LOOP 202 / US 60

SYSTEM TRAFFIC INTERCHANGE – PHASE 1

TRACS No. H5686 03C

FINAL

DRAINAGE REPORT

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1 INTRODUCTION

1.1 Project Location

The US 60/SR 202L System Traffic Interchange, also called the SuperRedTan TI (SRT TI), is a freeway-to-freeway, fully directional facility located in the eastern part of the City of Mesa, Maricopa County, Arizona. The project limits along US 60 are Sossaman Road to the west and Ellsworth Road to the east, while Southern Road to the north and Baseline Road to the south are the limits along the SR 202L alignment. A project location map is shown in Figure 1.

The analysis of the existing off-site drainage characteristics and the development of the proposed hydrologic model were completed by the ADOT General Consultant as part of the Stage II design of the project. The following reports, developed by DMJM+Harris, document the project off-site hydrology: "202L/US 60 Traffic Interchange Initial Drainage Report" dated September 2001, "202L/US 60 Traffic Interchange – Phase I - Initial Drainage Report (Stage II Design)" dated February 2002, and "202L/US 60 Traffic Interchange – Phase II - Initial Drainage Report (Stage II Design)", dated August 2002.

1.2 Project Description

Design and construction of the project are being completed in phases. This report addresses the drainage facilities included in Phase 1 of the project, which will interconnect the southern and western quadrants of the SRT TI as shown in Figure 2.

The US 60 mainline will be widened to its final configuration to accommodate three basic through lanes as well as merge lanes from all future ramps that will connect to the Santan Freeway to the south and the Red Mountain Freeway to the north. The vertical profile of the US 60 mainline will not be changed, while the horizontal alignment will be modified by separating the eastbound and westbound roadways east of sta. 967+00 to make room for the system TI's structures and a future HOV connector from east US 60 to the Santan Freeway.

New ramps E-S and N-W are also part of the Phase 1 package. These ramps will be connecting the eastbound US 60 to the southbound Santan, and the northbound Santan to the westbound US 60. A short segment of the Santan mainline will be constructed south of sta. 1466+00 to the project terminus just north of the Baseline Road overpass. The eastern ramps of the Sossaman Road TI will be obliterated.

Offsite and onsite drainage improvements are also included in the project as described in this document.

PB 100 YEARS

N

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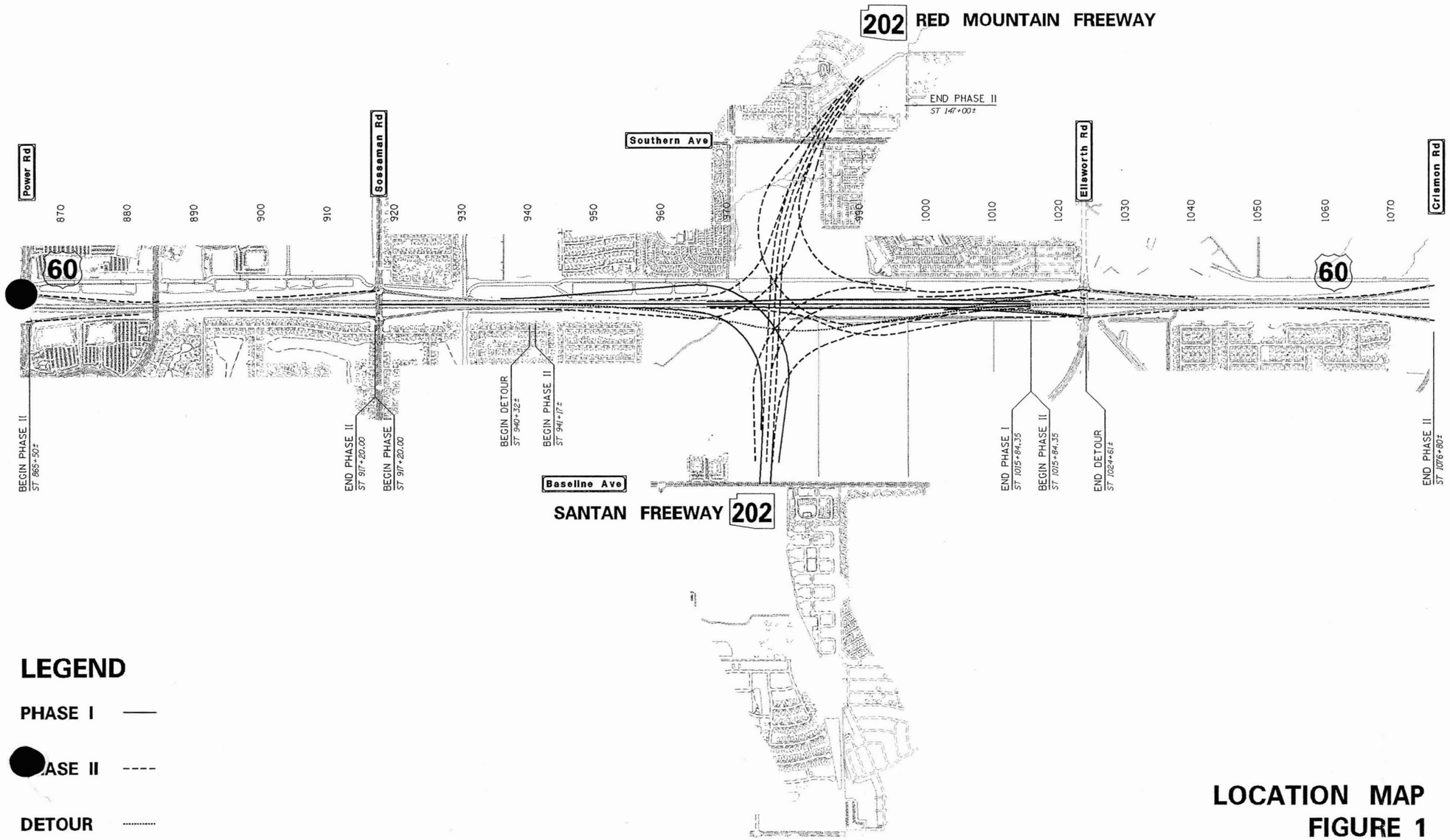

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PHASE I ——

PHASE II - - - -

DETOUR .....

LOCATION MAP
FIGURE 1

PB 100 YEARS

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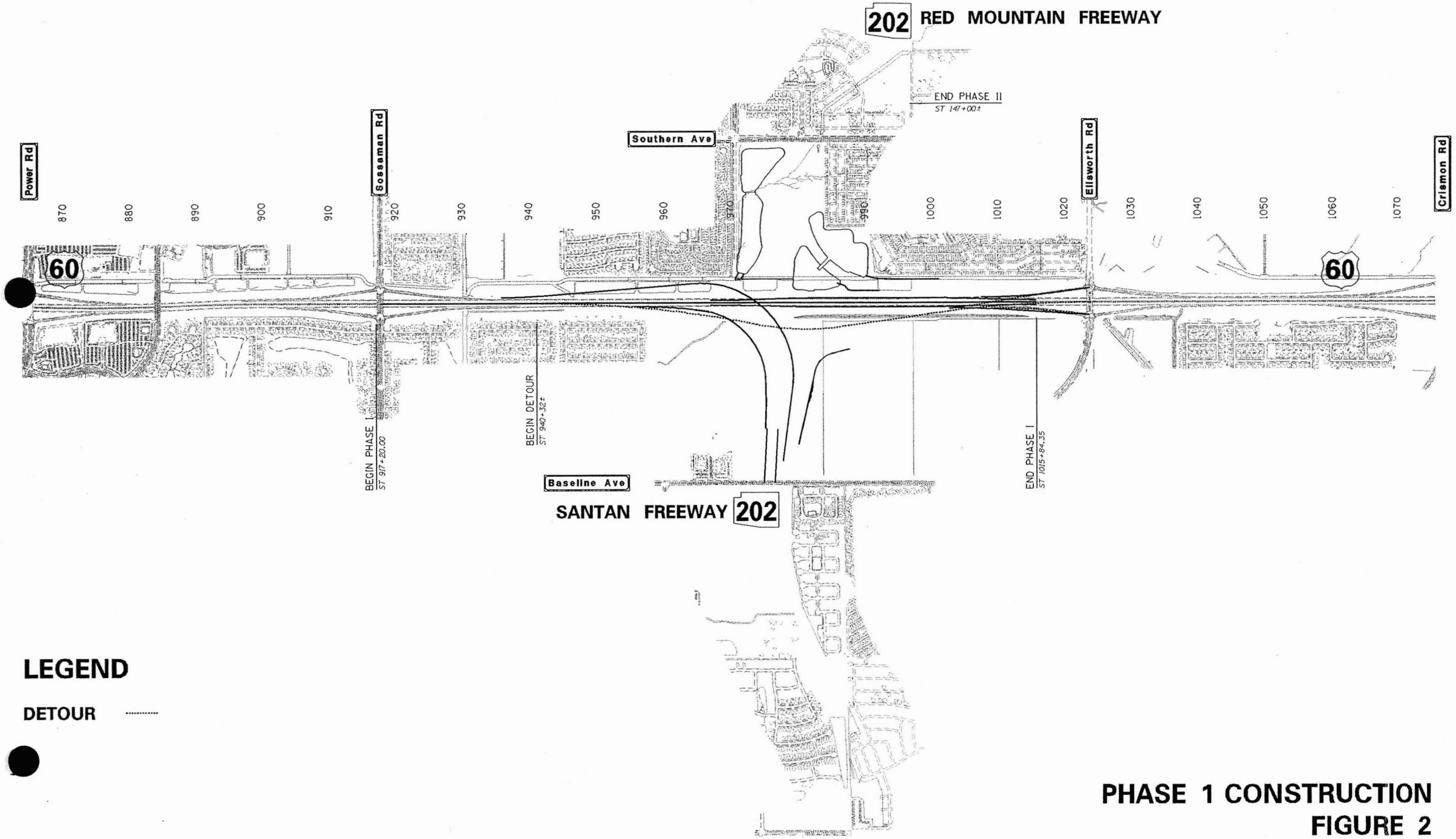

LEGEND

DETOUR .....

PHASE 1 CONSTRUCTION
FIGURE 2

The existing off-site system within the project limits is comprised of an open channel (the North Channel) that intercepts runoff from the north and conveys flows in a westerly direction along the north side of US 60 to the Sossaman Channel. The North Channel will still be used as the outfall of the proposed new facilities, although it will be modified to fit the new system's concept. The main elements of the proposed off-site system are described below:

- The downstream end of the Red Mountain Freeway's off-site drainage system is a detention basin in the northeast corner of the intersection with Southern Avenue. Flows from the Southern Avenue basin will be routed through a box culvert under Southern Avenue and the freeway and split to the existing Hawes Road Channel and to new on-line basins (NW-1 and NW-2) in the northwest quadrant of the SRT TI. Only basins NW-1 and NW-2 are part of the Phase I construction, as construction of the Red Mountain Freeway to the north will be completed at a later date.
- Since the Red Mountain Freeway's off-site drainage system will concentrate and convey flows to the North Channel faster than in the existing condition, it is necessary to attenuate peak flows from the east before they reach the SRT TI. This will be accomplished with the construction of two on-line basins (NE-1 and NE-2) in the northeast quadrant of the SRT TI. The existing channel will be cut off by the northeast basins, which will detain the flows and meter them to the North Channel to the west through a box culvert under the SR 202L alignment. The channel upstream of the northeast basins is identified as the Northeast Channel. A HEC-RAS run of the Northeast Channel is included in Appendix B.
- The attenuation capacity of the northwest and northeast basins reduces the design flow in the North Channel that reaches the Sossaman Channel. The combined flows from the northeast basins, the northwest basins and the Hawes Channel are conveyed along the existing North Channel to the west. Three off-line basins on the south side of the channel between the Hawes Channel and Sossaman Channel, and two on-line basins east of the Hawes Channel, will be obliterated by the roadway improvements. The existing diversion structures will be removed.
- The existing 6-12'x6' concrete box culvert for the Sossaman Channel at US 60 will be extended to accommodate the proposed roadway improvements. The hydraulic capacity of the structure will not be impacted because the baseline (existing conditions) peak flow is 1,764 cfs, but the proposed conditions peak flow is only 1,312 cfs. The interim conditions (after Phase I improvements have been constructed but before later phases have been constructed) peak flow is 1,800 cfs. A HEC-RAS model was created (Appendix B) that includes the culvert hydraulics and shows the following 100-year headwater elevations at the culvert: existing conditions = 1409.04, interim conditions = 1409.07, and proposed conditions = 1408.01.

- A new concrete-lined channel will be constructed in the southeast quadrant of the SRT TI to intercept the existing channel on the south side of US 60. The new Southeast channel will bend along ramp N-E and turn south to discharge into the new Santan Channel on the east side of the freeway. The Santan Channel will convey off-site flows along the freeway alignment to the East Maricopa Floodway.

The Flood Control District of Maricopa County will be improving the Hawes Road Channel in the near future.

1.3 Purpose of Drainage Report

This report documents the procedures, methodologies, criteria, and computations utilized in the hydrologic and hydraulic analyses and design of the proposed off-site and on-site drainage facilities for the project. Tables, calculation sheets and drawings are included in this report to provide the necessary detail.

2 OFF-SITE DRAINAGE

2.1 Hydrology

The analysis of the existing off-site drainage characteristics and the development of the proposed hydrologic model were completed by the ADOT General Consultant as part of the Stage II design of the project. Chapter 2.0-Offsite Hydrology of the "202L/US 60 Traffic Interchange Initial Drainage Report" developed by DMJM+Harris and dated September 2001, documents the project off-site hydrology and is included in this report in Appendix A.

2.2 Description of New Improvements

The existing off-site system within the project limits is comprised of an open channel (the North Channel) that intercepts runoff from the north and conveys flows in a westerly direction along the north side of US 60 to the Sossaman Channel. The North Channel will still be used as the outfall of the proposed new facilities, although it will be modified to fit the new system's concept. The main elements of the proposed off-site system are described below:

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- Since the Red Mountain Freeway's off-site drainage system will concentrate and convey flows to the North Channel faster than in the existing condition, it is necessary to attenuate peak flows from the east before they reach the SRT TI. This will be accomplished with the construction of two on-line basins (NE-1 and NE-2) in the northeast quadrant of the SRT TI. The existing channel will be cut off by the northeast basins, which will detain the flows and meter them to the North Channel to the west through a box culvert under the SR 202L alignment. The channel upstream of the northeast basins is identified as the Northeast Channel. A HEC-RAS run of the Northeast Channel is included in Appendix B.
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Channel, will be obliterated by the roadway improvements. The existing diversion structures will be removed.

- The existing 6-12'x6' concrete box culvert for the Sossaman Channel at US 60 will be extended to accommodate the proposed roadway improvements. The hydraulic capacity of the structure will not be impacted because the baseline (existing conditions) peak flow is 1,764 cfs, but the proposed conditions peak flow is only 1,312 cfs. The interim conditions (after Phase I improvements have been constructed but before later phases have been constructed) peak flow is 1,800 cfs. A HEC-RAS model was created (Appendix B) that includes the culvert hydraulics and shows the following 100-year headwater elevations at the culvert: existing conditions = 1409.04, interim conditions = 1409.07, and proposed conditions = 1408.01.
- A new concrete-lined channel will be constructed in the southeast quadrant of the SRT TI to intercept the existing channel on the south side of US 60. The new Southeast channel will bend along ramp N-E and turn south to discharge into the new Santan Channel on the east side of the freeway. The Santan Channel will convey off-site flows along the freeway alignment to the East Maricopa Floodway.
- The Flood Control District of Maricopa County will be improving the Hawes Road Channel in the near future.

Slight changes to the hydrologic model prepared for the Stage II submittal have been made as a result of changes in the storage capacity of some of the basins. Roadway geometry changes introduced in the development of the Phase 2 Stage II plans resulted in modifications to the configuration of some of the basins. However, the basic concept of off-site detention remains unchanged.

2.3 Modifications to the Stage II Concept

The final design of the off-site drainage facilities follows the Stage II concept. Figure 3 shows the elements of the off-site system included in the Phase I construction. Some elements of the Stage II design have been modified as explained below:

- The emergency spillway outlet for Detention Basin NE-1 has been changed from a 10' X 6' RCBC, to a 6' X 6' RCBC with a side tapered and slope tapered inlet.
- The outlet structure for Detention Basin NW-1 has changed from 3 – 48" RCP's to a 2 – 8' X 4' RCBC. The emergency spillway for Detention Basin NW-1 has changed from a 114' bottom width with a Q100 flow depth of 1.6', to a 35' bottom width with a Q100 flow depth of 1.55'.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			

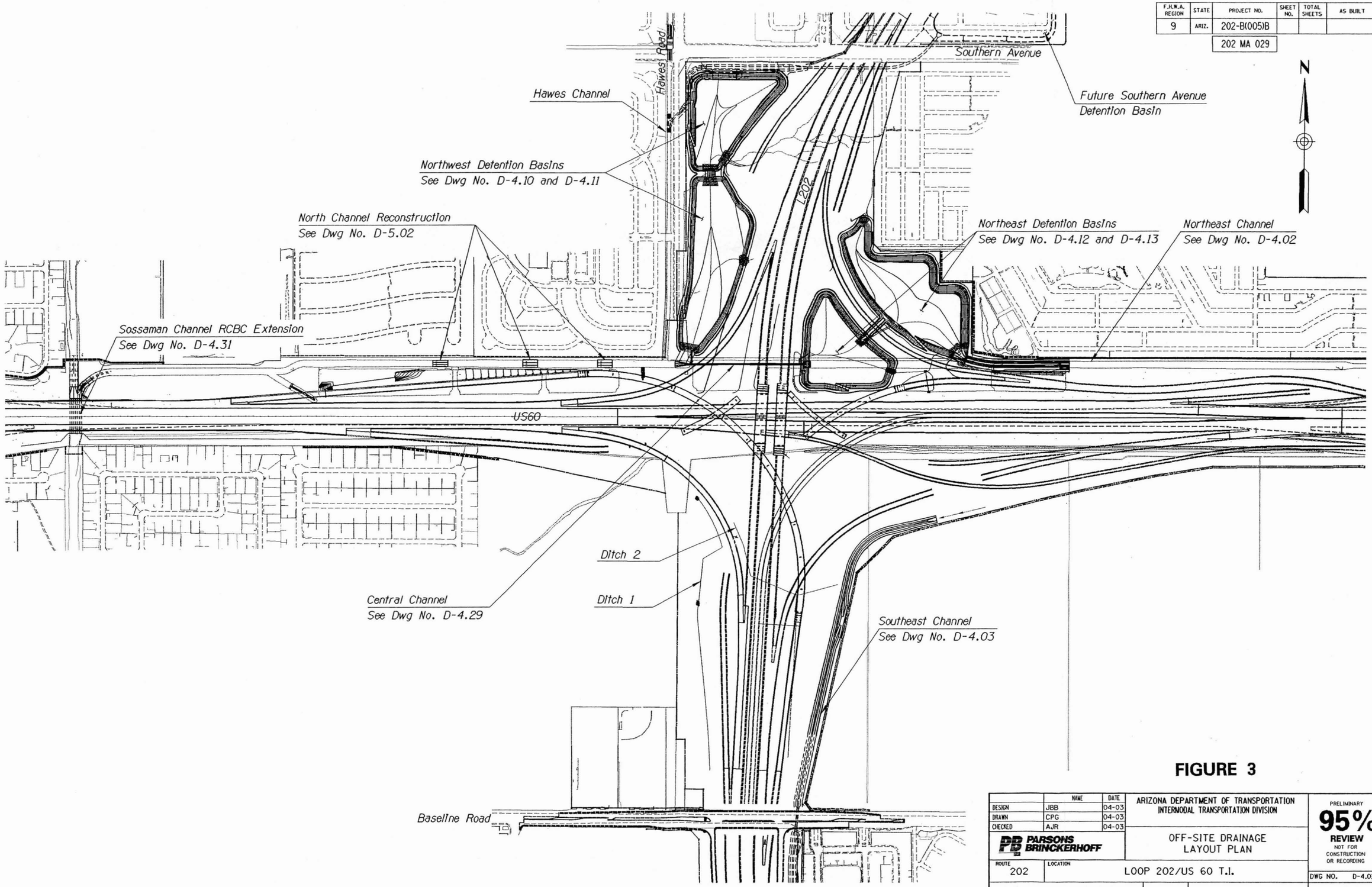

FIGURE 3

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING
DESIGN	JBB	04-03		
DRAWN	CPG	04-03		
CHECKED	AJR	04-03		
PB PARSONS BRINCKERHOFF			OFF-SITE DRAINAGE LAYOUT PLAN	
ROUTE 202	LOCATION LOOP 202/US 60 T.I.			DWG NO. D-4.01
TRACS NO. H 5686 03C			202-B(005)B	___ OF ___

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- The outlet structure for Detention Basin NW-2 has changed from 2 – 48" RCP's to 2 – 36" RCP's. The spillway for Detention Basin NW-2 has changed from an emergency spillway only, to also controlling discharges less than the Q100. The spillway has changed from a 74' bottom width with a Q100 flow depth of 1.25', to a 45' bottom width with a Q100 flow depth of 1.9'.
- About 225' of the outlet box from basin NE-2 between ramps E-N and S-W is changed to a "U" shaped channel following a recommendation from the VE study.
- The downstream extension of the Sossaman Channel box culvert across US 60 has been eliminated. A new retaining wall on top of the existing structure will contain the fill for the widening of the mainline.
- The Channel Design Criteria in the Initial Drainage Reports state that freeboard for supercritical flow shall be a minimum of 2'. Due to the geometry of the channel that the Southeast Channel will tie into, and by direction from ADOT (see email in Appendix B), this 2' of freeboard was not maintained at the tie in location. The freeboard for the supercritical flow at this location is 1.5'.

2.4 Modifications to the Stage II HEC-1 Models

As recommended in the Stage II Initial Drainage Reports, an Interim Conditions Model for the Northeast Region has been created. Also, the Proposed Conditions Model was revised to reflect the revisions to the Stage II design listed above. The HEC-1 models (Appendix A) have been annotated to describe the revisions for this Final Drainage Report. A summary of these revisions is presented below:

<u>Interim Conditions Model:</u>

The Interim Conditions Model represents the conditions that will exist after the Phase I improvements have been constructed, and before later Phases have been constructed. The model was created from the Baseline (Existing Conditions) Model in the Initial Drainage Report, with the following revisions:

- ADOT Detention Basins 5 – 10 located along the north side of the Superstition Freeway between Ellsworth Road and the Sossoman Channel were removed.
- Phase I Detention Basins NE-1, NE-2, NW-1 and NW-2 were added.
- Drainage Basin 38 was split into two sub-basins; Sub-basin 38A which drains into Detention Basins NE-1 and NE-2, and Sub-basin 38B which drains into Detention Basins NW-1 and NW-2.

Proposed Conditions Model:

The Proposed Conditions Model in the Phase II Initial Drainage Report (File 200235.DAT) was revised as follows:

- The stage/storage data for each of the 4 detention basins has been updated to reflect revisions to the basin geometries in the final design.
- The stage discharge data for Detention Basins NW-1 and NW-2 has been updated to reflect the revisions to the outlet structures listed above.

Table 1 presents data for each of the 4 detention basins. Table 2 presents the 100-year peak flows at the locations of interest.

Table 1 – Detention Basin Data

Basin	Interim Conditions				Proposed Conditions			
	Q100 In (cfs)	Q100 Out (cfs)	Design 100-yr WSEL	100-yr Storage Volume (ac-ft)	Q100 In (cfs)	Q100 Out (cfs)	Design 100-yr WSEL	100-yr Storage Volume (ac-ft)
NE-1	184	46	1440.2	15.8	279	60	1441.3	23.7
NE-2	46	22	1437.5	10.5	60	29	1439.0	17.8
NW-1	795	540	1438.9	22.9	495	481	1438.3	19.7
NW-2	540	416	1436.3	31.1	481	472	1436.6	32.0

Table 2 – Summary of 100-Year Peak Flows

Location	Baseline Conditions (cfs)	Interim Conditions (cfs)	Proposed Conditions (cfs)
Existing concrete channel along north side of US 60, just downstream of confluence with Hawes Channel	1,503	765	653
Existing concrete channel along north side of US 60, just upstream of confluence with Sossoman Channel	633	757	652
Sossoman Channel at US 60 culvert crossing	1,764	1,800	1,312

2.5 Outfall Structures

Outfall structures consisting of low flow pipe culverts under emergency spillways are designed at the outfall of the NW-1, NW-2 and NE-1 basins. These structures act as controls to provide sufficient storage in the basins. Low flow pipes perform under inlet control, allowing the ponding of water above their crowns to an elevation at which water weirs over the emergency spillway to the downstream outfall. Riprap is provided downstream of the outfall structures for stabilization. Calculations are included in Appendix A.

3 ON-SITE DRAINAGE

3.1 Proposed On-site Systems

The on-site systems consist of grate and grate-slotted drain combination inlets connected by laterals to trunk lines that run along the roadway. Four separate closed systems are identified for the US 60 mainline:

- System 0: From the western end of the project to the Sossaman Channel new inlets will replace existing ones being obliterated by the widening of the roadway. These inlets will be connected to the existing trunk line that will be buried under the westbound lanes. No improvements or calculation of the HGL for the existing trunk line will be done in this project since design flows in the trunk line will decrease as a result of the proposed changes. Eight existing inlets are to be removed as part of the proposed improvements. The design flow in the trunk line with these inlets in place as it passes under Sossaman Road is 47.6 cfs. In the proposed condition, there are only three new inlets upstream of this point in the trunk line, producing a total design flow of 25.5 cfs.
- System 1: New inlets along the westbound lanes and ramp N-W, from the Sossaman Channel to sta. 943+00, will be connected by a short trunk line that will discharge into the North Channel.
- System 2: A new trunk line along the south side of the eastbound lanes will be constructed between the Sossaman Channel and sta. 954+00. The trunk line will collect flows from relocated inlets along the eastbound mainline and ramp E-N.
- System 3: The main on-site storm sewer system for the project discharges into the North Channel near sta. 945+00 and collects pavement runoff from the westbound and eastbound lanes from the east. The existing trunk line runs along the westbound mainline from east of Ellsworth Road intercepting several 24" laterals that will be extended to connect with relocated inlets. The existing trunk line will remain in place from the east end to a manhole at sta. 964+50 (MH 249). West of sta. 964+50 the existing trunk line will be removed (due to conflicts with the pavement structural section of the widened mainline) and a new trunk line will be installed behind the new curb along the north side of the westbound mainline.

Separate systems will be constructed to drain ramp N-W, ramp E-S, the US 60 detour and the Santan Freeway mainline at the south end of the project. These flows will be routed in ditches through infield basins and collected at area inlets to discharge into the Southeast Channel.

Ditches D1 and D2 collect on-site flows in the interim condition and route flows on both sides of ramp E-S to the outfall at the Southeast channel. To eliminate the potential placement of a considerably deep storm drain pipe underneath Loop 202 north of Baseline Road, flow in Ditch 1 will be collected in a sedimentation basin located at the southern project limit and conveyed to an existing 42" storm drain in Baseline Road, south of the project limit. Ditch 1 is a triangular ditch with 3:1 side slopes, 3 feet deep and a 50-Yr flow depth of 2 feet (see Appendix C for Ditch 1 geometry). The riprap-lined sedimentation basin matches Ditch 1 at approximately Eastbound Loop 202 Station 474+74 and transitions to a trapezoidal section also with 3:1 side slopes. The bottom width is 14 ft, and will be 3 feet below the flowline of Ditch 1. This will allow sediment to descend to the bottom of the basin while the flow is conveyed by a Modified C-15.80 catch basin (CB 713) and a 30" diameter pipe (Pipe 713) to the existing storm drain. See Detail DK in Appendix C for sedimentation basin and Pipe 713 details.

FlowMaster v6.1 by Haestad Methods, Inc. was used to analyze capacity of the basin. FlowMaster results located in Appendix C show that the sedimentation basin contains enough capacity (335 cfs) to maintain the 50-Yr event (44.4 cfs). A new manhole (MH 605) will be constructed by others, prior to Phase I construction, at the existing 42" storm drain at approximately Baseline Road Station 17+74, that will allow the flow in Ditch 1 to enter the existing storm drain system. StormCADv5.0 by Haestad Methods, Inc. was used to analyze the proposed storm drain (CB 713-Pipe 713-MH 605). Results from StormCAD show that the hydraulic grade line (HGL) for the 50-Yr event in the existing 42" storm drain at MH 605 does not exceed the rim elevation. Also, velocity in Pipe 713 meets the self-cleaning velocity requirements in the ADOT Roadway Design Guidelines. See Appendix C for StormCAD results.

FlowMaster v6.1 by Haestad Methods, Inc. was used to analyze capacity of the basin. FlowMaster results located in Appendix C show that the sedimentation basin contains enough capacity (335 cfs) to maintain the 50-Yr event (44.4 cfs). A new manhole (MH 605) will be constructed by others, prior to Phase I construction, at the existing 42" storm drain at approximately Baseline Road Station 17+74, that will allow the flow in Ditch 1 to enter the existing storm drain system.

StormCADv5.0 by Haestad Methods, Inc. was used to analyze the proposed storm drain (CB 713-Pipe 713-MH 605). Results from StormCAD show that the hydraulic grade line (HGL) for the 50-Yr event in the existing 42" storm drain at MH 605 does not exceed the rim elevation. Also, velocity in Pipe 713 meets the self-cleaning velocity requirements in the ADOT Roadway Design Guidelines. See Appendix C for StormCAD results.

Loop 202 drainage design north of Baseline Road was done in accordance with ADOT Roadway Design Guidelines (RDG). The Rational Method, as described in

Section 3.2, was used to calculate the 10-Yr discharge for roadway and median areas. Catch basins were placed according to allowable spread criteria as discussed in Section 3.3. Also, minimizing bypass flow to the adjacent project on the south was required; therefore, catch basins were placed at the southern limits of the project. Catch basins were placed in the median to allow flow depth to remain 3 inches below the edges of pavement, as required by the RDG. The median and area drains at the southern project limits required a grate area greater than standard ADOT area drains in order to capture the maximum amount of flow before it passes to the adjacent project; therefore, a modified C-15.80 (Detail DJ) was used in these locations. HY-12 was used to analyze spread for pavement drainage and FlowMaster v6.1 by Haestad Methods, Inc. was used to analyze median drainage. HY-12 results in Appendix E show that spread criteria is met at the catch basins capturing pavement drainage. FlowMaster results in Appendix E show that flow depths in the median do not exceed the elevation 3 inches below the edge of pavement. Contributing drainage areas are shown in Drainage Figure 1 in Appendix D. See Appendix E for Rational Method calculation spreadsheets. The hydraulic grade line (HGL) for storm drain systems was analyzed using StormCAD v5.0 by Haestad Methods, Inc. StormCAD results in Appendix F show that the HGL for each system does not exceed the grate elevation at each catch basin, as required by the RDG.

Ramps S-E and W-S were analyzed for deck drainage based on allowable spread criteria in the Arizona Department of Transportation's (ADOT's) Roadway Design Guidelines (RDG's), Chapter 600. The RDG states that allowable spread for a 10-Yr storm should not exceed the shoulder width plus one-half the travel lane width. The Rational Method, as described in Section 3.2, was used to calculate the 10-Yr discharge for both ramps and FlowMaster v6.1 by Haestad Methods, Inc. was utilized to perform the hydraulic analyses. The discharge calculations and FlowMaster results are shown in Appendix E. Spread width was calculated and checked against the allowable spread width at the Begin and End Anchor stations of each deck, where the contributing area limits were from each deck high point to its anchors. See Appendix E for ramp deck configurations, allowable spread widths and contributing areas. Ramps S-E and W-S meet the spread criteria and do not require deck drains. See the FlowMaster results in Appendix E for ramp hydraulics.

3.2 Hydrology

Peak flows from all on-site drainage areas were calculated using the rational equation:

$$Q=CiA$$

Where:
- Q: Peak flow in cfs
- C: Runoff coefficient (0.95 for paved, 0.7 for unpaved roadside)
- i: Rainfall intensity in in/hr
- A: Contributing area in Acres

The 25-year storm is the designated design event for the US 60 mainline, while the 10-year storm is the design event for all other roadways. A site-specific I-D-F graph was developed from precipitation data following the process outlined in ADOT's "Highway Drainage Design Manual – Hydrology", dated March of 1993. The time of concentration for all sub-basins was set at 10 minutes considering the small size of the drainage areas, resulting in the following intensity values:

$$i_{10} = 4.22 \text{ in/hr}$$
$$i_{25} = 5.15 \text{ in/hr}$$

A summary of the peak discharge data for all concentration points is provided in Table 4. Delineation of the drainage areas and location of the concentration points are included in Appendix D.

Table 4: On-site Hydrology Summary

	Location		Contributing Area			Composite	Peak Discharge		
Inlet No.	Roadway or Ramp	Station (ft)	Paved (acres)	Unpaved (acres)	Total (acres)	C	10-year (cfs)	25-year (cfs)	50-year (cfs)
202	US60 WB	918+78	2.780	0.344	3.124	0.92	12.2	14.8	16.9
205	US60 WB	929+70	1.930	0.306	2.236	0.92	8.6	10.5	12.0
211	US60 WB	937+41	0.947	0.596	1.543	0.85	5.6	6.8	7.7
217	US60 WB	942+41	0.000	0.000	0.000	0.70	0.0	0.0	0.0
217	US60 WB	942+41	1.079	0.318	1.397	0.89	5.3	6.4	7.3
220	US60 WB	947+67	0.000	0.000	0.000	0.70	0.0	0.0	0.0
220	US60 WB	947+67	0.925	0.546	1.471	0.86	5.3	6.5	7.4
228	US60 WB	951+84	0.000	0.000	0.000	0.70	0.0	0.0	0.0
228	US60 WB	951+84	0.766	0.692	1.458	0.83	5.1	6.2	7.1
232	US60 WB	955+27	0.000	0.000	0.000	0.70	0.0	0.0	0.0
232	US60 WB	955+27	0.652	0.777	1.429	0.81	4.9	6.0	6.8
234	US60 WB	958+24	0.001	0.001	0.002	0.83	0.0	0.0	0.0
234	US60 WB	958+24	0.614	0.815	1.429	0.81	4.9	5.9	6.8
250	US60 WB	960+99	0.001	0.001	0.002	0.83	0.0	0.0	0.0
250	US60 WB	960+99	0.544	0.716	1.260	0.81	4.3	5.2	6.0
257	US60 WB	964+50	0.035	0.007	0.042	0.91	0.2	0.2	0.2
257	US60 WB	964+50	0.646	0.168	0.814	0.90	3.1	3.8	4.3
260	US60 WB	967+55	0.016	0.021	0.037	0.81	0.1	0.2	0.2
260	US60 WB	967+55	0.308	0.429	0.737	0.80	2.5	3.1	3.5
263	US60 WB	970+50	0.496	0.881	1.377	0.79	4.6	5.6	6.4
300	US60 WB	978+44	0.035	0.069	0.104	0.78	0.3	0.4	0.5
300	US60 WB	978+44	0.255	0.286	0.541	0.82	1.9	2.3	2.6
305	US60 WB	981+50	0.446	0.532	0.978	0.81	3.4	4.1	4.7
311	US60 WB	987+00	0.035	0.069	0.104	0.78	0.3	0.4	0.5
311	US60 WB	987+00	1.020	1.780	2.800	0.79	9.3	11.4	13.0
318	US60 WB	995+00	0.035	0.046	0.081	0.81	0.3	0.3	0.4
318	US60 WB	995+00	1.380	1.120	2.500	0.84	8.8	10.8	12.3
326	US60 WB	1004+40	0.017	0.000	0.017	0.95	0.1	0.1	0.1
326	US60 WB	1004+40	0.563	0.293	0.856	0.86	3.1	3.8	4.3
329	US60 WB	1009+37	0.013	0.000	0.013	0.95	0.1	0.1	0.1
329	US60 WB	1009+37	0.872	0.643	1.515	0.84	5.4	6.6	7.5
262	US60 HOV WB	970+50	0.014	0.000	0.014	0.95	0.1	0.1	0.1
262	US60 HOV WB	970+50	0.647	0.000	0.647	0.95	2.6	3.2	3.6
308	US60 HOV WB	981+96	0.010	0.000	0.010	0.95	0.0	0.0	0.1
308	US60 HOV WB	981+96	0.402	0.000	0.402	0.95	1.6	2.0	2.2
315	US60 HOV WB	989+01	1.560	0.000	1.560	0.95	6.3	7.6	8.7
330	WB Roadside	1009+47	2.380	1.200	3.580	0.87	13.1	16.0	18.2
334	WB Roadside	1015+46	0.195	0.208	0.403	0.82	1.4	1.7	1.9
201	US60 EB	919+98	1.100	1.780	2.880	0.80	9.7	11.8	13.4
204	US60 EB	925+00	0.000	0.000	0.000	0.70	0.0	0.0	0.0
204	US60 EB	925+00	1.393	1.430	2.823	0.82	9.8	12.0	13.6
206	US60 EB	931+29	1.730	0.000	1.730	0.95	6.9	8.5	9.6
209	US60 EB	938+92	0.990	0.000	0.990	0.95	4.0	4.8	5.5
216	US60 EB	943+27	1.546	0.000	1.546	0.95	6.2	7.6	8.6
225	US60 EB	950+63	0.000	0.000	0.000	0.70	0.0	0.0	0.0
225	US60 EB	950+63	0.475	0.345	0.820	0.84	2.9	3.6	4.1
227	US60 EB	953+21	0.715	0.607	1.322	0.84	4.7	5.7	6.5
231	US60 EB	957+00	0.000	0.000	0.000	0.70	0.0	0.0	0.0
231	US60 EB	957+00	0.861	0.630	1.491	0.84	5.3	6.5	7.4
251	US60 EB	957+30	0.034	0.026	0.060	0.84	0.2	0.3	0.3
251	US60 EB	957+30	0.787	0.604	1.391	0.84	4.9	6.0	6.9
254	US60 EB	961+25	0.034	0.026	0.060	0.84	0.2	0.3	0.3
254	US60 EB	961+25	0.553	0.362	0.915	0.85	3.3	4.0	4.6
256	US60 EB	964+56	0.034	0.000	0.034	0.95	0.1	0.2	0.2

Table 4: On-site Hydrology Summary

	Location		Contributing Area			Composite	Peak Discharge		
Inlet No.	Roadway or Ramp	Station (ft)	Paved (acres)	Unpaved (acres)	Total (acres)	C	10-year (cfs)	25-year (cfs)	50-year (cfs)
256	US60 EB	964+56	0.460	0.161	0.621	0.89	2.3	2.8	3.2
259	US60 EB	968+70	0.026	0.000	0.026	0.95	0.1	0.1	0.1
259	US60 EB	968+70	0.643	0.000	0.643	0.95	2.6	3.1	3.6
302	US60 EB	978+68	0.029	0.000	0.029	0.95	0.1	0.1	0.2
302	US60 EB	978+68	0.615	0.423	1.038	0.85	3.7	4.5	5.2
310	US60 EB	985+70	0.029	0.032	0.061	0.82	0.2	0.3	0.3
310	US60 EB	985+70	0.334	0.948	1.282	0.77	4.1	5.1	5.7
313	US60 EB	989+01	0.466	1.710	2.176	0.75	6.9	8.4	9.6
317	US60 EB	993+30	0.454	1.240	1.694	0.77	5.5	6.7	7.6
319	US60 EB	997+45	0.590	0.978	1.568	0.79	5.3	6.4	7.3
323	US60 EB	1002+85	0.577	0.368	0.945	0.85	3.4	4.1	4.7
261	US60 HOV EB	970+50	0.014	0.000	0.014	0.95	0.1	0.1	0.1
261	US60 HOV EB	970+50	0.656	0.000	0.656	0.95	2.6	3.2	3.7
307	US60 HOV EB	981+96	0.010	0.000	0.010	0.95	0.0	0.0	0.1
307	US60 HOV EB	981+96	0.404	0.000	0.404	0.95	1.6	2.0	2.2
314	US60 HOV EB	989+01	1.580	0.000	1.580	0.95	6.3	7.7	8.8
253	EB Roadside	963+51	0.000	0.582	0.582	0.70	1.7	2.1	2.4
255	EB Roadside	964+56	0.000	0.400	0.400	0.70	1.2	1.4	1.6
258	EB Roadside	967+55	0.000	1.280	1.280	0.70	3.8	4.6	5.3
303	EB Roadside	979+16	0.000	0.701	0.701	0.70	2.1	2.5	2.9
322	EB Roadside	1002+85	0.536	0.772	1.308	0.80	4.4	5.4	6.2
332	EB Roadside	1010+47	1.500	1.620	3.120	0.82	10.8	13.2	15.0
333	EB Roadside	1014+48	0.660	0.332	0.992	0.87	3.6	4.4	5.0
320	Median	978+90	0.000	2.020	2.020	0.70	6.0	7.3	8.3
324	Median	993+30	0.000	2.000	2.000	0.70	5.9	7.2	8.2
266	Ellsworth Ramp B	14+66	0.079	0.218	0.297	0.77	1.0	1.2	1.3
265	Ellsworth Ramp B	15+76	0.142	0.275	0.417	0.79	1.4	1.7	1.9
264	Ellsworth Ramp B	16+77	0.018	0.014	0.032	0.84	0.1	0.1	0.2
264	Ellsworth Ramp B	16+77	0.131	0.290	0.421	0.78	1.4	1.7	1.9
269	Ellsworth Ramp B	18+32	0.166	0.139	0.305	0.84	1.1	1.3	1.5
268	Ellsworth Ramp B	19+98	0.018	0.014	0.032	0.84	0.1	0.1	0.2
268	Ellsworth Ramp B	19+98	0.089	0.065	0.154	0.84	0.5	0.7	0.8
500	Ramp E-S	17+56	0.030	0.000	0.030	0.95	0.1	0.1	0.2
500	Ramp E-S	17+56	1.120	0.102	1.222	0.93	4.8	5.8	6.7
504	Ramp N-W	18+50	0.024	0.000	0.024	0.95	0.1	0.1	0.1
504	Ramp N-W	18+50	0.892	0.000	0.892	0.95	3.6	4.4	5.0
505	Ramp N-W	28+00	0.024	0.000	0.024	0.95	0.1	0.1	0.1
505	Ramp N-W	28+00	0.930	0.000	0.930	0.95	3.7	4.6	5.2
509	Ramp N-W	37+90	0.005	0.000	0.005	0.95	0.0	0.0	0.0
510	Ramp N-W	37+95	0.024	0.000	0.024	0.95	0.1	0.1	0.1
510	Ramp N-W	37+95	0.448	0.000	0.448	0.95	1.8	2.2	2.5
511	Ramp N-W	42+85	1.170	0.000	1.170	0.95	4.7	5.7	6.5
512	Ramp N-W	57+75	0.265	0.000	0.265	0.95	1.1	1.3	1.5
513	Ramp N-W	60+00	0.217	0.000	0.217	0.95	0.9	1.1	1.2
514	Ramp N-W	62+15	0.207	0.000	0.207	0.95	0.8	1.0	1.2
515	Ramp N-W	63+65	0.176	0.000	0.176	0.95	0.7	0.9	1.0
515	Ramp N-W	63+65	0.001	0.000	0.001	0.95	0.0	0.0	0.0
517	Ramp N-W	74+54	1.020	0.000	1.020	0.95	4.1	5.0	5.7
517	Ramp N-W	74+54	0.024	0.000	0.024	0.95	0.1	0.1	0.1
501	Ramp E-S	28+00	0.024	0.000	0.024	0.95	0.1	0.1	0.1
501	Ramp E-S	28+00	0.771	0.498	1.269	0.85	4.6	5.6	6.3
502	Ramp E-S	36+00	0.024	0.050	0.074	0.78	0.2	0.3	0.3
502	Ramp E-S	36+00	0.594	0.300	0.894	0.87	3.3	4.0	4.5
503	Ramp E-S	38+00	0.079	0.047	0.126	0.86	0.5	0.6	0.6

Table 4: On-site Hydrology Summary

	Location		Contributing Area			Composite	Peak Discharge		
Inlet No.	Roadway	Station	Paved	Unpaved	Total	C	10-year	25-year	50-year
	or Ramp	(ft)	(acres)	(acres)	(acres)		(cfs)	(cfs)	(cfs)
503	Ramp E-S	38+00	0.533	0.313	0.846	0.86	3.1	3.7	4.3

3.3 Gutter and Inlet Hydraulics

The design concept was to utilize to the greatest extent possible the allowable spread and ponding depth specified in the "Roadway Design Guidelines". This approach minimizes the number of inlets needed to intercept the design storm flows. For the multi-lane sections of the project the allowable spread comprises the combined width of the gutter, shoulder and half on the adjacent travel lane (entire travel lane for the 25-year storm). For single-lane one-directional sections the allowable spread is limited to the combined width of the gutter and right shoulder (for either side of the roadway). Table 5 shows the spread constraints for all segments of the project.

Table 5: Spread Design Criteria

Inlet Location	Max. Spread 10-year Storm	Max. Spread 25-year Storm
Mainline Outside	16 ft	22 ft
Mainline Inside	14 ft	20 ft
1-Lane Ramps	10 ft	10 ft
2-Lane Ramps	16 ft	22 ft

Note: Some segments have wider than standard shoulders that allow spreads in excess of the values in this table

The allowable ponding depth does not exceed the curb height during the 10-year storm. ADOT std. dwg. C-05.10 Type B curb and gutter is mostly used along the mainline. Type C is also used at some locations. ADOT std. dwg. C-15.80, C-15.91, and C-15.92 catch basins are used for the freeway.

Inlet design and spacing follow the procedures described in HEC-12. There are no sag vertical curves within the project limits. Spreadsheets with the pertinent calculations are included in Appendix E. A summary of the gutter and inlet hydraulics is shown in Table 6.

Table 6: Ini[illegible]aulics Summary

Inlet No.	Location		Inlet Type	10-year Storm					25-year Storm					50-year Storm					Downstream Inlet
				Spread		Flows			Spread		Flows			Spread		Flows			
	Roadway or Ramp	Station (ft)		Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	
202	US60 WB	918+78	Grate	16.0	15.7	16.60	9.29	7.31	22.0	15.5	19.50	12.40	7.10						205
205	US60 WB	929+70	Grate	16.0	14.8	10.80	6.35	4.45	22.0	15.0	13.40	8.77	4.63						211
211	US60 WB	937+41	Grate	16.0	15.2	5.60	3.43	2.17	22.0	16.6	6.80	3.91	2.89						217
217	US60 WB	942+41	Grate	16.0	10.1	1.90	1.50	0.40	22.0	11.8	2.60	1.87	0.73						217
217	US60 WB	942+41	Slotted	16.0	15.9	5.30	3.40	1.90	22.0	17.3	6.40	3.75	2.65						220
220	US60 WB	947+67	Grate	16.0	6.6	0.90	0.84	0.06	22.0	8.8	1.50	1.26	0.24						220
220	US60 WB	947+67	Grate	16.0	16.0	5.40	4.54	0.86	22.0	17.6	6.70	5.24	1.46						228
228	US60 WB	951+84	Grate	16.0	6.1	0.80	0.76	0.04	22.0	8.5	1.40	1.19	0.21						228
228	US60 WB	951+84	Slotted	16.0	15.8	5.20	4.43	0.77	22.0	17.4	6.50	5.14	1.36						232
232	US60 WB	955+27	Grate	16.0	6.4	0.80	0.74	0.06	22.0	9.0	1.50	1.25	0.25						232
232	US60 WB	955+27	Slotted	16.0	16.0	5.30	4.47	0.83	22.0	17.7	6.80	5.30	1.50						234
234	US60 WB	958+24	Grate	16.0	10.1	1.90	1.49	0.41	22.0	12.0	2.80	2.01	0.79						234
234	US60 WB	958+24	Slotted	16.0	15.9	5.30	3.39	1.91	22.0	17.5	6.60	3.83	2.77						250
250	US60 WB	960+99	Grate	16.0	10.1	1.90	1.49	0.41	22.0	11.5	2.50	1.83	0.67						250
250	US60 WB	960+99	Slotted	16.0	15.9	5.30	3.38	1.92	22.0	17.1	6.20	3.67	2.53						257
257	US60 WB	964+50	Grate	16.0	2.4	0.30	0.30	0.00	22.0	4.5	0.50	0.49	0.01						257
257	US60 WB	964+50	Slotted	16.0	12.6	3.10	3.01	0.09	22.0	14.0	3.90	3.60	0.30						260
260	US60 WB	967+55	Grate	16.0	5.1	0.60	0.59	0.01	22.0	7.8	1.20	1.06	0.14						260
260	US60 WB	967+55	Slotted	16.0	14.7	4.40	3.95	0.45	22.0	16.5	5.70	4.69	1.01						263
263	US60 WB	970+50	Grate	16.0	15.3	4.80	2.94	1.86	22.0	17.1	6.30	3.62	2.68						300
300	US60 WB	978+44	Grate	16.0	9.0	1.50	1.24	0.26	22.0	11.5	2.50	1.82	0.68						300
300	US60 WB	978+44	Slotted	16.0	14.2	4.00	2.83	1.17	22.0	16.3	5.60	3.48	2.12						305
305	US60 WB	981+50	Grate	16.0	14.6	5.70	3.53	2.17	22.0	16.6	7.70	4.37	3.33						311
311	US60 WB	987+00	Grate	16.0	13.4	6.60	4.26	2.34	22.0	15.2	8.80	5.20	3.60						311
311	US60 WB	987+00	Slotted	16.0	16.0	9.90	3.69	6.21	22.0	17.6	12.50	4.16	8.34						318
318	US60 WB	995+00	Grate	16.0	9.3	2.80	2.24	0.56	22.0	11.1	4.00	2.89	1.11						318
318	US60 WB	995+00	Slotted	16.0	15.8	8.80	6.30	2.50	22.0	17.2	10.90	7.22	3.68						326
326	US60 WB	1004+40	Grate	16.0	4.3	0.60	0.59	0.01	22.0	6.6	1.10	1.01	0.09						326
326	US60 WB	1004+40	Slotted	16.0	12.6	3.90	3.38	0.52	22.0	14.1	5.00	4.00	1.00						329
329	US60 WB	1009+37	Grate	16.0	11.2	3.00	2.19	0.81	22.0	12.6	3.90	2.68	1.22						329
329	US60 WB	1009+37	Slotted	16.0	15.6	6.40	3.43	2.97	22.0	16.8	7.60	3.79	3.81						
262	US60 HOV WB	970+50	Grate	16.0	2.5	0.20	0.20	0.00	22.0	5.6	0.60	0.54	0.06						262
262	US60 HOV WB	970+50	Slotted	16.0	13.5	3.20	3.04	0.16	22.0	15.2	4.20	3.70	0.50						308
308	US60 HOV WB	981+96	Grate	16.0	9.2	1.80	1.24	0.56	22.0	11.0	2.60	1.58	1.02						308
308	US60 HOV WB	981+96	Slotted	16.0	13.9	4.40	2.67	1.73	22.0	15.4	5.50	2.98	2.52						315
315	US60 HOV WB	989+01	Grate	16.0	13.8	6.30	3.55	2.75	22.0	14.8	7.60	4.04	3.56						
330	WB Roadside	1009+47	Area Inlet	na	na	13.10	13.10	0.00	na	na	16.00	16.00	0.00						334
334	WB Roadside	1015+46	Area Inlet	na	na	1.40	1.40	0.00	na	na	1.70	1.70	0.00						
201	US60 EB	919+98	Grate	16.0	12.9	9.70	4.73	4.97	22.0	16.5	17.50	6.68	10.82						204
204	US60 EB	925+00	Grate	16.0	0.2	0.00	0.00	0.00	22.0	15.1	12.20	6.49	5.71						204
204	US60 EB	925+00	Slotted	16.0	15.6	13.40	3.35	10.05	22.0	16.8	15.80	3.60	12.20						206
206	US60 EB	931+29	Grate	16.0	14.4	9.00	5.44	3.56	22.0	14.6	11.50	7.67	3.83						209
209	US60 EB	938+92	Grate	16.0	15.8	6.10	4.04	2.06	22.0	17.7	7.80	4.78	3.02						216
216	US60 EB	943+27	Grate	16.0	15.9	6.20	4.07	2.13	22.0	17.5	7.70	4.74	2.96						225
225	US60 EB	950+63	Grate	16.0	5.0	0.60	0.59	0.01	22.0	7.5	1.10	0.98	0.12						225
225	US60 EB	950+63	Slotted	16.0	15.1	4.70	4.13	0.57	22.0	16.7	5.90	4.82	1.08						227
227	US60 EB	953+21	Grate	16.0	15.1	4.70	2.95	1.75	22.0	16.4	5.70	3.36	2.34						231
231	US60 EB	957+00	Grate	16.0	10.1	1.90	1.49	0.41	22.0	11.8	2.70	1.96	0.74						231
231	US60 EB	957+00	Slotted	16.0	15.9	5.30	3.37	1.93	22.0	17.3	6.50	3.82	2.68						251
251	US60 EB	957+30	Grate	16.0	2.8	0.30	0.30	0.00	22.0	5.2	0.60	0.58	0.02						251
251	US60 EB	957+30	Slotted	16.0	15.5	5.00	4.91	0.09	22.0	16.9	6.10	5.76	0.34						254
254	US60 EB	961+25	Grate	16.0	5.2	0.60	0.58	0.02	22.0	6.8	0.90	0.82	0.08						254
254	US60 EB	961+25	Slotted	16.0	14.4	4.20	3.82	0.38	22.0	15.4	4.90	4.25	0.65						256
256	US60 EB	964+56	Grate	16.0	3.0	0.10	0.10	0.00	22.0	3.4	0.20	0.20	0.00						256
256	US60 EB	964+56	Slotted	16.0	11.7	2.30	2.30	0.00	22.0	12.9	2.90	2.88	0.02						259

Table 6: Inl[illegible]ulics Summary

Inlet No.	Location		Inlet	10-year Storm					25-year Storm					50-year Storm					Downstream
				Spread		Flows			Spread		Flows			Spread		Flows			
	Roadway or Ramp	Station (ft)	Type	Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	Allowable (ft)	Actual (ft)	Total (cfs)	Intercepted (cfs)	By-pass (cfs)	Inlet
259	US60 EB	968+70	Grate	16.0	4.6	0.40	0.38	0.02	22.0	6.1	0.70	0.61	0.09						259
259	US60 EB	968+70	Slotted	16.0	12.8	2.90	2.58	0.32	22.0	13.8	3.40	2.87	0.53						302
302	US60 EB	978+68	Grate	16.0	2.8	0.10	0.10	0.00	22.0	3.7	0.20	0.19	0.01						302
302	US60 EB	978+68	Slotted	16.0	14.5	3.80	3.80	0.00	22.0	16.3	5.10	5.01	0.09						310
310	US60 EB	985+70	Grate	16.0	6.6	1.50	1.38	0.12	22.0	9.3	2.70	2.16	0.54						310
310	US60 EB	985+70	Slotted	16.0	15.5	8.40	7.16	1.24	22.0	17.4	11.00	8.55	2.45						313
313	US60 EB	989+01	Grate	16.0	15.6	10.00	5.75	4.25	22.0	17.3	12.80	6.85	5.95						317
317	US60 EB	993+30	Grate	16.0	14.5	7.90	4.82	3.08	22.0	16.1	9.90	5.58	4.32						319
319	US60 EB	997+45	Grate	16.0	14.3	6.20	3.83	2.37	22.0	15.7	7.80	4.55	3.25						323
323	US60 EB	1002+85	Grate	16.0	11.8	3.40	2.41	0.99	22.0	12.9	4.10	2.74	1.36						
261	US60 HOV EB	970+50	Grate	16.0	2.6	0.20	0.20	0.00	22.0	5.8	0.60	0.53	0.07						261
261	US60 HOV EB	970+50	Slotted	16.0	13.6	3.20	3.02	0.18	22.0	15.3	4.30	3.77	0.53						307
307	US60 HOV EB	981+96	Grate	16.0	9.3	1.80	1.22	0.58	22.0	11.1	2.60	1.55	1.05						307
307	US60 HOV EB	981+96	Slotted	16.0	14.0	4.40	2.64	1.76	22.0	15.4	5.60	3.04	2.56						314
314	US60 HOV EB	989+01	Grate	16.0	13.8	6.30	3.50	2.80	22.0	14.9	7.70	4.09	3.61						
253	EB Roadside	963+51	Area Inlet	na	na	1.70	1.70	0.00	na	na	2.10	2.10	0.00						
255	EB Roadside	964+56	Area Inlet	na	na	1.20	1.20	0.00	na	na	1.40	1.40	0.00						
258	EB Roadside	967+55	Area Inlet	na	na	3.80	3.80	0.00	na	na	4.60	4.60	0.00						
303	EB Roadside	979+16	Area Inlet	na	na	2.10	2.10	0.00	na	na	2.50	2.50	0.00						
322	EB Roadside	1002+85	Area Inlet	na	na	4.40	4.40	0.00	na	na	5.40	5.40	0.00						
332	EB Roadside	1010+47	Area Inlet	na	na	10.80	10.80	0.00	na	na	13.20	13.20	0.00						
333	EB Roadside	1014+48	Area Inlet	na	na	3.60	3.60	0.00	na	na	4.40	4.40	0.00						
320	Median	978+90	Area Inlet	na	na	6.00	6.00	0.00	na	na	7.30	7.30	0.00						
324	Median	993+30	Area Inlet	na	na	5.90	5.90	0.00	na	na	7.20	7.20	0.00						
266	Ellsworth Ramp B	14+66	Grate	14.0	8.4	1.20	0.91	0.29	20.0	9.6	1.50	1.04	0.46						265
265	Ellsworth Ramp B	15+76	Grate	14.0	8.7	1.40	1.18	0.22	20.0	9.7	1.80	1.45	0.35						264
264	Ellsworth Ramp B	16+77	Grate	14.0	5.6	0.70	0.67	0.03	20.0	7.0	0.90	0.82	0.08						264
264	Ellsworth Ramp B	16+77	Slotted	14.0	8.9	1.50	0.94	0.56	20.0	10.0	1.90	1.09	0.81						269
269	Ellsworth Ramp B	18+32	Grate	8.0	7.5	1.10	0.98	0.12	10.0	8.4	1.30	1.11	0.19						268
268	Ellsworth Ramp B	19+98	Grate	8.0	2.8	0.30	0.30	0.00	8.0	3.7	0.40	0.40	0.00						268
268	Ellsworth Ramp B	19+98	Slotted	8.0	6.7	0.80	0.62	0.18	8.0	7.2	1.00	0.76	0.24						
500	Ramp E-S	17+56	Grate	16.0	11.3	2.30	1.43	0.87	22.0	12.8	3.00	1.67	1.33						500
500	Ramp E-S	17+56	Slotted	16.0	15.6	4.80	2.64	2.16	22.0	17.0	5.80	2.91	2.89						
504	Ramp N-W	18+50	Grate	16.0	3.9	0.60	0.57	0.03	16.0	4.8	1.00	0.91	0.09	22.0	5.8	1.40	1.20	0.20	504
504	Ramp N-W	18+50	Slotted	16.0	9.7	3.60	3.06	0.54	16.0	10.7	4.50	3.59	0.91	22.0	11.4	5.20	3.95	1.25	505
505	Ramp N-W	28+00	Grate	16.0	4.1	1.10	1.04	0.06	16.0	4.9	1.50	1.36	0.14	22.0	5.6	1.90	1.64	0.26	505
505	Ramp N-W	28+00	Slotted	16.0	8.2	3.70	2.74	0.96	16.0	9.1	4.60	3.20	1.40	22.0	9.7	5.20	3.45	1.75	509
509	Ramp N-W	37+90	Grate	12.0	2.8	0.40	0.39	0.01	12.0	3.0	0.50	0.49	0.01	18.0	3.2	0.50	0.48	0.02	510
510	Ramp N-W	37+95	Grate	12.0	5.5	2.00	1.65	0.35	12.0	5.9	2.20	1.76	0.44	18.0	6.1	2.40	1.88	0.52	510
510	Ramp N-W	37+95	Slotted	12.0	7.9	5.60	3.73	1.87	12.0	8.1	6.00	3.91	2.09	18.0	8.2	6.30	4.04	2.26	511
511	Ramp N-W	42+85	Grate	12.0	5.4	4.70	0.90	3.80	12.0	5.9	5.70	1.90	3.80	18.0	6.2	6.50	2.70	3.80	512
512	Ramp N-W	57+75	Grate	12.0	3.7	1.10	1.07	0.03	12.0	4.0	1.30	1.27	0.03	18.0	4.2	1.50	1.20	0.30	513
513	Ramp N-W	60+00	Grate	12.0	3.5	1.20	0.80	0.40	12.0	3.7	1.40	1.00	0.40	18.0	3.9	1.50	1.10	0.40	514
514	Ramp N-W	62+15	Grate	12.0	3.4	1.20	0.80	0.40	12.0	3.6	1.40	1.00	0.40	18.0	3.7	1.60	1.20	0.40	515
515	Ramp N-W	63+65	Grate	12.0	5.7	1.10	0.84	0.26	12.0	6.0	1.30	0.97	0.33	18.0	6.2	1.40	1.02	0.38	515
515	Ramp N-W	63+65	Grate	12.0	3.3	0.30	0.29	0.01	12.0	3.6	0.30	0.28	0.02	18.0	3.8	0.40	0.37	0.03	517
517	Ramp N-W	74+54	Slotted	16.0	6.8	4.10	2.93	1.17	16.0	7.4	5.00	3.35	1.65	22.0	7.7	5.70	3.66	2.04	517
517	Ramp N-W	74+54	Grate	16.0	4.3	1.30	1.10	0.20	16.0	4.9	1.80	1.42	0.38	22.0	5.3	2.20	1.66	0.54	
501	Ramp E-S	28+00	Grate	14.0	4.3	1.60	1.52	0.08	14.0	4.7	2.20	2.03	0.17	20.0	5.0	2.80	2.53	0.27	501
501	Ramp E-S	28+00	Slotted	14.0	5.9	4.90	3.38	1.52	14.0	6.3	6.10	3.97	2.13	20.0	6.6	7.10	4.46	2.64	502
502	Ramp E-S	36+00	Grate	16.0	8.1	1.40	1.08	0.32	16.0	9.1	1.90	1.37	0.53	22.0	9.9	2.30	1.58	0.72	502
502	Ramp E-S	36+00	Slotted	16.0	11.4	3.40	2.27	1.13	16.0	12.4	4.30	2.70	1.60	22.0	13.1	4.90	2.91	1.99	503
503	Ramp E-S	38+00	Grate	14.0	7.3	0.80	0.65	0.15	14.0	8.3	1.20	0.93	0.27	20.0	9.0	1.40	1.02	0.38	503
503	Ramp E-S	38+00	Slotted	14.0	11.9	3.10	2.73	0.37	14.0	12.9	3.70	3.10	0.60	20.0	13.5	4.30	3.49	0.81	

3.4 Storm Drain Hydraulics

Design of the storm drain systems follows the criteria outlined in ADOT's "Roadway Design Guidelines" and "Pipe Selection Guidelines and Procedures" of 1996.

The design concept developed by ADOT's General Consultant during preliminary design was refined to match the optimized new inlet layout and the corresponding inflows.

Closed storm sewer systems were designed using Haestad Methods' Storm CAD software. Inlets previously located using HEC-12 procedures were inter-connected in a way that minimizes the length of pipe required and fits the finished grades for the project. Pipes were initially sized according to the 30% concept. Rainfall and contributing drainage area data for each inlet was also entered in the program.

The computer program uses the Rational Method to compute peak flows in the system, and Manning's equation to compute travel times and energy losses, to ultimately generate a hydraulic grade line. Where required, localized energy losses at junctions and manholes were independently calculated using the momentum equation and entered in the program. Several iterations changing pipe sizes and slopes were required to arrive at a design that minimizes pipe diameters while meeting all required criteria.

Table 7 lists the final computed system parameters for the three mainline networks. Pipe sizes range between 24" for lateral connections and crossroad systems, to 84" at the downstream end of the main trunk line.

Note that systems 1 and 2 are totally new systems, whereas system 3 connects into the existing 72" trunk line near mainline station 965+00. Comparison of system 3 existing design flows with the proposed condition design flows at the new / old connection point shows that the design flow increases from 185.7 cfs (existing 50-year flow) to 244.15 cfs in the trunk line. However, the hydraulic analysis shows that the HGL is still well below manhole rim and catch basin grate elevations. Furthermore, downstream of the connection with the existing system, the new trunk line has been upsized to 84" from 72" to accommodate these increased design discharges.

The locations of several inlets in the vicinity of US 60 Detour Stations 995+00 to 1020+00 are being redesigned at the time of printing of this report. The StormCad model has been updated to reflect revised CA values for these inlets on the south side of US 60, but the exact inlet locations are not yet designed.

Table 7: Computed System Parameters (25-year)

System Number	Outfall Flow (cfs)	System Travel Time (min)	System CA (acres)
1	15.36	1.62	2.57
2	39.63	7.52	7.10
3	270.17	32.03	46.63

Tables showing the detailed computed hydraulic data for each element of the mainline and crossroad systems are included in Appendix F. Stage III storm sewer drainage sheets are included in Appendix G.

