     7.1     6.8     6.6     6.4     6.1
             *  QI   5.6     5.4     5.2     4.9     4.7     4.4     4.2     4.0     3.7
             *  QI   3.3     3.0     2.8     2.5     2.3     2.1     1.8     1.6     1.3
             *  QI   0.9     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

407          IN      15

408          KK   RPR60
409          KM   Route PR60 from US60 to CPRBW via Storm Drain
410          RD    1725   .0055    .013            CIRC     5.5

411          KK   CPRSO
412          KM   Combine Hydrographs from SE02 and PR60
413          HC       2

414          KK  RSOTAL
415          KM   Route CPRSO from Southern to Alameda along Priest Drive
416          RS       7    FLOW      -1
417          RC    .025    .016    .025    2600   .0031
418          RX       0       1      15      16      84      85      99     100
419          RY       4       1      .5       0       0      .5       1       4

420          KK    SE04   BASIN
421          KM   Runoff from Sub-basin SE04
422          BA   0.481
423          LG    0.13    0.15    9.70    0.07      66
424          UC   0.804   0.570
425          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
426          UA     100

427          KK    DE04
428          KM   Diversion for Retention in SE04
429          KM   57% of Sub-basin Area Drains to Retention Basins
430          DT  RETE04   20.06
431          DI       0   10000
432          DQ       0    5700

433          KK   CPRAL
434          KM   Combine Hydrographs from CPRSO and SE04
435          HC       2

436          KK  RALTBW
437          KM   Route CPRAL from Alameda to Broadway along Priest Drive
438          RS       7    FLOW      -1
439          RC    .025    .016    .025    2600   .0031
440          RX       0       1      15      16      84      85      99     100
441          RY       4       1      .5       0       0      .5       1       4

442          KK    SE06   BASIN
443          KM   Runoff from Sub-basin SE06
444          BA   0.745
445          LG    0.18    0.15    9.70    0.06      47
446          UC   0.896   0.561
447          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
448          UA     100
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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449          KK    DE06
450          KM   Diversion for Retention in SE06
451          KM   38% of Sub-basin Area Drains to Retention Basins
452          DT  RETE06   20.87
453          DI       0   10000
454          DQ       0    3800
455          IN      50
             *  IN     6

456          KK    RRBW
457          KM   Hydrograph from Areas East of Railroad at Broadway
458          KM   Existing Storm Drain - 63" RCP @ 0.27% (Capacity = 167 cfs)
459          KM   Hydrograph developed with design Tc (1.54 hr.)
             *  KM Hydrograph developed with design Tc (1.54 hr.) and TR55, then lagged 2 hou
460          BA    0.01
461          QI       0     167     167     167     167     167     167     167     167     167
462          QI     167     167     167     167     167     167     167      83       0       0
             *  BA     2
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI   0.0     0.5     1.1     1.6     2.2     2.7     3.3     3.8     4.4
             *  QI   5.5     5.9     6.3     6.7     7.5     8.3     9.1    10.3    11.5     1
             *  QI  15.2    18.8    24.9    35.2    49.8    68.0    89.3   111.7   131.2    14
             *  QI 154.9   160.9   167.0   155.2   143.3   131.8   120.2   108.4    96.6     8
             *  QI  78.3    72.1    65.8    59.5    55.1    50.6    46.2    43.3    40.4     3
             *  QI  34.6    32.9    31.2    29.5    27.8    26.1    25.1    24.2    23.2     2
             *  QI  21.3    20.6    20.0    19.4    18.8    18.2    17.6    17.0    16.4     1
             *  QI  15.2    14.9    14.7    14.5    14.2    14.0    13.7    13.5    13.2     1
             *  QI  12.8    12.6    12.4    12.2    12.0    11.8    11.7    11.5    11.3     1
             *  QI  10.9    10.8    10.7    10.6    10.4    10.3    10.2    10.1    10.0
             *  QI   9.7     9.6     9.5     9.4     9.2     9.1     9.0     8.9     8.7
             *  QI   8.5     8.4     8.3     8.1     8.0     7.9     7.8     7.7     7.5
             *  QI   7.3     7.1     6.9     6.7     6.6     6.4     6.2     6.0     5.8
             *  QI   5.5     5.3     5.1     4.9     4.7     4.6     4.4     4.2     4.0
             *  QI   3.6     3.5     3.3     3.1     2.9     2.7     2.6     2.4     2.2
             *  QI   1.8     1.6     1.5     1.3     1.1     0.9     0.7     0.5     0.4
             *  QI   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
463          IN      15

464          KK   RRRBW
465          KM   Route RRBW from Railroad to CPRBW via Storm Drain
466          RD    2700    .003    .013            CIRC       7

467          KK   CPRBW
468          KM   Combine Hydrographs from CPRAL and SE06
469          HC       3

470          KK   DPRBW
471          KM   Diversion for Existing Storm Drain - 102" RCP @ 0.22% (Capacity = 574 cfs)
472          DT   DIVSD
473          DI       0     574    2000
474          DQ       0     574     574
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

475          KK  RPRT52
476          KM   Route DPRBW Overland Flow from Priest and Broadway to 52nd Street
477          RS      12    FLOW      -1
478          RC    .025    .016    .025    5850   .0043
479          RX       0       1      15      16      84      85      99     100
480          RY       4       1      .5       0       0      .5       1       4

481          KK    SE08   BASIN
482          KM   Runoff from Sub-basin SE08
483          BA   0.425
484          LG    0.27    0.26    5.80    0.22      20
485          UC   1.038   0.682
486          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
487          UA     100

488          KK    DE08
489          KM   Diversion for Retention in SE08
490          KM   24% of Sub-basin Area Drains to Retention Basins
491          DT  RETE08    4.85
492          DI       0   10000
493          DQ       0    2400

494          KK   RSE08
495          KM   Route SE08 from Priest to C52DRN via Storm Drain
496          RD    2700   .0019    .013            CIRC       3

497          KK  RDIVSD
498          KM   Retrieve Hydrograph for Storm Drain at CPRBW
499          DR   DIVSD

500          KK  RSDT52
501          KM   Route DIVSD from Priest to C52DRN via Storm Drain
502          RD    5100    .003    .016            CIRC     8.5

503          KK    SE16   BASIN
504          KM   Runoff from Sub-basin SE16
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505          BA   0.362
506          LG    0.11    0.15    8.40    0.10      76
507          UC   0.642   0.420
508          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
509          UA     100

510          KK    DE16
511          KM   Diversion for Retention in SE16
512          KM   23% of Sub-basin Area Drains to Retention Basins
513          DT  RETE16    5.37
514          DI       0   10000
515          DQ       0    2400
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

516          KK  C52DRS
517          KM   Combine South Hydrographs at Tempe Drain and 52nd Street
518          HC       4

519          KK    SE10   BASIN
520          KM   Runoff from Sub-basin SE10
521          BA   0.561
522          LG    0.25    0.16    8.80    0.07      29
523          UC   0.958   0.510
524          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
525          UA     100

526          KK    DE10
527          KM   Diversion for Retention in SE10
528          KM   22% of Sub-basin Area Drains to Retention Basins
529          DT  RETE10    6.65
530          DI       0   10000
531          DQ       0    2200
532          IN      37
             *  IN     6

533          KK    RRUN
534          KM   Hydrograph from Areas East of Railroad at University
535          KM   Existing Storm Drain - 30" RCP @ 0.13% (Capacity = 16 cfs)
536          KM   Hydrograph developed with design Tc
             *  KM Hydrograph developed with design Tc and TR55, then lagged 2 hours.
537          BA    0.01
538          QI       0      16      16      16      16      16      16      16      16       0
539          QI      16      16      16      16      16      16      16    10.4     2.4       0
540          QI       0       0       0       0       0       0       0       0       0       0
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI     0       0       0       0       0       0       0       0       0
             *  QI   0.0     0.0     0.1     0.1     0.2     0.2     0.3     0.3     0.4
             *  QI   0.5     0.5     0.6     0.6     0.7     0.8     0.9     2.0     3.1
             *  QI   8.1    14.8    16.0     9.6     5.0     3.3     2.6     2.0     1.7
             *  QI   1.4     1.3     1.2     1.2     1.1     1.0     1.0     0.9     0.9
             *  QI   0.8     0.8     0.7     0.7     0.7     0.7     0.7     0.6     0.6
             *  QI   0.6     0.6     0.6     0.6     0.6     0.5     0.5     0.5     0.5
             *  QI   0.5     0.5     0.5     0.4     0.4     0.4     0.4     0.4     0.4
             *  QI   0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.4
             *  QI   0.4     0.4     0.4     0.3     0.3     0.3     0.3     0.3     0.3
             *  QI   0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3
             *  QI   0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3
             *  QI   0.3     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
             *  QI   0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
             *  QI   0.2     0.2     0.2     0.2     0.2     0.2     0.1     0.1     0.1
             *  QI   0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
             *  QI   0.1     0.1     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *  QI   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
541          IN      15
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

542          KK   RRRUN
543          KM   Route RRUN from Railroad to CPRBW via Storm Drain
544          RD    5300   .0025    .013            CIRC    3.25

545          KK  CPRUN
546          KM  Combine Hydrographs at Priest and University
547          HC       2

548          KK  RCPRUN
549          KM   Route CPRUN from Priest and University to C52DRN
550          RS      18    FLOW      -1
551          RC    .025    .016    .025    4650   .0015
552          RX       0       1      15      16      84      85      99     100
553          RY       4       1      .5       0       0      .5       1       4

554          KK    SE12   BASIN
555          KM   Runoff from Sub-basin SE12
556          BA   0.328
557          LG    0.19    0.16    9.70    0.06      45
558          UC   0.946   0.709
559          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
560          UA     100
```

```
561          KK    DE12
562          KM   Diversion for Retention in SE12
563          KM   17% of Sub-basin Area Drains to Retention Basins
564          DT  RETE12    3.97
565          DI       0   10000
566          DQ       0    1700

567          KK  C52DRN
568          KM   Combine Hydrographs at Tempe Drain and 52nd Street
569          HC       2

570          KK  C52DRW
571          KM   Total Combined Hydrographs at Tempe Drain and 52nd Street
572          HC       2

573          KK  R52DRW
574          KM   Route C52DRW from 52nd Street West to SR143
575          RD    2700    .002    .016            TRAP      10    1.25

576          KK    SE14   BASIN
577          KM   Runoff from Sub-basin SE14
578          BA   0.257
579          LG    0.12    0.16    8.00    0.12      75
580          UC   0.917   0.573
581          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
582          UA     100
1                                        HEC-1 INPUT                                          PAGE 16

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

583          KK    DE14
584          KM   Diversion for Retention in SE14
585          KM   39% of Sub-basin Area Drains to Retention Basins
586          DT  RETE14    6.45
587          DI       0   10000
588          DQ       0    4400

589          KK  CTDRN1
590          KM   Combine Hydrographs at Tempe Drain and SR143
591          HC       2
             *

592          KK  CTDRN2
593          KM   Combine Flow from 48th St Storm Drain (RC143N) and Tempe Drain
594          HC       2
             *

595          KK  DTDRN2
596          KM   Diversion of Total Hydrograph for Later Retrieval
597          DT    DRN2
598          DI       0   10000
599          DQ       0   10000
             *

600          KK    SW18   BASIN
601          KM   Runoff from Sub-basin SW18
602          BA   0.992
603          LG    0.26    0.22    7.60    0.11      20
604          UC   1.050   0.634
605          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
606          UA     100

607          KK    DW18
608          KM   Diversion for Retention in SW18
609          DT  RETW18   23.91
610          DI       0   10000
611          DQ       0    2300

612          KK  RBW48W
613          KM   Retrieve Hydrograph from Diversion DBW48
614          DR  DBW48W

615          KK  BW48SW
616          KM   Diversion of Surface Runoff from CBW48 Northwest toward SW26
617          KM   Flows Split 61% West, 39% North
618          DT  DBWNW1
619          DI       0    1000
620          DQ       0     390
1                                        HEC-1 INPUT                                          PAGE 17

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

621          KK  RBWT40
622          KM   Route Flow from DBW48 along Broadway to CBW40
623          RS      12    FLOW      -1
624          RC    .025    .016    .025    5280   .0023
625          RX       0       1      15      16      84      85      99     100
626          RY       4       1      .5       0       0      .5       1       4

627          KK   CBW40
628          KM   Combine Hydrographs from RBWT40 and R40TBW and SW18
629          HC       4
```

```
630          KK   DBW40
631          KM   Diversion of Runoff from CBW40 West to CBW32 along Broadway
632          KM   Storm Drain to West - 78" RCP @ 0.11% (161 cfs); Remainder is split 62% West
633          DT  DBW40W
634          DI       0    161     1000
635          DQ       0    161      839

636          KK    SW26   BASIN
637          KM   Runoff from Sub-basin SW26
638          BA   0.187
639          LG    0.20    0.15    9.70    0.06      50
640          UC   0.879   0.880
641          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
642          UA     100

643          KK    DW26
644          KM   Diversion for Retention in SW26
645          KM   69% of Sub-basin Area Drains to Retention Basins
646          DT  RETW26   16.45
647          DI       0   10000
648          DQ       0    6900

649          KK  RBWNW1
650          KM   Retrieve Hydrograph from Diversion DBWNW1
651          DR  DBWNW1

652          KK   RTNW1
653          KM   Route Flow from BW48 to CWO40
654          RS      14    FLOW      -1
655          RC    .025    .016    .025    5600   .0022
656          RX       0       1      15      16      84      85      99     100
657          RY       4       1      .5       0       0      .5       1       4

658          KK   CSW26
659          KM   Combine Hydrographs from DBWNW1 and SW26
660          HC       2
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

661          KK  DSW26W
662          KM   Diversion of Runoff from SW26 North to I-10
             *  **** Assumed 70% Drains North ****
663          DT  DSW26N
664          DI       0   1000
665          DQ       0    700
             *

666          KK   CWO40
667          KM   Combine Hydrographs from CBW40 and SW26W
668          HC       2

669          KK  RWOT32
670          KM   Route Flow from CI1040 to CI1032 along Wood
671          RS      17    FLOW      -1
672          RC    .025    .016    .025    5800   .0036
673          RX       0       1      15      16      84      85      99     100
674          RY       4       1      .5       0       0      .5       1       4

675          KK    SW28   BASIN
676          KM   Runoff from Sub-basin SW28
677          BA   0.206
678          LG    0.21    0.20    8.40    0.09      45
679          UC   0.913   0.868
680          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
681          UA     100

682          KK    DW28
683          KM   Diversion for Retention in SW28
684          DT  RETW28   10.03
685          DI       0   10000
686          DQ       0    5100

687          KK   CSW28
688          KM   Combine Hydrographs from SW28 and RWOT32
689          HC       2
             *

690          KK  DSW28W
691          KM   Diversion of Runoff from SW28 North to I-10
             *  **** Assumed 35% Drains North to I-10 ****
692          DT  DSW28N
693          DI       0   1000
694          DQ       0    350
             *

695          KK    SW10   BASIN
696          KM   Runoff from Sub-basin SW10
697          BA   0.713
698          LG    0.30    0.29    4.70    0.36      33
699          UC   0.383   0.171
700          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
701          UA     100
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 702          KK    DW10
 703          KM   Diversion for Retention in SW08
 704          KM   19% of Sub-basin Area Drains to Retention Basins
 705          DT  RETW10   12.77
 706          DI       0   10000
 707          DQ       0    1900

 708          KK   DW10C
 709          KM   Diversion for Retention in Western and Highline Canals
 710          KM   Western Canal - L=5480', W=50', H=2.1', Volume = 13.21 ac-ft.
 711          KM   Highline Canal - L=5700', W=20', H=1.3', Volume = 3.40 ac-ft.
 712          DT   RW10C   16.61
 713          DI       0   10000
 714          DQ       0   10000

 715          KK  RSW10N
 716          KM   Route Flow from SW10 North to CSO32
 717          RS       3    FLOW      -1
 718          RC    .025    .016    .025    4200   .0095
 719          RX       0       1      15      16      84      85      99     100
 720          RY       4       1      .5       0       0      .5       1       4

 721          KK    SW16   BASIN
 722          KM   Runoff from Sub-basin SW16
 723          BA   0.890
 724          LG    0.32    0.26    4.50    0.46       8
 725          UC   1.500   0.908
 726          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 727          UA     100

 728          KK    DW16
 729          KM   Diversion for Retention in SW16
 730          KM   37% of Sub-basin Area Drains to Retention Basins
 731          DT  RETW16   11.60
 732          DI       0   10000
 733          DQ       0    3700

 734          KK  RSO40W
 735          KM   Retrieve Hydrograph from Diversion DSO40W
 736          DR  DSO40W

 737          KK  R40T32
 738          KM   Route Flow from DSO40W to CSO32
 739          RS      14    FLOW      -1
 740          RC    .025    .016    .025    5330   .0031
 741          RX       0       1      15      16      84      85      99     100
 742          RY       4       1      .5       0       0      .5       1       4

 743          KK   CSO32
 744          KM   Combine Hydrographs from DSO40W, RWC4N and SW16
 745          HC       3
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 746          KK   DSO32
 747          KM   Diversion of Runoff from CSO32 Overland to the Northwest
 748          KM   Divert Total Flow Less Exist. Storm Drain - 32nd St. 60" RCP @ 0.62%(222 cfs)
 749          DT  DSO32W
 750          DI       0     222    1000
 751          DQ       0       0     778

 752          KK  R32TBW
 753          KM   Route Flow from CSO32 North to CBW32 via Storm Drain
 754          RD    5200   .0046    .013            CIRC     2.5

 755          KK    SW20   BASIN
 756          KM   Runoff from Sub-basin SW20
 757          BA   0.992
 758          LG    0.22    0.17    8.00    0.11      36
 759          UC   0.988   0.584
 760          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 761          UA     100

 762          KK    DW20
 763          KM   Diversion for Retention in SW20
              *  *** Estimated Volume ***
 764          DT  RETW20   64.95
 765          DI       0   10000
 766          DQ       0    7100

 767          KK  RBW40W
 768          KM   Retrieve Hydrograph from Diversion DBW40W
 769          DR  DBW40W

 770          KK  RBWT32
 771          KM   Route Flow from CBW40 West to CBW32 along Broadway
 772          RS       7    FLOW      -1
 773          RC    .025    .016    .025    5280   .0028
```

```
774          RX       0       1      15      16      84      85      99     100
775          RY       4       1      .5       0       0      .5       1       4

776          KK   CBW32
777          KM   Combine Hydrographs from DBWT32, RSO32N and SW20
778          HC       3

779          KK  DBW32N
780          KM   Diversion of Runoff from CBW32 West to CBW30
781          KM   Storm Drain to West - 96" RCP @ 0.28% (530 cfs); Remainder is split 69% West
782          DT  DBW32W
783          DI       0     483    2000
784          DQ       0     483    1530

785          KK   CWO32
786          KM   Combine Hydrographs from DBW32N and SW28W
787          HC       2
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

788          KK  DWO32W
789          KM   Diversion of Runoff from CWO32 North to I-10 (30" RCP @ 0.791%, Q = 37 cfs)
790          DT  DWO32N
791          DI       0      37    2000
792          DQ       0      37      37

793          KK    SW22   BASIN
794          KM   Runoff from Sub-basin SW22
795          BA   0.141
796          LG    0.25    0.23    7.30    0.13      29
797          UC   0.550   0.361
798          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
799          UA     100

800          KK    DW22
801          KM   Diversion for Retention in SW22
             *  *** Estimated Volume ***
802          DT  RETW22       1
803          DI       0   10000
804          DQ       0   10000

805          KK  RBW32W
806          KM   Retrieve Hydrograph from Diversion DBW32W
807          DR  DBW32W

808          KK  RBWT30
809          KM   Route Flow from CBW32 to CBW30 along Broadway
810          RS       4    FLOW      -1
811          RC    .025    .016    .025    1320   .0023
812          RX       0       1      15      16      84      85      99     100
813          RY       4       1      .5       0       0      .5       1       4

814          KK   CBW30
815          KM   Combine Hydrographs from DBW32W, RBWT30 and SW22
816          HC       2

817          KK   DBW30
818          KM   Diversion of Runoff from CBW30 North to Salt River via 96" RCP @ 0.28%
819          DT  DWO30N
820          DI       0     483    2000
821          DQ       0     483     483
             *

822          KK   RDRN2
823          KM   Retrieve Hydrograph from Diversion
824          DR    DRN2
             *

825          KK  RTDRN2
826          KM   Route Tempe Drain CTDRN2 from SR143 to 32nd Street
827          RD   10200    .002    .016            TRAP      10    1.25
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

828          KK    SW30   BASIN
829          KM   Runoff from Sub-basin SW30
830          BA   0.812
831          LG    0.17    0.17    8.40    0.09      47
832          UC   1.500   1.232
833          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
834          UA     100

835          KK    DW30
836          KM   Diversion for Retention in SW30
             *  *** Estimated Volume ***
837          DT  RETW30       5
838          DI       0   10000
839          DQ       0   10000
             *

840          KK  DSW30W
```

```
841          KM   Diversion of Runoff from SW30 South to I-10
             *  **** Assumed 20% Drains South ****
842          DT  DSW30S
843          DI       0  10000
844          DQ       0   2000
             *

845          KK  CTDRN3
846          KM   Combine Hydrographs from RTDRN2 - Tempe Drain and SW30
847          HC       2

848          KK  RWO32N
849          KM   Retrieve Hydrograph from Diversion DW3O32
850          DR  DWO32N

851          KK    SW27   BASIN
852          KM   Runoff from Sub-basin SW27
853          BA   0.227
854          LG    0.16    0.17    7.60    0.13      53
855          UC   1.500   2.749
856          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
857          UA     100

858          KK   DSW27
859          KM   Diversion for Retention in SW27
860          KM   Simulation of Existing Detention in ADOT ROW(original design volumes)
861          KM   Existing Detention 2.2 ac-ft West of 48th St, 6.53 ac-ft West of 40th St
862          DT  RETW27    8.73
863          DI       0   10000
864          DQ       0    5000

865          KK  RSW30S
866          KM   Retrieve Hydrograph from Diversion DSW30S
867          DR  DSW30S
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

868          KK  RSW26N
869          KM   Retrieve Hydrograph from Diversion DSW26N
870          DR  DSW26N

871          KK  RSW28N
872          KM   Retrieve Hydrograph from Diversion DSW28N
873          DR  DSW28N

874          KK  CI1032
875          KM   Combine Hydrographs from Storm Drain Systems within ADOT ROW
876          HC       4

877          KK  CTDRN4
878          KM   Combine Hydrographs from Tempe Drain and Storm Drain West of 32nd St.
879          HC       3
880          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   34       SW06
               .
               .
   48          .-------> RETW06
   45       DW06
               .
               .
   55          .------->  RW06C
   51      DW06C
               .
               .
   60          .-------> DSW06E
   58     DSW06N
               V
               V
   63     RSW06N
               .
               .
   69          .        SW08
               .           .
               .           .
   79          .           .-------> RETW08
   76          .        DW08
               .           .
               .           .
   86          .           .------->  RW08C
   82          .       DW08C
               .           V
               .           V
   89          .      RW8TSO
               .           .
               .           .
   95          .           .        SW14
```

```
                .          .          .
                .          .          .
104             .          .          .-------> RETW14
102             .          .       DW14
                .          .          .
                .          .          .
107        CSO40.......................
                .
                .
113             .-------> DSO40W
110        DSO40N
                V
                V
116        R40TBW
                .
                .
122             .       SW24
                .          .
                .          .
132             .          .-------> RETW24
129             .       DW24
                .          .
                .          .
135             .          .       SE18
                .          .          .
                .          .          .
145             .          .          .-------> RETE18
142             .          .       DE18
                .          .          .
                .          .          .
151             .          .          .-------> DSE18W
148             .          .      SE18N
                .          .          V
                .          .          V
154             .          .     RSE18N
                .          .          .
                .          .          .
157             .          .          .       SE20
                .          .          .          .
                .          .          .          .
167             .          .          .          .-------> RETE20
164             .          .          .      DSE20
                .          .          .          .
                .          .          .          .
170             .          .     CBWPRW............
                .          .          .
                .          .          .
173             .          .          .       SE19
                .          .          .          .
                .          .          .          .
183             .          .          .          .-------> RETE19
180             .          .          .       DE19
                .          .          .          V
                .          .          .          V
186             .          .          .     R19T21
                .          .          .          .
                .          .          .          .
189             .          .          .          .       SE21
                .          .          .          .          .
                .          .          .          .          .
196             .          .          .     CBW52A............
                .          .          .          .
                .          .          .          .
202             .          .          .          .-------> RETE21
199             .          .          .       DE21
                .          .          .          .
                .          .          .          .
205             .          .     CBW52B............
                .          .          V
                .          .          V
208             .          .     RBW52W
                .          .          .
                .          .          .
211             .          .          .       SE22
                .          .          .          .
                .          .          .          .
221             .          .          .          .-------> RETE22
218             .          .          .       DE22
                .          .          .          .
                .          .          .          .
224             .          .      CBWTI............
                .          .          .
                .          .          .
227             .     C143TI............
                .          .
                .          .
230             .          .       QDA1
                .          .          .
                .          .          .
235             .          .          .       QDA2
                .          .          .          .
                .          .          .          .
240             .          .         C1............
                .          .          V
                .          .          V
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243          .          .        RC1
             .          .         .
             .          .         .
246          .          .         .       QDA3
             .          .         .         .
             .          .         .         .
251          .          .         .         .       QDA4
             .          .         .         .         .
             .          .         .         .         .
256          .          .        C2........................
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259          .          .        RC2
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262          .          .         .       QDA5
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             .          .         .         .
267          .          .        C3............
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             .          .         V
270          .          .        RC3
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273          .          .         .       QDA6
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             .          .         .         .
278          .          .        C4............
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281          .          .         .       QDA7
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286          .          .         .         .       QDA8
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291          .          .        C5........................
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294          .          .         .       QDA9
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299          .          .        C6............
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             .          .         .
304          .          .         .-------> RETFRS
302          .          .       DFRS
             .          .         V
             .          .         V
307          .          .      RTFRS
             .          .         .
             .          .         .
313          .          .         .       SW04
             .          .         .         .
             .          .         .         .
323          .          .         .         .-------> RETW04
320          .          .         .       DW04
             .          .         .         .
             .          .         .         .
330          .          .         .         .-------> RW04C
326          .          .         .      DW04C
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             .          .         .         .
333          .          .       CWC1............
             .          .         .
             .          .         .
338          .          .         .         .<------- DSW06E
336          .          .         .     RSW06E
             .          .         .         .
             .          .         .         .
339          .          .       CWC2............
             .          .         V
             .          .         V
342          .          .     R48TBW
             .          .         .
             .          .         .
348          .          .         .       SW12
             .          .         .         .
             .          .         .         .
358          .          .         .         .-------> RETW12
355          .          .         .       DW12
             .          .         .         .
             .          .         .         .
363          .          .         .         .         .<------- DSE18W
361          .          .         .         .     RSE18W
             .          .         .         .         V
             .          .         .         .         V
364          .          .         .         .     RTE18W
             .          .         .         .         .
             .          .         .         .         .
368          .          .      CBW48........................
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374          .          .         .-------> DBW48W
371          .          .     DBW48N
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                 .          .          V
                 .          .          V
377              .          .     R48TTI
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                 .          .          .
380              .     C143NE............
                 .          V
                 .          V
383              .     RC143N
                 .          .
                 .          .
386              .          .       SE02
                 .          .          .
                 .          .          .-------> RETE02
396              .          .
393              .          .       DE02
                 .          .          .
                 .          .          .
400              .          .          .       PR60
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411              .          .     CPRSO............
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414              .          .     RSOTAL
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420              .          .          .       SE04
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                 .          .          .          .
430              .          .          .          .-------> RETE04
427              .          .          .       DE04
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433              .          .     CPRAL............
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                 .          .          V
436              .          .     RALTBW
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442              .          .          .       SE06
                 .          .          .          .
                 .          .          .          .
452              .          .          .          .-------> RETE06
449              .          .          .       DE06
                 .          .          .          .
                 .          .          .          .
456              .          .          .          .       RRBW
                 .          .          .          .          V
                 .          .          .          .          V
464              .          .          .          .      RRRBW
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472              .          .          .-------> DIVSD
470              .          .       DPRBW
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                 .          .          V
475              .          .     RPRT52
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481              .          .          .       SE08
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                 .          .          .          .
491              .          .          .          .-------> RETE08
488              .          .          .       DE08
                 .          .          .          V
                 .          .          .          V
494              .          .          .      RSE08
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                 .          .          .          .
499              .          .          .          .          .<-------  DIVSD
497              .          .          .          .     RDIVSD
                 .          .          .          .          V
                 .          .          .          .          V
500              .          .          .          .     RSDT52
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503              .          .          .          .          .       SE16
                 .          .          .          .          .          .
                 .          .          .          .          .          .-------> RETE16
513              .          .          .          .          .       DE16
510              .          .          .          .          .          .
                 .          .          .          .          .          .
516              .          .     C52DRS.....................................
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519              .          .          .       SE10
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529                                  .-------> RETE10
526                                DE10
                                     .
533                                  .        RRUN
                                     .          V
                                     .          V
542                                  .       RRRUN
                                     .          .
                                     .          .
545                                CPRUN ............
                                       V
                                       V
548                                RCPRUN
                                       .
                                       .
554                                  .        SE12
                                     .          .
                                     .          .
564                                  .          .-------> RETE12
561                                  .        DE12
                                     .          .
                                     .          .
567                                CPRUN ............
                                       .
                                       .
570                          C52DRW............
                                 V
                                 V
573                          R52DRW
                                 .
                                 .
576                                SE14
                                     .
                                     .
586                                  .-------> RETE14
583                                DE14
                                     .
                                     .
589                          CTDRN1............
                                 .
                                 .
592                     CTDRN2............
                            .
                            .
597                         .-------> DRN2
595                     DTDRN2
                            .
                            .
600                             SW18
                                    .
                                    .
609                                 .-------> RETW18
607                             DW18
                                    .
                                    .
614                                 .<-------  DBW48W
612                                RBW48W
                                    .
                                    .
618                                 .-------> DBWNW1
615                                BW48SW
                                       V
                                       V
621                                RBWT40
                                       .
                                       .
627 CBW40.................................
    .
    .
633 .-------> DBW40W
630 DBW40
    .
    .
636 .       SW26
            .
            .
646         .-------> RETW26
643         DW26
            .
            .
651         .           .<-------  DBWNW1
649         .      RBWNW1
            .          V
            .          V
652         .       RTNW1
            .          .
            .          .
658         .      CSW26............
            .
            .
663         .-------> DSW26N
661         .      DSW26W
            .
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666      CWO40............
             V
             V
669     RWOT32
             .
             .
675          .        SW28
             .           .
             .           .
684          .           .-------> RETW28
682          .        DW28
             .           .
             .           .
687      CSW28............
             .
             .
692          .-------> DSW28N
690     DSW28W
             .
             .
695          .        SW10
             .           .
             .           .
705          .           .-------> RETW10
702          .        DW10
             .           .
             .           .
712          .           .------->  RW10C
708          .       DW10C
             .           V
             .           V
715          .      RSW10N
             .           .
             .           .
721          .           .        SW16
             .           .           .
             .           .           .
731          .           .           .-------> RETW16
728          .           .        DW16
             .           .           .
             .           .           .
736          .           .           .          .<-------  DSO40W
734          .           .           .      RSO40W
             .           .           .           V
             .           .           .           V
737          .           .           .      R40T32
             .           .           .           .
             .           .           .           .
743          .       CSO32........................
             .           .
             .           .
749          .           .-------> DSO32W
746          .       DSO32
             .           V
             .           V
752          .      R32TBW
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             .           .
755          .           .        SW20
             .           .           .
             .           .           .
764          .           .           .-------> RETW20
762          .           .        DW20
             .           .           .
             .           .           .
769          .           .           .          .<-------  DBW40W
767          .           .           .      RBW40W
             .           .           .           V
             .           .           .           V
770          .           .           .      RBWT32
             .           .           .           .
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776          .       CBW32........................
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             .           .
782          .           .-------> DBW32W
779          .       DBW32N
             .           .
             .           .
785      CWO32............
             .
             .
790          .-------> DWO32N
788     DWO32W
             .
             .
793          .        SW22
             .           .
             .           .
802          .           .-------> RETW22
800          .        DW22
             .           .
             .           .
807          .           .          .<-------  DBW32W
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805          .          .      RBW32W
             .          .          V
             .          .          V
808          .          .      RBWT30
             .          .          .
             .          .          .
814          .      CBW30............
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             .          .
819          .          .-------> DWO30N
817          .      DBW30
             .          .
             .          .
824          .          .<-------    DRN2
822          .          .      RDRN2
             .          .          V
             .          .          V
825          .          .      RTDRN2
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             .          .          .
828          .          .          .        SW30
             .          .          .          .
             .          .          .          .
837          .          .          .          .-------> RETW30
835          .          .          .        DW30
             .          .          .          .
             .          .          .          .
842          .          .          .          .-------> DSW30S
840          .          .          .      DSW30W
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845          .          .      CTDRN3............
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850          .          .          .          .<-------  DWO32N
848          .          .          .      RWO32N
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             .          .          .          .
851          .          .          .          .        SW27
             .          .          .          .          .
             .          .          .          .          .
862          .          .          .          .          .-------> RETW27
858          .          .          .          .       DSW27
             .          .          .          .          .
             .          .          .          .          .
867          .          .          .          .          .          .<-------  DSW30S
865          .          .          .          .          .     RSW30S
             .          .          .          .          .          .
             .          .          .          .          .          .
870          .          .          .          .          .          .          .<-------  DSW26N
868          .          .          .          .          .          .     RSW26N
             .          .          .          .          .          .          .
             .          .          .          .          .          .          .
873          .          .          .          .          .          .          .          .<-------  DSW28N
871          .          .          .          .          .          .          .     RSW28N
             .          .          .          .          .          .          .          .
             .          .          .          .          .          .          .          .
874          .          .          .          .      CI1032.....................................
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             .          .          .          .          .
877          .          .      CTDRN4........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   06DEC07  TIME  15:51:55  *
*                                      *
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Project ID: I-10 SALT - Major Basin: 01 - Return Period: 100 Years

I-10 Corridor Improvement Study - Buckeye Road to Baseline Road

****

Prepared for:

Arizona Department of Transportation

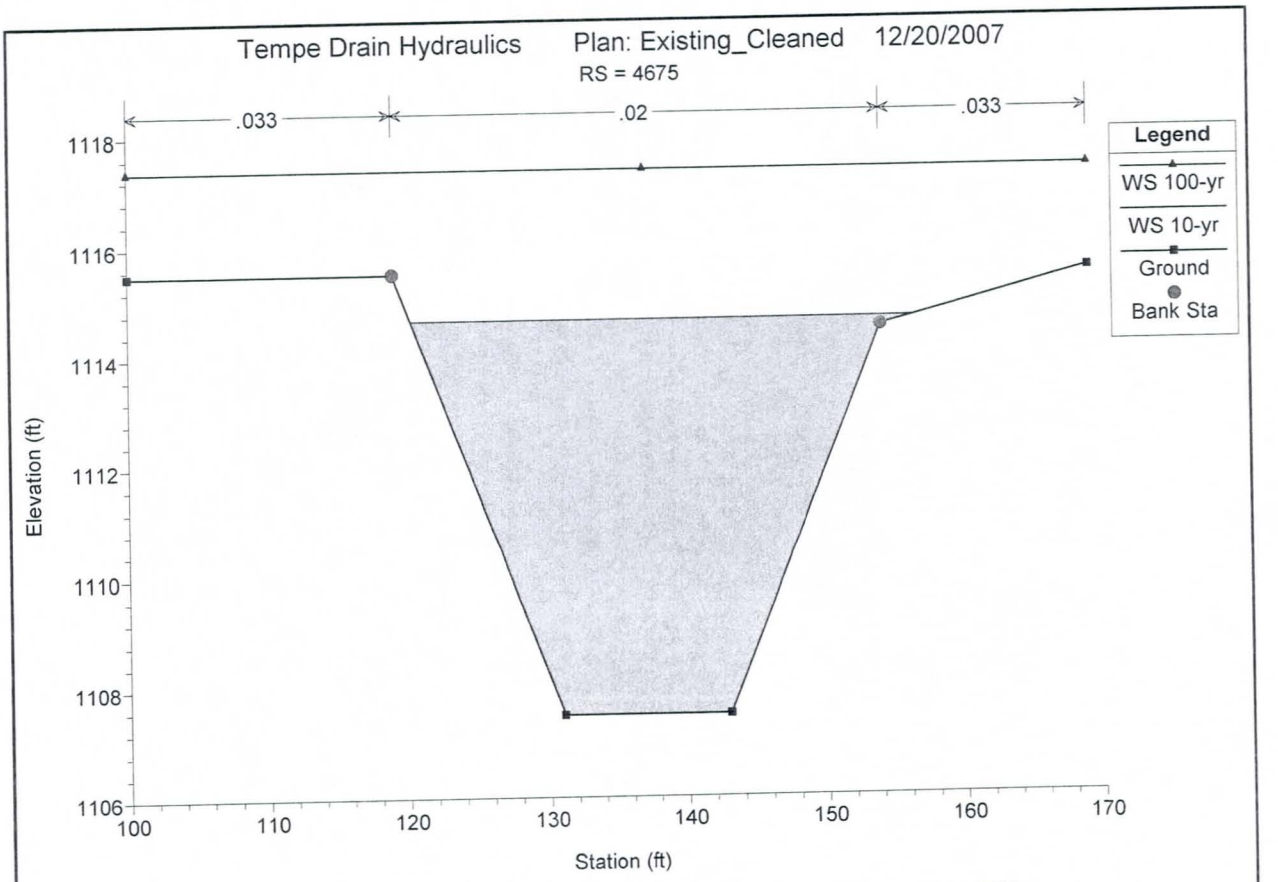
****

Prepared by:

DMJM+HARRIS
2777 E. Camelback Road, Ste. 200
Phoenix, AZ 85016-4302
(602) 337-2777

HEC-RAS Plan: Exst_Clean River: Tempe Drain Reach: Tempe Drain

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)	
Tempe Drain	4675	10-yr	2060.00	1107.50	1114.66	1114.63	1117.09	0.004007	12.51	164.84	36.15	1.00
Tempe Drain	4675	100-yr	3769.00	1107.50	1117.36	1117.36	1120.05	0.002723	13.58	329.61	69.00	0.88
Tempe Drain	4575	10-yr	2060.00	1107.00	1114.15	1114.15	1116.59	0.004026	12.53	164.57	36.02	1.00
Tempe Drain	4575	100-yr	3769.00	1107.00	1116.86	1116.86	1119.55	0.002723	13.58	329.61	69.00	0.88
Tempe Drain	4512	10-yr	2060.00	1106.50	1112.65	1112.65	1114.96	0.004036	12.21	168.69	36.88	1.01
Tempe Drain	4512	100-yr	3769.00	1106.50	1115.44	1115.44	1118.03	0.002759	13.11	319.13	75.00	0.88
Tempe Drain	4450	10-yr	2060.00	1105.50	1111.60		1113.17	0.002762	10.05	205.07	47.10	0.85
Tempe Drain	4450	100-yr	3769.00	1105.50	1115.10		1116.52	0.001511	9.53	396.45	72.00	0.66
Tempe Drain	4365	10-yr	2060.00	1105.50	1112.04		1112.60	0.003651	6.00	343.58	77.01	0.50
Tempe Drain	4365	100-yr	3769.00	1105.50	1115.60		1116.10	0.001799	5.71	675.88	111.00	0.38
Tempe Drain	4295	10-yr	2060.00	1105.00	1111.99		1112.35	0.001999	4.83	426.50	83.98	0.38
Tempe Drain	4295	100-yr	3769.00	1105.00	1115.59		1115.96	0.001176	4.90	788.90	121.00	0.31
Tempe Drain	4195	10-yr	2060.00	1105.00	1111.81		1112.17	0.001993	4.80	428.80	84.90	0.38
Tempe Drain	4195	100-yr	3769.00	1105.00	1115.52		1115.84	0.001144	4.58	869.12	165.87	0.30
Tempe Drain	4045	10-yr	2060.00	1104.50	1111.69	1107.73	1111.92	0.001040	3.81	540.44	92.31	0.28
Tempe Drain	4045	100-yr	3769.00	1104.50	1115.43	1109.23	1115.69	0.000724	4.11	932.37	159.86	0.25
Tempe Drain	3930		Culvert									
Tempe Drain	3805	10-yr	2266.00	1104.00	1110.90		1111.24	0.001741	4.68	483.74	89.57	0.36
Tempe Drain	3805	100-yr	4124.00	1104.00	1113.03		1113.60	0.002091	6.01	685.70	99.51	0.40
Tempe Drain	3733	10-yr	2266.00	1103.50	1110.00		1110.95	0.007397	7.81	289.99	74.25	0.70
Tempe Drain	3733	100-yr	4124.00	1103.50	1111.95		1113.27	0.007239	9.20	448.30	88.19	0.72
Tempe Drain	3565	10-yr	2266.00	1102.30	1109.25		1109.89	0.004610	6.42	353.00	85.56	0.56
Tempe Drain	3565	100-yr	4124.00	1102.30	1111.30		1112.18	0.004552	7.53	547.88	103.19	0.58
Tempe Drain	3436	10-yr	2266.00	1101.50	1107.09	1107.09	1108.78	0.015951	10.43	217.27	64.38	1.00
Tempe Drain	3436	100-yr	4124.00	1101.50	1108.88	1108.88	1111.08	0.014937	11.88	347.04	80.38	1.01
Tempe Drain	3365	10-yr	2266.00	1101.00	1106.49		1107.63	0.008659	8.57	264.27	65.64	0.75
Tempe Drain	3365	100-yr	4124.00	1101.00	1108.56		1110.12	0.008165	10.00	412.34	77.46	0.76
Tempe Drain	3150	10-yr	2266.00	1098.95	1105.28		1106.09	0.005386	7.23	313.50	70.85	0.61
Tempe Drain	3150	100-yr	4124.00	1098.95	1107.48		1108.59	0.005250	8.48	488.87	97.80	0.62
Tempe Drain	2750	10-yr	2266.00	1095.90	1102.49		1103.57	0.007269	8.33	272.02	61.76	0.70
Tempe Drain	2750	100-yr	4124.00	1095.90	1104.85		1106.25	0.006411	9.51	439.51	89.24	0.69
Tempe Drain	2400	10-yr	2266.00	1093.20	1101.36		1101.88	0.002895	5.82	397.30	91.67	0.45
Tempe Drain	2400	100-yr	4124.00	1093.20	1100.81	1100.78	1103.01	0.013665	11.92	349.14	83.48	0.97
Tempe Drain	2200	10-yr	2266.00	1090.50	1101.27		1101.50	0.000883	3.84	594.66	99.60	0.26
Tempe Drain	2200	100-yr	4124.00	1090.50	1099.18		1100.73	0.008198	9.98	413.07	78.53	0.77
Tempe Drain	2020	10-yr	2286.00	1088.60	1101.22		1101.36	0.000452	3.00	767.30	110.96	0.19
Tempe Drain	2020	100-yr	4174.00	1088.60	1098.31		1099.44	0.005232	8.52	489.84	84.10	0.62
Tempe Drain	1800	10-yr	2286.00	1087.60	1101.16		1101.27	0.000327	2.65	871.25	122.02	0.16
Tempe Drain	1800	100-yr	4174.00	1087.60	1096.16		1097.88	0.009280	10.53	396.43	76.20	0.81
Tempe Drain	1400	10-yr	2286.00	1084.80	1101.13		1101.18	0.000111	1.79	1292.87	146.27	0.10
Tempe Drain	1400	100-yr	4174.00	1084.80	1093.92		1095.02	0.005042	8.40	496.97	84.88	0.61
Tempe Drain	1200	10-yr	2286.00	1084.20	1101.12		1101.16	0.000081	1.57	1461.64	150.77	0.09
Tempe Drain	1200	100-yr	4174.00	1084.20	1093.09		1094.05	0.004335	7.86	530.74	89.53	0.57
Tempe Drain	1000	10-yr	2286.00	1083.70	1101.12	1088.17	1101.14	0.000046	1.19	1918.70	180.00	0.06
Tempe Drain	1000	100-yr	4174.00	1083.70	1092.52	1089.87	1093.21	0.003310	6.67	625.98	111.75	0.50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12/20/2007
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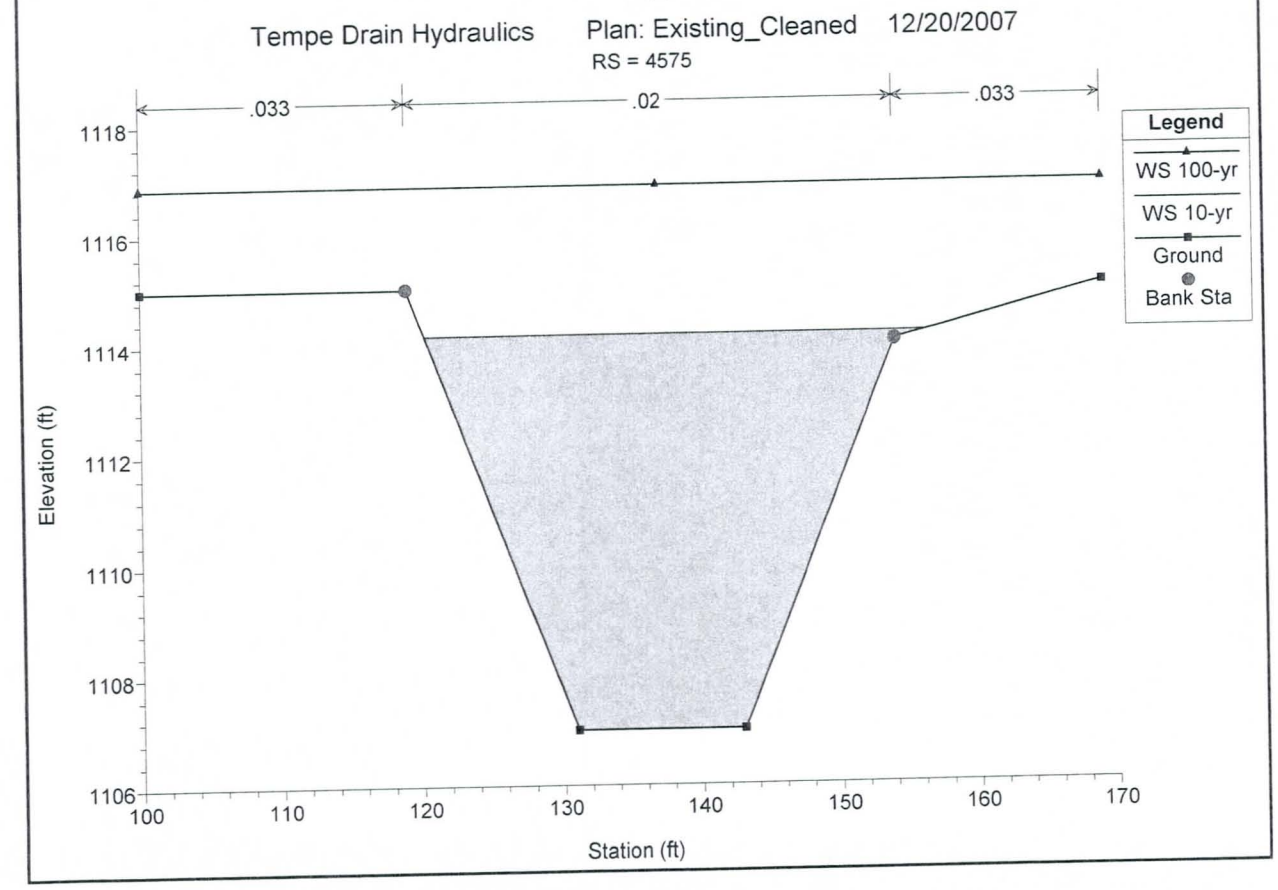
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
100
110
120
130
140
150
160
170
Station (ft)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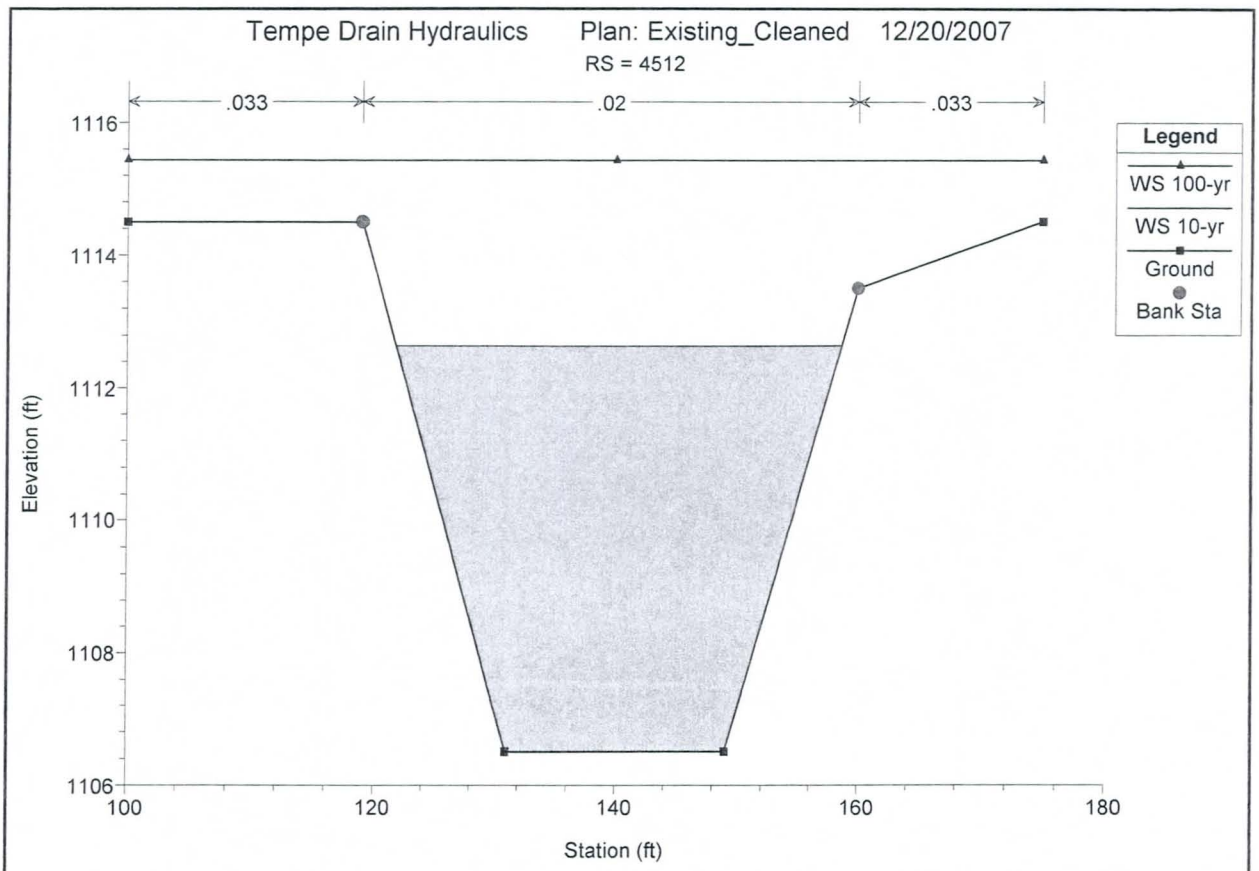
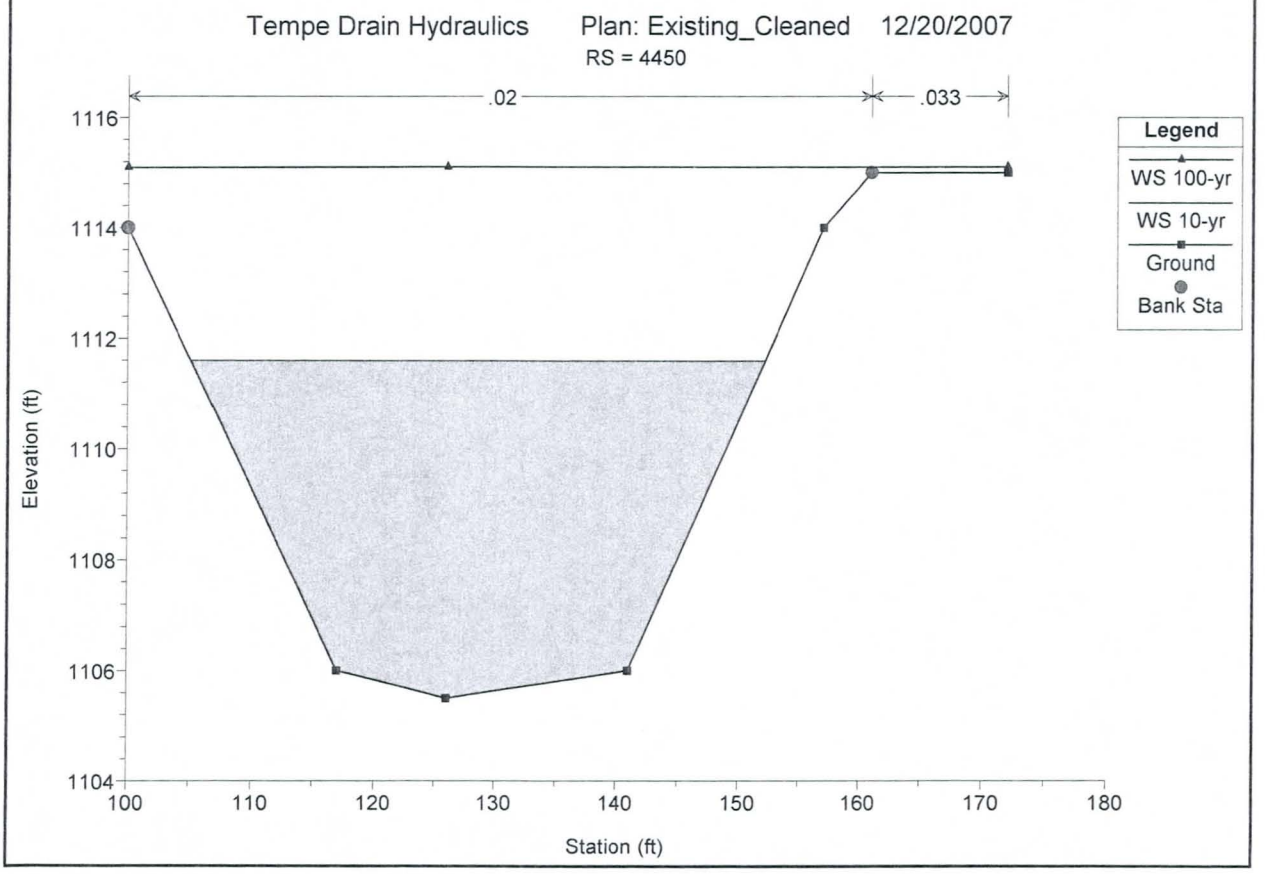
Plan: Existing_Cleaned
12/20/2007
RS = 4575
.033
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
100
110
120
130
140
150
160
170
Station (ft)


Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 4512
.033
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
100
120
140
160
180
Station (ft)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12/20/2007
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.02
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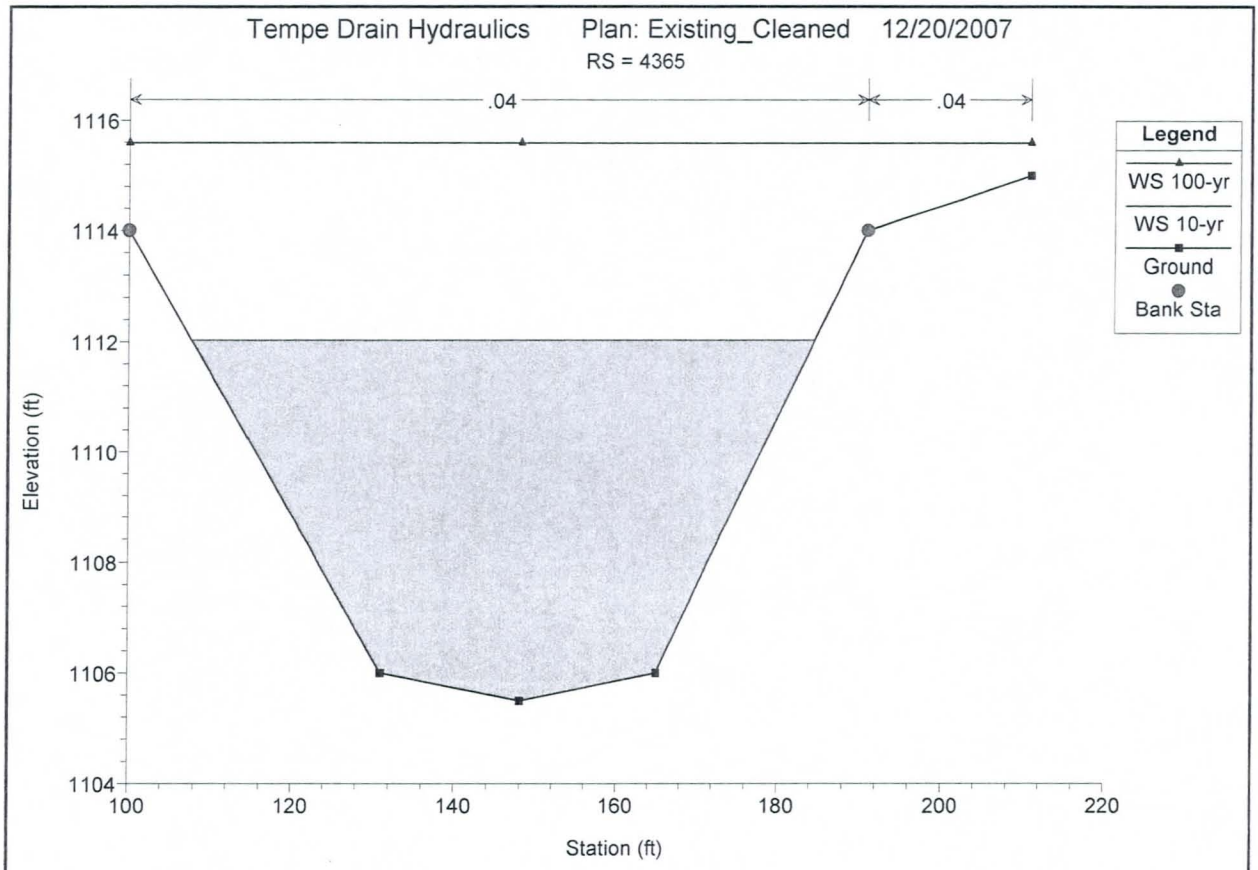
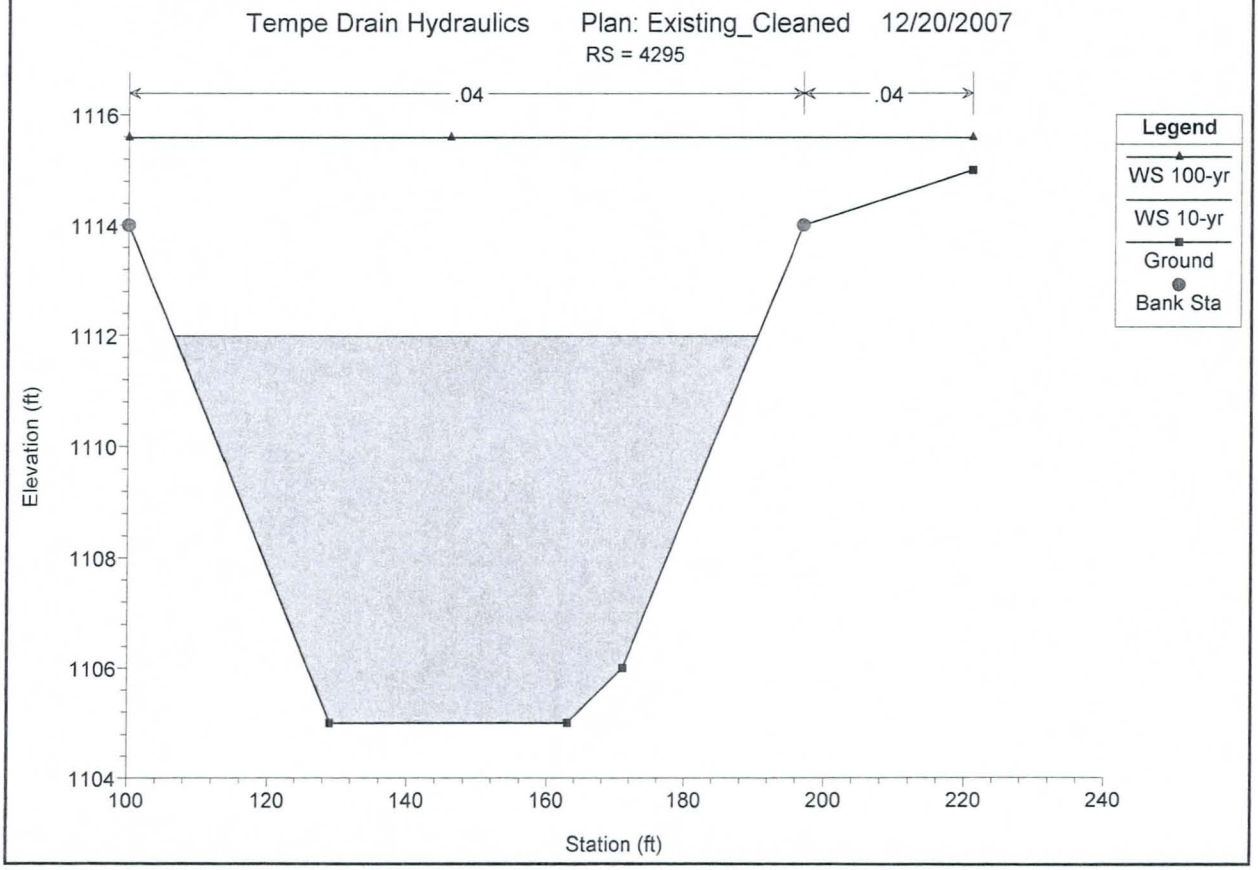
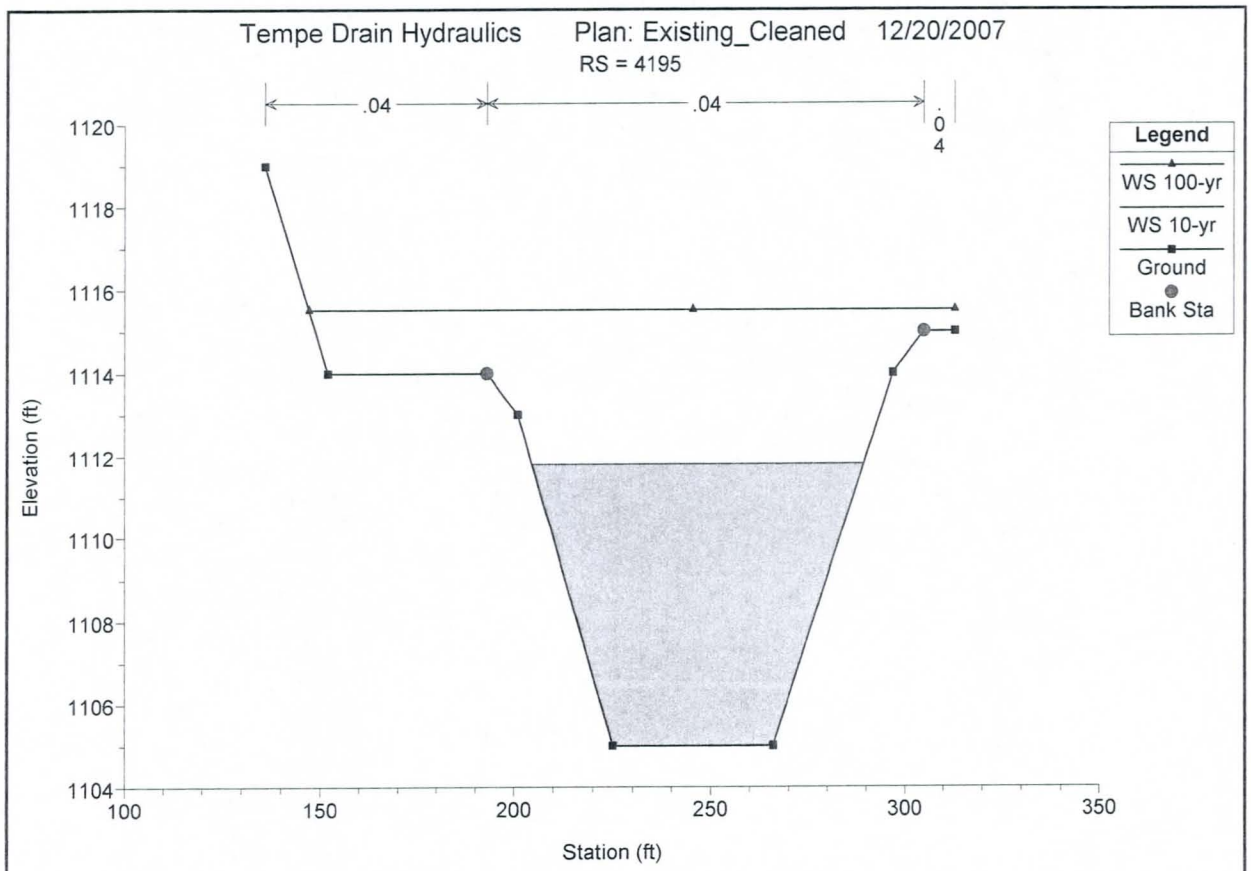
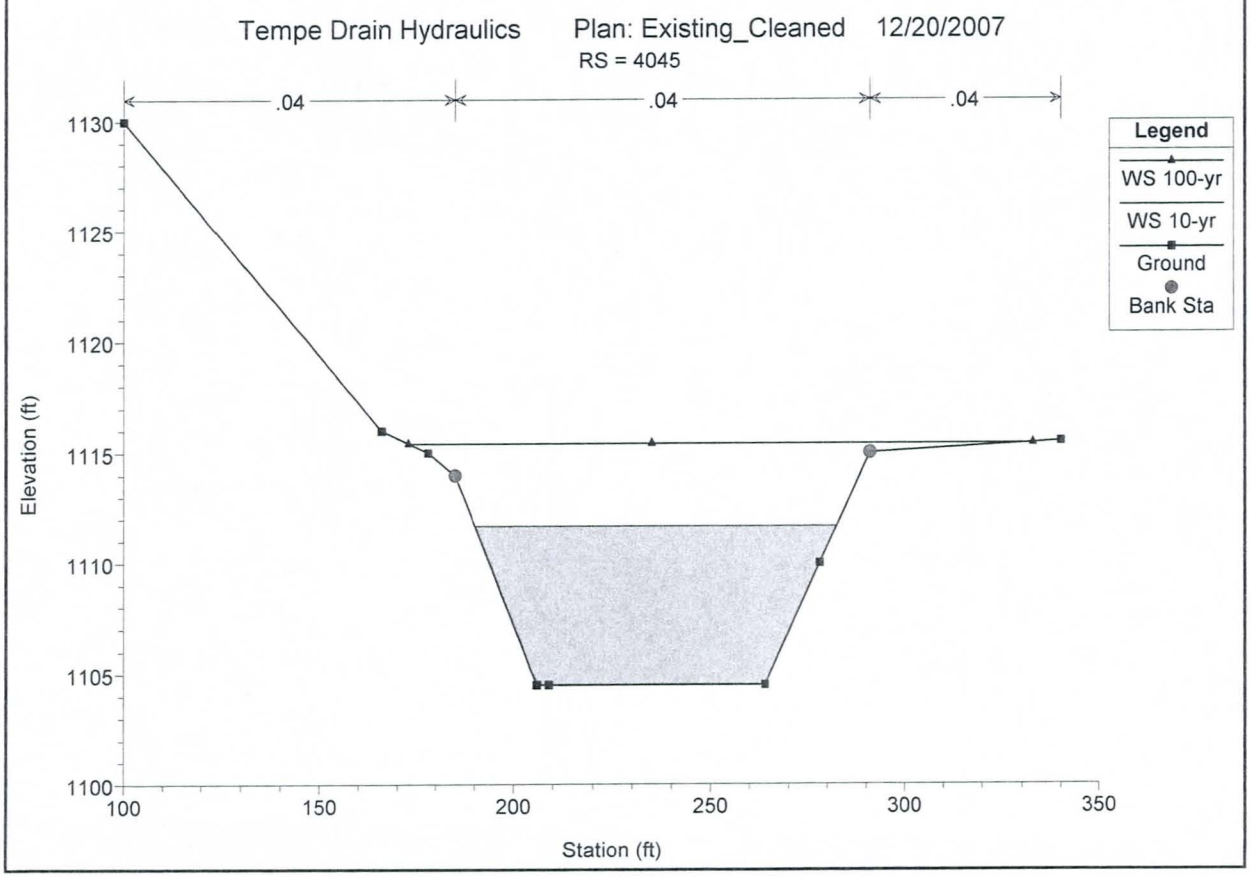
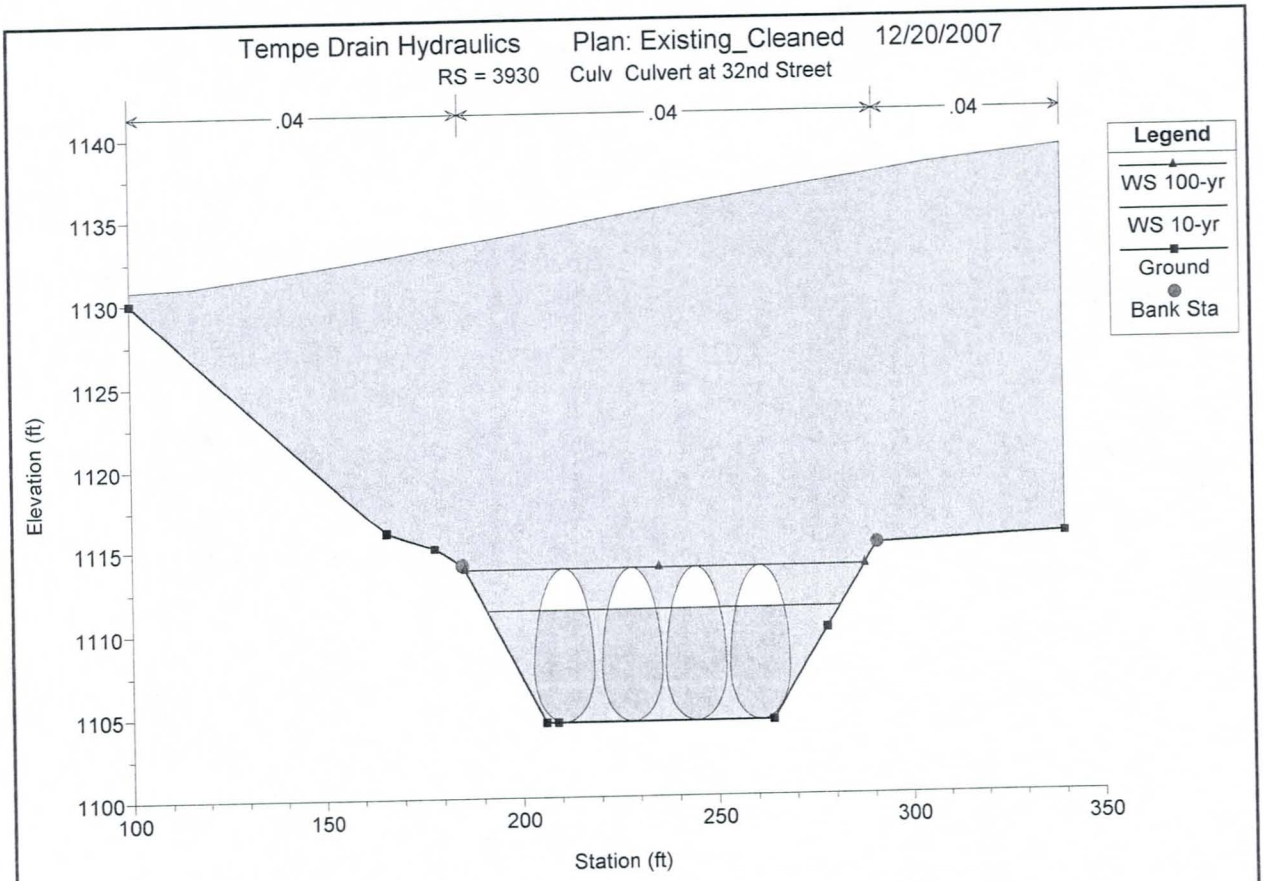
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
110
120
130
140
150
160
170
180
Station (ft)

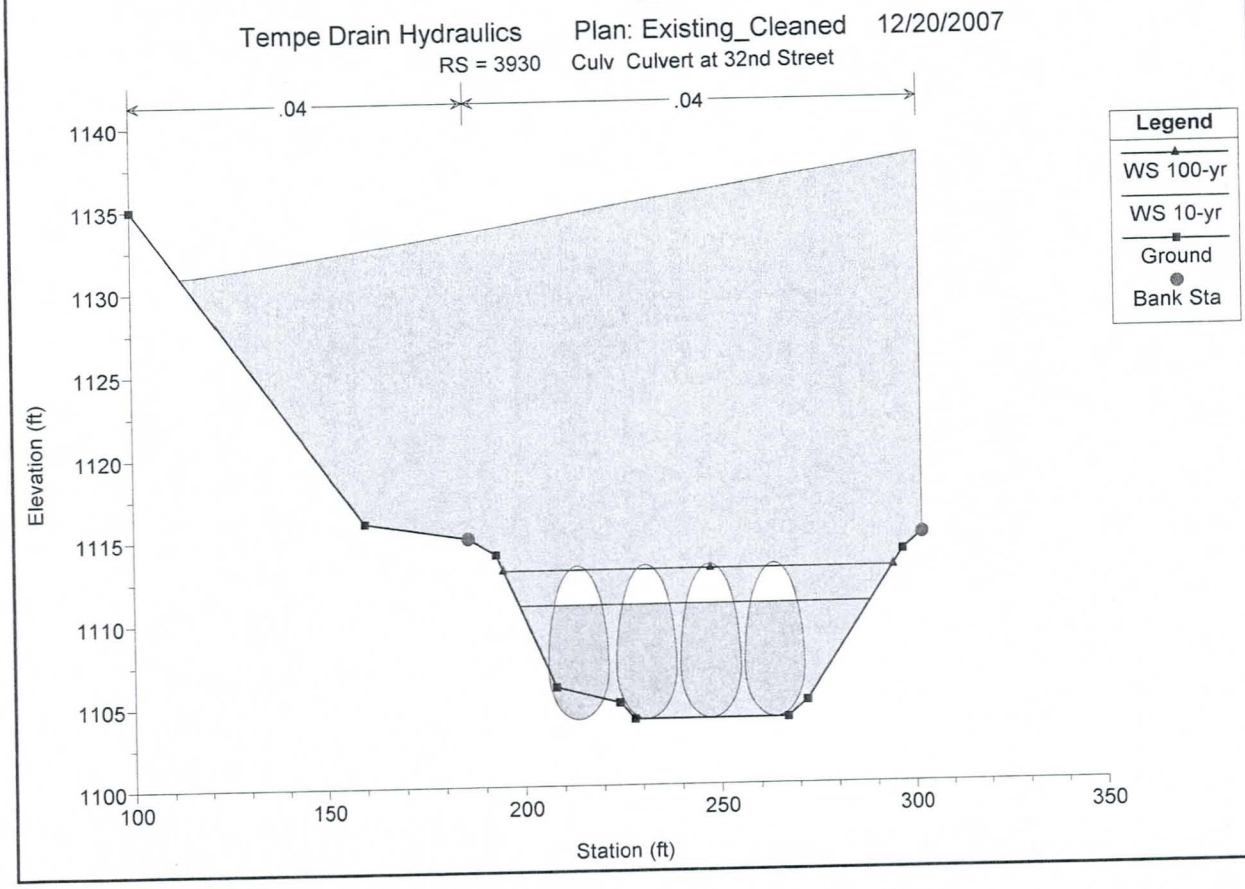

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 4365
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
120
140
160
180
200
220
Station (ft)

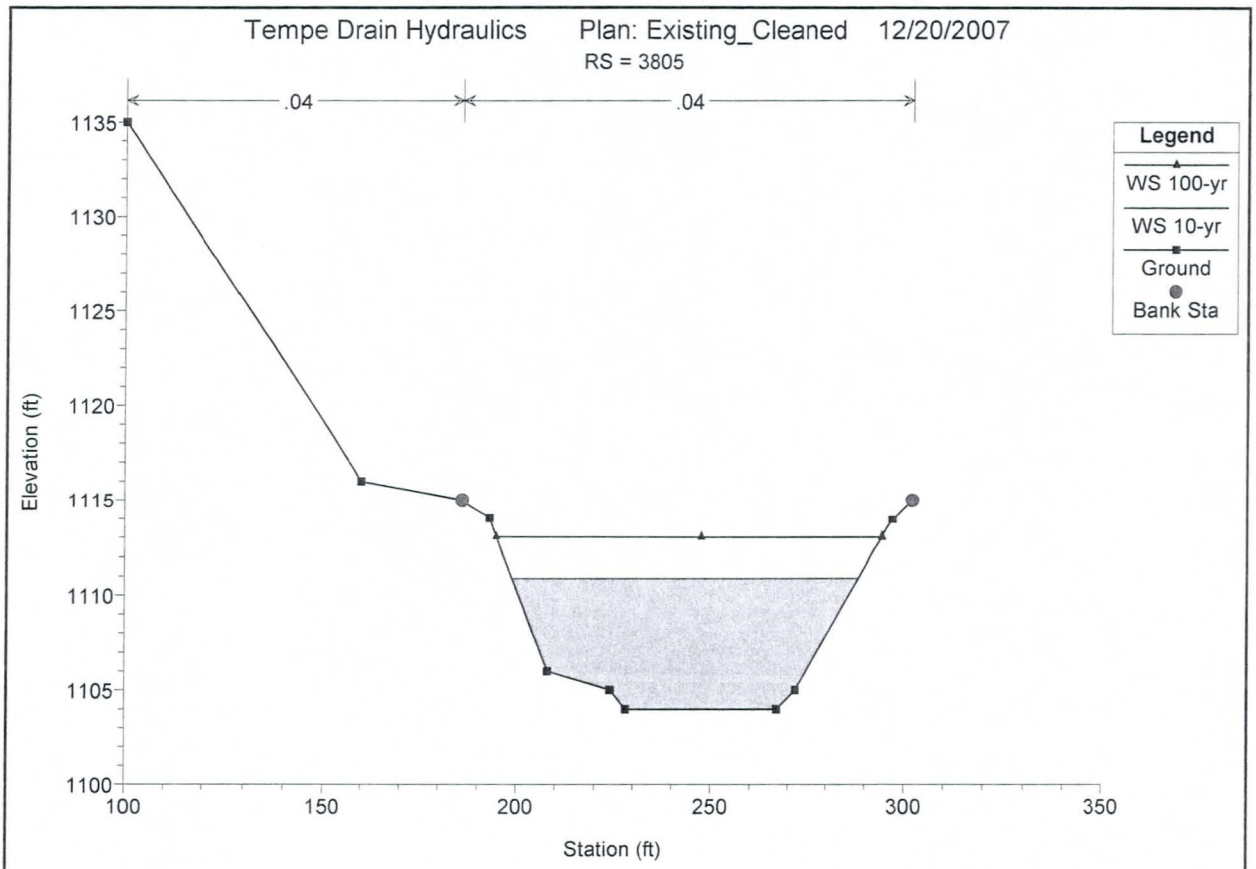

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 4295
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
120
140
160
180
200
220
240
Station (ft)

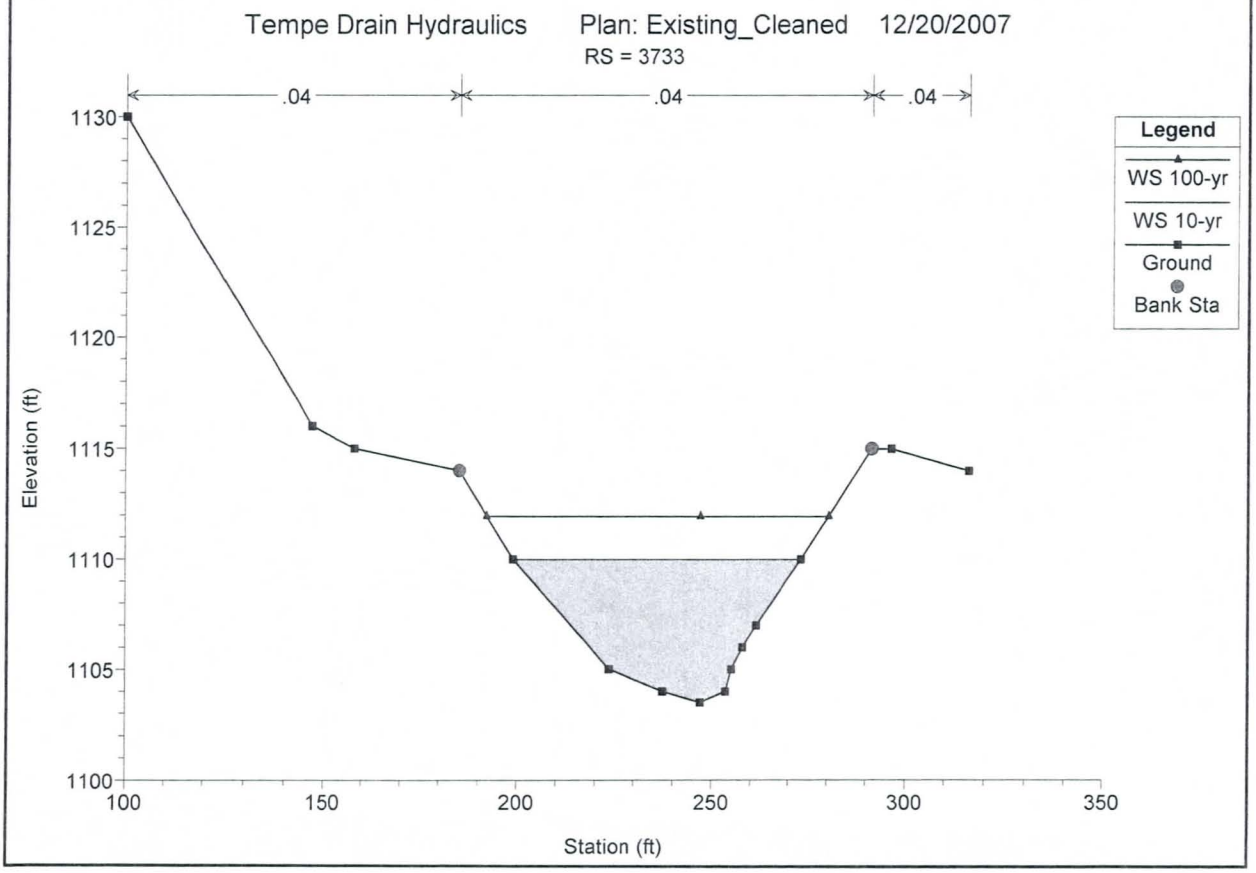

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 4195
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1120
1118
1116
1114
1112
1110
1108
1106
1104
100
150
200
250
300
350