Geotechnical Information

Final results of subgrade soil tests are not yet available.

Pipe Selection

Selection of pipe alternatives for use in this project follows the criteria in ADOT's "Pipe Selection Guidelines and Procedures". The use of a roughness coefficient of 0.013 for the design of the system assures that the alternative use of pipes with "n" values of 0.012 or 0.014 will not result in noticeable or significant differences in the resulting peak flows and hydraulic grade line.

Table 8 is a summary of the pipes that can be used for the construction of the on-site drainage systems, based on 75-year service-life, type of roadway and geotechnical conditions.

Table 8: Summary of Allowed Pipe Alternatives

	Allowed Pipe Sizes			
Fill Height Range	RCP	NRCP	NRCIPCP	CHDPEPP
1	All	24" to 36"	30" and up	24" to 36"
2	All	24" to 36"	30" and up	24" to 36"
3	All	24" to 36"	30" and up	24" to 48"
4	All	24" to 36"	30" and up[1]	24" to 48"[2]
5	All	N/A	30" and up[1]	N/A
6	All[3]	N/A	30" and up[1]	N/A
7	All[4]	N/A	30" and up[1]	N/A

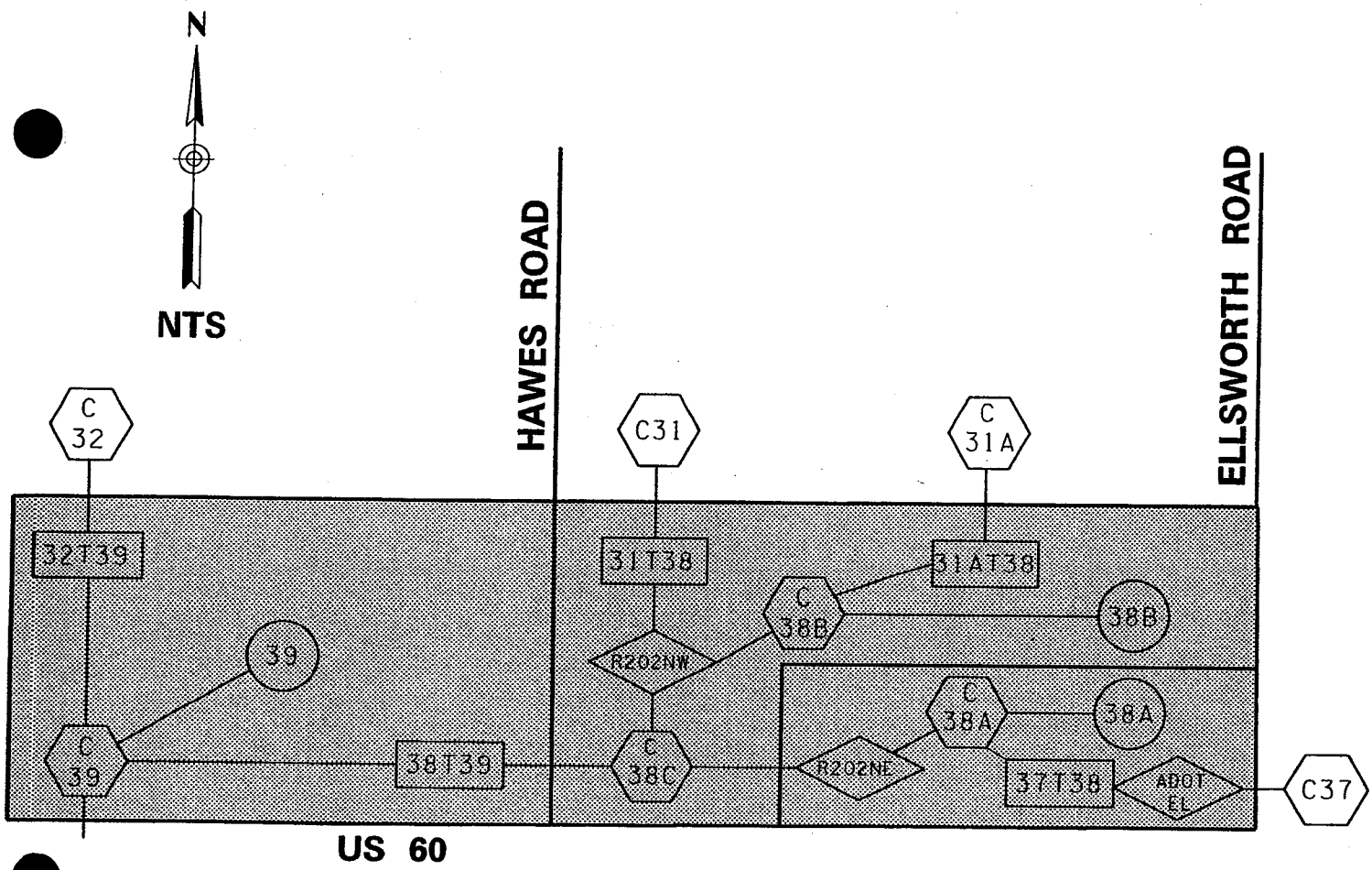
[1] Trench condition only
[2] 9.8 ft maximum fill
[3] Special design required for 96"
[4] Special design required for 84" and 96"

4 REFERENCES

- "Roadway Design Guidelines", ADOT, May 1996
- "Pipe Selection Guidelines and Procedures", ADOT, May 1996
- "Highway Drainage Design Manual – Hydrology", ADOT, March 1993
- "Drainage of Highway Pavements – HEC 12", FHWA, March 1984
- "Hydraulic Design of Highway Culverts – HDS 5", FHWA, September 1985
- "Urban Drainage Design Manual – HEC 22", FHWA, August 2001
- "202L/US 60 Traffic Interchange - Initial Drainage Report", DMJM+Harris, September 2001
- "202L/US 60 Traffic Interchange – Phase I - Initial Drainage Report (Stage II Design)", DMJM+Harris, February 2002
- "202L/US 60 Traffic Interchange – Phase II - Initial Drainage Report (Stage II Design)", DMJM+Harris, August 2002

APPENDIX A

OFF-SITE HYDROLOGY



LEGEND

38A	*SUB-BASIN*
37T38	*ROUTING*
C 38A	*CONCENTRATION POINT*
R202NE	*DETENTION BASIN*

PARSONS BRINCKERHOFF

Revised
HEC-1 Schematic
Northern Region
For Interim Conditions
Model

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   01APR03  TIME  13:36:31  *
*                                      *
****************************************
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID
  2           ID  ******************************************************************************
  3           ID  ******************************************************************************
  4           ID   MODEL NAME: NE2002IN.DAT   Revised by PARSONS BRINCKERHOFF - January 2003
  5           ID
  6           ID   This model represents the Interim Conditions for the Loop 202/US 60 TI,
  7           ID   i.e. for conditions after Phase 1 has been constructed, and before later
  8           ID   phases are constructed.
  9           ID
 10           ID   This model includes the following revisions to the Baseline Model NE2002.DAT:
 11           ID
 12           ID    1. Basin 38 has been split into Subbasins 38A and 38B.
 13           ID
 14           ID    2. ADOT Detention Basins 5 - 10 have been removed.
 15           ID
 16           ID    3. Proposed Phase 1 Detention Basins NE-1, NE-2, NW-1 and NW-2
 17           ID       have been added.
 18           ID
 19           ID  ******************************************************************************
 20           ID  ******************************************************************************
 21           ID   MODEL NAME: NE2002.DAT
 22           ID
```

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23          ID   THIS MODEL COVERS THE AREA EAST OF HAWES ROAD AND THE SOSSAMAN CHANNEL
24          ID   MAJOR CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
25          ID
26          ID    1. OLD SUBBASIN 18A HAS BEEN SPLIT INTO TWO SUBBASINS. SUBBASIN 18C REMAINS
27          ID       IN THIS MODEL AS PART OF THE HAWES CHANNEL INFRASTRUCTURE
28          ID    2. OLD SUBBASIN 30 HAS BEEN SPLIT INTO SUBBASIN 30A AND SUBBASIN 30B.
29          ID       SUBBASIN 30 GETS INTERCEPTED BY A CHANNEL ON THE NORTH SIDE OF CORALBELL
30          ID       AND GETS ROUTED TO SUBBASIN 31A. SUBBASIN 30B STILL GOES SOUTH ALONG
31          ID       ELLSWORTH ROAD
32          ID    3. FOR THE 2002 YEAR CONDITION, ALL CAP DETENTION BASINS HAVE BEEN PLACED IN
33          ID       THE MODEL. THEIR OUTLET CHANNELS HAVE FOR THE MOST PART NOT BEEN INCLUDED
34          ID       IN THIS MODEL. THE OUTLET CHANNELS WILL BE IN THE FUTURE MODEL
35          ID  ******************************************************************************
36          ID
37          ID   SOUTHEAST MESA AREA DRAINAGE MASTER PLAN
38          ID   AREA NORTH OF SUPERSTITION FREEWAY
39          ID
40          ID
41          ID   REVISED BY VALERIE SWICK, OCTOBER-NOVEMBER 1996
42          ID   TO INCORPORATE THE SUPERSITION STRUCTURES AND COMBINE MODELS
43          ID
44          ID   FILENAME:  MESANE.DAT
45          ID
46          ID   THIS MODEL REPRESENTS THE EXISTING CONDITION OF THE WATERSHED.
47          ID   TOTAL DRAINAGE AREA IS APPROXIMATELY 17 SQ. MI.
48          ID
49          ID   100-YEAR 24-HOUR FREQUENCY
50          ID
51          ID
52          ID   METHODOLOGY
53          ID   THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
54          ID   SCS TYPE II RAINFALL DISTRIBUTION
55          ID   S-GRAPH HYDROGRAPH
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

56          ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
57          ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
58          ID   APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
59          ID   EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
60          ID   DATED 1994
61          ID   THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
62          ID
63          ID   INITIAL STUDY PERFORMED BY LISA C. YOUNG
64          ID   REVIEWED BY VALERIE A. SWICK
65          ID   HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
66          ID   DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
67          ID
68          ID   ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2 FT/SEC FOR WASH/NATURAL
69          ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
70          ID
71          ID
72          ID    LAST UPDATED ON  3/13/98
73          ID
74          ID    UPDATE WAS BASED UPON NEW MAG LAND USE DEFINITIONS FOR SINGLE FAMILY HOUSING
75          ID
76          ID   DDM MCUHP2 MESA AREA DRAINAGE MASTER PLAN
            *DIAGRAM
77          IT       5  1APR97    0000    1000
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 78          IO      5
 79          IN     15
 80          JD  3.600    .01
 81          PC   .000   .002   .005   .008   .011   .014   .017   .020   .023   .026
 82          PC   .029   .032   .035   .038   .041   .044   .048   .052   .056   .060
 83          PC   .064   .068   .072   .076   .080   .085   .090   .095   .100   .105
 84          PC   .110   .115   .120   .126   .133   .140   .147   .155   .163   .172
 85          PC   .181   .191   .203   .218   .236   .257   .283   .387   .663   .707
 86          PC   .735   .758   .776   .791   .804   .815   .825   .834   .842   .849
 87          PC   .856   .863   .869   .875   .881   .887   .893   .898   .903   .908
 88          PC   .913   .918   .922   .926   .930   .934   .938   .942   .946   .950
 89          PC   .953   .956   .959   .962   .965   .968   .971   .974   .977   .980
 90          PC   .983   .986   .989   .992   .995   .998  1.000
 91          JD  3.58    1.0
 92          JD  3.49    5.0
 93          JD  3.38   10.0
 94          JD  3.24   30.0
 95          JD  3.10   60.0
 96          JD  3.05   90.0
 97          JD  3.00  120.0
 98          JD  2.97  150.0
             *
             * DDM   ***** Updated *****

 99          KK     42
100          KM   BASIN 42
101          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
102          KM    L=      3.1  Lca=      1.5   S=   60.9  Kn= .043  LAG=  51.6
103          KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
104          BA    1.75
105          LG     .32     .29    5.00     .31   10.00
106          UI    114.    114.    248.    441.    618.    773.    923.   1018.   1086.   1092.
1                                         HEC-1 INPUT                                          PAGE  3

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

107          UI   1041.    954.    806.    673.    573.    485.    415.    340.    290.    242.
108          UI    212.    175.    147.    121.    109.     78.     78.     78.     38.     28.
109          UI     28.     28.     28.     28.     28.     28.     28.      0.      0.      0.
110          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

111          KK   42T51
112          RS     10    FLOW      -1
113          RC   0.08   0.055    0.08    7000   0.011
114          RX      0     600     700     710     720     730     830    1630
115          RY     10       5       3       0       0       3       5      10
             *
             * DDM   ***** Updated *****

116          KK     51
117          KM   BASIN 51
118          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
119          KM    L=      1.5  Lca=       .8   S=   54.4  Kn= .039  LAG=  27.3
120          KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
121          BA    1.24
122          LG     .29     .30    4.60     .37   18.00
123          UI    153.    416.    885.   1248.   1446.   1410.   1128.    817.    598.    428.
124          UI    311.    232.    163.    110.     99.     37.     37.     37.     37.     37.
```

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125        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
126        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

127        KK     C51
128        KM   COMBINE FLOWS FROM 42 AND 51
129        HC       2
           *
           * DDM   ***** Preserved *****

130        KK   51T53
131        KM    ROUTE 51 TO 53
132        RS       9    FLOW      -1
133        RC    0.08   0.055    0.08    8000    0.01
134        RX       0     100     200     210     220     230     330     430
135        RY       7       6       5       0       0       5       6       7
           *
           * DDM   ***** Updated *****

136        KK     44A
137        KM   BASIN 44A
138        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
139        KM    L=      2.8  Lca=      1.4   S=   54.5  Kn= .039  LAG=  43.6
140        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
141        BA    1.59
142        LG     .20     .25    4.50     .45   45.00
143        UI    123.    123.    390.    597.    813.    994.   1114.   1180.   1153.   1063.
144        UI    881.    716.    588.    484.    397.    320.    259.    219.    189.    131.
145        UI    126.     84.     84.     75.     30.     30.     30.     30.     30.     30.
146        UI     30.     30.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE  4

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

147        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

148        KK  DIV44A
149        KM   DIVERT 80% OF THE LOW FLOWS WEST AND SOUTH TO 44B, 70% OF HIGH FLOWS
150        DT    D44A
151        DI       0     500    1000    3000
152        DQ       0     400     750    2100
           * DDM   ***** Updated *****

153        KK      43
154        KM   BASIN 43
155        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
156        KM    L=      1.9  Lca=       .9   S=   58.2  Kn= .036  LAG=  29.8
157        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
158        BA    1.42
159        LG     .29     .30    4.70     .35   18.00
160        UI    161.    376.    827.   1212.   1470.   1531.   1375.   1047.    783.    584.
161        UI    434.    324.    251.    171.    127.    110.     59.     39.     39.     39.
162        UI     39.      0.      0.      0.      0.      0.      0.      0.      0.      0.
163        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```

```
164          KK     C43
165          KM     COMBINE 43 WITH DIVERTED FLOWS FROM 45A
166          HC       2
             *
             * DDM   ***** Preserved *****

167          KK   43T53
168          RS      12    FLOW      -1
169          RC    0.08   0.055    0.08   11250   0.009
170          RX       0     200     300     310     315     325     335     535
171          RY       6       3       2       0       0       2       3       6
             *
             * DDM   ***** Updated *****

172          KK      53
173          KM   BASIN 53
174          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
175          KM    L=      1.9  Lca=       .9   S=   63.5  Kn= .039  LAG=  31.8
176          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
177          BA     .78
178          LG     .29     .30    5.20     .28   20.00
179          UI     83.    189.    377.    486.    616.    903.    943.    707.    555.    428.
180          UI    291.    149.    123.     83.     38.     25.     25.     25.      0.      0.
181          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
```



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

182          KK     C53
183          KM     COMBINE 53, 43 AND 51
184          HC       3
             *
             * DDM   ***** Updated *****

185          KK      54
186          KM   BASIN 54
187          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
188          KM    L=      1.5  Lca=       .8   S=   42.8  Kn= .044  LAG=  32.8
189          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
190          BA     .49
191          LG     .30     .29    5.40     .26   17.00
192          UI     50.    107.    221.    287.    359.    502.    603.    449.    358.    278.
193          UI    206.    110.     84.     55.     39.     15.     15.     15.     15.      0.
194          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
195          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

196          KK     C54
197          KM   COMBINE 53 AND 54
198          HC       2
             *
             * DDM   ***** Preserved *****

199          KK  DCAP12
200          KM   FLOWS SPLIT AT CAP AND SOUTHERN AVE, RATING CURVES BASED ON THREE 5X7 CBCs
201          KM   PART OF THE FLOW GOES SOUTH ACRSS SOUTHERN TO CAP 13 +14
```

```
202        DT   SOUTH
203        DI       0     450    1000    2500
204        DQ       0       0     275    1025
           *
           * DDM   ***** Preserved *****

205        KK   CAP12
206        RS       1    FLOW      -1
207        SV       0   0.238    2.72   13.37   36.82
208        SE  1563.6    1564    1566    1568    1570
209        SQ       0      30     188     574    1098
           *
           * DDM   ***** Preserved *****

210        KK   DR44A
211        KM   RETRIEVE DIVERTED FLOWS FROM 44A
212        DR    D44A
           *
           * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                          PAGE  6

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


213        KK   44ATB
214        KM   ROUTE 44A TO 44B, STREET AND SHEET FLOW THROUGH NEIGHBORHOODS
215        KM   NO CURB AND GUTTER
216        RS      15    FLOW      -1
217        RC   0.055   0.045   0.055    9000   0.008
218        RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
219        RY       6     5.5       3       0       0       3     5.5       6
           *
           * DDM   ***** Updated *****

220        KK     44B
221        KM   BASIN 44B
222        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
223        KM    L=      1.1  Lca=       .9   S=   64.8  Kn= .041  LAG=  26.2
224        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
225        BA    1.06
226        LG     .26     .24    6.60     .17   30.00
227        UI    136.    426.    715.    947.   1453.   1456.   1057.    775.    520.    251.
228        UI    180.    109.     42.     42.     42.      0.      0.      0.      0.      0.
229        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

230        KK    C44B
231        KM   COMBINE 44A WITH 44B
232        HC       2
           *
           * DDM   ***** Preserved *****

233        KK  CAP10+
234        KM   COMBINED CAP 10 AND 11, SAME CONTRIBUTING AREA AND HYDRAULICALLY CONNECTED
235        KM   STORAGE AND DISCHARGES WERE ADDED AT THE APPROPRIATE ELEVATIONS
236        RS       1    FLOW      -1
237        SV       0    0.43   3.397  11.626   66.53
238        SE  1562.4    1564    1566    1568    1570
239        SQ       0     180     736    1684    2754
```

```
*
* DDM   ***** Preserved *****

KK  RCAP11
KM   ROUTE FLOWS FROM CAP OVERCHUTE #10 AND 11 TO ADOT WEST BASIN
RK    2400  0.0003   0.013            TRAP      20       3
*
* DDM   ***** Preserved *****

KK     C12
KM   COMBINE ROUTED FLOWS FROM CAP #10 AND 11 WITH CAP #12
HC       2
*
* DDM   ***** Preserved *****
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```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  ADOT-W
KM   WEST ADOT DETENTION BASIN 4189, WEST OF CAP AND NORTH OF SUPERSITION FREEWAY
KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
KM        COUNTY
KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
KM            A-N WEST, INC., FEBRUARY, 1987.
RS       1    ELEV      36
SV       0   12.35    63.5   210.3   367.5   535.1  667.85  713.55
SE      36      38      40      44      48      52      55      56
SL    36.0   28.27      .6      .5
SS      55     200     2.6     1.5
*
* DDM   ***** Preserved *****

KK  RADOTW
KM   ROUTE FLOWS IN CONCRETE CHANNEL TO CULVERTS UNDER SUPERSTITION FREEWAY
RS    1.75    FLOW      -1
RC    .035   0.012    .035    4500   .0033
RX       0     500    1000    1012    1020    1032    1532    2032
RY      13    12.5      12       0       0      12    12.5      13
*
* DDM   ***** Updated *****

KK     36B
KM   BASIN 36B
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .32
LG     .30     .29    7.30     .11   16.00
UI    125.    387.    715.    627.    361.    139.     58.     22.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK    C36B
KM   COMBINE FLOWS FROM ADOT BASIN W WITH SUB36
HC       2
ZW     A=ADOT WEST BASIN  B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
*
* DDM   ***** Preserved *****
```

```
 276          KK  RSOUTH
 277          KM   RETRIEVE FLOWS CROSSING SOUTHERN AT CAP
 278          DR   SOUTH
              *
              * DDM   ***** Updated *****

 279          KK      57
 280          KM   BASIN 57
 281          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 282          KM    L=       .3  Lca=       .1   S=   35.7  Kn= .044  LAG=   9.4
 283          KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
 284          BA     .18
```



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

 285          LG     .37     .35    5.40     .25    2.00
 286          UI    193.    566.    378.    149.     59.     19.      0.      0.      0.      0.
 287          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

 288          KK     C57
 289          KM   COMBINE FLOWS CROSSING SOUTHERN AT CAP WITH THOSE OF SUBBASIN 57
 290          HC       2
              *
              * DDM   ***** Preserved *****

 291          KK  CAP13+
 292          KM    CAP OVERCHUTES 13 AND 14 WERE COMBINED SINCE THY HAVE COMMON DRAINAGE
 293          KM    STORAGE AND DISCHARGES WERE ADDED AT SPECIFIED ELEVATIONS
 294          RS       1    FLOW      -1
 295          SV       0   1.198   2.601   5.746
 296          SE    1564    1567    1568    1570
 297          SQ       0     180     500    1143
              *
              * DDM   ***** Updated *****

 298          KK     36A
 299          KM   BASIN 36A
 300          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 301          KM    L=       .3  Lca=       .2   S=   44.1  Kn= .028  LAG=   6.6
 302          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 303          BA     .10
 304          LG     .27     .34    6.00     .21   28.00
 305          UI    201.    435.    101.      0.      0.      0.      0.      0.      0.      0.
 306          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
              * DDM   ***** Preserved *****

 307          KK    C36A
 308          KM   COMBINE FLOWS FROM CAP OVERCHUTES INTO ADOT EAST DETENTION BASIN
 309          HC       2
              *
              * DDM   ***** Preserved *****

 310          KK  ADOT-E
 311          KM   EAST ADOT DETENTION BASIN 4105, WEST OF CAP AND NORTH OF SUPERSTITION
 312          KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
```

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313        KM        COUNTY
314        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
315        KM            A-N WEST, INC., FEBRUARY, 1987.
316        RS       1    ELEV    49.5
317        SV       0     300     340
318        SE    49.5      60      61
319        SL    49.5   28.27      .6      .5
320        SS      60     200     2.6     1.5
321        ZW    A=ADOT EAST BASIN B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
           *
           * DDM   ***** Preserved *****
1                                    HEC-1 INPUT                                          PAGE  9

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


322        KK   CFAKE
323        KM   THIS IS JUST A FAKE CONCENTRATION POINT TO ELIMINATE THE ERROR THAT SAYS TO
324        KM   "COMBINE HYDROGRAPHS MORE OFTEN".
325        HC       2
           *
           * DDM   ***** Updated *****

326        KK      52
327        KM   BASIN 52
328        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
329        KM    L=      1.6  Lca=       .7   S=   54.9  Kn= .035  LAG=  25.3
330        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
331        BA     .43
332        LG     .31     .31    6.60     .15   12.00
333        UI     58.    191.    311.    418.    657.    573.    419.    304.    176.     98.
334        UI     63.     30.     18.     18.     18.      0.      0.      0.      0.      0.
335        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           * DDM   ***** Updated *****

336        KK      56
337        KM   BASIN 56
338        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
339        KM    L=       .9  Lca=       .5   S=   57.9  Kn= .040  LAG=  20.2
340        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
341        BA     .55
342        LG     .31     .24    7.30     .13   20.00
343        UI    106.    393.    593.    982.    870.    588.    362.    157.     97.     30.
344        UI     28.     28.      0.      0.      0.      0.      0.      0.      0.      0.
345        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

346        KK     C56
347        KM     COMBINE 52 AND 56 BEHIND THE STOCK POND
348        KM     ASSUMING STOCK POND IS EFFECTIVE, DIVERTS FLOWS SOUTH ACROSS SUPERSTITION
349        KM     STORAGE ROUTING WAS NOT PERFORMED, CHANNEL/PIPE CROSSING
350        HC       2
           *
           * DDM   ***** Preserved *****

351        KK   56T58
352        RS       3    FLOW      -1
353        RC    0.08   0.055    0.08    2500   0.004
354        RX       0     200     300     310     320     330     430     530
```

```
355     RY       6       4       3       0       0       3       4       6
        *
        * DDM   ***** Updated *****

356     KK      58
357     KM    BASIN 58
358     KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
359     KM     L=      1.1  Lca=       .5   S=   50.4  Kn= .033  LAG=  18.3
360     KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
361     BA      .95
```



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

362     LG      .34     .36    5.60     .22    4.00
363     UI     238.    813.   1261.   1998.   1385.    886.    384.    213.     76.     54.
364     UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
365     UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

366     KK     C58
367     KM    COMBINE 58 WITH 56
368     KM    THE VOLUME AT THIS CONCENTRATION POINT WILL BE SPLIT BETWEEN THE OVERCHUTES
369     KM    CAP1A AND CAP1B. THIS WILL BE MODELED AS FLAT TOP HYDROGRAPHS WITH 217 CFS
370     KM    VALUES FOR UI CARDS AT THESE OVERCHUTES
371     KM    NO DATA AVAILABLE ON CAP OVERCHUTE SIZING
372     ZW      A=CONCENTRATION POINT C58  B=FLOW TO OVERCHUTES  C=FLOW  F=OBSERVED
373     HC        2
        *

374     KK     46B
375     KM    BASIN 46B
376     KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
377     KM     L=      1.4  Lca=       .7   S=   42.9  Kn= .073  LAG=  51.1
378     KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
379     BA      .36
380     LG      .21     .24    4.00     .56   51.00
381     UI      24.     24.     59.     95.    118.    135.    156.    182.    232.    298.
382     UI     262.    217.    189.    161.    138.    117.     94.     61.     42.     39.
383     UI      31.     24.     21.      7.      7.      7.      7.      7.      7.      7.
384     UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
385     UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *

386     KK    D46B
387     KM    RETAIN 100 YEAR 2 HOUR, (16% FOR FUTURE DEVELOPMENT)
388     DT     D46       5
389     DI       0   10000
390     DQ       0   10000
        *

391     KK    CAP6
392     RS       1    FLOW      -1
393     SV       0   0.236   1.627   8.021
394     SE  1556.2    1558    1560    1562
395     SQ       0      52     180     350
        *

396     KK  RCAP6B
```

```
397          KM   CHANNEL PARAMETERS TAKEN FROM PLANS BY AMERICAN ENGINEERING
398          KM   FOR THE SUPERSTITION SKYLINE HIGH SCHOOL
399          KM   FLOW IS ROUTED ALONG THE TRANSMISSION LINE CORRIDOR
400          KM   ROUTE CONCENTRATION POINT CAP#6 TO SUBBASIN 29A (CRISMON CHANNEL)
401          RS       2    FLOW      -1
402          RC    .013    .013    .013    2300    .002
403          RX       0      39      40    45.5    53.5      59      60      99
404          RY     6.5     5.5     5.5       0       0     6.5     6.5     6.5
             *
```



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


405          KK     29A
406          KM   BASIN 29A
407          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
408          KM    L=       .9  Lca=       .4   S=   41.2  Kn= .107  LAG=  49.5
409          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
410          BA     .18
411          LG     .21     .24    4.00     .58   29.00
412          UI     12.     12.     33.     51.     63.     72.     84.     99.    131.    157.
413          UI    127.    107.     93.     78.     66.     56.     40.     24.     21.     19.
414          UI     12.     12.      5.      4.      4.      4.      4.      4.      4.      0.
415          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
416          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

417          KK    D29A
418          KM    RETAIN 100 YEAR 2 HOUR, (73% FOR FUTURE DEVELOPMENT)
419          DT    D29A       9
420          DI       0   10000
421          DQ       0   10000
             *

422          KK    C29A
423          HC       2
             *
             * OVERTOPPING OF CRISMON ROAD CHANNEL REMOVED TO REFLECT FUTURE CHANNEL

424          KK     45A
425          KM   BASIN 45A
426          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
427          KM    L=      2.0  Lca=      1.0   S=   70.4  Kn= .079  LAG=  66.1
428          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
429          BA     .62
430          LG     .21     .25    4.00     .60   19.00
431          UI     31.     31.     31.    101.    126.    150.    171.    187.    210.    238.
432          UI    273.    346.    409.    353.    303.    269.    243.    213.    190.    166.
433          UI    149.    120.     89.     56.     54.     52.     42.     31.     31.     22.
434          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.      0.
435          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
436          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

437          KK    D45A
438          KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
439          DT    D29A      24
440          DI       0   10000
441          DQ       0   10000
```

```
*
KK    D45A
KM    DIVERT 75% OF THE FLOW SOUTH,THE REMAINDER ALONG UNIVERSITY TO NEXT SUBBASIN
KM    CHANNEL ALONG UNIVERSITY, SOME SHEET FLOW IS DIVERTED
DT   45ATB
DI       0    5000
DQ       0    4750
*
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     55B
KM   BASIN 55B
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      3.5  Lca=      1.8   S=   48.6  Kn= .058  LAG=  79.5
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA    1.86
LG     .23     .25    4.10     .57   31.00
UI     79.     79.     79.    141.    269.    319.    374.    413.    451.    490.
UI    542.    600.    670.    821.    973.    999.    852.    753.    682.    628.
UI    569.    510.    465.    413.    376.    325.    252.    192.    139.    136.
UI    129.    124.     79.     79.     79.     54.     24.     24.     24.     24.
UI     24.     24.     24.     24.     24.     24.     24.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK    D55B
KM    RETAIN 100 YEAR 2 HOUR, (73% FUTURE DEVELOPMENT)
DT    D55B      92
DI       0   10000
DQ       0   10000
*

KK    C55B
KM   COMBINE 55B WITH DIVERTED FLOWS FROM 45A
HC       2
*

KK    CAP7
KM   ROUTE THROUGH CAP#7
RS       1    FLOW      -1
SV       0   0.167   0.309   0.539   24.52   85.75
SE  1560.5    1563 1564.27    1566    1568    1570
SQ       0       0     225     460     756    1017
*
*  FOLLOWING ROUTING CHANGED TO REFLECT FUTURE LAND USE CHANGES FOR
*  PARKWOOD RANCH

KK   RD45A
KM   RETURN DIVERTED FLOWS FROM 45A
DR   45ATB
*

KK   45ATB
KM   ROUTE REMAINDER OF FLOWS TO 45B
KM   STREET FLOW AND SHEET FLOW, NO DEFINED CHANNEL
RS      17    FLOW      -1
```

```
482          RC   0.055   0.035   0.055   10000   0.001
483          RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
484          RY       6     5.5       5       0       0       5     5.5       6
             *
```



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

485          KK     45B
486          KM   BASIN 45B
487          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
488          KM    L=      1.9  Lca=       .9   S=   45.0  Kn= .052  LAG=  45.2
489          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
490          BA     .66
491          LG     .22     .25    6.00     .22   50.00
492          UI     49.     49.    159.    219.    266.    309.    368.    482.    614.    516.
493          UI    425.    363.    302.    252.    202.    124.     86.     80.     53.     49.
494          UI     22.     15.     15.     15.     15.     15.      0.      0.      0.      0.
495          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

496          KK    D45B
497          KM    RETAIN 100 YEAR 2 HOUR, (42% FOR FUTURE DEVELOPMENT)
498          DT    D45B      24
499          DI       0   10000
500          DQ       0   10000
             *

501          KK    C45B
502          KM   COMBINE FLOWS FROM 45A AND 45B
503          HC       2
             *

504          KK    CAP8
505          KM   ROUTE THROUGH CAP OVERCHUTE #8
506          RS       1    FLOW      -1
507          SV       0   1.449   9.494   43.04
508          SE  1562.1    1564    1566    1568
509          SQ       0     120     436     935
             *

510          KK    C7+8
511          KM   COMBINE FLOW FROM OVERCHUTES #7 & #8
512          KM   ROUTE FLOW FROM HERE THROUGH PARKWOOD RANCH
513          HC       2
             *

514          KK  RCAP78
515          KM   ROUTE CAP OVERCHUTE #7 & #8 TO SUBBASIN 29B, A ROUTING OF ABOUT 4000 FT
516          KM   CHANNEL DIMENSIONS FROM PARKWOOD RANCH
517          KM  (ADMP CHANNEL ID CN4)
518          RS       3    FLOW      -1
519          RC    .035    .035    .035    4000   .0033
520          RX       0      12      27      45     125     143     158     170
521          RY     6.5     4.5       3       0       0       3     4.5     6.5
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
522        KK     29B
523        KM   BASIN 29B
524        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
525        KM    L=       .8  Lca=       .5   S=   52.6  Kn= .092  LAG=  42.2
526        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
527        BA     .08
528        LG     .18     .25    4.00     .66   17.00
529        UI      6.      7.     23.     31.     36.     43.     53.     74.     75.     59.
530        UI     50.     41.     34.     27.     16.     11.     10.      6.      6.      2.
531        UI      2.      2.      2.      2.      2.      0.      0.      0.      0.      0.
532        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

533        KK    D29B
534        KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
535        DT    D29B       5
536        DI       0   10000
537        DQ       0   10000
           *

538        KK   C29B1
539        KM   COMBINE FLOWS FROM CAP #7 OVERCHUTE AND SUBBASIN 29B
540        HC       2
           *

541        KK   C29B2
542        KM   COMBINE ROUTED FLOW FROM 29A WITH SUBBASIN 29B
543        HC       2
           *

544        KK   TRANS
545        KM   ROUTE FLOW ALONG THE TRANSMISSION CORRIDOR
546        KM   ADJACENT TO SCHOOL SITE AND PARKWOOD RANCH
547        KM  (ADMP CHANNEL ID CN3)
548        RS       1    FLOW      -1
549        RC    .013    .013    .013    2600   .0015
550        RX       0      39      40      51      78      89      90     129
551        RY     6.5     5.5     5.5       0       0     5.5     5.5     6.5
           *

552        KK     29C
553        KM   BASIN 29C
554        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
555        KM    L=       .9  Lca=       .5   S=   58.8  Kn= .074  LAG=  34.7
556        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
557        BA     .23
558        LG     .24     .25    5.70     .27   32.00
559        UI     23.     43.     95.    124.    153.    199.    280.    226.    180.    143.
560        UI    113.     77.     41.     36.     23.     15.      7.      7.      7.      7.
561        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
562        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
```



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

563        KK    D29C
```

```
564          KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
565          DT     D29      17
566          DI       0   10000
567          DQ       0   10000
             *

568          KK   C29C2
569          KM   COMBINE ROUTED FLOWS FROM C29B2 AND C29C1
570          HC       2
             *

571          KK  29CTD1
572          KM   REACH PR-2, PR-3
573          KM   ROUTE FLOW ALONG SOUTH OF SCHOOL AND SOUTH ALONG CRISMON TO SOUTHERN
574          KM   GRASS LINED CHANNEL
575          RS       1    FLOW      -1
576          RC    .045    .045    .045    2500   .0025
577          RX       0      20      40      69     109     139     147     155
578          RY     6.5     5.5     4.9       0       0     4.9     5.5     6.5
             *

579          KK      55
580          KM   BASIN 55
581          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
582          KM    L=       .5  Lca=       .2   S=   72.3  Kn= .081  LAG=  22.2
583          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
584          BA     .14
585          LG     .24     .24    4.60     .40   29.00
586          UI     21.     85.    128.    192.    243.    167.    116.     63.     35.     20.
587          UI      7.      7.      7.      0.      0.      0.      0.      0.      0.      0.
588          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

589          KK     D55
590          KM    RETAIN 100 YEAR 2 HOUR, (90% FOR FUTURE DEVELOPMENT)
591          DT     D55       9
592          DI       0   10000
593          DQ       0   10000
             *

594          KK    CAP9
595          RS       1    FLOW      -1
596          SV       0    2.03  10.075  43.569
597          SE  1562.1    1564    1566    1568
598          SQ       0     120     436     935
             *

599          KK   RCAP9
600          KM   ROUTE CAP OVERCHUTE #9 TO SUBBASIN 29D
601          KM   UNLINED CHANNEL THROUGH PARKWOOD RANCH
602          KM   DESIGN PLANS BY STANDAGE & TRUITT
603          KM   CHANNEL REVISED BY HOSKIN ENG.
604          KM   CHANNEL ID FOR THAT PART OF THE CHANNEL THAT CUT ACROSS 29D)
```



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

605          RS       3    FLOW      -1
606          RC    .035    .035    .035    4700   .0050
607          RX       0      16      30      40      50      60      74      90
```

```
608        RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
           *

609        KK     29D
610        KM   BASIN 29D
611        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
612        KM    L=      1.2  Lca=       .9   S=   40.7  Kn= .066  LAG=  47.8
613        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
614        BA     .65
615        LG     .21     .25    4.90     .35   43.00
616        UI     46.     46.    133.    196.    239.    275.    325.    390.    532.    552.
617        UI    439.    375.    319.    270.    225.    177.    111.     80.     75.     51.
618        UI     46.     26.     14.     14.     14.     14.     14.     14.      0.      0.
619        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

620        KK    D29D
621        KM    RETAIN 100 YEAR 2 HOUR, (53% FOR FUTURE DEVELOPMENT)
622        DT    D29D      27
623        DI       0   10000
624        DQ       0   10000
           *

625        KK   D29D2
626        KM   DIVERT APPROXIMATLY 2/3 OF SUBBASIN 29D'S FLOW TO THE EAST. THIS HAPPENS
627        KM   BECAUSE CHANNEL CN5 CUTS ACROSS SUBBASIN 29D. ONLY THOSE FLOWS TO THE EAST OF
628        KM   THE CHANNEL GET INTO THE CHANNEL
629        DT   D29DE   10000
630        DI       0     100     200     500     800
631        DQ       0      66     132     330     528
           *
           *       *****KVM*****

632        KK   C29C3
633        KM  COMBINE FLOWS FROM C29C2, D29D2, AND RCAP9
634        HC       3
           *
           * RETENTION BASIN 5, OPTION 2

635        KK  BASIN5
636        KM  WITH 36-INCH OUTFALL
637        RS       1    STOR      -1
638        SA       0     3.9      11    13.7      14      14
639        SE    1518    1521    1523    1524    1528    1531
640        SL    1518   18.00     0.6     0.5
641        SS    1528     200     2.5     1.5
           *
```



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

642        KK   RBAS5
643        KM   REACH PR-1
644        KM   ROUTE FLOWS FORM 29D (WESTERN 1/3) TO SUBBASIN 36.  CRISMON AND SOUTHERN TO
645        KM  THE SUPERSTITION FWY. (PREVIOUSLY CALLED 29DT36)
646        RS       1    FLOW      -1
647        RC   0.025   0.025   0.025    2150  0.0017
648        RX       0      20      25      32      44      60      68      76
649        RY     3.8     3.9       4       0       0       4     3.9     3.8
```

```
*
KK   G29DE
KM   RECALL THE EASTERN 2/3 OF SUBBASIN 29D. THIS IS RECALLED 2600 FT EAST OF
KM   CRISMON RD.
DR   D29DE
*
*  FOLLOWING ROUTE ADDED BY HOSKIN ENG.*

KK   29T36
KM   ROUTE FLOW FROM PARKWOOD RANCH THROUGH NEW UNLINED CHANNEL
KM   CROSS-SECTION MATCHES PARKWOOD RANCH CHANNEL
KM  (ADMP CHANNEL ID CN5)
RS       3    FLOW      -1
RC    .035    .035    .035    3000   .0050
RX       0      16      30      40      50      60      74      90
RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
*

KK     36C
KM   BASIN 36C
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .6   S=   44.2  Kn= .020  LAG=  12.4
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .44
LG     .10     .25    4.65     .47   80.00
UI    266.    780.   1282.    724.    259.     83.     37.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK    D36C
KM    RETAIN 100 YEAR 2 HOUR, (87% FOR FUTURE DEVELOPMENT)
DT    D36C      38
DI       0   10000
DQ       0   10000
*

KK     C36
KM   COMBINE FLOWS IN CHANNEL ACROSS PARKWOOD RANCH (SUBBASIN 29D) WITH SUBBASIN 3
HC       3
*
* DDM   ***** Preserved *****
```



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

KK   36T37
KM   ROUTE C36 TO C37 VIA ADOT CONCRETE CHANNEL
RS    1.76    FLOW      -1
RC   0.035   0.013   0.035    5280  0.0033
RX       0     500    1000    1012    1020    1032    1532    2032
RY      13    12.5      12       0       0      12    12.5      13
*
* DDM   ***** Updated *****

KK     30b
KM   BASIN 30b
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.5  Lca=       .9   S=   43.3  Kn= .060  LAG=  48.3
```

```
689        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
690        BA     .81
691        LG     .27     .27    4.00     .52   25.00
692        UI     57.     57.    161.    241.    296.    339.    400.    475.    645.    703.
693        UI    558.    475.    407.    344.    288.    236.    149.    101.     94.     71.
694        UI     57.     41.     17.     17.     17.     17.     17.     17.      0.      0.
695        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

696        KK   30bT37
697        KM   ROUTE FLOWS FROM S30b TO C37 VIA NATURAL CHANNEL
698        RS     4.4    FLOW      -1
699        RC   0.040   0.035   0.040    2640   0.053
700        RX       0       2       3       4       7       8      28     528
701        RY       6       5       5       0       0       4     4.5       5
           * DDM   ***** Updated *****

702        KK      37
703        KM   BASIN 37
704        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
705        KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
706        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
707        BA     .47
708        LG     .31     .33    4.00     .49   14.00
709        UI    184.    569.   1051.    922.    531.    204.     85.     32.      0.      0.
710        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           * DDM   ***** Preserved *****

711        KK     C37
712        KM   COMBINE FLOWS FROM S37, S30, AND C36 AT C37
713        HC       3
           *
           * DDM   ***** Preserved *****

714        KK  ADOTEL
715        KM   ADOT DETENTION BASIN 4313 AT ELLSWORTH RD. AND SUPERSTITION
716        KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
717        KM        COUNTY
718        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
719        KM            A-N WEST, INC., FEBRUARY, 1987.
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

720        RS       1    ELEV      56
721        SV       0     617     650
722        SE      56      74      75
723        SL      56    3.14     0.6     .05
724        SS      74     200     2.6     1.5
           *
           * DDM   ***** Preserved *****

725        KK   37T38
726        KM   ROUTE FLOWS FROM C37 TO C38 VIA ADOT CONCRETE CHANNEL
727        RS    1.76    FLOW      -1
           *
728        *R  C0.035   0.012   0.035    5280  0.0045
           *
           * *** Revised by PB to reflect routing to Detention Basin NE-1 ****
```

```
          *
729       RC   0.035   0.012   0.035    3280  0.0045
730       RX       0     500    1000    1012    1020    1032    1532    2032
731       RY      13    12.5      12       0       0      12    12.5      13
          *
          * *** Revised by PB to reflect area of original Basin 38 that drains to
          *     Detention Basins NE-1 and NE-2 ****
          *

732       KK     38A
733       BA    .235
734       LG     .25     .29    4.25     .44    31.0
735       UI    15.5    15.5      39    63.5      78    89.5   103.5     121   156.5     196
736       UI     170     141   123.5   104.5    89.5      76    59.5    38.5    27.5    25.5
737       UI    19.5    15.5    12.5       5       5       5       5       5       5       5
738       UI       0       0       0       0       0       0       0       0       0       0
739       UI       0       0       0       0       0       0       0       0       0       0
          *

740       KK    C38A
741       HC       2
          *

742       KK  202NE1
743       RS       1    ELEV  1436.2
744       SV       0     0.4     2.8     6.4    14.3    28.8    36.4    44.1    52.0    60.7
745       SE  1436.2  1437.0  1438.0 1438.73  1440.0  1442.0  1443.0  1444.0  1445.0  1446.0
746       SQ       0       0       0       0      43      69      79      88      96     103
          *

747       KK  202NE2
748       RS       1    ELEV  1433.9
749       SV       0     0.9     3.7     8.1    12.8    17.8    22.8    28.2    33.5    40.1
750       SE  1433.9  1435.0  1436.0  1437.0  1438.0  1439.0  1440.0  1441.0  1442.0  1443.0
751       SQ       0     5.0    12.8    20.7    25.1    29.1    32.7    36.0    39.1    42.0
          *
          * *** End of revisions by PB at this location ****
          *
          * DDM ***** Updated *****
1                                   HEC-1 INPUT                                          PAGE 20

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


752       KK     17A
753       KM   BASIN 17A
754       KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
755       KM    L=       .7  Lca=       .5   S=   60.6  Kn= .042  LAG=  18.5
756       KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
757       BA     .18
758       LG     .26     .28    4.00     .55   33.00
759       UI     44.    151.    233.    375.    265.    171.     77.     42.     16.     10.
760       UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
761       UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          *
          * DDM   ***** Preserved *****

762       KK  17AT23
763       KM   ROUTE FLOWS FROM 17 TO 23 VIA DIRT CHANNEL, THEN NATURAL WASH
764       RS       3    FLOW      -1
```

```
765          RC   0.045   0.032   0.045    2600   0.015
766          RX       0     100     133     137     142     147     200     300
767          RY       5       4     3.5       0       0     3.5       4       5
             *
             * DDM   ***** Updated *****

768          KK      23
769          KM   BASIN 23
770          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
771          KM    L=      1.0  Lca=       .3   S=   65.0  Kn= .038  LAG=  16.2
772          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
773          BA     .28
774          LG     .28     .30    4.00     .53   20.00
775          UI     92.    296.    509.    595.    357.    170.     77.     28.     18.      0.
776          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
777          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Updated *****

778          KK      48
779          KM   BASIN 48
780          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
781          KM    L=      1.6  Lca=       .8   S=   80.2  Kn= .038  LAG=  26.4
782          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
783          BA     .77
784          LG     .31     .31    4.10     .49   12.00
785          UI     98.    305.    517.    682.   1035.   1076.    777.    573.    390.    190.
786          UI    136.     85.     30.     30.     30.      0.      0.      0.      0.      0.
787          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

788          KK    CAP3
789          RS       1    FLOW      -1
790          SV       0   0.934   1.222   4.303   13.13
791          SE  1564.6  1567.5    1568    1570    1572
792          SQ       0       0     143     750    1530
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


793          KK  BASIN3
             * KO     1       2
794          KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP3
795          KM        WITH 30-INCH OUTFALL    BASIN AE2B (BASIN 3)
796          RS       1    STOR      -1
797          SA       0      .5       1     1.8     3.4       4       6       6
798          SE      55      56      57      58      59      60      62      65
799          SL   56.25    4.91     .62      .5
800          SS      62     100     2.5     1.5
             *
             * DDM   ***** Preserved *****

801          KK  RCAP3A
802          KM   ROUTE CAP OVERCHUTE #3 TO APACHE TRAIL (ALONG NATURAL CHANNEL)
803          RS     3.3    FLOW      -1
804          RC    .055    .045    .055    2000    .020
805          RX     100     200     300     305     310     315     415     515
```

```
806        RY      7      6      5      0      0      5      6      7
           *
           * DDM   ***** Preserved *****

807        KK  RCAP3B
808        KM   ROUTE CAP OVERCHUTE #3 FROM APACHE TRAIL TO 17B
809        RS      1    FLOW     -1
810        RC   .045    .035   .045   2300    .01
811        RX    100     200    300    301    311    312    412    512
812        RY      3       2      1      0      0      1      2      3
           *
           * DDM   ***** Updated *****

813        KK     17B
814        KM   BASIN 17B
815        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
816        KM    L=       .8  Lca=       .6   S=   50.0  Kn= .042  LAG=  21.2
817        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
818        BA     .22
819        LG     .26     .28    4.00    .54   30.00
820        UI     37.    146.    220.   348.    372.   252.   169.    77.    47.    23.
821        UI     11.     11.      0.     0.      0.     0.     0.     0.     0.     0.
822        UI      0.      0.      0.     0.      0.     0.     0.     0.     0.     0.
           *
           * DDM   ***** Preserved *****

823        KK    C17B
824        KM    COMBINE FLOWS FROM CAP OVERCHUTE #3 AND S17B
825        HC       2
           * DDM   ***** Preserved *****

826        KK  17BT22
827        KM   ROUTE FLOWS FROM S17 TO C22 VIA LINED CHANNEL
828        RS      3    FLOW     -1
829        RC  0.035   0.015  0.035   2700  0.0114
830        RX      0       1      3      6     18     21     36     70
831        RY   6.25    6.10      6      0      0      3   3.25    3.5
           *
           * DDM   ***** Updated *****
```



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

832        KK     47
833        KM   BASIN 47
834        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
835        KM    L=      3.0  Lca=      1.5   S=   51.2  Kn= .037  LAG=  44.8
836        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
837        BA    1.67
838        LG     .32     .32    4.00    .49    8.00
839        UI    126.    126.    418.   569.    691.   804.   959.  1272.  1579.  1302.
840        UI   1079.    920.    765.   631.    492.   300.   218.   205.   126.   126.
841        UI     42.     39.     39.    39.     39.    39.     0.     0.     0.     0.
842        UI      0.      0.      0.     0.      0.     0.     0.     0.     0.     0.
           *
           * DDM   ***** Preserved *****
           * KKCAP4+5
           * KM ROUTE THROUGH OVERCHUTES 4 AND 5, HUYDRAULICALLY CONNECTED
           * KM STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
```

```
* RS      1    FLOW      -1
* SV      0   0.081   0.483   4.779   39.02  121.88
* SE1568.3    1570    1572    1574    1576    1578
* SQ      0     170     575    1085    1245    1410
*

KK  BASIN4
KM   ROUTE THROUGH OVERCHUTES 4 AND 5, HYDRAULICALLY CONNECTED
KM   STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
KM  OUTFLOW THROUGH ONE 30-INCH PIPE
KM        BASIN4 (BY4B)
RS       1    STOR      -1
SA       0    0.64      2.3    5.28    6.88    9.41
SE      68      69       70      71      72      76
SL   69.75    4.91      .62      .5
SS      74     200      2.5     1.5
*
* DDM   ***** Preserved *****

KK   RCAP4
KM   ROUTE CAP OVERCHUTE #4 AND #5 TO SUBBASIN 22
RS      10    FLOW      -1
RC     .05    .045     .05    6000    .005
RX     100     200     300     304     310     314     414     514
RY       6       5       4       0       0       4       5       6
*
* DDM   ***** Updated *****

KK      22
KM   BASIN 22
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=      .3   S=   51.3  Kn= .041  LAG=  19.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .41
LG     .27     .28    4.00     .54   29.00
UI     86.    310.    470.    782.    624.    415.    227.    109.     56.     21.
UI     21.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
* DDM   ***** Preserved *****
```



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

KK    C22A
KM   COMBINE FLOWS FROM CAP OVERCHUTES 4 & 5 AND SUBBASIN 22
HC       2
* DDM   ***** Preserved *****

KK     C22
KM   COMBINE S17B AND S22
HC       2
* DDM   ***** Preserved *****

KK   22T23
KM   ROUTE C22 TO C23 VIA CONCRETE CHANNEL
KM   VELOCITY = 5FT/S
RS       2    FLOW      -1
RC   0.045   0.022   0.042    2640   0.001
RX       0     102     103     106    1021     124     128     270
```

```
881        RY       7     6.5       6       0       0       3       5       7
           *
           * DDM   ***** Preserved *****

882        KK     C23
883        KM   COMBINE FLOWS FROM C22, C17A, AND S23 AT C23
884        HC       3
           * DDM   ***** Preserved *****

885        KK   23T24
886        KM   ROUTE FLOWS FROM C23 TO C24 VIA CONCRETE LINED CHANNEL
887        RS       2    FLOW      -1
888        RC   0.045   0.022   0.045    2640  0.0117
889        RX       0       2       3       6      21      24      26      70
890        RY       6       6       6       0       0       3       5       6
           *
           * DDM   ***** Updated *****

891        KK      49
892        KM   BASIN 49
893        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
894        KM    L=      1.6  Lca=       .8   S=   73.6  Kn= .040  LAG=  28.4
895        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
896        BA     .79
897        LG     .30     .30    4.15     .48   14.00
898        UI     94.    257.    467.    603.    836.   1129.    839.    643.    482.    296.
899        UI    161.    117.     74.     29.     29.     29.      0.      0.      0.      0.
900        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

901        KK    CAP2
902        RS       1    FLOW      -1
903        SV       0    0.02   0.538   2.545  13.729
904        SE  1565.1    1566    1568    1570    1572
905        SQ       0      60     340     807    1395
           *
1                                   HEC-1 INPUT                                          PAGE 24

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


906        KK  BASIN2
           * KO     1
907        KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP2
908        KM        WITH 24-INCH OUTFALL      (EH1B)
909        RS       1    STOR      -1
910        SA       0     .54    1.81    4.10    5.14     6.3     6.3     6.3
911        SE      49      51      52      53      54      55      64      67
912        SL      50    3.14     .62      .5
913        SS    56.5     100     2.5     1.5
           *

914        KK  RCAP2A
915        KM   ROUTE BASIN 2 OUTFLOW THROUGH 36-INCH PIPE
916        RK    1370  0.0088   0.012            CIRC       3
           *
           * DDM   ***** Preserved *****

917        KK   RCAP2
```

```
918        KM   ROUTE CAP OVERCHUTE #2 ACROSS ELLSWORTH ROAD TO 18A
919        RS      10    FLOW      -1
920        RC    .045    .040    .045    7500    .012
921        RX     100     200     300     316     321     329     429     529
922        RY       6       5       3       0       0       3       5       6
           *
           * DDM   ***** Updated *****

923        KK      50
924        KM   BASIN 50
925        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
926        KM    L=       .9  Lca=       .4   S=   81.4  Kn= .037  LAG=  15.8
927        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
928        BA     .28
929        LG     .33     .31    4.00     .49    5.00
930        UI     97.    306.    543.    575.    342.    149.     71.     21.     18.      0.
931        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
932        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

933        KK    CAP1
934        RS       1    FLOW      -1
935        SV       0   0.091   0.575   3.319  13.256
936        SE    1566    1568    1570    1572    1574
937        SQ       5      90     275     470     610
           *

938        KK  BASIN1
           * KO     1       2
939        KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP1
940        KM        WITH 24-INCH OUTFALL
941        RS       1    STOR      -1
942        SA    0.01    1.94    3.10    3.49    3.94    4.40    4.85
943        SE      60      61      62      63      64      65      66
944        SL    60.2    3.14     .62      .5
```



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

945        SS      64      50     2.5     1.5
           *
           *
           * DDM   ***** Preserved *****

946        KK   RCAP1
947        KM   ROUTE CAP OVERCHUTE #1 TO SUBBASIN 18A
948        RS      11    FLOW      -1
949        RC     .05    .045     .05    7000     .02
950        RX     100     200     300     301     303     304     404     505
951        RY       6       5       2       0       0       2       5       6
           *
           * DDM   ***** Updated *****

952        KK     18c
953        KM   BASIN 18c
954        KM    THIS IS THE FUTURE SUBBASIN
955        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
956        KM    L=      1.2  Lca=       .7   S=   66.1  Kn= .061  LAG=  37.2
957        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
```

```
958          BA     .50
959          LG     .22     .25    4.00     .57   44.00
960          UI     45.     75.    180.    237.    287.    355.    507.    531.    407.    335.
961          UI    268.    214.    140.     80.     72.     45.     34.     14.     14.     14.
962          UI     14.     14.      0.      0.      0.      0.      0.      0.      0.      0.
963          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

964          KK    D18c
965          KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (53% OF BASIN HAS RETENTION
966          DT    D18c      20
967          DI       0   10000
968          DQ       0   10000
             *
             * DDM   ***** Preserved *****

969          KK    C18C
970          KM    COMBINE FLOWS FROM ROUTED FLOW OF SUBBASIN 50 WITH FLOW FROM 18c
971          KM    BEFORE CROSSING UNDERNEATH APACHE BLVD AND GOING INTO THE HAWES CHANNEL
972          HC       2
             *
             * DDM   ***** Preserved *****

973          KK   18T24
974          KM   REACH HS-6, HS-7, HS-8
975          KM   ROUTE FLOWS FROM SUBBASIN 18A TO SUBBASIN 24.
976          RS       1    FLOW      -1
977          RC    .025    .015    .025    2730  0.0017
978          RX       0       8      16      26      46      58      65      73
979          RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
             *  THE ABOVE CHANNEL DIMS ARE BASED ON THE NARROWEST DESIGN REACH.
             *
             * DDM   ***** Updated *****
1                                    HEC-1 INPUT                                          PAGE 26

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


980          KK      24
981          KM   BASIN 24
982          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
983          KM    L=       .9  Lca=       .5   S=   43.5  Kn= .047  LAG=  24.6
984          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
985          BA     .29
986          LG     .23     .26    4.00     .58   38.00
987          UI     40.    138.    220.    300.    469.    376.    275.    195.    100.     63.
988          UI     40.     12.     12.     12.      0.      0.      0.      0.      0.      0.
989          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

990          KK     C24
991          KM   COMBINE FLOWS FROM C23, S18A AND S24
992          ZW     A=HAWES RD @ BROADWAY RD   B=HAWES CHANNEL PROJECT  C=FLOW   F=HYDROGRAPH
993          HC       4
             *
             * DDM   ***** Preserved *****

994          KK  BRDHAW
995          KM    DIVERT FLOW OF 360 CFS TO THE WEST PER THE CITY OF MESA FUTURE DRAINAGE
```

```
KM    SYSTEM
DT  DIVBRD
DI       0     200     400     500     700    1000
DQ       0       0       0       0       0       0
* DI     0     200     400     500     700    1000
* DQ     0     200     360     360     360     360
*

KK  RT31B1
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-5 plus culvert HSC-4
KM   ROUTE FLOWS FROM HAWES ROAD AND BROADWAY ROAD (C24) TO CORAL BELL AVENUE.
KO                                        21                        10
ZW   A=FLOW AFTER 360 CFS DIVERT TO WEST B=HAWES CHANNEL PROJECT C=FLOW  F=HYDRO
RS       1    FLOW      -1
RC    .025    .015    .025    1312  0.0015
RX       0       8      15      28      68      81      89      97
RY     6.2     6.4     6.5       0       0     6.5     6.4     6.2
*

KK  RT31B2
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-4A AND HS4-B plus culvert HSC-3
KM   ROUTE FLOWS FROM CORAL BELL AVENUE TO EMELITA AVENUE.
RS       1    FLOW      -1
RC    .025    .015    .025    2080  0.0018
RX       0       8    15.9      16      66    66.1      74      82
RY     5.8     5.9     6.1       0       0     6.1     5.9     5.8
*
```



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

KK  RT31B3
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-3
KM    THIS REACH IS AN EXISTING CHANNEL FOR THE CRESCENT RUN MOBILE HOME PARK.
KM    The existing channel 5.6 ft deep has no freeboard.  Overbank flows in street
KM    Routing values per channel design plans,
KM    Sheet 2 of 19, City of Mesa Project 97-69.
KM   ROUTE FLOWS FROM EMELITA AVENUE TO SOUTHERN AVENUE (C31) WITHIN SUBBASIN 31B.
RS       1    FLOW      -1
RC    .025    .015    .025    1935  0.0033
RX       0    35.6    41.6      50    66.7    75.1    81.1    92.0
RY     5.4     4.7     5.6       0       0     5.6     7.6     7.7
*
* DDM   ***** Updated *****
*

KK     31B
KM   BASIN 31B
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .5   S=   29.7  Kn= .049  LAG=  30.8
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .47
LG     .24     .25    4.45     .46   37.00
UI     52.    125.    240.    309.    399.    601.    544.    416.    321.    243.
UI    141.     88.     63.     44.     16.     16.     16.     16.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
*
KK    D31B
KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
DT    D31B      23
DI       0   10000
DQ       0   10000
*
* DDM   ***** Preserved *****

KK     C31
KM   COMBINE FLOWS FROM C24  WITH S31A AND S31B
ZW   A=FLOW SOUTHERN AND HAWES BEFORE SPLIT BOX B=HAWES CHANNEL PROJ C=FLOW F=HYDR
HC       2
*
* DDM   ***** Preserved *****

KK    D31W
KM    THIS DIVERT RECORD IS FOR THE BOX CULVERT SYSTEM AT SOUTHERN AVE AND HAWES
KM    IT IS BASED UPON A HEC-RAS ANALYSIS OF THE FOLLOWING STRUCTURES:
KM    3-8'X4' CBC SOUTH,  2-10'X6' CBC TO THE WEST
KM    THE CULVERT TO THE SOUTH HAS THE TWO THAT ARE THERE NOW WITH AN ADDITIONAL
KM    ONE CONSTRUCTED
DT    D31W
*  THESE NEW CARDS BASED UPON HEC-RAS ANALYSIS
DI       0     144     182     252     380     454     544     671     758     844
DI     976    1098    1184    1280    1412    1544    1646    1738    1830
DQ       0     144     182     220     316     358     400     460     520     580
```



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

DQ     640     690     740     800     860     920     980    1030    1080
*
*

KK  31T381  ROUTED IN TWO STEPS DUE TO CHANNEL DISSIMILARITY.
KM   REACH HS-2 plus culvert HSC-2
KM     ROUTE FLOWS FROM SOUTHERN AVENUE (C31) IN THE HAWES CHANNEL.
KM   REACH HS-2 IS A PROPOSED CHANNEL SOON-TO-BE-CONSTRUCTED.  IT IS 4.5 FEET
KM     DEEP, WITH FREEBOARD. CHANNEL CROSS-SECTION FROM DESIGN PLANS FOR
KM     SOUTHERN AVENUE DRAINAGE IMPROVEMENTS.  SHEET 28 OF 43
KM     CITY OF MESA PROJECT NO. 97-56.1 DESIGN PLANS BY ENTELLUS
KM     DATED 8/8/97 REV. 12/19/97
RS       1    FLOW      -1
RC   0.025   0.015   0.025    1248   .0022
RX       0      32      37      46      56      65      73      75
RY       5     7.0     4.5       0       0     4.5     9.0     9.5
*

KK  31T382
KM   REACH HS-1 plus culvert HSC-1
KM     ROUTE FLOWS TO SUPERSTITION FREEWAY (C38)
KM     IN THE HAWES CHANNEL.
RS       1    FLOW      -1
RC   0.025   0.015   0.025     810   .0017
RX       0      10      16      26      51      61      77      81
RY     5.3     4.8     4.9       0       0     4.9     4.6     3.6
*
* INSERTED HERE
```