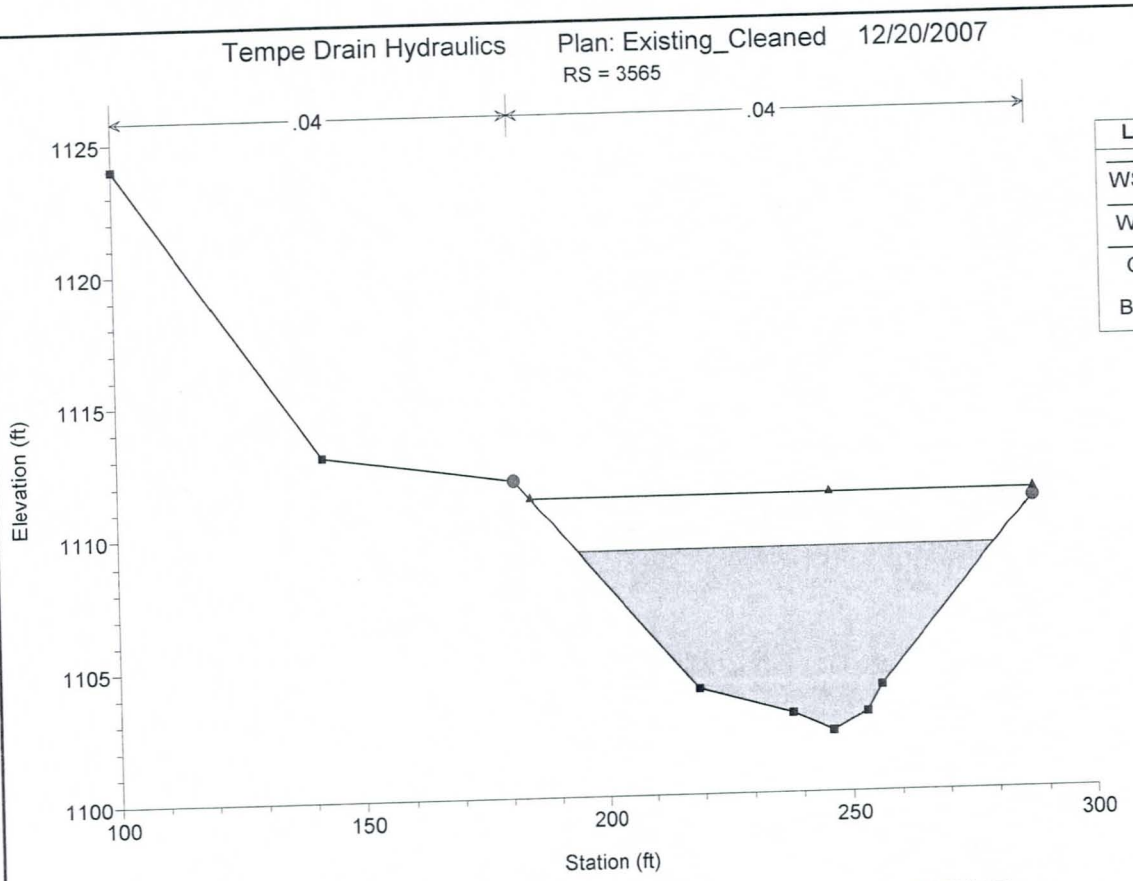

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 4045
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350

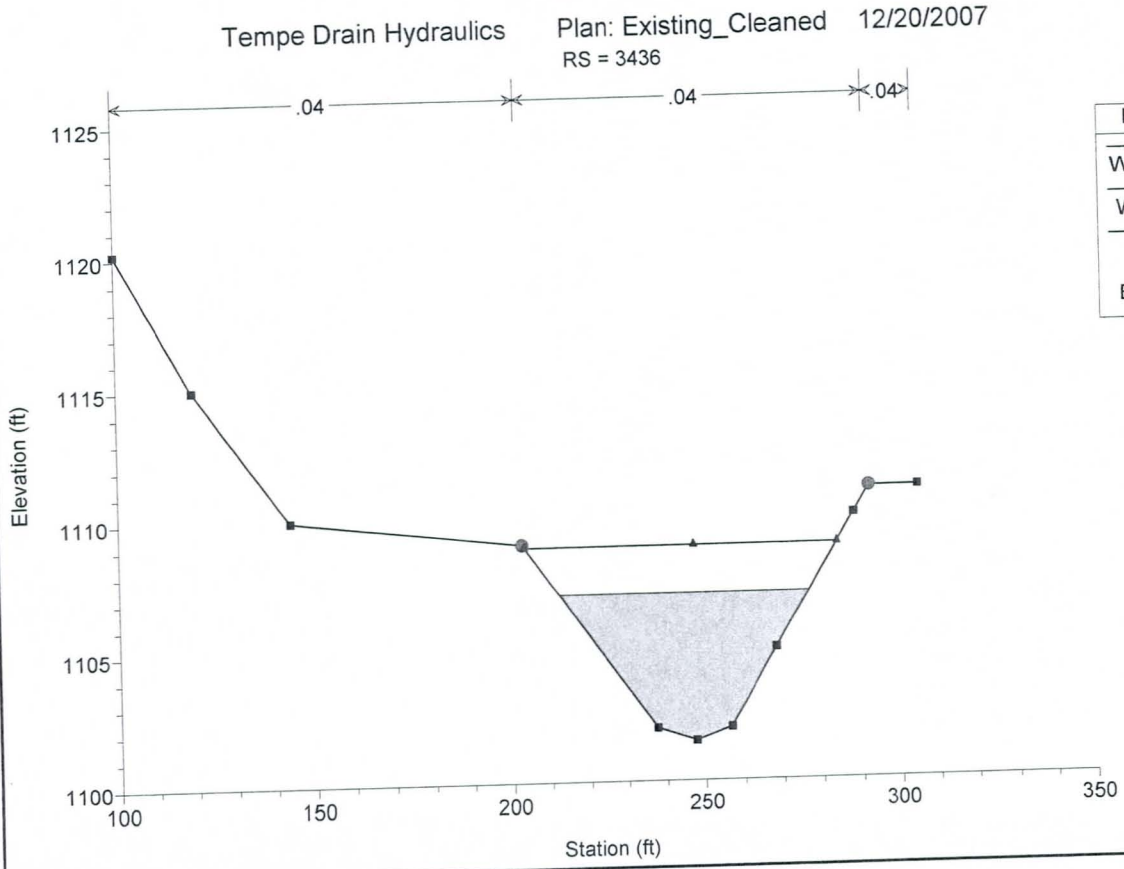

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3930
Culv Culvert at 32nd Street
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

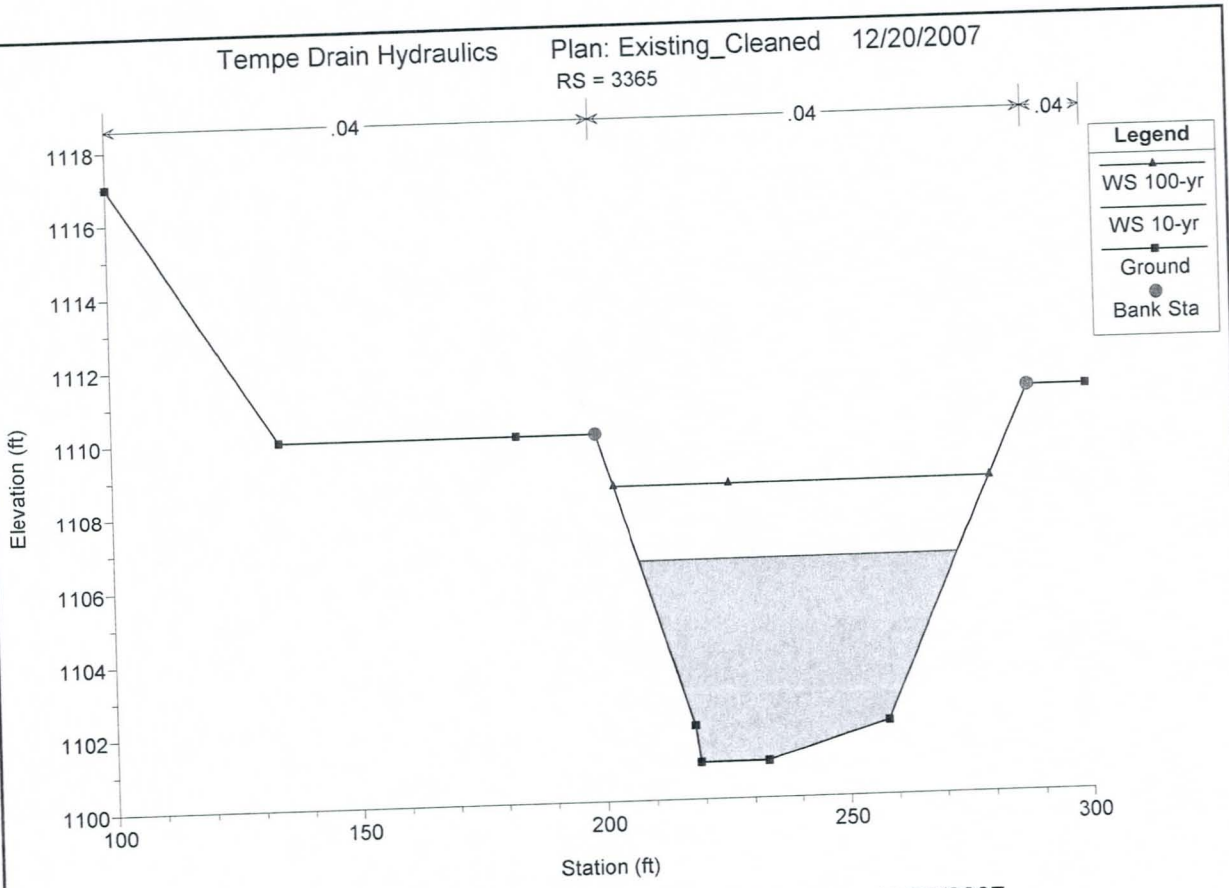

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3930
Culv Culvert at 32nd Street
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

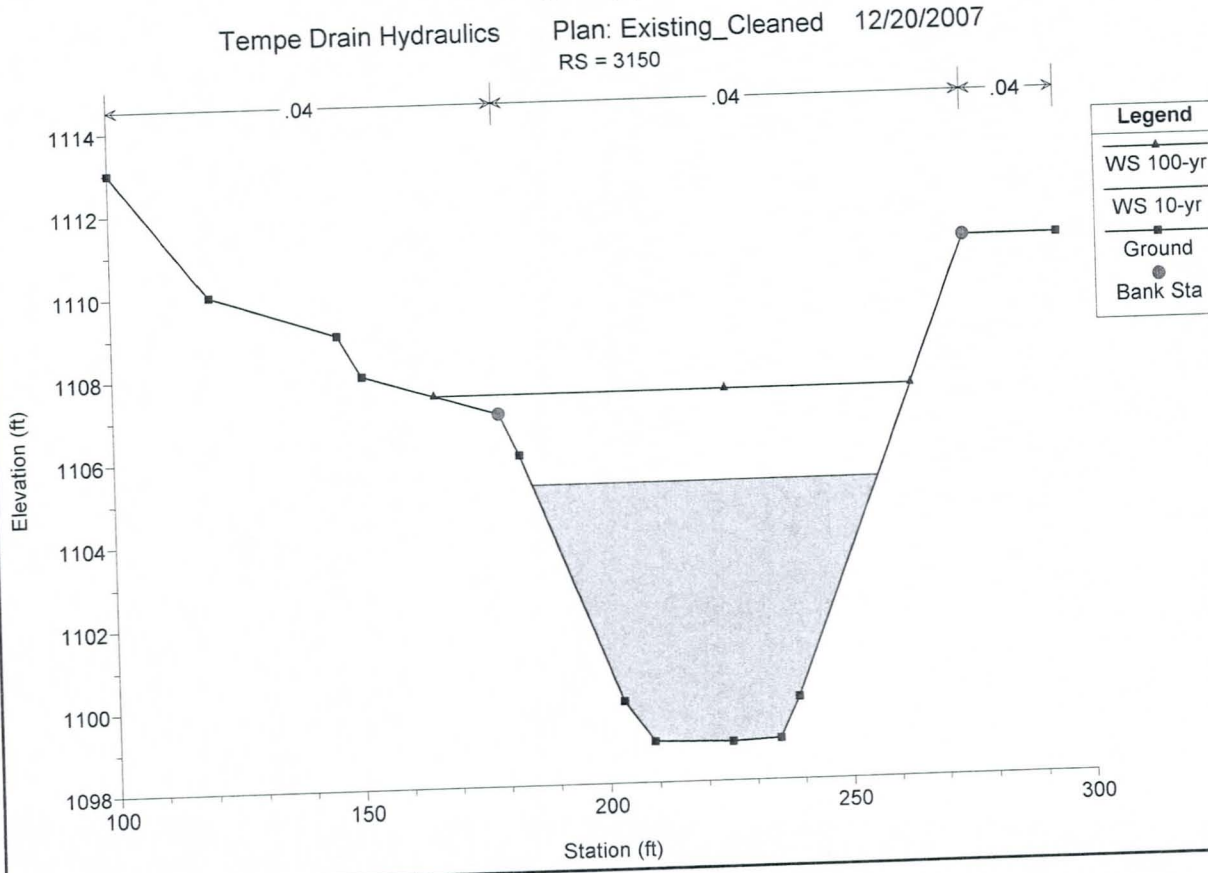

Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 3805
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

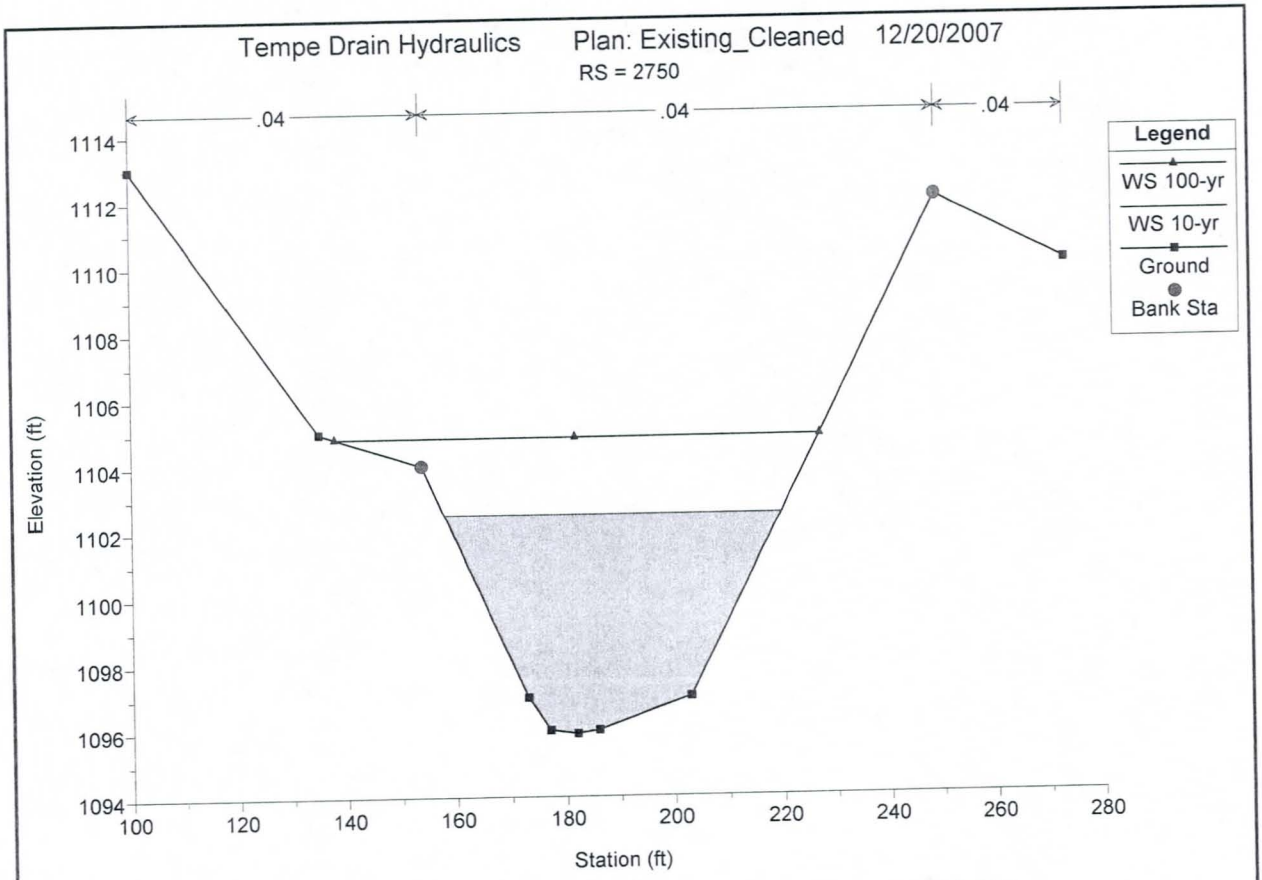

Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 3733
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

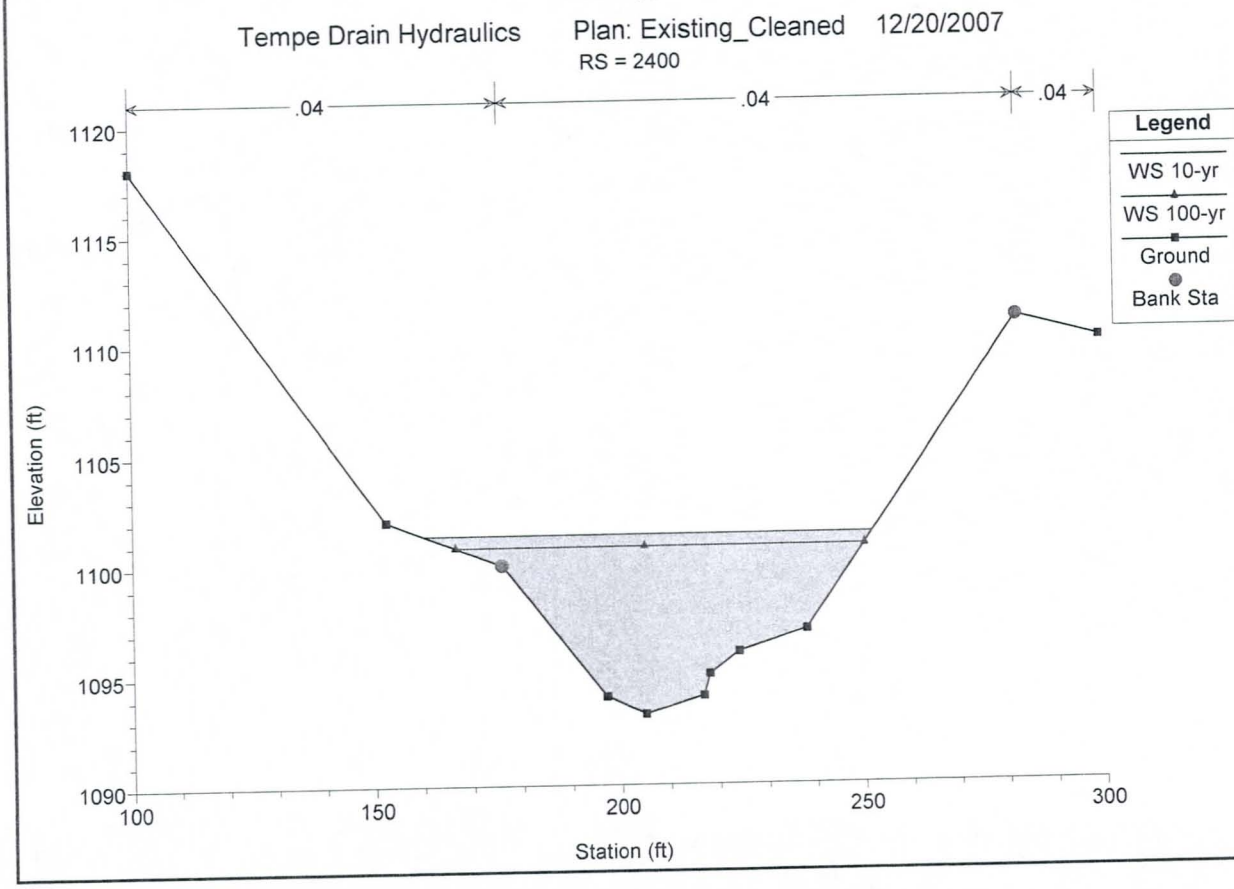

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3565
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
100
150
200
250
300
Station (ft)

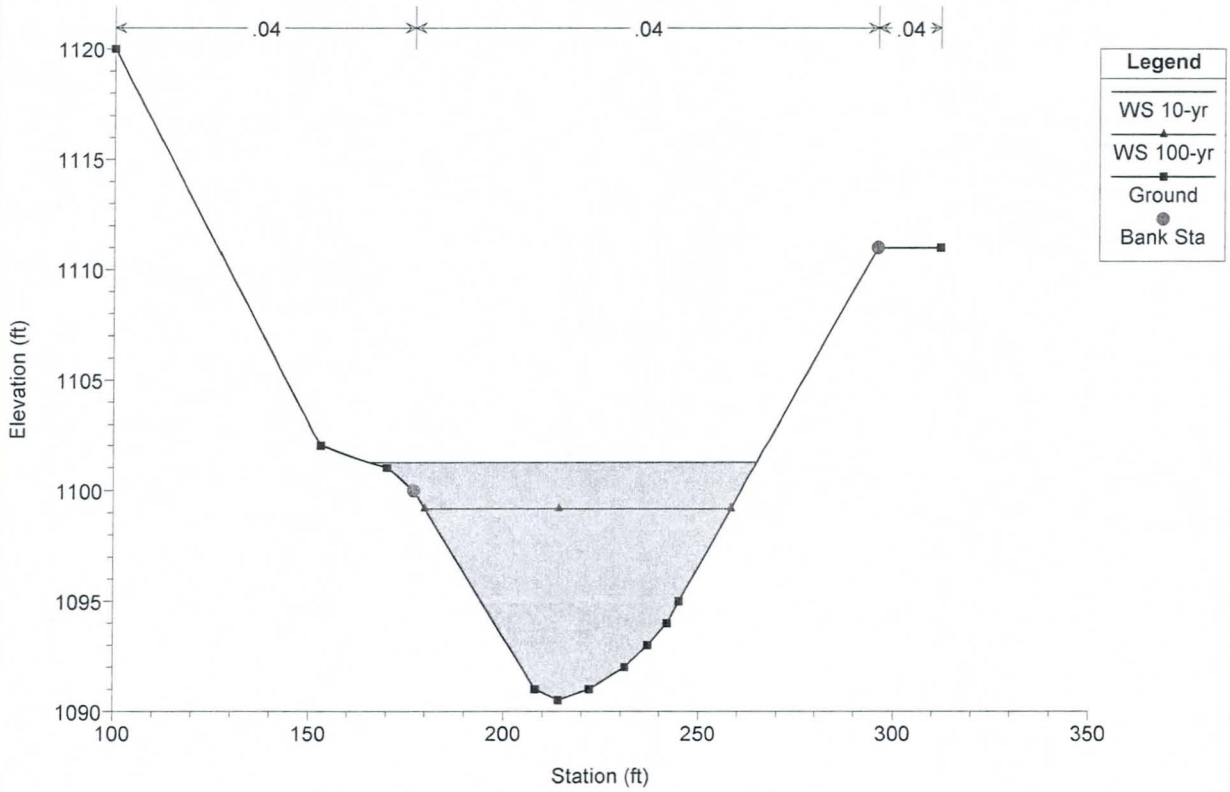

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3436
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

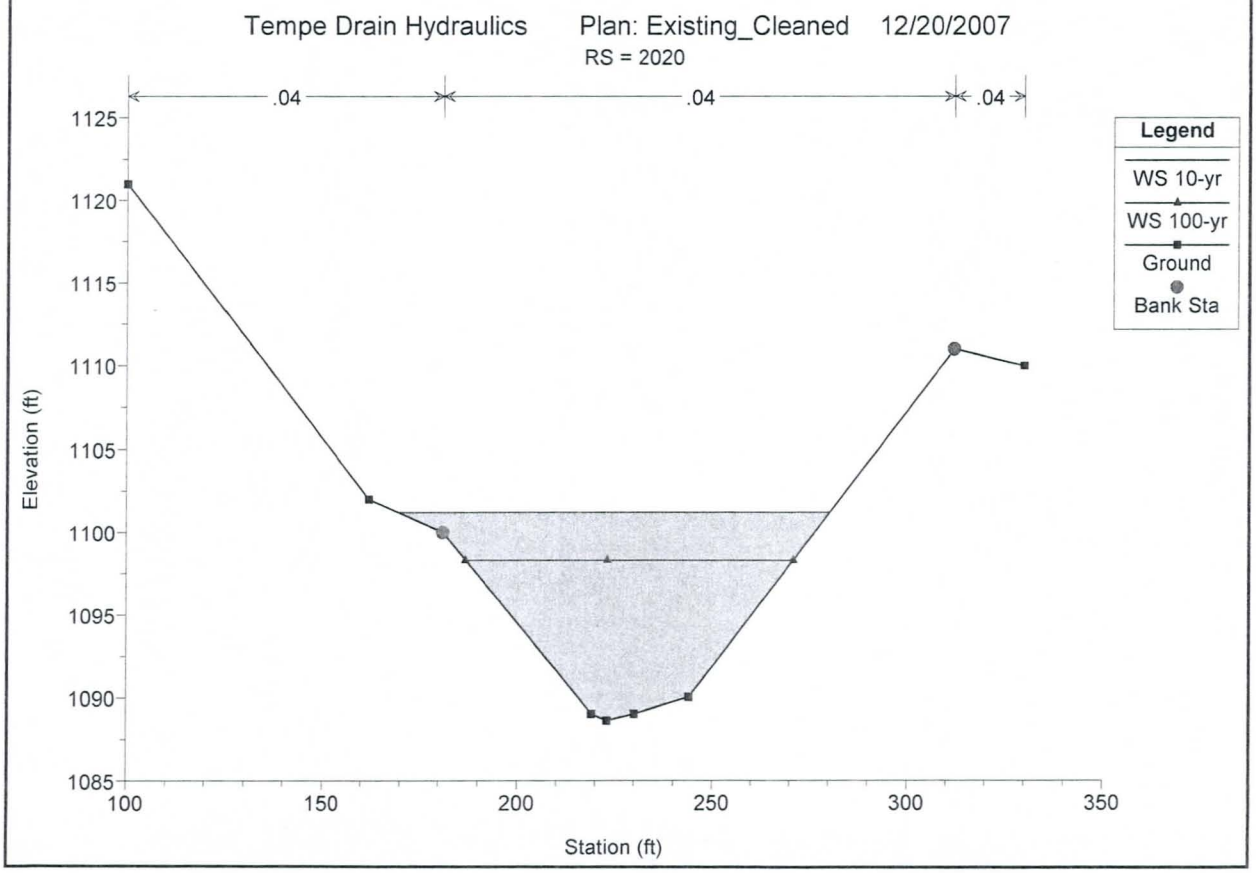

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3365
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
1104
1102
1100
100
150
200
250
300
Station (ft)

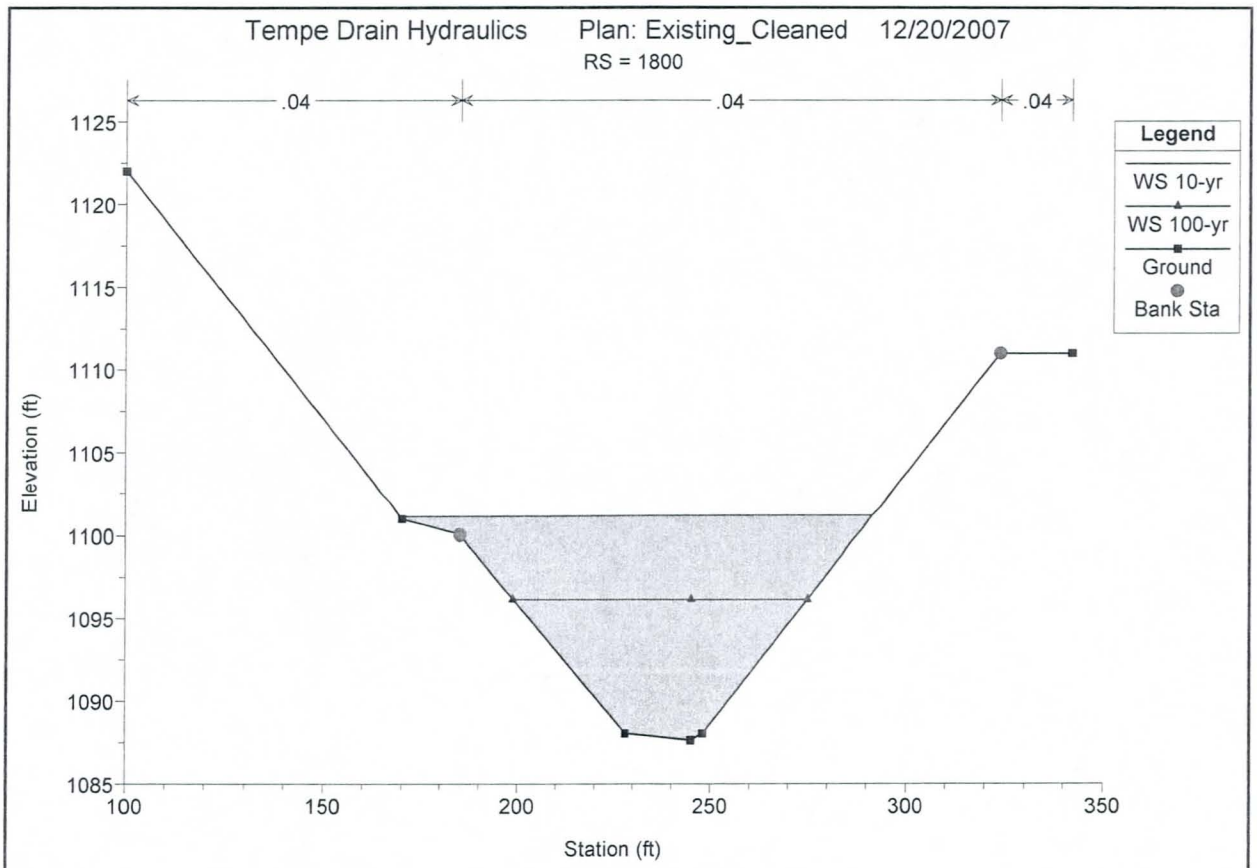

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 3150
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1114
1112
1110
1108
1106
1104
1102
1100
1098
100
150
200
250
300
Station (ft)

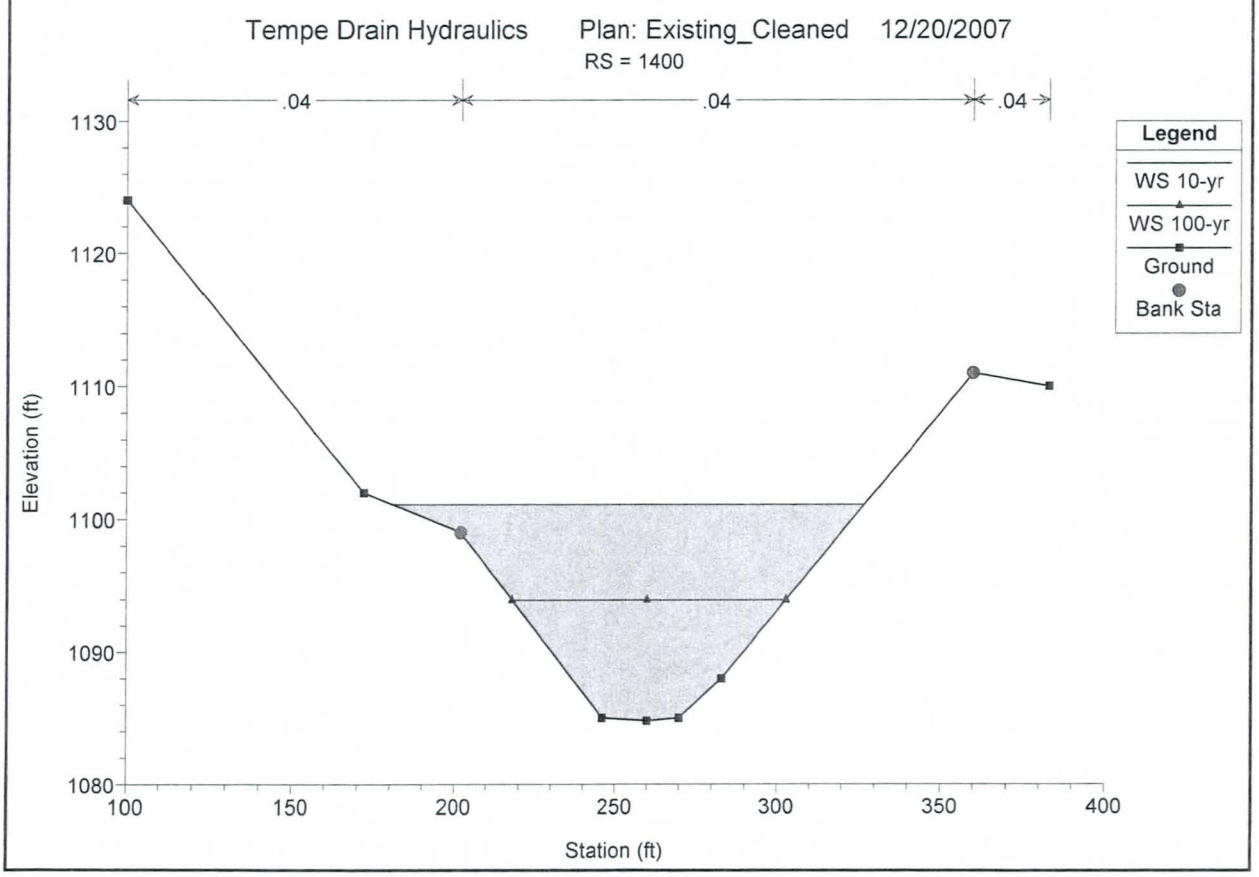

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 2750
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1114
1112
1110
1108
1106
1104
1102
1100
1098
1096
1094
100
120
140
160
180
200
220
240
260
280
Station (ft)

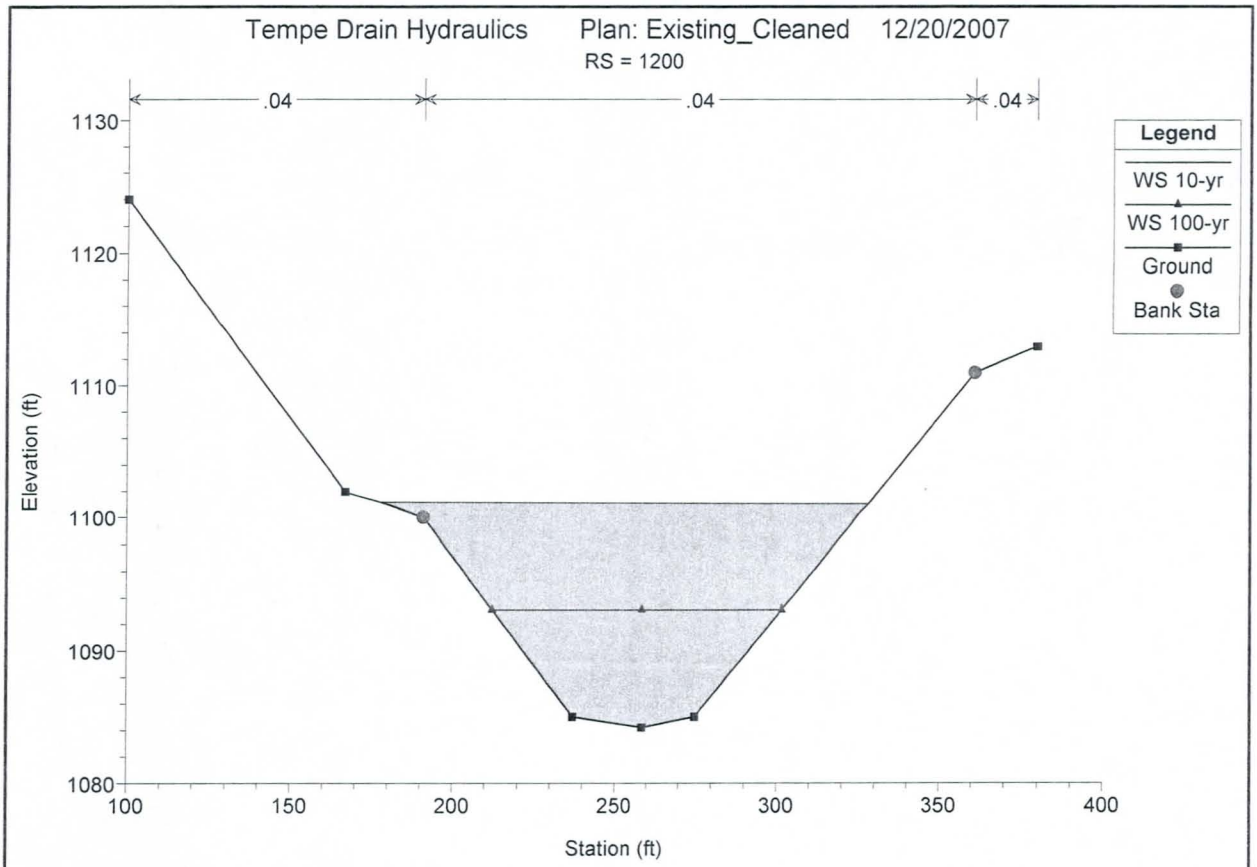

Tempe Drain Hydraulics
Plan: Existing_Cleaned
12/20/2007
RS = 2400
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1120
1115
1110
1105
1100
1095
1090
100
150
200
250
300
Station (ft)

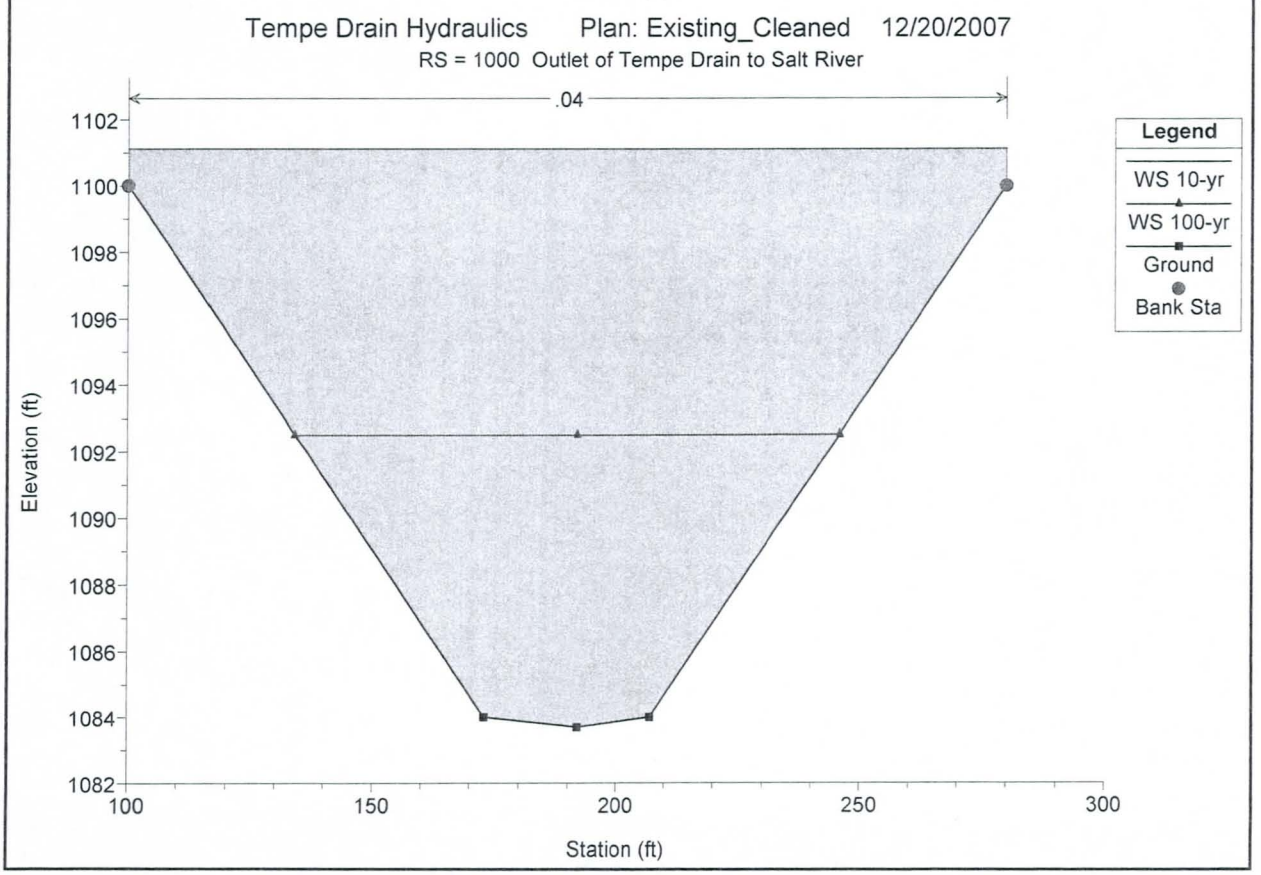

Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 2200
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1120
1115
1110
1105
1100
1095
1090
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 2020
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
1095
1090
1085
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 1800
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
1095
1090
1085
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 1400
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1130
1120
1110
1100
1090
1080
100
150
200
250
300
350
400
Station (ft)

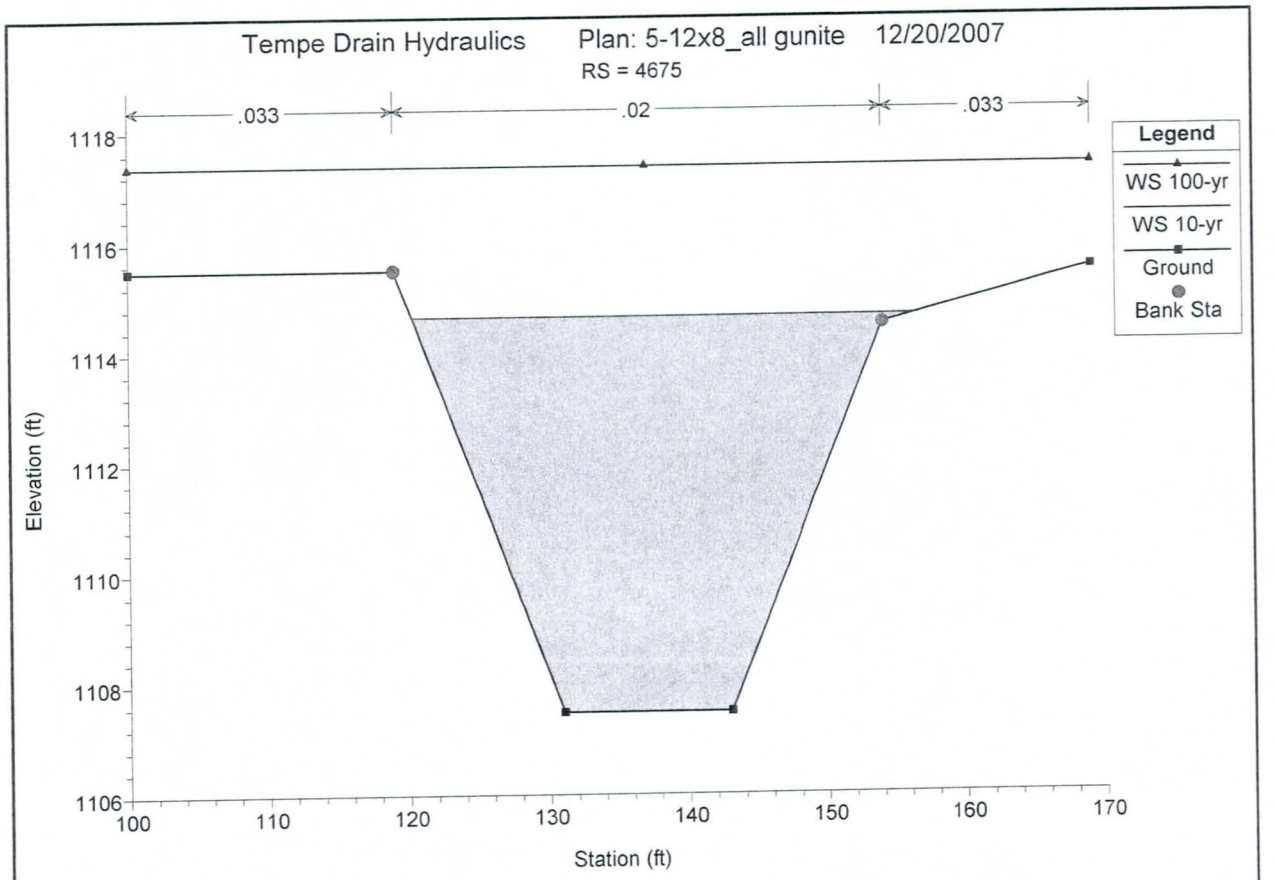

Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 1200
.04
.04
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1130
1120
1110
1100
1090
1080
100
150
200
250
300
350
400
Station (ft)

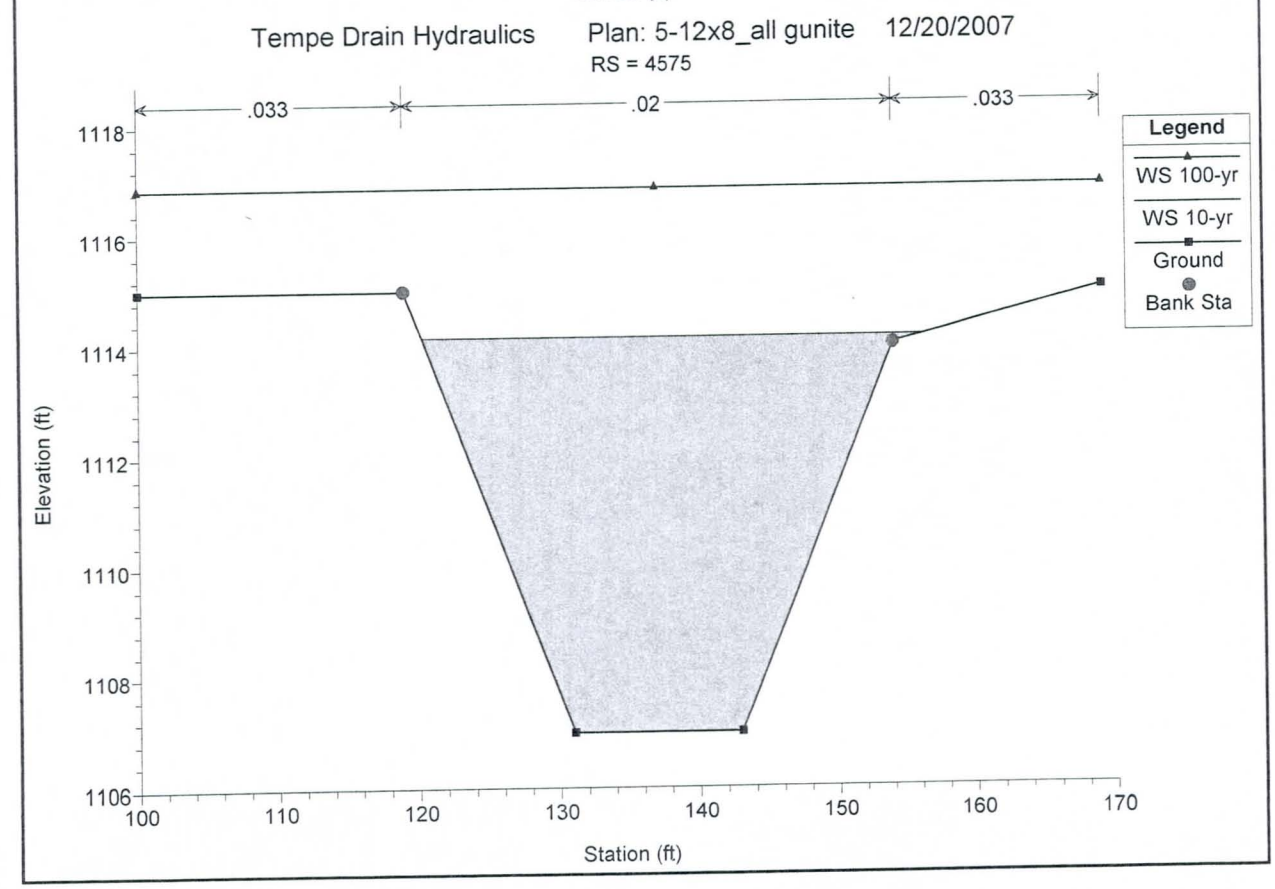

Tempe Drain Hydraulics Plan: Existing_Cleaned 12/20/2007
RS = 1000 Outlet of Tempe Drain to Salt River
.04
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1102
1100
1098
1096
1094
1092
1090
1088
1086
1084
1082
100
150
200
250
300
Station (ft)

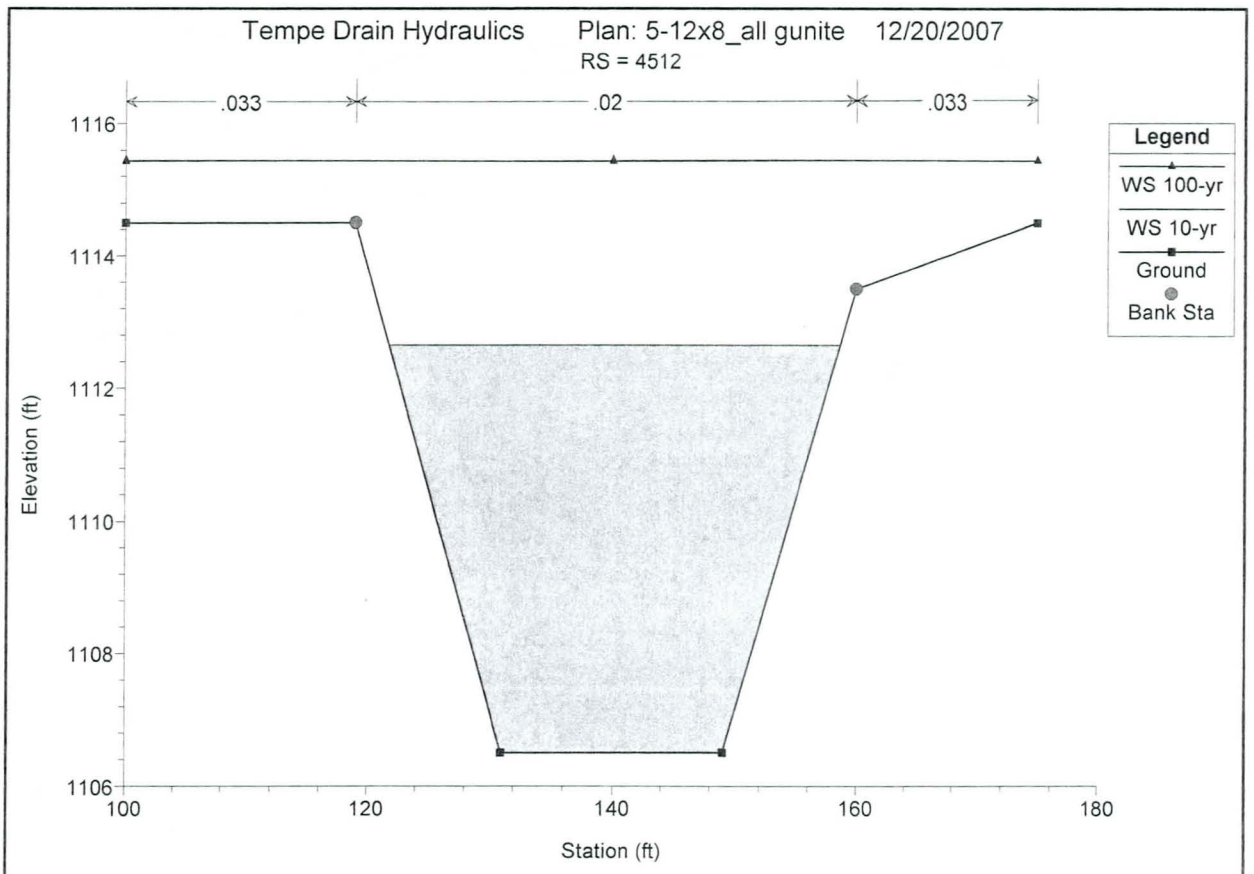
Proposed Condition

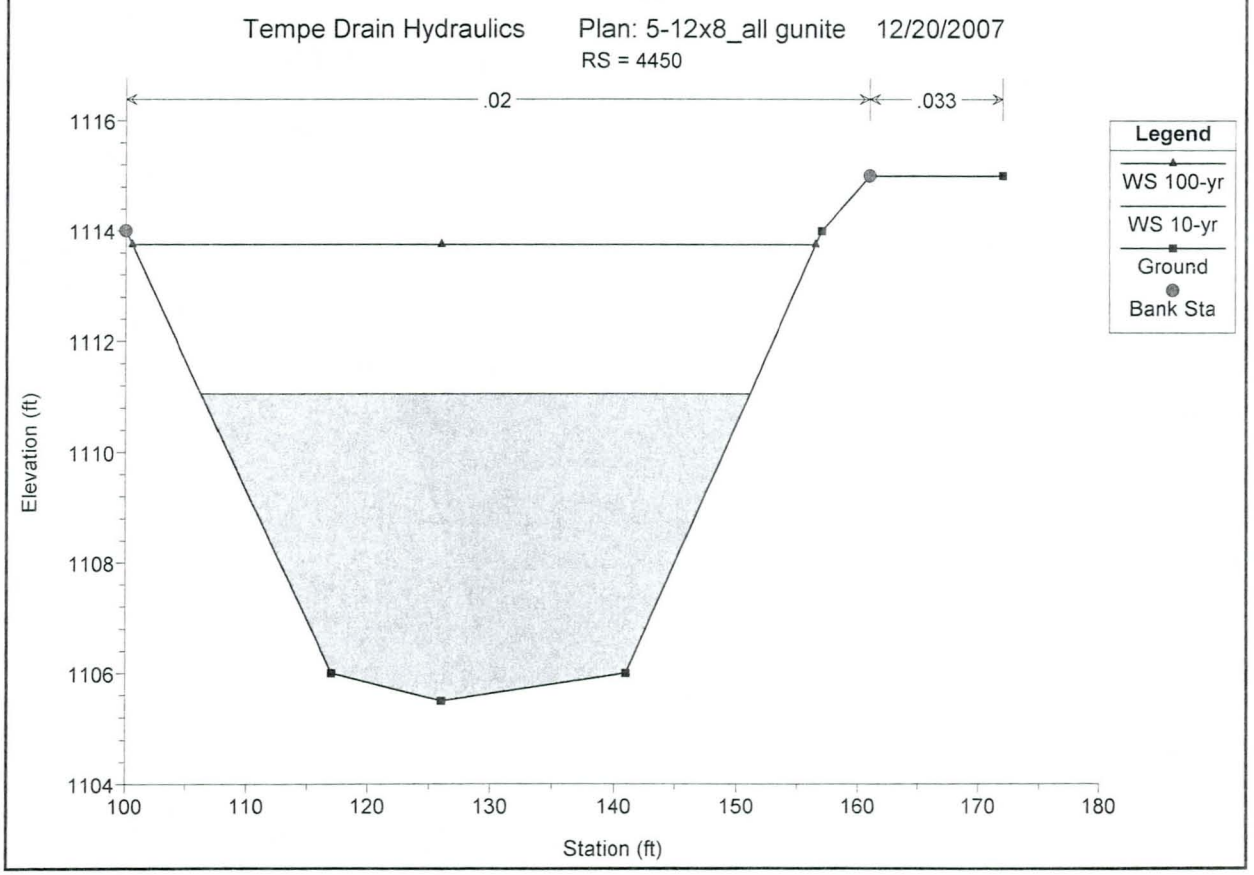
HEC-RAS Plan: GUNITE River: Tempe Drain Reach: Tempe Drain