```
*
* DDM   ***** Updated *****

KK     30a
KM   BASIN 30a
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .7   S=   48.8  Kn= .060  LAG=  38.1
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .30
LG     .27     .28    3.91     .53   28.00
UI     27.     42.    104.    138.    166.    204.    281.    329.    251.    208.
UI    167.    135.     96.     54.     45.     32.     27.      9.      8.      8.
UI      8.      8.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK  30at31
KM   ROUTE SUBBASIN 30A IN VARIOUS CHANNELS UNTIL IT COMBINES WITH SUBBASIN 31A
KM   AT THE CORNER OF 88TH ST AND SOUTHERN.  IN REALITY THIS ROUTING COULD BE
KM   BROKEN UP INTO POSSIBLY 3 DIFFERENT ROUTINGS DUE TO CHANGES IN HOW THE
KM   ROUTING IS ACCOMPLISHED, IE. CEMENT CHANNEL, EARTH LINED CHANNEL AND OPEN
KM   WASH. THE PARAMETERS WILL TRY TO BE AN AVERAGE FOR THE ENTIRE REACH
RS       4    FLOW      -1
RC    .038    .030    .038    5000    .005
RX       0      15      25      40      60      75      85     100
RY       8       6       3       2       2       3       6       8
*
* DDM   ***** Updated *****
```



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

KK     31A
KM   BASIN 31A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.0  Lca=       .5   S=   43.3  Kn= .064  LAG=  22.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .53
LG     .29     .29    4.15     .46   18.00
UI     80.    312.    472.    702.    919.    639.    448.    259.    135.     81.
UI     28.     25.     25.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
*
* *** Revised by PB for Interim Conditions ****
*
* KK31AT38
* KM ROUTE S31A TO 38
* RS     6    FLOW      -1
* RC   .04     .03     .04    3500    .012
* RX   100     200     300     302     307     309     409     509
* RY     4       3       2       0       0       2       3       4
* *
* * DDM   ***** Updated *****
* KK    38
* KM BASIN 38
* KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
* KM  L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  50.8
* KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
* BA   .47
* LG   .25     .29    4.25     .44   31.00
* UI   31.     31.     78.    127.    156.    179.    207.    242.    313.    39
* UI  340.    282.    247.    209.    179.    152.    119.     77.     55.     5
* UI   39.     31.     25.     10.     10.     10.     10.     10.     10.     1
* UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
* UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
* *
* *
* * DDM   ***** Preserved *****
* KK   C38
* KM COMBINE FLOWS FROM S38, C37 AND D31A AND B AT C38
* HC     4
* * DDM   ***** Preserved *****
* KK 38T39
* KM ROUTE FLOWS FROM C38 TO C39 VIA CONCRETE CHANNEL
* RS  1.32    FLOW      -1
* RC 0.035   0.012   0.035    3960  0.0066
* RX     0     500    1000    1012    1020    1032    1532    2032
* RY    13    12.5      12       0              12    12.5      13
* * ADOT DETENTION BASINS FROM URS REPORT SEPT 1988
* * DDM   ***** Preserved *****
* KK ADD10
* KM  BASIN #10 - OFF-LINE DETENTION POND TO ATTENUATE PEAK FLOWS
* KM   BUT DO NOT DELAY THE PEAK
* DT  DB10
* DI   807     879     961    1070    1190    1320
* DQ     0      29      61     120     190     270
* * DDM   ***** Preserved *****
* KK  ADD9
* KM BASIN #9 - OFF-LINE DETENTION POND
* DT   DB9
* DI   626     660     751     861     987    1128
* DQ     0      10      51     110     189     278
* * DDM   ***** Preserved *****
* KK  ADD8
* KM BASIN #8 - OFF-LINE DETENTION POND
* DT   DB8
* DI   464     521     627     752     898
* DQ     0      21      77     152     248
* * DDM   ***** Preserved *****
* KK  ADD7
* KM BASIN #7 - OFF-LINE DETENTION POND
* DT   DB7
* DI   770     810     892     988    1093    1207    1331    1462
* DQ     0      10      42      88     143     207     281     362
* * DDM   ***** Preserved *****
* KK  ADD6
* KM BASIN #6 - OFF-LINE DETENTION POND
* DT   DB6
* DI   685     703     781     875     978    1092    1215
* DQ     0       3      31      75     128     192     265
* * DDM   ***** Preserved *****
* KK  ADD5
* KM BASIN #5 - OFF-LINE DETENTION POND
* DT   DB5
* DI  1005    1063    1141    1227    1320    1421    1527
* DQ     0      13      41      77     120     171     227
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                *
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1111            KK    C31A
1112            KM    COMBINE FLOWS FROM SUBBASIN 30A WITH SUBBASIN 31 AT THE SW CORNER OF SUB-31
1113            HC       2
                *
                * DDM   ***** Updated *****

1114            KK     38B
1115            BA    .235
1116            LG     .25     .29    4.25     .44    31.0
1117            UI    15.5    15.5      39    63.5      78    89.5   103.5     121   156.5     196
1118            UI     170     141   123.5   104.5    89.5      76    59.5    38.5    27.5    25.5
1119            UI    19.5    15.5    12.5       5       5       5       5       5       5       5
1120            UI       0       0       0       0       0       0       0       0       0       0
1121            UI       0       0       0       0       0       0       0       0       0       0
                *

1122            KK    C38B
1123            HC       2
                *

1124            KK  202NW1
1125            RS       1    ELEV  1433.0
1126            SV       0     0.7     3.5     8.0    10.5    12.9    18.1    20.8    23.4    28.9
1127            SE  1433.0  1434.0  1435.0  1436.0  1436.5  1437.0  1438.0  1438.5  1439.0  1440.0
1128            SQ       0       0       0       0       0     266     451     502     551     814
                *

1129            KK  202NW2
1130            RS       1    ELEV  1430.3
1131            SV       0     0.2     1.9     6.1    12.5    19.8    23.6    27.3    31.2    35.2
1132            SV    39.2
1133            SE  1430.3  1431.0  1432.0  1433.0  1434.0  1435.0  1435.5  1436.0  1436.5  1437.0
1134            SE  1437.5
1135            SQ       0       5      27      61      96     122     186     304     469     683
1136            SQ     946
                * DDM   ***** Preserved *****

1137            KK    C38C
1138            KM   COMBINE FLOWS FROM S38, C37 AND D31A AND B AT C38
1139            HC       3
                * DDM   ***** Preserved *****

1140            KK   38T39
1141            KM   ROUTE FLOWS FROM C38C TO C39 VIA CONCRETE CHANNEL
1142            RS    1.32    FLOW      -1
1143            RC   0.035   0.012   0.035    3960  0.0066
1144            RX       0     500    1000    1012    1020    1032    1532    2032
1145            RY      13    12.5      12       0              12    12.5      13
                *
                * *** End of revisions by PB at this location ****
                *
```



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

```
1146        KK    R31W
1147        KM   RETURN DIVERTED FLOW AT CORNER OF SOUTHERN AND HAWES
1148        DR    D31W
            *
            * DDM   ***** Preserved *****

1149        KK  31WT32
1150        KM   ROUTE FLOWS FROM D31A TO C32
1151        RS    1.76    FLOW      -1
1152        RC    .035    .022    .035    5280   .0027
1153        RX       0    2005    2012    2012    2106    2106    2113    3122
1154        RY     4.5     4.5     3.5       0       0     3.5     4.5     4.5
            *
            * DDM   ***** Updated *****

1155        KK      32
1156        KM   BASIN 32
1157        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1158        KM    L=       .9  Lca=       .5   S=   38.9  Kn= .055  LAG=  29.1
1159        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1160        BA     .38
1161        LG     .23     .25    4.55     .44   27.00
1162        UI     43.    115.    212.    273.    368.    529.    407.    314.    237.    161.
1163        UI     81.     62.     43.     14.     13.     13.     13.      0.      0.      0.
1164        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * KK   D32
            * KM  RETAIN 100 YEAR 2 HOUR, (FULLY DEVELOPED - NO RETENTION)
            * DT   D32       0
            * DI     0   10000
            * DQ     0   10000
            *
            * DDM   ***** Preserved *****

1165        KK     C32
1166        KM    COMBINE SOSSAMAN CHANNEL FLOWS WITH FLOWS FROM 32
1167        HC       2
            *
            * DDM   ***** Preserved *****

1168        KK   32T39
1169        KM   ROUTE FLOWS FROM C32 TO C39
1170        RS    0.88    FLOW      -1
1171        RC   0.012   0.012   0.012    2640   0.004
1172        RX       0       5      10      28      38      60      65      70
1173        RY      14      14      14       0       0      14      14      14
            * DDM   ***** Updated *****

1174        KK      39
1175        KM   BASIN 39
1176        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1177        KM    L=       .9  Lca=       .7   S=   38.0  Kn= .060  LAG=  32.4
1178        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1179        BA     .36
```



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

```
LG     .22     .25    4.60     .41   44.00
UI      37      81     165     213     269     383     437     325     258     200
UI     142      76      61      37      24      11      11      11      11       0
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK     D39
KM    RETAIN 100 YEAR 2 HOUR, (13% FOR FUTURE DEVELOPMENT)
DT     D39       4
DI       0   10000
DQ       0   10000
*
* DDM   ***** Preserved *****

KK    C39A
KM   COMBINE FLOWS FROM C32, C38 AND S39 AT C39
HC       2
*
* DDM   ***** Preserved *****

KK    C39B
KM   COMBINE FLOWS FROM C39A AND ADOT BASINS
HC       2
*
* DDM   ***** Preserved *****

KK    SOSS
KM   THIS WAS FORMERLY CALLED CHANNEL
KM   DIVERT FLOWS IN EXCESS OF 1800 CFS TO SOSSAMAN DET. BASIN
KM   IN REALITY, BACKWATER FROM THE ADOT CROSSING DETERMINES THE AMOUNT OF SPILL
KM   SUPERSTITION FREEWAY
ZW    A=SOSSAMAN DRAIN  B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
DT   BASIN
DI       0    1800    2000   10000
DQ       0       0     200    8200
ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

          (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  99         42
              V
              V
 111       42T51
              .
              .
 116          .          51
              .           .
              .           .
 127        C51............
              V
              V
 130       51T53
              .
              .
 136          .         44A
              .           .
              .           .
 150          .           .-------->    D44A
 148          .      DIV44A
              .           .
              .           .
 153          .           .          43
              .           .           .
              .           .           .
 164          .         C43............
              .           V
              .           V
 167          .       43T53
              .           .
              .           .
 172          .           .          53
              .           .           .
              .           .           .
 182        C53........................
              .
              .
 185          .          54
              .           .
              .           .
 196        C54............
              .
              .
 202          .-------->   SOUTH
 199     DCAP12
              V
              V
 205      CAP12
              .
              .
 2            .           .<--------    D44A
 210          .      DR44A
              .           V
              .           V
```

```
213          .        44ATB
             .           .
             .           .
             .           .          44B
             .           .           .
             .           .           .
230          .       C44B............
             .          V
             .          V
233          .      CAP10+
             .          V
             .          V
240          .      RCAP11
             .           .
             .           .
243        C12............
            V
            V
246      ADOT-W
            V
            V
257      RADOTW
            .
            .
263          .         36B
             .           .
             .           .
272        C36B............
            .
            .
             .           .<-------   SOUTH
276          .      RSOUTH
             .           .
             .           .
279          .           .          57
             .           .           .
             .           .           .
288          .       C57............
             .          V
             .          V
291          .      CAP13+
             .           .
             .           .
298          .           .         36A
             .           .           .
             .           .           .
307          .       C36A............
             .          V
             .          V
310          .      ADOT-E
             .           .
             .           .
322      CFAKE............
            .
            .
             .         52
             .           .
             .           .
336          .           .         56
             .           .           .
```

```
346          C56............
               V
               V
           56T58

356                 58

366          C58............

374                 46B

388                 .-------->     D46
386               D46B
                    V
                    V
391               CAP6
                    V
                    V
396             RCAP6B

405                       29A

                            .-------->    D29A
                          D29A

422               C29A............

424                       45A

439                       .-------->    D29A
437                       D45A

445                       .-------->   45ATB
442                       D45A
.

448                                 55B

463                                 .-------->    D55B
461                                 D55B

                          C55B............
                            V
                            V
469                       CAP7
```

```
477   .     .     .     .     .<-------  45ATB
475   .     .     .     .  RD45A
      .     .     .     .     V
      .     .     .     .     V
      .     .     .     .  45ATB
      .     .     .     .     .
      .     .     .     .     .
485   .     .     .     .     .       45B
      .     .     .     .     .        .
      .     .     .     .     .        .
498   .     .     .     .     .        .------->  D45B
496   .     .     .     .     .     D45B
      .     .     .     .     .        .
      .     .     .     .     .        .
501   .     .     .     .  C45B............
      .     .     .     .     V
      .     .     .     .     V
504   .     .     .     .  CAP8
      .     .     .     .     .
      .     .     .     .     .
510   .     .     .  C7+8............
      .     .     .     V
      .     .     .     V
514   .     .     .  RCAP78
      .     .     .     .
      .     .     .     .
522   .     .     .     .    29B
      .     .     .     .     .
      .     .     .     .     .
      .     .     .     .     .------->  D29B
      .     .     .     .  D29B
      .     .     .     .     .
      .     .     .     .     .
538   .     .     .  C29B1............
      .     .     .     .
      .     .     .     .
541   .     .  C29B2............
      .     .     V
      .     .     V
544   .     .  TRANS
      .     .     .
      .     .     .
552   .     .     .   29C
      .     .     .     .
      .     .     .     .
565   .     .     .     .------->  D29
563   .     .     .  D29C
      .     .     .     .
      .     .     .     .
568   .     .  C29C2............
      .     .     V
      .     .     V
571   .     .  29CTD1
      .     .     .
      .     .     .
      .     .     .    55
      .     .     .     .
      .     .     .     .
591   .     .     .     .------->  D55
589   .     .     .  D55
```

```
                 .         .         .         V
                 .         .         .         V
594              .         .         .       CAP9
                 .         .         .         V
                 .         .         .         V
                 .         .         .      RCAP9
                 .         .         .         .
                 .         .         .         .
609              .         .         .         .        29D
                 .         .         .         .         .
                 .         .         .         .         .
622              .         .         .         .         .-------->   D29D
620              .         .         .         .       D29D
                 .         .         .         .         .
                 .         .         .         .         .
629              .         .         .         .         .-------->   D29DE
625              .         .         .         .      D29D2
                 .         .         .         .         .
                 .         .         .         .         .
632              .         .     C29C3.......................
                 .         .         V
                 .         .         V
635              .         .     BASIN5
                 .         .         V
                 .         .         V
642              .         .     RBAS5
                 .         .         .
                 .         .         .
653              .         .         .         .<-------   D29DE
                 .         .         .      G29DE
                 .         .         .         V
                 .         .         .         V
654              .         .         .      29T36
                 .         .         .         .
                 .         .         .         .
662              .         .         .         .        36C
                 .         .         .         .         .
                 .         .         .         .         .
673              .         .         .         .         .-------->   D36C
671              .         .         .         .      D36C
                 .         .         .         .         .
                 .         .         .         .         .
676              .         .       C36........................
                 .         .         V
                 .         .         V
679              .         .     36T37
                 .         .         .
                 .         .         .
685              .         .         .       30b
                 .         .         .         V
                 .         .         .         V
696              .         .         .     30bT3
                 .         .         .         .
                 .         .         .         .
                 .         .         .         .         37
                 .         .         .         .         .
                 .         .         .         .         .
711              .         .       C37........................
                 .         .         V
                 .         .         V
```

```
714     .       .     ADOTEL
        .       .        V
        .       .        V
725     .       .     37T38
        .       .        .
        .       .        .
732     .       .        .      38A
        .       .        .       .
        .       .        .       .
740     .       .     C38A............
        .       .        V
        .       .        V
742     .       .     202NE1
        .       .        V
        .       .        V
747     .       .     202NE2
        .       .        .
        .       .        .
752     .       .        .      17A
        .       .        .       V
        .       .        .       V
762     .       .        .    17AT23
        .       .        .       .
        .       .        .       .
768     .       .        .       .      23
        .       .        .       .       .
        .       .        .       .       .
778     .       .        .       .       .      48
        .       .        .       .       .       V
        .       .        .       .       .       V
        .       .        .       .       .     CAP3
        .       .        .       .       .       V
        .       .        .       .       .       V
793     .       .        .       .       .   BASIN3
        .       .        .       .       .       V
        .       .        .       .       .       V
801     .       .        .       .       .   RCAP3A
        .       .        .       .       .       V
        .       .        .       .       .       V
807     .       .        .       .       .   RCAP3B
        .       .        .       .       .       .
        .       .        .       .       .       .
813     .       .        .       .       .       .       17B
        .       .        .       .       .       .        .
        .       .        .       .       .       .        .
823     .       .        .       .       .     C17B............
        .       .        .       .       .       V
        .       .        .       .       .       V
826     .       .        .       .       .   17BT22
        .       .        .       .       .       .
        .       .        .       .       .       .
832     .       .        .       .       .       .       47
        .       .        .       .       .       .        V
        .       .        .       .       .       .        V
        .       .        .       .       .       .    BASIN4
        .       .        .       .       .       .        V
        .       .        .       .       .       .        V
853     .       .        .       .       .       .    RCAP4
        .       .        .       .       .       .        .
        .       .        .       .       .       .        .
```

```
859     .       .       .       .       .       .       .       22
        .       .       .       .       .       .       .       .
        .       .       .       .       .       .       .       .
869     .       .       .       .       .       .     C22A.............
        .       .       .       .       .       .       .
        .       .       .       .       .       .       .
872     .       .       .       .       .     C22.............
        .       .       .       .       .       V
        .       .       .       .       .       V
875     .       .       .       .       .    22T23
        .       .       .       .       .       .
        .       .       .       .       .       .
882     .       .       .     C23........................
        .       .       .       V
        .       .       .       V
885     .       .       .    23T24
        .       .       .       .
        .       .       .       .
891     .       .       .       .      49
        .       .       .       .       V
        .       .       .       .       V
901     .       .       .       .     CAP2
        .       .       .       .       V
        .       .       .       .       V
906     .       .       .       .   BASIN2
        .       .       .       .       V
        .       .       .       .       V
914     .       .       .       .   RCAP2A
        .       .       .       .       V
        .       .       .       .       V
        .       .       .       .    RCAP2
        .       .       .       .       .
        .       .       .       .       .
923     .       .       .       .       .      50
        .       .       .       .       .       V
        .       .       .       .       .       V
933     .       .       .       .       .    CAP1
        .       .       .       .       .       V
        .       .       .       .       .       V
938     .       .       .       .       .   BASIN1
        .       .       .       .       .       V
        .       .       .       .       .       V
946     .       .       .       .       .    RCAP1
        .       .       .       .       .       .
        .       .       .       .       .       .
952     .       .       .       .       .       .       18c
        .       .       .       .       .       .        .
        .       .       .       .       .       .        .
966     .       .       .       .       .       .        .-------->    D18c
964     .       .       .       .       .       .      D18c
        .       .       .       .       .       .        .
        .       .       .       .       .       .        .
969     .       .       .       .       .    C18C.............
        .       .       .       .       .       V
        .       .       .       .       .       V
        .       .       .       .       .    18T24
        .       .       .       .       .       .
        .       .       .       .       .       .
980     .       .       .       .       .       .       24
        .       .       .       .       .       .        .
```

```
990                C24.................................
                    .
                    .
                    .-------> DIVBRD
                 BRDHAW
                    V
                    V
1000             RT31B1
                    V
                    V
1010             RT31B2
                    V
                    V
1018             RT31B3
                    .
                    .
1030                .        31B
                    .          .
                    .          .
1042                .          .------->   D31B
1040                .       D31B
                    .          .
                    .          .
1045               C31............
                    .
                    .
1055                .------->   D31W
                  D31W
                    V
                    V
1060             31T381
                    V
                    V
1072             31T382
                    .
                    .
1080                .       30a
                    .        V
                    .        V
1091                .     30at31
                    .          .
                    .          .
1101                .          .        31A
                    .          .          .
                    .          .          .
1111                .       C31A............
                    .          .
                    .          .
1114                .          .        38B
                    .          .          .
                    .          .          .
1122                .       C38B............
                    .        V
                    .        V
                    .     202NW1
                    .        V
                    .        V
1129                .     202NW2
                    .          .
```

```
                .         .         .
1137            .         .       C38C.......................
                .         .         V
                .         .         V
                .         .       38T39
                .         .         .
                .         .         .
1148            .         .         .          .<-------    D31W
1146            .         .         .       R31W
                .         .         .          V
                .         .         .          V
1149            .         .         .      31WT32
                .         .         .          .
                .         .         .          .
1155            .         .         .          .         32
                .         .         .          .          .
                .         .         .          .          .
1165            .         .         .        C32............
                .         .         .          V
                .         .         .          V
1168            .         .         .      32T39
                .         .         .          .
                .         .         .          .
1174            .         .         .          .         39
                .         .         .          .          .
                .         .         .          .          .
1186            .         .         .          .          .-------->     D39
1184            .         .         .          .        D39
                .         .         .          .          .
                .         .         .          .          .
                .         .         .       C39A............
                .         .         .          .
                .         .         .          .
1192            .         .       C39B............
                .         .         .
                .         .         .
1201            .         .         .-------->  BASIN
1195            .         .       SOSS
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	42	1048.	12.58	206.	56.	19.	1.75		
+	ROUTED TO	42T51	962.	13.17	206.	56.	19.	1.75		
+	HYDROGRAPH AT	51	1277.	12.25	159.	46.	15.	1.24		
+	2 COMBINED AT	C51	1420.	12.33	359.	100.	34.	2.99		
+	ROUTED TO	51T53	1129.	13.08	359.	100.	34.	2.99		
+	HYDROGRAPH AT	44A	1297.	12.50	277.	89.	30.	1.59		
+	DIVERSION TO	D44A	951.	12.50	213.	69.	23.	1.59		
+	HYDROGRAPH AT	DIV44A	347.	12.50	64.	20.	7.	1.59		
+	HYDROGRAPH AT	43	1365.	12.33	184.	53.	18.	1.42		
+	2 COMBINED AT	C43	1646.	12.33	244.	72.	24.	3.01		
+	ROUTED TO	43T53	1104.	13.42	244.	72.	24.	3.01		
+	HYDROGRAPH AT	53	831.	12.42	108.	31.	11.	.78		
+	3 COMBINED AT	C53	2157.	13.33	684.	196.	66.	6.78		
+	HYDROGRAPH AT	54	512.	12.42	66.	19.	6.	.49		
+	2 COMBINED AT	C54	2173.	13.33	743.	213.	71.	7.27		
+	DIVERSION TO	SOUTH	862.	13.33	235.	59.	20.	7.27		
+	HYDROGRAPH AT	DCAP12	1312.	13.33	508.	154.	52.	7.27		
	ROUTED TO									

+	CAP12	1166.	13.67	508.	154.	52.	7.27
HYDROGRAPH AT							
+	DR44A	951.	12.50	213.	69.	23.	1.59
ROUTED TO							
+	44ATB	769.	13.58	213.	69.	23.	1.59
HYDROGRAPH AT							
+	44B	1430.	12.25	179.	54.	18.	1.06
2 COMBINED AT							
+	C44B	1606.	12.25	393.	123.	41.	1.06
ROUTED TO							
+	CAP10+	1490.	12.33	393.	123.	41.	1.06
ROUTED TO							
+	RCAP11	1490.	12.42	393.	123.	41.	1.06
2 COMBINED AT							
+	C12	2146.	12.50	874.	269.	90.	8.33
ROUTED TO							
+	ADOT-W	439.	15.17	414.	263.	90.	8.33
ROUTED TO							
+	RADOTW	438.	15.25	414.	263.	90.	8.33
HYDROGRAPH AT							
+	36B	581.	12.08	49.	14.	5.	.32
2 COMBINED AT							
+	C36B	745.	12.08	421.	275.	94.	8.65
HYDROGRAPH AT							
+	RSOUTH	862.	13.33	235.	59.	20.	7.27
HYDROGRAPH AT							
+	57	318.	12.00	19.	5.	2.	.18
2 COMBINED AT							
+	C57	941.	13.33	277.	69.	23.	.18
ROUTED TO							
+	CAP13+	931.	13.33	277.	69.	23.	.18
HYDROGRAPH AT							
+	36A	215.	12.00	15.	4.	1.	.10
2 COMBINED AT							
+	C36A	934.	13.33	292.	74.	25.	.28
ROUTED TO							
+	ADOT-E	267.	14.25	200.	73.	25.	.28
2 COMBINED AT							
+	CFAKE	771.	12.08	594.	339.	116.	8.93
HYDROGRAPH AT							

+		52	572.	12.25	61.	17.	6.	.43
	HYDROGRAPH AT							
+		56	862.	12.17	88.	25.	8.	.55
	2 COMBINED AT							
+		C56	1400.	12.25	149.	42.	14.	.98
	ROUTED TO							
+		56T58	1068.	12.50	149.	42.	14.	.98
	HYDROGRAPH AT							
+		58	1370.	12.17	107.	28.	9.	.95
	2 COMBINED AT							
+		C58	1813.	12.25	252.	68.	23.	1.93
	HYDROGRAPH AT							
+		46B	300.	12.67	65.	21.	7.	.36
	DIVERSION TO							
+		D46	12.	9.67	8.	3.	1.	.36
	HYDROGRAPH AT							
+		D46B	300.	12.67	65.	19.	6.	.36
	ROUTED TO							
+		CAP6	239.	12.92	65.	19.	6.	.36
	ROUTED TO							
+		RCAP6B	239.	12.92	65.	19.	6.	.36
	HYDROGRAPH AT							
+		29A	135.	12.67	26.	8.	3.	.18
	DIVERSION TO							
+		D29A	135.	12.67	17.	5.	2.	.18
	HYDROGRAPH AT							
+		D29A	95.	12.92	12.	3.	1.	.18
	2 COMBINED AT							
+		C29A	333.	12.92	76.	22.	7.	.54
	HYDROGRAPH AT							
+		45A	336.	12.92	74.	22.	7.	.62
	DIVERSION TO							
+		D29A	336.	12.92	45.	12.	4.	.62
	HYDROGRAPH AT							
+		D45A	256.	13.17	35.	10.	3.	.62
	DIVERSION TO							
+		45ATB	243.	13.17	33.	9.	3.	.62
	HYDROGRAPH AT							
+		D45A	13.	13.17	2.	0.	0.	.62
	HYDROGRAPH AT							

+	55B	955.	13.17	263.	82.	27.	1.86
DIVERSION TO							
+	D55B	955.	13.17	168.	46.	15.	1.86
HYDROGRAPH AT							
+	D55B	740.	13.42	124.	36.	12.	1.86
2 COMBINED AT							
+	C55B	743.	13.42	124.	36.	12.	2.48
ROUTED TO							
+	CAP7	517.	13.75	124.	36.	12.	2.48
HYDROGRAPH AT							
+	RD45A	243.	13.17	33.	9.	3.	.62
ROUTED TO							
+	45ATB	167.	14.17	31.	9.	3.	.62
HYDROGRAPH AT							
+	45B	653.	12.58	128.	41.	14.	.66
DIVERSION TO							
+	D45B	358.	12.17	39.	12.	4.	.66
HYDROGRAPH AT							
+	D45B	653.	12.58	105.	29.	10.	.66
2 COMBINED AT							
+	C45B	653.	12.58	135.	38.	13.	.66
ROUTED TO							
+	CAP8	464.	12.83	134.	38.	13.	.66
2 COMBINED AT							
+	C7+8	727.	13.42	247.	72.	24.	3.14
ROUTED TO							
+	RCAP78	674.	13.83	243.	72.	24.	3.14
HYDROGRAPH AT							
+	29B	58.	12.58	9.	3.	1.	.08
DIVERSION TO							
+	D29B	58.	12.58	9.	3.	1.	.08
HYDROGRAPH AT							
+	D29B	1.	18.58	0.	0.	0.	.08
2 COMBINED AT							
+	C29B1	674.	13.83	243.	72.	24.	3.22
2 COMBINED AT							
+	C29B2	757.	13.75	307.	93.	31.	3.76
ROUTED TO							
+	TRANS	749.	13.83	307.	93.	31.	3.76
HYDROGRAPH AT							

+	29C	253.	12.42	38.	12.	4.	.23
DIVERSION TO							
+	D29	253.	12.42	32.	9.	3.	.23
HYDROGRAPH AT							
+	D29C	94.	12.83	10.	3.	1.	.23
2 COMBINED AT							
+	C29C2	765.	13.08	315.	95.	32.	3.99
ROUTED TO							
+	29CTD1	734.	14.00	313.	95.	32.	3.99
HYDROGRAPH AT							
+	55	190.	12.25	21.	6.	2.	.14
DIVERSION TO							
+	D55	190.	12.25	17.	5.	2.	.14
HYDROGRAPH AT							
+	D55	75.	12.50	6.	2.	1.	.14
ROUTED TO							
+	CAP9	39.	12.58	6.	2.	1.	.14
ROUTED TO							
+	RCAP9	23.	13.17	6.	2.	1.	.14
HYDROGRAPH AT							
+	29D	573.	12.67	114.	36.	12.	.65
DIVERSION TO							
+	D29D	415.	12.42	46.	14.	5.	.65
HYDROGRAPH AT							
+	D29D	573.	12.67	82.	23.	8.	.65
DIVERSION TO							
+	D29DE	378.	12.67	54.	15.	5.	.65
HYDROGRAPH AT							
+	D29D2	195.	12.67	28.	8.	3.	.65
3 COMBINED AT							
+	C29C3	771.	13.25	343.	104.	35.	4.78
ROUTED TO							
+	BASIN5	273.	15.33	251.	104.	35.	4.78
ROUTED TO							
+	RBAS5	272.	15.42	251.	104.	35.	4.78
HYDROGRAPH AT							
+	G29DE	378.	12.67	54.	15.	5.	.65
ROUTED TO							
+	29T36	357.	12.75	54.	15.	5.	.65
HYDROGRAPH AT							

+	36C	929.	12.08	105.	36.	12.	.44
DIVERSION TO							
+	D36C	848.	12.00	66.	19.	6.	.44
HYDROGRAPH AT							
+	D36C	770.	12.17	57.	17.	6.	.44
3 COMBINED AT							
+	C36	763.	12.17	323.	133.	44.	5.22
ROUTED TO							
+	36T37	519.	12.92	320.	133.	44.	5.22
HYDROGRAPH AT							
+	30b	603.	12.67	109.	33.	11.	.81
ROUTED TO							
+	30bT3	574.	12.83	109.	33.	11.	.81
HYDROGRAPH AT							
+	37	678.	12.08	51.	15.	5.	.47
3 COMBINED AT							
+	C37	1096.	12.25	447.	173.	58.	6.50
ROUTED TO							
+	ADOTEL	17.	27.00	17.	17.	17.	6.50
ROUTED TO							
+	37T38	17.	27.17	17.	17.	16.	6.50
HYDROGRAPH AT							
+	38A	179.	12.67	35.	11.	4.	.23
2 COMBINED AT							
+	C38A	184.	12.67	47.	25.	19.	6.74
ROUTED TO							
+	202NE1	46.	13.58	37.	23.	19.	6.74
ROUTED TO							
+	202NE2	22.	19.75	22.	20.	18.	6.74
HYDROGRAPH AT							
+	17A	257.	12.17	26.	8.	3.	.18
ROUTED TO							
+	17AT23	253.	12.25	26.	8.	3.	.18
HYDROGRAPH AT							
+	23	394.	12.17	34.	10.	3.	.28
HYDROGRAPH AT							
+	48	786.	12.33	83.	23.	8.	.77
ROUTED TO							
+	CAP3	757.	12.33	83.	23.	8.	.77
ROUTED TO							

+	BASIN3	366.	12.67	75.	23.	8.	.77
ROUTED TO							
+	RCAP3A	376.	12.67	75.	23.	8.	.77
ROUTED TO							
+	RCAP3B	267.	12.92	75.	23.	8.	.77
HYDROGRAPH AT							
+	17B	284.	12.25	31.	10.	3.	.22
2 COMBINED AT							
+	C17B	321.	12.25	103.	33.	11.	.99
ROUTED TO							
+	17BT22	324.	12.25	103.	33.	11.	.99
HYDROGRAPH AT							
+	47	1121.	12.58	165.	45.	15.	1.67
ROUTED TO							
+	BASIN4	871.	12.75	136.	45.	15.	1.67
ROUTED TO							
+	RCAP4	642.	13.50	136.	45.	15.	1.67
HYDROGRAPH AT							
+	22	549.	12.17	56.	17.	6.	.41
2 COMBINED AT							
+	C22A	650.	13.50	183.	61.	21.	2.08
2 COMBINED AT							
+	C22	840.	12.25	281.	93.	31.	3.07
ROUTED TO							
+	22T23	711.	13.75	279.	92.	31.	3.07
3 COMBINED AT							
+	C23	979.	12.25	331.	110.	37.	3.53
ROUTED TO							
+	23T24	974.	12.33	331.	110.	37.	3.53
HYDROGRAPH AT							
+	49	792.	12.33	89.	25.	8.	.79
ROUTED TO							
+	CAP2	760.	12.42	89.	25.	8.	.79
ROUTED TO							
+	BASIN2	280.	12.75	59.	25.	8.	.79
ROUTED TO							
+	RCAP2A	279.	12.75	59.	25.	8.	.79
ROUTED TO							
+	RCAP2	258.	13.08	59.	25.	8.	.79
HYDROGRAPH AT							

+	50	371.	12.17	26.	7.	2.	.28
ROUTED TO							
+	CAP1	325.	12.17	29.	11.	7.	.28
ROUTED TO							
+	BASIN1	38.	12.50	25.	11.	7.	.28
ROUTED TO							
+	RCAP1	34.	13.08	25.	11.	7.	.28
HYDROGRAPH AT							
+	18c	494.	12.50	85.	27.	9.	.50
DIVERSION TO							
+	D18c	370.	12.25	34.	10.	3.	.50
HYDROGRAPH AT							
+	D18c	494.	12.50	62.	17.	6.	.50
2 COMBINED AT							
+	C18C	517.	12.50	87.	28.	13.	.78
ROUTED TO							
+	18T24	476.	12.58	86.	28.	13.	.78
HYDROGRAPH AT							
+	24	359.	12.25	45.	14.	5.	.29
4 COMBINED AT							
+	C24	1412.	12.42	498.	173.	61.	5.39
DIVERSION TO							
+	DIVBRD	0.	.00	0.	0.	0.	5.39
HYDROGRAPH AT							
+	BRDHAW	1412.	12.42	498.	173.	61.	5.39
ROUTED TO							
+	RT31B1	1412.	12.50	498.	173.	61.	5.39
ROUTED TO							
+	RT31B2	1403.	12.50	497.	173.	61.	5.39
ROUTED TO							
+	RT31B3	1391.	12.50	497.	172.	61.	5.39
HYDROGRAPH AT							
+	31B	523.	12.33	76.	24.	8.	.47
DIVERSION TO							
+	D31B	474.	12.25	41.	12.	4.	.47
HYDROGRAPH AT							
+	D31B	514.	12.42	43.	12.	4.	.47
2 COMBINED AT							
+	C31	1790.	12.42	532.	183.	65.	5.86
DIVERSION TO							

+	D31W	1058.	12.42	384.	146.	52.	5.86
HYDROGRAPH AT							
+	D31W	732.	12.42	148.	37.	12.	5.86
ROUTED TO							
+	31T381	752.	12.50	148.	37.	12.	5.86
ROUTED TO							
+	31T382	752.	12.50	148.	37.	12.	5.86
HYDROGRAPH AT							
+	30a	270.	12.50	42.	13.	4.	.30
ROUTED TO							
+	30at31	244.	12.67	42.	13.	4.	.30
HYDROGRAPH AT							
+	31A	649.	12.25	66.	19.	6.	.53
2 COMBINED AT							
+	C31A	698.	12.25	108.	32.	11.	.83
HYDROGRAPH AT							
+	38B	179.	12.67	35.	11.	4.	.23
2 COMBINED AT							
+	C38B	795.	12.25	142.	43.	14.	1.06
ROUTED TO							
+	202NW1	540.	12.58	139.	37.	12.	1.06
ROUTED TO							
+	202NW2	416.	13.17	134.	37.	12.	1.06
3 COMBINED AT							
+	C38C	765.	12.58	267.	86.	40.	13.66
ROUTED TO							
+	38T39	757.	12.58	267.	85.	40.	13.66
HYDROGRAPH AT							
+	R31W	1058.	12.42	384.	146.	52.	5.86
ROUTED TO							
+	31WT32	889.	12.67	380.	145.	52.	5.86
HYDROGRAPH AT							
+	32	417.	12.33	54.	16.	5.	.38
2 COMBINED AT							
+	C32	1152.	12.58	447.	167.	60.	.38
ROUTED TO							
+	32T39	1140.	12.67	447.	167.	60.	.38
HYDROGRAPH AT							
+	39	402.	12.42	62.	20.	7.	.36
DIVERSION TO							

+	D39	10.	9.00	6.	2.	1.	.36
HYDROGRAPH AT							
+	D39	402.	12.42	62.	18.	6.	.36
2 COMBINED AT							
+	C39A	1424.	12.50	504.	185.	66.	.74
2 COMBINED AT							
+	C39B	1958.	12.58	714.	249.	98.	14.40
DIVERSION TO							
+	BASIN	158.	12.58	6.	1.	0.	14.40
HYDROGRAPH AT							
+	SOSS	1800.	12.58	708.	247.	97.	14.40

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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   01APR03  TIME  12:11:46  *
*                                      *
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*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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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


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

   1          ID
   2          ID ******************************************************************************
   3          ID ******************************************************************************
   4          ID ******************************************************************************
   5          ID  MODEL NAME: NE200240.DAT   Revised by PARSONS BRINCKERHOFF - January 2003
   6          ID
   7          ID  This model includes the following revisions to DMJM+HARRIS model
   8          ID  NE200235.DAT dated July 2002.
   9          ID
  10          ID   1. The storage volumes for detention basins NE-1, NE-2, NW-1 and NW-2 have
  11          ID      been updated per the final basin geometry.
  12          ID
  13          ID   2. The discharge rates for detention basins NW-1 and NW-2 have been revised
  14          ID      to reflect the revisions to the outlet structures and emergency
  15          ID      spillways.
  16          ID
  17          ID ******************************************************************************
  18          ID ******************************************************************************
  19          ID ******************************************************************************
  20          ID
  21          ID  MODEL NAME: Ne200235.DAT          Revised by DMJM+HARRIS - July 2002
  22          ID
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 23          ID   This model includes various revisions to incorporate the Red Mountain Freeway
 24          ID   in association with the 202L/US60 Traffic Interchange Design Concept Report.
 25          ID
 26          ID   CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
 27          ID
 28          ID    1. In order to reflect the proposed 202 Freeway Loop, basin areas for 18C,
 29          ID       23, 24, 31A and 31B were revised.  Drainage basins 18D, 202A, 202B, and
 30          ID       202D were added.      Basin 38 was split into 38A and 38B due to the 202 Loop
 31          ID
 32          ID    2. Several concentration points have been added and basins have been routed
 33          ID       to reflect the proposed Red Mountain Freeway alignment.
 34          ID
 35          ID    3. Existing detention basins (ADOT) have been removed and new detention
 36          ID       basins are proposed as part of the freeway construction.
 37          ID
 38          ID  ******************************************************************************
 39          ID
 40          ID    4. Modifications were made to the previous (Ne20030) model per the City of
 41          ID       Mesa to remove the connection of the Southern Ave. Channel from the
 42          ID       structure at Hawes Rd. and instead connect to the Hawes Channel south of
 43          ID       the intersection.
 44          ID
 45          ID  ******************************************************************************
 46          ID  ******************************************************************************
 47          ID   ** Previous ** MODEL NAME: NE2002.DAT
 48          ID
 49          ID   THIS MODEL COVERS THE AREA EAST OF HAWES ROAD AND THE SOSSAMAN CHANNEL
 50          ID   MAJOR CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
 51          ID
 52          ID    1. OLD SUBBASIN 18A HAS BEEN SPLIT INTO TWO SUBBASINS. SUBBASIN 18C REMAINS
 53          ID       IN THIS MODEL AS PART OF THE HAWES CHANNEL INFRASTRUCTURE
 54          ID    2. OLD SUBBASIN 30 HAS BEEN SPLIT INTO SUBBASIN 30A AND SUBBASIN 30B.
 55          ID       SUBBASIN 30 GETS INTERCEPTED BY A CHANNEL ON THE NORTH SIDE OF CORALBELL
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 56          ID       AND GETS ROUTED TO SUBBASIN 31A. SUBBASIN 30B STILL GOES SOUTH ALONG
 57          ID       ELLSWORTH ROAD
 58          ID    3. FOR THE 2002 YEAR CONDITION, ALL CAP DETENTION BASINS HAVE BEEN PLACED IN
 59          ID       THE MODEL. THEIR OUTLET CHANNELS HAVE FOR THE MOST PART NOT BEEN INCLUDED
 60          ID       IN THIS MODEL. THE OUTLET CHANNELS WILL BE IN THE FUTURE MODEL
 61          ID  ******************************************************************************
 62          ID
 63          ID   SOUTHEAST MESA AREA DRAINAGE MASTER PLAN
 64          ID   AREA NORTH OF SUPERSTITION FREEWAY
 65          ID
 66          ID
 67          ID   REVISED BY VALERIE SWICK, OCTOBER-NOVEMBER 1996
 68          ID   TO INCORPORATE THE SUPERSITION STRUCTURES AND COMBINE MODELS
 69          ID
 70          ID   FILENAME:  MESANE.DAT
 71          ID
 72          ID   THIS MODEL REPRESENTS THE EXISTING CONDITION OF THE WATERSHED.
 73          ID   TOTAL DRAINAGE AREA IS APPROXIMATELY 17 SQ. MI.
 74          ID
 75          ID   100-YEAR 24-HOUR FREQUENCY
 76          ID
 77          ID
 78          ID   METHODOLOGY
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 79        ID   THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
 80        ID   SCS TYPE II RAINFALL DISTRIBUTION
 81        ID   S-GRAPH HYDROGRAPH
 82        ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
 83        ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
 84        ID   APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
 85        ID   EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
 86        ID   DATED 1994
 87        ID   THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
 88        ID
 89        ID   INITIAL STUDY PERFORMED BY LISA C. YOUNG
 90        ID   REVIEWED BY VALERIE A. SWICK
 91        ID   HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
 92        ID   DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
 93        ID
 94        ID   ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2 FT/SEC FOR WASH/NATURAL
 95        ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
 96        ID
 97        ID
 98        ID    LAST UPDATED ON  3/13/98
 99        ID
100        ID    UPDATE WAS BASED UPON NEW MAG LAND USE DEFINITIONS FOR SINGLE FAMILY HOUSING
101        ID
102        ID   DDM MCUHP2 MESA AREA DRAINAGE MASTER PLAN
           *DIAGRAM
103        IT       5  1APR97    0000    1000
104        IO       5
105        IN      15
106        JD   3.600     .01
107        PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
108        PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
109        PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

110        PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
111        PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
112        PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
113        PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
114        PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
115        PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
116        PC    .983    .986    .989    .992    .995    .998   1.000
117        JD    3.58     1.0
118        JD    3.49     5.0
119        JD    3.38    10.0
120        JD    3.24    30.0
121        JD    3.10    60.0
122        JD    3.05    90.0
123        JD    3.00   120.0
124        JD    2.97   150.0
           *
           * DDM   ***** Updated *****

125        KK      42
126        KM   BASIN 42
127        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
128        KM    L=      3.1  Lca=      1.5   S=   60.9  Kn= .043  LAG=  51.6
129        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
130        BA    1.75
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131        LG     .32     .29    5.00     .31   10.00
132        UI    114.    114.    248.    441.    618.    773.    923.   1018.   1086.   1092.
133        UI   1041.    954.    806.    673.    573.    485.    415.    340.    290.    242.
134        UI    212.    175.    147.    121.    109.     78.     78.     78.     38.     28.
135        UI     28.     28.     28.     28.     28.     28.     28.      0.      0.      0.
136        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

137        KK   42T51
138        RS      10    FLOW      -1
139        RC    0.08   0.055    0.08    7000   0.011
140        RX       0     600     700     710     720     730     830    1630
141        RY      10       5       3       0       0       3       5      10
           *
           * DDM   ***** Updated *****

142        KK      51
143        KM   BASIN 51
144        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
145        KM    L=      1.5  Lca=      .8   S=   54.4  Kn= .039  LAG=  27.3
146        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
147        BA    1.24
148        LG     .29     .30    4.60     .37   18.00
149        UI    153.    416.    885.   1248.   1446.   1410.   1128.    817.    598.    428.
150        UI    311.    232.    163.    110.     99.     37.     37.     37.     37.     37.
151        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
152        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```



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


153        KK     C51
154        KM   COMBINE FLOWS FROM 42 AND 51
155        HC       2
           *
           * DDM   ***** Preserved *****

156        KK   51T53
157        KM    ROUTE 51 TO 53
158        RS       9    FLOW      -1
159        RC    0.08   0.055    0.08    8000    0.01
160        RX       0     100     200     210     220     230     330     430
161        RY       7       6       5       0       0       5       6       7
           *
           * DDM   ***** Updated *****

162        KK     44A
163        KM   BASIN 44A
164        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
165        KM    L=      2.8  Lca=      1.4   S=   54.5  Kn= .039  LAG=  43.6
166        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
167        BA    1.59
168        LG     .20     .25    4.50     .45   45.00
169        UI    123.    123.    390.    597.    813.    994.   1114.   1180.   1153.   1063.
170        UI    881.    716.    588.    484.    397.    320.    259.    219.    189.    131.
171        UI    126.     84.     84.     75.     30.     30.     30.     30.     30.     30.
```

```
172        UI     30.     30.      0.      0.      0.      0.      0.      0.      0.      0.
173        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

174        KK  DIV44A
175        KM   DIVERT 80% OF THE LOW FLOWS WEST AND SOUTH TO 44B, 70% OF HIGH FLOWS
176        DT    D44A
177        DI       0     500    1000    3000
178        DQ       0     400     750    2100
           * DDM   ***** Updated *****

179        KK      43
180        KM   BASIN 43
181        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
182        KM    L=      1.9  Lca=       .9   S=   58.2  Kn= .036  LAG=  29.8
183        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
184        BA    1.42
185        LG     .29     .30    4.70     .35   18.00
186        UI    161.    376.    827.   1212.   1470.   1531.   1375.   1047.    783.    584.
187        UI    434.    324.    251.    171.    127.    110.     59.     39.     39.     39.
188        UI     39.      0.      0.      0.      0.      0.      0.      0.      0.      0.
189        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```



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

190        KK     C43
191        KM     COMBINE 43 WITH DIVERTED FLOWS FROM 45A
192        HC       2
           *
           * DDM   ***** Preserved *****

193        KK   43T53
194        RS      12    FLOW      -1
195        RC    0.08   0.055    0.08   11250   0.009
196        RX       0     200     300     310     315     325     335     535
197        RY       6       3       2       0       0       2       3       6
           *
           * DDM   ***** Updated *****

198        KK      53
199        KM   BASIN 53
200        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
201        KM    L=      1.9  Lca=       .9   S=   63.5  Kn= .039  LAG=  31.8
202        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
203        BA     .78
204        LG     .29     .30    5.20     .28   20.00
205        UI     83.    189.    377.    486.    616.    903.    943.    707.    555.    428.
206        UI    291.    149.    123.     83.     38.     25.     25.     25.      0.      0.
207        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

208        KK     C53
209        KM     COMBINE 53, 43 AND 51
210        HC       3
```

```
*
* DDM   ***** Updated *****

KK      54
KM   BASIN 54
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.5  Lca=       .8   S=   42.8  Kn= .044  LAG=  32.8
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .49
LG     .30     .29    5.40     .26   17.00
UI     50.    107.    221.    287.    359.    502.    603.    449.    358.    278.
UI    206.    110.     84.     55.     39.     15.     15.     15.     15.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK     C54
KM   COMBINE 53 AND 54
HC       2
*
* DDM   ***** Preserved *****
```



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

KK  DCAP12
KM   FLOWS SPLIT AT CAP AND SOUTHERN AVE, RATING CURVES BASED ON THREE 5X7 CBCs
KM   PART OF THE FLOW GOES SOUTH ACRSS SOUTHERN TO CAP 13 +14
DT   SOUTH
DI       0     450    1000    2500
DQ       0       0     275    1025
*
* DDM   ***** Preserved *****

KK   CAP12
RS       1    FLOW      -1
SV       0   0.238    2.72   13.37   36.82
SE  1563.6    1564    1566    1568    1570
SQ       0      30     188     574    1098
*
* DDM   ***** Preserved *****

KK   DR44A
KM   RETRIEVE DIVERTED FLOWS FROM 44A
DR    D44A
*
* DDM   ***** Preserved *****

KK   44ATB
KM   ROUTE 44A TO 44B, STREET AND SHEET FLOW THROUGH NEIGHBORHOODS
KM   NO CURB AND GUTTER
RS      15    FLOW      -1
RC   0.055   0.045   0.055    9000   0.008
RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
RY       6     5.5       3       0       0       3     5.5       6
*
* DDM   ***** Updated *****
```

```
246        KK     44B
247        KM   BASIN 44B
248        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
249        KM    L=      1.1  Lca=       .9   S=   64.8  Kn= .041  LAG=  26.2
250        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
251        BA    1.06
252        LG     .26     .24    6.60     .17   30.00
253        UI    136.    426.    715.    947.   1453.   1456.   1057.    775.    520.    251.
254        UI    180.    109.     42.     42.     42.      0.      0.      0.      0.      0.
255        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

256        KK    C44B
257        KM   COMBINE 44A WITH 44B
258        HC       2
           *
           * DDM   ***** Preserved *****
1                                    HEC-1 INPUT                                          PAGE  7

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


259        KK  CAP10+
260        KM   COMBINED CAP 10 AND 11, SAME CONTRIBUTING AREA AND HYDRAULICALLY CONNECTED
261        KM   STORAGE AND DISCHARGES WERE ADDED AT THE APPROPRIATE ELEVATIONS
262        RS       1    FLOW      -1
263        SV       0    0.43   3.397  11.626   66.53
264        SE  1562.4    1564    1566    1568    1570
265        SQ       0     180     736    1684    2754
           *
           * DDM   ***** Preserved *****

266        KK  RCAP11
267        KM   ROUTE FLOWS FROM CAP OVERCHUTE #10 AND 11 TO ADOT WEST BASIN
268        RK    2400  0.0003   0.013            TRAP      20       3
           *
           * DDM   ***** Preserved *****

269        KK     C12
270        KM   COMBINE ROUTED FLOWS FROM CAP #10 AND 11 WITH CAP #12
271        HC       2
           *
           * DDM   ***** Preserved *****

272        KK  ADOT-W
273        KM   WEST ADOT DETENTION BASIN 4189, WEST OF CAP AND NORTH OF SUPERSITION FREEWAY
274        KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
275        KM        COUNTY
276        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
277        KM            A-N WEST, INC., FEBRUARY, 1987.
278        RS       1    ELEV      36
279        SV       0   12.35    63.5   210.3   367.5   535.1  667.85  713.55
280        SE      36      38      40      44      48      52      55      56
281        SL    36.0   28.27      .6      .5
282        SS      55     200     2.6     1.5
           *
           * DDM   ***** Preserved *****

283        KK  RADOTW
```

```
 284        KM   ROUTE FLOWS IN CONCRETE CHANNEL TO CULVERTS UNDER SUPERSTITION FREEWAY
 285        RS    1.75    FLOW      -1
 286        RC    .035   0.012    .035    4500   .0033
 287        RX       0     500    1000    1012    1020    1032    1532    2032
 288        RY      13    12.5      12       0       0      12    12.5      13
            *
            * DDM   ***** Updated *****

 289        KK     36B
 290        KM   BASIN 36B
 291        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 292        KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
 293        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 294        BA     .32
 295        LG     .30     .29    7.30     .11   16.00
 296        UI    125.    387.    715.    627.    361.    139.     58.     22.      0.      0.
 297        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                          PAGE  8

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


 298        KK    C36B
 299        KM   COMBINE FLOWS FROM ADOT BASIN W WITH SUB36
 300        HC       2
 301        ZW     A=ADOT WEST BASIN  B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
            *
            * DDM   ***** Preserved *****

 302        KK  RSOUTH
 303        KM   RETRIEVE FLOWS CROSSING SOUTHERN AT CAP
 304        DR   SOUTH
            *
            * DDM   ***** Updated *****

 305        KK      57
 306        KM   BASIN 57
 307        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 308        KM    L=       .3  Lca=       .1   S=   35.7  Kn= .044  LAG=   9.4
 309        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
 310        BA     .18
 311        LG     .37     .35    5.40     .25    2.00
 312        UI    193.    566.    378.    149.     59.     19.      0.      0.      0.      0.
 313        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

 314        KK     C57
 315        KM   COMBINE FLOWS CROSSING SOUTHERN AT CAP WITH THOSE OF SUBBASIN 57
 316        HC       2
            *
            * DDM   ***** Preserved *****

 317        KK  CAP13+
 318        KM    CAP OVERCHUTES 13 AND 14 WERE COMBINED SINCE THY HAVE COMMON DRAINAGE
 319        KM    STORAGE AND DISCHARGES WERE ADDED AT SPECIFIED ELEVATIONS
 320        RS       1    FLOW      -1
 321        SV       0   1.198   2.601   5.746
```

```
322          SE    1564    1567    1568    1570
323          SQ       0     180     500    1143
             *
             * DDM   ***** Updated *****

324          KK     36A
325          KM   BASIN 36A
326          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
327          KM    L=       .3  Lca=       .2   S=   44.1  Kn= .028  LAG=   6.6
328          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
329          BA     .10
330          LG     .27     .34    6.00     .21   28.00
331          UI    201.    435.    101.      0.      0.      0.      0.      0.      0.      0.
332          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE  9

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


333          KK    C36A
334          KM   COMBINE FLOWS FROM CAP OVERCHUTES INTO ADOT EAST DETENTION BASIN
335          HC       2
             *
             * DDM   ***** Preserved *****

336          KK  ADOT-E
337          KM   EAST ADOT DETENTION BASIN 4105, WEST OF CAP AND NORTH OF SUPERSTITION
338          KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
339          KM        COUNTY
340          KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
341          KM            A-N WEST, INC., FEBRUARY, 1987.
342          RS       1    ELEV    49.5
343          SV       0     300     340
344          SE    49.5      60      61
345          SL    49.5   28.27      .6      .5
346          SS      60     200     2.6     1.5
347          ZW    A=ADOT EAST BASIN B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
             *
             * DDM   ***** Preserved *****

348          KK   CFAKE
349          KM   THIS IS JUST A FAKE CONCENTRATION POINT TO ELIMINATE THE ERROR THAT SAYS TO
350          KM   "COMBINE HYDROGRAPHS MORE OFTEN".
351          HC       2
             *
             * DDM   ***** Updated *****

352          KK      52
353          KM   BASIN 52
354          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
355          KM    L=      1.6  Lca=       .7   S=   54.9  Kn= .035  LAG=  25.3
356          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
357          BA     .43
358          LG     .31     .31    6.60     .15   12.00
359          UI     58.    191.    311.    418.    657.    573.    419.    304.    176.     98.
360          UI     63.     30.     18.     18.     18.      0.      0.      0.      0.      0.
361          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Updated *****
```

```
KK      56
KM   BASIN 56
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=       .9  Lca=       .5   S=   57.9  Kn= .040  LAG=  20.2
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .55
LG     .31     .24    7.30     .13   20.00
UI    106.    393.    593.    982.    870.    588.    362.    157.     97.     30.
UI     28.     28.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
```



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

KK     C56
KM     COMBINE 52 AND 56 BEHIND THE STOCK POND
KM     ASSUMING STOCK POND IS EFFECTIVE, DIVERTS FLOWS SOUTH ACROSS SUPERSTITION
KM     STORAGE ROUTING WAS NOT PERFORMED, CHANNEL/PIPE CROSSING
HC       2
*
* DDM   ***** Preserved *****

KK   56T58
RS       3    FLOW      -1
RC    0.08   0.055    0.08    2500   0.004
RX       0     200     300     310     320     330     430     530
RY       6       4       3       0       0       3       4       6
*
* DDM   ***** Updated *****

KK      58
KM   BASIN 58
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=       1.1  Lca=       .5   S=   50.4  Kn= .033  LAG=  18.3
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .95
LG     .34     .36    5.60     .22    4.00
UI    238.    813.   1261.   1998.   1385.    886.    384.    213.     76.     54.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK     C58
KM   COMBINE 58 WITH 56
KM   THE VOLUME AT THIS CONCENTRATION POINT WILL BE SPLIT BETWEEN THE OVERCHUTES
KM   CAP1A AND CAP1B. THIS WILL BE MODELED AS FLAT TOP HYDROGRAPHS WITH 217 CFS
KM   VALUES FOR UI CARDS AT THESE OVERCHUTES
KM   NO DATA AVAILABLE ON CAP OVERCHUTE SIZING
ZW     A=CONCENTRATION POINT C58  B=FLOW TO OVERCHUTES  C=FLOW  F=OBSERVED
HC       2
*

KK     46B
KM   BASIN 46B
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
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```
403        KM    L=      1.4  Lca=       .7   S=   42.9  Kn= .073  LAG=  51.1
404        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
405        BA     .36
406        LG     .21     .24    4.00     .56   51.00
407        UI     24.     24.     59.     95.    118.    135.    156.    182.    232.    298.
408        UI    262.    217.    189.    161.    138.    117.     94.     61.     42.     39.
409        UI     31.     24.     21.      7.      7.      7.      7.      7.      7.      7.
410        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
411        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


412        KK    D46B
413        KM    RETAIN 100 YEAR 2 HOUR, (16% FOR FUTURE DEVELOPMENT)
414        DT     D46       5
415        DI       0   10000
416        DQ       0   10000
           *

417        KK    CAP6
418        RS       1    FLOW      -1
419        SV       0   0.236   1.627   8.021
420        SE  1556.2    1558    1560    1562
421        SQ       0      52     180     350
           *

422        KK  RCAP6B
423        KM   CHANNEL PARAMETERS TAKEN FROM PLANS BY AMERICAN ENGINEERING
424        KM   FOR THE SUPERSTITION SKYLINE HIGH SCHOOL
425        KM   FLOW IS ROUTED ALONG THE TRANSMISSION LINE CORRIDOR
426        KM   ROUTE CONCENTRATION POINT CAP#6 TO SUBBASIN 29A (CRISMON CHANNEL)
427        RS       2    FLOW      -1
428        RC    .013    .013    .013    2300    .002
429        RX       0      39      40    45.5    53.5      59      60      99
430        RY     6.5     5.5     5.5       0       0     6.5     6.5     6.5
           *

431        KK     29A
432        KM   BASIN 29A
433        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
434        KM    L=       .9  Lca=       .4   S=   41.2  Kn= .107  LAG=  49.5
435        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
436        BA     .18
437        LG     .21     .24    4.00     .58   29.00
438        UI     12.     12.     33.     51.     63.     72.     84.     99.    131.    157.
439        UI    127.    107.     93.     78.     66.     56.     40.     24.     21.     19.
440        UI     12.     12.      5.      4.      4.      4.      4.      4.      4.      0.
441        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
442        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

443        KK    D29A
444        KM    RETAIN 100 YEAR 2 HOUR, (73% FOR FUTURE DEVELOPMENT)
445        DT    D29A       9
446        DI       0   10000
447        DQ       0   10000
           *
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```
448          KK    C29A
449          HC       2
             *
             * OVERTOPPING OF CRISMON ROAD CHANNEL REMOVED TO REFLECT FUTURE CHANNEL
1                                          HEC-1 INPUT                                          PAGE 12

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


450          KK     45A
451          KM   BASIN 45A
452          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
453          KM    L=      2.0  Lca=      1.0   S=   70.4  Kn= .079  LAG=  66.1
454          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
455          BA     .62
456          LG     .21     .25    4.00     .60   19.00
457          UI     31.     31.     31.    101.    126.    150.    171.    187.    210.    238.
458          UI    273.    346.    409.    353.    303.    269.    243.    213.    190.    166.
459          UI    149.    120.     89.     56.     54.     52.     42.     31.     31.     22.
460          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.      0.
461          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
462          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

463          KK    D45A
464          KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
465          DT    D29A      24
466          DI       0   10000
467          DQ       0   10000
             *

468          KK    D45A
469          KM    DIVERT 75% OF THE FLOW SOUTH,THE REMAINDER ALONG UNIVERSITY TO NEXT SUBBASIN
470          KM    CHANNEL ALONG UNIVERSITY, SOME SHEET FLOW IS DIVERTED
471          DT   45ATB
472          DI       0    5000
473          DQ       0    4750
             *

474          KK     55B
475          KM   BASIN 55B
476          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
477          KM    L=      3.5  Lca=      1.8   S=   48.6  Kn= .058  LAG=  79.5
478          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
479          BA    1.86
480          LG     .23     .25    4.10     .57   31.00
481          UI     79.     79.     79.    141.    269.    319.    374.    413.    451.    490.
482          UI    542.    600.    670.    821.    973.    999.    852.    753.    682.    628.
483          UI    569.    510.    465.    413.    376.    325.    252.    192.    139.    136.
484          UI    129.    124.     79.     79.     79.     54.     24.     24.     24.     24.
485          UI     24.     24.     24.     24.     24.     24.     24.      0.      0.      0.
486          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

487          KK    D55B
488          KM    RETAIN 100 YEAR 2 HOUR, (73% FUTURE DEVELOPMENT)
489          DT    D55B      92
490          DI       0   10000
491          DQ       0   10000
```

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

492             KK    C55B
493             KM   COMBINE 55B WITH DIVERTED FLOWS FROM 45A
494             HC       2
                *

495             KK    CAP7
496             KM   ROUTE THROUGH CAP#7
497             RS       1    FLOW      -1
498             SV       0   0.167   0.309   0.539   24.52   85.75
499             SE  1560.5    1563 1564.27    1566    1568    1570
500             SQ       0       0     225     460     756    1017
                *
                *  FOLLOWING ROUTING CHANGED TO REFLECT FUTURE LAND USE CHANGES FOR
                *  PARKWOOD RANCH

501             KK   RD45A
502             KM   RETURN DIVERTED FLOWS FROM 45A
503             DR   45ATB
                *

504             KK   45ATB
505             KM   ROUTE REMAINDER OF FLOWS TO 45B
506             KM   STREET FLOW AND SHEET FLOW, NO DEFINED CHANNEL
507             RS      17    FLOW      -1
508             RC   0.055   0.035   0.055   10000   0.001
509             RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
510             RY       6     5.5       5       0       0       5     5.5       6
                *

511             KK     45B
512             KM   BASIN 45B
513             KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
514             KM    L=      1.9  Lca=       .9   S=   45.0  Kn= .052  LAG=  45.2
515             KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
516             BA     .66
517             LG     .22     .25    6.00     .22   50.00
518             UI     49.     49.    159.    219.    266.    309.    368.    482.    614.    516.
519             UI    425.    363.    302.    252.    202.    124.     86.     80.     53.     49.
520             UI     22.     15.     15.     15.     15.     15.      0.      0.      0.      0.
521             UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

522             KK    D45B
523             KM    RETAIN 100 YEAR 2 HOUR, (42% FOR FUTURE DEVELOPMENT)
524             DT    D45B      24
525             DI       0   10000
526             DQ       0   10000
                *
```



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

527             KK    C45B
```

```
528        KM   COMBINE FLOWS FROM 45A AND 45B
529        HC       2
           *

530        KK    CAP8
531        KM   ROUTE THROUGH CAP OVERCHUTE #8
532        RS       1    FLOW      -1
533        SV       0   1.449   9.494   43.04
534        SE  1562.1    1564    1566    1568
535        SQ       0     120     436     935
           *

536        KK    C7+8
537        KM   COMBINE FLOW FROM OVERCHUTES #7 & #8
538        KM   ROUTE FLOW FROM HERE THROUGH PARKWOOD RANCH
539        HC       2
           *

540        KK  RCAP78
541        KM   ROUTE CAP OVERCHUTE #7 & #8 TO SUBBASIN 29B, A ROUTING OF ABOUT 4000 FT
542        KM   CHANNEL DIMENSIONS FROM PARKWOOD RANCH
543        KM  (ADMP CHANNEL ID CN4)
544        RS       3    FLOW      -1
545        RC    .035    .035    .035    4000   .0033
546        RX       0      12      27      45     125     143     158     170
547        RY     6.5     4.5       3       0       0       3     4.5     6.5
           *

548        KK     29B
549        KM   BASIN 29B
550        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
551        KM    L=       .8  Lca=       .5   S=   52.6  Kn= .092  LAG=  42.2
552        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
553        BA     .08
554        LG     .18     .25    4.00     .66   17.00
555        UI      6.      7.     23.     31.     36.     43.     53.     74.     75.     59.
556        UI     50.     41.     34.     27.     16.     11.     10.      6.      6.      2.
557        UI      2.      2.      2.      2.      2.      0.      0.      0.      0.      0.
558        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

559        KK    D29B
560        KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
561        DT    D29B       5
562        DI       0   10000
563        DQ       0   10000
           *
```



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

564        KK   C29B1
565        KM   COMBINE FLOWS FROM CAP #7 OVERCHUTE AND SUBBASIN 29B
566        HC       2
           *

567        KK   C29B2
568        KM   COMBINE ROUTED FLOW FROM 29A WITH SUBBASIN 29B
569        HC       2
```

```
*

KK   TRANS
KM   ROUTE FLOW ALONG THE TRANSMISSION CORRIDOR
KM   ADJACENT TO SCHOOL SITE AND PARKWOOD RANCH
KM  (ADMP CHANNEL ID CN3)
RS       1    FLOW      -1
RC    .013    .013    .013    2600   .0015
RX       0      39      40      51      78      89      90     129
RY     6.5     5.5     5.5       0       0     5.5     5.5     6.5
*

KK     29C
KM   BASIN 29C
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=        .9  Lca=        .5   S=   58.8  Kn= .074  LAG=  34.7
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .23
LG     .24     .25    5.70     .27   32.00
UI     23.     43.     95.    124.    153.    199.    280.    226.    180.    143.
UI    113.     77.     41.     36.     23.     15.      7.      7.      7.      7.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*

KK    D29C
KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
DT     D29      17
DI       0   10000
DQ       0   10000
*