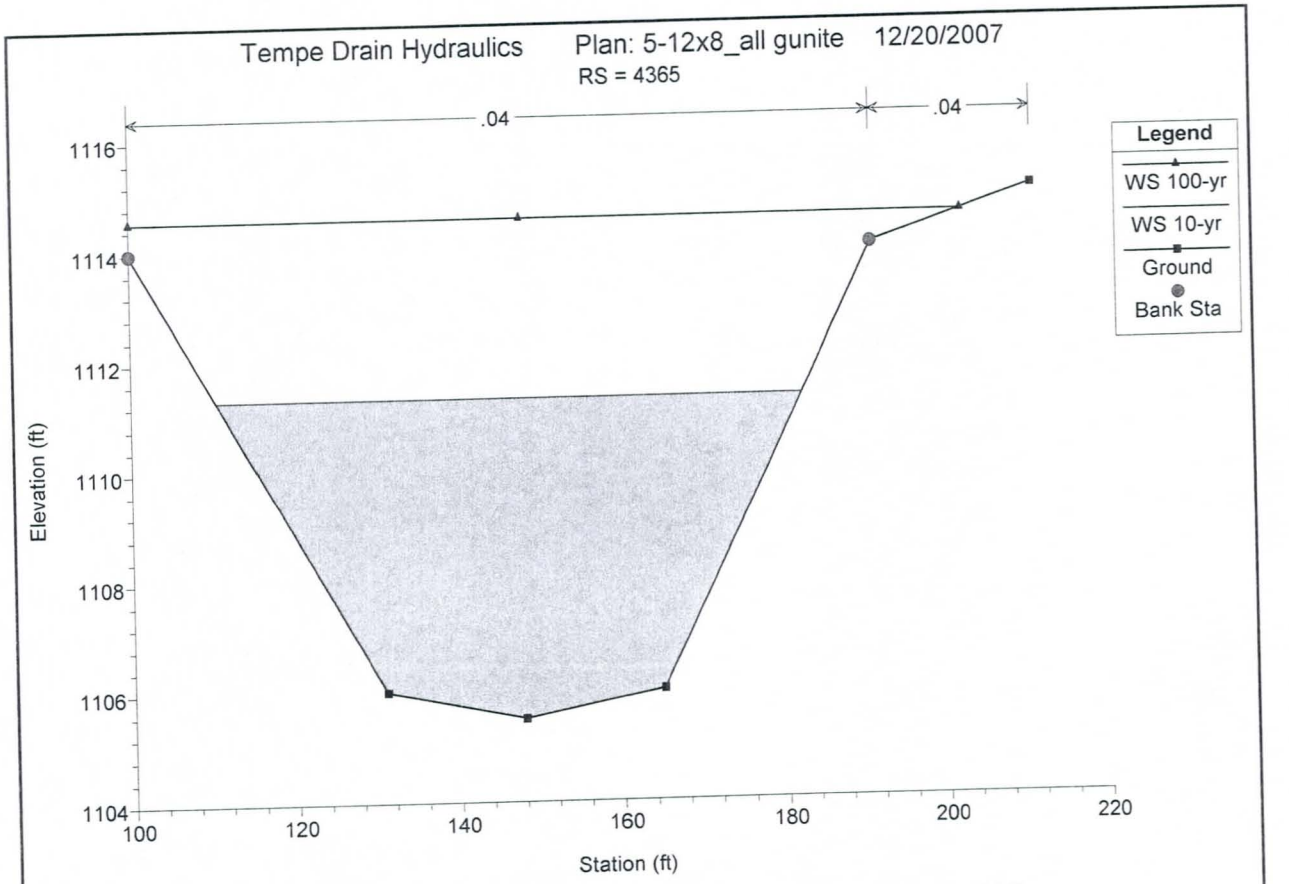
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Tempe Drain	4675	10-yr	2060.00	1107.50	1114.66	1114.63	1117.09	0.004010	12.51	164.80	36.13	1.00
Tempe Drain	4675	100-yr	3769.00	1107.50	1117.36	1117.36	1120.05	0.002723	13.58	329.61	69.00	0.88
Tempe Drain	4575	10-yr	2060.00	1107.00	1114.15	1114.15	1116.59	0.004027	12.53	164.55	36.01	1.00
Tempe Drain	4575	100-yr	3769.00	1107.00	1116.86	1116.86	1119.55	0.002723	13.58	329.61	69.00	0.88
Tempe Drain	4512	10-yr	2060.00	1106.50	1112.65	1112.65	1114.96	0.004024	12.20	168.86	36.90	1.00
Tempe Drain	4512	100-yr	3769.00	1106.50	1115.44	1115.44	1118.03	0.002759	13.11	319.13	75.00	0.88
Tempe Drain	4450	10-yr	2060.00	1105.50	1111.06	1111.06	1113.09	0.003980	11.44	180.03	44.85	1.01
Tempe Drain	4450	100-yr	3769.00	1105.50	1113.75	1113.23	1115.96	0.002783	11.92	316.08	55.98	0.88
Tempe Drain	4365	10-yr	2060.00	1105.50	1111.31		1112.10	0.005886	7.12	289.40	71.82	0.62
Tempe Drain	4365	100-yr	3769.00	1105.50	1114.56		1115.26	0.003040	6.73	562.34	102.15	0.48
Tempe Drain	4295	10-yr	2060.00	1105.00	1111.22		1111.72	0.003130	5.67	363.59	78.99	0.47
Tempe Drain	4295	100-yr	3769.00	1105.00	1114.53		1115.04	0.001912	5.71	663.22	109.71	0.39
Tempe Drain	4195	10-yr	2060.00	1105.00	1110.89		1111.42	0.003447	5.83	353.14	78.95	0.49
Tempe Drain	4195	100-yr	3769.00	1105.00	1114.37		1114.85	0.002025	5.60	686.57	149.12	0.39
Tempe Drain	4045	10-yr	2060.00	1104.50	1110.66	1107.73	1110.99	0.001800	4.60	447.89	87.35	0.36
Tempe Drain	4045	100-yr	3769.00	1104.50	1114.23	1109.23	1114.59	0.001158	4.77	790.55	105.65	0.30
Tempe Drain	3930		Culvert									
Tempe Drain	3805	10-yr	2266.00	1104.00	1109.41		1109.90	0.000745	5.60	404.88	85.65	0.45
Tempe Drain	3805	100-yr	4124.00	1104.00	1111.86		1112.53	0.000674	6.58	626.46	95.43	0.45
Tempe Drain	3733	10-yr	2266.00	1103.51	1107.81	1107.81	1109.66	0.004014	10.92	207.50	56.63	1.01
Tempe Drain	3733	100-yr	4124.00	1103.51	1109.71	1109.71	1112.25	0.003654	12.80	322.28	63.99	1.00
Tempe Drain	3565	10-yr	2266.00	1102.37	1106.67	1106.67	1108.52	0.004015	10.92	207.42	56.57	1.01
Tempe Drain	3565	100-yr	4124.00	1102.37	1108.58	1108.58	1111.11	0.003624	12.76	323.08	63.98	1.00
Tempe Drain	3436	10-yr	2266.00	1101.49	1105.78	1105.78	1107.63	0.004015	10.92	207.57	56.70	1.01
Tempe Drain	3436	100-yr	4124.00	1101.49	1107.70	1107.70	1110.23	0.003618	12.75	323.57	64.17	1.00
Tempe Drain	3365	10-yr	2266.00	1101.00	1106.14	1104.30	1106.74	0.000949	6.22	364.19	77.71	0.51
Tempe Drain	3365	100-yr	4124.00	1101.00	1108.77	1105.87	1109.56	0.000775	7.14	577.67	84.72	0.48
Tempe Drain	2783		Culvert									
Tempe Drain	2020	10-yr	2286.00	1089.00	1101.13		1101.20	0.000045	2.21	1050.42	122.67	0.12
Tempe Drain	2020	100-yr	4174.00	1089.00	1095.93		1096.90	0.001106	7.92	527.26	88.24	0.57
Tempe Drain	1950	10-yr	2286.00	1088.64	1101.10		1101.20	0.000063	2.53	903.15	95.02	0.14
Tempe Drain	1950	100-yr	4174.00	1088.64	1094.22	1094.22	1096.63	0.003692	12.46	335.01	70.15	1.00
Tempe Drain	1800	10-yr	2286.00	1087.86	1101.10		1101.18	0.000048	2.26	1010.34	102.60	0.13
Tempe Drain	1800	100-yr	4174.00	1087.86	1093.40	1093.40	1095.77	0.003688	12.35	338.00	72.01	1.00
Tempe Drain	1400	10-yr	2286.00	1085.78	1101.11		1101.16	0.000027	1.84	1243.38	112.25	0.10
Tempe Drain	1400	100-yr	4174.00	1085.78	1092.43		1093.95	0.001933	9.89	422.02	77.00	0.74
Tempe Drain	1200	10-yr	2286.00	1084.74	1101.11		1101.15	0.000021	1.69	1354.06	115.46	0.09
Tempe Drain	1200	100-yr	4174.00	1084.74	1092.45		1093.52	0.001144	8.27	504.61	80.85	0.58
Tempe Drain	1000	10-yr	2286.00	1083.70	1101.12	1088.17	1101.14	0.000011	1.19	1918.70	180.00	0.06
Tempe Drain	1000	100-yr	4174.00	1083.70	1092.52	1089.87	1093.21	0.000828	6.67	625.98	111.75	0.50

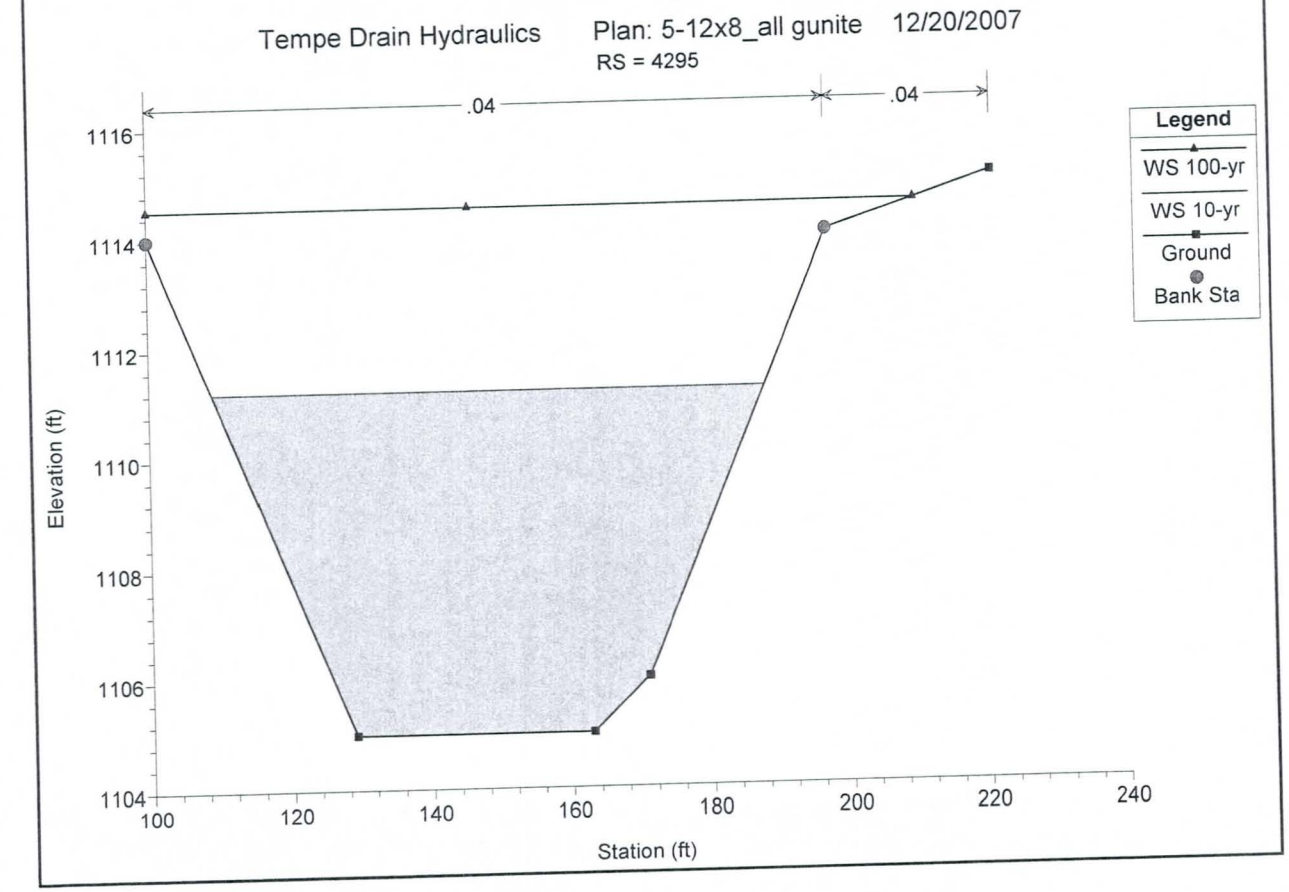

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4675
.033
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
100
110
120
130
140
150
160
170
Station (ft)

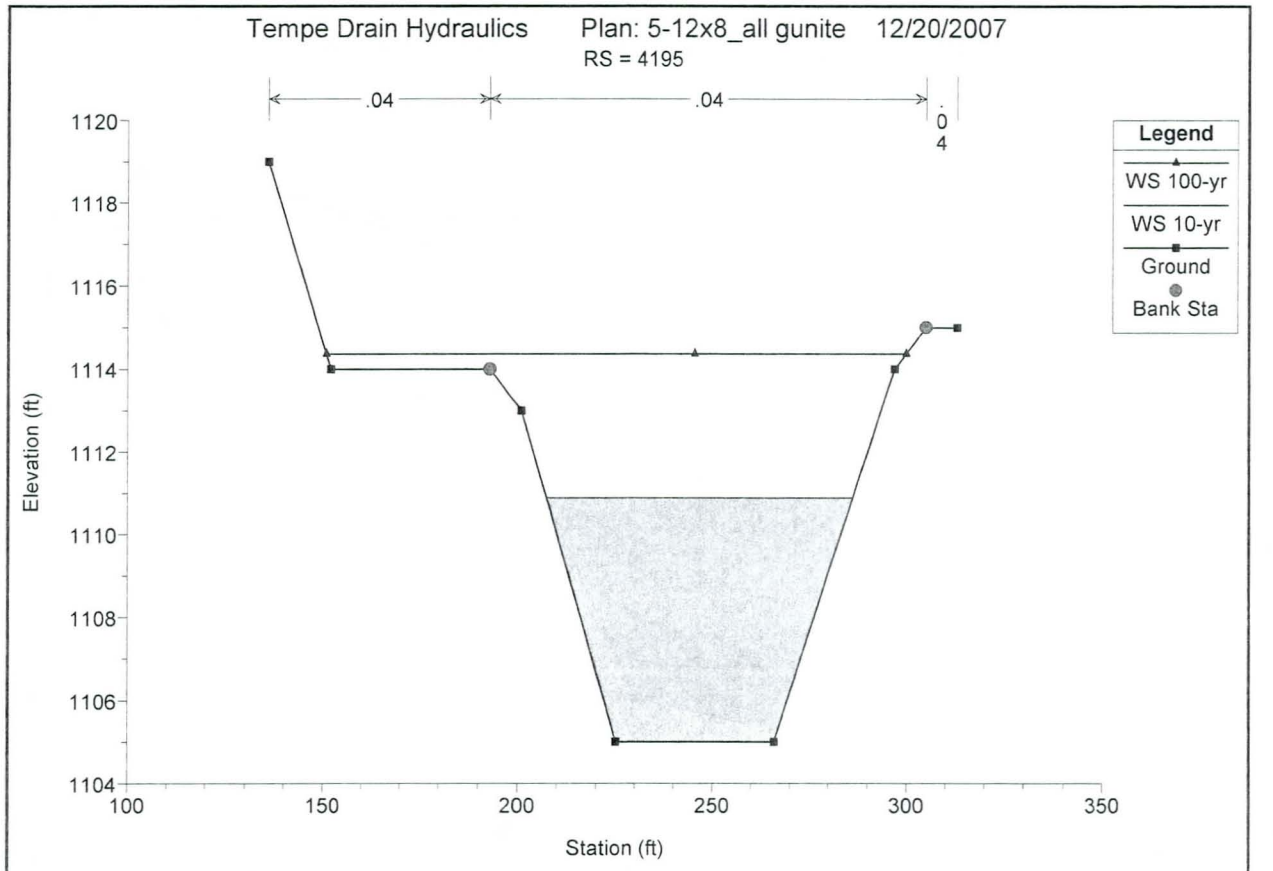

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4575
.033
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
100
110
120
130
140
150
160
170
Station (ft)

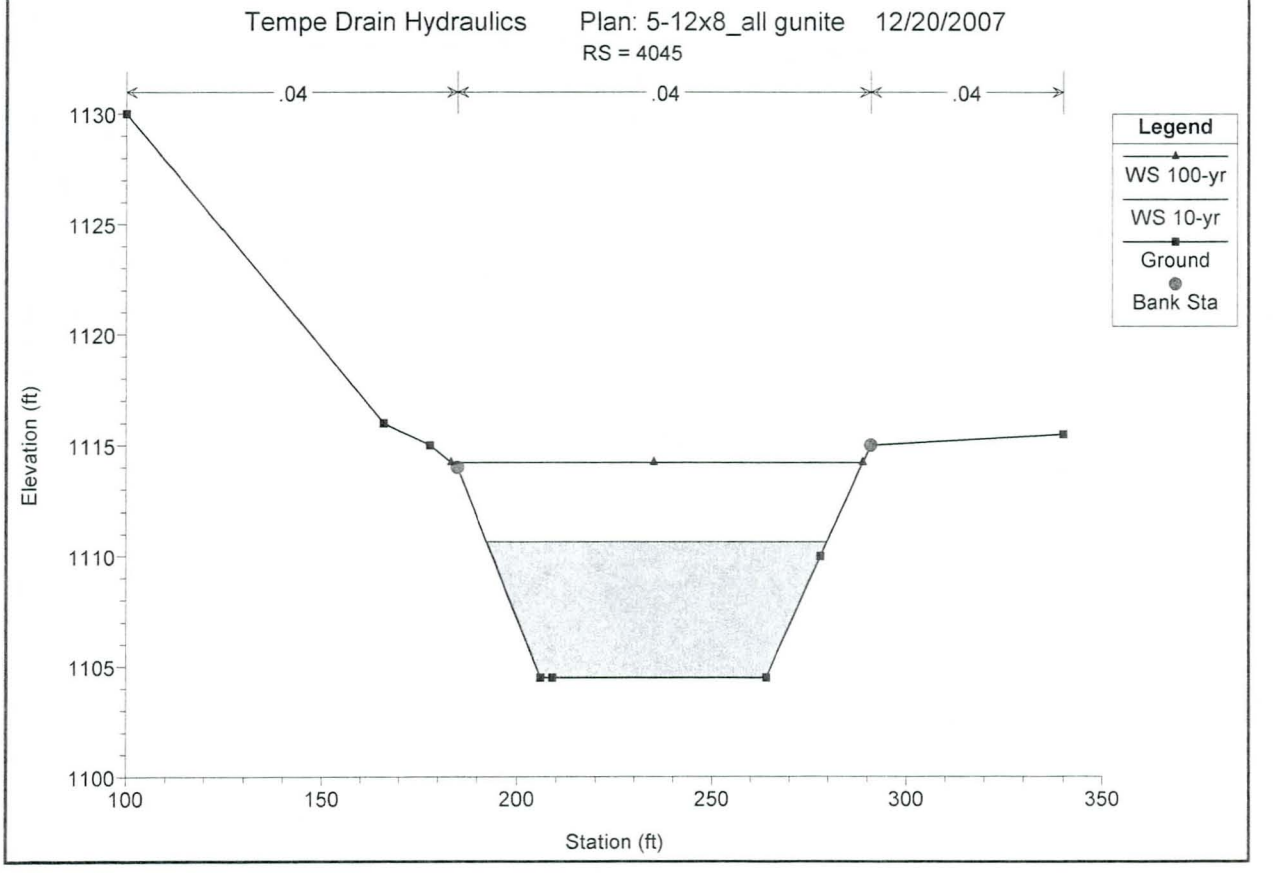

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4512
.033
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
100
120
140
160
180
Station (ft)

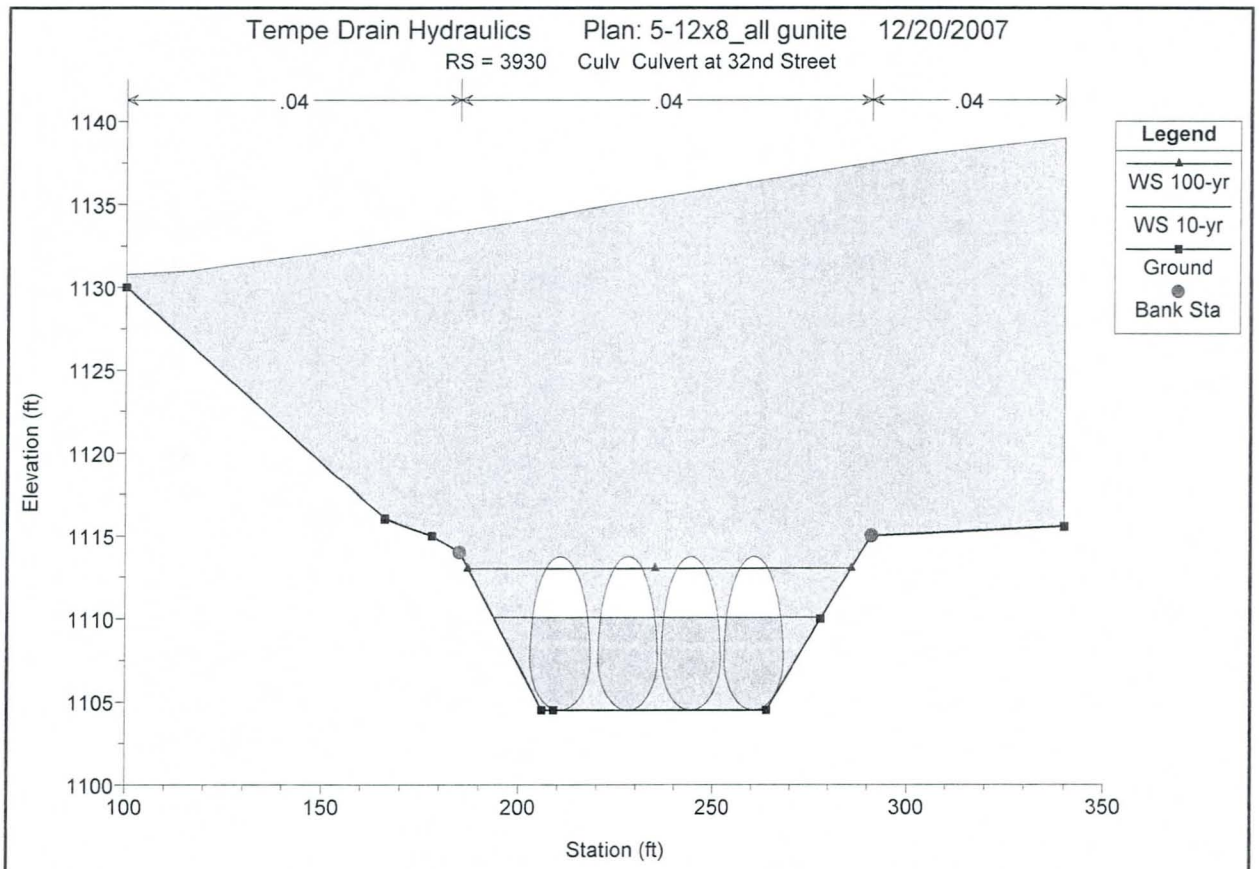

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4450
.02
.033
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
110
120
130
140
150
160
170
180
Station (ft)

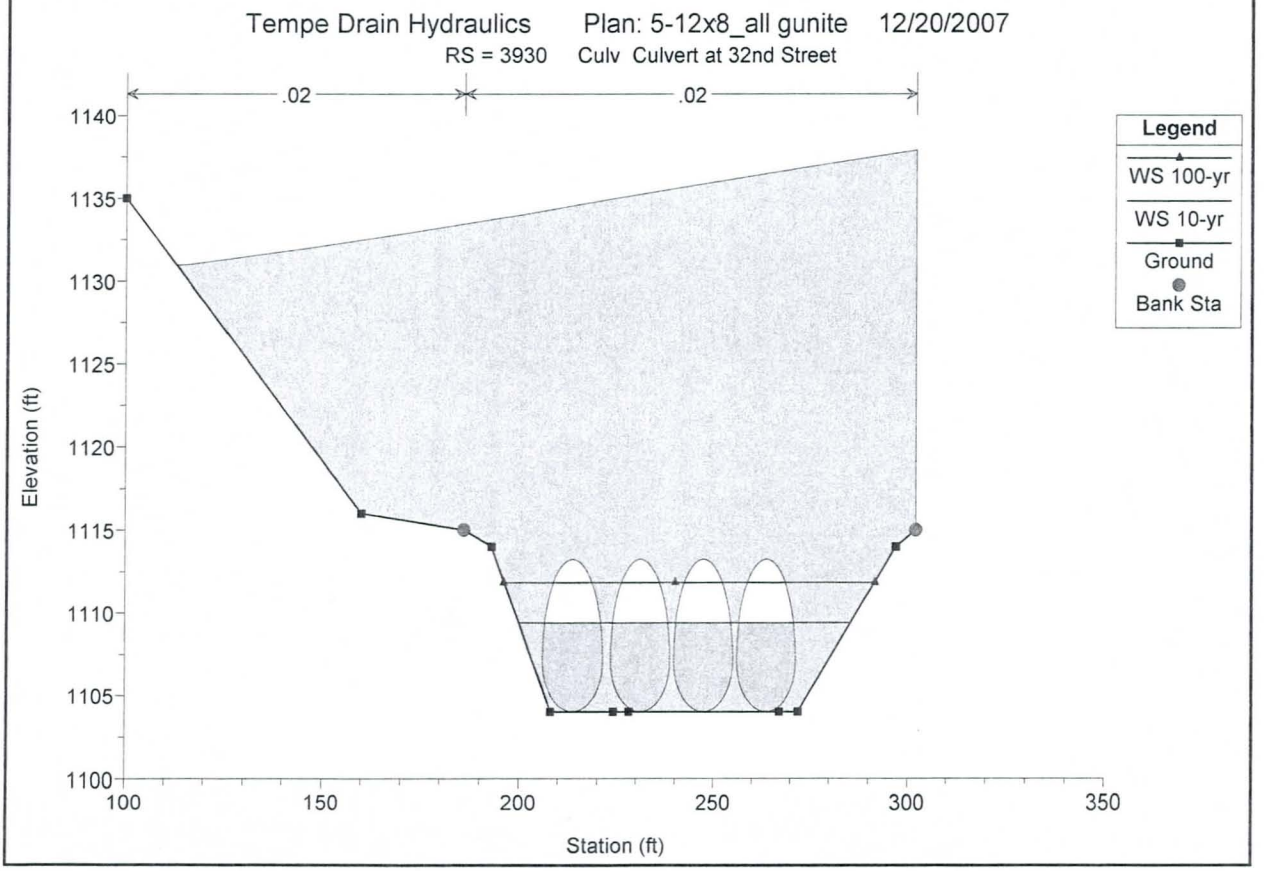

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4365
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
120
140
160
180
200
220
Station (ft)