KK   C29C2
KM   COMBINE ROUTED FLOWS FROM C29B2 AND C29C1
HC       2
*

KK  29CTD1
KM   REACH PR-2, PR-3
KM   ROUTE FLOW ALONG SOUTH OF SCHOOL AND SOUTH ALONG CRISMON TO SOUTHERN
KM   GRASS LINED CHANNEL
RS       1    FLOW      -1
RC    .045    .045    .045    2500   .0025
RX       0      20      40      69     109     139     147     155
RY     6.5     5.5     4.9       0       0     4.9     5.5     6.5
*
```



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

KK      55
KM   BASIN 55
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=        .5  Lca=        .2   S=   72.3  Kn= .081  LAG=  22.2
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .14
LG     .24     .24    4.60     .40   29.00
UI     21.     85.    128.    192.    243.    167.    116.     63.     35.     20.
UI      7.      7.      7.      0.      0.      0.      0.      0.      0.      0.
```

```
614          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

615          KK     D55
616          KM    RETAIN 100 YEAR 2 HOUR, (90% FOR FUTURE DEVELOPMENT)
617          DT     D55       9
618          DI       0   10000
619          DQ       0   10000
             *

620          KK    CAP9
621          RS       1    FLOW      -1
622          SV       0    2.03  10.075  43.569
623          SE  1562.1    1564    1566    1568
624          SQ       0     120     436     935
             *

625          KK   RCAP9
626          KM   ROUTE CAP OVERCHUTE #9 TO SUBBASIN 29D
627          KM   UNLINED CHANNEL THROUGH PARKWOOD RANCH
628          KM   DESIGN PLANS BY STANDAGE & TRUITT
629          KM   CHANNEL REVISED BY HOSKIN ENG.
630          KM   CHANNEL ID FOR THAT PART OF THE CHANNEL THAT CUT ACROSS 29D)
631          RS       3    FLOW      -1
632          RC    .035    .035    .035    4700   .0050
633          RX       0      16      30      40      50      60      74      90
634          RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
             *

635          KK     29D
636          KM   BASIN 29D
637          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
638          KM    L=      1.2  Lca=       .9   S=   40.7  Kn= .066  LAG=  47.8
639          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
640          BA     .65
641          LG     .21     .25    4.90     .35   43.00
642          UI     46.     46.    133.    196.    239.    275.    325.    390.    532.    552.
643          UI    439.    375.    319.    270.    225.    177.    111.     80.     75.     51.
644          UI     46.     26.     14.     14.     14.     14.     14.     14.      0.      0.
645          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```



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

646          KK    D29D
647          KM    RETAIN 100 YEAR 2 HOUR, (53% FOR FUTURE DEVELOPMENT)
648          DT    D29D      27
649          DI       0   10000
650          DQ       0   10000
             *

651          KK   D29D2
652          KM   DIVERT APPROXIMATLY 2/3 OF SUBBASIN 29D'S FLOW TO THE EAST. THIS HAPPENS
653          KM   BECAUSE CHANNEL CN5 CUTS ACROSS SUBBASIN 29D. ONLY THOSE FLOWS TO THE EAST OF
654          KM   THE CHANNEL GET INTO THE CHANNEL
655          DT   D29DE   10000
656          DI       0     100     200     500     800
657          DQ       0      66     132     330     528
```

```
*
*       *****KVM*****

KK   C29C3
KM  COMBINE FLOWS FROM C29C2, D29D2, AND RCAP9
HC       3
*
* RETENTION BASIN 5, OPTION 2

KK  BASIN5
KM  WITH 36-INCH OUTFALL
RS       1    STOR      -1
SA       0     3.9      11    13.7      14      14
SE    1518    1521    1523    1524    1528    1531
SL    1518   18.00     0.6     0.5
SS    1528     200     2.5     1.5
*

KK   RBAS5
KM   REACH PR-1
KM   ROUTE FLOWS FORM 29D (WESTERN 1/3) TO SUBBASIN 36.  CRISMON AND SOUTHERN TO
KM  THE SUPERSTITION FWY. (PREVIOUSLY CALLED 29DT36)
RS       1    FLOW      -1
RC   0.025   0.025   0.025    2150  0.0017
RX       0      20      25      32      44      60      68      76
RY     3.8     3.9       4       0       0       4     3.9     3.8
*

KK   G29DE
KM   RECALL THE EASTERN 2/3 OF SUBBASIN 29D. THIS IS RECALLED 2600 FT EAST OF
KM   CRISMON RD.
DR   D29DE
*
*  FOLLOWING ROUTE ADDED BY HOSKIN ENG.*
```



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

KK   29T36
KM   ROUTE FLOW FROM PARKWOOD RANCH THROUGH NEW UNLINED CHANNEL
KM   CROSS-SECTION MATCHES PARKWOOD RANCH CHANNEL
KM  (ADMP CHANNEL ID CN5)
RS       3    FLOW      -1
RC    .035    .035    .035    3000   .0050
RX       0      16      30      40      50      60      74      90
RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
*

KK     36C
KM   BASIN 36C
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .6   S=   44.2  Kn= .020  LAG=  12.4
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .44
LG     .10     .25    4.65     .47   80.00
UI    266.    780.   1282.    724.    259.     83.     37.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```

```
697          KK    D36C
698          KM    RETAIN 100 YEAR 2 HOUR, (87% FOR FUTURE DEVELOPMENT)
699          DT    D36C      38
700          DI       0   10000
701          DQ       0   10000
             *

702          KK     C36
703          KM   COMBINE FLOWS IN CHANNEL ACROSS PARKWOOD RANCH (SUBBASIN 29D) WITH SUBBASIN 3
704          HC       3
             *
             * DDM   ***** Preserved *****

705          KK   36T37
706          KM   ROUTE C36 TO C37 VIA ADOT CONCRETE CHANNEL
707          RS    1.76    FLOW      -1
708          RC   0.035   0.013   0.035    5280  0.0033
709          RX       0     500    1000    1012    1020    1032    1532    2032
710          RY      13    12.5      12       0       0      12    12.5      13
             *
             * DDM   ***** Updated *****

711          KK     30b
712          KM   BASIN 30b
713          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
714          KM    L=      1.5  Lca=       .9   S=   43.3  Kn= .060  LAG=  48.3
715          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
716          BA     .81
717          LG     .27     .27    4.00     .52   25.00
718          UI     57.     57.    161.    241.    296.    339.    400.    475.    645.    703.
719          UI    558.    475.    407.    344.    288.    236.    149.    101.     94.     71.
720          UI     57.     41.     17.     17.     17.     17.     17.     17.      0.      0.
721          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
```



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

722          KK   30bT37
723          KM   ROUTE FLOWS FROM S30b TO C37 VIA NATURAL CHANNEL
724          RS     4.4    FLOW      -1
725          RC   0.040   0.035   0.040    2640   0.053
726          RX       0       2       3       4       7       8      28     528
727          RY       6       5       5       0       0       4     4.5       5
             * DDM   ***** Updated *****

728          KK      37
729          KM   BASIN 37
730          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
731          KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
732          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
733          BA     .47
734          LG     .31     .33    4.00     .49   14.00
735          UI    184.    569.   1051.    922.    531.    204.     85.     32.      0.      0.
736          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

737          KK     C37
```

```
738        KM   COMBINE FLOWS FROM S37, S30, AND C36 AT C37
739        HC       3
           *
           * DDM   ***** Preserved *****

740        KK  ADOTEL
741        KM   ADOT DETENTION BASIN 4313 AT ELLSWORTH RD. AND SUPERSTITION
742        KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
743        KM        COUNTY
744        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
745        KM            A-N WEST, INC., FEBRUARY, 1987.
746        RS       1    ELEV      56
747        SV       0     617     650
748        SE      56      74      75
749        SL      56    3.14     0.6     .05
750        SS      74     200     2.6     1.5
           *
           * DDM   ***** Preserved *****
           *
           * ******************************************************************************
           * Revised by DMJM to reflect Red Mountain Freeway Design Concepts
           * ******************************************************************************
           *

751        KK  37T38A
752        KM   ROUTE FLOWS FROM C37 TO C38A VIA ADOT CONCRETE CHANNEL
753        RS    1.76    FLOW      -1
           *
754        RC   0.035   0.012   0.035    3620  0.0045
755        RX       0     500    1000    1012    1020    1032    1532    2032
756        RY      13    12.5      12       0       0      12    12.5      13
           *
           * Revised by DMJM to reflect Red Mountain Freeway Design Concepts
           *
           * DDM   ***** Inserted *****
```



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

757        KK     38A
758        KM   BASIN 38A
759        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           *     KM  L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  50.8
760        KM    L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  43.8
761        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
762        BA   .3275
763        LG     .25     .29    4.25     .44   31.00
764        UI     25.     25.     87.    116.    141.    164.    198.    266.    316.    249.
765        UI    209.    175.    145.    121.     85.     50.     43.     34.     25.     18.
766        UI      8.      8.      8.      8.      8.      8.      0.      0.      0.      0.
767        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           *    Old Parameters from the Previous Subbbasin 38
           *    BA   .47
           *    LG   .25     .29    4.25     .44   31.00
           *    UI   31.     31.     78.    127.    156.    179.    207.    242.    313.
           *    UI  340.    282.    247.    209.    179.    152.    119.     77.     55.
           *    UI   39.     31.     25.     10.     10.     10.     10.     10.     10.
           *    UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
*    UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* ******************************************************************************
*    ***** Revisions by DMJM to document original design *****
*
*  ***** Original ADOT On-line Detention Basin per URS Final Drainage Report ***
*
*  KKHDET12
*  KM ONLINE DETENTION POND #12 - UPSTREAM FROM HAWES RD. (STA. 992+00 - 997+00)
*  RS     1.   ELEV  1439.8
*  SV     0.    0.11    1.81    5.73    8.84    9.92   10.78
*  SE1439.8  1441.8  1443.8  1445.8  1447.3  1447.8  1448.2
*  SQ   0.    52.0   100.0   132.0   152.0   209.0   285.0
*
* ***** Original ADOT On-line Detention Basin per URS Final Drainage Report ****
*
*  KKHDET11
*  KM ONLINE DETENTION POND #11 - UPSTREAM FROM HAWES RD. (STA. 977+00 - 972+00)
*  RS     1.   ELEV  1427.8
*  SV     0.    0.11    1.87    5.88    7.10    7.96   10.09
*  SE1427.8  1429.8  1431.8  1433.8  1434.4  1434.8  1435.8
*  SQ   0.    52.0   100.0   132.0   140.0   162.0   279.0
*
* ******************************************************************************
*
*  Revise interval to read hydrograph more accurately
*
768  IN       5
*
```



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

769         KK    202D
770         KM   BASIN 202D
771         KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
772         KM     A = 15.93 acres, C = 0.80, Tc = 15.33 min.
773         BA   .0249
774         QI       1       1       1       1       1       1       1       1       1       1
775         QI       1       1       1       1       1       1       1       1       1       1
776         QI       1       1       1       1       1       1       1       1       1       1
777         QI       1       1       1       1       1       1       1       1       1       1
778         QI       1       1       1       1       1       1       1       1       1       1
779         QI       1       1       1       1       1       1       1       1       1       1
780         QI       1       1       1       1       1       1       1       1       1       1
781         QI       1       1       1       2       2       2       2       2       2       2
782         QI       2       2       2       2       2       2       2       2       3       3
783         QI       3       3       3       3       4       4       4       6      10      15
784         QI      19      26      40      71     100      94      69      48      35      25
785         QI      17      11       8       6       5       4       4       3       3       3
786         QI       3       3       3       2       2       2       2       2       2       2
787         QI       2       2       2       2       2       2       2       2       1       1
788         QI       1       1       1       1       1       1       1       1       1       1
789         QI       1       1       1       1       1       1       1       1       1       1
790         QI       1       1       1       1       1       1       1       1       1       1
791         QI       1       1       1       1       1       1       1       1       1       1
792         QI       1       1       1       1       1       1       1       1       1       1
793         QI       1       1       1       1       1       1       1       1       1       1
794         QI       1       1       1       1       1       1       1       1       1       1
```

```
795     QI       1
        *

796     KK    C38A
797     KM    COMBINE FLOWS FROM BASIN 38A WITH ADOT DETENTION OUTLET AND FREEWAY'S 202D
798     HC       3
        *
        * **** Revised by DMJM to reflect Red Mountain Freeway 30% Design Concepts ****
        *

799     KK  202NE1
800     KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
801     KM   Basin is located Northeast of the 202L/US60 Traffic Interchange - Upper Basin
802     RS       1    ELEV  1436.2
        *
        * SV   0     0.2     2.3     6.4    14.9    29.2    36.7    44.4    52.3    60.4
        *
        * *** Revised by PB to reflect final basin geometry ****
        *
803     SV       0     0.4     2.8     6.4    14.3    28.8    36.4    44.1    52.0    60.7
804     SE  1436.2  1437.0  1438.0 1438.73  1440.0  1442.0  1443.0  1444.0  1445.0  1446.0
        *   ***** Double 30 inch dia. RCP Outlet Pipe *****
805     SQ       0       0       0       0      43      69      79      88      96     103
        *
        *
```



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

806     KK  202NE2
807     KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
808     KM   Basin is located Northeast of the 202L/US60 Traffic Interchange - Lower Basin
809     RS       1    ELEV  1433.9
        *
        * SV   0     0.7     4.2     8.9    13.9    19.0    24.3    29.7    35.4    41.3
        *
        * *** Revised by PB to reflect final basin geometry ****
        *
810     SV       0     0.9     3.7     8.1    12.8    17.8    22.8    28.2    33.5    40.1
811     SE  1433.9  1435.0  1436.0  1437.0  1438.0  1439.0  1440.0  1441.0  1442.0  1443.0
        *   ***** Single 24 inch dia. RCP Outlet Pipe *****
812     SQ       0     5.0    12.8    20.7    25.1    29.1    32.7    36.0    39.1    42.0
        *
        *
        * DDM   ***** Updated *****

813     KK     17A
814     KM   BASIN 17A
815     KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
816     KM    L=       .7  Lca=       .5   S=   60.6  Kn= .042  LAG=  18.5
817     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
818     BA     .18
819     LG     .26     .28    4.00     .55   33.00
820     UI     44.    151.    233.    375.    265.    171.     77.     42.     16.     10.
821     UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
822     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****
        * Revised by DMJM to reflect Red Mountain Freeway Design Concepts
```

```
*    KK17AT23
*    KM ROUTE FLOWS FROM 17 TO 23 VIA DIRT CHANNEL, THEN NATURAL WASH
*    RS     3    FLOW      -1
*    RC 0.045   0.032   0.045    2600   0.015
*    RX     0     100     133     137     142     147     200     300
*    RY     5       4     3.5       0       0     3.5       4       5
*
* **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
*
* DDM   ***** Updated *****

KK      49
KM   BASIN 49
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.6  Lca=       .8   S=   73.6  Kn= .040  LAG=  28.4
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .79
LG     .30     .30    4.15     .48   14.00
UI     94.    257.    467.    603.    836.   1129.    839.    643.    482.    296.
UI    161.    117.     74.     29.     29.     29.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
```



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

KK    CAP2
RS       1    FLOW      -1
SV       0    0.02   0.538   2.545  13.729
SE  1565.1    1566    1568    1570    1572
SQ       0      60     340     807    1395
*

KK  BASIN2
* KO     1
KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP2
KM        WITH 24-INCH OUTFALL      (EH1B)
RS       1    STOR      -1
SA       0     .54    1.81    4.10    5.14     6.3     6.3     6.3
SE      49      51      52      53      54      55      64      67
SL      50    3.14     .62      .5
SS    56.5     100     2.5     1.5
*

KK  RCAP2A
KM   ROUTE BASIN 2 OUTFLOW THROUGH 36-INCH PIPE
RK    1370  0.0088   0.012            CIRC       3
*
* DDM   ***** Preserved *****

KK   RCAP2
*
KM   ROUTE CAP OVERCHUTE #2 South to Broadway Road at C17A
*
RS      10    FLOW      -1
*
RC    .045    .040    .045    1100    .012
*
```

```
853        RX     100     200     300     316     321     329     429     529
854        RY       6       5       3       0       0       3       5       6
           *
           *

855        KK    C17A
856        KM    COMBINE FLOWS FROM CAP OVERCHUTE #2 AND S17A
857        HC       2
           *
           * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
           *
           * DDM   ***** Inserted *****

858        KK     18D
859        KM   BASIN 18D
           *
860        KM    THIS IS THE FUTURE SUBBASIN CREATED BY 202L BISECTING 18C
           *
861        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           *     KM  L=      1.2  Lca=       .7   S=   66.1  Kn= .061  LAG=  37.2
862        KM    L=       .7  Lca=       .4   S=   50.0  Kn= .071  LAG=  29.7
863        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1                                    HEC-1 INPUT                                    PAGE 24

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

864        BA   .1367
865        LG     .28     .29    4.10     .48   19.00
866        UI     16.     40.     75.     96.    127.    188.    152.    117.     89.     64.
867        UI     33.     25.     16.      8.      5.      5.      5.      0.      0.      0.
868        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           *     LG   .22     .25    4.00     .57   44.00
           *     UI   45.     75.    180.    237.    287.    355.    507.    531.    407.
           *     UI  268.    214.    140.     80.     72.     45.     34.     14.     14.
           *     UI   14.     14.      0.      0.      0.      0.      0.      0.      0.
           *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Updated *****

869        KK      48
870        KM   BASIN 48
871        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
872        KM    L=      1.6  Lca=       .8   S=   80.2  Kn= .038  LAG=  26.4
873        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
874        BA     .77
875        LG     .31     .31    4.10     .49   12.00
876        UI     98.    305.    517.    682.   1035.   1076.    777.    573.    390.    190.
877        UI    136.     85.     30.     30.     30.      0.      0.      0.      0.      0.
878        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

879        KK    CAP3
880        RS       1    FLOW      -1
881        SV       0   0.934   1.222   4.303   13.13
882        SE  1564.6  1567.5    1568    1570    1572
883        SQ       0       0     143     750    1530
           *
```

```
884     KK  BASIN3
        * KO     1       2
885     KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP3
886     KM        WITH 30-INCH OUTFALL    BASIN AE2B (BASIN 3)
887     RS       1    STOR      -1
888     SA       0      .5       1     1.8     3.4       4       6       6
889     SE      55      56      57      58      59      60      62      65
890     SL   56.25    4.91     .62      .5
891     SS      62     100     2.5     1.5
        *
        * DDM   ***** Preserved *****

892     KK  RCAP3A
893     KM   ROUTE CAP OVERCHUTE #3 TO APACHE TRAIL (ALONG NATURAL CHANNEL)
894     RS     3.3    FLOW      -1
895     RC    .055    .045    .055    2000    .020
896     RX     100     200     300     305     310     315     415     515
897     RY       7       6       5       0       0       5       6       7
        *
        * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                                    PAGE 25

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


898     KK  RCAP3B
899     KM   ROUTE CAP OVERCHUTE #3 FROM APACHE TRAIL TO 17B
900     RS       1    FLOW      -1
901     RC    .045    .035    .045    2300     .01
902     RX     100     200     300     301     311     312     412     512
903     RY       3       2       1       0       0       1       2       3
        *
        * DDM   ***** Updated *****

904     KK     17B
905     KM   BASIN 17B
906     KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
907     KM    L=       .8  Lca=       .6   S=   50.0  Kn= .042  LAG=  21.2
908     KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
909     BA     .22
910     LG     .26     .28    4.00     .54   30.00
911     UI     37.    146.    220.    348.    372.    252.    169.     77.     47.     23.
912     UI     11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
913     UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

914     KK    C17B
915     KM    COMBINE FLOWS FROM CAP OVERCHUTE #3 AND S17B
916     HC       2
        *
        *     * DDM   ***** Preserved *****
        *     KK17BT22
        *     KM ROUTE FLOWS FROM S17 TO C22 VIA LINED CHANNEL
        *     RS     3    FLOW      -1
        *     RC 0.035   0.015   0.035    2700  0.0114
        *     RX     0       1       3       6      18      21      36      70
        *     RY  6.25    6.10       6       0       0       3    3.25     3.5
        *
```

```
917          KK    C17C
918          KM    COMBINE FLOWS FROM C17B AND BASIN 18D
919          HC       3
             *
             * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
             *

920          KK  17CT23
921          KM   ROUTE FLOWS FROM C17C TO C23 VIA CONCRETE CHANNEL ON EAST SIDE OF FREEWAY
             *
922          RS       2    FLOW      -1
923          RC   0.035   0.015   0.035    3000  0.0083
924          RX       0       9      17      29      41      53      68      80
925          RY       9       8       6       0       0       6     6.3       9
             *
             * DDM   ***** Updated *****
             * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
             * DDM   ***** Inserted *****
```



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


926          KK      23
927          KM   BASIN 23
928          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
             *     KM  L=      1.0  Lca=       .3   S=   65.0  Kn= .038  LAG=  16.2
929          KM    L=       .6  Lca=       .2   S=   58.6  Kn= .068  LAG=  19.9
             *
930          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
931          BA   .1750
932          LG     .28     .30    4.00     .47   20.00
933          UI     35.    129.    195.    325.    274.    184.    108.     50.     28.      9.
934          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
935          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *     BA   .28
             *     LG   .28     .30    4.00     .53   20.00
             *     UI   92.    296.    509.    595.    357.    170.     77.     28.     18.
             *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
             *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Updated *****

936          KK      47
937          KM   BASIN 47
938          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
939          KM    L=      3.0  Lca=      1.5   S=   51.2  Kn= .037  LAG=  44.8
940          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
941          BA    1.67
942          LG     .32     .32    4.00     .49    8.00
943          UI    126.    126.    418.    569.    691.    804.    959.   1272.   1579.   1302.
944          UI   1079.    920.    765.    631.    492.    300.    218.    205.    126.    126.
945          UI     42.     39.     39.     39.     39.     39.      0.      0.      0.      0.
946          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
             * KKCAP4+5
             * KM ROUTE THROUGH OVERCHUTES 4 AND 5, HUYDRAULICALLY CONNECTED
             * KM STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
             * RS     1    FLOW      -1
```

```
* SV      0   0.081   0.483   4.779   39.02  121.88
* SE1568.3    1570    1572    1574    1576    1578
* SQ      0     170     575    1085    1245    1410
*

KK  BASIN4
KM   ROUTE THROUGH OVERCHUTES 4 AND 5, HYDRAULICALLY CONNECTED
KM   STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
KM  OUTFLOW THROUGH ONE 30-INCH PIPE
KM        BASIN4 (BY4B)
RS       1    STOR      -1
SA       0    0.64     2.3    5.28    6.88    9.41
SE      68      69      70      71      72      76
SL   69.75    4.91     .62      .5
SS      74     200     2.5     1.5
*
* DDM   ***** Preserved *****
```



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

KK   RCAP4
KM   ROUTE CAP OVERCHUTE #4 AND #5 TO SUBBASIN 22
RS      10    FLOW      -1
RC     .05    .045     .05    6000    .005
RX     100     200     300     304     310     314     414     514
RY       6       5       4       0       0       4       5       6
*
* DDM   ***** Updated *****

KK      22
KM   BASIN 22
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .3   S=   51.3  Kn= .041  LAG=  19.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .41
LG     .27     .28    4.00     .54   29.00
UI     86.    310.    470.    782.    624.    415.    227.    109.     56.     21.
UI     21.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
* DDM   ***** Preserved *****

KK    C22A
KM   COMBINE FLOWS FROM CAP OVERCHUTES 4 & 5 AND SUBBASIN 22
HC       2
*
* **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
*
*    * DDM   ***** Preserved *****
*    KK   C22
*    KM COMBINE S17B AND S22
*    HC     2
*    * DDM   ***** Preserved *****

KK  22AT23
KM   ROUTE C22A TO C23 VIA CONCRETE CHANNEL
KM   VELOCITY = 5FT/S
RS       2    FLOW      -1
*
```

```
980   RC   0.045   0.022   0.042    1600   0.001
      *
981   RX       0     102     103     106    1021     124     128     270
982   RY       7     6.5       6       0       0       3       5       7
      *
      * DDM   ***** Preserved *****
      *
      * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
      *

983   KK     C23
      *
984   KM   COMBINE FLOWS FROM C22A, C17C, AND S23 AT C23
      *
985   HC       3
      *    * DDM   ***** Preserved *****
      *    KK 23T24
      *    KM ROUTE FLOWS FROM C23 TO C24 VIA CONCRETE LINED CHANNEL
      *    RS     2    FLOW      -1
      *    RC 0.045   0.022   0.045    2640  0.0117
      *    RX     0       2       3       6      21      24      26      70
      *    RY     6       6       6       0       0       3       5       6
      *
      * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
      *
```



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

986         KK   RC23
987         KM   ROUTE FLOWS FROM C23 TO C31a VIA CONCRETE LINED CHANNEL
988         RS       3    FLOW      -1
989         RC   0.035   0.015   0.035    5700  0.0046
990         RX       0       9      17      29      41      53      68      80
991         RY       9       8       6       0       0       6     6.3       9
            *
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *
            *
            * DDM   ***** Updated *****

992         KK     30a
993         KM   BASIN 30a
994         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
995         KM    L=      1.2  Lca=       .7   S=   48.8  Kn= .060  LAG=  38.1
996         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
997         BA     .30
998         LG     .27     .28    3.91     .53   28.00
999         UI     27.     42.    104.    138.    166.    204.    281.    329.    251.    208.
1000        UI    167.    135.     96.     54.     45.     32.     27.      9.      8.      8.
1001        UI      8.      8.      0.      0.      0.      0.      0.      0.      0.      0.
1002        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****

1003        KK  30at31
1004        KM   ROUTE SUBBASIN 30A IN VARIOUS CHANNELS UNTIL IT COMBINES WITH SUBBASIN 31A
1005        KM   AT THE CORNER OF 88TH ST AND SOUTHERN.  IN REALITY THIS ROUTING COULD BE
```

```
1006    KM   BROKEN UP INTO POSSIBLY 3 DIFFERENT ROUTINGS DUE TO CHANGES IN HOW THE
1007    KM   ROUTING IS ACCOMPLISHED, IE. CEMENT CHANNEL, EARTH LINED CHANNEL AND OPEN
1008    KM   WASH. THE PARAMETERS WILL TRY TO BE AN AVERAGE FOR THE ENTIRE REACH
1009    RS       4    FLOW      -1
1010    RC    .038    .030    .038    5000    .005
1011    RX       0      15      25      40      60      75      85     100
1012    RY       8       6       3       2       2       3       6       8
        *
        * DDM   ***** Updated *****

1013    KK     31A
1014    KM   BASIN 31A
1015    KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1016    KM    L=      1.0  Lca=       .5   S=   43.3  Kn= .064  LAG=  22.5
1017    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1018    BA   .5127
1019    LG     .29     .29    4.15     .46   18.00
1020    UI     77.    299.    454.    675.    882.    614.    430.    249.    130.     78.
1021    UI     27.     24.     24.      0.      0.      0.      0.      0.      0.      0.
1022    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *     BA   .53
        *     LG   .29     .29    4.15     .46   18.00
        *     UI   80.    312.    472.    702.    919.    639.    448.    259.    135.
        *     UI   28.     25.     25.      0.      0.      0.      0.      0.      0.
        *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
```



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

1023    KK    202C
1024    KM   BASIN 202C
1025    KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
1026    KM     A = 6.66 acres, C = 0.95, Tc = 13.33 min.
1027    BA   .0104
1028    QI       1       1       1       1       1       1       1       1       1       1
1029    QI       1       1       1       1       1       1       1       1       1       1
1030    QI       1       1       1       2       4       5       7       9      14      26
1031    QI      34      30      20      14      10       7       5       3       2       2
1032    QI       1       1       1       1       1       1       1       1       1       1
1033    QI       1       1       1       1       1       1       1       1       1       1
1034    QI       1       1
        *
        * DDM   ***** Preserved *****

1035    KK    C31A
        *
1036    KM    COMBINE FLOWS FROM SUBBASIN 30A, SUBBASIN 31A, C23, AND SUBBASIN 202C
        *
1037    HC       4
        *
        *
        * **** Revised by DMJM to reflect Red Mountain Freeway 30% Design Concepts ****
        *

1038    KK   R202S
1039    KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
1040    KM    Basin located on the east side of the 202L Freeway north of Southern Ave.
1041    KM    Principal Outlet Structure consists of 1 - 10'x6' RCB.
```

```
*   RS      1    ELEV  1446.0
*   SV      0     0.2     1.4     4.3     9.5    17.5    28.6    52.9    78.4
*   SE1446.0  1447.0  1448.0  1449.0  1450.0  1451.0  1452.0  1454.0  1456.0  14
*   SQ      0    46.3    92.6   164.1   245.7   333.9   425.9   604.9   804.7   8
*
* **** Revised by DMJM to reflect 202L/US60 - Phase 2 - 30% Design Concepts ****
*
RS       1    ELEV  1444.0
SV       0     0.2     1.4     4.3     9.5    17.5    28.6    52.9    78.4    91.3
SE  1444.0  1445.0  1446.0  1447.0  1448.0  1449.0  1450.0  1452.0  1454.0  1455.0
SQ       0    46.1    92.2   163.8   245.3   333.3   425.7   604.8   803.6   826.1
*
* ***** Onsite 202L Runoff *****
*

KK    202A
KM   BASIN 202A
KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
KM     A = 56.9 acres, C = 0.76, Tc = 22.9 min.
BA   .0889
QI       0       0       1       1       2       2       2       3       3       3
QI       3       3       3       3       4       4       4       4       4       4
QI       4       4       5       5       5       5       6       6       6       7
QI       8       9      14      20      28      38      55      90     137     163
QI     155     127      96      73      54      39      27      20      15      12
```



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

QI      10       8       7       6       6       5       5       5       5       5
QI       4       4       4       4       4       4       4       3       3       3
QI       3       3       3       3       2       2       1       1
*

KK   R202A
KM   ROUTE FLOWS FROM Broadway Road to C202B
RK   6000.  0.0016   0.013            CIRC     6.0
*

KK    202B
KM   BASIN 202B
KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
KM     A = 35.73 acres, C = 0.84, Tc = 17.67 min.
BA   .0558
QI       0       0       1       1       2       2       2       2       2       2
QI       2       2       2       2       2       3       3       3       3       3
QI       3       3       3       3       4       4       4       4       5       5
QI       6       7      12      17      24      32      48      82     121     125
QI     101      73      53      39      27      18      13       9       7       6
QI       5       5       4       4       4       3       3       3       3       3
QI       3       3       3       3       3       2       2       2       2       2
QI       2       2       2       2       1       1
*

KK   C202B
KM    COMBINE FLOWS FROM SUBBASIN 202A WITH SUBBASIN 202B
HC       2
*
*
```

```
1078        KK   R202B
1079        KM   ROUTE FLOWS FROM C202B TO C202C
1080        RK   3200.  0.0010   0.013            CIRC     5.0
            *
            *

1081        KK   C202C
1082        KM    COMBINE FLOWS FROM C202B WITH C31A
            * KO     1
1083        HC       2
            *

1084        KK  RT202C
1085        KM   ROUTE FLOWS ALONG SOUTHERN AVE FROM 202L TO HAWES ROAD.
1086        RS       1    FLOW      -1
1087        RC    .025    .015    .025     683  0.0010
1088        RX       0       4      16      28      44      56      68      72
1089        RY     7.3     6.3     6.0       0       0     6.0     6.3     7.3
            *
            *   *** REVISED BY DMJM+HARRIS PER CITY OF MESA COMMENTS ***
            *
```



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

1090        KK  DSPILL
1091        KM   DIVERT FLOW SW TOWARD HAWES CHANNEL VIA 10x4 RCB
1092        KM   REMAINDER FLOWS SOUTH VIA SIDE CHANNEL WEIR (L=165') TO NW BASINS
1093        DT   DHAWS
            *
            * *** Flow Split rating from HEC-RAS model and channel w/ weir (L=165') ***
1094        DI       0     104     185     461     527     579     618     674     719
1095        DQ       0     104     140     162     189     208     217     224     225
            *
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            * DDM   ***** Inserted *****
            *

1096        KK     38B
1097        KM   BASIN 38B
1098        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
            *     KM  L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  50.8
1099        KM    L=       .5  Lca=       .4   S=   28.0  Kn= .063  LAG=  25.6
1100        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1101        BA   .0528
1102        LG     .25     .29    4.25     .44   31.00
1103        UI      7.     23.     37.     50.     78.     71.     52.     38.     23.     12.
1104        UI      8.      4.      2.      2.      2.      0.      0.      0.      0.      0.
1105        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            *     LG   .25     .29    4.25     .44   31.00
            *     UI   31.     31.     78.    127.    156.    179.    207.    242.    313.
            *     UI  340.    282.    247.    209.    179.    152.    119.     77.     55.
            *     UI   39.     31.     25.     10.     10.     10.     10.     10.     10.
            *     UI    0.
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *
```

```
1106        KK    C38B
1107        KM   COMBINE FLOWS FROM D31S with SUBBASIN 38B AT C38B
            *
1108        HC       2
            *
            *

1109        KK  202NW1
1110        KM   Off-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
1111        KM    Upper Basin of Two in Series
1112        RS       1    ELEV  1433.0
            *  *   ***** Triple 48 Inch dia. RCP Outlet Pipes *****
            *  SV     0     0.4     3.1    11.5    12.6    17.7    23.0    28.4    33.8
            *  SE1433.0  1434.0  1435.0 1436.66  1437.0  1438.0  1439.0  1440.0  1441.0
            *  SQ     0       0       0       0     125     246     343     395     438
            *  **** Triple 48 Inch dia. RCP Outlet Pipes and Emergency Spillway ****
            * SV   0     0.4     3.1    11.5    12.6    17.7    23.0   23.70   32.34
            * SE1433  1434.0  1435.0 1436.66  1437.0  1438.0  1439.0 1439.13 1440.73
            * SQ   0       0       0       0     125     246     343     352    1192
            *
            * *** Revised by PB to reflect final basin geomerty and 2-8'X4" RCBC outlet ****
            *
1                                   HEC-1 INPUT                                          PAGE 32

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

1113        SV       0     0.7     3.5    10.5    12.9    18.1    20.8    23.4    24.5    25.6
1114        SV    26.7    28.9
1115        SE  1433.0  1434.0  1435.0  1436.5  1437.0  1438.0  1438.5 1439.00 1439.20  1439.4
1116        SE  1439.6  1440.0
1117        SQ       0       0       0       0     266     451     502     551     570     595
1118        SQ     615     650
            *
            *

1119        KK  202NW2
1120        KM   Off-line Detention Basin for 202L/US60 Traffic Interchange 30% Design
1121        KM    Lower Basin of Two in Series
1122        RS       1    ELEV  1430.4
            *  *   ***** Double 48 inch dia. RCP Outlet Pipe *****
            *  SV     0     0.1     1.4     5.2    10.7    16.6    22.7    29.0    35.3
            *  SE1430.4  1431.0  1432.0  1433.0  1434.0  1435.0  1436.0  1437.0  1438.0
            *  SQ     0      12      35      74     109     160     216     250     280
            *   **** Double 48 inch dia. RCP Outlet Pipe and Emergency Spillway ****
            * SV   0     0.1     1.4     5.2    10.7    16.6    22.7   27.42    47.9
1123        *S  E1430.4 1431.0  1432.0  1433.0  1434.0  1435.0  1436.0 1436.75  1440.0
            * SQ   0      12      35      74     109     160     216     246    1265
            *
            * *** Revised by PB to reflect final basin geometry and 2-36" RCP outlet ****
            *
1124        SV       0     0.2     1.9     6.1    12.5    19.8    23.6    27.3    31.2    35.2
1125        SV    39.2
1126        SE  1430.3  1431.0  1432.0  1433.0  1434.0  1435.0  1435.5  1436.0  1436.5  1437.0
1127        SE  1437.5
1128        SQ       0       5      27      61      96     122     186     304     469     683
1129        SQ     946
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *
```

```
            * DDM   ***** Updated *****

1130        KK      50
1131        KM   BASIN 50
1132        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1133        KM    L=       .9  Lca=       .4   S=   81.4  Kn= .037  LAG=  15.8
1134        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
            *     BA   .28
1135        BA   .2639
            *
1136        LG     .33     .31    4.00     .49    5.00
1137        UI     97.    306.    543.    575.    342.    149.     71.     21.     18.      0.
1138        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1139        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                          PAGE 33

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


1140        KK    CAP1
1141        RS       1    FLOW      -1
1142        SV       0   0.091   0.575   3.319  13.256
1143        SE    1566    1568    1570    1572    1574
1144        SQ       5      90     275     470     610
            *

1145        KK  BASIN1
            * KO     1       2
1146        KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP1
1147        KM        WITH 24-INCH OUTFALL
1148        RS       1    STOR      -1
1149        SA    0.01    1.94    3.10    3.49    3.94    4.40    4.85
1150        SE      60      61      62      63      64      65      66
1151        SL    60.2    3.14     .62      .5
1152        SS      64      50     2.5     1.5
            *
            *
            * DDM   ***** Preserved *****

1153        KK   RCAP1
1154        KM   ROUTE CAP OVERCHUTE #1 TO SUBBASIN 18A
1155        RS      11    FLOW      -1
1156        RC     .05    .045     .05    7000     .02
1157        RX     100     200     300     301     303     304     404     505
1158        RY       6       5       2       0       0       2       5       6
            *
            * DDM   ***** Updated *****
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *

1159        KK     18c
1160        KM   BASIN 18c
            *
1161        KM    THIS IS THE FUTURE SUBBASIN     WITH LESS AREA DUE TO 202L FREEWAY
            *
1162        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1163        KM    L=      1.0  Lca=       .5   S=   60.6  Kn= .071  LAG=  24.1
```

```
*     KM  L=      1.2  Lca=       .7   S=   66.1  Kn= .061  LAG=  37.2
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .4172
LG     .28     .29    4.10     .48   19.00
UI     58.    207.    326.    450.    691.    528.    384.    266.    127.     83.
UI     49.     18.     18.     18.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*     BA   .50
*     LG   .22     .25    4.00     .57   44.00
*     UI   45.     75.    180.    237.    287.    355.    507.    531.    407.
*     UI  268.    214.    140.     80.     72.     45.     34.     14.     14.
*     UI   14.     14.      0.      0.      0.      0.      0.      0.      0.
*     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```



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

KK    D18c
KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (53% OF BASIN HAS RETENTION
DT    D18c      20
DI       0   10000
DQ       0   10000
*
* DDM   ***** Preserved *****

KK    C18C
KM    COMBINE FLOWS FROM ROUTED FLOW OF SUBBASIN 50 WITH FLOW FROM 18c
KM    BEFORE CROSSING UNDERNEATH APACHE BLVD AND GOING INTO THE HAWES CHANNEL
HC       2
*
* DDM   ***** Preserved *****

KK   18T24
KM   REACH HS-6, HS-7, HS-8
KM   ROUTE FLOWS FROM SUBBASIN 18A TO SUBBASIN 24.
RS       1    FLOW      -1
RC    .025    .015    .025    2730  0.0017
RX       0       8      16      26      46      58      65      73
RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
*  THE ABOVE CHANNEL DIMS ARE BASED ON THE NARROWEST DESIGN REACH.
*
* DDM   ***** Updated *****
* DDM   ***** Inserted *****

KK      24
KM   BASIN 24
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
*     KM  L=       .9  Lca=       .5   S=   43.5  Kn= .047  LAG=  24.6
KM    L=       .9  Lca=       .5   S=   43.5  Kn= .052  LAG=  30.4
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .4272
LG     .23     .26    4.00     .56   38.00
UI     47.    117.    223.    286.    373.    562.    484.    372.    285.    214.
UI    116.     80.     53.     34.     15.     15.     15.     15.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*     BA   .29
*     LG   .23     .26    4.00     .58   38.00
*     UI   40.    138.    220.    300.    469.    376.    275.    195.    100.
```

```
*     UI   40.     12.     12.     12.      0.      0.      0.      0.      0.
*     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK     C24
KM   COMBINE FLOWS FROM S18C AND S24
ZW     A=HAWES RD @ BROADWAY RD   B=HAWES CHANNEL PROJECT  C=FLOW   F=HYDROGRAPH
HC       2
*
* DDM   ***** Preserved *****
```



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

KK  BRDHAW
KM    DIVERT FLOW OF 360 CFS TO THE WEST PER THE CITY OF MESA FUTURE DRAINAGE
KM    SYSTEM
DT  DIVBRD
DI       0     200     400     500     700    1000
DQ       0       0       0       0       0       0
* DI     0     200     400     500     700    1000
* DQ     0     200     360     360     360     360
*

KK  RT31B1
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-5 plus culvert HSC-4
KM   ROUTE FLOWS FROM HAWES ROAD AND BROADWAY ROAD (C24) TO CORAL BELL AVENUE.
KO                                        21                      10
ZW   A=FLOW AFTER 360 CFS DIVERT TO WEST B=HAWES CHANNEL PROJECT C=FLOW  F=HYDRO
RS       1    FLOW      -1
RC    .025    .015    .025    1312  0.0015
RX       0       8      15      28      68      81      89      97
RY     6.2     6.4     6.5       0       0     6.5     6.4     6.2
*

KK  RT31B2
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-4A AND HS4-B plus culvert HSC-3
KM   ROUTE FLOWS FROM CORAL BELL AVENUE TO EMELITA AVENUE.
RS       1    FLOW      -1
RC    .025    .015    .025    2080  0.0018
RX       0       8    15.9      16      66    66.1      74      82
RY     5.8     5.9     6.1       0       0     6.1     5.9     5.8
*

KK  RT31B3
KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
KM   REACH HS-3
KM    THIS REACH IS AN EXISTING CHANNEL FOR THE CRESCENT RUN MOBILE HOME PARK.
KM    The existing channel 5.6 ft deep has no freeboard.  Overbank flows in street
KM    Routing values per channel design plans,
KM    Sheet 2 of 19, City of Mesa Project 97-69.
KM   ROUTE FLOWS FROM EMELITA AVENUE TO SOUTHERN AVENUE (C31) WITHIN SUBBASIN 31B.
RS       1    FLOW      -1
RC    .025    .015    .025    1935  0.0033
RX       0    35.6    41.6      50    66.7    75.1    81.1    92.0
RY     5.4     4.7     5.6       0       0     5.6     7.6     7.7
```

```
            *
            * DDM   ***** Updated *****
            *

1236        KK     31B
1237        KM   BASIN  31B
1238        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
            *     KM  L=      1.2  Lca=       .5   S=   29.7  Kn= .049  LAG=  30.8
1239        KM    L=      1.2  Lca=       .5   S=   29.7  Kn= .077  LAG=  23.2
1240        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1                                   HEC-1 INPUT                                          PAGE 36

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

1241        BA    .720
1242        LG     .31     .32    4.45     .35   11.00
1243        UI    104.    391.    602.    859.   1236.    884.    629.    407.    187.    125.
1244        UI     59.     32.     32.      0.      0.      0.      0.      0.      0.      0.
1245        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            *     BA   .47
            *     LG   .24     .25    4.45     .46   37.00
            *     UI   52.    125.    240.    309.    399.    601.    544.    416.    321.
            *     UI  141.     88.     63.     44.     16.     16.     16.     16.      0.
            *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1246        KK   D31BS
1247        KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
1248        DT   D31BS      23
1249        DI       0   10000
1250        DQ       0   10000
            *
            * DDM   ***** Preserved *****
            *
            *
            * ***** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *

1251        KK   C31B
1252        KM   COMBINE FLOWS FROM C24 AND 31B
1253        ZW   A=FLOW SOUTHERN AND HAWES BEFORE SPLIT BOX B=HAWES CHANNEL PROJ C=FLOW F=HYDR
1254        HC       2
            *
            *
            * DDM   ***** Preserved *****
            *     KK  D31W
            *

1255        KK    D31S
            *
1256        KM    THIS DIVERT RECORD IS FOR THE BOX CULVERT SYSTEM AT SOUTHERN AVE AND HAWES
1257        KM    IT IS BASED UPON A HEC-RAS ANALYSIS OF THE FOLLOWING STRUCTURES:
1258        KM    3-8'X4' CBC SOUTH,  2-10'X6' CBC TO THE WEST
1259        KM    THE CULVERT TO THE SOUTH HAS THE TWO THAT ARE THERE NOW WITH AN ADDITIONAL
1260        KM    ONE CONSTRUCTED
            * KO     1
1261        DT    D31W
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
```

```
*
*   *  THESE NEW CARDS BASED UPON HEC-RAS ANALYSIS
*   DI     0     144     182     252     380     454     544     671     758
*   DI   976    1098    1184    1280    1412    1544    1646    1738    1830
*   DQ     0       0       0     220     316     358     400     460     520
*   DQ   640     690     740     800     860     920     980    1030    1080
*
*  THESE CARDS BASED UPON HEC-RAS ANALYSIS *** As Intended ***
*
*  DI     0     144     182     252     380     454     544     671     758
*  DI   976    1098    1184    1280    1412    1544    1646    1738    1830
*  DQ     0     144     182     220     316     358     400     460     520
*  DQ   640     690     740     800     860     920     980    1030    1080
*
*  ** Revised to help allow proper function of NW Detention Basins (Off-line Typ
*  *** Simulating 75% blockage of the Southern Avenue culverts ***
*
```



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

1262        DI       0      62     111     230     309     403     504     611     727     847
1263        DI     971    1098    1223    1346
1264        DQ       0      62     111     214     283     362     445     533     629     729
1265        DQ     834     941    1049    1155
            *
            *

1266        KK  31T381  ROUTED IN TWO STEPS DUE TO CHANNEL DISSIMILARITY.
1267        KM   REACH HS-2 plus culvert HSC-2
1268        KM     ROUTE FLOWS FROM SOUTHERN AVENUE (C31) IN THE HAWES CHANNEL.
1269        KM   REACH HS-2 IS A PROPOSED CHANNEL SOON-TO-BE-CONSTRUCTED.  IT IS 4.5 FEET
1270        KM     DEEP, WITH FREEBOARD. CHANNEL CROSS-SECTION FROM DESIGN PLANS FOR
1271        KM     SOUTHERN AVENUE DRAINAGE IMPROVEMENTS.  SHEET 28 OF 43
1272        KM     CITY OF MESA PROJECT NO. 97-56.1 DESIGN PLANS BY ENTELLUS
1273        KM     DATED 8/8/97 REV. 12/19/97
1274        RS       1    FLOW      -1
1275        RC   0.025   0.015   0.025    1248   .0022
1276        RX       0      32      37      46      56      65      73      75
1277        RY       5     7.0     4.5       0       0     4.5     9.0     9.5
            *
            *
            * **** Revised by DMJM+HARRIS at request of City of Mesa *****
            *
            *

1278        KK   RHAWS
1279        KM   RETRIEVE DIVERTED HYDROGRAPH FROM CHANNEL ALONG SOUTHERN AVE.
1280        DR   DHAWS
            *
            *

1281        KK  RTHAWS
1282        KM   ROUTE FLOWS FROM SOUTHERN AVENUE TO HAWES CHANNEL.
1283        RS       1    FLOW      -1
1284        RC    .025    .015    .025     513  0.0010
1285        RX       0       4      16      28      38      50      62      66
1286        RY     7.3     6.3     6.0       0       0     6.0     6.3     7.3
            *
            *
```

```
1287        KK   C31S
1288        KM   COMBINE FLOWS FROM D31S AND RHAWS
1289        HC       2
            *

1290        KK  31T382
1291        KM   REACH HS-1 plus culvert HSC-1
1292        KM   ROUTE FLOWS TO SUPERSTITION FREEWAY (C38)
1293        KM   IN THE HAWES CHANNEL.
1294        RS       1    FLOW      -1
1295        RC   0.025   0.015   0.025     810   .0017
1296        RX       0      10      16      26      51      61      77      81
1297        RY     5.3     4.8     4.9       0       0     4.9     4.6     3.6
            *
            *    * DDM   ***** Preserved *****
            *    KK31AT38
            *    KM ROUTE S31A TO 38
            *    RS      6    FLOW      -1
            *    RC    .04     .03     .04    3500    .012
            *    RX    100     200     300     302     307     309     409     509
            *    RY      4       3       2       0       0       2       3       4
            *
            *
```



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

1298        KK   C38C1
1299        KM   COMBINE FLOWS FROM HAWES CHANNEL WITH NW DETENTION BASINS FLOW
1300        HC       2
            *
            *

1301        KK    C38C
1302        KM   COMBINE FLOWS FROM R202NE with R202NW AT C38
1303        HC       2
            *
            * DDM   ***** Preserved *****

1304        KK   38T39
1305        KM   ROUTE FLOWS FROM C38C TO C39 VIA CONCRETE CHANNEL
1306        RS    1.32    FLOW      -1
1307        RC   0.035   0.012   0.035    3960  0.0066
1308        RX       0     500    1000    1012    1020    1032    1532    2032
1309        RY      13    12.5      12       0              12    12.5      13
            *     * ADOT DETENTION BASINS FROM URS REPORT SEPT 1988
            *     * DDM   ***** Preserved *****
            *     KK ADD10
            *     KM  BASIN #10 - OFF-LINE DETENTION POND TO ATTENUATE PEAK FLOWS
            *     KM   BUT DO NOT DELAY THE PEAK
            *     DT  DB10
            *     DI   807     879     961    1070    1190    1320
            *     DQ     0      29      61     120     190     270
            *     * DDM   ***** Preserved *****
            *     KK  ADD9
            *     KM BASIN #9 - OFF-LINE DETENTION POND
            *     DT   DB9
            *     DI   626     660     751     861     987    1128
```

```
*     DQ     0      10      51     110     189     278
*     * DDM   ***** Preserved *****
*     KK  ADD8
*     KM BASIN #8 - OFF-LINE DETENTION POND
*     DT   DB8
*      * ORIGINAL DESIGN PER URS FINAL DRAINAGE REPORT
*     *     DI   464     521     627     752     898
*     DI   464     521     627     752     898          1059    1236
*     *     DQ     0      21      77     152     248
*     DQ     0      21      77     152     248     359          486
*
*  ***** Per Original Design and URS Final Drainage Report *****
*  ***** These Detention Basins occurred West of Sossaman Channel *****
*
*     * DDM   ***** Preserved *****
*     KK  ADD7
*     KM BASIN #7 - OFF-LINE DETENTION POND
*     DT   DB7
*     DI   770     810     892     988    1093    1207    1331    1462
*     DQ     0      10      42      88     143     207     281     362
*     * DDM   ***** Preserved *****
*     KK  ADD6
*     KM BASIN #6 - OFF-LINE DETENTION POND
*     DT   DB6
*     DI   685     703     781     875     978    1092    1215
*     DQ     0       3      31      75     128     192     265
*     * DDM   ***** Preserved *****
*     KK  ADD5
*     KM BASIN #5 - OFF-LINE DETENTION POND
*     DT   DB5
*     DI  1005    1063    1141    1227    1320    1421    1527
*     DQ     0      13      41      77     120     171     227
*
*
* ******************************************************************************
* End of Revisions by DMJM to reflect Red Mountain Freeway Design Concepts
* ******************************************************************************
*
*
```



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


1310        KK    R31W
1311        KM   RETURN DIVERTED FLOW AT CORNER OF SOUTHERN AND HAWES
1312        DR    D31W
            *
            * DDM   ***** Preserved *****

1313        KK  31WT32
1314        KM   ROUTE FLOWS FROM D31A TO C32
1315        RS    1.76    FLOW      -1
1316        RC    .035    .022    .035    5280   .0027
1317        RX       0    2005    2012    2012    2106    2106    2113    3122
1318        RY     4.5     4.5     3.5       0       0     3.5     4.5     4.5
            *
            * DDM   ***** Updated *****

1319        KK      32
```

```
1320        KM   BASIN 32
1321        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1322        KM    L=       .9  Lca=       .5   S=   38.9  Kn= .055  LAG=  29.1
1323        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1324        BA     .38
1325        LG     .23     .25    4.55     .44   27.00
1326        UI     43.    115.    212.    273.    368.    529.    407.    314.    237.    161.
1327        UI     81.     62.     43.     14.     13.     13.     13.      0.      0.      0.
1328        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * KK   D32
            * KM  RETAIN 100 YEAR 2 HOUR, (FULLY DEVELOPED - NO RETENTION)
            * DT   D32       0
            * DI     0   10000
            * DQ     0   10000
            *
            * DDM   ***** Preserved *****

1329        KK     C32
1330        KM    COMBINE SOSSAMAN CHANNEL FLOWS WITH FLOWS FROM 32
1331        HC       2
            *
            * DDM   ***** Preserved *****

1332        KK   32T39
1333        KM   ROUTE FLOWS FROM C32 TO C39
1334        RS    0.88    FLOW      -1
1335        RC   0.012   0.012   0.012    2640   0.004
1336        RX       0       5      10      28      38      60      65      70
1337        RY      14      14      14       0       0      14      14      14
            * DDM   ***** Updated *****