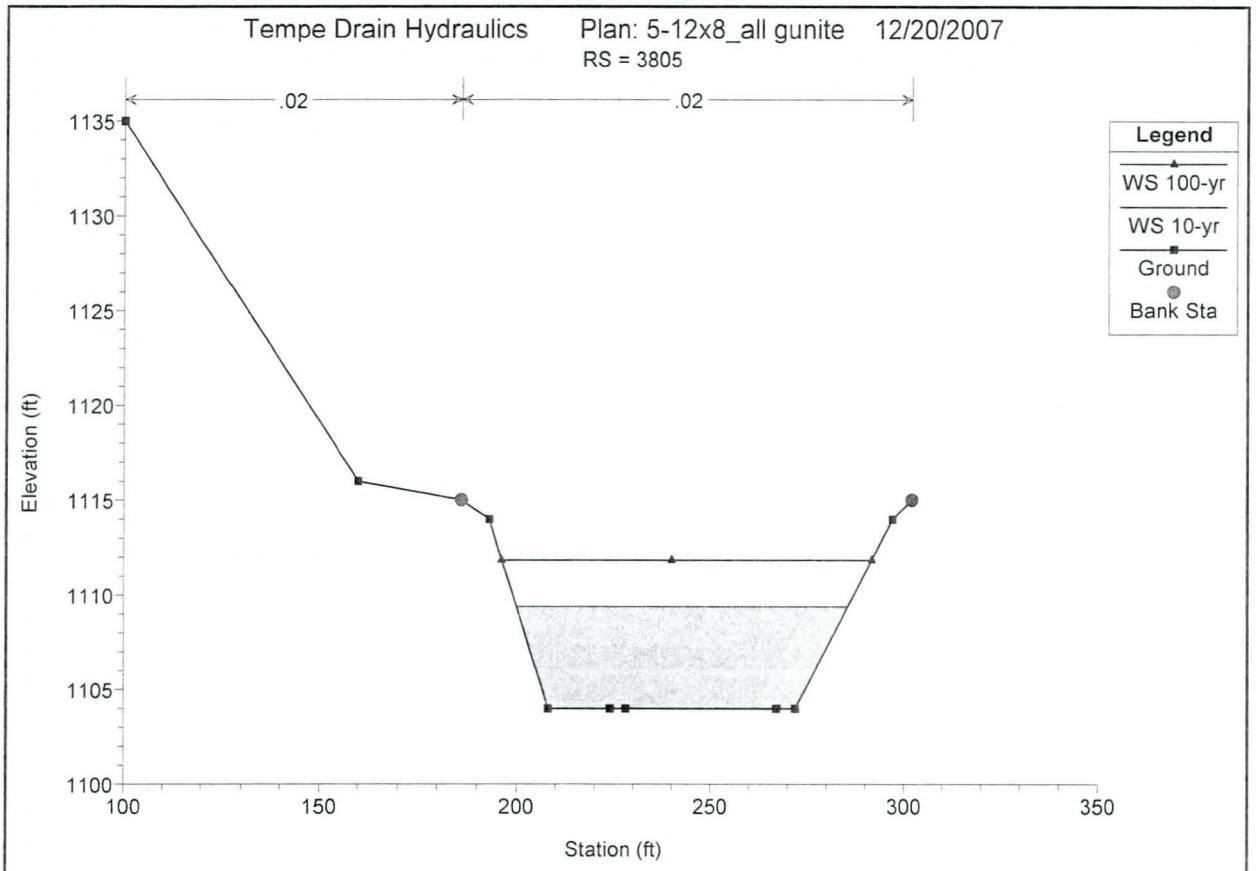

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4295
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1116
1114
1112
1110
1108
1106
1104
100
120
140
160
180
200
220
240
Station (ft)

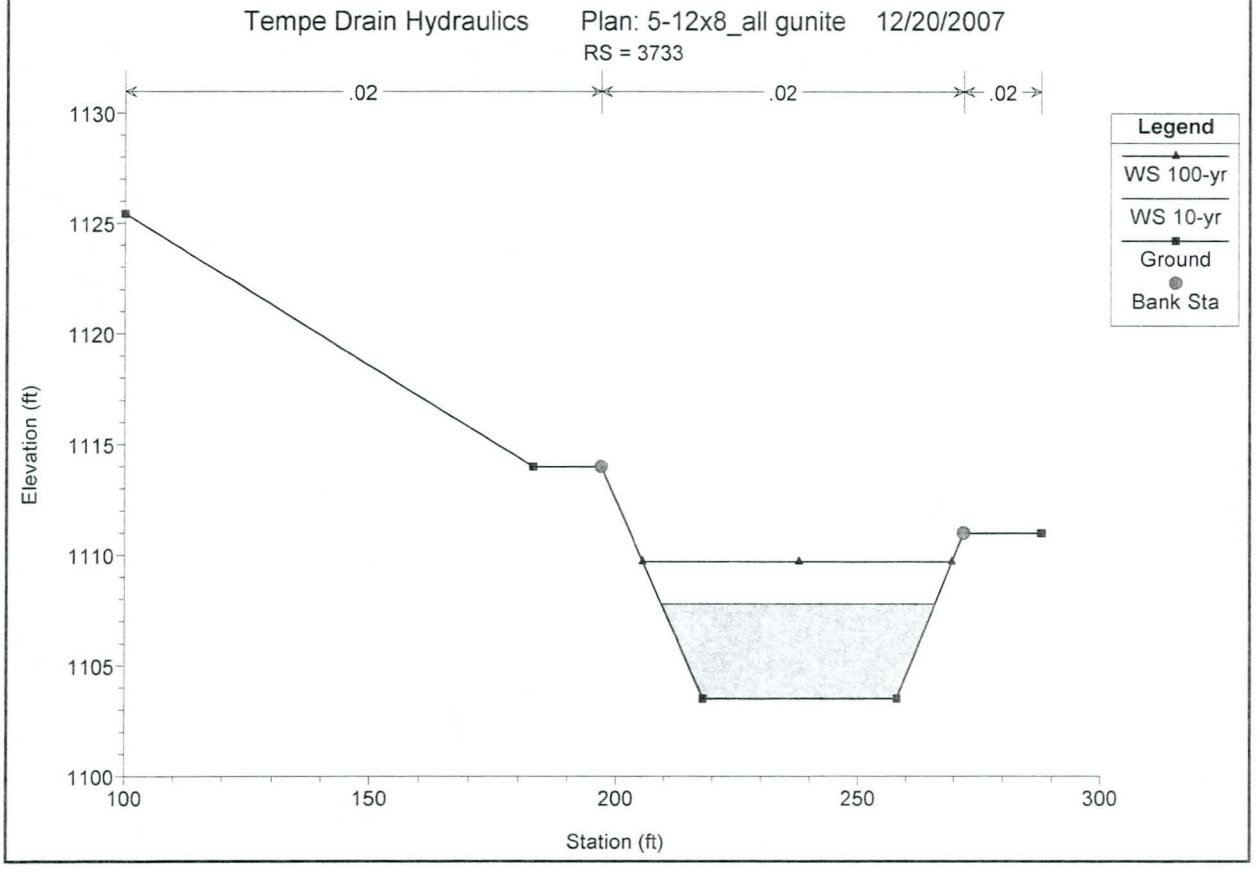

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4195
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1120
1118
1116
1114
1112
1110
1108
1106
1104
100
150
200
250
300
350

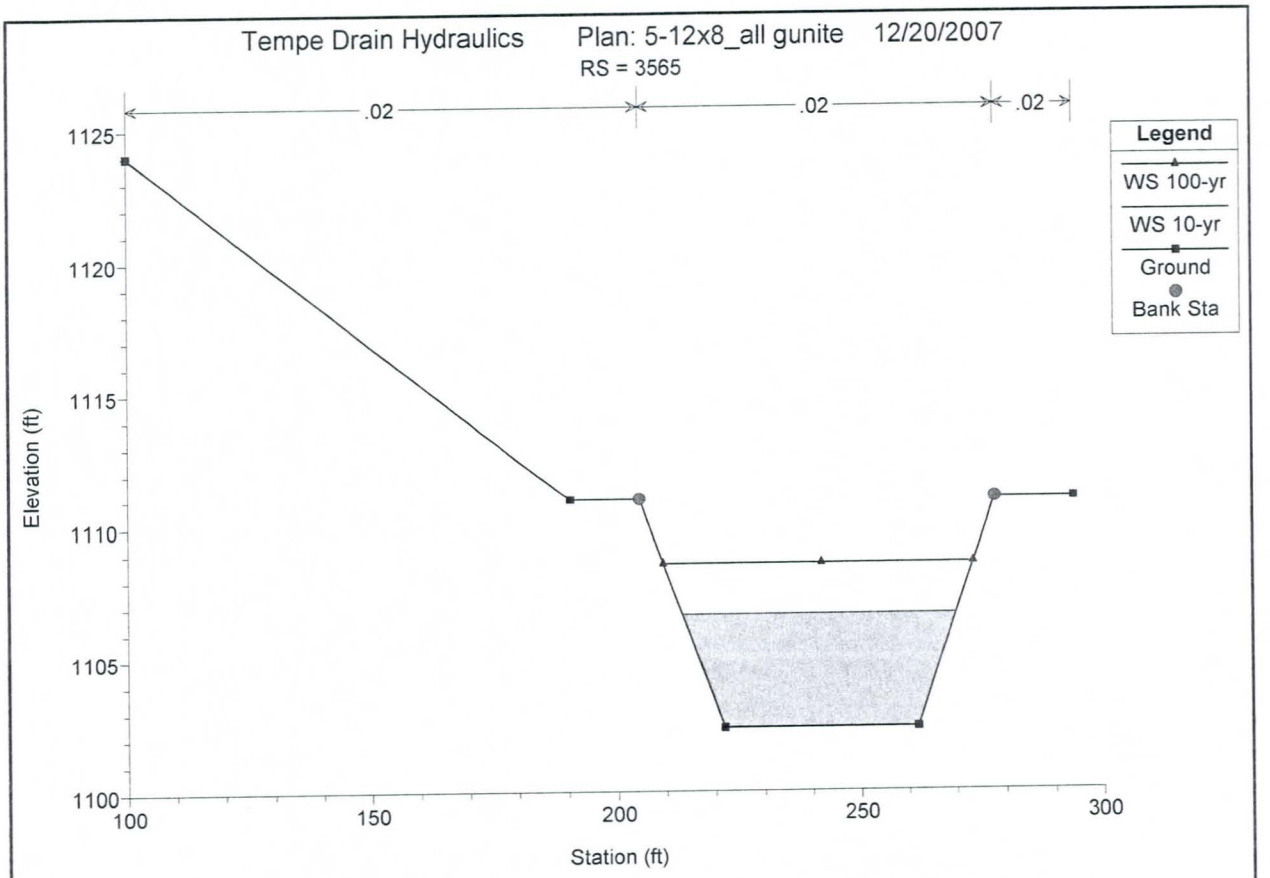

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 4045
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350

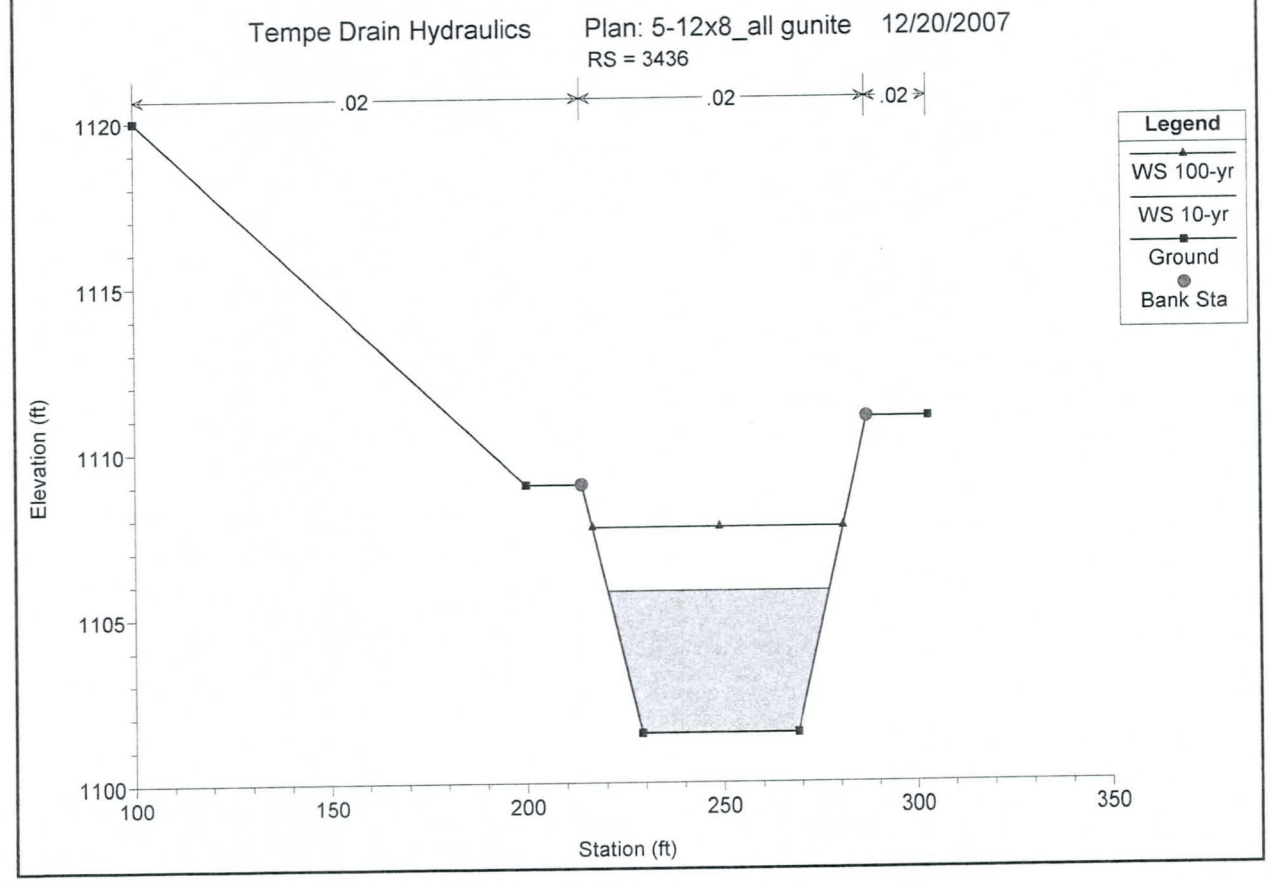

Tempe Drain Hydraulics Plan: 5-12x8_all gunite 12/20/2007
RS = 3930 Culv Culvert at 32nd Street
.04
.04
.04
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

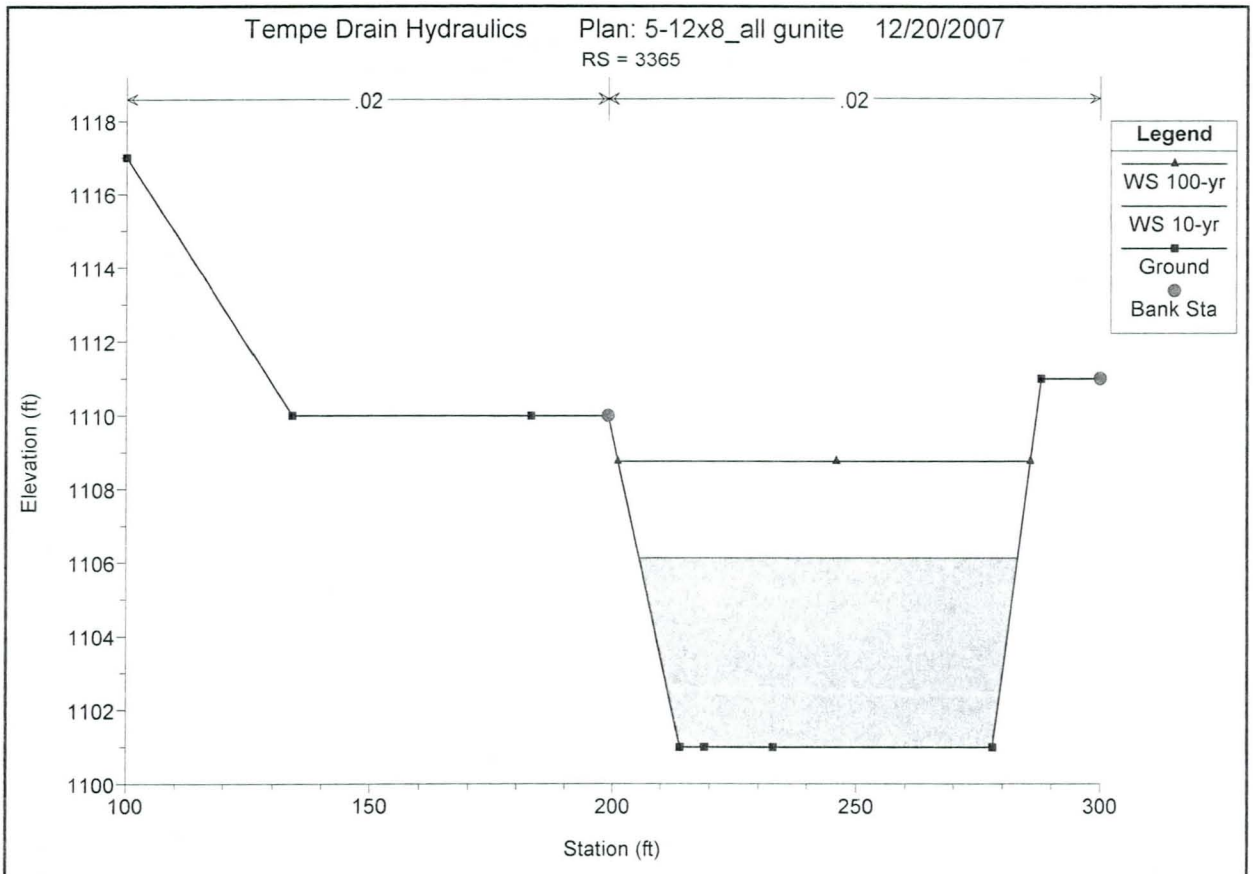

Tempe Drain Hydraulics Plan: 5-12x8_all gunite 12/20/2007
RS = 3930 Culv Culvert at 32nd Street
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

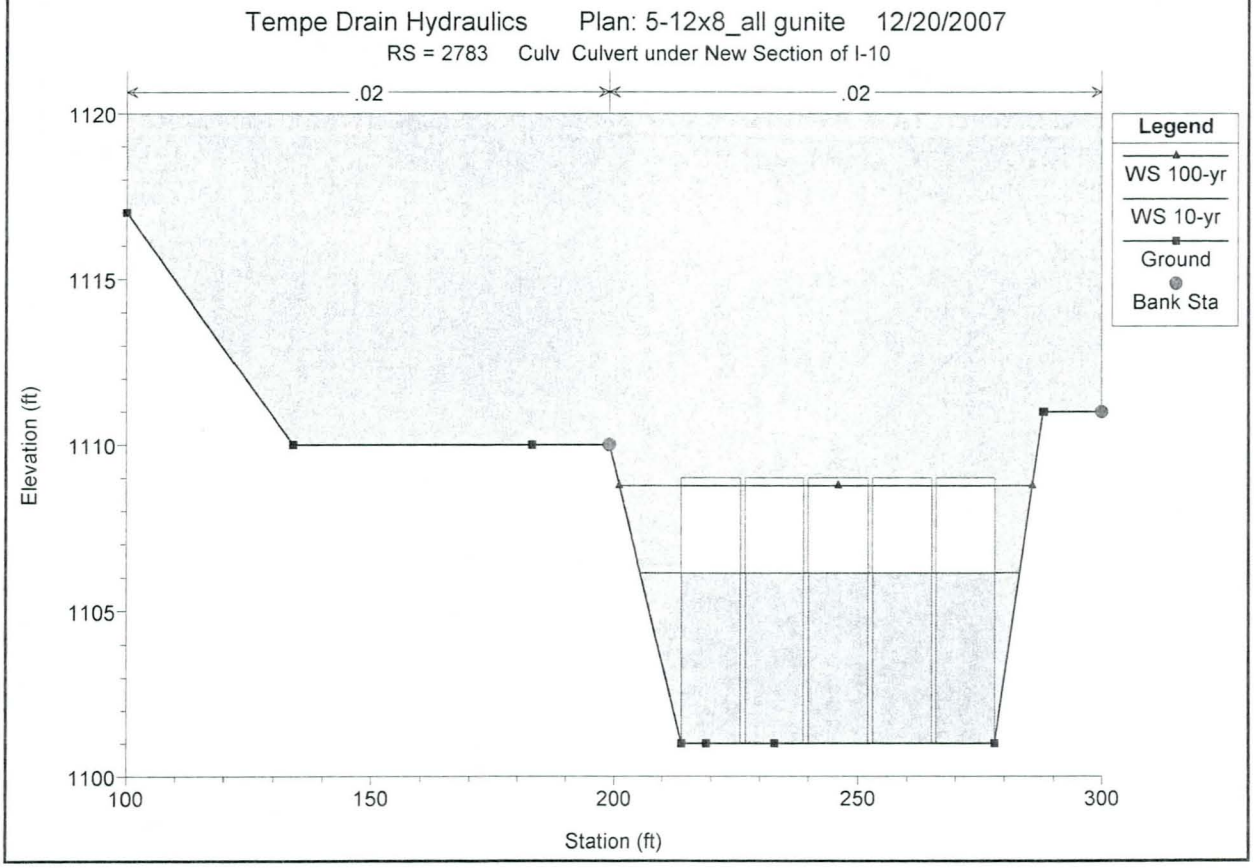

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 3805
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1135
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

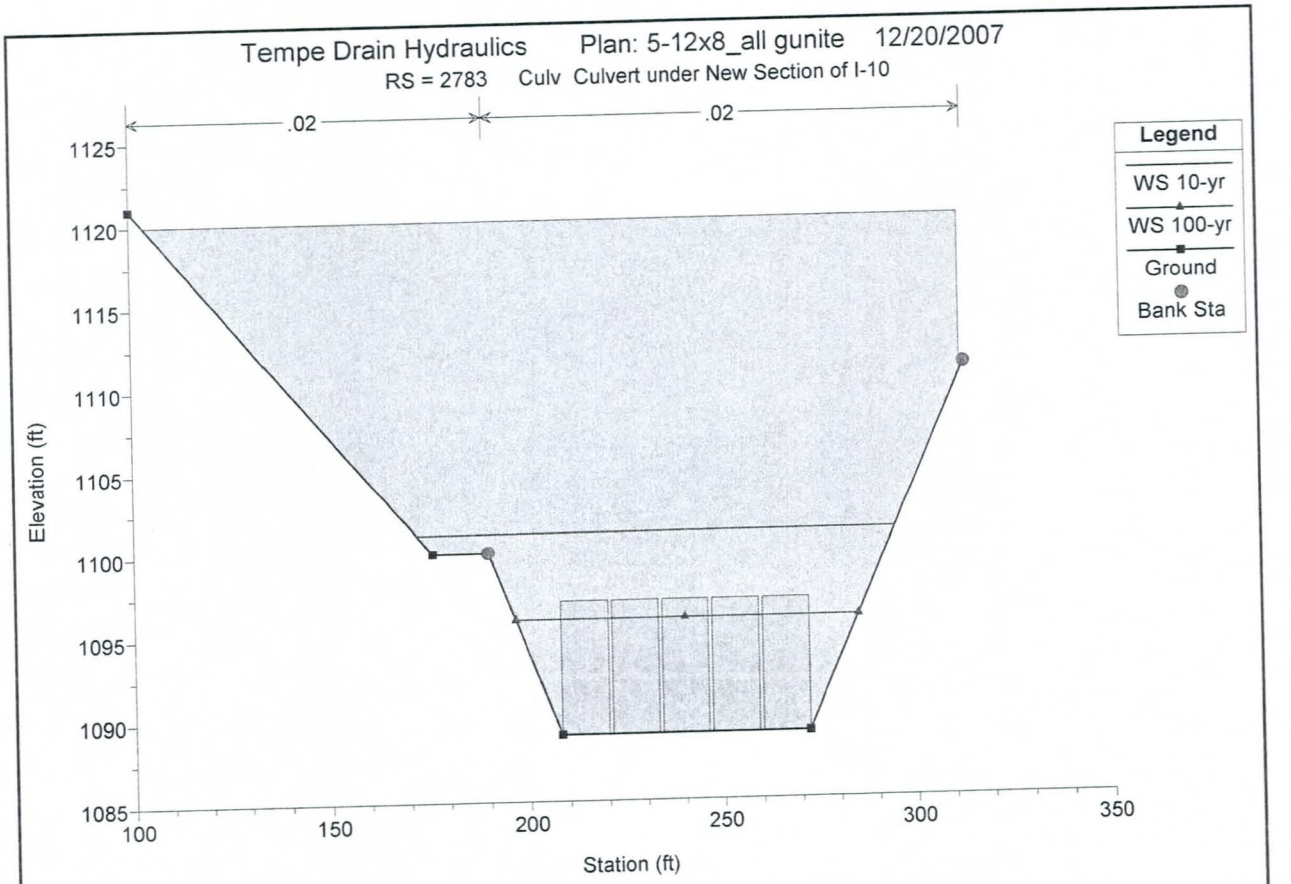

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 3733
.02
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
100
150
200
250
300
Station (ft)

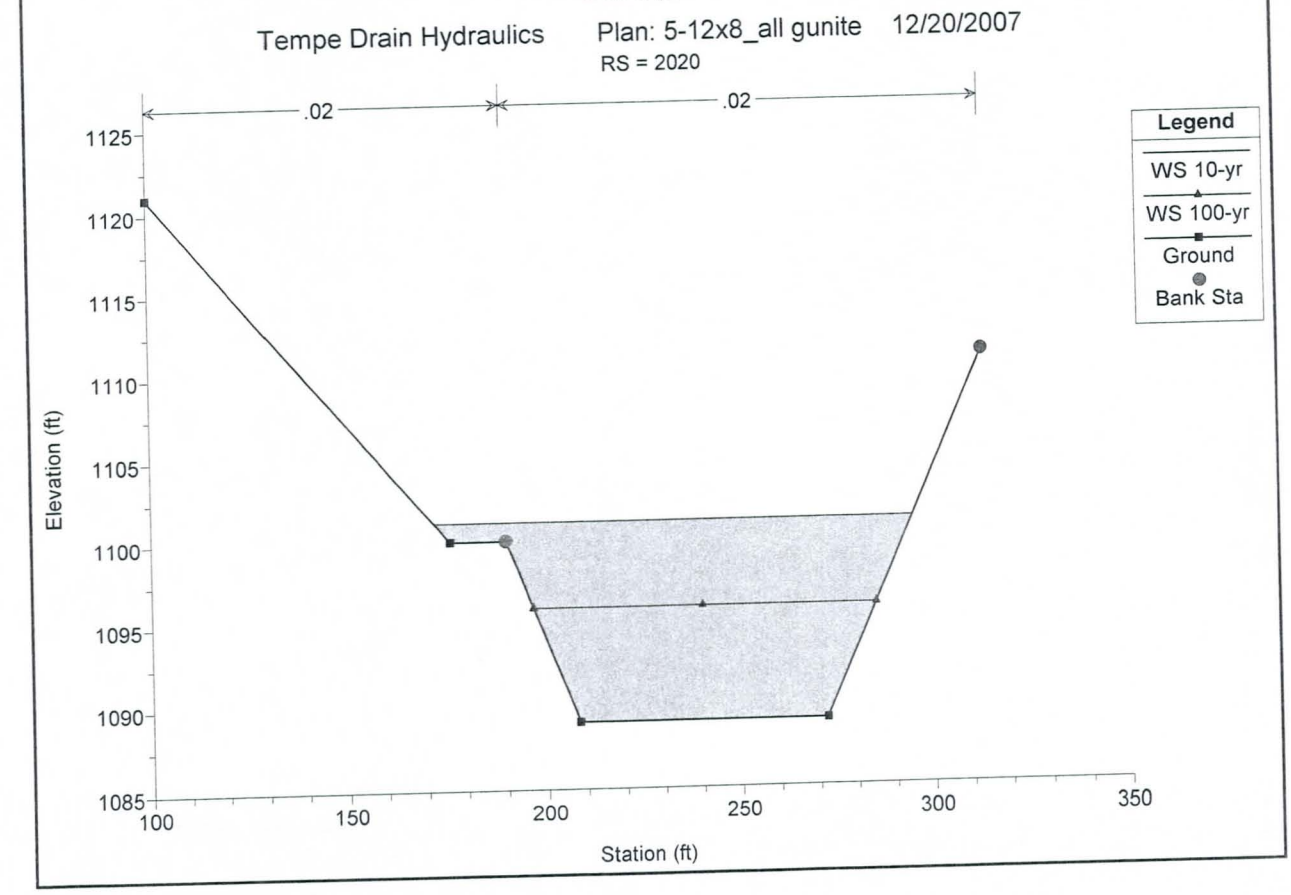

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 3565
.02
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
100
150
200
250
300
Station (ft)