1338        KK      39
1339        KM   BASIN 39
1340        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1341        KM    L=       .9  Lca=       .7   S=   38.0  Kn= .060  LAG=  32.4
1342        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1343        BA     .36
```



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

1344        LG     .22     .25    4.60     .41   44.00
1345        UI      37      81     165     213     269     383     437     325     258     200
1346        UI     142      76      61      37      24      11      11      11      11       0
1347        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1348        KK     D39
1349        KM    RETAIN 100 YEAR 2 HOUR, (13% FOR FUTURE DEVELOPMENT)
1350        DT     D39       4
1351        DI       0   10000
1352        DQ       0   10000
            *
            * DDM   ***** Preserved *****

1353        KK    C39A
1354        KM   COMBINE FLOWS FROM C32, C38 AND S39 AT C39
1355        HC       2
            *
```

```
* DDM   ***** Preserved *****

KK    C39B
KM   COMBINE FLOWS FROM C39A AND ADOT BASINS
HC       2
*
* DDM   ***** Preserved *****

KK    SOSS
KM   THIS WAS FORMERLY CALLED CHANNEL
KM   DIVERT FLOWS IN EXCESS OF 1800 CFS TO SOSSAMAN DET. BASIN
KM   IN REALITY, BACKWATER FROM THE ADOT CROSSING DETERMINES THE AMOUNT OF SPILL
KM   SUPERSTITION FREEWAY
ZW    A=SOSSAMAN DRAIN  B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
DT   BASIN
DI       0    1800    2000   10000
DQ       0       0     200    8200
ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 127         42
              V
              V
 139       42T51
              .
              .
 144          .          51
              .           .
              .           .
 155        C51............
              V
              V
 158       51T53
              .
              .
 164          .         44A
              .           .
              .           .
 178          .           .-------->    D44A
 176          .      DIV44A
              .           .
              .           .
              .           .          43
              .           .           .
              .           .           .
 192          .         C43............
              .           V
              .           V
 195          .      43T53
              .           .
              .           .
 200          .           .          53
              .           .           .
              .           .           .
 210        C53........................
              .
              .
 213          .          54
              .           .
              .           .
 224        C54............
              .
              .
 230          .-------->   SOUTH
 227     DCAP12
              V
              V
 233      CAP12
              .
              .
 240          .           .<-------    D44A
 238          .      DR44A
              .           V
```

```
          .          V
241       .       44ATB
          .          .
          .          .
          .          .          44B
          .          .           .
          .          .           .
258       .       C44B............
          .          V
          .          V
261       .      CAP10+
          .          V
          .          V
268       .      RCAP11
          .          .
          .          .
271     C12............
         V
         V
274   ADOT-W
         V
         V
285   RADOTW
         .
         .
291      .         36B
         .          .
         .          .
300     C36B...........
         .
         .
306      .          .<-------   SOUTH
304      .      RSOUTH
         .          .
         .          .
307      .          .          57
         .          .           .
         .          .           .
316      .        C57............
         .          V
         .          V
319      .      CAP13+
         .          .
         .          .
326      .          .         36A
         .          .           .
         .          .           .
335      .       C36A............
         .          V
         .          V
338      .      ADOT-E
         .          .
         .          .
350   CFAKE...........
         .
         .
354      .         52
         .          .
         .          .
364      .          .         56
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                .          .          .
                .          .          .
374             .        C56............
                .          V
                .          V
379             .      56T58
                .          .
                .          .
384             .          .         58
                .          .          .
                .          .          .
394             .        C58............
                .          .
                .          .
402             .          .        46B
                .          .          .
                .          .          .
416             .          .          .-------->     D46
414             .          .       D46B
                .          .          V
                .          .          V
419             .          .       CAP6
                .          .          V
                .          .          V
424             .          .     RCAP6B
                .          .          .
                .          .          .
433             .          .          .        29A
                .          .          .          .
                .          .          .          .
                .          .          .          .-------->   D29A
445             .          .          .       D29A
                .          .          .          .
                .          .          .          .
450             .          .       C29A............
                .          .          .
                .          .          .
452             .          .          .        45A
                .          .          .          .
                .          .          .          .
467             .          .          .          .-------->   D29A
465             .          .          .       D45A
                .          .          .          .
                .          .          .          .
473             .          .          .          .-------->   45ATB
470             .          .          .       D45A
                .          .          .          .
                .          .          .          .
476             .          .          .          .         55B
                .          .          .          .           .
                .          .          .          .           .
491             .          .          .          .           .-------->   D55B
489             .          .          .          .        D55B
                .          .          .          .           .
                .          .          .          .           .
                .          .          .       C55B............
                .          .          .          V
                .          .          .          V
497             .          .          .       CAP7
                .          .          .          .
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```
                .         .         .         .
505             .         .         .         .          .<-------   45ATB
503             .         .         .         .      RD45A
                .         .         .         .          V
                .         .         .         .          V
                .         .         .         .      45ATB
                .         .         .         .          .
                .         .         .         .          .
513             .         .         .         .          .        45B
                .         .         .         .          .          .
                .         .         .         .          .          .
526             .         .         .         .          .          .------->    D45B
524             .         .         .         .          .       D45B
                .         .         .         .          .          .
                .         .         .         .          .          .
529             .         .         .         .      C45B............
                .         .         .         .          V
                .         .         .         .          V
532             .         .         .         .      CAP8
                .         .         .         .          .
                .         .         .         .          .
538             .         .         .      C7+8...........
                .         .         .         V
                .         .         .         V
542             .         .         .     RCAP78
                .         .         .         .
                .         .         .         .
550             .         .         .         .       29B
                .         .         .         .          .
                .         .         .         .          .
                .         .         .         .          .------->    D29B
561             .         .         .         .      D29B
                .         .         .         .          .
                .         .         .         .          .
566             .         .         .     C29B1...........
                .         .         .         .
                .         .         .         .
569             .         .     C29B2...........
                .         .         V
                .         .         V
572             .         .     TRANS
                .         .         .
                .         .         .
580             .         .         .      29C
                .         .         .         .
                .         .         .         .
593             .         .         .         .------->    D29
591             .         .         .      D29C
                .         .         .         .
                .         .         .         .
596             .         .     C29C2...........
                .         .         V
                .         .         V
599             .         .    29CTD1
                .         .         .
                .         .         .
                .         .         .      55
                .         .         .         .
                .         .         .         .
619             .         .         .         .------->    D55
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```
617   .         .         .        D55
      .         .         .         V
      .         .         .         V
622   .         .         .       CAP9
      .         .         .         V
      .         .         .         V
627   .         .         .      RCAP9
      .         .         .         .
      .         .         .         .
637   .         .         .         .        29D
      .         .         .         .         .
      .         .         .         .         .
650   .         .         .         .         .-------->   D29D
648   .         .         .         .       D29D
      .         .         .         .         .
      .         .         .         .         .
657   .         .         .         .         .-------->   D29DE
653   .         .         .         .      D29D2
      .         .         .         .         .
      .         .         .         .         .
660   .         .     C29C3.......................
      .         .         V
      .         .         V
663   .         .     BASIN5
      .         .         V
      .         .         V
670   .         .     RBAS5
      .         .         .
      .         .         .
      .         .         .         .<-------   D29DE
      .         .         .      G29DE
      .         .         .         V
      .         .         .         V
682   .         .         .      29T36
      .         .         .         .
      .         .         .         .
690   .         .         .         .        36C
      .         .         .         .         .
      .         .         .         .         .
701   .         .         .         .         .-------->   D36C
699   .         .         .         .       D36C
      .         .         .         .         .
      .         .         .         .         .
704   .         .       C36........................
      .         .         V
      .         .         V
707   .         .     36T37
      .         .         .
      .         .         .
713   .         .         .       30b
      .         .         .         V
      .         .         .         V
724   .         .         .      30bT3
      .         .         .         .
      .         .         .         .
      .         .         .         .         37
      .         .         .         .         .
      .         .         .         .         .
739   .         .       C37........................
      .         .         V
```

```
     .    .     V
742  .    .  ADOTEL
     .    .     V
     .    .     V
     .    .  37T38A
     .    .     .
     .    .     .
759  .    .     .      38A
     .    .     .       .
     .    .     .       .
771  .    .     .       .      202D
     .    .     .       .        .
     .    .     .       .        .
798  .    .   C38A.......................
     .    .     V
     .    .     V
801  .    .  202NE1
     .    .     V
     .    .     V
808  .    .  202NE2
     .    .     .
     .    .     .
815  .    .     .      17A
     .    .     .       .
     .    .     .       .
825  .    .     .       .        49
     .    .     .       .         V
     .    .     .       .         V
835  .    .     .       .       CAP2
     .    .     .       .         V
     .    .     .       .         V
840  .    .     .       .      BASIN2
     .    .     .       .         V
     .    .     .       .         V
848  .    .     .       .      RCAP2A
     .    .     .       .         V
     .    .     .       .         V
851  .    .     .       .      RCAP2
     .    .     .       .         .
     .    .     .       .         .
857  .    .     .     C17A............
     .    .     .       .
     .    .     .       .
860  .    .     .       .        18D
     .    .     .       .         .
     .    .     .       .         .
871  .    .     .       .         .        48
     .    .     .       .         .         V
     .    .     .       .         .         V
881  .    .     .       .         .      CAP3
     .    .     .       .         .         V
     .    .     .       .         .         V
886  .    .     .       .         .     BASIN3
     .    .     .       .         .         V
     .    .     .       .         .         V
     .    .     .       .         .     RCAP3A
     .    .     .       .         .         V
     .    .     .       .         .         V
900  .    .     .       .         .     RCAP3B
     .    .     .       .         .         .
```

```
906                                                   17B
                                                       .
                                                       .
                                          C17B............
                                                       .
                                                       .
919                       C17C......................
                            V
                            V
922                       17CT23
                            .
                            .
928                                 23
                                     .
                                     .
938                                            47
                                                V
                                                V
949                                        BASIN4
                                                V
                                                V
959                                        RCAP4
                                                .
                                                .
965                                                            22
                                                               .
                                                               .
975                                        C22A............
                                                V
                                                V
978                                        22AT23
                                                .
                                                .
985                       C23......................
                            V
                            V
988                       RC23
                            .
                            .
994                                 30a
                                     V
                                     V
1005                             30at31
                                     .
                                     .
1015                                           31A
                                                .
                                                .
1025                                                        202C
                                                              .
                                                              .
1037                      C31A.................................
                            V
                            V
                          R202S
                            .
                            .
1048                             202A
                                  V
```

```
                                  V
1061                            R202A
                                    .
                                    .
                                    .        202B
                                    .          .
                                    .          .
1077                            C202B............
                                  V
                                  V
1080                            R202B
                                    .
                                    .
1083                      C202C............
                            V
                            V
1086                      RT202C
                                .
                                .
1095                            .-------->   DHAWS
1092                      DSPILL
                                .
                                .
1098                            .        38B
                                .          .
                                .          .
1108                      C38B............
                            V
                            V
                          202NW1
                            V
                            V
1121                      202NW2
                                .
                                .
1132                            .         50
                                .          V
                                .          V
1142                            .       CAP1
                                .          V
                                .          V
1147                            .     BASIN1
                                .          V
                                .          V
1155                            .      RCAP1
                                .          .
                                .          .
1161                            .          .        18c
                                .          .          .
                                .          .          .
1174                            .          .          .-------->   D18c
1172                            .          .       D18c
                                .          .          .
                                .          .          .
1177                            .      C18C............
                                .          V
                                .          V
1181                            .     18T24
                                .          .
                                .          .
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```
1188    .       .       .       .       .       24
        .       .       .       .       .       .
        .       .       .       .       .       .
1198    .       .       .       .     C24............
        .       .       .       .       .
        .       .       .       .       .
1205    .       .       .       .       .-------> DIVBRD
1202    .       .       .       .   BRDHAW
        .       .       .       .       V
        .       .       .       .       V
1208    .       .       .       .   RT31B1
        .       .       .       .       V
        .       .       .       .       V
1218    .       .       .       .   RT31B2
        .       .       .       .       V
        .       .       .       .       V
1226    .       .       .       .   RT31B3
        .       .       .       .       .
        .       .       .       .       .
1238    .       .       .       .       .       31B
        .       .       .       .       .       .
        .       .       .       .       .       .
1250    .       .       .       .       .       .-------> D31BS
1248    .       .       .       .       .     D31BS
        .       .       .       .       .       .
        .       .       .       .       .       .
1253    .       .       .       .    C31B ............
        .       .       .       .       .
        .       .       .       .       .
        .       .       .       .       .-------> D31W
        .       .       .       .     D31S
        .       .       .       .       V
        .       .       .       .       V
1268    .       .       .       .   31T381
        .       .       .       .       .
        .       .       .       .       .
1282    .       .       .       .       .       .<------- DHAWS
1280    .       .       .       .       .     RHAWS
        .       .       .       .       .       V
        .       .       .       .       .       V
1283    .       .       .       .       .    RTHAWS
        .       .       .       .       .       .
        .       .       .       .       .       .
1289    .       .       .       .    C31S ............
        .       .       .       .       V
        .       .       .       .       V
1292    .       .       .       .   31T382
        .       .       .       .       .
        .       .       .       .       .
1300    .       .       .     C38C1............
        .       .       .       .
        .       .       .       .
1303    .       .     C38C............
        .       .       V
        .       .       V
        .       .     38T39
        .       .       .
        .       .       .
1314    .       .       .       .<------- D31W
1312    .       .       .     R31W
```

```
                .         .         .         V
                .         .         .         V
1315            .         .         .      31WT32
                .         .         .         .
                .         .         .         .
                .         .         .         .         32
                .         .         .         .          .
                .         .         .         .          .
1331            .         .         .       C32............
                .         .         .         V
                .         .         .         V
1334            .         .         .      32T39
                .         .         .         .
                .         .         .         .
1340            .         .         .         .         39
                .         .         .         .          .
                .         .         .         .          .
1352            .         .         .         .          .-------->     D39
1350            .         .         .         .        D39
                .         .         .         .          .
                .         .         .         .          .
1355            .         .         .       C39A............
                .         .         .         .
                .         .         .         .
1358            .         .      C39B............
                .         .         .
                .         .         .
1367            .         .         .-------->   BASIN
1361            .         .      SOSS
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	42	1048.	12.58	206.	56.	19.	1.75		
+	ROUTED TO	42T51	962.	13.17	206.	56.	19.	1.75		
+	HYDROGRAPH AT	51	1277.	12.25	159.	46.	15.	1.24		
+	2 COMBINED AT	C51	1420.	12.33	359.	100.	34.	2.99		
+	ROUTED TO	51T53	1129.	13.08	359.	100.	34.	2.99		
+	HYDROGRAPH AT	44A	1297.	12.50	277.	89.	30.	1.59		
+	DIVERSION TO	D44A	951.	12.50	213.	69.	23.	1.59		
+	HYDROGRAPH AT	DIV44A	347.	12.50	64.	20.	7.	1.59		
+	HYDROGRAPH AT	43	1365.	12.33	184.	53.	18.	1.42		
+	2 COMBINED AT	C43	1646.	12.33	244.	72.	24.	3.01		
+	ROUTED TO	43T53	1104.	13.42	244.	72.	24.	3.01		
+	HYDROGRAPH AT	53	831.	12.42	108.	31.	11.	.78		
+	3 COMBINED AT	C53	2157.	13.33	684.	196.	66.	6.78		
+	HYDROGRAPH AT	54	512.	12.42	66.	19.	6.	.49		
+	2 COMBINED AT	C54	2173.	13.33	743.	213.	71.	7.27		
+	DIVERSION TO	SOUTH	862.	13.33	235.	59.	20.	7.27		
+	HYDROGRAPH AT	DCAP12	1312.	13.33	508.	154.	52.	7.27		
	ROUTED TO									

+	CAP12	1166.	13.67	508.	154.	52.	7.27
HYDROGRAPH AT							
+	DR44A	951.	12.50	213.	69.	23.	1.59
ROUTED TO							
+	44ATB	769.	13.58	213.	69.	23.	1.59
HYDROGRAPH AT							
+	44B	1430.	12.25	179.	54.	18.	1.06
2 COMBINED AT							
+	C44B	1606.	12.25	393.	123.	41.	1.06
ROUTED TO							
+	CAP10+	1490.	12.33	393.	123.	41.	1.06
ROUTED TO							
+	RCAP11	1490.	12.42	393.	123.	41.	1.06
2 COMBINED AT							
+	C12	2146.	12.50	874.	269.	90.	8.33
ROUTED TO							
+	ADOT-W	439.	15.17	414.	263.	90.	8.33
ROUTED TO							
+	RADOTW	438.	15.25	414.	263.	90.	8.33
HYDROGRAPH AT							
+	36B	581.	12.08	49.	14.	5.	.32
2 COMBINED AT							
+	C36B	745.	12.08	421.	275.	94.	8.65
HYDROGRAPH AT							
+	RSOUTH	862.	13.33	235.	59.	20.	7.27
HYDROGRAPH AT							
+	57	318.	12.00	19.	5.	2.	.18
2 COMBINED AT							
+	C57	941.	13.33	277.	69.	23.	.18
ROUTED TO							
+	CAP13+	931.	13.33	277.	69.	23.	.18
HYDROGRAPH AT							
+	36A	215.	12.00	15.	4.	1.	.10
2 COMBINED AT							
+	C36A	934.	13.33	292.	74.	25.	.28
ROUTED TO							
+	ADOT-E	267.	14.25	200.	73.	25.	.28
2 COMBINED AT							
+	CFAKE	771.	12.08	594.	339.	116.	8.93
HYDROGRAPH AT							

+	52	572.	12.25	61.	17.	6.	.43
HYDROGRAPH AT							
+	56	862.	12.17	88.	25.	8.	.55
2 COMBINED AT							
+	C56	1400.	12.25	149.	42.	14.	.98
ROUTED TO							
+	56T58	1068.	12.50	149.	42.	14.	.98
HYDROGRAPH AT							
+	58	1370.	12.17	107.	28.	9.	.95
2 COMBINED AT							
+	C58	1813.	12.25	252.	68.	23.	1.93
HYDROGRAPH AT							
+	46B	300.	12.67	65.	21.	7.	.36
DIVERSION TO							
+	D46	12.	9.67	8.	3.	1.	.36
HYDROGRAPH AT							
+	D46B	300.	12.67	65.	19.	6.	.36
ROUTED TO							
+	CAP6	239.	12.92	65.	19.	6.	.36
ROUTED TO							
+	RCAP6B	239.	12.92	65.	19.	6.	.36
HYDROGRAPH AT							
+	29A	135.	12.67	26.	8.	3.	.18
DIVERSION TO							
+	D29A	135.	12.67	17.	5.	2.	.18
HYDROGRAPH AT							
+	D29A	95.	12.92	12.	3.	1.	.18
2 COMBINED AT							
+	C29A	333.	12.92	76.	22.	7.	.54
HYDROGRAPH AT							
+	45A	336.	12.92	74.	22.	7.	.62
DIVERSION TO							
+	D29A	336.	12.92	45.	12.	4.	.62
HYDROGRAPH AT							
+	D45A	256.	13.17	35.	10.	3.	.62
DIVERSION TO							
+	45ATB	243.	13.17	33.	9.	3.	.62
HYDROGRAPH AT							
+	D45A	13.	13.17	2.	0.	0.	.62
HYDROGRAPH AT							

+	55B	955.	13.17	263.	82.	27.	1.86
DIVERSION TO							
+	D55B	955.	13.17	168.	46.	15.	1.86
HYDROGRAPH AT							
+	D55B	740.	13.42	124.	36.	12.	1.86
2 COMBINED AT							
+	C55B	743.	13.42	124.	36.	12.	2.48
ROUTED TO							
+	CAP7	517.	13.75	124.	36.	12.	2.48
HYDROGRAPH AT							
+	RD45A	243.	13.17	33.	9.	3.	.62
ROUTED TO							
+	45ATB	167.	14.17	31.	9.	3.	.62
HYDROGRAPH AT							
+	45B	653.	12.58	128.	41.	14.	.66
DIVERSION TO							
+	D45B	358.	12.17	39.	12.	4.	.66
HYDROGRAPH AT							
+	D45B	653.	12.58	105.	29.	10.	.66
2 COMBINED AT							
+	C45B	653.	12.58	135.	38.	13.	.66
ROUTED TO							
+	CAP8	464.	12.83	134.	38.	13.	.66
2 COMBINED AT							
+	C7+8	727.	13.42	247.	72.	24.	3.14
ROUTED TO							
+	RCAP78	674.	13.83	243.	72.	24.	3.14
HYDROGRAPH AT							
+	29B	58.	12.58	9.	3.	1.	.08
DIVERSION TO							
+	D29B	58.	12.58	9.	3.	1.	.08
HYDROGRAPH AT							
+	D29B	1.	18.58	0.	0.	0.	.08
2 COMBINED AT							
+	C29B1	674.	13.83	243.	72.	24.	3.22
2 COMBINED AT							
+	C29B2	757.	13.75	307.	93.	31.	3.76
ROUTED TO							
+	TRANS	749.	13.83	307.	93.	31.	3.76
HYDROGRAPH AT							

+	29C	253.	12.42	38.	12.	4.	.23
DIVERSION TO							
+	D29	253.	12.42	32.	9.	3.	.23
HYDROGRAPH AT							
+	D29C	94.	12.83	10.	3.	1.	.23
2 COMBINED AT							
+	C29C2	765.	13.08	315.	95.	32.	3.99
ROUTED TO							
+	29CTD1	734.	14.00	313.	95.	32.	3.99
HYDROGRAPH AT							
+	55	190.	12.25	21.	6.	2.	.14
DIVERSION TO							
+	D55	190.	12.25	17.	5.	2.	.14
HYDROGRAPH AT							
+	D55	75.	12.50	6.	2.	1.	.14
ROUTED TO							
+	CAP9	39.	12.58	6.	2.	1.	.14
ROUTED TO							
+	RCAP9	23.	13.17	6.	2.	1.	.14
HYDROGRAPH AT							
+	29D	573.	12.67	114.	36.	12.	.65
DIVERSION TO							
+	D29D	415.	12.42	46.	14.	5.	.65
HYDROGRAPH AT							
+	D29D	573.	12.67	82.	23.	8.	.65
DIVERSION TO							
+	D29DE	378.	12.67	54.	15.	5.	.65
HYDROGRAPH AT							
+	D29D2	195.	12.67	28.	8.	3.	.65
3 COMBINED AT							
+	C29C3	771.	13.25	343.	104.	35.	4.78
ROUTED TO							
+	BASIN5	273.	15.33	251.	104.	35.	4.78
ROUTED TO							
+	RBAS5	272.	15.42	251.	104.	35.	4.78
HYDROGRAPH AT							
+	G29DE	378.	12.67	54.	15.	5.	.65
ROUTED TO							
+	29T36	357.	12.75	54.	15.	5.	.65
HYDROGRAPH AT							

+	36C	929.	12.08	105.	36.	12.	.44
DIVERSION TO							
+	D36C	848.	12.00	66.	19.	6.	.44
HYDROGRAPH AT							
+	D36C	770.	12.17	57.	17.	6.	.44
3 COMBINED AT							
+	C36	763.	12.17	323.	133.	44.	5.22
ROUTED TO							
+	36T37	519.	12.92	320.	133.	44.	5.22
HYDROGRAPH AT							
+	30b	603.	12.67	109.	33.	11.	.81
ROUTED TO							
+	30bT3	574.	12.83	109.	33.	11.	.81
HYDROGRAPH AT							
+	37	678.	12.08	51.	15.	5.	.47
3 COMBINED AT							
+	C37	1096.	12.25	447.	173.	58.	6.50
ROUTED TO							
+	ADOTEL	17.	27.00	17.	17.	17.	6.50
ROUTED TO							
+	37T38A	17.	27.17	17.	17.	16.	6.50
HYDROGRAPH AT							
+	38A	279.	12.58	49.	15.	5.	.33
HYDROGRAPH AT							
+	202D	100.	8.67	10.	3.	2.	.02
3 COMBINED AT							
+	C38A	279.	12.58	62.	31.	22.	6.85
ROUTED TO							
+	202NE1	60.	13.42	51.	29.	21.	6.85
ROUTED TO							
+	202NE2	29.	20.33	28.	26.	21.	6.85
HYDROGRAPH AT							
+	17A	257.	12.17	26.	8.	3.	.18
HYDROGRAPH AT							
+	49	792.	12.33	89.	25.	8.	.79
ROUTED TO							
+	CAP2	760.	12.42	89.	25.	8.	.79
ROUTED TO							
+	BASIN2	280.	12.75	59.	25.	8.	.79
ROUTED TO							

+	RCAP2A	279.	12.75	59.	25.	8.	.79
ROUTED TO							
+	RCAP2	288.	12.75	59.	25.	8.	.79
2 COMBINED AT							
+	C17A	308.	12.75	83.	34.	11.	.97
HYDROGRAPH AT							
+	18D	139.	12.33	17.	5.	2.	.14
HYDROGRAPH AT							
+	48	786.	12.33	83.	23.	8.	.77
ROUTED TO							
+	CAP3	757.	12.33	83.	23.	8.	.77
ROUTED TO							
+	BASIN3	366.	12.67	75.	23.	8.	.77
ROUTED TO							
+	RCAP3A	376.	12.67	75.	23.	8.	.77
ROUTED TO							
+	RCAP3B	267.	12.92	75.	23.	8.	.77
HYDROGRAPH AT							
+	17B	284.	12.25	31.	10.	3.	.22
2 COMBINED AT							
+	C17B	321.	12.25	103.	33.	11.	.99
3 COMBINED AT							
+	C17C	703.	12.25	198.	70.	23.	2.10
ROUTED TO							
+	17CT23	702.	12.25	198.	70.	23.	2.10
HYDROGRAPH AT							
+	23	230.	12.17	22.	6.	2.	.17
HYDROGRAPH AT							
+	47	1121.	12.58	165.	45.	15.	1.67
ROUTED TO							
+	BASIN4	871.	12.75	136.	45.	15.	1.67
ROUTED TO							
+	RCAP4	642.	13.50	136.	45.	15.	1.67
HYDROGRAPH AT							
+	22	549.	12.17	56.	17.	6.	.41
2 COMBINED AT							
+	C22A	650.	13.50	183.	61.	21.	2.08
ROUTED TO							
+	22AT23	622.	13.67	182.	61.	21.	2.08
3 COMBINED AT							

+	C23	1311.	12.25	391.	135.	45.	4.35
ROUTED TO							
+	RC23	1269.	12.33	391.	135.	45.	4.35
HYDROGRAPH AT							
+	30a	270.	12.50	42.	13.	4.	.30
ROUTED TO							
+	30at31	244.	12.67	42.	13.	4.	.30
HYDROGRAPH AT							
+	31A	624.	12.25	63.	18.	6.	.51
HYDROGRAPH AT							
+	202C	34.	2.50	3.	2.	1.	.01
4 COMBINED AT							
+	C31A	1864.	12.33	486.	165.	56.	5.17
ROUTED TO							
+	R202S	719.	14.00	480.	165.	56.	5.17
HYDROGRAPH AT							
+	202A	163.	3.25	19.	6.	3.	.09
ROUTED TO							
+	R202A	159.	3.42	19.	6.	3.	.09
HYDROGRAPH AT							
+	202B	125.	3.25	13.	4.	2.	.06
2 COMBINED AT							
+	C202B	249.	3.33	33.	10.	5.	.14
ROUTED TO							
+	R202B	245.	3.42	33.	10.	5.	.14
2 COMBINED AT							
+	C202C	719.	14.00	481.	175.	61.	5.32
ROUTED TO							
+	RT202C	719.	14.00	481.	175.	61.	5.32
DIVERSION TO							
+	DHAWS	225.	14.00	183.	97.	35.	5.32
HYDROGRAPH AT							
+	DSPILL	494.	14.00	298.	78.	26.	5.32
HYDROGRAPH AT							
+	38B	64.	12.25	8.	2.	1.	.05
2 COMBINED AT							
+	C38B	495.	14.00	304.	80.	27.	5.37
ROUTED TO							
+	202NW1	481.	14.25	294.	75.	25.	5.37
ROUTED TO							

+	202NW2	472.	14.58	267.	75.	25.	5.37
HYDROGRAPH AT							
+	50	371.	12.17	26.	7.	2.	.26
ROUTED TO							
+	CAP1	325.	12.17	29.	11.	7.	.26
ROUTED TO							
+	BASIN1	38.	12.50	25.	11.	7.	.26
ROUTED TO							
+	RCAP1	34.	13.08	25.	11.	7.	.26
HYDROGRAPH AT							
+	18c	485.	12.25	52.	15.	5.	.42
DIVERSION TO							
+	D18c	485.	12.25	38.	10.	3.	.42
HYDROGRAPH AT							
+	D18c	254.	12.42	18.	5.	2.	.42
2 COMBINED AT							
+	C18C	271.	12.42	43.	16.	9.	.68
ROUTED TO							
+	18T24	194.	12.58	42.	16.	9.	.68
HYDROGRAPH AT							
+	24	464.	12.33	67.	21.	7.	.43
2 COMBINED AT							
+	C24	528.	12.50	104.	37.	16.	1.11
DIVERSION TO							
+	DIVBRD	0.	.00	0.	0.	0.	1.11
HYDROGRAPH AT							
+	BRDHAW	528.	12.50	104.	37.	16.	1.11
ROUTED TO							
+	RT31B1	516.	12.50	104.	37.	16.	1.11
ROUTED TO							
+	RT31B2	508.	12.58	104.	37.	16.	1.11
ROUTED TO							
+	RT31B3	500.	12.58	104.	37.	16.	1.11
HYDROGRAPH AT							
+	31B	873.	12.25	84.	23.	8.	.72
DIVERSION TO							
+	D31BS	830.	12.17	44.	12.	4.	.72
HYDROGRAPH AT							
+	D31BS	789.	12.33	44.	12.	4.	.72
2 COMBINED AT							

+	C31B	1115.	12.33	145.	48.	19.	1.83
DIVERSION TO							
+	D31W	956.	12.33	133.	45.	18.	1.83
HYDROGRAPH AT							
+	D31S	159.	12.33	12.	3.	1.	1.83
ROUTED TO							
+	31T381	147.	12.42	12.	3.	1.	1.83
HYDROGRAPH AT							
+	RHAWS	225.	14.00	183.	97.	35.	5.32
ROUTED TO							
+	RTHAWS	225.	14.00	183.	97.	35.	5.32
2 COMBINED AT							
+	C31S	328.	12.50	197.	100.	36.	1.83
ROUTED TO							
+	31T382	329.	12.50	197.	100.	36.	1.83
2 COMBINED AT							
+	C38C1	675.	14.50	442.	171.	59.	7.20
2 COMBINED AT							
+	C38C	653.	14.50	440.	178.	75.	14.05
ROUTED TO							
+	38T39	652.	14.50	439.	178.	75.	14.05
HYDROGRAPH AT							
+	R31W	956.	12.33	133.	45.	18.	1.83
ROUTED TO							
+	31WT32	579.	12.58	131.	45.	18.	1.83
HYDROGRAPH AT							
+	32	417.	12.33	54.	16.	5.	.38
2 COMBINED AT							
+	C32	866.	12.50	185.	62.	24.	.38
ROUTED TO							
+	32T39	863.	12.50	185.	62.	24.	.38
HYDROGRAPH AT							
+	39	402.	12.42	62.	20.	7.	.36
DIVERSION TO							
+	D39	10.	9.00	6.	2.	1.	.36
HYDROGRAPH AT							
+	D39	402.	12.42	62.	18.	6.	.36
2 COMBINED AT							
+	C39A	1218.	12.50	244.	79.	30.	.74
2 COMBINED AT							

+	C39B	1312.	12.50	638.	248.	102.	14.79
DIVERSION TO							
+	BASIN	0.	.00	0.	0.	0.	14.79
HYDROGRAPH AT							
+	SOSS	1312.	12.50	638.	248.	102.	14.79

These calculations are only for the outlet structures that are different than the outlet structures that are sized in the "202L/US 60 Traffic Interchange Phase 1 Initial Drainage Report (Stage II Design)" by DMJM+HARRIS, February 2002.

The low flow culverts for Basins NE-1 and NE-2, and the emergency spillway for Basin NE-1 has not changed from the Initial Drainage Report.

<u>Basin NE-2 Emergency Spillway</u>

Size for inflow to Basin NE-1, $Q_{100} = 279$ cfs

Use a 6'X6' RCBC with a slope tapered (2.6:1) and side tapered (6:1) inlet

Set culvert inlet invert elevation at 1438.80. Max. 100 yr. WSEL = 1443.40.

Minimum top of basin elev. = 1444.0.

Basin NW-1

Low Flow Outlet: 2-8'x4' RCBC

Q_{100} inflow = 495 cfs

Q_{100} outflow = 481 cfs

100 yr. design WSEL = 1438.3

Emergency Spillway:

Follow methodology in Initial Drainage Report.

Size for 1/2 of basin inflow for basins with RCBC low flow outlets.

Dam Crest Elev. = 1440.75

Set Spillway Crest Elev. = 1439.20

Available Head = 40.75 - 39.20 = 1.55 ft

Spillway Discharge:

$$Q = CLH^{1.5} = 3(L + 8(H))(H)^{1.5}$$

$$250 = 3.0(L + 8(1.55))(1.55)^{1.5}$$

L_{min} = 30.8 ft, Use L = 35 ft.

Basin NW-2

Low Flow Outlet: 2-36" RCP's

Spillway will be used for discharges less than the Q_{100}.

Dam Crest Elev. = 1437.50

Spillway Crest Elev. = 1435.00

Spillway Crest Length = 45 ft.

Subject Offsite Detention Basin Outlet Calculations

Spillway Discharge:

$Q = CLH^{1.5} = 3(45 + 8(H))(H)^{1.5}$

Combined Discharge of 2-36" Pipes and Spillway flow for HEC-1 Routings.

WSEL	Q pipes	Q spillway	Q total
1430.3	0	0	0
1431.0	5	0	5
1432.0	27	0	27
1433.0	61	0	61
1434.0	96	0	96
1435.0	122	0	122
1435.5	134	52	186
1436.0	145	159	304
1436.5	155	314	469
1437.0	165	518	683
1437.5	175	771	946

Q_{100} Inflow = 481 cfs.

Q_{100} Outflow = 472 cfs

100 yr. Design WSEL = 1436.6

100 yr. WSEL with entire Q_{100} over weir (blocked low flow pipes) = 1436.9

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NE-2
Emergency
Spillway

CURRENT DATE: 04-01-2003
CURRENT TIME: 16:32:58

FILE DATE: 02-03-2003
FILE NAME: SRTNE2T5

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1438.80	1429.95	760.05	1 RCB	6.00	6.00	.013	IMPR SLT REC
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SRTNE2T5 DATE: 02-03-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1438.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1439.84	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1440.45	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible].96	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible]42	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1441.84	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.23	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.61	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.96	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1443.30	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1443.40	279.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SRTNE2T5 DATE: 02-03-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1438.80	0.000	0.00	0.00	0.00
1439.84	0.000	30.00	0.00	0.00
1440.45	0.000	60.00	0.00	0.00
1440.96	0.000	90.00	0.00	0.00
1441.42	0.000	120.00	0.00	0.00
1441.84	0.000	150.00	0.00	0.00
1442.23	0.000	180.00	0.00	0.00
1442.61	0.000	210.00	0.00	0.00
1442.96	0.000	240.00	0.00	0.00
1443.30	0.000	270.00	0.00	0.00
1443.40	0.000	279.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

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NE-2

CURRENT DATE: 04-01-2003 FILE DATE: 02-03-2003
CURRENT TIME: 16:32:58 FILE NAME: SRTNE2T5

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

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1438.80	0.00	-8.85	0-NF	0.00	0.00	0.00	0.00	0.00	5.61
30.00	1439.84	1.04	-5.35	1-S2n	0.62	0.92	0.52	0.42	9.60	5.61
60.00	1440.45	1.65	-4.97	1-S2n	0.97	1.46	0.86	0.63	11.60	7.21
90.00	1440.96	2.16	-4.57	1-S2n	1.29	1.92	1.22	0.80	12.34	8.31
120.00	1441.42	2.62	-4.11	1-S2n	1.57	2.32	1.52	0.94	13.15	9.17
150.00	1441.84	3.04	-3.60	1-S2n	1.85	2.69	1.79	1.07	13.94	9.89
180.00	1442.23	3.43	-3.02	1-S2n	2.10	3.04	2.04	1.19	14.70	10.50
210.00	1442.61	3.81	-2.38	1-S2n	2.36	3.37	2.27	1.30	15.42	11.05
240.00	1442.96	4.16	-1.68	1-S2n	2.60	3.68	2.48	1.40	16.10	11.54
270.00	1443.30	4.50	-0.91	1-S2n	2.83	3.99	2.79	1.50	16.16	11.98
279.00	1443.40	4.60	-0.67	1-S2n	2.91	4.07	2.91	1.53	15.96	12.11

El. inlet face invert 1438.80 ft El. outlet invert 1429.95 ft
El. inlet throat invert 1433.00 ft El. inlet crest 1438.80 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	760.00 ft
INLET ELEVATION	1438.80 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1429.95 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0116
CULVERT LENGTH ALONG SLOPE	760.05 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	6.00 ft
BARREL RISE	6.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	IMPR SLT RECT
INLET EDGE AND WALL	SQUARE EDGE TOP (26-90 DEG WINGWALL)
INLET DEPRESSION	FALL INCLUDED IN SLOPE TAPER

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NE-2

CURRENT DATE: 04-01-2003
CURRENT TIME: 16:32:58

FILE DATE: 02-03-2003
FILE NAME: SRTNE2T5

IMPROVED INLET FOR CULVERT 1 - 1(6.00 (ft) BY 6.00 (ft)) RCB

DIS-CHARGE Flow (cfs)	HEAD-WATER Elev. (ft)	INLET CONTROL Depth (ft)	OUTLET CONTROL Depth (ft)	FLOW TYPE <F4>	CREST CONTROL Elev. (ft)	FACE CONTROL Elev. (ft)	THROAT CONTROL Elev. (ft)	TAILWATER Elev. (ft)
0	1438.80	0.00	-8.85	0-NF	1438.80	1438.80	1433.00	1429.95
30	1439.84	1.04	-5.35	1-S2n	1439.84	1439.78	1434.52	1430.37
60	1440.45	1.65	-4.97	1-S2n	1440.45	1440.35	1435.21	1430.58
90	1440.96	2.16	-4.57	1-S2n	1440.96	1440.83	1435.85	1430.75
120	1441.42	2.62	-4.11	1-S2n	1441.42	1441.26	1436.45	1430.89
150	1441.84	3.04	-3.60	1-S2n	1441.84	1441.65	1437.01	1431.02
180	1442.23	3.43	-3.02	1-S2n	1442.23	1442.02	1437.53	1431.14
210	1442.61	3.81	-2.38	1-S2n	1442.61	1442.37	1438.03	1431.25
240	1442.96	4.16	-1.68	1-S2n	1442.96	1442.70	1438.50	1431.35
270	1443.30	4.50	-0.91	1-S2n	1443.30	1443.02	1438.96	1431.45
279	1443.40	4.60	-0.67	1-S2n	1443.40	1443.12	1439.09	1431.48

***** SLOPE-TAPERED IMPROVED INLET **********

FACE WIDTH	11.00 ft
SIDE TAPER (4:1 TO 6:1) (X:1)	6.00
FALL SLOPE (2:1 TO 3:1) (X:1)	2.59
FALL	5.80 ft
MITERED FACE (Y/N)	N
FACE-CREST LENGTH IF MITERED	10.00 ft

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NE-2

CURRENT DATE: 04-01-2003
CURRENT TIME: 16:32:58

FILE DATE: 02-03-2003
FILE NAME: SRTNE2T5

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	12.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.013
MANNING'S n (.01-0.1)	0.016
CHANNEL INVERT ELEVATION	1429.95 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1429.95 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1429.95	1.531	0.00	5.61	0.34
30.00	1430.37	1.531	0.42	5.61	0.34
60.00	1430.58	1.603	0.63	7.21	0.51
90.00	1430.75	1.641	0.80	8.31	0.65
120.00	1430.89	1.665	0.94	9.17	0.76
150.00	1431.02	1.683	1.07	9.89	0.87
180.00	1431.14	1.696	1.19	10.50	0.97
210.00	1431.25	1.706	1.30	11.05	1.06
240.00	1431.35	1.716	1.40	11.54	1.14
270.00	1431.45	1.723	1.50	11.98	1.22
279.00	1431.48	1.725	1.53	12.11	1.24

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	70.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

Culvert Designer/Analyzer Report
NW1 Box

Analysis Component			
Storm Event	Design	Discharge	500.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	500.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	36.50 ft

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	2-8 x 4 ft Box	500.00 cfs	38.47 ft	11.61 ft/s
Weir	Not Considered	N/A	N/A	N/A

Culvert Designer/Analyzer Report
NW1 Box

Component:Culvert-1

Culvert Summary			
Computed Headwater Elev:	38.47 ft	Discharge	500.00 cfs
Inlet Control HW Elev.	38.47 ft	Tailwater Elevation	36.50 ft
Outlet Control HW Elev.	38.46 ft	Control Type	Inlet Control
Headwater Depth/Height	1.37		

Grades			
Upstream Invert	33.00 ft	Downstream Invert	32.60 ft
Length	60.00 ft	Constructed Slope	0.006667 ft/ft

Hydraulic Profile			
Profile	CompositeS1S2	Depth, Downstream	2.69 ft
Slope Type	Steep	Normal Depth	2.51 ft
Flow Regime	N/A	Critical Depth	3.12 ft
Velocity Downstream	11.61 ft/s	Critical Slope	0.003635 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	8.00 ft
Section Size	8 x 4 ft	Rise	4.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	38.46 ft	Upstream Velocity Head	1.56 ft
Ke	0.50	Entrance Loss	0.78 ft

Inlet Control Properties			
Inlet Control HW Elev.	38.47 ft	Flow Control	Transition
Inlet Type	30 to 75° wingwall flares	Area Full	64.0 ft²
K	0.02600	HDS 5 Chart	8
M	1.00000	HDS 5 Scale	1
C	0.03470	Equation Form	1
Y	0.86000		

NW-1

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Rating Table Report
Culvert-1 2-8'x4' RCBC

Range Data:

	Minimum	Maximum	Increment
Discharge	0.00	495.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	36.50
10.00	36.50
20.00	36.50
30.00	36.51
40.00	36.51
50.00	36.52
60.00	36.53
70.00	36.53
80.00	36.54
90.00	36.56
100.00	36.57
110.00	36.59
120.00	36.60
130.00	36.62
140.00	36.64
150.00	36.66
160.00	36.68
170.00	36.70
180.00	36.73
190.00	36.75
200.00	36.78
210.00	36.81
220.00	36.84
230.00	36.87
240.00	36.91
250.00	36.94
260.00	36.98
270.00	37.02
280.00	37.06
290.00	37.10
300.00	37.14
310.00	37.18
320.00	37.23
330.00	37.28
340.00	37.33
350.00	37.38
360.00	37.43
370.00	37.48
380.00	37.54
390.00	37.60
400.00	37.66
410.00	37.72
420.00	37.78
430.00	37.85
440.00	37.92
450.00	37.99
460.00	38.07

NW-1

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Rating Table Report
Culvert-1

2-8'X4' RCBC

Discharge (cfs)	HW Elev. (ft)
470.00	38.16
480.00	38.26
490.00	38.39
495.00	38.42

Culvert Designer/Analyzer Report
NW2 Pipes Vert

Peak Discharge Method: User-Specified			
Design Discharge	400.00 cfs	Check Discharge	150.00 cfs

Grades Model: Inverts			
Invert Upstream	30.30 ft	Invert Downstream	30.00 ft
Length	100.00 ft	Slope	0.003000 ft/ft
Drop	0.30 ft		

Headwater Model: Unspecified

Tailwater properties: Rectangular Channel

Tailwater conditions for Design Storm.			
Discharge	400.00 cfs	Bottom Elevation	29.95 ft
Depth	4.17 ft	Velocity	15.99 ft/s

Tailwater conditions for Check Storm.			
Discharge	150.00 cfs	Bottom Elevation	29.95 ft
Depth	2.00 ft	Velocity	12.47 ft/s

name	Description	Discharge	HW Elev.	Velocity
x Trial-2	2-36 inch Circular	400.00 cfs	58.04 ft	28.29 ft/s

Culvert Designer/Analyzer Report
NW2 Pipes Vert

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev:	58.04	ft	Discharge	400.00	cfs
Headwater Depth/Height	9.25		Tailwater Elevation	34.12	ft
Inlet Control HW Elev.	55.89	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	58.04	ft			

Grades					
Upstream Invert	30.30	ft	Downstream Invert	30.00	ft
Length	100.00	ft	Constructed Slope	0.003000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	4.12	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.99	ft
Velocity Downstream	28.29	ft/s	Critical Slope	0.086320	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	58.04	ft	Upstream Velocity Head	12.44	ft
Ke	0.20		Entrance Loss	2.49	ft

Inlet Control Properties					
Inlet Control HW Elev.	55.89	ft	Flow Control	Submerged	
Inlet Type	Groove end w/headwall		Area Full	14.1	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

NW-2

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Rating Table Report
Trial-2

2-36" RCP's

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	175.00	5.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	30.30
5.00	30.99
10.00	31.29
15.00	31.53
20.00	31.73
25.00	31.92
30.00	32.09
35.00	32.25
40.00	32.40
45.00	32.55
50.00	32.69
55.00	32.84
60.00	32.97
65.00	33.11
70.00	33.25
75.00	33.39
80.00	33.53
85.00	33.67
90.00	33.81
95.00	33.96
100.00	34.12
105.00	34.29
110.00	34.49
115.00	34.70
120.00	34.91
125.00	35.12
130.00	35.33
135.00	35.55
140.00	35.78
145.00	36.01
150.00	36.25
155.00	36.49
160.00	36.73
165.00	36.99
170.00	37.25
175.00	37.51

APPENDIX B

HEC-RAS ANALYSES

Memorandum

177 North Church Avenue, Suite 500
Tucson, Arizona 85701
520-882-6424
Fax: 520-882-8830

To: File

From: Steve Kemna

Date: 4/1/03

Subject: SRT – Sossaman CBC/Channel and North Channel HEC-RAS Analysis

PB performed a HEC-RAS analysis of the Sossaman CBC/Channel and North Channel for Existing, Interim, and Proposed Conditions. The Interim and Proposed conditions included a 14' extension of the Sossaman CBC at the upstream end and related channel modifications. The HEC-RAS files are:

Filename	Description
NorthSossExstQ100.prj	Sossaman CBC/Channel and North Channel for Existing Conditions. Q100 at Sossaman CBC is 1787 cfs, at Sossaman Channel u/s of CBC is 1154 cfs, and at North Channel u/s of CBC is 633 cfs.
NorthSossIntQ100.prj	Sossaman CBC/Channel and North Channel for Interim Conditions (with 14' Extension of CBC). Q100 at Sossaman CBC is 1800 cfs, at Sossaman Channel u/s of CBC is 1135 cfs, and at North Channel u/s of CBC is 765 cfs.
NorthSossPropQ100.prj	Sossaman CBC/Channel and North Channel for Proposed Conditions (with 14' Extension of CBC). Q100 at Sossaman CBC is 1312 cfs, at Sossaman Channel u/s of CBC is 659 cfs, and at North Channel u/s of CBC is 653 cfs.

EXIST Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Hydr Depth	Crit W.S.	Crit Depth	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sossaman Channel	Sossaman CBC	3	1787.00	1403.31	1409.04	5.72	1405.87	2.56	1409.30	0.000172	4.06	439.78	76.88	0.30
Sossaman Channel	Sossaman CBC	2.5	Culvert											
Sossaman Channel	Sossaman CBC	2	1787.00	1402.86	1408.79	5.92			1409.03	0.000154	3.92	455.61	76.96	0.28
Sossaman Channel	Sossaman CBC	1	1787.00	1402.74	1407.06	3.53	1407.06	4.32	1408.84	0.002001	10.70	166.97	47.28	1.00
North Channel	North Channel	28	633.00	1427.57	1429.82	1.77	1431.15	3.58	1434.34	0.012909	17.06	37.11	21.00	2.26
North Channel	North Channel	27	633.00	1423.78	1426.15	1.85	1427.36	3.58	1430.10	0.010658	15.95	39.69	21.48	2.07
North Channel	North Channel	26	633.00	1423.91	1425.53	1.42	1426.75	2.83	1429.91	0.016266	16.80	37.68	26.48	2.48
North Channel	North Channel	25	633.00	1423.73	1428.18	3.40	1426.57	2.84	1428.56	0.000450	4.92	128.73	37.81	0.47
North Channel	North Channel	24	633.00	1423.55	1427.13	2.61	1427.13	3.58	1428.45	0.002284	9.22	68.67	26.33	1.01
North Channel	North Channel	23	633.00	1421.22	1423.88	2.04	1424.81	3.59	1426.81	0.006974	13.73	46.09	22.64	1.70
North Channel	North Channel	22	633.00	1421.18	1425.73	3.46	1424.01	2.83	1426.08	0.000418	4.79	132.21	38.18	0.45
North Channel	North Channel	21	633.00	1421.18	1425.69	3.44			1426.06	0.000429	4.83	130.95	38.05	0.46
North Channel	North Channel	20	633.00	1421.05	1424.63	2.61	1424.63	3.58	1425.95	0.002284	9.22	68.66	26.33	1.01
North Channel	North Channel	19	633.00	1419.84	1422.68	2.15	1423.42	3.58	1425.14	0.005448	12.58	50.31	23.38	1.51
North Channel	North Channel	18	633.00	1418.07	1420.86	2.12	1421.65	3.58	1423.44	0.005821	12.88	49.14	23.18	1.56
North Channel	North Channel	17	633.00	1418.05	1422.40	3.34	1420.89	2.83	1422.80	0.000491	5.07	124.89	37.40	0.49
North Channel	North Channel	16	633.00	1417.85	1422.40	3.47			1422.76	0.000415	4.78	132.49	38.21	0.45
North Channel	North Channel	15	633.00	1417.75	1421.33	2.61	1421.33	3.58	1422.65	0.002284	9.22	68.66	26.33	1.01
North Channel	North Channel	14	633.00	1416.23	1419.02	2.12	1419.81	3.58	1421.61	0.005884	12.93	48.96	23.14	1.57
North Channel	North Channel	13	633.00	1414.82	1417.52	2.06	1418.40	3.58	1420.34	0.006598	13.47	47.01	22.80	1.65
North Channel	North Channel	12	633.00	1412.75	1415.43	2.04	1416.33	3.58	1418.31	0.006842	13.64	46.41	22.70	1.68
North Channel	North Channel	11	633.00	1410.17	1412.82	2.03	1413.75	3.58	1415.78	0.007063	13.79	45.89	22.61	1.71
North Channel	North Channel	10	633.00	1409.30	1412.01	2.07	1412.88	3.58	1414.81	0.006542	13.43	47.15	22.83	1.65
North Channel	North Channel	9	633.00	1406.47	1409.12	2.03	1410.05	3.58	1412.08	0.007059	13.79	45.90	22.61	1.71
North Channel	North Channel	8	633.00	1404.72	1407.54	2.13	1408.31	3.59	1410.06	0.005662	12.76	49.63	23.26	1.54
North Channel	North Channel	7	633.00	1404.26	1408.99	3.28	1407.86	3.60	1409.59	0.000778	6.24	101.45	30.91	0.61
North Channel	North Channel	6	633.00	1403.70	1408.92	3.56			1409.38	0.000524	5.40	117.18	32.89	0.50
Sossaman CBC	Sossaman Channel	5	1154.00	1404.47	1407.84	2.67	1408.62	4.15	1410.58	0.004501	13.28	86.87	32.50	1.43
Sossaman CBC	Sossaman Channel	4	1154.00	1403.61	1406.87	2.60	1407.76	4.15	1409.85	0.005078	13.86	83.29	32.05	1.51

EXIST Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Culv Q	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
Sossaman Channel	Sossaman CBC	2.5 Culvert #1	1409.30	1409.04	1407.58	1409.30	1413.51	1787.00		0.25	4.49	4.19

Interim Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sossaman Channel	Sossaman CBC	3	1800.00	1403.34	1409.07	1405.91	1409.33	0.000174	4.09	439.79	76.87	0.30
Sossaman Channel	Sossaman CBC	2.5	Culvert									
Sossaman Channel	Sossaman CBC	2	1800.00	1402.86	1408.81		1409.05	0.000154	3.94	457.43	76.96	0.28
Sossaman Channel	Sossaman CBC	1	1800.00	1402.74	1407.09	1407.09	1408.87	0.001985	10.70	168.26	47.39	1.00
North Channel	North Channel	28	765.00	1427.57	1430.07	1431.55	1435.12	0.012891	18.04	42.41	21.98	2.29
North Channel	North Channel	27	765.00	1423.78	1426.40	1427.76	1430.85	0.010760	16.92	45.21	22.49	2.10
North Channel	North Channel	26	765.00	1423.91	1425.73	1427.09	1430.66	0.016034	17.82	42.93	27.27	2.50
North Channel	North Channel	25	765.00	1423.73	1428.66	1426.91	1429.08	0.000450	5.19	147.31	39.73	0.48
North Channel	North Channel	24	765.00	1423.55	1427.55	1427.55	1428.97	0.002189	9.57	79.94	27.99	1.00
North Channel	North Channel	23	765.00	1421.22	1424.20	1425.21	1427.37	0.006683	14.29	53.53	23.92	1.68
North Channel	North Channel	22	765.00	1421.18	1426.21	1424.36	1426.60	0.000420	5.07	151.00	40.10	0.46
North Channel	North Channel	21	765.00	1421.18	1426.17		1426.58	0.000431	5.11	149.66	39.97	0.47
North Channel	North Channel	20	765.00	1421.05	1425.05	1425.05	1426.47	0.002189	9.57	79.93	27.99	1.00
North Channel	North Channel	19	765.00	1419.84	1423.03	1423.84	1425.68	0.005209	13.07	58.52	24.74	1.50
North Channel	North Channel	18	765.00	1418.07	1421.18	1422.06	1424.02	0.005736	13.53	56.54	24.42	1.57
North Channel	North Channel	17	765.00	1418.05	1422.88	1421.23	1423.32	0.000487	5.34	143.28	39.32	0.49
North Channel	North Channel	16	765.00	1417.85	1422.88		1423.28	0.000418	5.06	151.30	40.13	0.46
North Channel	North Channel	15	765.00	1417.75	1421.75	1421.75	1423.17	0.002190	9.57	79.93	27.99	1.00
North Channel	North Channel	14	765.00	1416.23	1419.35	1420.23	1422.16	0.005633	13.44	56.90	24.48	1.55
North Channel	North Channel	13	765.00	1414.82	1417.83	1418.82	1420.92	0.006462	14.12	54.18	24.03	1.66
North Channel	North Channel	12	765.00	1412.75	1415.72	1416.75	1418.93	0.006789	14.37	53.23	23.87	1.70
North Channel	North Channel	11	765.00	1410.17	1413.11	1414.17	1416.40	0.007040	14.56	52.55	23.76	1.72
North Channel	North Channel	10	765.00	1409.30	1412.29	1413.30	1415.43	0.006578	14.21	53.84	23.97	1.67
North Channel	North Channel	9	765.00	1406.47	1409.41	1410.46	1412.69	0.007002	14.53	52.65	23.77	1.72
North Channel	North Channel	8	765.00	1404.72	1407.82	1408.71	1410.67	0.005738	13.53	56.53	24.42	1.57
North Channel	North Channel	7	765.00	1404.26	1408.84	1408.26	1409.81	0.001287	7.89	96.93	30.32	0.78
North Channel	North Channel	6	765.00	1403.70	1408.76		1409.49	0.000868	6.84	111.92	32.24	0.65
Sossaman CBC	Sossaman Channel	5	1035.00	1404.47	1407.65	1408.37	1410.21	0.004501	12.85	80.53	31.71	1.42
Sossaman CBC	Sossaman Channel	4	1035.00	1403.80	1408.68	1407.70	1409.53	0.000936	7.40	139.79	38.28	0.68

Interim Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta		E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Culv Q	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
				(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
Sossaman Channel	Sossaman CBC	2.5	Culvert #1	1409.34	1409.07	1407.63	1409.34	1413.51	1800.00		0.26	4.53	4.20

PROP Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sossaman Channel	Sossaman CBC	3	1312.00	1403.34	1408.01	1405.42	1408.22	0.000177	3.66	358.58	76.82	0.30
Sossaman Channel	Sossaman CBC	2.5	Culvert									
Sossaman Channel	Sossaman CBC	2	1312.00	1402.86	1407.80		1407.99	0.000147	3.45	380.07	76.94	0.27
Sossaman Channel	Sossaman CBC	1	1312.00	1402.74	1406.37	1406.32	1407.83	0.002001	9.71	135.15	44.51	0.98
North Channel	North Channel	28	653.00	1427.57	1429.86	1431.23	1434.46	0.012909	17.22	37.93	21.15	2.27
North Channel	North Channel	27	653.00	1423.78	1426.19	1427.44	1430.22	0.010667	16.10	40.56	21.64	2.07
North Channel	North Channel	26	653.00	1423.91	1425.56	1426.80	1430.03	0.016220	16.96	38.50	26.61	2.49
North Channel	North Channel	25	653.00	1423.73	1428.26	1426.62	1428.64	0.000450	4.96	131.63	38.12	0.47
North Channel	North Channel	24	653.00	1423.55	1427.19	1427.19	1428.53	0.002277	9.29	70.30	26.58	1.01
North Channel	North Channel	23	653.00	1421.22	1423.93	1424.88	1426.90	0.006917	13.82	47.26	22.85	1.69
North Channel	North Channel	22	653.00	1421.18	1425.80	1424.07	1426.16	0.000418	4.83	135.14	38.49	0.45
North Channel	North Channel	21	653.00	1421.18	1425.77		1426.14	0.000429	4.88	133.86	38.35	0.46
North Channel	North Channel	20	653.00	1421.05	1424.70	1424.70	1426.03	0.002274	9.29	70.32	26.58	1.01
North Channel	North Channel	19	653.00	1419.84	1422.74	1423.48	1425.23	0.005407	12.66	51.57	23.59	1.51
North Channel	North Channel	18	653.00	1418.07	1420.91	1421.73	1423.53	0.005809	12.99	50.28	23.37	1.56
North Channel	North Channel	17	653.00	1418.05	1422.48	1420.94	1422.88	0.000490	5.11	127.76	37.71	0.49
North Channel	North Channel	16	653.00	1417.85	1422.48		1422.84	0.000416	4.82	135.42	38.51	0.45
North Channel	North Channel	15	653.00	1417.75	1421.40	1421.40	1422.73	0.002273	9.28	70.34	26.58	1.01
North Channel	North Channel	14	653.00	1416.23	1419.07	1419.87	1421.70	0.005840	13.01	50.18	23.35	1.56
North Channel	North Channel	13	653.00	1414.82	1417.57	1418.46	1420.43	0.006569	13.57	48.13	23.00	1.65
North Channel	North Channel	12	653.00	1412.75	1415.47	1416.40	1418.41	0.006833	13.76	47.46	22.88	1.68
North Channel	North Channel	11	653.00	1410.17	1412.87	1413.81	1415.88	0.007060	13.92	46.91	22.79	1.71
North Channel	North Channel	10	653.00	1409.30	1412.05	1412.95	1414.91	0.006548	13.55	48.18	23.01	1.65
North Channel	North Channel	9	653.00	1406.47	1409.17	1410.11	1412.17	0.007056	13.92	46.93	22.79	1.71
North Channel	North Channel	8	653.00	1404.72	1407.58	1408.36	1410.16	0.005675	12.88	50.70	23.44	1.54
North Channel	North Channel	7	653.00	1404.26	1407.91	1407.91	1409.24	0.002277	9.29	70.30	26.58	1.01
North Channel	North Channel	6	653.00	1403.70	1407.30	1407.35	1408.69	0.002378	9.44	69.21	26.41	1.03
Sossaman CBC	Sossaman Channel	5	659.00	1404.47	1406.94	1407.45	1408.87	0.004500	11.17	59.00	28.86	1.38
Sossaman CBC	Sossaman Channel	4	659.00	1403.80	1407.76	1406.79	1408.36	0.000820	6.20	106.36	34.66	0.62

PROP Q100

HEC-RAS Plan: Plan 02 Profile: PF 1

River	Reach	River Sta	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Culv Q	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
Sossaman Channel	Sossaman CBC	2.5 Culvert #1	1408.23	1408.01	1406.79	1408.23	1413.51	1312.00		0.21	4.04	3.69

SRT - Sossaman Channel and North Channel from D/S End of Sossaman CBC to Hawes Channel - Existing Conditions

Station	Survey Invert	Survey Channel Depth	Survey Bottom Width	Distance to Downstream Xsection	Sta Point #1	Elev Point #1	Sta Point #2	Elev Point #2	Sta Point #3	Elev Point #3	Sta Point #4	Elev Point #4	Existing Q100
Sossaman CBC and Channel													
#1 - 930+50, 200' Rt	1402.74	7.5	30	0	0	1410.24	15.0	1402.74	45	1402.74	60	1410.24	1787
#2 - D/S End of Sossaman CBC	1402.86	7.3	77	86	0	1410.16	0.1	1402.86	76.9	1402.86	77	1410.16	
#3 - U/S End of Sossaman CBC	1403.31	8.1	77	222	0	1411.41	0.1	1403.31	76.7	1403.31	77	1411.41	
#4 - 930+50, 168' Lt	1403.61	7.9	19	60	0	1411.51	15.8	1403.61	34.8	1403.61	50.6	1411.51	1154
#5 - 930+50, 316' Lt	1404.47	8	19	148	0	1412.47	16.0	1404.47	35.0	1404.47	51	1412.47	1154
North Channel Tributary													
#6 - 930+96.65, 148' Lt	1403.7	7.8	12	41	0	1411.5	15.6	1403.7	27.6	1403.7	40.6	1410.2	633
#7 - 932+98, 300' Lt	1404.26	8.1	12	271	0	1412.36	16.2	1404.26	28.2	1404.26	44.4	1412.36	
#8 - 935+00, 300' Lt	1404.72	9.2	12	202	0	1413.92	18.4	1404.72	30.4	1404.72	48.8	1413.92	
#9 - 938+00, 300' Lt	1406.47	8.5	12	300	0	1414.97	17.0	1406.47	29	1406.47	46	1414.97	
#10 - 942+00, 305' Lt	1409.3	7.7	12	400	0	1417	15.4	1409.3	27.4	1409.3	42.8	1417	
#11 - 943+36, 306' Lt	1410.17	7.5	12	136	0	1417.67	15.0	1410.17	27	1410.17	42	1417.67	
#12 - 947+00, 358' Lt	1412.75	8.3	12	364	0	1421.05	16.6	1412.75	28.6	1412.75	45.2	1421.05	
#13 - 950+00, 358' Lt	1414.82	8.2	12	300	0	1423.02	16.4	1414.82	28.4	1414.82	44.8	1423.02	
#14 - 952+00, 358' Lt	1416.23	7.5	12	200	0	1423.73	15.0	1416.23	27	1416.23	42	1423.73	
#15 - 954+63, 359' Lt	1417.75	7.2	12	263	0	1424.95	14.4	1417.75	26.4	1417.75	40.8	1424.95	
#16 - 954+80, 359' Lt	1417.85	6.9	20	17	0	1424.75	13.8	1417.85	33.8	1417.85	47.6	1424.75	
#17 - 955+45, 359' Lt	1418.05	7.7	20	65	0	1425.75	15.4	1418.05	35.4	1418.05	50.8	1425.75	
#18 - 955+60, 359' Lt	1418.07	7.8	12	15	0	1425.87	15.6	1418.07	27.6	1418.07	43.2	1425.87	
#19 - 958+60, 359' Lt	1419.84	8	12	300	0	1427.84	16.0	1419.84	28	1419.84	44	1427.84	
#20 - 960+65, 356' Lt	1421.05	7.6	12	205	0	1428.65	15.2	1421.05	27.2	1421.05	42.4	1428.65	
#21 - 960+80, 356' Lt	1421.18	8	20	15	0	1429.18	16.0	1421.18	36	1421.18	52	1429.18	
#22 - 961+40, 356' Lt	1421.18	7.9	20	60	0	1429.08	15.8	1421.18	35.8	1421.18	51.6	1429.08	
#23 - 961+60, 356' Lt	1421.22	7.8	12	20	0	1429.02	15.6	1421.22	27.6	1421.22	43.2	1429.02	
#24 - 965+60, 355' Lt	1423.55	8.1	12	400	0	1431.65	16.2	1423.55	28.2	1423.55	44.4	1431.65	
#25 - 965+80, 355' Lt	1423.73	7.9	20	20	0	1431.63	15.8	1423.73	35.8	1423.73	51.6	1431.63	
#26 - 966+53, 355' Lt	1423.91	8.3	20	73	0	1432.21	16.6	1423.91	36.6	1423.91	53.2	1432.21	
#27 - 966+64, 355' Lt	1423.78	8.4	12	11	0	1432.18	16.8	1423.78	28.8	1423.78	45.6	1432.18	
#28 - 970+11, 355' Lt	1427.57	8.9	12	347	0	1436.47	17.8	1427.57	29.8	1427.57	47.6	1436.47	

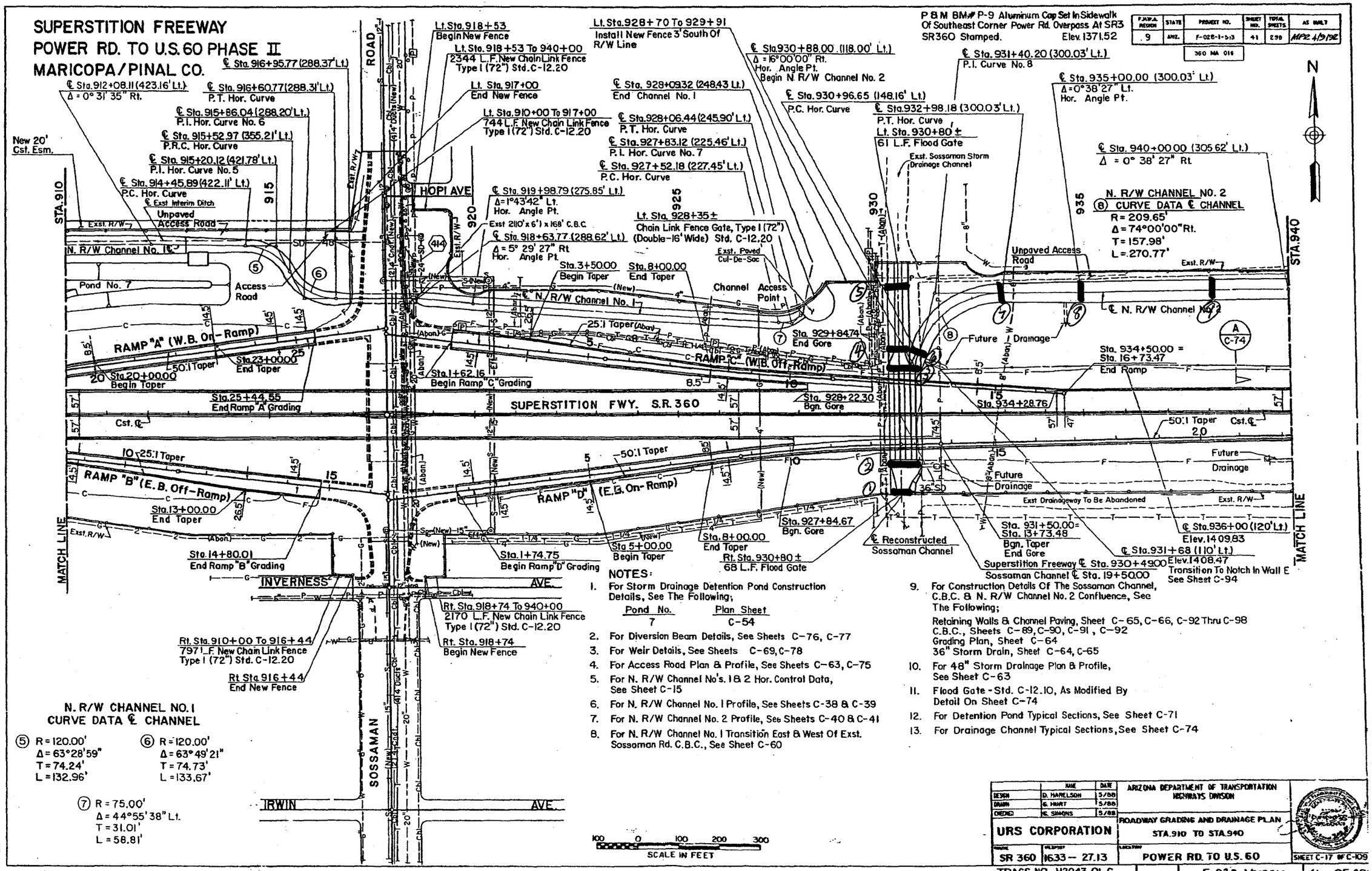
The Sossaman CBC is a 6-12'x6' CBC with 12" walls and a top of road elev = 1413.5

C-17

SUPERSTITION FREEWAY
POWER RD. TO U.S. 60 PHASE II
MARICOPA/PINAL CO.

P & M BM# P-9 Aluminum Cap Set In Sidewalk Of Southeast Corner Power Rd. Overpass At SR3 SR360 Stamped. Elev. 1371.52

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513	41	298	MPZ 4/19/92
		360 MA 016			



NOTES:

1. For Storm Drainage Detention Pond Construction Details, See The Following;

Pond No.	Plan Sheet
7	C-54

2. For Diversion Beam Details, See Sheets C-76, C-77
3. For Weir Details, See Sheets C-69, C-78
4. For Access Road Plan & Profile, See Sheets C-63, C-75
5. For N. R/W Channel No's. 1 & 2 Hor. Control Data, See Sheet C-15
6. For N. R/W Channel No. 1 Profile, See Sheets C-38 & C-39
7. For N. R/W Channel No. 2 Profile, See Sheets C-40 & C-41
8. For N. R/W Channel No. 1 Transition East & West Of Exst. Sossaman Rd. C.B.C., See Sheet C-60
9. For Construction Details Of The Sossaman Channel, C.B.C. & N. R/W Channel No. 2 Confluence, See The Following;
   Retaining Walls & Channel Paving, Sheet C-65, C-66, C-92 Thru C-98
   C.B.C., Sheets C-89, C-90, C-91, C-92
   Grading Plan, Sheet C-64
   36" Storm Drain, Sheet C-64, C-65
10. For 48" Storm Drainage Plan & Profile, See Sheet C-63
11. Flood Gate - Std. C-12.10, As Modified By Detail On Sheet C-74
12. For Detention Pond Typical Sections, See Sheet C-71
13. For Drainage Channel Typical Sections, See Sheet C-74

	NAME	DATE
DESIGN	D. HARELSON	3/88
DRAWN	G. HART	3/88
CHECKED	K. SIMONS	3/88

URS CORPORATION

ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

ROADWAY GRADING AND DRAINAGE PLAN
STA. 910 TO STA. 940

ROUTE	MILEPOST	LOCATION
SR 360	1633 – 27.13	POWER RD. TO U.S. 60

SHEET C-17 OF C-109

TRACS NO. H2043 01 C

F-028-1-513

41 OF 29

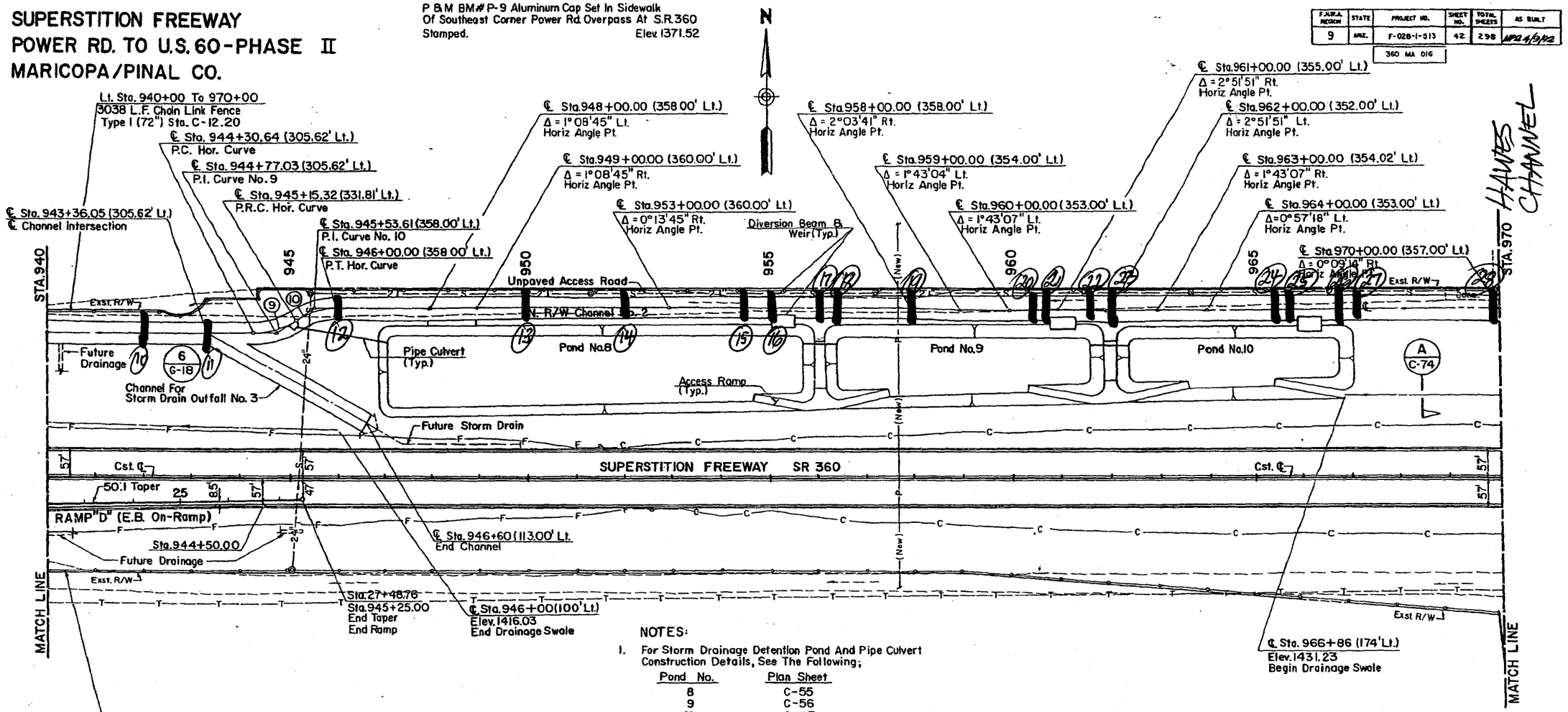
C-18

SUPERSTITION FREEWAY
POWER RD. TO U.S. 60-PHASE II
MARICOPA/PINAL CO.

P & M BM# P-9 Aluminum Cap Set In Sidewalk
Of Southeast Corner Power Rd. Overpass At S.R.360
Stamped. Elev 1371.52

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513	42	298	MP 2/5/92

360 MA 016



⑨ CURVE DATA ℄ CHANNEL

R = 150.00'
Δ = 34°22'15" Lt.
T = 46.39'
L = 89.98'

⑩ CURVE DATA ℄ CHANNEL

R = 150.00'
Δ = 34°22'15" Rt.
T = 46.39'
L = 89.98'

NOTES:

1. For Storm Drainage Detention Pond And Pipe Culvert Construction Details, See The Following;

Pond No.	Plan Sheet
8	C-55
9	C-56
10	C-57

2. For Diversion Beam Details, See Sheets C-76, C-77
3. For Weir Details, See Sheets C-69, C-78
4. For Access Ramp Details, See Sheet C-79
5. For N. R/W Channel No. 2 Hor. Control Data, See Sheet C-15
6. For N. R/W Channel No. 2 Profile, See Sheets C-41, C-42 & C-43
7. For Storm Drain Outfall No. 3 Plan & Profile, See Sheets C-55 & C-48
8. For Detention Pond Typical Sections, See Sheet C-71
9. For Drainage Channel Typical Sections, See Sheet C-74

100 0 100 200 300
SCALE IN FEET

	NAME	DATE
DESIGN	D. HARELSON	5/88
DRAWN	G. HURT	5/88
CHECKED	G. SIMONS	5/88

URS CORPORATION

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY GRADING AND DRAINAGE PLAN
STA. 940 TO STA. 970

ROUTE: SR 360 | MILEPOST: 16.33 – 27.13 | LOCATION: POWER RD. TO U.S. 60

SHEET C-18 OF C-109

TRACS NO. H2043 01 C | F-028-1(32) 513 | 42 OF 298

Regis, Tony

From: Blau, Jeff
Sent: Wednesday, April 02, 2003 4:17 PM
To: Regis, Tony
Subject: FW: Santan Freeway East Channel Freeboard Requirement

-----Original Message-----
From: D'Arcangelis, Chris [mailto:darcangelisChris@stanleygroup.com]
Sent: Wednesday, February 26, 2003 10:28 AM
To: Rasmussen, Scott; Blau, Jeff
Cc: Jeff Beimer (E-mail)
Subject: Santan Freeway East Channel Freeboard Requirement

Scott & Jeff Blau,

I spoke with both Dennis Crandall and Jeff Beimer yesterday (2/26/03) concerning the freeboard requirements for the east side offsite channel. Since this is an ADOT channel, even though the design is for the 100-year discharge set by the FCDMC, we are to design to ADOT criteria.

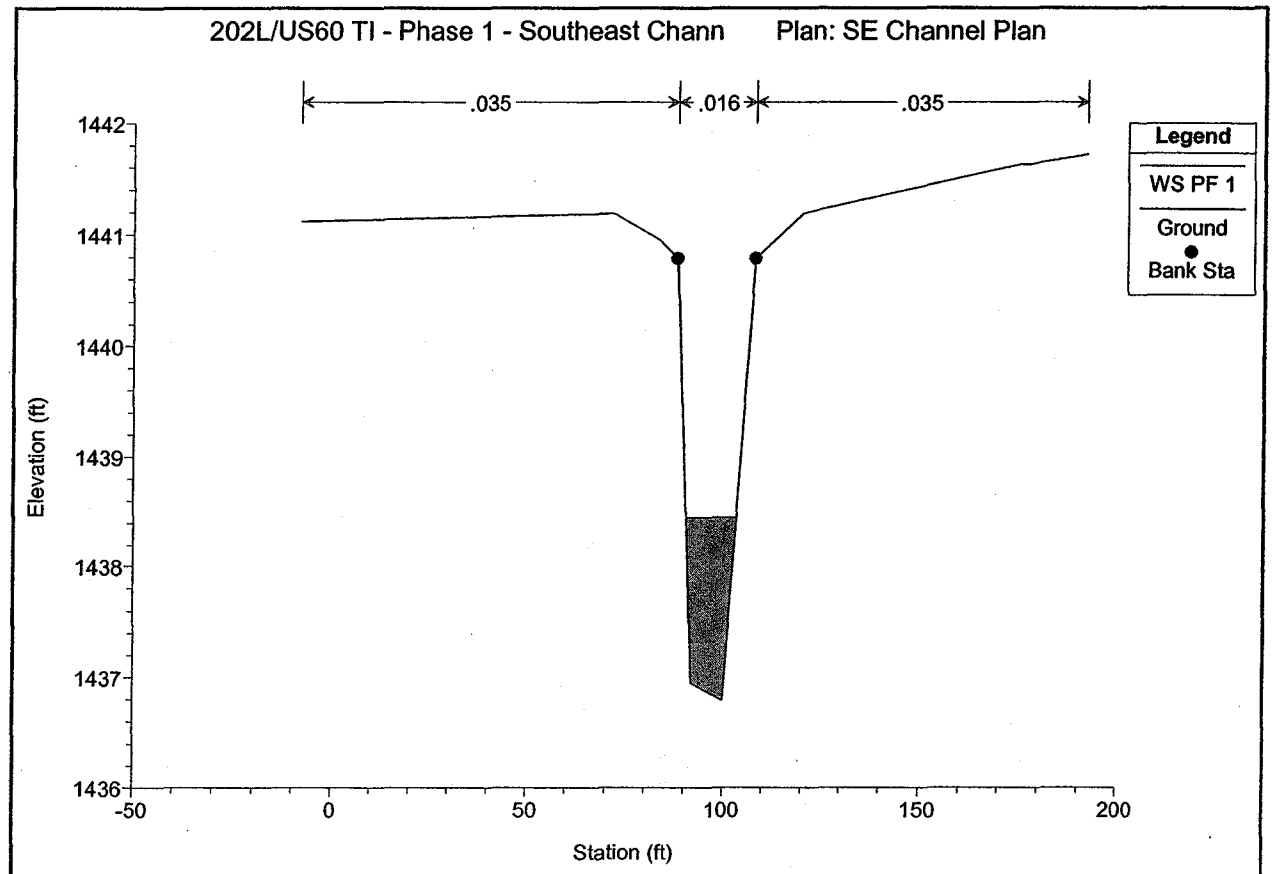
ADOT's position is that the channel be designed so the 100-year Q is kept within the channel lining.

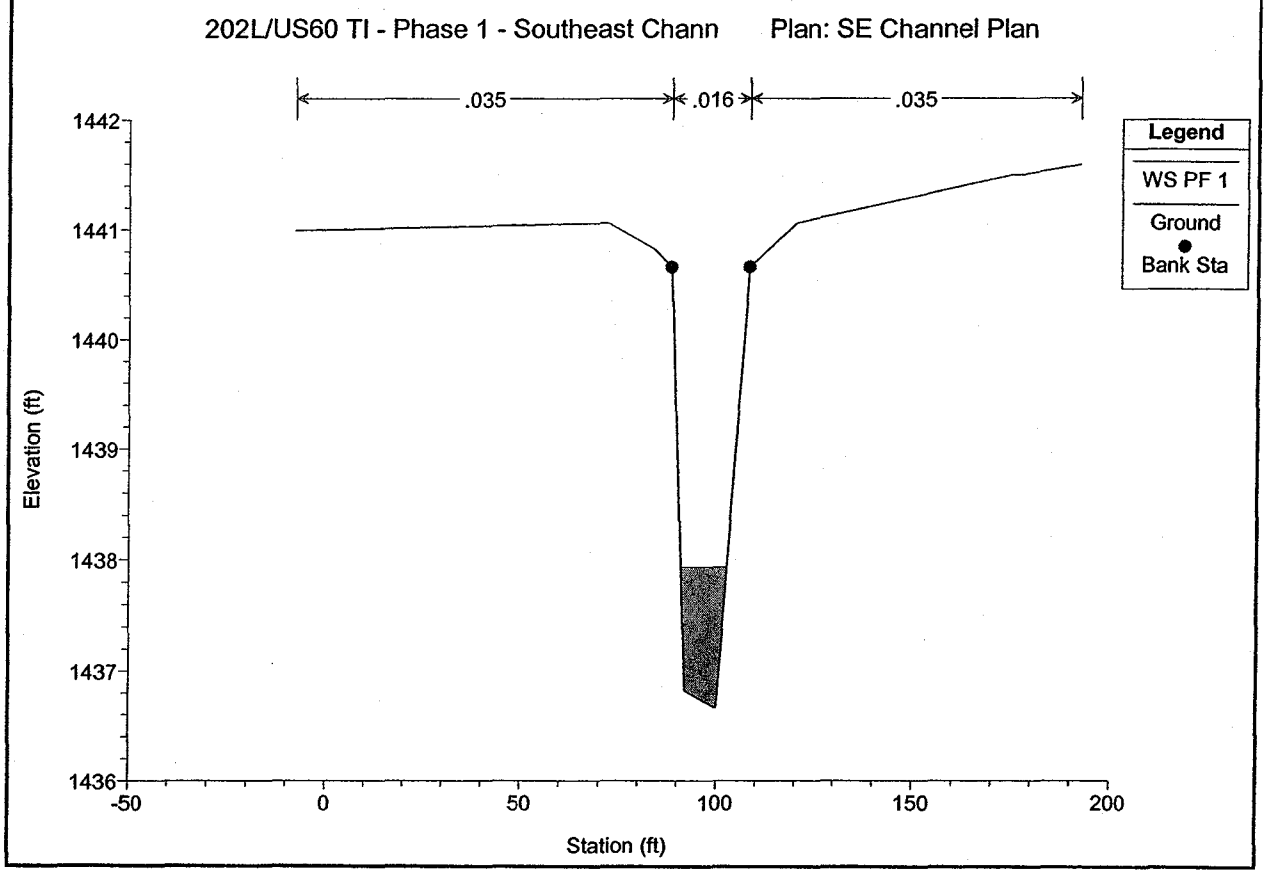
Sincerely,

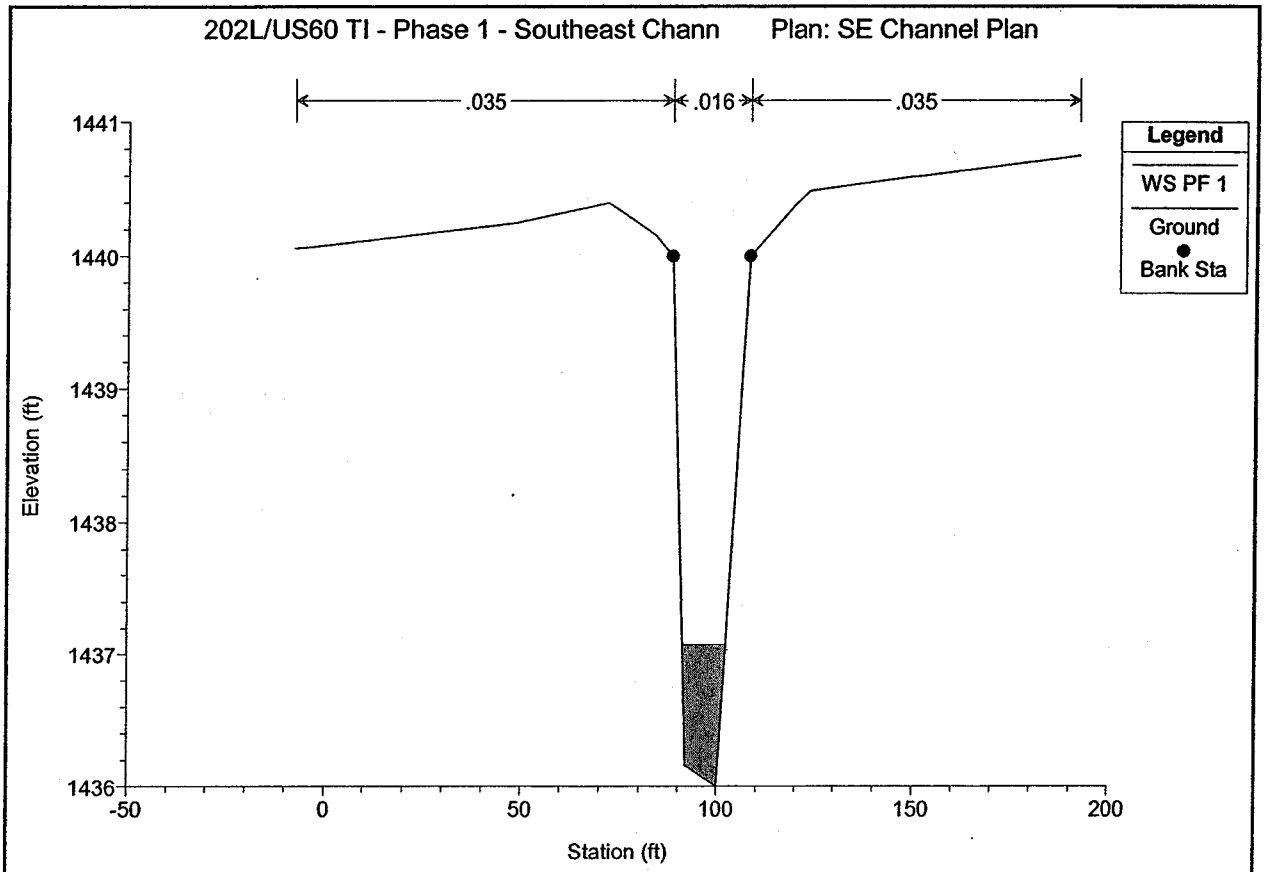
Christopher D'Arcangelis, P.E.
Stanley Consultants
[illegible]2-508-3040

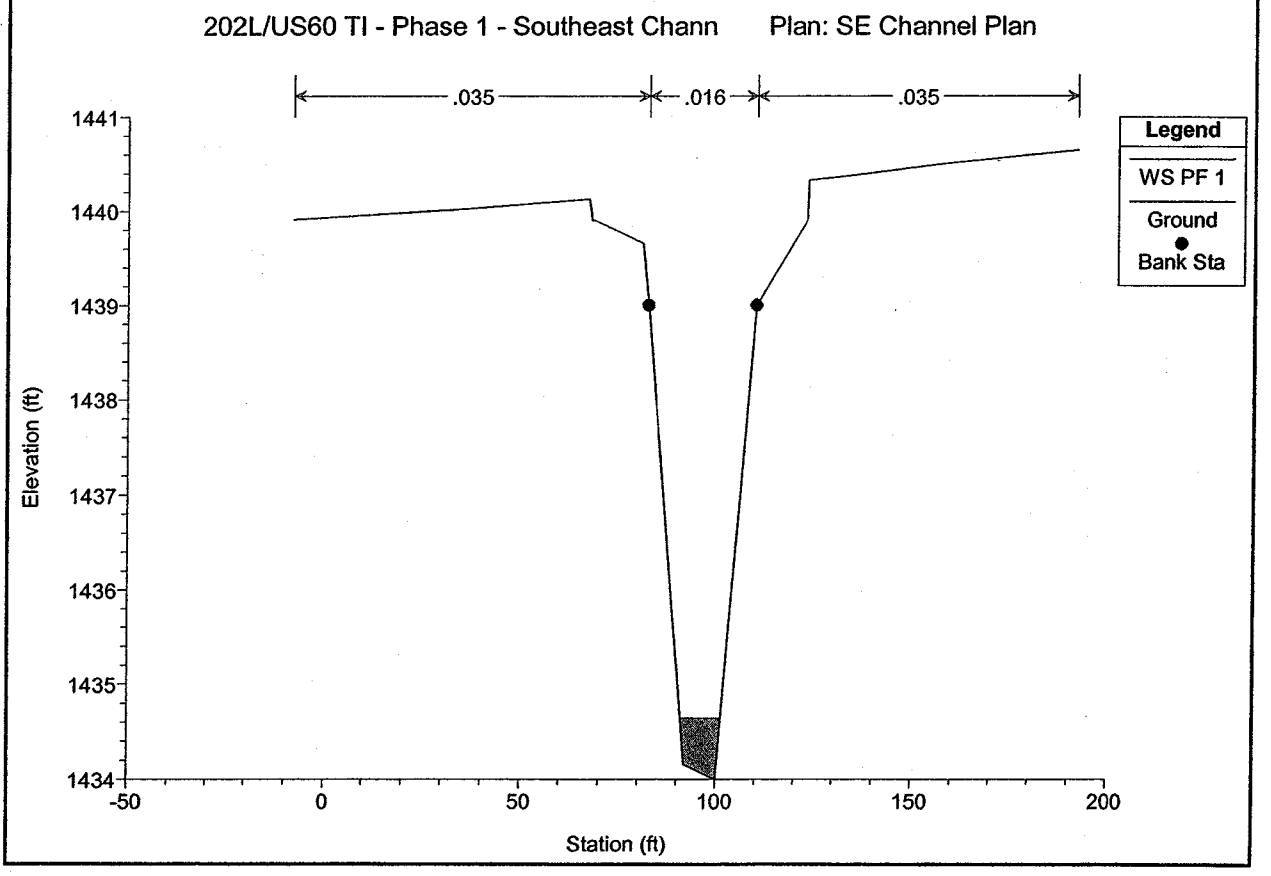
HEC-RAS Plan: SEchan River: 202L/US60 TI Reach: Southeast Chan. Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southeast Chan.	25708	68.00	1436.79	1438.45	1438.07	1438.71	0.001544	4.11	16.54	12.83	0.64
Southeast Chan.	25680	68.00	1436.66	1437.94	1437.94	1438.45	0.004122	5.76	11.80	11.66	1.01
Southeast Chan.	25580	68.00	1436.00	1437.07	1437.28	1437.87	0.007812	7.15	9.51	11.06	1.36
Southeast Chan.	25560	68.00	1434.00	1434.64	1435.25	1437.34	0.052192	13.19	5.16	10.25	3.28
Southeast Chan.	25400	68.00	1433.07	1434.25	1434.32	1434.82	0.005092	6.04	11.25	12.41	1.12
Southeast Chan.	25200	68.00	1431.90	1433.01	1433.15	1433.68	0.006380	6.53	10.42	12.13	1.24
Southeast Chan.	25000	68.00	1430.73	1431.89	1431.98	1432.48	0.005386	6.16	11.04	12.34	1.15
Southeast Chan.	24880	68.00	1430.04	1431.18	1431.29	1431.80	0.005785	6.31	10.77	12.25	1.19
Southeast Chan.	24800	68.00	1429.57	1430.71	1430.82	1431.33	0.005919	6.36	10.69	12.22	1.20
Southeast Chan.	24720	68.00	1429.10	1430.24	1430.35	1430.86	0.005876	6.35	10.72	12.23	1.19
Southeast Chan.	24660	68.00	1428.75	1429.89	1430.01	1430.51	0.005890	6.35	10.71	12.23	1.20
Southeast Chan.	24580	68.00	1428.29	1430.12	1429.54	1430.30	0.000959	3.38	20.14	15.00	0.51
Southeast Chan.	24500	68.00	1427.82	1430.12		1430.22	0.000393	2.46	27.67	16.89	0.34
Southeast Chan.	24300	210.00	1426.65	1429.46		1429.97	0.001715	5.73	36.67	18.90	0.72
Southeast Chan.	24100	325.00	1425.49	1428.80	1428.46	1429.55	0.002116	6.96	46.68	20.91	0.82
Southeast Chan.	23900.00	439.00	1424.32	1427.80	1427.80	1428.98	0.003149	8.73	50.29	21.59	1.01


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1442
1441
1440
1439
1438
1437
1436
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1442
1441
1440
1439
1438
1437
1436
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1441
1440
1439
1438
1437
1436
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
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.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
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1439
1438
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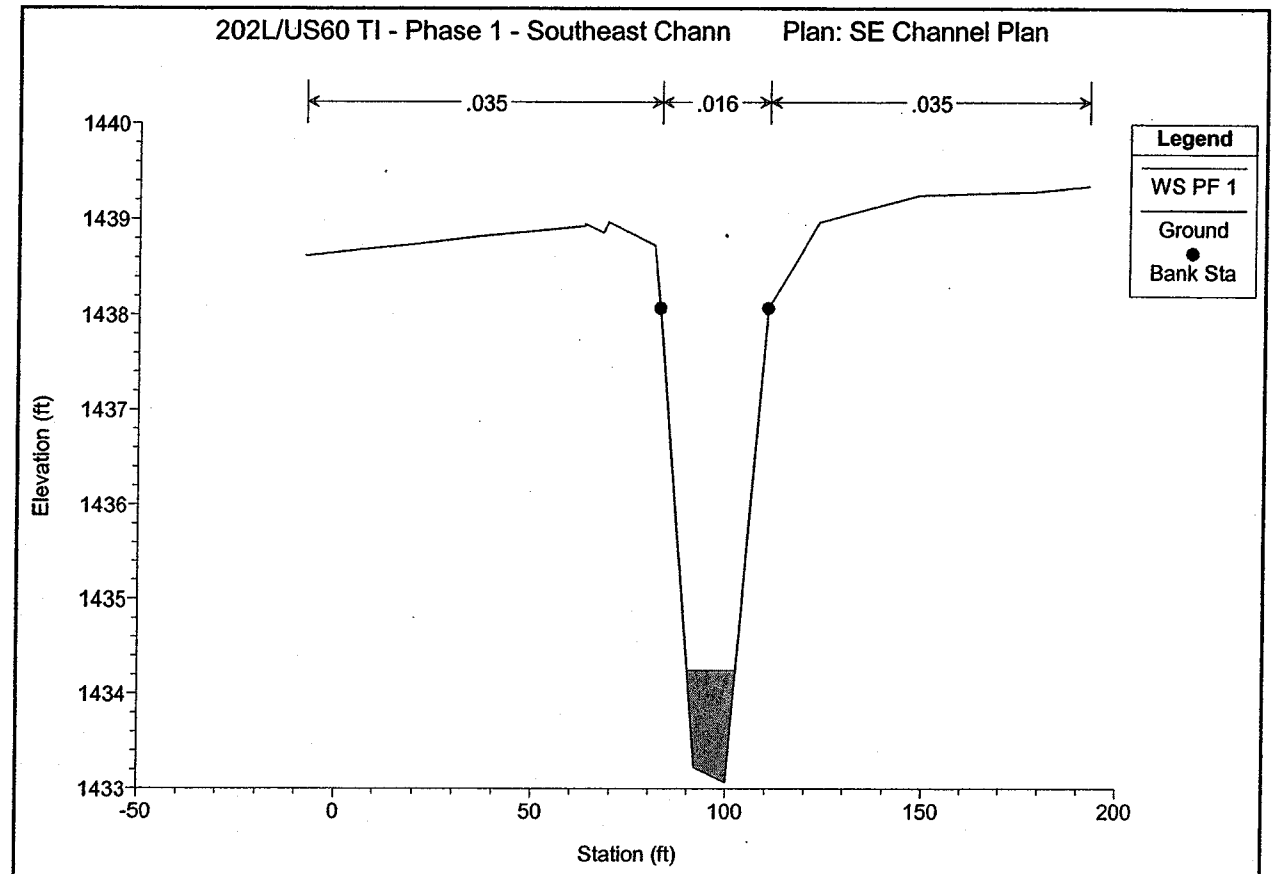
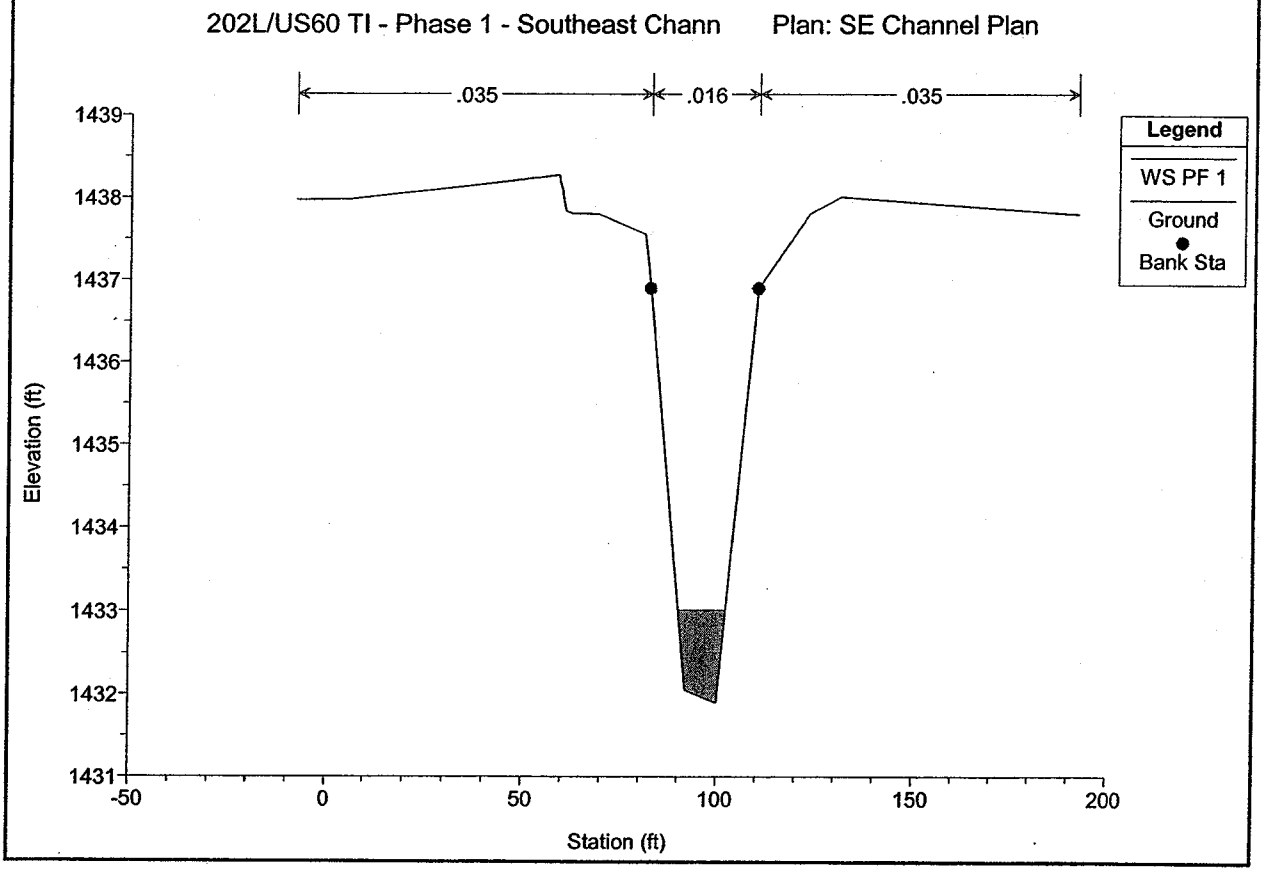
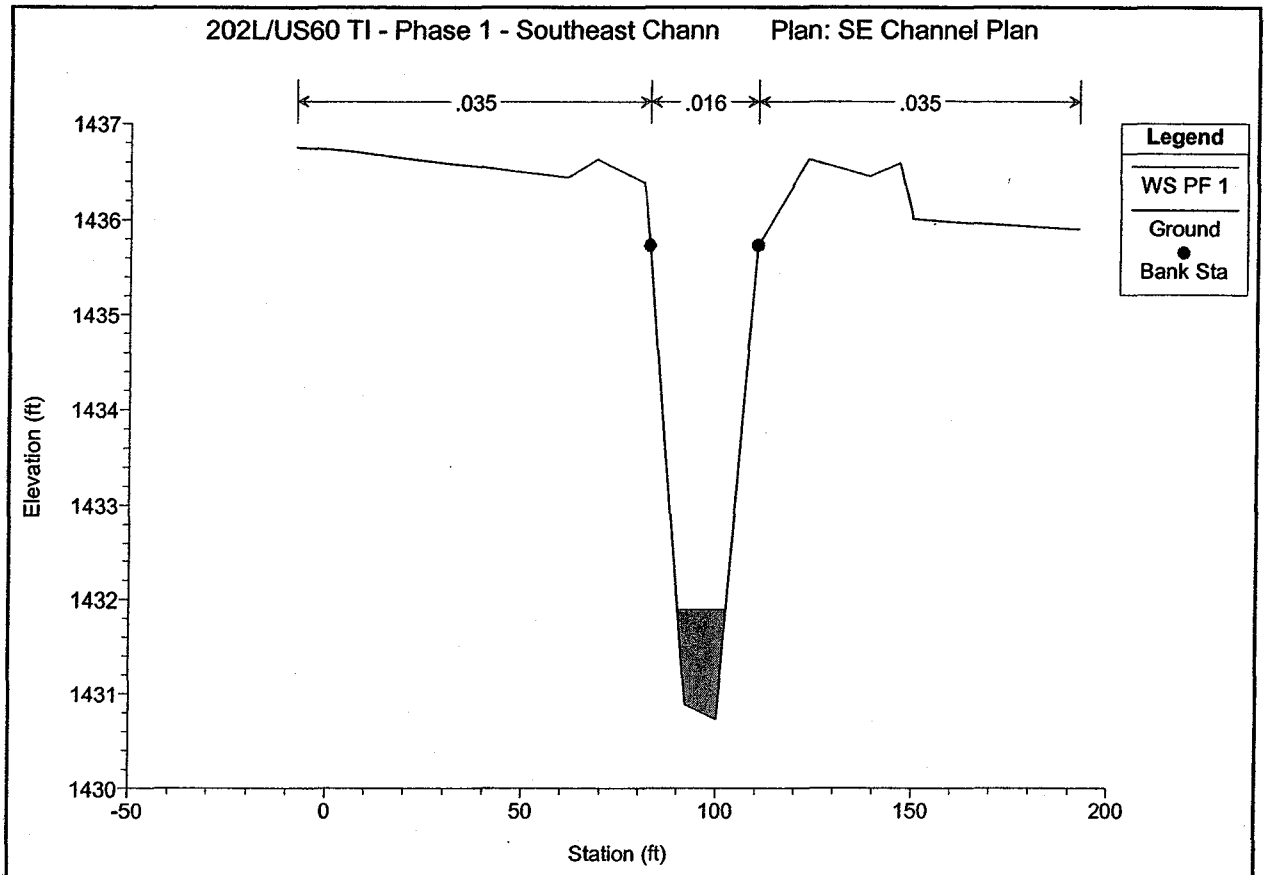
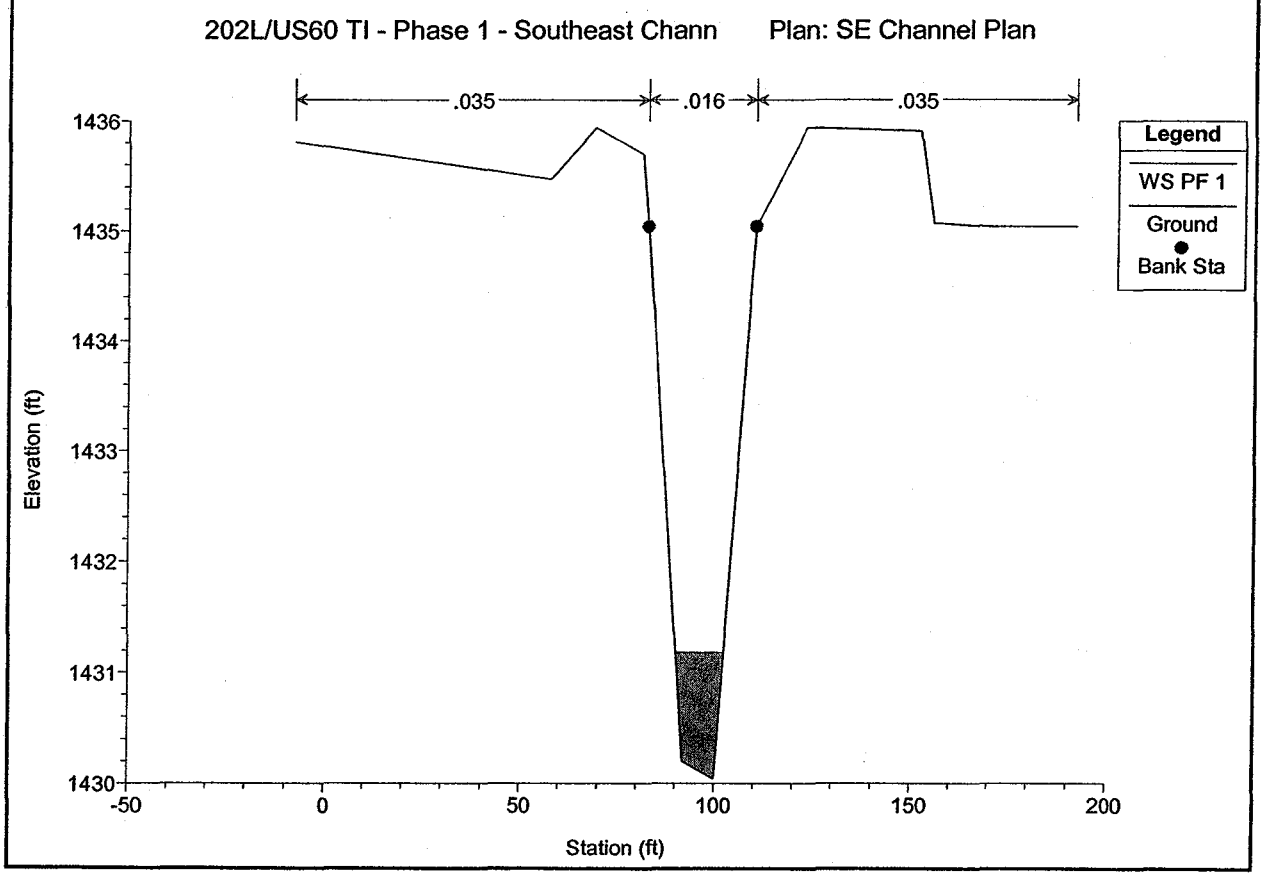
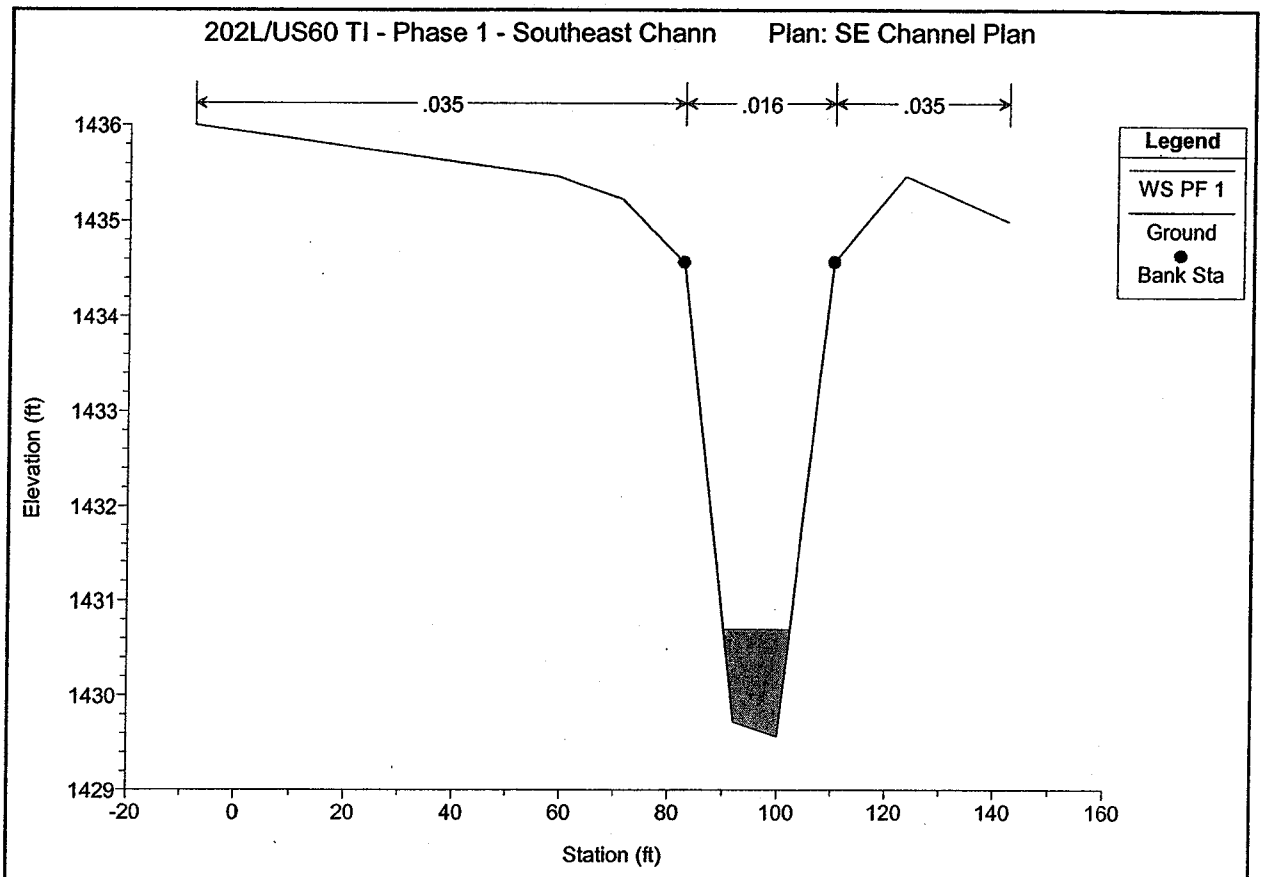
1436
1435
1434
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1440
1439
1438
1437
1436
1435
1434
1433
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1439
1438
1437
1436
1435
1434
1433
1432
1431
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1437
1436
1435
1434
1433
1432
1431
1430
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1436
1435
1434
1433
1432
1431
1430
-50
0
50
100
150
200
Station (ft)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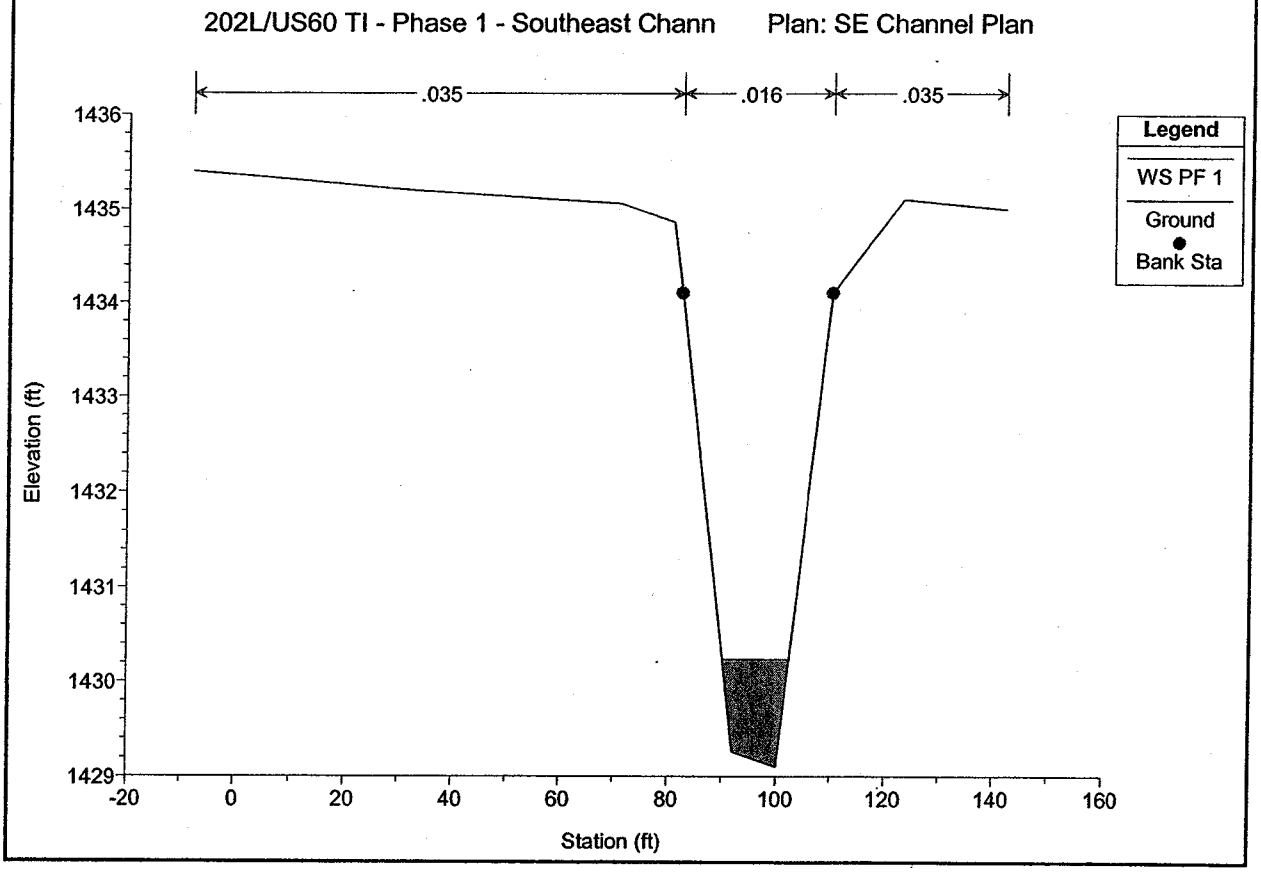
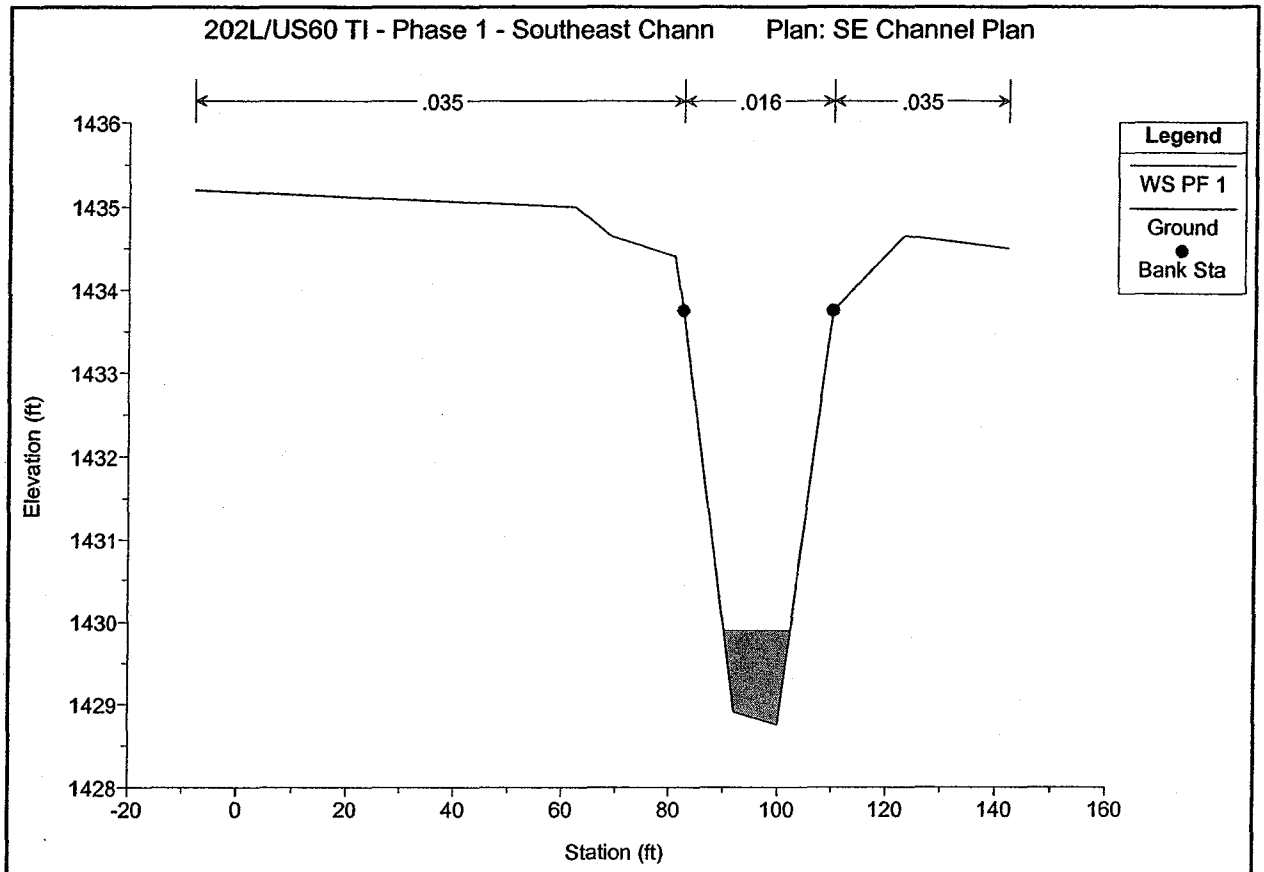
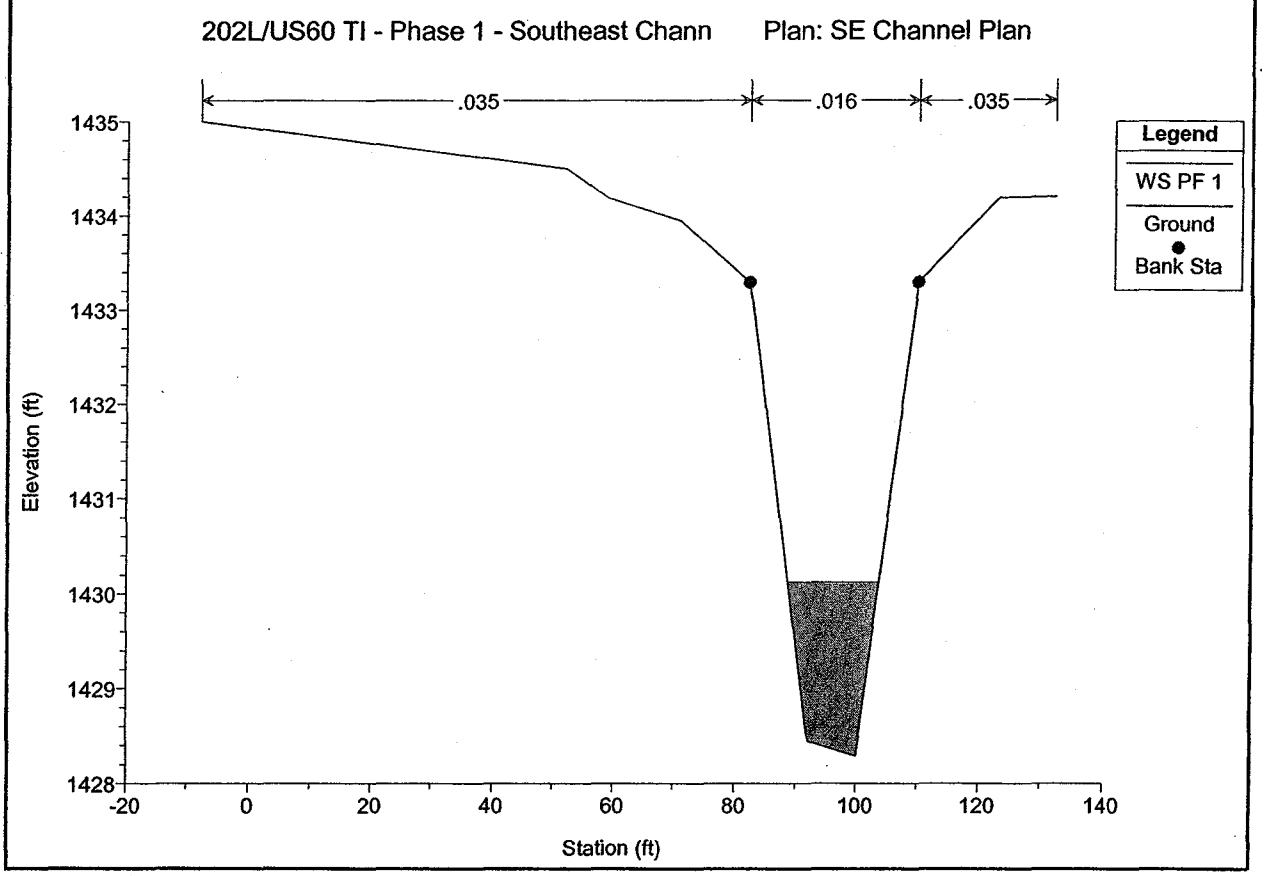
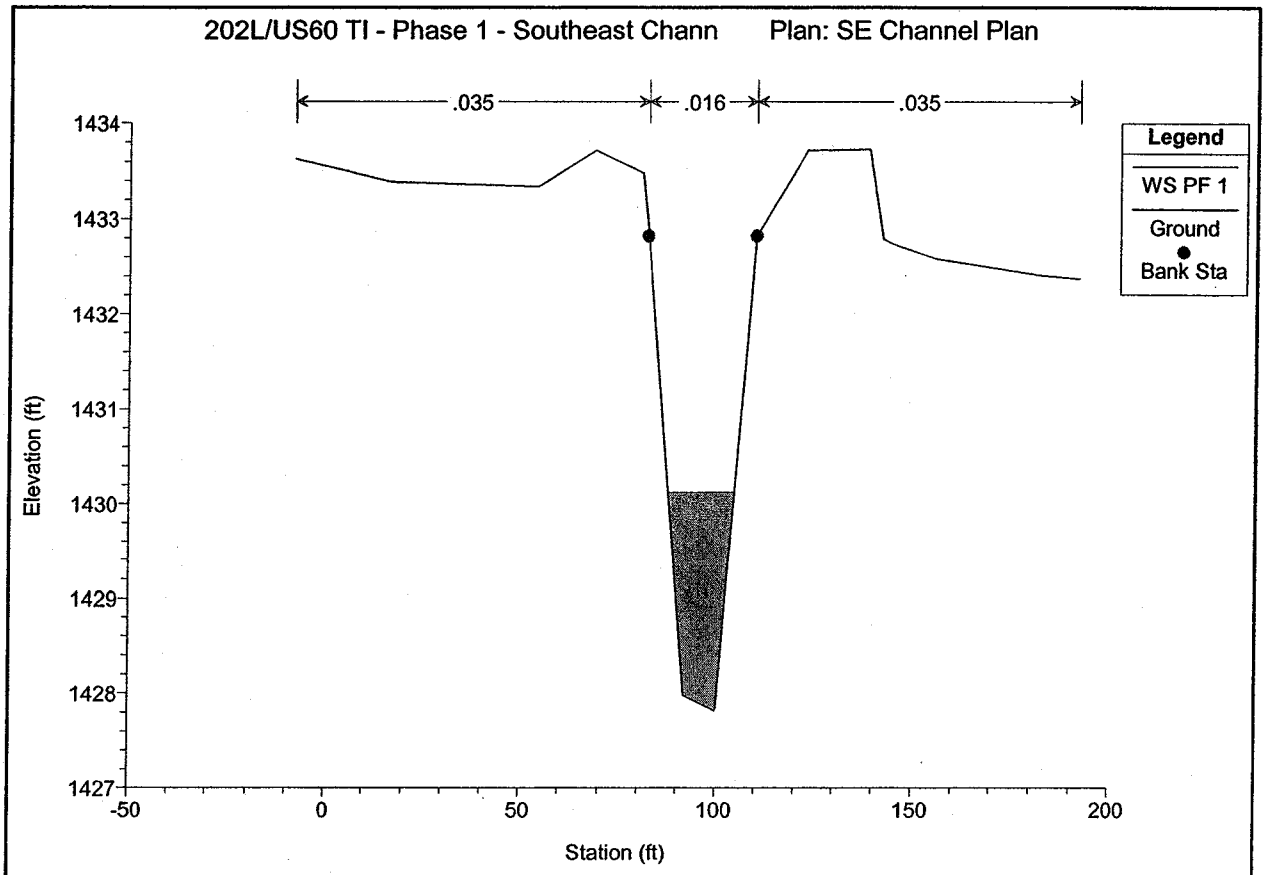
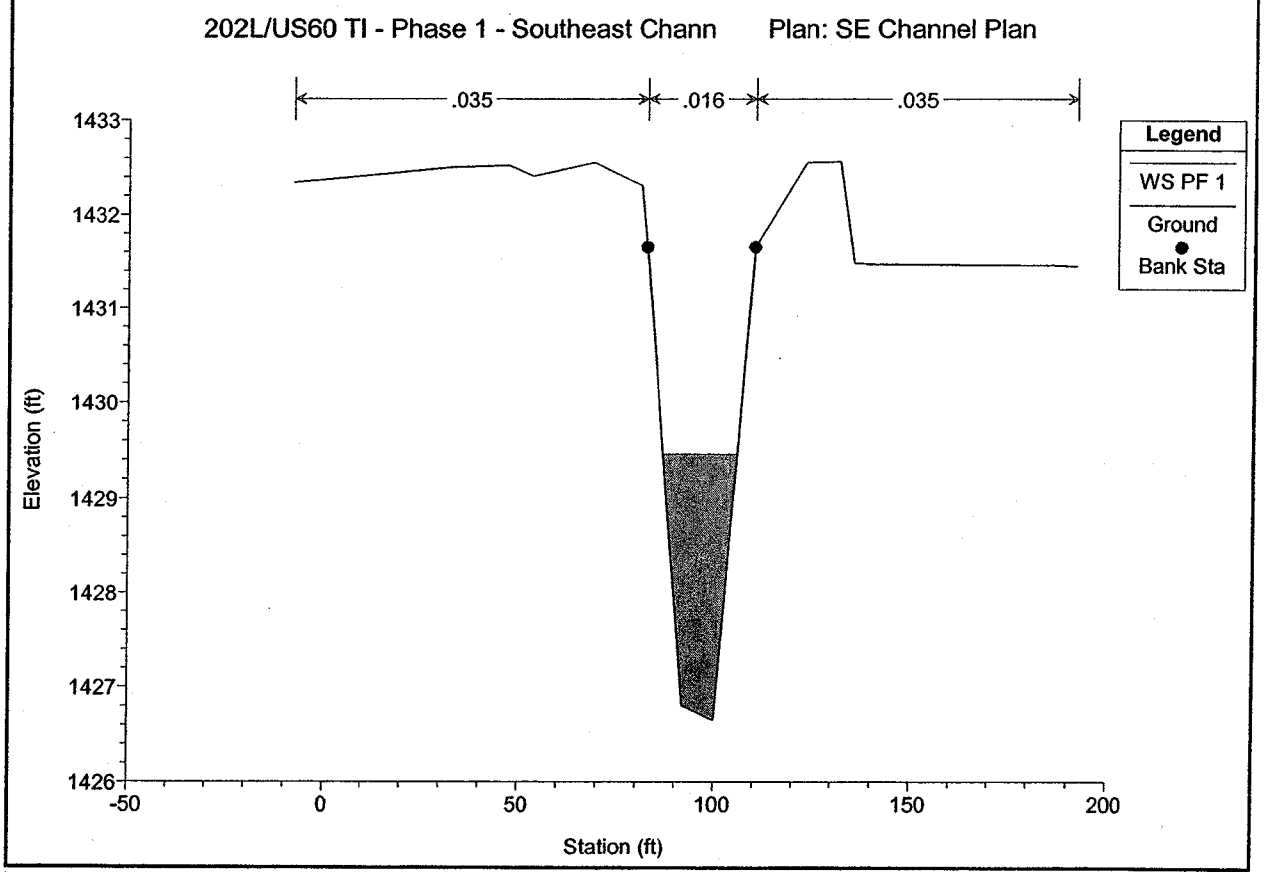
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1436
1435
1434
1433
1432
1431
1430
1429
-20
0
20
40
60
80
100
120
140
160
Station (ft)

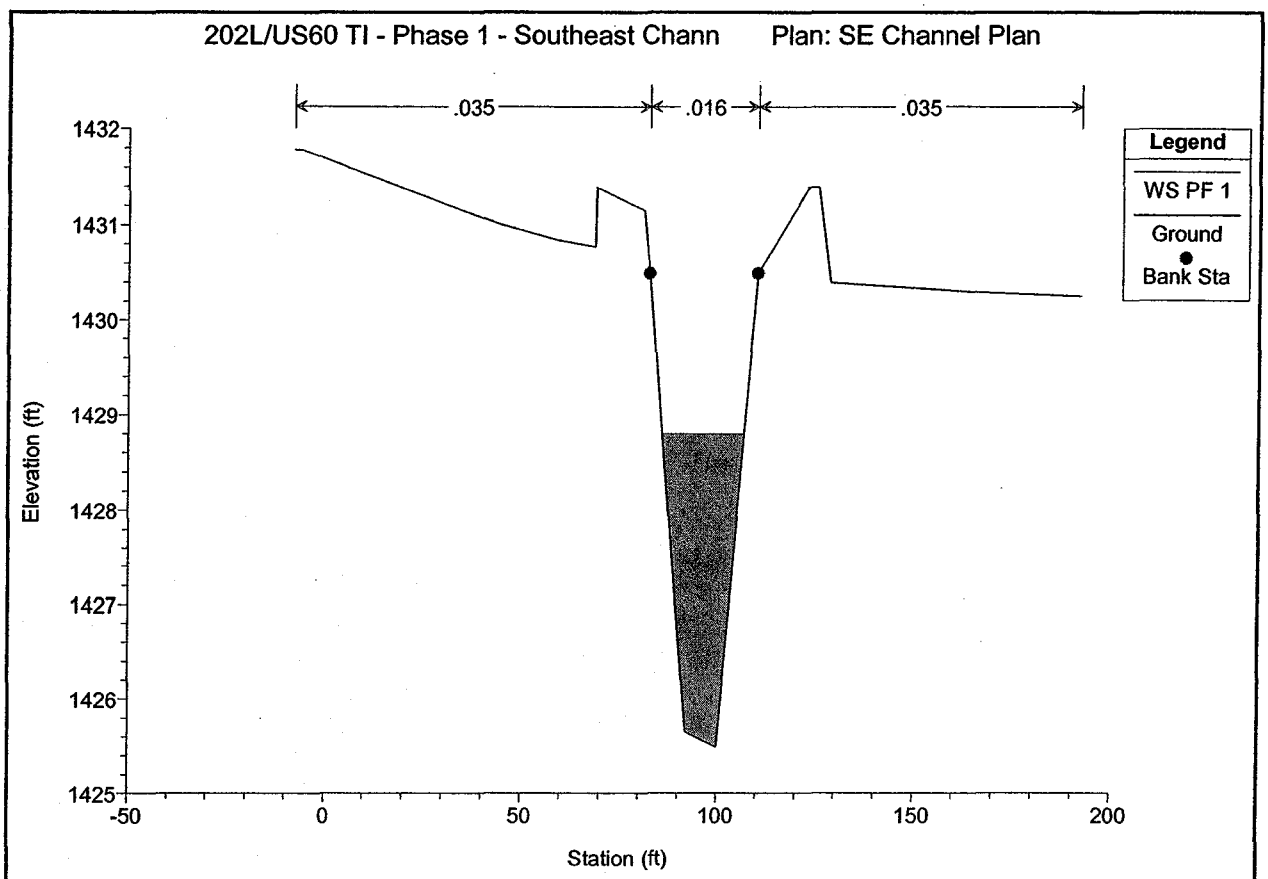

202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1436
1435
1434
1433
1432
1431
1430
1429
-20
0
20
40
60
80
100
120
140
160
Station (ft)

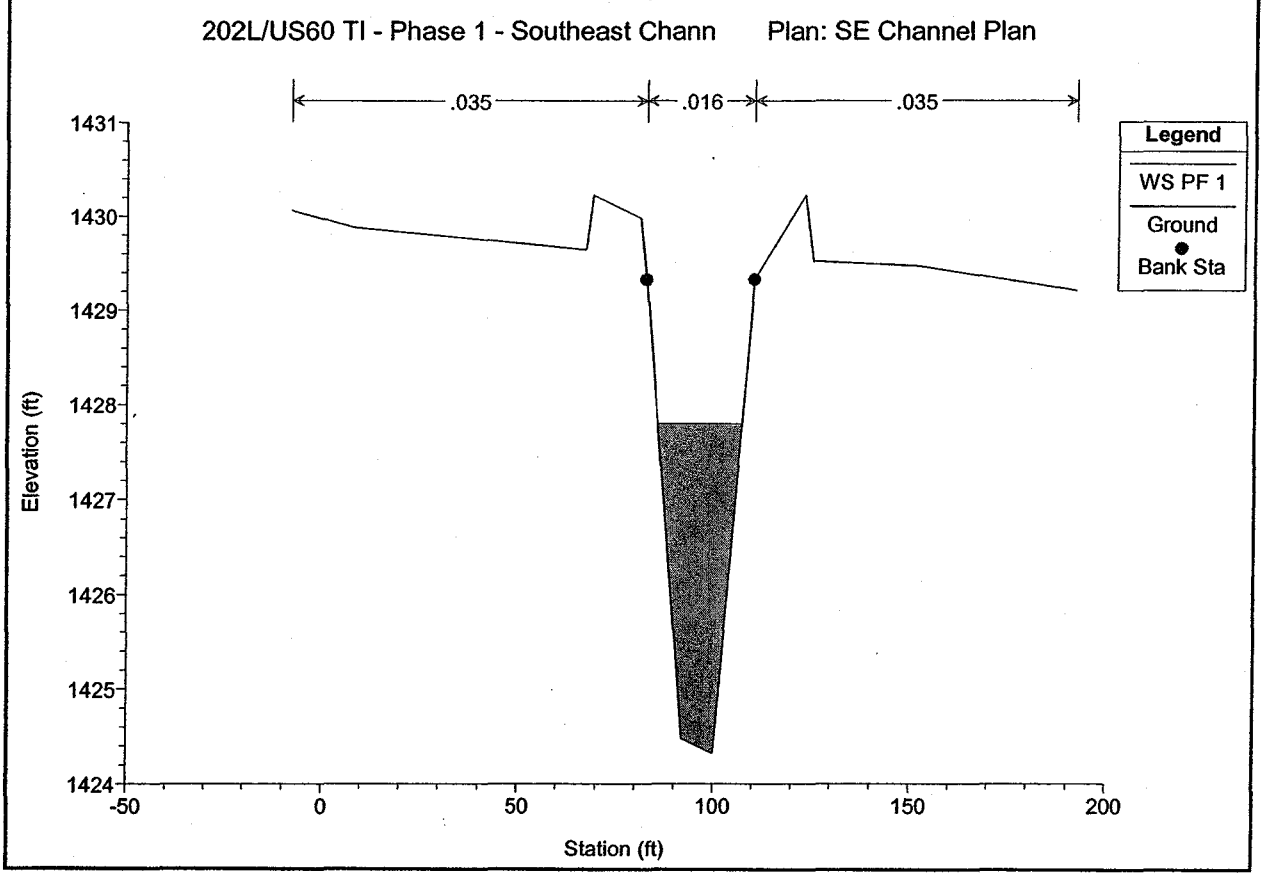

202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1436
1435
1434
1433
1432
1431
1430
1429
1428
-20
0
20
40
60
80
100
120
140
160
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1435
1434
1433
1432
1431
1430
1429
1428
-20
0
20
40
60
80
100
120
140
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1434
1433
1432
1431
1430
1429
1428
1427
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1433
1432
1431
1430
1429
1428
1427
1426
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1432
1431
1430
1429
1428
1427
1426
1425
-50
0
50
100
150
200
Station (ft)


202L/US60 TI - Phase 1 - Southeast Chann
Plan: SE Channel Plan
.035
.016
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1431
1430
1429
1428
1427
1426
1425
1424
-50
0
50
100
150
200
Station (ft)

```
                    HEC-RAS Version 3.0.1  Mar 2001
                      U.S. Army Corp of Engineers
                     Hydrologic Engineering Center
                       609 Second Street, Suite D
                     Davis, California 95616-4687
                            (916) 756-1104

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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PROJECT DATA
Project Title: 202L/US60 TI - Phase 1 - Southeast Chann
Project File : RMSAse.prj
Run Date and Time: 4/1/2003 3:53:41 PM

Project in English units

PLAN DATA

Plan Title: SE Channel Plan
Plan File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAse.p01

Geometry Title: SE Channel Geometry
Geometry File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAse.g01

Flow Title : SE Channel Flow Data
Flow File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAse.f01

Plan Summary Information:
Number of: Cross Sections = 16 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculaton tolerance = 0.01
Maximum number of interations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: SE Channel Flow Data
Flow File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAse.f01

Flow Data (cfs)

River	Reach	RS	PF 1
202L/US60 TI	Southeast Chan.	25708	68
202L/US60 TI	Southeast Chan.	24300	210
202L/US60 TI	Southeast Chan.	24100	325
202L/US60 TI	Southeast Chan.	23900.00	439

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
202L/US60 TI	Southeast Chan.	PF 1	Known WS = 1442.86	Known WS = 1426.42

GEOMETRY DATA

Geometry Title: SE Channel Geometry
Geometry File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAse.g01

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25708

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1441.12	71.68	1441.19	83.68	1440.95	88.16	1440.79	92	1436.95
100	1436.79	108	1440.79	120	1441.19	175.04	1441.63	175.05	1441.63
175.25	1441.63	177.91	1441.63	178.57	1441.64	178.69	1441.64	191.99	1441.72

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	88.16	.016	108	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88.16	108	100	100	100	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.45	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1438.07	Flow Area (sq ft)		16.54	
E.G. Slope (ft/ft)	0.001544	Area (sq ft)		16.54	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.83	Top Width (ft)		12.83	
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)		4.11	
Max Chl Dpth (ft)	1.66	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	1730.6	Conv. (cfs)		1730.6	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		13.84	
Min Ch El (ft)	1436.79	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.47	
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)		0.91	
C & E Loss (ft)	0.03	Cum SA (acres)		0.63	

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

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25680

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1440.99	71.68	1441.06	83.68	1440.82	88.16	1440.66	92	1436.82
100	1436.66	108	1440.66	120	1441.06	175.04	1441.5	175.05	1441.5
175.25	1441.5	177.91	1441.5	178.57	1441.51	178.69	1441.51	191.99	1441.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	88.16	.016	108	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88.16	108	100	100	100	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.016	
W.S. Elev (ft)	1437.94	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1437.94	Flow Area (sq ft)		11.80	
E.G. Slope (ft/ft)	0.004122	Area (sq ft)		11.80	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	11.66	Top Width (ft)		11.66	
Vel Total (ft/s)	5.76	Avg. Vel. (ft/s)		5.76	
Max Chl Dpth (ft)	1.27	Hydr. Depth (ft)		1.01	
Conv. Total (cfs)	1059.2	Conv. (cfs)		1059.2	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		12.43	
Min Ch El (ft)	1436.66	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		1.41	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)		0.88	
C & E Loss (ft)	0.00	Cum SA (acres)		0.61	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25580

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1440.06	-3.91	1440.07	-3.84	1440.07	48.15	1440.25	71.68	1440.4
83.68	1440.16	88.16	1440	92	1436.16	100	1436	108	1440
120	1440.4	123.54	1440.49	123.61	1440.49	148.59	1440.59	152.21	1440.6
163.13	1440.64	163.28	1440.64	163.32	1440.64	192	1440.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	88.16	.016	108	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88.16	108	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1437.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.016	
W.S. Elev (ft)	1437.07	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1437.28	Flow Area (sq ft)		9.51	
E.G. Slope (ft/ft)	0.007812	Area (sq ft)		9.51	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	11.06	Top Width (ft)		11.06	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	1.07	Hydr. Depth (ft)		0.86	
Conv. Total (cfs)	769.3	Conv. (cfs)		769.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		11.69	
Min Ch El (ft)	1436.00	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		2.84	
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)		0.85	
C & E Loss (ft)	0.03	Cum SA (acres)		0.58	

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25560

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1439.91	37.17	1440.03	67.12	1440.13	67.78	1439.91	67.81	1439.9
68.68	1439.9	80.68	1439.66	82.32	1439	92	1434.16	100	1434
110	1439	123	1439.9	123.41	1440.33	134.09	1440.38	157.22	1440.5
157.25	1440.5	157.27	1440.5	179.83	1440.6	191.99	1440.65		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	160	160	160	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1437.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.70	Wt. n-Val.		0.016	
W.S. Elev (ft)	1434.64	Reach Len. (ft)	160.00	160.00	160.00
Crit W.S. (ft)	1435.25	Flow Area (sq ft)		5.16	
E.G. Slope (ft/ft)	0.052192	Area (sq ft)		5.16	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	10.25	Top Width (ft)		10.25	
Vel Total (ft/s)	13.19	Avg. Vel. (ft/s)		13.19	
Max Chl Dpth (ft)	0.64	Hydr. Depth (ft)		0.50	
Conv. Total (cfs)	297.6	Conv. (cfs)		297.6	
Length Wtd. (ft)	160.00	Wetted Per. (ft)		10.52	
Min Ch El (ft)	1434.00	Shear (lb/sq ft)		1.60	
Alpha	1.00	Stream Power (lb/ft s)		21.06	
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		0.85	
C & E Loss (ft)	0.19	Cum SA (acres)		0.58	