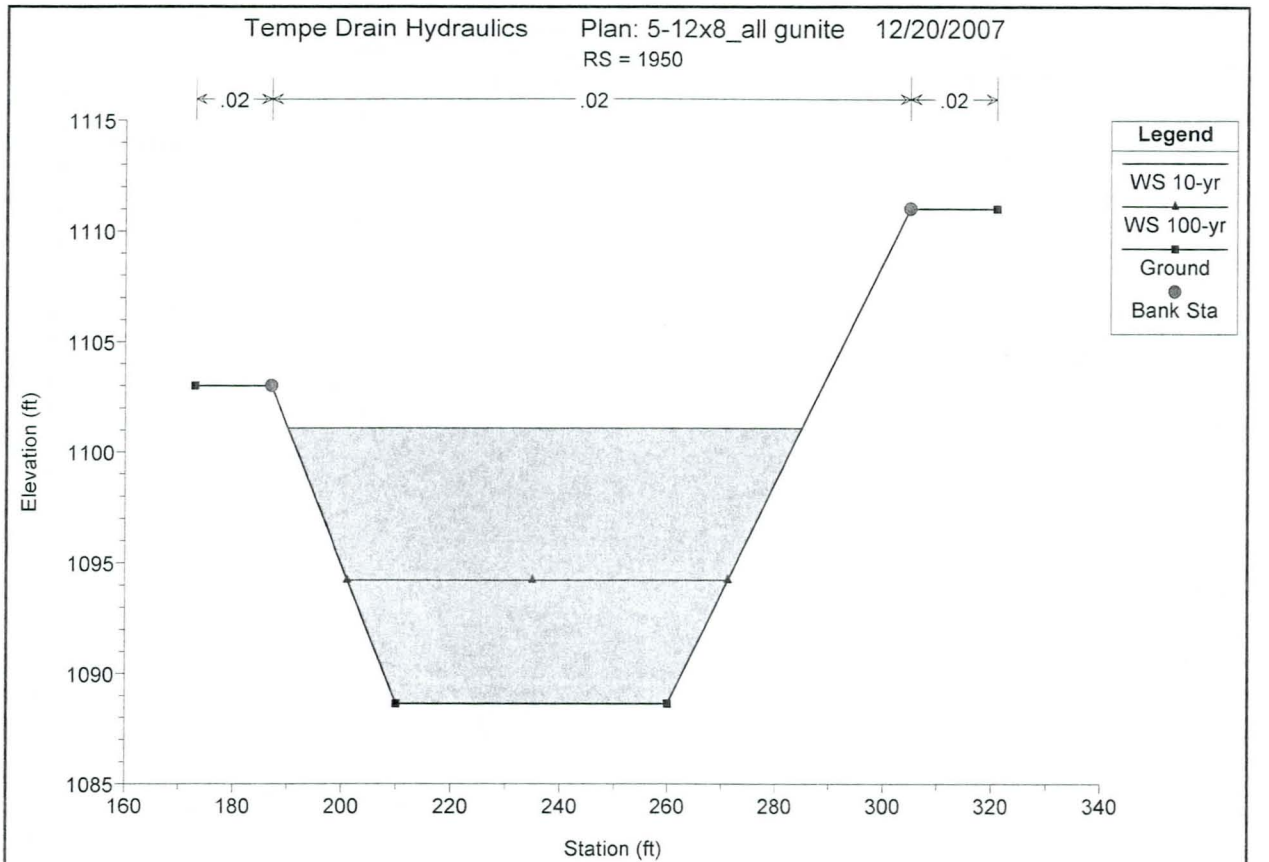

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 3436
.02
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1120
1115
1110
1105
1100
100
150
200
250
300
350
Station (ft)

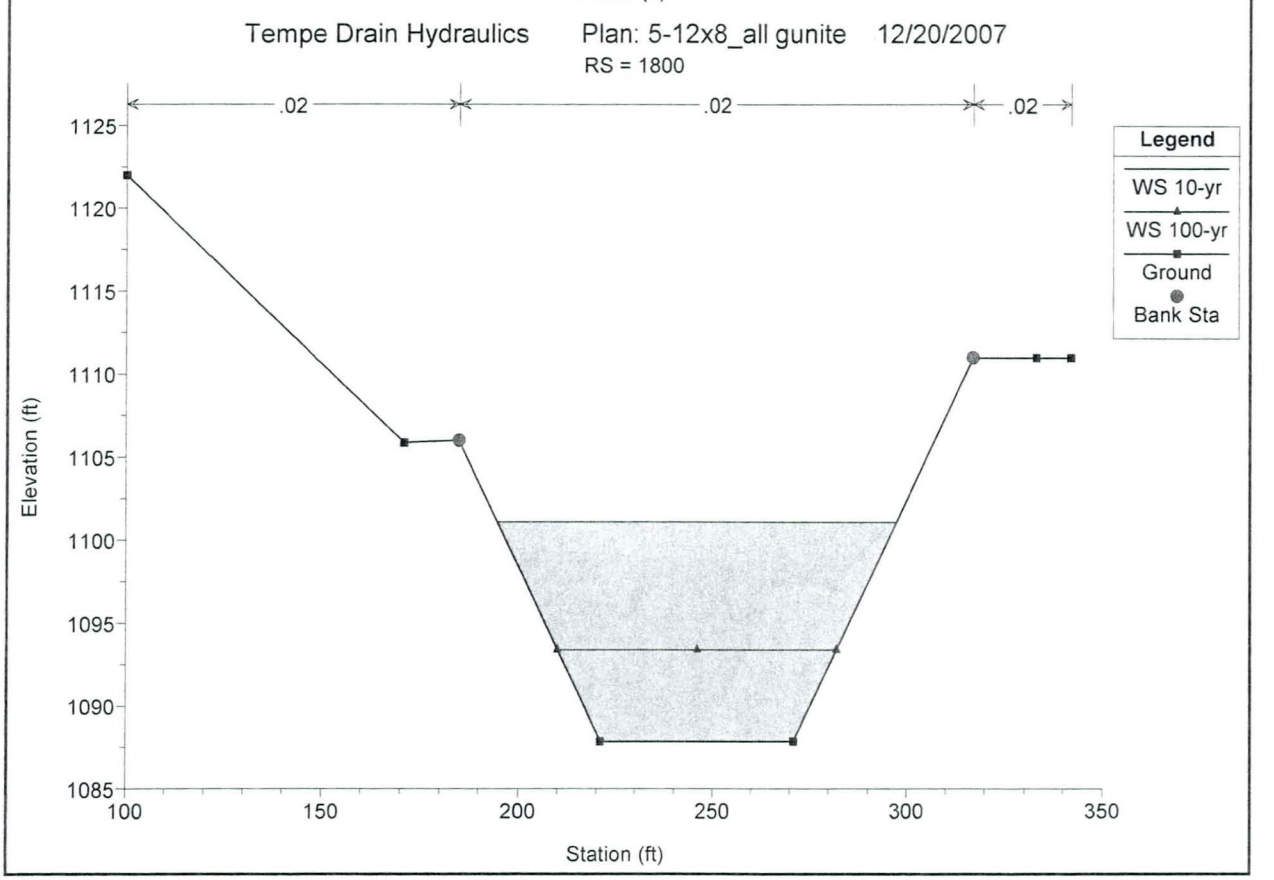

Tempe Drain Hydraulics Plan: 5-12x8_all gunite 12/20/2007
RS = 3365
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1118
1116
1114
1112
1110
1108
1106
1104
1102
1100
100
150
200
250
300
Station (ft)

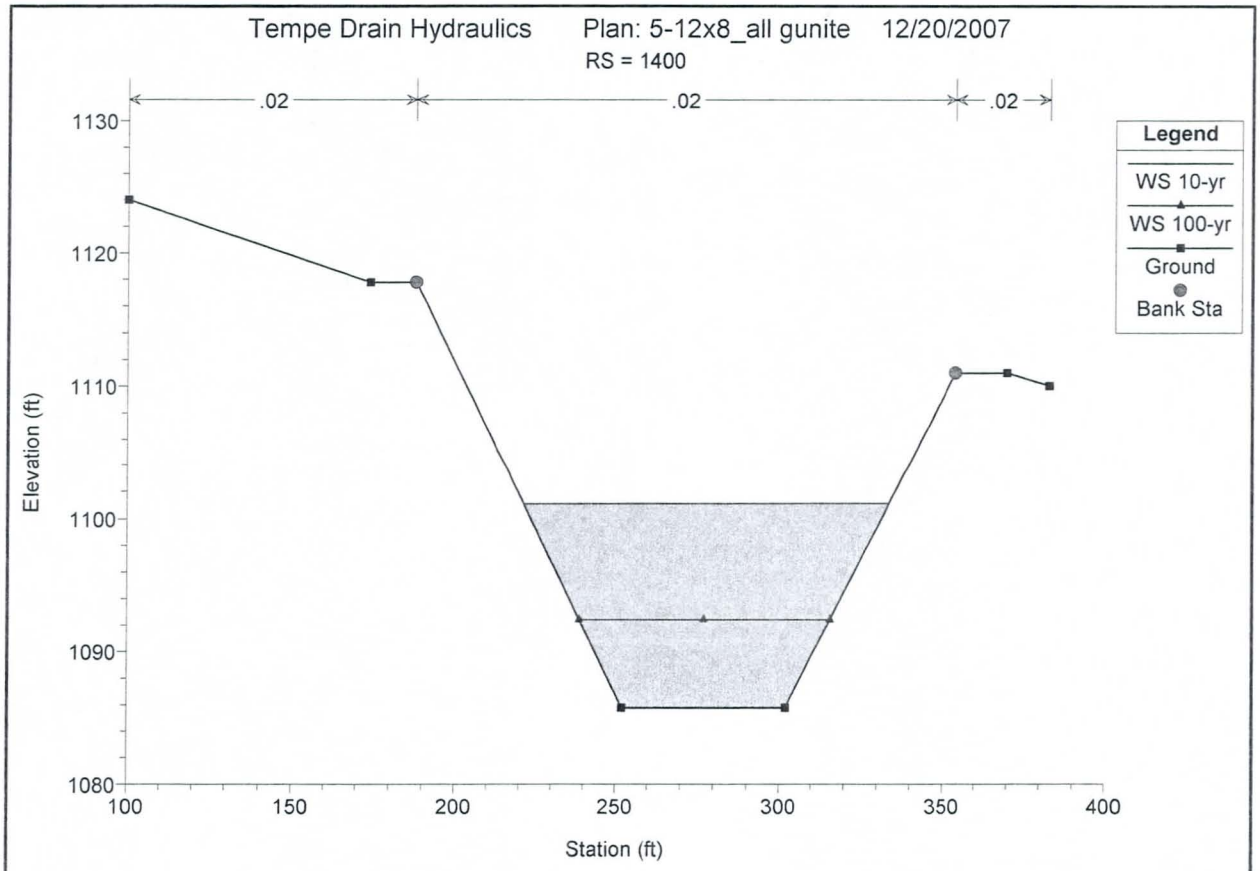

Tempe Drain Hydraulics Plan: 5-12x8_all gunite 12/20/2007
RS = 2783 Culv Culvert under New Section of I-10
.02
.02
Legend
WS 100-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
1120
1115
1110
1105
1100
100
150
200
250
300
Station (ft)

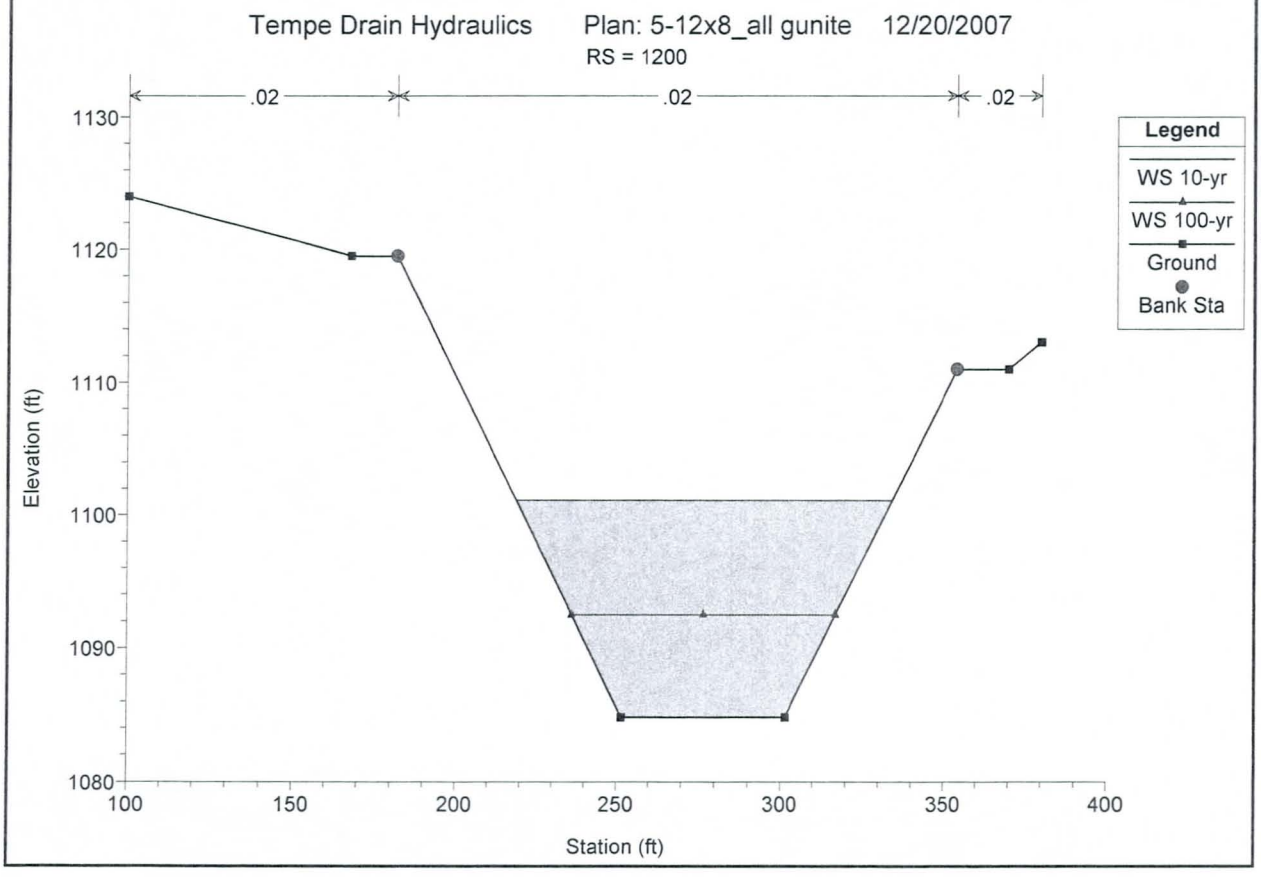

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 2783
Culv Culvert under New Section of I-10
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
1095
1090
1085
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 2020
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
1095
1090
1085
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 1950
.02
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1115
1110
1105
1100
1095
1090
1085
160
180
200
220
240
260
280
300
320
340
Station (ft)

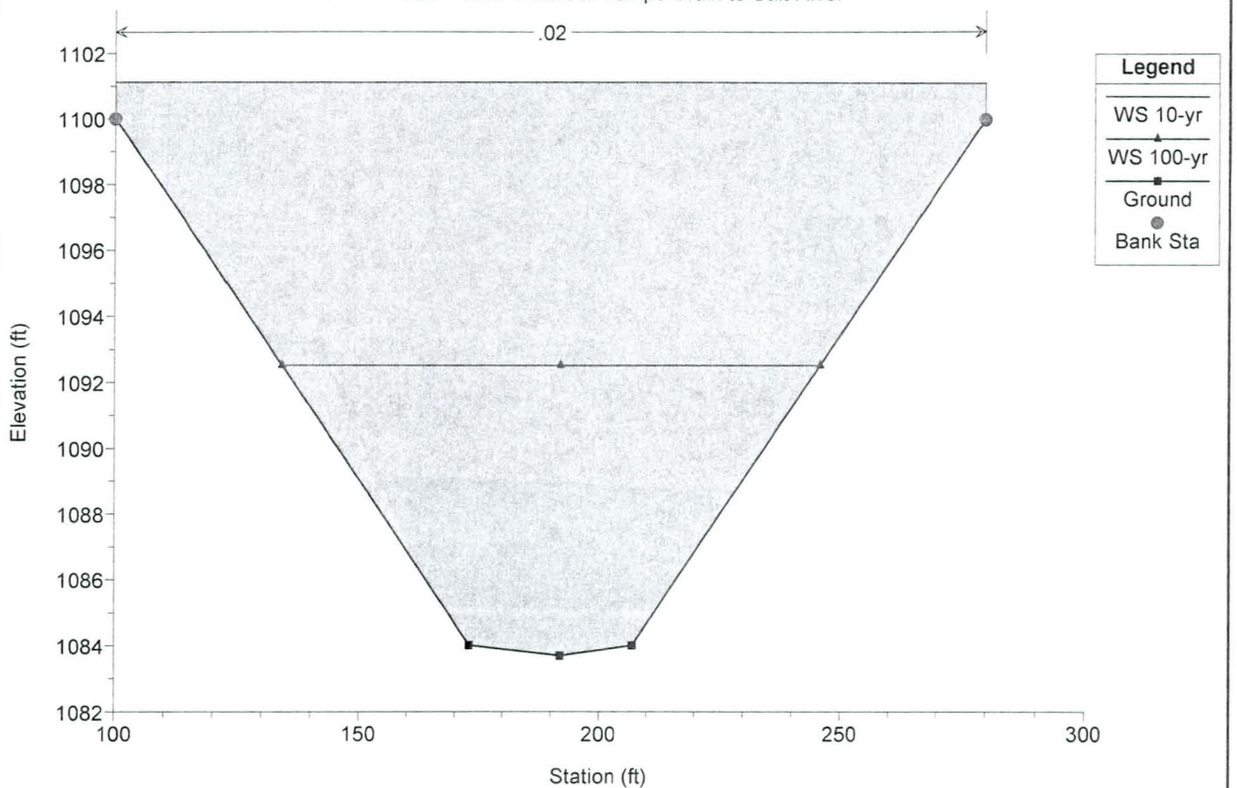

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 1800
.02
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1125
1120
1115
1110
1105
1100
1095
1090
1085
100
150
200
250
300
350
Station (ft)


Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 1400
.02
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1130
1120
1110
1100
1090
1080
100
150
200
250
300
350
400
Station (ft)

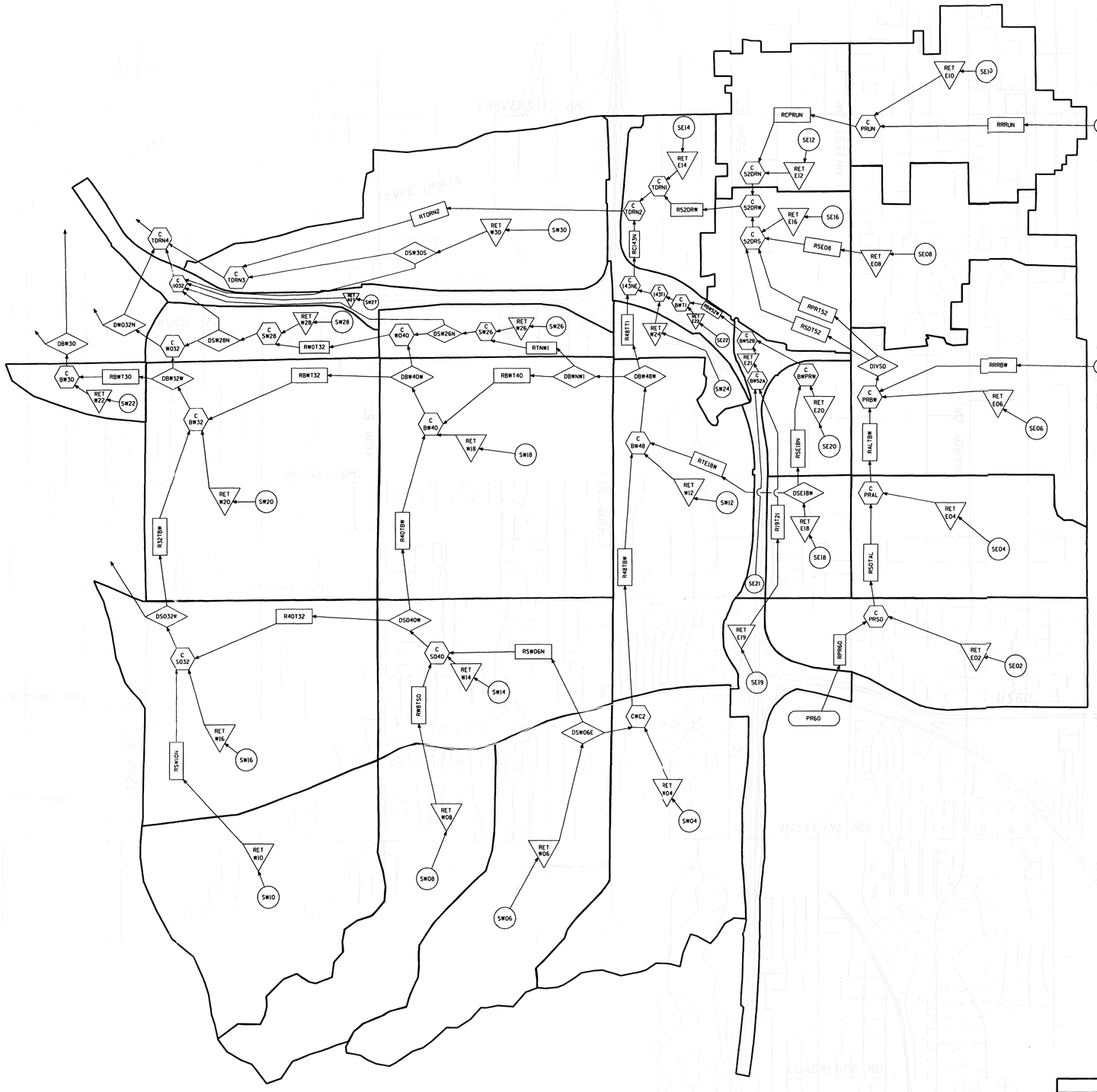

Tempe Drain Hydraulics
Plan: 5-12x8_all gunite
12/20/2007
RS = 1200
.02
.02
.02
Legend
WS 10-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
1130
1120
1110
1100
1090
1080
100
150
200
250
300
350
400
Station (ft)

Tempe Drain Hydraulics Plan: 5-12x8_all gunite 12/20/2007

RS = 1000 Outlet of Tempe Drain to Salt River



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



N

N.T.S.

LEGEND

- (IA) SUB-BASIN
- [R4OTBW] ROUTING
- <DSO40W> DIVERSION
- (C BW40) CONCENTRATION POINT
- △ DET BW — DETENTION
- ▽ RET E18 — RETENTION
- (PR60) FLOW FROM INDEPENDENT WATERSHED
- ——— DRAINAGE BASIN BOUNDARY

NOTE:

- HEC-1 DIAGRAM OF WATERSHED NETWORK IS NOT TO SCALE AND DOES NOT NECESSARILY REFLECT THE ACTUAL FLOW PATHS, LENGTHS OR LOCATIONS.

	NAME	DATE
DESIGN	ABM	6/03
DRAWN	GML	6/03
CHECKED	JRM	6/03

DMJM HARRIS
2777 E. CAMELBACK ROAD SUITE 200
PHOENIX, AZ. 85016-4302 (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

I-10 CORRIDOR IMPROVEMENT STUDY
SEGMENT 2

ROUTE: I-10
LOCATION: HEC-1 SCHEMATIC

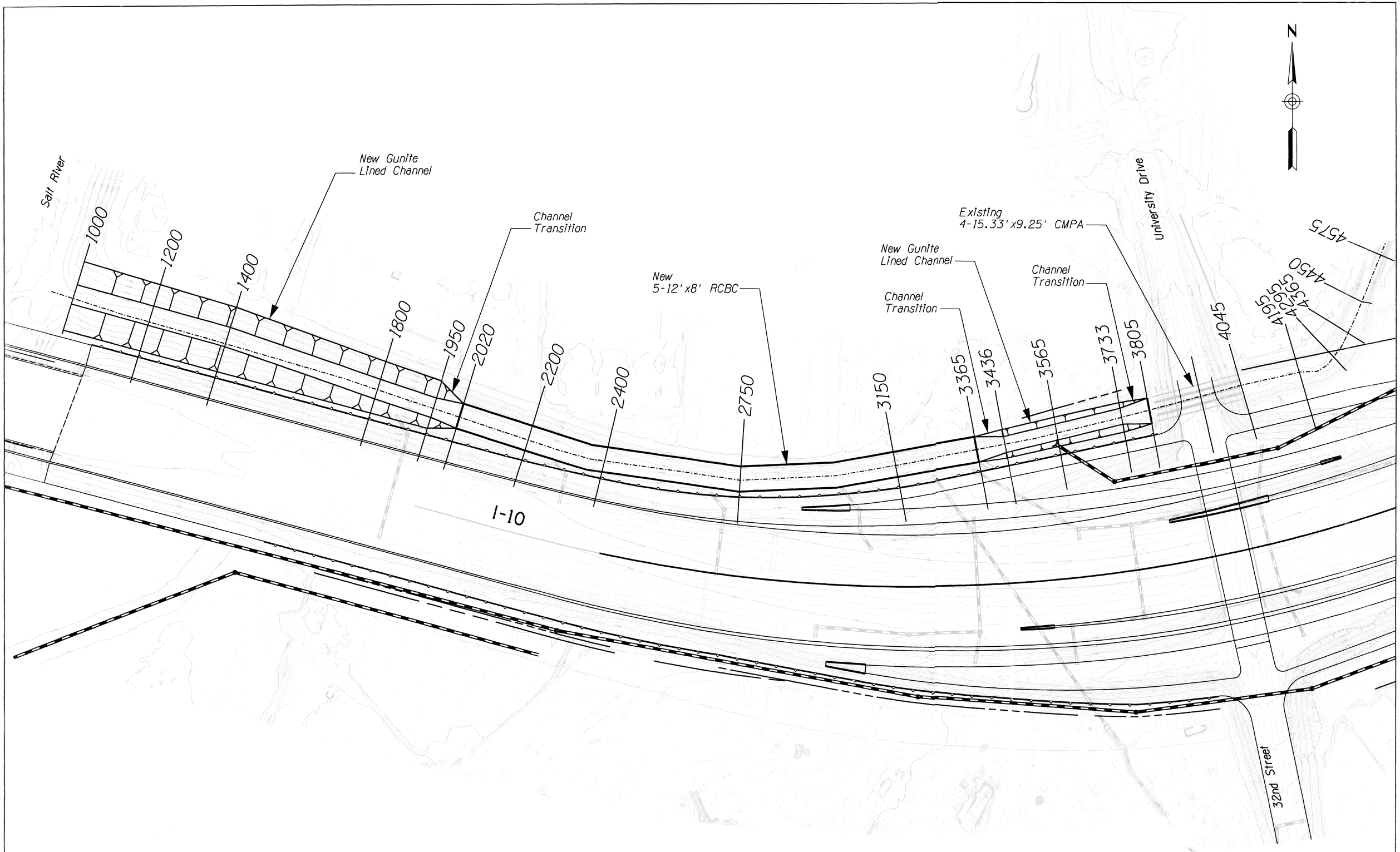
TRACS NO.

APPENDIX C-1

DWG. NO. 1 OF 3

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

Plotted By: JMW p:\050048\DMJM\Drainage Report Figures\Figure1-1.dgn 12/21/2007 7:09:39 AM



J2 engineering and environmental design
4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phones 602.438.2221
www.j2designus

PROJECT NO. 05.0048	DRAWN BY ALU
DATE 12/2007	CHECKED BY JH

TEMPE DRAIN HEC-RAS WORK MAP

FIGURE 14