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

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25400

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1438.62	-7.36	1438.62	5.38	1438.68	19.55	1438.74	35.4	1438.82
53.24	1438.89	62.77	1438.93	62.82	1438.94	62.84	1438.95	67.51	1438.86
68.68	1438.97	80.68	1438.73	82.32	1438.07	92	1433.23	100	1433.07
110	1438.07	123	1438.97	148.3	1439.25	148.32	1439.25	177.78	1439.29
177.86	1439.29	177.93	1439.29	192	1439.35				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	190	200	210	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1434.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.		0.016	
W.S. Elev (ft)	1434.25	Reach Len. (ft)	190.00	200.00	210.00
Crit W.S. (ft)	1434.32	Flow Area (sq ft)		11.25	
E.G. Slope (ft/ft)	0.005092	Area (sq ft)		11.25	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.41	Top Width (ft)		12.41	
Vel Total (ft/s)	6.04	Avg. Vel. (ft/s)		6.04	
Max Chl Dpth (ft)	1.18	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	952.9	Conv. (cfs)		952.9	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		12.93	
Min Ch El (ft)	1433.07	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		1.67	
Frctn Loss (ft)	1.89	Cum Volume (acre-ft)		0.82	
C & E Loss (ft)	0.64	Cum SA (acres)		0.53	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25200

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1437.97	5.77	1437.98	58.58	1438.27	58.87	1438.21	59.55	1438.07
59.56	1438.07	59.6	1438.05	60.33	1437.84	62.05	1437.81	68.68	1437.8
80.68	1437.56	82.32	1436.9	92	1432.06	100	1431.9	110	1436.9
123	1437.8	131.01	1438.01	131.03	1438.01	185.52	1437.82	191.99	1437.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	190	200	210	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1433.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.016	
W.S. Elev (ft)	1433.01	Reach Len. (ft)	190.00	200.00	210.00
Crit W.S. (ft)	1433.15	Flow Area (sq ft)		10.42	
E.G. Slope (ft/ft)	0.006380	Area (sq ft)		10.42	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.13	Top Width (ft)		12.13	
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)		6.53	
Max Chl Dpth (ft)	1.11	Hydr. Depth (ft)		0.86	
Conv. Total (cfs)	851.3	Conv. (cfs)		851.3	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		12.62	
Min Ch El (ft)	1431.90	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.15	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.01	Cum SA (acres)		0.48	

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

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 25000

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1436.75	-2.98	1436.74	5.9	1436.71	15.39	1436.66	25.57	1436.61
31.82	1436.58	36.54	1436.56	48.38	1436.5	61.21	1436.44	68.68	1436.63
80.68	1436.39	82.32	1435.73	92	1430.89	100	1430.73	110	1435.73
123	1436.63	138.54	1436.45	146.18	1436.59	149.21	1436.07	149.43	1436.01
159.53	1435.98	166.76	1435.96	191.44	1435.9	191.46	1435.9	192	1435.9

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	120	120	120	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1432.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.016	
W.S. Elev (ft)	1431.89	Reach Len. (ft)	120.00	120.00	120.00
Crit W.S. (ft)	1431.98	Flow Area (sq ft)		11.04	
E.G. Slope (ft/ft)	0.005386	Area (sq ft)		11.04	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.34	Top Width (ft)		12.34	
Vel Total (ft/s)	6.16	Avg. Vel. (ft/s)		6.16	
Max Chl Dpth (ft)	1.16	Hydr. Depth (ft)		0.89	
Conv. Total (cfs)	926.5	Conv. (cfs)		926.5	
Length Wtd. (ft)	120.00	Wetted Per. (ft)		12.85	
Min Ch El (ft)	1430.73	Shear (lb/sq ft)		0.29	
Alpha	1.00	Stream Power (lb/ft s)		1.78	
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)		0.72	
C & E Loss (ft)	0.02	Cum SA (acres)		0.42	

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

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24880

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1435.81	57.23	1435.47	68.68	1435.94	80.68	1435.7	82.32	1435.04
92	1430.2	100	1430.04	110	1435.04	123	1435.94	152.05	1435.91
153.14	1435.64	155.42	1435.07	157.49	1435.07	160.08	1435.06	170.09	1435.04
192	1435.04								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	80	80	80	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1431.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.016	
W.S. Elev (ft)	1431.18	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	1431.29	Flow Area (sq ft)		10.77	
E.G. Slope (ft/ft)	0.005785	Area (sq ft)		10.77	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.25	Top Width (ft)		12.25	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	
Max Chl Dpth (ft)	1.14	Hydr. Depth (ft)		0.88	
Conv. Total (cfs)	894.1	Conv. (cfs)		894.1	
Length Wtd. (ft)	80.00	Wetted Per. (ft)		12.75	
Min Ch El (ft)	1430.04	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.93	
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)		0.69	
C & E Loss (ft)	0.00	Cum SA (acres)		0.39	

CROSS SECTION RIVER: 202L/US60 TI

REACH: Southeast Chan. RS: 24800

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1436	58.68	1435.47	70.68	1435.23	82.32	1434.57	92	1429.73
100	1429.57	110	1434.57	123	1435.47	142	1435		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	80	80	80	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1431.33	Element			
Vel Head (ft)	0.63	Wt. n-Val.		0.016	
W.S. Elev (ft)	1430.71	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	1430.82	Flow Area (sq ft)		10.69	
E.G. Slope (ft/ft)	0.005919	Area (sq ft)		10.69	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.22	Top Width (ft)		12.22	
Vel Total (ft/s)	6.36	Avg. Vel. (ft/s)		6.36	
Max Chl Dpth (ft)	1.14	Hydr. Depth (ft)		0.87	
Conv. Total (cfs)	883.9	Conv. (cfs)		883.9	
Length Wtd. (ft)	80.00	Wetted Per. (ft)		12.72	
Min Ch El (ft)	1429.57	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.97	
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)		0.67	
C & E Loss (ft)	0.00	Cum SA (acres)		0.36	

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24720

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1435.4	32	1435.2	58.68	1435.1	70.68	1435.06	80.68	1434.86
82.32	1434.1	92	1429.26	100	1429.1	110	1434.1	123	1435.1
142	1435								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	60	60	60	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1430.86	Element			
Vel Head (ft)	0.63	Wt. n-Val.		0.016	
W.S. Elev (ft)	1430.24	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1430.35	Flow Area (sq ft)		10.72	
E.G. Slope (ft/ft)	0.005876	Area (sq ft)		10.72	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.23	Top Width (ft)		12.23	
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)		6.35	
Max Chl Dpth (ft)	1.14	Hydr. Depth (ft)		0.88	
Conv. Total (cfs)	887.1	Conv. (cfs)		887.1	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		12.73	
Min Ch El (ft)	1429.10	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.96	
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)		0.65	
C & E Loss (ft)	0.00	Cum SA (acres)		0.34	

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24660

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1435.2	62	1435	68.68	1434.65	80.68	1434.41	82.32	1433.75
92	1428.91	100	1428.75	110	1433.75	123	1434.65	142	1434.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	80	80	80	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1430.51	Element			
Vel Head (ft)	0.63	Wt. n-Val.		0.016	
W.S. Elev (ft)	1429.89	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	1430.01	Flow Area (sq ft)		10.71	
E.G. Slope (ft/ft)	0.005890	Area (sq ft)		10.71	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	12.23	Top Width (ft)		12.23	
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)		6.35	
Max Chl Dpth (ft)	1.14	Hydr. Depth (ft)		0.88	
Conv. Total (cfs)	886.0	Conv. (cfs)		886.0	
Length Wtd. (ft)	80.00	Wetted Per. (ft)		12.73	
Min Ch El (ft)	1428.75	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		1.96	
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)		0.63	
C & E Loss (ft)	0.00	Cum SA (acres)		0.33	

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24580

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1435	52	1434.5	58.68	1434.19	70.68	1433.95	82.32	1433.29
92	1428.45	100	1428.29	110	1433.29	123	1434.19	132	1434.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	80	80	80	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1430.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.016	
W.S. Elev (ft)	1430.12	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	1429.54	Flow Area (sq ft)		20.14	
E.G. Slope (ft/ft)	0.000959	Area (sq ft)		20.14	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	15.00	Top Width (ft)		15.00	
Vel Total (ft/s)	3.38	Avg. Vel. (ft/s)		3.38	
Max Chl Dpth (ft)	1.83	Hydr. Depth (ft)		1.34	
Conv. Total (cfs)	2195.9	Conv. (cfs)		2195.9	
Length Wtd. (ft)	80.00	Wetted Per. (ft)		15.83	
Min Ch El (ft)	1428.29	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.26	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.61	
C & E Loss (ft)	0.02	Cum SA (acres)		0.30	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24500

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1433.63	16.59	1433.39	16.61	1433.39	54.39	1433.34	68.68	1433.72
80.68	1433.48	82.32	1432.82	92	1427.98	100	1427.82	110	1432.82
123	1433.72	138.69	1433.73	138.88	1433.68	142.3	1432.79	144.21	1432.75
144.22	1432.75	155.69	1432.58	182.36	1432.41	182.43	1432.41	182.46	1432.41
192.01	1432.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1430.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1430.12	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		27.67	
E.G. Slope (ft/ft)	0.000393	Area (sq ft)		27.67	
Q Total (cfs)	68.00	Flow (cfs)		68.00	
Top Width (ft)	16.89	Top Width (ft)		16.89	
Vel Total (ft/s)	2.46	Avg. Vel. (ft/s)		2.46	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		1.64	
Conv. Total (cfs)	3430.9	Conv. (cfs)		3430.9	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		17.94	
Min Ch El (ft)	1427.82	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)		0.56	
C & E Loss (ft)	0.04	Cum SA (acres)		0.27	

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

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24300

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1432.34	32.18	1432.5	32.2	1432.5	32.28	1432.5	47.12	1432.52
53.39	1432.41	68.68	1432.55	80.68	1432.31	82.32	1431.65	92	1426.81
100	1426.65	110	1431.65	123	1432.55	131.58	1432.56	131.77	1432.51
135.37	1431.48	137.4	1431.48	138.98	1431.47	139	1431.47	185.39	1431.46
185.41	1431.46	192.01	1431.45						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1429.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.		0.016	
W.S. Elev (ft)	1429.46	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		36.67	
E.G. Slope (ft/ft)	0.001715	Area (sq ft)		36.67	
Q Total (cfs)	210.00	Flow (cfs)		210.00	
Top Width (ft)	18.90	Top Width (ft)		18.90	
Vel Total (ft/s)	5.73	Avg. Vel. (ft/s)		5.73	
Max Chl Dpth (ft)	2.81	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	5070.4	Conv. (cfs)		5070.4	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		20.19	
Min Ch El (ft)	1426.65	Shear (lb/sq ft)		0.19	
Alpha	1.00	Stream Power (lb/ft s)		1.11	
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)		0.41	
C & E Loss (ft)	0.02	Cum SA (acres)		0.19	

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 24100

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1431.78	-6.36	1431.78	43.13	1431.02	58.83	1430.84	58.86	1430.84
68.49	1430.77	68.68	1431.39	80.68	1431.15	82.32	1430.49	92	1425.65
100	1425.49	110	1430.49	123	1431.39	125.43	1431.39	128.56	1430.42
128.68	1430.39	128.76	1430.39	167.52	1430.29	167.6	1430.29	192.01	1430.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110		200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1429.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.		0.016	
W.S. Elev (ft)	1428.80	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1428.46	Flow Area (sq ft)		46.68	
E.G. Slope (ft/ft)	0.002116	Area (sq ft)		46.68	
Q Total (cfs)	325.00	Flow (cfs)		325.00	
Top Width (ft)	20.91	Top Width (ft)		20.91	
Vel Total (ft/s)	6.96	Avg. Vel. (ft/s)		6.96	
Max Chl Dpth (ft)	3.31	Hydr. Depth (ft)		2.23	
Conv. Total (cfs)	7064.5	Conv. (cfs)		7064.5	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		22.44	
Min Ch El (ft)	1425.49	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		1.91	
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.04	Cum SA (acres)		0.10	

CROSS SECTION RIVER: 202L/US60 TI
REACH: Southeast Chan. RS: 23900.00

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	1430.06	7.55	1429.88	66.94	1429.64	68.68	1430.22	80.68	1429.98
82.32	1429.32	92.01	1424.48	100	1424.32	110	1429.32	123	1430.22
125.11	1429.52	151.91	1429.47	192	1429.21				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.035	82.32	.016	110	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.32	110		200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1428.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.18	Wt. n-Val.		0.016	
W.S. Elev (ft)	1427.80	Reach Len. (ft)			
Crit W.S. (ft)	1427.80	Flow Area (sq ft)		50.29	
E.G. Slope (ft/ft)	0.003149	Area (sq ft)		50.29	
Q Total (cfs)	439.00	Flow (cfs)		439.00	
Top Width (ft)	21.59	Top Width (ft)		21.59	
Vel Total (ft/s)	8.73	Avg. Vel. (ft/s)		8.73	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		2.33	
Conv. Total (cfs)	7823.7	Conv. (cfs)		7823.7	
Length Wtd. (ft)		Wetted Per. (ft)		23.20	
Min Ch El (ft)	1424.32	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		3.72	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: User specified water surface is not possible for the specified flow regime. The program used critical depth as the starting water surface.

SUMMARY OF MANNING'S N VALUES

River:202L/US60 TI

Reach	River Sta.	n1	n2	n3
Southeast Chan.	25708	.035	.016	.035
Southeast Chan.	25680	.035	.016	.035
Southeast Chan.	25580	.035	.016	.035

Southeast Chan.	25560	.035	.016	.035
Southeast Chan.	25400	.035	.016	.035
Southeast Chan.	25200	.035	.016	.035
Southeast Chan.	25000	.035	.016	.035
Southeast Chan.	24880	.035	.016	.035
Southeast Chan.	24800	.035	.016	.035
Southeast Chan.	24720	.035	.016	.035
Southeast Chan.	24660	.035	.016	.035
Southeast Chan.	24580	.035	.016	.035
Southeast Chan.	24500	.035	.016	.035
Southeast Chan.	24300	.035	.016	.035
Southeast Chan.	24100	.035	.016	.035
Southeast Chan.	23900.00	.035	.016	.035

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: 202L/US60 TI

Reach	River Sta.	Contr.	Expan.
Southeast Chan.	25708	.1	.3
Southeast Chan.	25680	.1	.3
Southeast Chan.	25580	.1	.3
Southeast Chan.	25560	.1	.3
Southeast Chan.	25400	.1	.3
Southeast Chan.	25200	.1	.3
Southeast Chan.	25000	.1	.3
Southeast Chan.	24880	.1	.3
Southeast Chan.	24800	.1	.3
Southeast Chan.	24720	.1	.3
Southeast Chan.	24660	.1	.3
Southeast Chan.	24580	.1	.3
Southeast Chan.	24500	.1	.3
Southeast Chan.	24300	.1	.3
Southeast Chan.	24100	.1	.3
Southeast Chan.	23900.00	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southeast Chan.	25708	68.00	1436.79	1438.45	1438.07	1438.71	0.001544	4.11	16.54	12.83	0.64
Southeast Chan.	25680	68.00	1436.66	1437.94	1437.94	1438.45	0.004122	5.76	11.80	11.66	1.01
Southeast Chan.	25580	68.00	1436.00	1437.07	1437.28	1437.87	0.007812	7.15	9.51	11.06	1.36
Southeast Chan.	25560	68.00	1434.00	1434.64	1435.25	1437.34	0.052192	13.19	5.16	10.25	3.28
Southeast Chan.	25400	68.00	1433.07	1434.25	1434.32	1434.82	0.005092	6.04	11.25	12.41	1.12
Southeast Chan.	25200	68.00	1431.90	1433.01	1433.15	1433.68	0.006380	6.53	10.42	12.13	1.24
Southeast Chan.	25000	68.00	1430.73	1431.89	1431.98	1432.48	0.005386	6.16	11.04	12.34	1.15
Southeast Chan.	24880	68.00	1430.04	1431.18	1431.29	1431.80	0.005785	6.31	10.77	12.25	1.19
Southeast Chan.	24800	68.00	1429.57	1430.71	1430.82	1431.33	0.005919	6.36	10.69	12.22	1.20
Southeast Chan.	24720	68.00	1429.10	1430.24	1430.35	1430.86	0.005876	6.35	10.72	12.23	1.19
Southeast Chan.	24660	68.00	1428.75	1429.89	1430.01	1430.51	0.005890	6.35	10.71	12.23	1.20
Southeast Chan.	24580	68.00	1428.29	1430.12	1429.54	1430.30	0.000959	3.38	20.14	15.00	0.51
Southeast Chan.	24500	68.00	1427.82	1430.12		1430.22	0.000393	2.46	27.67	16.89	0.34
Southeast Chan.	24300	210.00	1426.65	1429.46		1429.97	0.001715	5.73	36.67	18.90	0.72
Southeast Chan.	24100	325.00	1425.49	1428.80	1428.46	1429.55	0.002116	6.96	46.68	20.91	0.82
Southeast Chan.	23900.00	439.00	1424.32	1427.80	1427.80	1428.98	0.003149	8.73	50.29	21.59	1.01

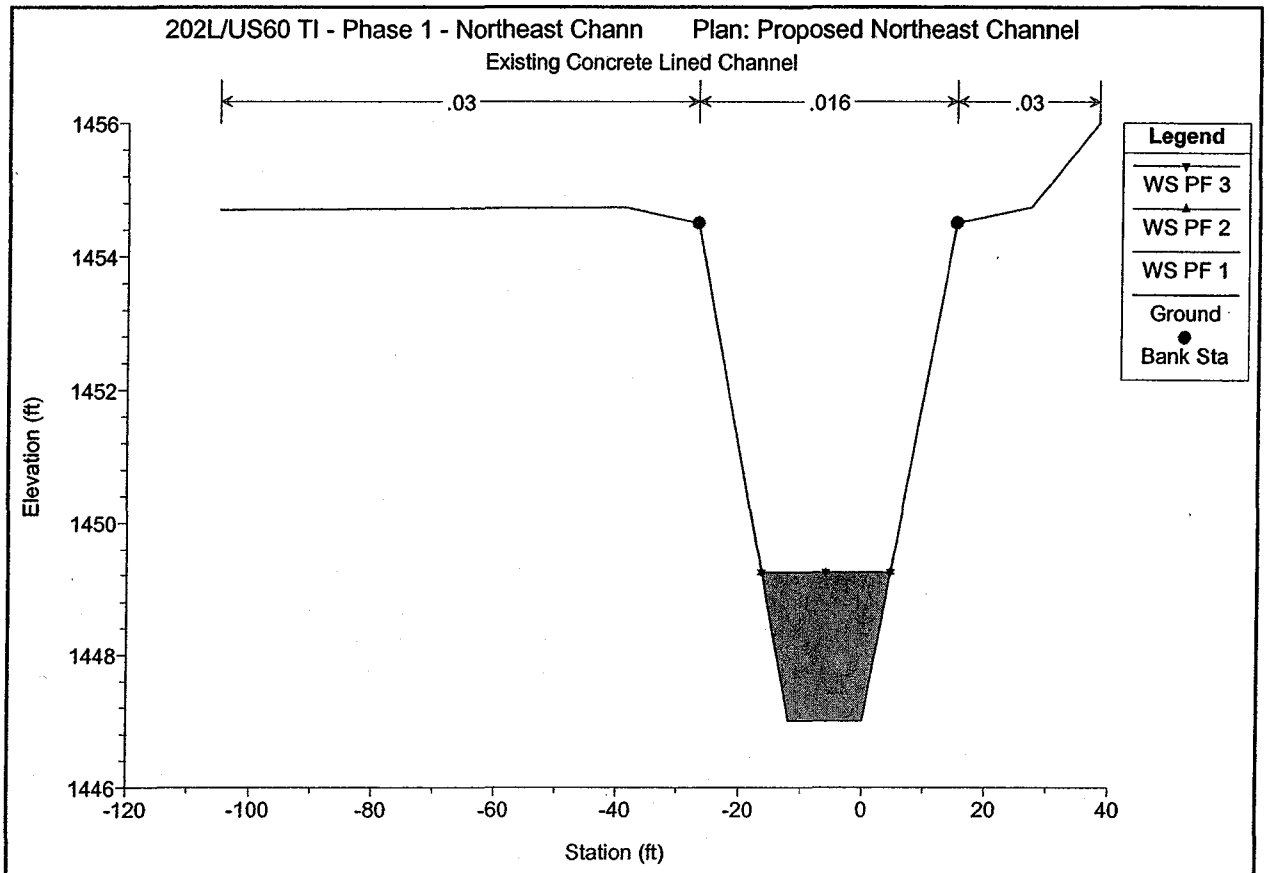
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : SEchan

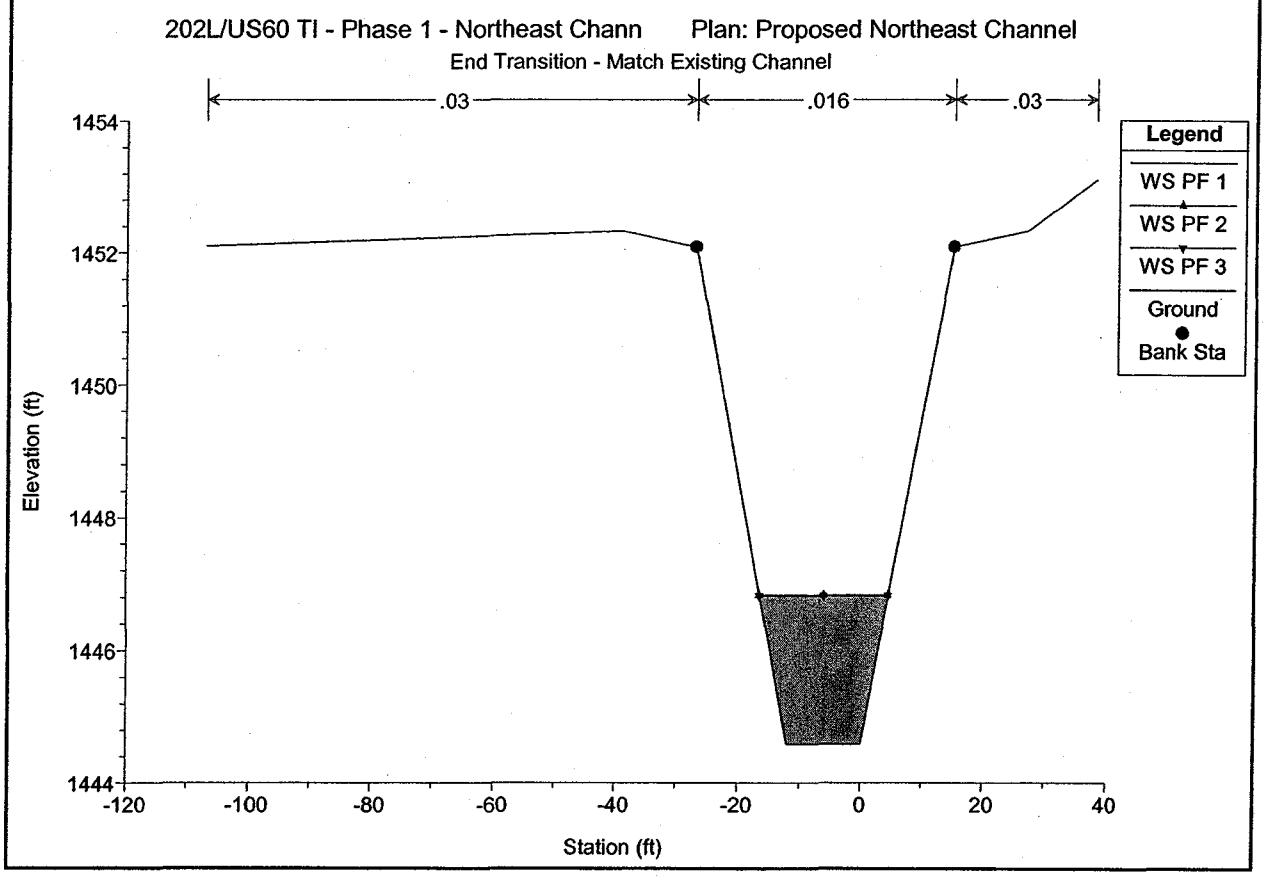
River: 202L/US60 TI Reach: Southeast Chan. RS: 25708 Profile: PF 1
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: 202L/US60 TI Reach: Southeast Chan. RS: 25680 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: 202L/US60 TI Reach: Southeast Chan. RS: 25580 Profile: PF 1
Note: Program found supercritical flow starting at this cross section.
River: 202L/US60 TI Reach: Southeast Chan. RS: 25560 Profile: PF 1
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: 202L/US60 TI Reach: Southeast Chan. RS: 25400 Profile: PF 1

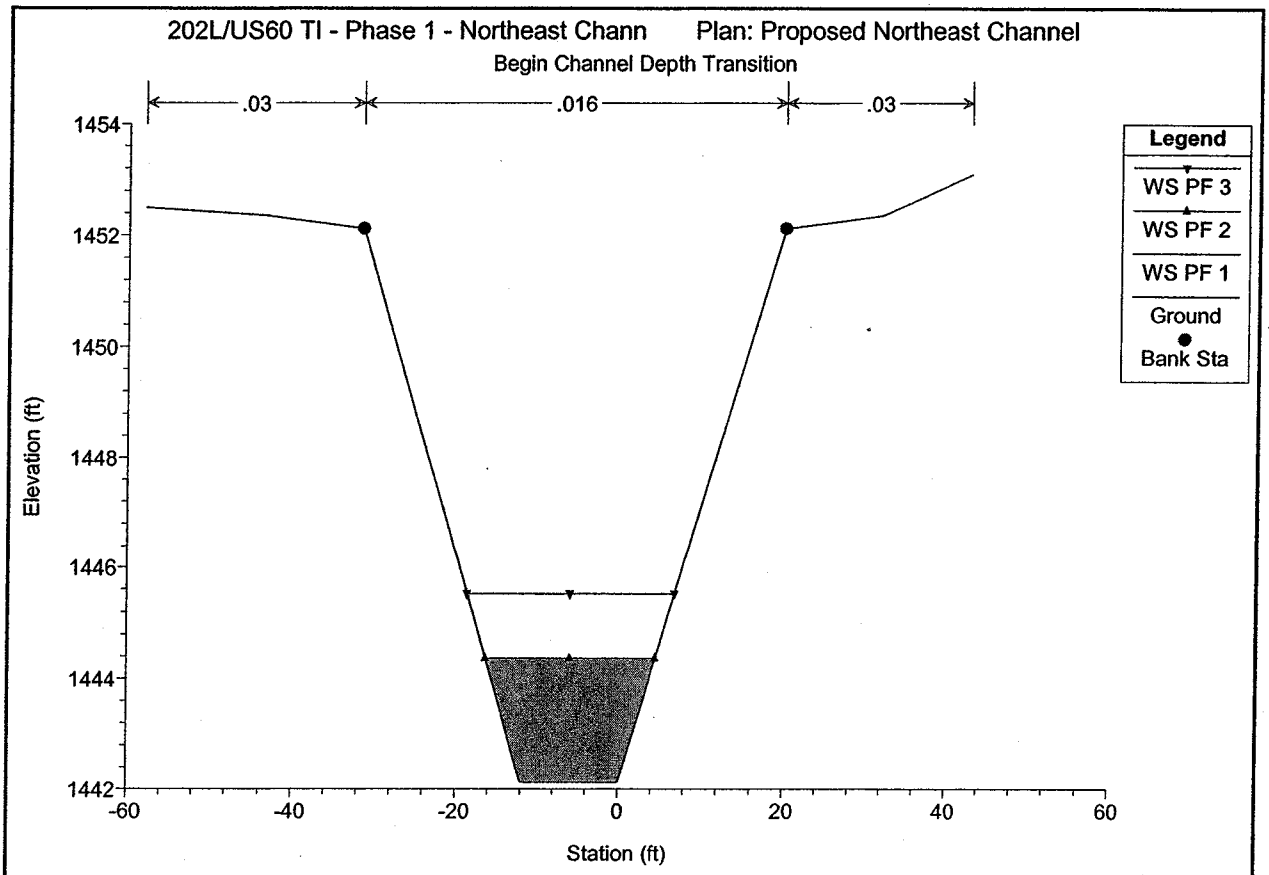
```
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: 202L/US60 TI  Reach: Southeast Chan.     RS: 25200     Profile: PF 1
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: 202L/US60 TI  Reach: Southeast Chan.     RS: 25000     Profile: PF 1
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: 202L/US60 TI  Reach: Southeast Chan.     RS: 24580     Profile: PF 1
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: 202L/US60 TI  Reach: Southeast Chan.     RS: 24500     Profile: PF 1
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: 202L/US60 TI  Reach: Southeast Chan.     RS: 23900.00     Profile: PF 1
     Warning:User specified water surface is not possible for the specified flow regime. The program used critical depth as the
             starting water surface.
```

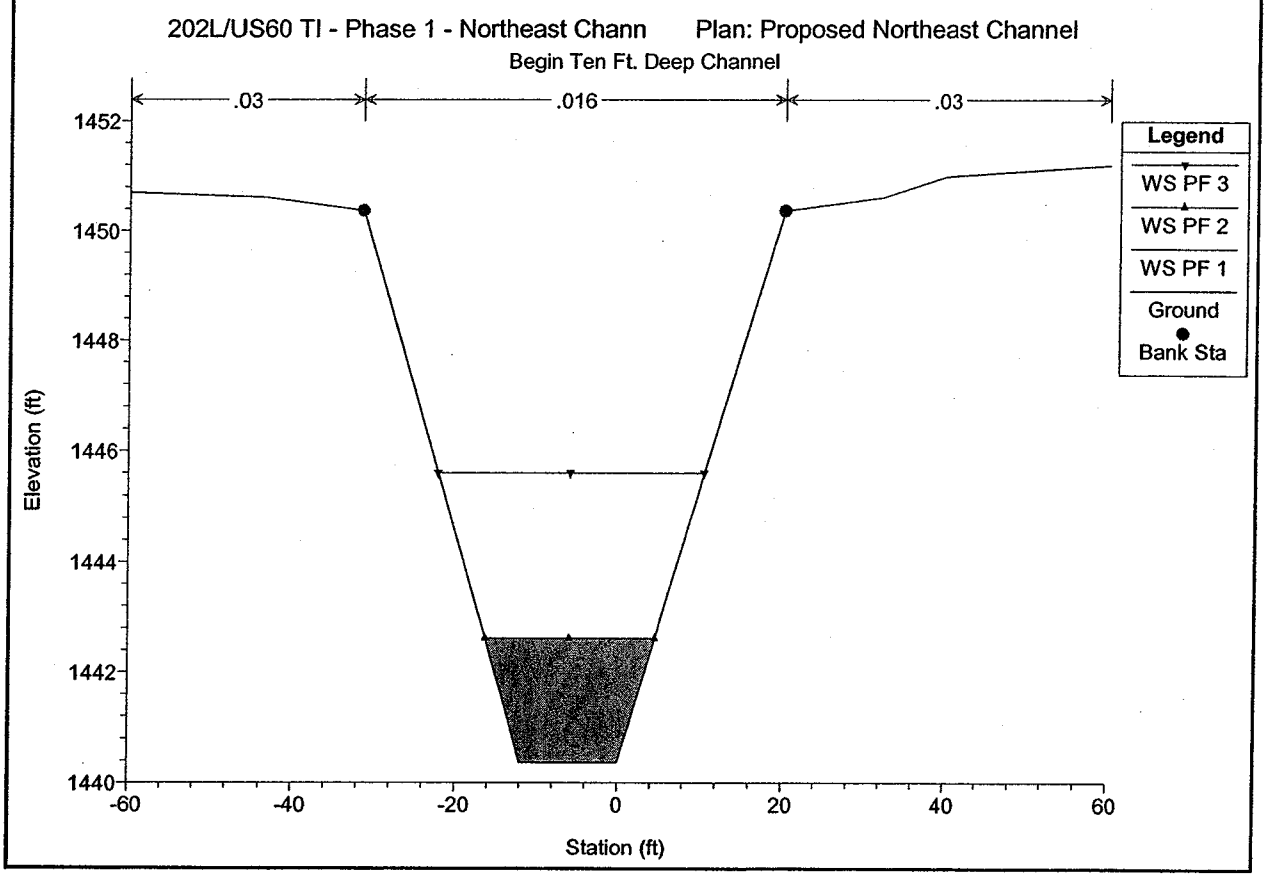
HEC-RAS Plan: NE Channel River: Northeast Channl Reach: 202L/US60 TI

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003302	7.54	37.01	20.98	1.00
202L/US60 TI	1775	279.00	1444.59	1446.84	1446.84	1447.72	0.003287	7.53	37.06	20.99	1.00
202L/US60 TI	1775	279.00	1444.59	1446.84	1446.84	1447.72	0.003287	7.53	37.06	20.99	1.00
202L/US60 TI	1775	279.00	1444.59	1446.83	1446.83	1447.72	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	1360	279.00	1442.12	1444.36	1444.36	1445.25	0.003329	7.57	36.84	20.86	1.00
202L/US60 TI	1360	279.00	1442.12	1444.36	1444.36	1445.25	0.003329	7.57	36.84	20.86	1.00
202L/US60 TI	1360	279.00	1442.12	1445.53		1445.83	0.000703	4.36	63.95	25.49	0.49
202L/US60 TI	1070	279.00	1440.37	1442.61	1442.61	1443.50	0.003330	7.57	36.84	20.86	1.00
202L/US60 TI	1070	279.00	1440.37	1442.61	1442.61	1443.50	0.003330	7.57	36.84	20.86	1.00
202L/US60 TI	1070	279.00	1440.37	1445.60		1445.69	0.000133	2.39	116.82	32.67	0.22
202L/US60 TI	1020	279.00	1437.75	1438.92	1438.92	1439.44	0.003758	5.81	48.01	46.29	1.01
202L/US60 TI	1020	279.00	1437.75	1441.29		1441.33	0.000072	1.52	182.97	67.25	0.16
202L/US60 TI	1020	279.00	1437.75	1445.66		1445.66	0.000003	0.50	560.50	105.73	0.04
202L/US60 TI	1000	279.00	1437.69	1438.78	1438.78	1439.26	0.003831	5.59	49.88	51.75	1.00
202L/US60 TI	1000	279.00	1437.69	1441.30	1438.78	1441.33	0.000052	1.30	214.80	79.00	0.14
202L/US60 TI	1000	279.00	1437.69	1445.66	1438.78	1445.66	0.000002	0.42	661.93	126.10	0.03


202L/US60 TI - Phase 1 - Northeast Chann Plan: Proposed Northeast Channel
Existing Concrete Lined Channel
.03
.016
.03
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
1456
1454
1452
1450
1448
1446
-120
-100
-80
-60
-40
-20
0
20
40
Station (ft)

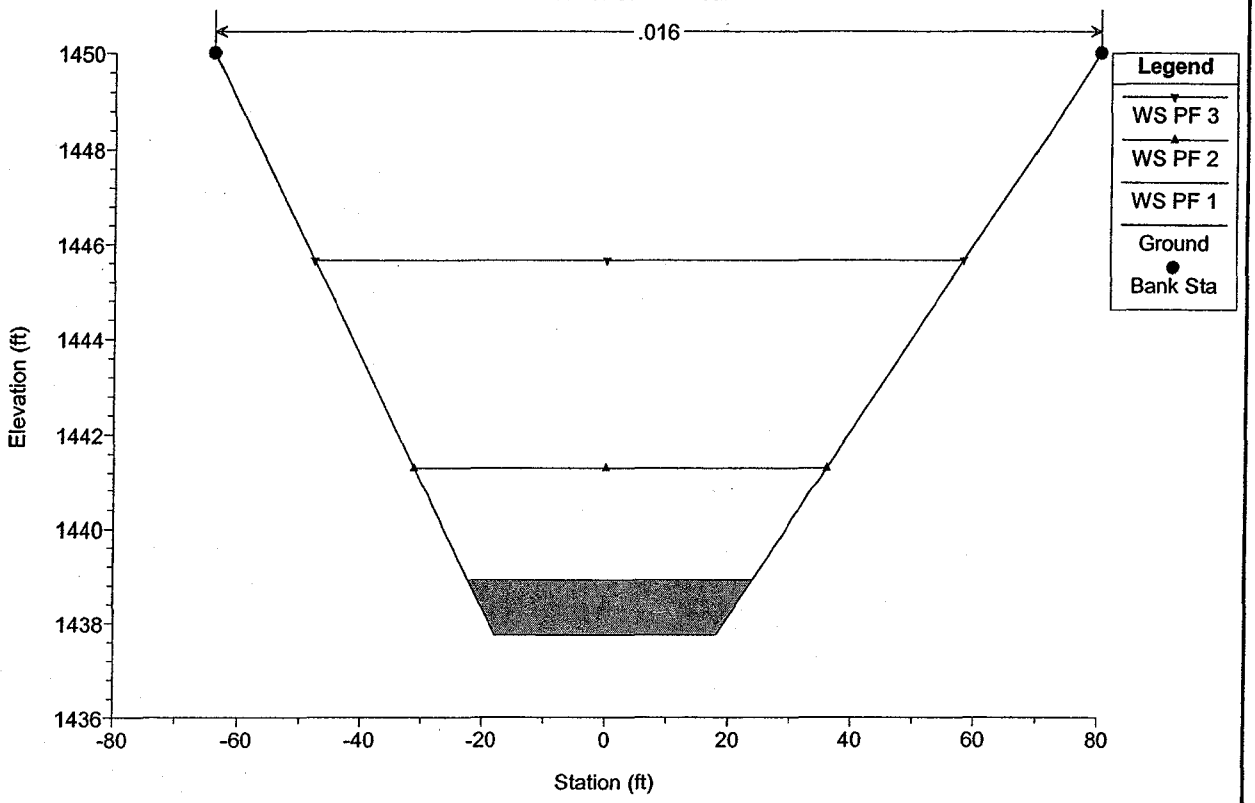

202L/US60 TI - Phase 1 - Northeast Chann Plan: Proposed Northeast Channel
End Transition - Match Existing Channel
.03
.016
.03
Legend
WS PF 1
WS PF 2
WS PF 3
Ground
Bank Sta
Elevation (ft)
1454
1452
1450
1448
1446
1444
-120
-100
-80
-60
-40
-20
0
20
40
Station (ft)


202L/US60 TI - Phase 1 - Northeast Chann
Plan: Proposed Northeast Channel
Begin Channel Depth Transition
.03
.016
.03
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
1454
1452
1450
1448
1446
1444
1442
-60
-40
-20
0
20
40
60
Station (ft)


202L/US60 TI - Phase 1 - Northeast Chann
Plan: Proposed Northeast Channel
Begin Ten Ft. Deep Channel
.03
.016
.03
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
1452
1450
1448
1446
1444
1442
1440
-60
-40
-20
0
20
40
60
Station (ft)

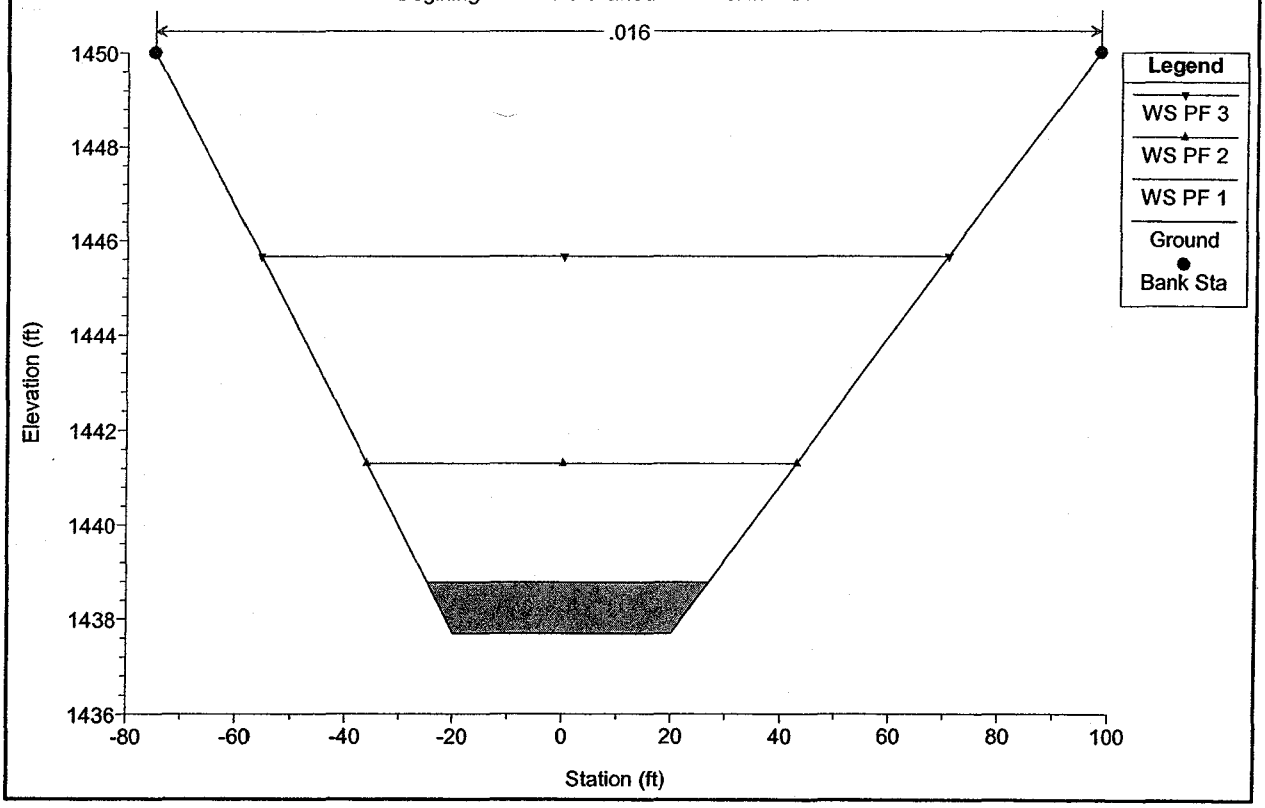
202L/US60 TI - Phase 1 - Northeast Chann Plan: Proposed Northeast Channel

Channel Grade Break



202L/US60 TI - Phase 1 - Northeast Chann Plan: Proposed Northeast Channel

Begining of Concrete Lined Channel in NE Pond - 1



HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
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PROJECT DATA
Project Title: 202L/US60 TI - Phase 1 - Northeast Chann
Project File : RMSAne.prj
Run Date and Time: 3/31/2003 4:15:31 PM

Project in English units

Project Description:
202L / \US60 Traffic Interchange - Phase 1 - Northeast Channel

PLAN DATA

Plan Title: Proposed Northeast Channel
Plan File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAne.p01

Geometry Title: Northeast Channel
Geometry File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAne.g01

Flow Title : NE Channel
Flow File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAne.f01

Plan Summary Information:
Number of: Cross Sections = 6 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: NE Channel
Flow File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAne.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3
Northeast Channl	202L/US60 TI	2170	279	279	279

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Northeast Channl	202L/US60 TI	PF 1		Critical
Northeast Channl	202L/US60 TI	PF 2		Known WS = 1441.3
Northeast Channl	202L/US60 TI	PF 3		Known WS = 1445.66

GEOMETRY DATA

Geometry Title: Northeast Channel
Geometry File : I:\PROJECTS\11194 SuperRedTan\Drng\95%\HEC-RAS\RMSAne.g01

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 2170

INPUT
Description: Existing Concrete Lined Channel
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-105	1454.7	-39	1454.74	-27	1454.5	-12	1447	0	1447
15	1454.5	27	1454.74	38	1456				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-105	.03	-27	.016	15	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-27	15	400	400	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1450.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1449.24	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1449.24	Flow Area (sq ft)		36.88	
E.G. Slope (ft/ft)	0.003334	Area (sq ft)		36.88	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.95	Top Width (ft)		20.95	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	4831.7	Conv. (cfs)		4831.7	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		22.01	
Min Ch El (ft)	1447.00	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	1.32	Cum Volume (acre-ft)		1.00	
C & E Loss (ft)	0.00	Cum SA (acres)		0.59	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1450.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1449.24	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1449.24	Flow Area (sq ft)		36.88	
E.G. Slope (ft/ft)	0.003334	Area (sq ft)		36.88	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.95	Top Width (ft)		20.95	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	4831.7	Conv. (cfs)		4831.7	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		22.01	
Min Ch El (ft)	1447.00	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	1.32	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.00	Cum SA (acres)		0.61	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1450.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.88	Wt. n-Val.		0.016	
W.S. Elev (ft)	1449.24	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1449.24	Flow Area (sq ft)		37.01	
E.G. Slope (ft/ft)	0.003302	Area (sq ft)		37.01	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.98	Top Width (ft)		20.98	
Vel Total (ft/s)	7.54	Avg. Vel. (ft/s)		7.54	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	4855.6	Conv. (cfs)		4855.6	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		22.04	
Min Ch El (ft)	1447.00	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.61	
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)		2.08	
C & E Loss (ft)	0.00	Cum SA (acres)		0.74	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 1775

INPUT
Description: End Transition - Match Existing Channel
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-107	1452.1	-39	1452.33	-27	1452.09	-12	1444.59	0	1444.59
15	1452.09	27	1452.33	38	1453.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-107	.03	-27	.016	15	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-27	15	410.03	410	410.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1447.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.88	Wt. n-Val.		0.016	
W.S. Elev (ft)	1446.84	Reach Len. (ft)	410.03	410.00	410.03

Crit W.S. (ft)	1446.84	Flow Area (sq ft)	37.06
E.G. Slope (ft/ft)	0.003287	Area (sq ft)	37.06
Q Total (cfs)	279.00	Flow (cfs)	279.00
Top Width (ft)	20.99	Top Width (ft)	20.99
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)	7.53
Max Chl Dpth (ft)	2.25	Hydr. Depth (ft)	1.77
Conv. Total (cfs)	4866.2	Conv. (cfs)	4866.2
Length Wtd. (ft)	410.00	Wetted Per. (ft)	22.05
Min Ch El (ft)	1444.59	Shear (lb/sq ft)	0.34
Alpha	1.00	Stream Power (lb/ft s)	2.60
Frctn Loss (ft)	1.36	Cum Volume (acre-ft)	0.66
C & E Loss (ft)	0.00	Cum SA (acres)	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1447.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.88	Wt. n-Val.		0.016	
W.S. Elev (ft)	1446.84	Reach Len. (ft)	410.03	410.00	410.03
Crit W.S. (ft)	1446.84	Flow Area (sq ft)		37.06	
E.G. Slope (ft/ft)	0.003287	Area (sq ft)		37.06	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.99	Top Width (ft)		20.99	
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		7.53	
Max Chl Dpth (ft)	2.25	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	4866.2	Conv. (cfs)		4866.2	
Length Wtd. (ft)	410.00	Wetted Per. (ft)		22.05	
Min Ch El (ft)	1444.59	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		2.60	
Frctn Loss (ft)	1.36	Cum Volume (acre-ft)		0.81	
C & E Loss (ft)	0.00	Cum SA (acres)		0.42	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1447.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1446.83	Reach Len. (ft)	410.03	410.00	410.03
Crit W.S. (ft)	1446.83	Flow Area (sq ft)		36.88	
E.G. Slope (ft/ft)	0.003334	Area (sq ft)		36.88	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.95	Top Width (ft)		20.95	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	4831.7	Conv. (cfs)		4831.7	
Length Wtd. (ft)	410.00	Wetted Per. (ft)		22.01	
Min Ch El (ft)	1444.59	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)		1.75	
C & E Loss (ft)	0.18	Cum SA (acres)		0.54	

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

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 1360

INPUT
Description: Begin Channel Depth Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-58	1452.5	-43.52	1452.36	-31.52	1452.12	-12	1442.12	0	1442.12
20	1452.12	32	1452.36	43	1453.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-58	.03	-31.52	.016	20	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-31.52	20	300	290	280	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1445.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1444.36	Reach Len. (ft)	300.00	290.00	280.00
Crit W.S. (ft)	1444.36	Flow Area (sq ft)		36.84	
E.G. Slope (ft/ft)	0.003329	Area (sq ft)		36.84	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.86	Top Width (ft)		20.86	

Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)	7.57
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)	1.77
Conv. Total (cfs)	4835.2	Conv. (cfs)	4835.2
Length Wtd. (ft)	290.00	Wetted Per. (ft)	21.93
Min Ch El (ft)	1442.12	Shear (lb/sq ft)	0.35
Alpha	1.00	Stream Power (lb/ft s)	2.64
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1445.25	Element			
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1444.36	Reach Len. (ft)	300.00	290.00	280.00
Crit W.S. (ft)	1444.36	Flow Area (sq ft)		36.84	
E.G. Slope (ft/ft)	0.003329	Area (sq ft)		36.84	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.86	Top Width (ft)		20.86	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	4835.2	Conv. (cfs)		4835.2	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		21.93	
Min Ch El (ft)	1442.12	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)		0.46	
C & E Loss (ft)	0.00	Cum SA (acres)		0.22	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1445.83	Element			
Vel Head (ft)	0.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1445.53	Reach Len. (ft)	300.00	290.00	280.00
Crit W.S. (ft)		Flow Area (sq ft)		63.95	
E.G. Slope (ft/ft)	0.000703	Area (sq ft)		63.95	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	25.49	Top Width (ft)		25.49	
Vel Total (ft/s)	4.36	Avg. Vel. (ft/s)		4.36	
Max Chl Dpth (ft)	3.41	Hydr. Depth (ft)		2.51	
Conv. Total (cfs)	10524.3	Conv. (cfs)		10524.3	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		27.11	
Min Ch El (ft)	1442.12	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.45	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		1.27	
C & E Loss (ft)	0.06	Cum SA (acres)		0.33	

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

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 1070

INPUT
Description: Begin Ten Ft. Deep Channel
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-60	1450.7	-43.52	1450.61	-31.52	1450.37	-12	1440.37	0	1440.37
20	1450.37	32	1450.61	40	1451	60	1451.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-60	.03	-31.52	.016	20	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-31.52	20	55	50	55	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1443.50	Element			
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1442.61	Reach Len. (ft)	55.00	50.00	55.00
Crit W.S. (ft)	1442.61	Flow Area (sq ft)		36.84	
E.G. Slope (ft/ft)	0.003330	Area (sq ft)		36.84	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.86	Top Width (ft)		20.86	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	4834.7	Conv. (cfs)		4834.7	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		21.93	
Min Ch El (ft)	1440.37	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.11	Cum SA (acres)		0.06	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1443.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.016	
W.S. Elev (ft)	1442.61	Reach Len. (ft)	55.00	50.00	55.00
Crit W.S. (ft)	1442.61	Flow Area (sq ft)		36.84	
E.G. Slope (ft/ft)	0.003330	Area (sq ft)		36.84	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	20.86	Top Width (ft)		20.86	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	4834.7	Conv. (cfs)		4834.7	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		21.93	
Min Ch El (ft)	1440.37	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.26	Cum SA (acres)		0.08	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1445.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1445.60	Reach Len. (ft)	55.00	50.00	55.00
Crit W.S. (ft)		Flow Area (sq ft)		116.82	
E.G. Slope (ft/ft)	0.000133	Area (sq ft)		116.82	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	32.67	Top Width (ft)		32.67	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	5.23	Hydr. Depth (ft)		3.58	
Conv. Total (cfs)	24155.0	Conv. (cfs)		24155.0	
Length Wtd. (ft)	50.00	Wetted Per. (ft)		35.17	
Min Ch El (ft)	1440.37	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.67	
C & E Loss (ft)	0.03	Cum SA (acres)		0.13	

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

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 1020

INPUT
Description: Channel Grade Break
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-64	1450	-18	1437.75	0	1437.75	18	1437.75	80	1450

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-64	.03	-64	.016	80	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-64	80	22	20	22	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.92	Reach Len. (ft)	22.00	20.00	22.00
Crit W.S. (ft)	1438.92	Flow Area (sq ft)		48.01	
E.G. Slope (ft/ft)	0.003758	Area (sq ft)		48.01	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	46.29	Top Width (ft)		46.29	
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)		5.81	
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)		1.04	
Conv. Total (cfs)	4551.1	Conv. (cfs)		4551.1	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.55	
Min Ch El (ft)	1437.75	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		1.41	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		0.02	
C & E Loss (ft)	0.01	Cum SA (acres)		0.02	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1441.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.29	Reach Len. (ft)	22.00	20.00	22.00
Crit W.S. (ft)		Flow Area (sq ft)		182.97	

E.G. Slope (ft/ft)	0.000072	Area (sq ft)	182.97
Q Total (cfs)	279.00	Flow (cfs)	279.00
Top Width (ft)	67.25	Top Width (ft)	67.25
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)	1.52
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)	2.72
Conv. Total (cfs)	32854.3	Conv. (cfs)	32854.3
Length Wtd. (ft)	20.00	Wetted Per. (ft)	68.06
Min Ch El (ft)	1437.75	Shear (lb/sq ft)	0.01
Alpha	1.00	Stream Power (lb/ft s)	0.02
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.09
C & E Loss (ft)	0.00	Cum SA (acres)	0.03

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1445.66	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1445.66	Reach Len. (ft)	22.00	20.00	22.00
Crit W.S. (ft)		Flow Area (sq ft)		560.50	
E.G. Slope (ft/ft)	0.000003	Area (sq ft)		560.50	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	105.73	Top Width (ft)		105.73	
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)		0.50	
Max Chl Dpth (ft)	7.91	Hydr. Depth (ft)		5.30	
Conv. Total (cfs)	156476.8	Conv. (cfs)		156476.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		107.54	
Min Ch El (ft)	1437.75	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.28	
C & E Loss (ft)	0.00	Cum SA (acres)		0.05	

CROSS SECTION RIVER: Northeast Channl
REACH: 202L/US60 TI RS: 1000

INPUT
Description: Begining of Concrete Lined Channel in NE Pond - 1
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-75	1450	-20	1437.69	0	1437.69	20	1437.69	85	1447.95
98	1450								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-75	.03	-75	.016	98	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-75	98	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.26	Element			
Vel Head (ft)	0.49	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.78	Reach Len. (ft)			
Crit W.S. (ft)	1438.78	Flow Area (sq ft)		49.88	
E.G. Slope (ft/ft)	0.003831	Area (sq ft)		49.88	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	51.75	Top Width (ft)		51.75	
Vel Total (ft/s)	5.59	Avg. Vel. (ft/s)		5.59	
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)		0.96	
Conv. Total (cfs)	4507.9	Conv. (cfs)		4507.9	
Length Wtd. (ft)		Wetted Per. (ft)		51.95	
Min Ch El (ft)	1437.69	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		1.28	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.33	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.30	Reach Len. (ft)			
Crit W.S. (ft)	1438.78	Flow Area (sq ft)		214.80	
E.G. Slope (ft/ft)	0.000052	Area (sq ft)		214.80	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	79.00	Top Width (ft)		79.00	
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)		1.30	
Max Chl Dpth (ft)	3.61	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	38639.4	Conv. (cfs)		38639.4	
Length Wtd. (ft)		Wetted Per. (ft)		79.68	
Min Ch El (ft)	1437.69	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1445.66	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1445.66	Reach Len. (ft)			
Crit W.S. (ft)	1438.78	Flow Area (sq ft)		661.93	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		661.93	
Q Total (cfs)	279.00	Flow (cfs)		279.00	
Top Width (ft)	126.10	Top Width (ft)		126.10	
Vel Total (ft/s)	0.42	Avg. Vel. (ft/s)		0.42	
Max Chl Dpth (ft)	7.97	Hydr. Depth (ft)		5.25	
Conv. Total (cfs)	184206.0	Conv. (cfs)		184206.0	
Length Wtd. (ft)		Wetted Per. (ft)		127.61	
Min Ch El (ft)	1437.69	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Northeast Channl

Reach	River Sta.	n1	n2	n3
202L/US60 TI	2170	.03	.016	.03
202L/US60 TI	1775	.03	.016	.03
202L/US60 TI	1360	.03	.016	.03
202L/US60 TI	1070	.03	.016	.03
202L/US60 TI	1020	.03	.016	.03
202L/US60 TI	1000	.03	.016	.03

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Northeast Channl

Reach	River Sta.	Contr.	Expan.
202L/US60 TI	2170	.1	.3
202L/US60 TI	1775	.1	.3
202L/US60 TI	1360	.1	.3
202L/US60 TI	1070	.1	.3
202L/US60 TI	1020	.1	.3
202L/US60 TI	1000	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	2170	279.00	1447.00	1449.24	1449.24	1450.13	0.003302	7.54	37.01	20.98	1.00
202L/US60 TI	1775	279.00	1444.59	1446.84	1446.84	1447.72	0.003287	7.53	37.06	20.99	1.00
202L/US60 TI	1775	279.00	1444.59	1446.84	1446.84	1447.72	0.003287	7.53	37.06	20.99	1.00
202L/US60 TI	1775	279.00	1444.59	1446.83	1446.83	1447.72	0.003334	7.57	36.88	20.95	1.00
202L/US60 TI	1360	279.00	1442.12	1444.36	1444.36	1445.25	0.003329	7.57	36.84	20.86	1.00
202L/US60 TI	1360	279.00	1442.12	1444.36	1444.36	1445.25	0.003329	7.57	36.84	20.86	1.00
202L/US60 TI	1360	279.00	1442.12	1445.53		1445.83	0.000703	4.36	63.95	25.49	0.49
202L/US60 TI	1070	279.00	1440.37	1442.61	1442.61	1443.50	0.003330	7.57	36.84	20.86	1.00
202L/US60 TI	1070	279.00	1440.37	1442.61	1442.61	1443.50	0.003330	7.57	36.84	20.86	1.00
202L/US60 TI	1070	279.00	1440.37	1445.60		1445.69	0.000133	2.39	116.82	32.67	0.22
202L/US60 TI	1020	279.00	1437.75	1438.92	1438.92	1439.44	0.003758	5.81	48.01	46.29	1.01
202L/US60 TI	1020	279.00	1437.75	1441.29		1441.33	0.000072	1.52	182.97	67.25	0.16
202L/US60 TI	1020	279.00	1437.75	1445.66		1445.66	0.000003	0.50	560.50	105.73	0.04
202L/US60 TI	1000	279.00	1437.69	1438.78	1438.78	1439.26	0.003831	5.59	49.88	51.75	1.00
202L/US60 TI	1000	279.00	1437.69	1441.30	1438.78	1441.33	0.000052	1.30	214.80	79.00	0.14
202L/US60 TI	1000	279.00	1437.69	1445.66	1438.78	1445.66	0.000002	0.42	661.93	126.10	0.03

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : NE Channel

River: Northeast Channl Reach: 202L/US60 TI RS: 2170 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Northeast Channl Reach: 202L/US60 TI RS: 2170 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 2170 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1775 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1775 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1775 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1360 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1360 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1360 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Northeast Channl Reach: 202L/US60 TI RS: 1070 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1070 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Northeast Channl Reach: 202L/US60 TI RS: 1070 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Northeast Channl Reach: 202L/US60 TI RS: 1020 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

APPENDIX C

DITCH CALCULATIONS

PARSONS BRINCKERHOFF COMPUTATION SHEET

Subject: Sizing ditches entering detention basins

Page 1 of 13

Made by: J. Blay

Date: 3-31-03

Checked by: AJR

Date: 4/2/03

Ditch entering Detention Basin NW-1

This ditch will carry flows in the Interim Condition only. The flows are from the HEC-1 concentration point C3/A to the north ($Q_{100} = 6.98$ cfs) and flows from the subdivision to the east. The majority of this 100-year flow will enter the basin as sheet flow.

The ditch will be sized to handle the flow capacity of the existing channel to the east of the basin. Manning's Calculation using Flowmaster computer program of the existing channel (Figure 1) shows an approximate capacity of 180 cfs.

The proposed unlined ditch will have a 50 ft bottom, 4:1 side slopes, and will be 1 foot deep. The ditch slope will be 1.0%.

Ditch entering Detention Basin NW-2

This ditch will carry flows in the Interim Condition only. The flows entering this ditch are from runoff from within the existing undeveloped area that the future 202 will be located. Figure 2 shows the contributing drainage area to this ditch. The area is 12.6 acres. The 10-min, 100-year rainfall intensity is 6.78 in/hr. The C coefficient is 0.6 for hydrologic soil group C with a grass + brush cover density of 40%.

$Q_{100} = 0.6\,(6.78)\,12.6 = 51$ cfs.

The proposed unlined ditch will have a 15ft bottom, 4:1 side slopes, and will be 1 foot deep. The ditch slope will be 1.0%.

Ditches entering Detention Basin NE-1

Ditch entering basin from the north.

This ditch will not carry flows in the Interim Condition, it will only carry flows in the Proposed Condition. The flows entering this ditch will be from the Subdivision to the north. (Figure 3) The existing outlet from the subdivision is a 2-1.5 ft. high by 8 ft. wide openings in the block wall. The 100 year discharge out of this opening is computed using the weir equation for curb openings, and assuming a ponding depth at the openings of 2.5 ft. From the HEC-22 manual, C = 1.6.

$$Q = C L h^{1.5}$$

$$= 1.6 (2 \times 8) 2.5^{1.5} = 101 \text{ cfs.}$$

The proposed unlined ditch will have a 20 ft. bottom, 3:1 side slopes, and will be 1.5 feet deep. The ditch slope will be 0.5%.

PARSONS BRINCKERHOFF COMPUTATION SHEET

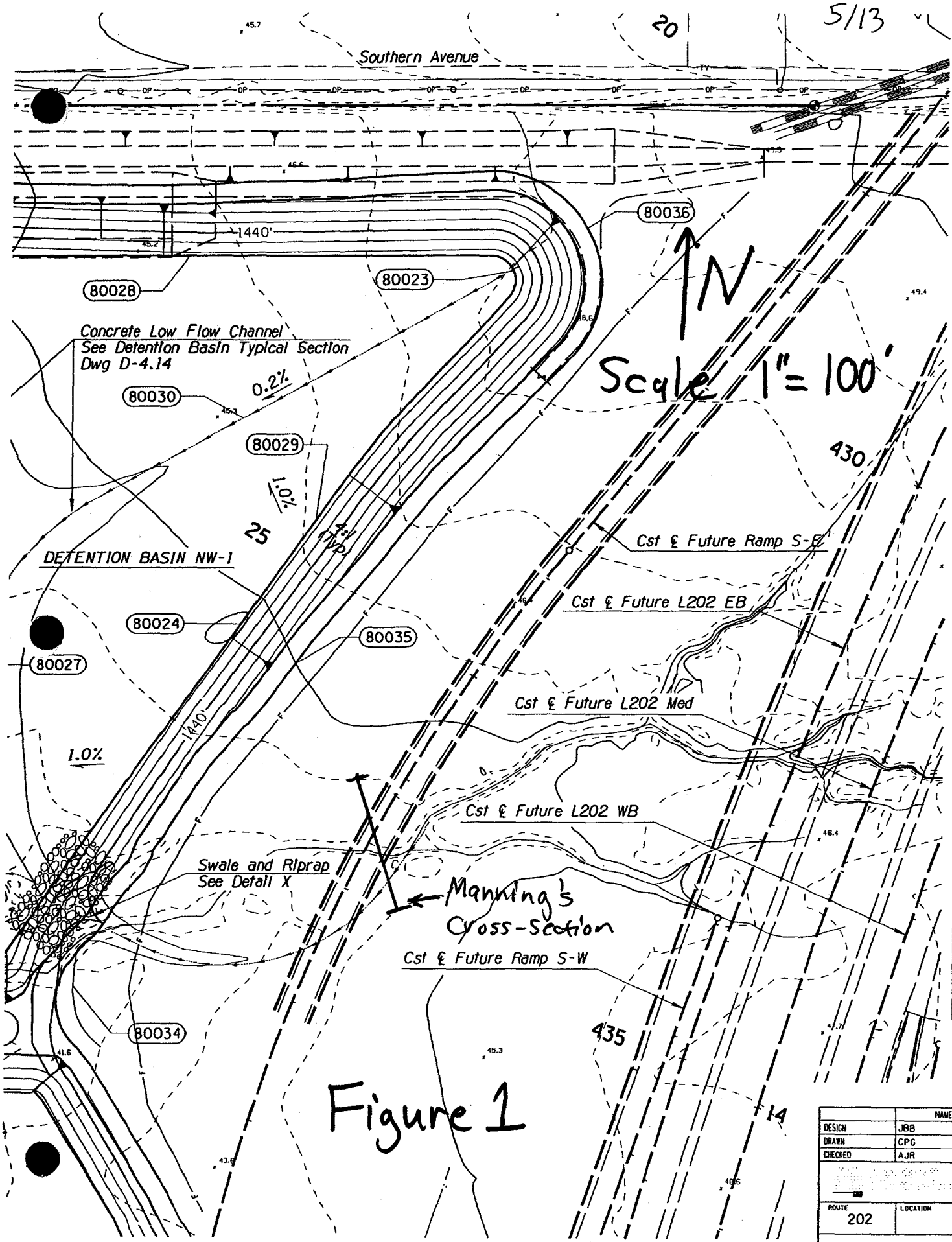
Subject: Ditches entering basins

Page 4 of 13
Made by JBB
Date 3-31-03
Checked by AJR
Date 4/2/03

Ditch entering Basin NE-1 from the Northeast

This ditch will carry flows in both the Interim and Proposed Conditions. The flows entering this ditch will be from the existing outlet from the detention basin to the east (Figure 3). The outlet is 6 - 12" diameter openings in the block wall. The existing detention basin is approximately 2.5 feet deep. The 100year discharge out of these openings is computed using the inlet control nomograph for concrete pipes with 2.5 ft. of ponded water. Each pipe will allow 5.5 cfs for a total of 33 cfs.

The proposed unlined ditch will have a 20 ft. bottom, 4:1 side slopes, and will be 1 ft. deep. The ditch slope will be 0.5%.



	NAME	DATE
DESIGN	JBB	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

ROUTE 202 | LOCATION

TRACS NO. H 5686 03C

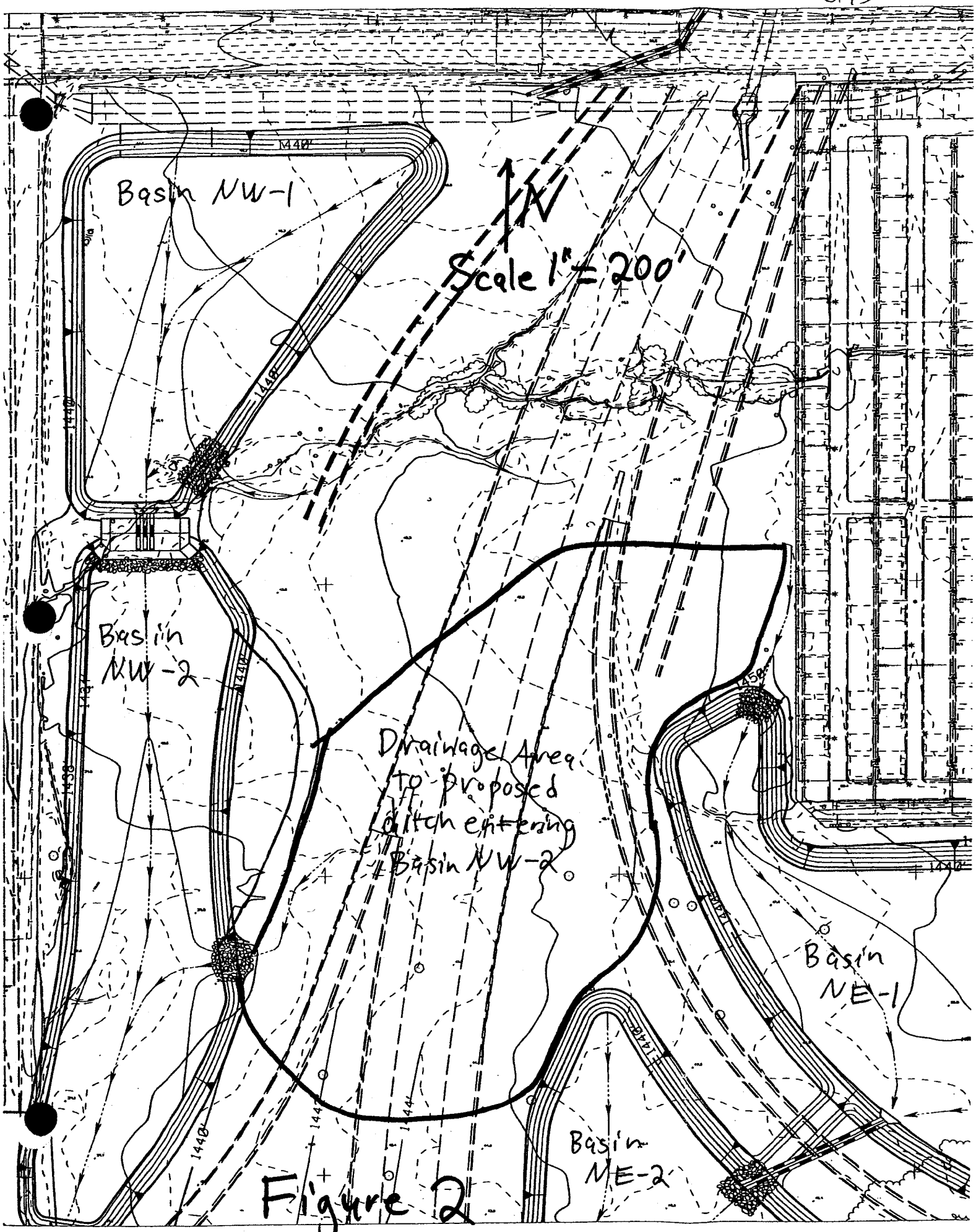

Basin NW-1
N
Scale 1" = 200'
Basin NW-2
Drainage Area to Proposed ditch entering Basin NW-2
Basin NE-1
Basin NE-2
1440
1448

Figure 2

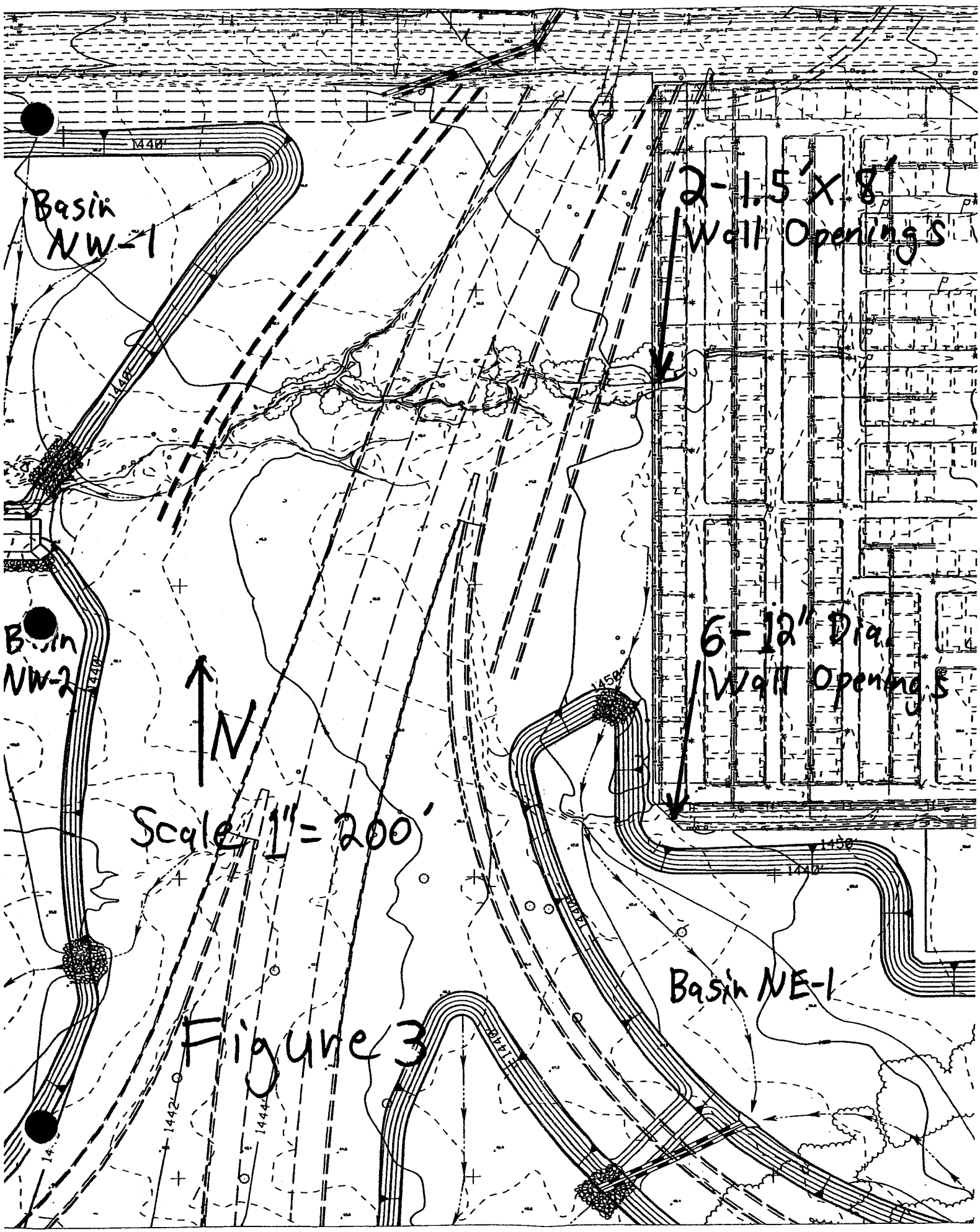
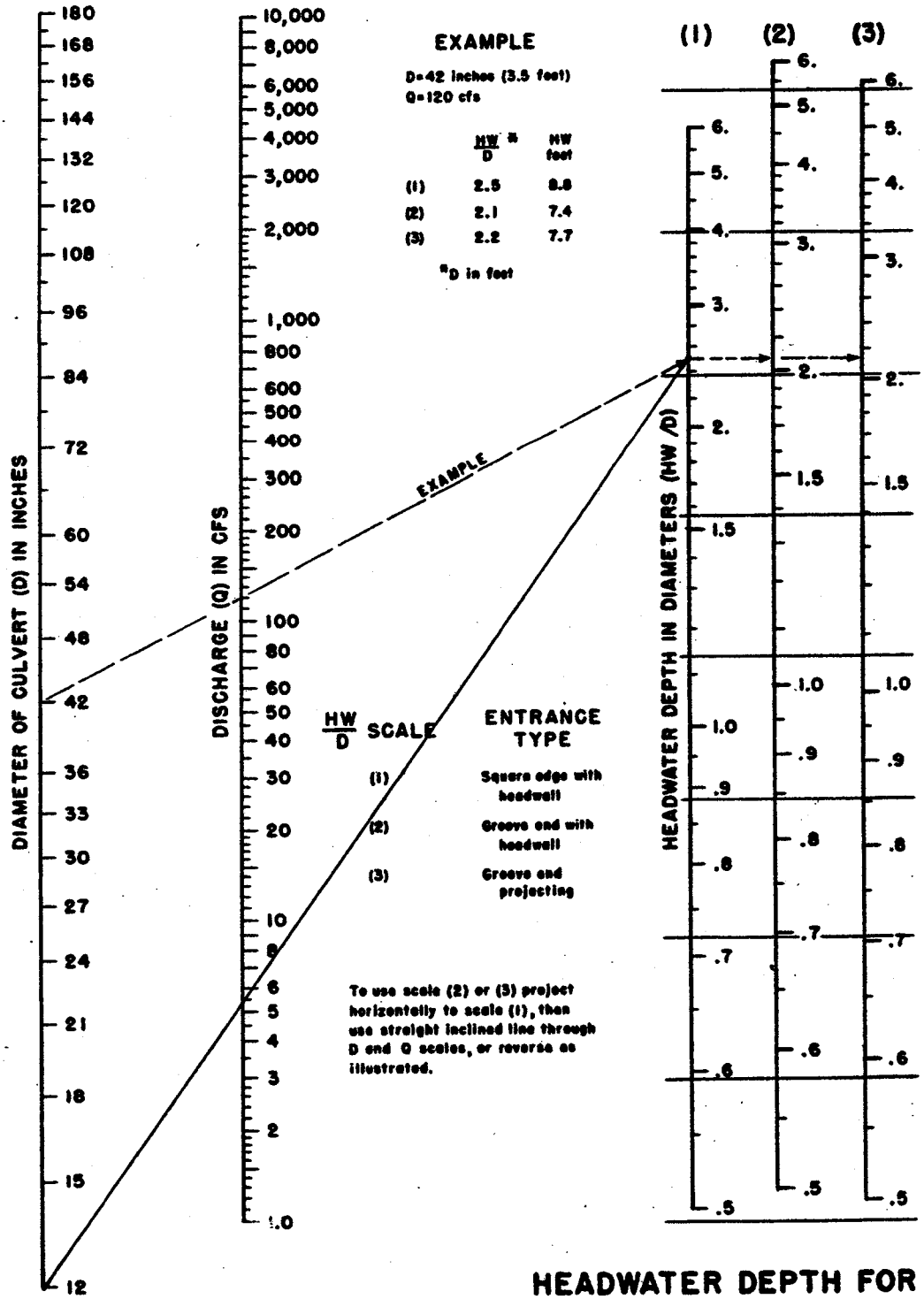

Basin NW-1
2-1.5' X 8' Wall Openings
Basin NW-2
6-12" Dia. Wall Openings
N
Scale 1" = 200'
Basin NE-1
1440'
1448
1442
1444
1458
1450
1446

Figure 3

CHART 1



HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

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Existing Channel into Basin NW-1
Worksheet for Irregular Channel

Project Description	
Worksheet	Existing Swale into Basin NW-1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Slope	0.010000 ft/ft
Water Surface Elevation	44.00 ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.035
Elevation Range	42.50 to 44.00
Discharge	178.32 cfs
Flow Area	61.7 ft²
Wetted Perimeter	110.08 ft
Top Width	110.00 ft
Actual Depth	1.50 ft
Critical Elevation	43.84 ft
Critical Slope	0.022772 ft/ft
Velocity	2.89 ft/s
Velocity Head	0.13 ft
Specific Energy	44.13 ft
Froude Number	0.68
Flow Type	Subcritical

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	1+10	0.035

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	44.00
0+43	43.00
0+48	42.50
0+52	43.00
1+10	44.00

Proposed Ditch into Basin NW-1
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Ditch entering Basin NW-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.010000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	50.00	ft
Discharge	180.00	cfs

Results		
Depth	0.82	ft
Flow Area	43.4	ft²
Wetted Perimeter	56.72	ft
Top Width	56.52	ft
Critical Depth	0.72	ft
Critical Slope	0.014930	ft/ft
Velocity	4.15	ft/s
Velocity Head	0.27	ft
Specific Energy	1.08	ft
Froude Number	0.83	
Flow Type	Subcritical	

Proposed Ditch into Basin NW-2
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Proposed Ditch into Basin NW-2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.010000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	15.00	ft
Discharge	50.00	cfs

Results		
Depth	0.75	ft
Flow Area	13.6	ft²
Wetted Perimeter	21.22	ft
Top Width	21.03	ft
Critical Depth	0.66	ft
Critical Slope	0.015951	ft/ft
Velocity	3.68	ft/s
Velocity Head	0.21	ft
Specific Energy	0.96	ft
Froude Number	0.81	
Flow Type	Subcritical	

Proposed Ditch into Basin NE-1 From the North
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Proposed Ditch into Basin NE-1 From the North
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	20.00	ft
Discharge	100.00	cfs

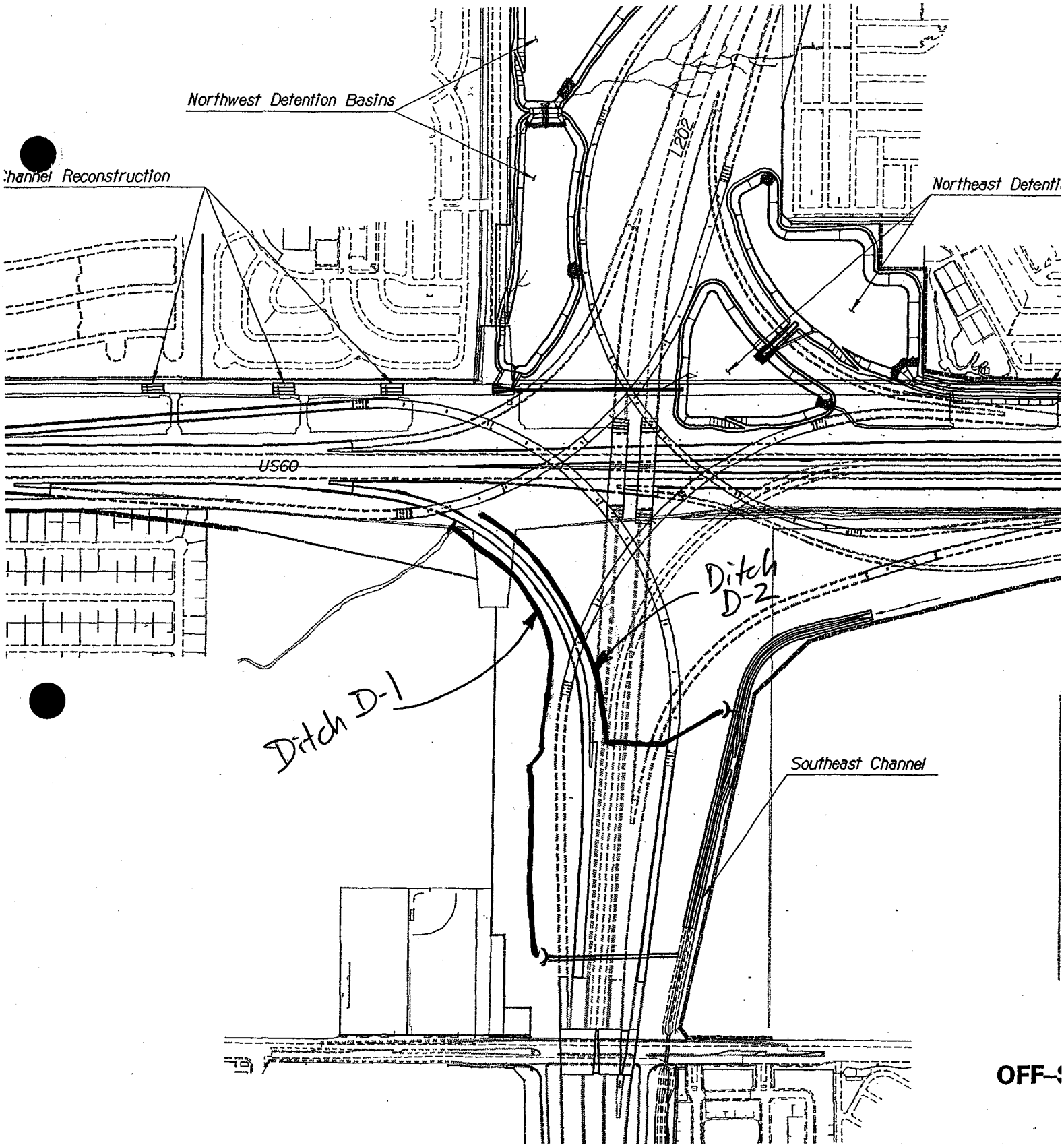
Results		
Depth	1.19	ft
Flow Area	28.1	ft²
Wetted Perimeter	27.55	ft
Top Width	27.16	ft
Critical Depth	0.88	ft
Critical Slope	0.014421	ft/ft
Velocity	3.55	ft/s
Velocity Head	0.20	ft
Specific Energy	1.39	ft
Froude Number	0.62	
Flow Type	Subcritical	

Proposed Ditch into Basin NE-1 From the Northeast
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Proposed Ditch into Basin NE-1 From the Northeast
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.005000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	20.00	ft
Discharge	50.00	cfs

Results		
Depth	0.79	ft
Flow Area	18.3	ft²
Wetted Perimeter	26.51	ft
Top Width	26.32	ft
Critical Depth	0.56	ft
Critical Slope	0.016576	ft/ft
Velocity	2.73	ft/s
Velocity Head	0.12	ft
Specific Energy	0.91	ft
Froude Number	0.58	
Flow Type	Subcritical	


Northwest Detention Basins
Channel Reconstruction
Northeast Detenti
US60
Ditch D-2
Ditch D-1
Southeast Channel
OFF-

10-Year and 50-Year Peak Flows at CB 520 (Ditch D2) and Inlet to Pipe 538 (Ditch D1)

Drainage Area ID	Length of Longest Flow Path (ft)	Watershed Resistance Coefficient, Kb	Upstream Elev (ft)[4]	Downstream Elev (ft)[4]	Elev Difference (ft)[4]	Average Slope (ft/mile)	Runoff Coefficient, C	Total Drainage Area (ac)	Assumed Time of Concentration, Tc (hr)	Assumed Rainfall Intensity, I (in/hr)	Computed Time of Concentration, Tc[1] (hr)	Computed Rainfall Intensity, I[2] (in/hr)	Peak Flow = CIA (cfs)
A1 - 10yr	1500	0.025	1435	1432	3	11	0.77	38.0	0.27	3.46	0.27	3.46	101.2
A1 - 50yr	1500	0.025	1435	1432	3	11	0.77	38.0	0.23	5.22	0.23	5.22	152.7
B1 - 10yr	2725	0.025	1450	1423	27	52	0.76	6.5	0.21	3.89	0.21	3.89	19.2
B1 - 50yr	2725	0.025	1450	1423	27	52	0.76	6.5	0.18	5.75	0.18	5.75	28.4

1 $Tc = 11.4*(L)^{0.5}*(Kb)^{0.52}*(S)^{-0.31}*(I)^{-0.38}$

2 The computed rainfall intensity is based on the computed time of concentration (minimum allowable Tc = 10 minutes = 0.17 hours)

Total Q10 at CB 520 = 101 cfs
Total Q50 at CB 520 = 153 cfs
Total Q10 at Upstream Inlet to Pipe 538 = 32.6 cfs (19.2 cfs direct runoff including Ramp W-S and fill slope plus 13.4 cfs from Ramp E-S pipes)
Total Q50 at Upstream Inlet to Pipe 538 = 44.4 cfs (28.4 cfs direct runoff including Ramp W-S and fill slope plus 16.0 cfs from Ramp E-S pipes)

Ditch Design Summary

Design of Ditch D1 – Contributes Flow to Inlet of Pipe 538
(Pipe 538 Designed by Aztec)

Designed for 50-year flow of 44.4 cfs
V-Ditch with 3H:1V side slopes
Channel Depth is 3'
50-year flow depth is 2'
Contributing Drainage Area is B1 and Pipe Flows from E-S Ramp
(This includes flows from future W-S Ramp and portions of 202L as well)

2/10

Control Points for Ditch D1

Point Number	Station	Construction Centerline	Invert Elevation
1	28+00, 55' Rt	Ramp E-S	1429.50
2	31+00, 60' Rt	Ramp E-S	1428.10
3	32+00, 75' Rt	Ramp E-S	1427.60
4	32+40,220' Rt	Ramp E-S	1426.90
5	36+00, 285' Rt	Ramp E-S	1425.40
6	469+00, 290' Rt	202L EB	1423.00
7	474+55, 210' Rt	202L EB	1420.50

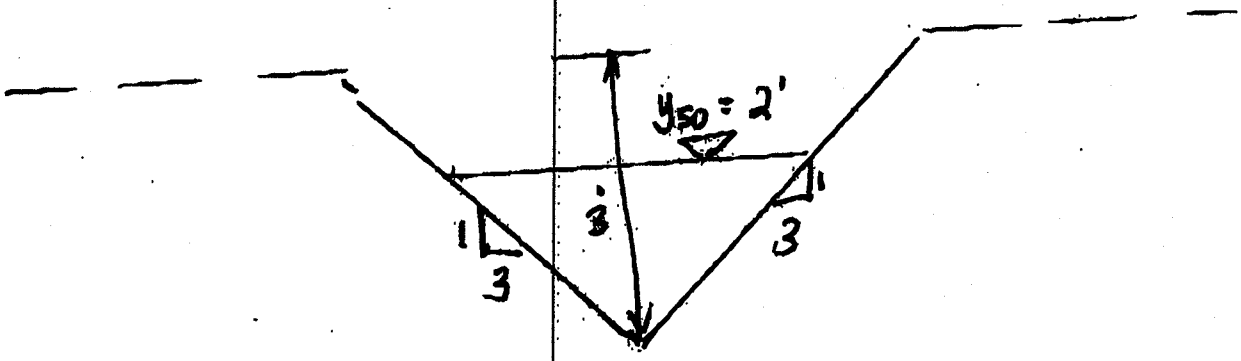
Ditch D1 - Ditch Contributing Flow to Pipe 538 - 50yr Capacity
Worksheet for Triangular Channel

3/10

Project Description	
Worksheet	Ditch D1 - Contributing Flow to Pi
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.025	
Slope	004000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Discharge	44.40	cfs

Results		
Depth	2.01	ft
Flow Area	12.2	ft²
Wetted Perim	12.74	ft
Top Width	12.09	ft
Critical Depth	1.69	ft
Critical Slope	0.010343	ft/ft
Velocity	3.65	ft/s
Velocity Head	0.21	ft
Specific Energ	2.22	ft
Froude Numb	0.64	
Flow Type	Subcritical	



5/10

Design of Ditch D2 – Temporary Ditch that Contributes Flow to Pipe 520
Designed for approximately 10-year flow of 101 cfs
Trapezoidal Ditch with 6H:1V side slopes and 20' bottom width
Channel Depth is 1'
10-year flow depth is 1.4'
Contributing Drainage Area is A1 from DMJM Initial Drainage Report (needs to be refined)

4/10
Missing
intentionally

6/10

Control Points for Ditch D2

Point Number	Station	Construction Centerline	Invert Elevation
1	1458+30, 210' Rt	202L Med Cst CL	1433.00
2	1459+75, 115' Rt	202L Med Cst CL	1432.68
3	1461+80, 50' Rt	202L Med Cst CL	1432.29
4	1463+25, 30' Rt	202L Med Cst CL	1432.02
5	1463+40, 180' Lt	202L Med Cst CL	1431.64
6	1462+08, 510' Lt	202L Med Cst CL	1431.00

Temp Ditch D2 - Contributing to Pipe 520 - 10yr Capacity
Worksheet for Trapezoidal Channel

7/10

Project Description

Worksheet	Ditch D2 - Contributing to Pip
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

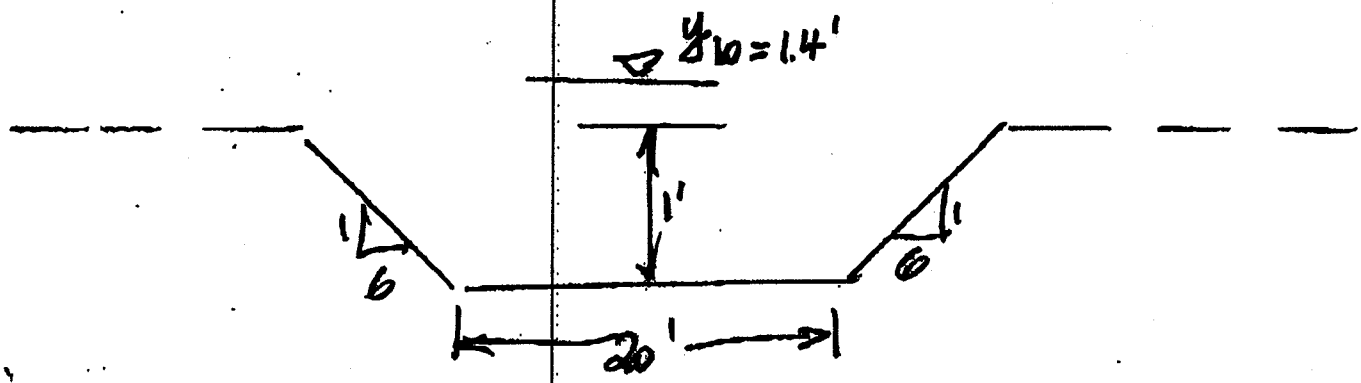
Input Data

Mannings Coeffic	0.025	
Slope	001800	ft/ft
Left Side Slope	6.00	H : V
Right Side Slope	6.00	H : V
Bottom Width	20.00	ft
Discharge	101.00	cfs

Results

Depth	1.37	ft
Flow Area	38.7	ft²
Wetted Perim	36.67	ft
Top Width	36.44	ft
Critical Depth	0.85	ft
Critical Slope	0.010302	ft/ft
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energ	1.48	ft
Froude Numb	0.45	
Flow Type	Subcritical	

9/10 and 9/10 missing. intentionally



AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: SRT | Project No: AZ01107
Computed by: RFC | Date: 2/13/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Pipe 713 | Sheet: 1 | Of: 2

Pipe 713 ~ Sta 475+00 (L202)

Pipe 713 will direct flow from "Ditch D-1" into the existing 42" SD in Baseline Rd, west of Stanley's (MH725) tie-in. This allows decrease in depth of CB701, CB706, CB708 and pipes 712, 711 & 710.

Ditch D-1 : $Q_{10} = 32.6$ cfs, $Q_{50} = 44.4$ cfs } from Draft Final Drainage Report - 11/19/02 ✓

Use a sedimentation basin & catch basin @ inlet of Pipe 713.

From Drainage Report: $V_{50} = 3.65$ ft/s ✓

Size Riprap for sedimentation basin: $D_{50} = \frac{0.0017\,(CD(SN))^{1.5}\,V^3}{(K(G_s-1))^{1.5}\,R^{0.5}}$ (ADOT RDG Chpt 600)

Basin Bottom Width "B" = Width of Modified C-15.80 + 2' (1' Lt & 1' Rt of CB)

$= (4' + 3' + 4') + 2' = 13'$

(CB wing, grate, CB wing; Lt & Rt of wings)

Grate to be set @ 1' above bottom of basin to allow settling.

Depth "d" of Basin, use 3' (ditch depth from Drng Rpt)

Basin will have 3:1 side slopes "z".

from ADOT RDG Fig. 613.3 : $B/d = 4.33$
$z = 3$ (3:1 SS)
so, $C = 1.25$

$D = \frac{2.65}{\left(\frac{r}{W}\right)^{0.5}}$ (from ADOT RDG) r = radius of channel @ ℄ (channel is straight; assume large r, r = 1000')
W = channel top width

$D = \frac{2.65}{\left(\frac{1000'}{31'}\right)^{0.5}} = 0.47$ ✓

Specific Gravity of Rock = 2.4 (ADOT RDG)

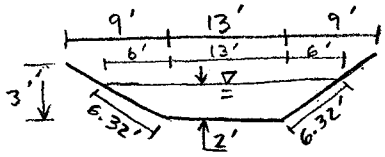
K = 0.87 for 3:1 SS (Table 613.3B ADOT RDG)

SN = 1.25 (Ditches) See RDG Chpt 600

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: SRT | Project No: AZ01107
Computed by: RFC | Date: 2/17/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Sedimentation Basin @ Pipe 713 | Sheet: 2 | Of: 2

$R = \frac{A}{P}$



$A = (6.32')(6') = 37.92\ ft^2$
$P = (6'+13'+6'+6.32'+13'+6.32') = 50.64'$

$R = 0.75'$

Long S = 0.0100'/ft (Basin bottom sloped 1% towards CB)

V_{50} in Ditch D-1 (from Drng Rpt) = 3.65 ft/s

so, $D_{50} = \frac{0.0017(1.25(0.47)(1.25))^{1.5}(3.65)^3}{(0.87(2.4-1))^{1.5}(0.75)^{0.5}} = 0.045' = 0.5'' < 6''$

Riprap D_{50} = 6" OK ✓

Length of Grate Needed for flow depth above grate < 1' ⇒ Length ~ 6.25'
(see Flowmaster results)

Grate length is in 4' increments ∴ use L = 8' ✓

Pipe 713 to tie-in to exst 42" SD in Baseline Rd, 20' West of Stanley's MH725
∴ new MH 605 @ Baseline Sta 17+73.97, 45.46' Lt
Stanley's MH 725 Inv = 1417.73 (from pothole info) Rim = 1423.21 (pothole info)
As-Built SD slope 0.005215'/ft (see A.B. plans "Baseline Road: Power Rd to Ellsworth Rd")
M. Stanley
∴ MH605 Inv = 1417.73 − (20')(0.005215'/ft) = 1417.63
Rim = 1423.21 − (20')(0.005215'/ft) = 1423.11

Stanley Consultants provided MH 605 in Baseline Rd & a 20' Stub-out north for pipe 713 to tie-in to. (Pipe 605)

Pipe 713 will tie-in @ 3" above exst 42" SD Inv (see Detail DK)

Pipe 713 will slope 0.0014'/ft to match Pipe 605 stub-out slope.

@ 330' Length (Pipe 713) Up Inv = 1418.37 (allowing 1' cover)

∴ Grate El CB 713 = 1422.87 (CB H = 4.5')

See Detail DK for Sedimentation Basin/CB713/Pipe 713

Sedimentation Basin @ Pipe 713
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sedimentation Basin @ F
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coeffic	0.030	
Slope	004000	ft/ft
Depth	3.00	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	13.00	ft

Results		
Discharge	335.18	cfs
Flow Area	66.0	ft²
Wetted Perim	31.97	ft
Top Width	31.00	ft
Critical Depth	2.28	ft
Critical Slope	0.011401	ft/ft
Velocity	5.08	ft/s
Velocity Head	0.40	ft
Specific Energ	3.40	ft
Froude Numb	0.61	
Flow Type	Subcritical	

Notes: Capacity of Sedimentation Basin for Pipe 713 is approximately 335 cfs.

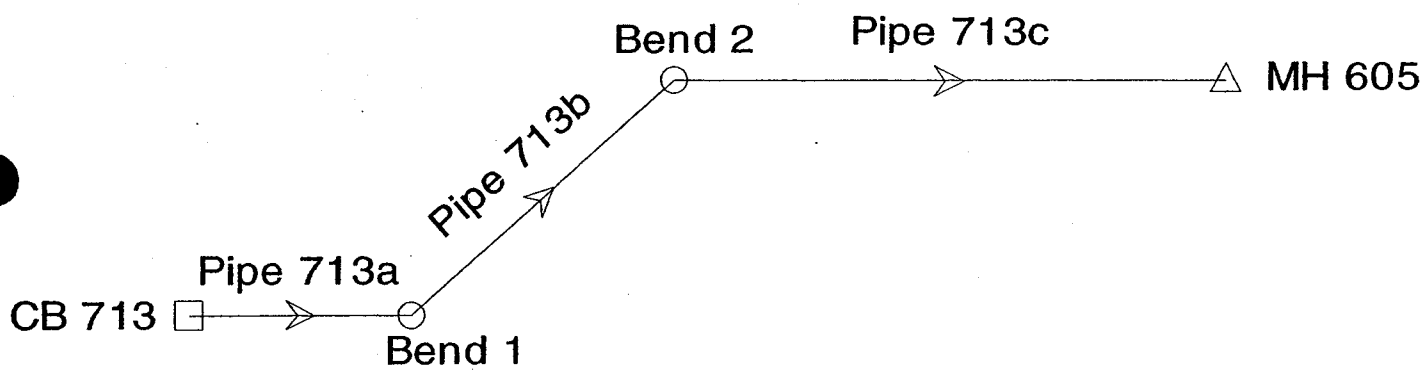
CB 713 (at Sedimentation Basin)
Worksheet for Ditch Inlet In Sag

Project Description	
Worksheet	CB 713
Type	Ditch Inlet In Sa
Solve For	Spread

Input Data		
Discharge	44.40	cfs
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	13.00	ft
Grate Width	3.00	ft
Grate Length	8.00	ft
Local Depression	0.0	in
Local Depression \	0.00	ft
Grate Type	) mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	18.08	ft
Depth	0.85	ft
Wetted Perimeter	18.35	ft
Top Width	18.08	ft
Open Grate Area	10.8	ft^2
Active Grate Weir Le	19.00	ft

Scenario: Base



Calculation Results Summary

==========
Scenario: Base

>>>> Info: Subsurface Network Rooted by: MH 605
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
CB 713	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: MH 605

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
Pipe 713c	1	30 inch	Circular	288.00	44.40	9.05	1,423.66	1,420.13
Pipe 713b	1	30 inch	Circular	53.00	44.40	9.05	1,422.62	1,422.00
Pipe 713a	1	30 inch	Circular	8.00	44.40	9.05	1,422.09	1,422.00

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
MH 605	44.40	1,423.20	1,417.63	1,417.63
Bend 2	44.40	1,422.00	1,422.64	1,422.00
Bend 1	44.40	1,422.00	1,422.64	1,422.00
CB 713	44.40	1,422.87	1,422.73	1,422.09

==========
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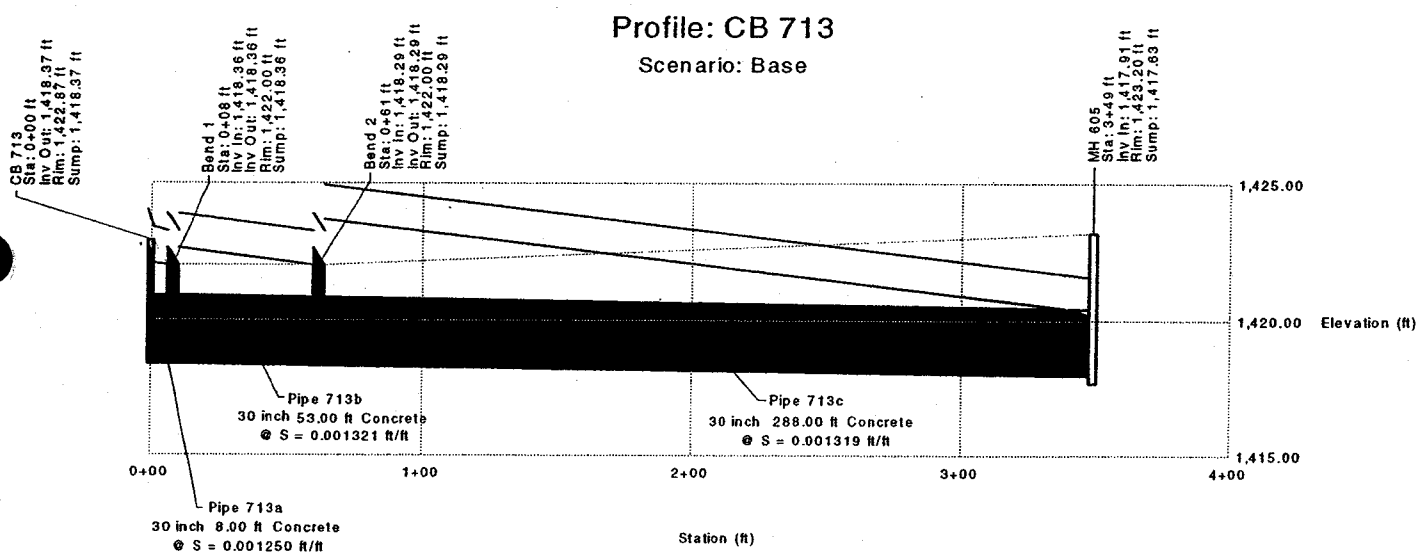
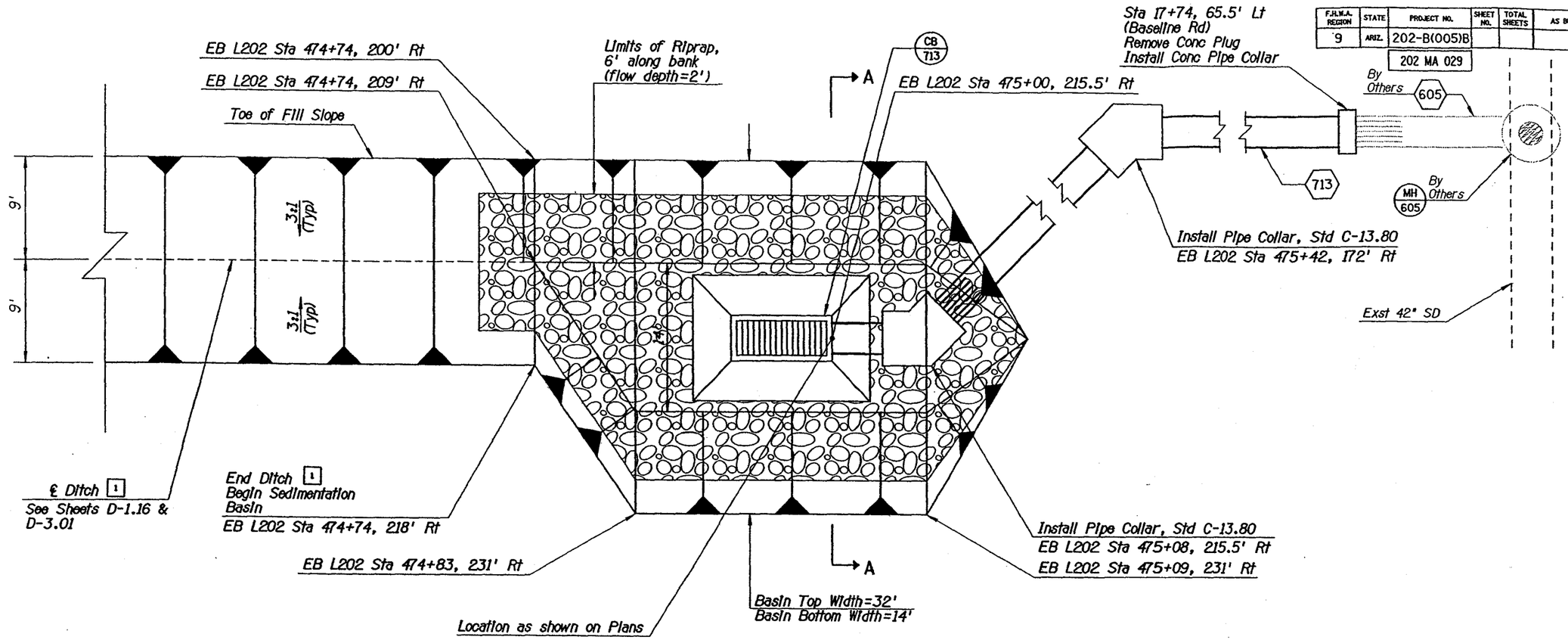
Profile
Scenario: Base

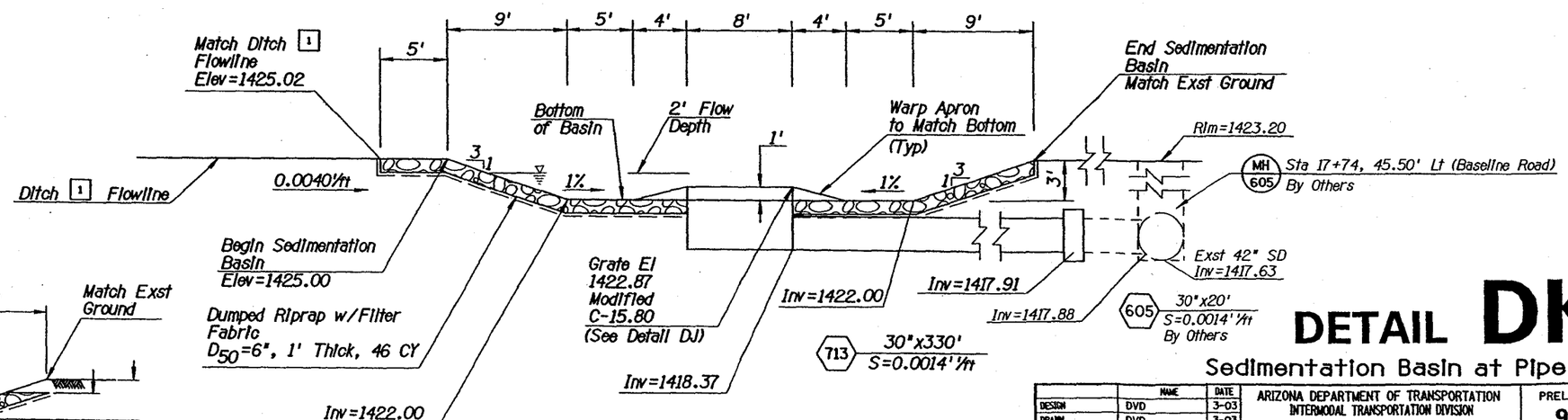


HGL above CB 713 ok, Sedimentation Basin.
HGL below MH ok

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



PLAN



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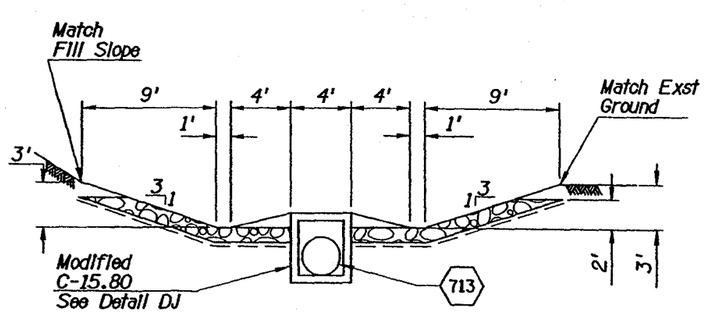


SECTION A-A

DETAIL DK

Sedimentation Basin at Pipe 713

	NAME	DATE
DESIGN	DVD	3-03
DRAWN	DVD	3-03
CHECKED	RCS	3-03

AZTEC 3747 E. Grove Street Phoenix, AZ 85040-7982 Tel: (602) 454-9482 Fax: (602) 454-9483 Mail@aztecinc.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
SEDIMENTATION BASIN AT PIPE 713

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY 95% Review
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-3.10

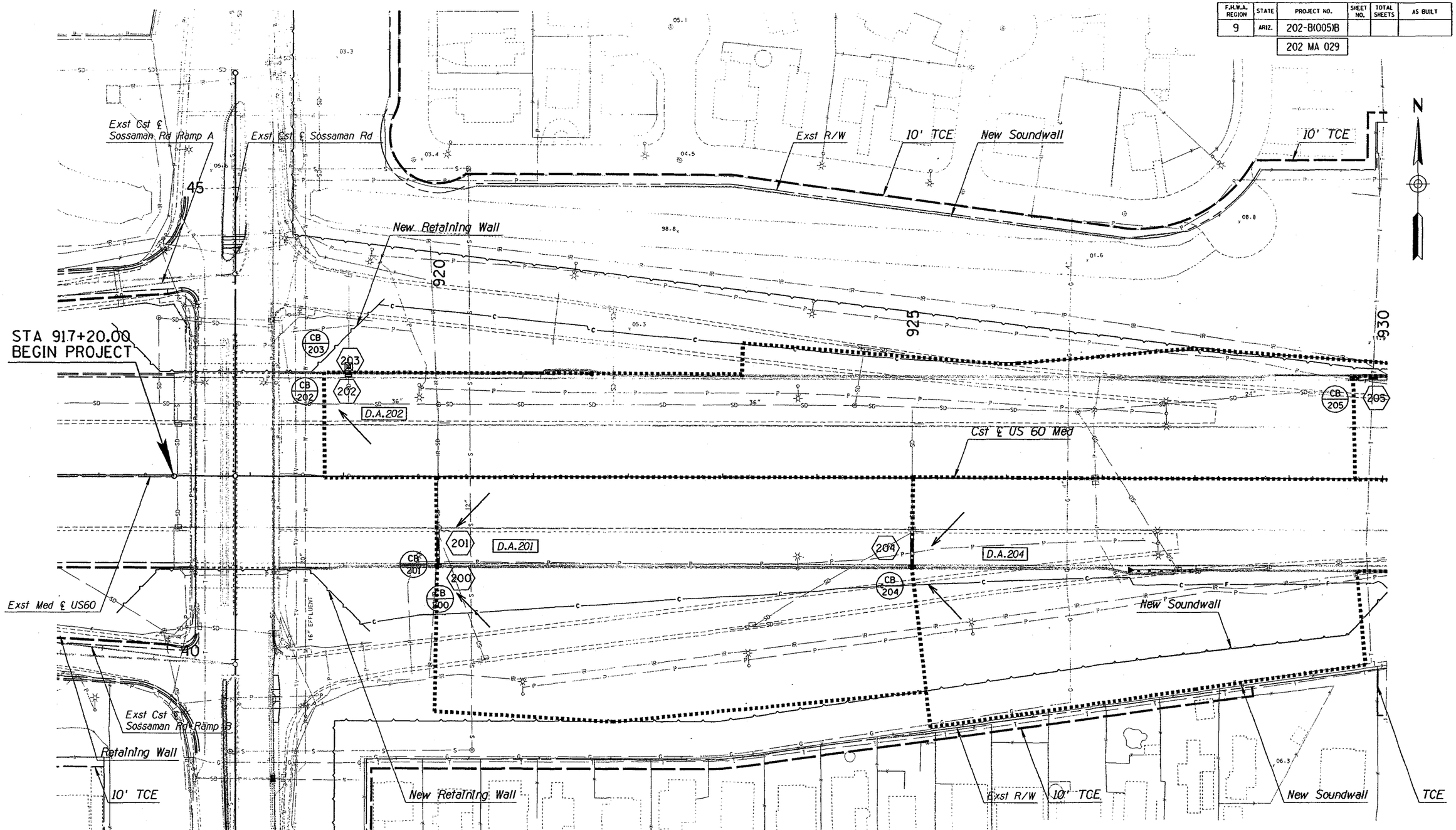
___ OF ___

Plotted By: Kleahy at 06:34:28 AM 03/27/2003 o:\pw_working\dms00816\AZ01107-01-DD-02.dgn

APPENDIX D

ON-SITE DRAINAGE AREAS AND CONCENTRATION POINTS

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH/SK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 916+00 to 930+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
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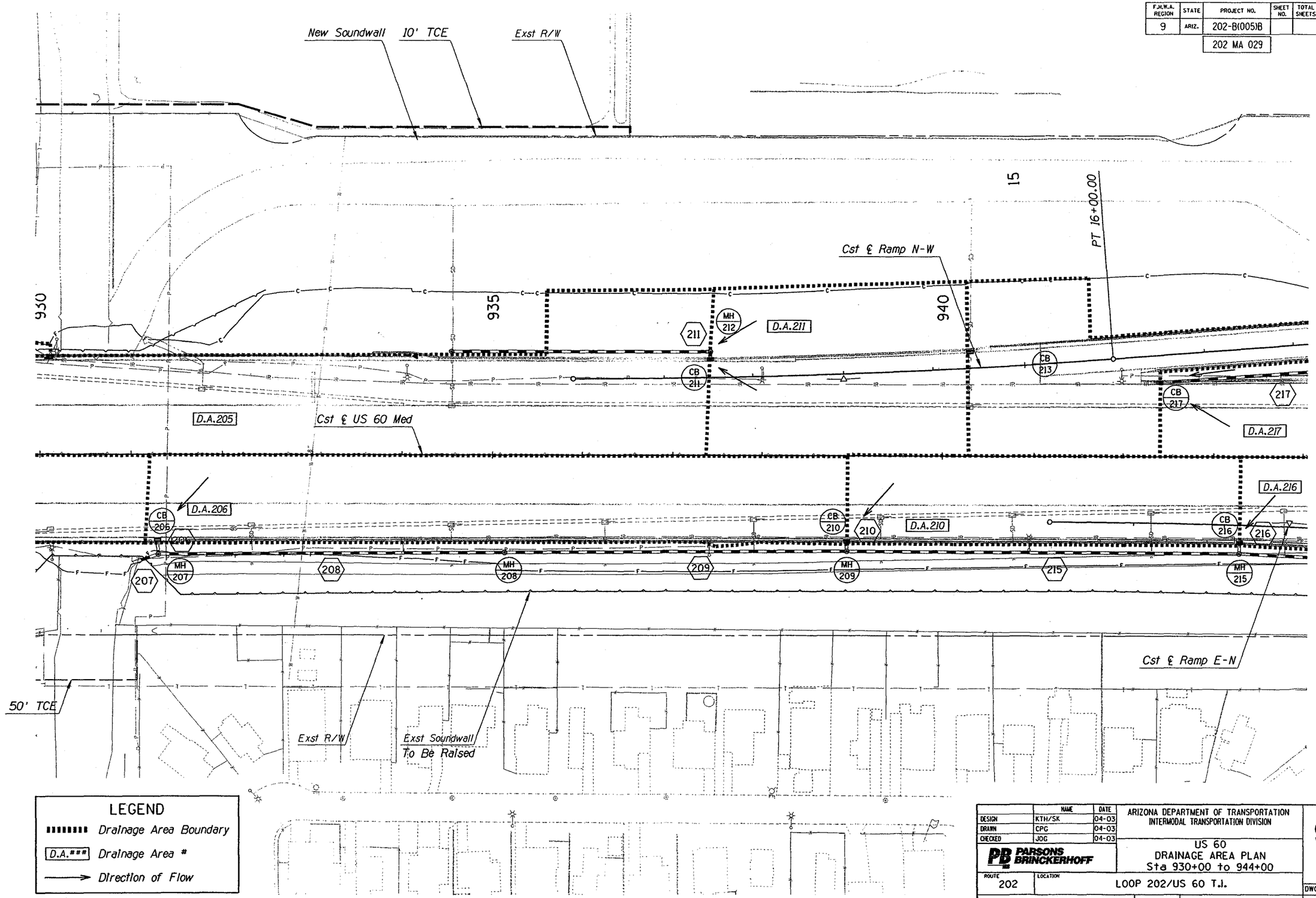
DWG NO. D-1.01

___ OF ___

Wed Apr 02 18:25:07 2003 H:\60_TI\phase_1\Drngarea\dapl01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH/SK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 930+00 to 944+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

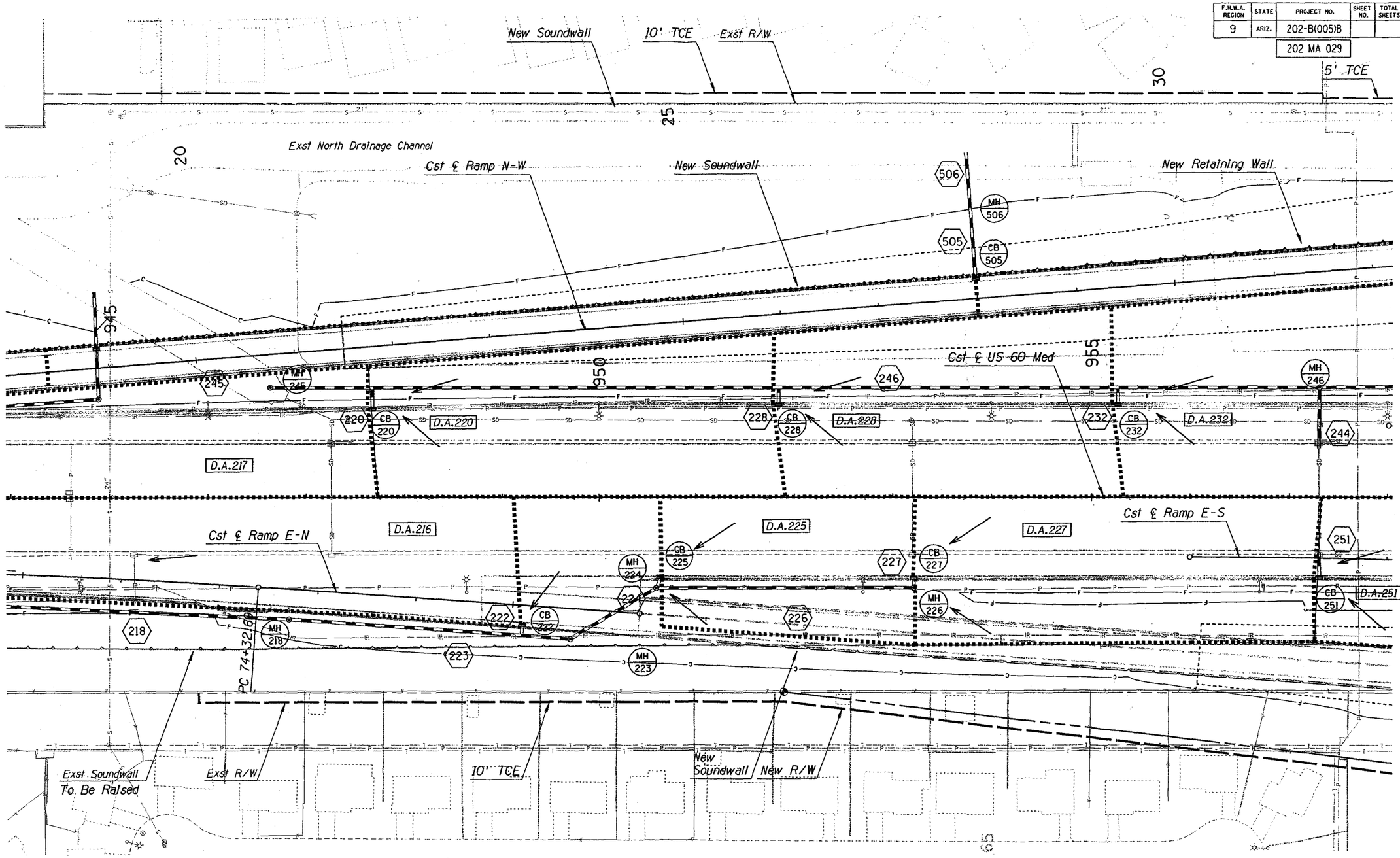
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.02

___ OF ___

Wed Apr 02 18:30:00 2003 H:\60_TI\phase_1\Drngarea\dap102.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH/SK/SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 944+00 to 958+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
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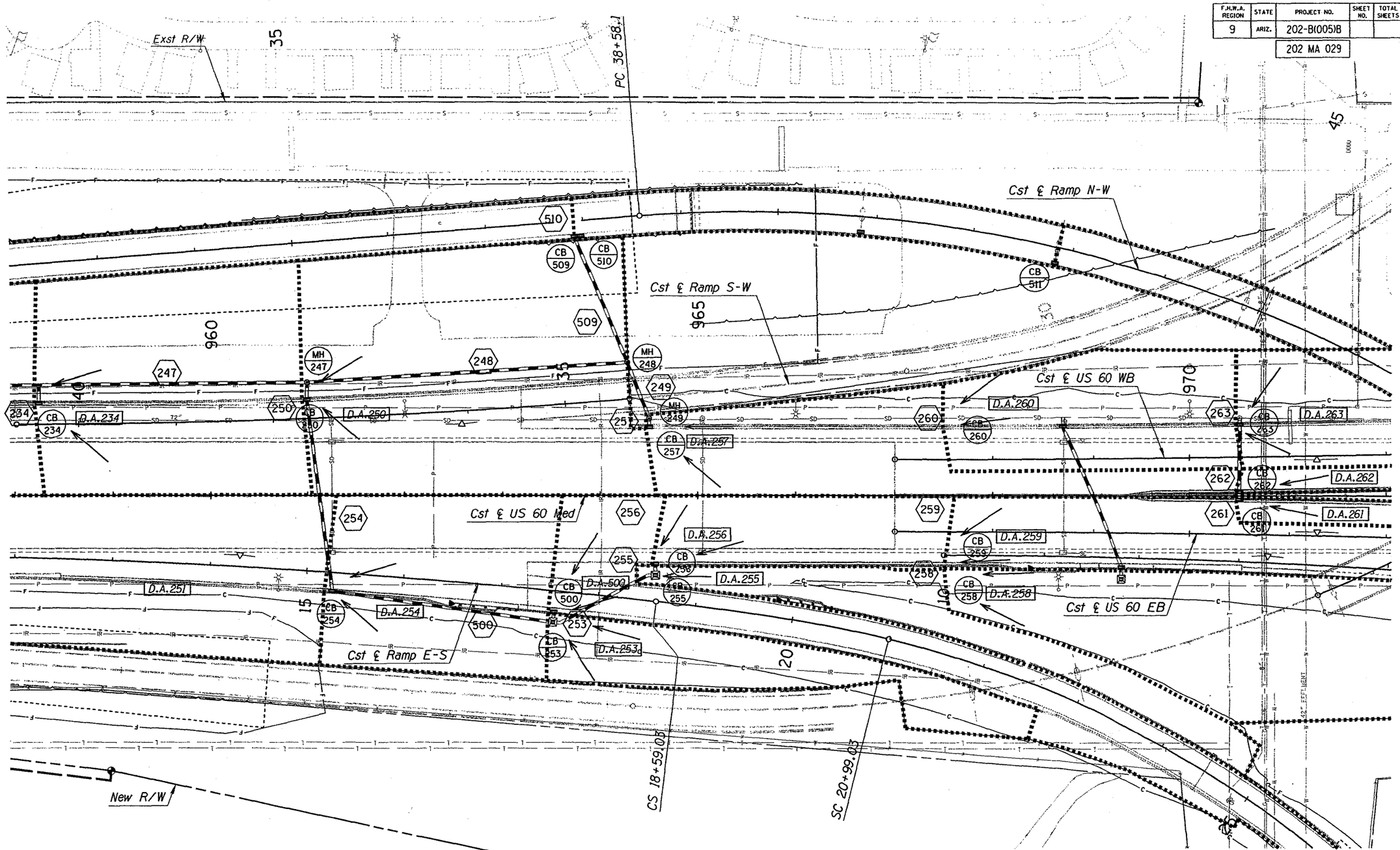
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.03

___ OF ___

Wed Apr 02 18:29:41 2003 H:\60_TI\phase_1\Drngarea\dap103.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH/SPK	04-03
DRAWN	CPC	04-03
CHECKED	JOG	04-03

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 958+00 to 972+00

PRELIMINARY
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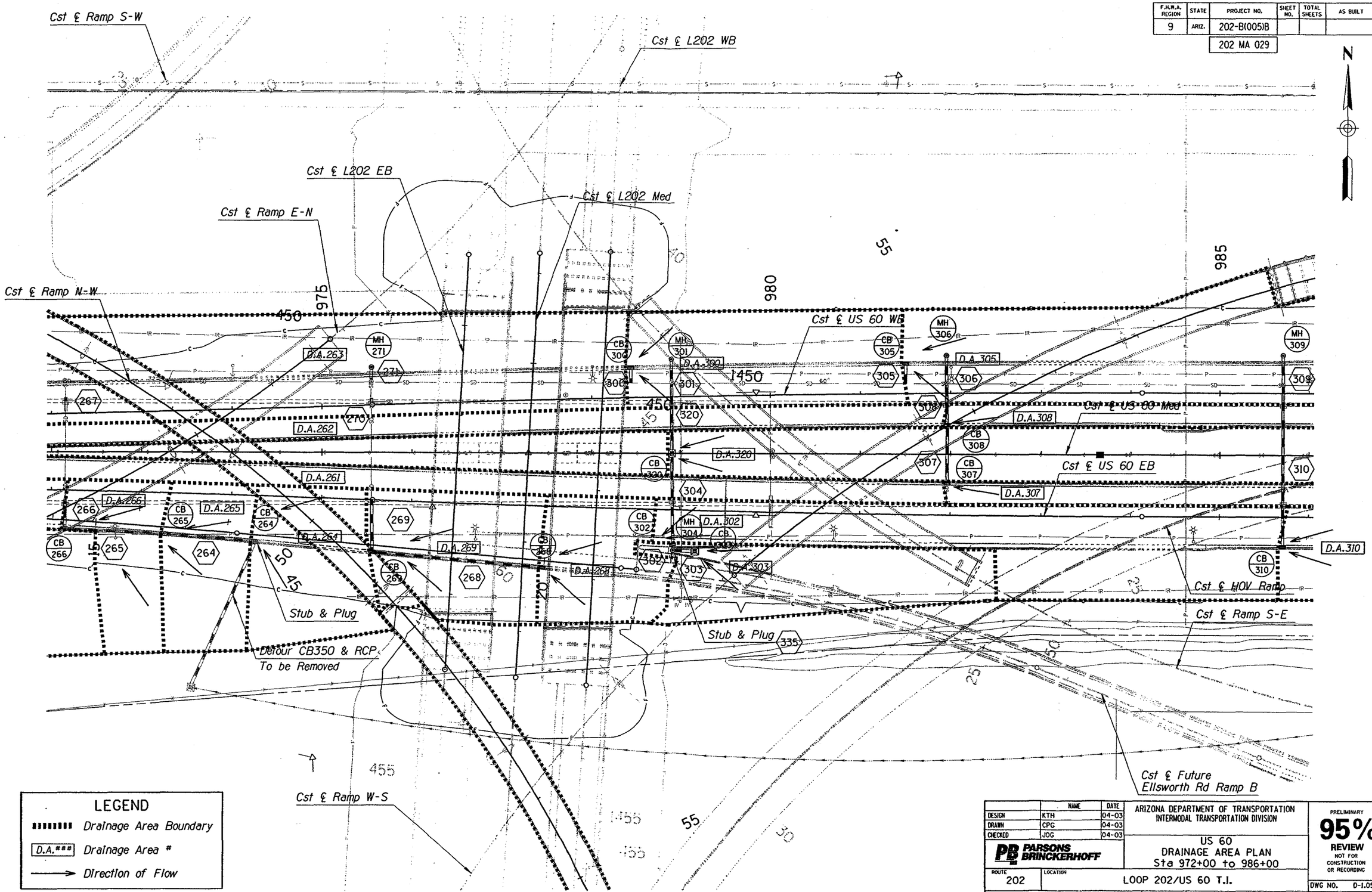
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.04

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 18:29:21 2003 H:\60_TI\phase_1\Drngarea\dap104.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 972+00 to 986+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

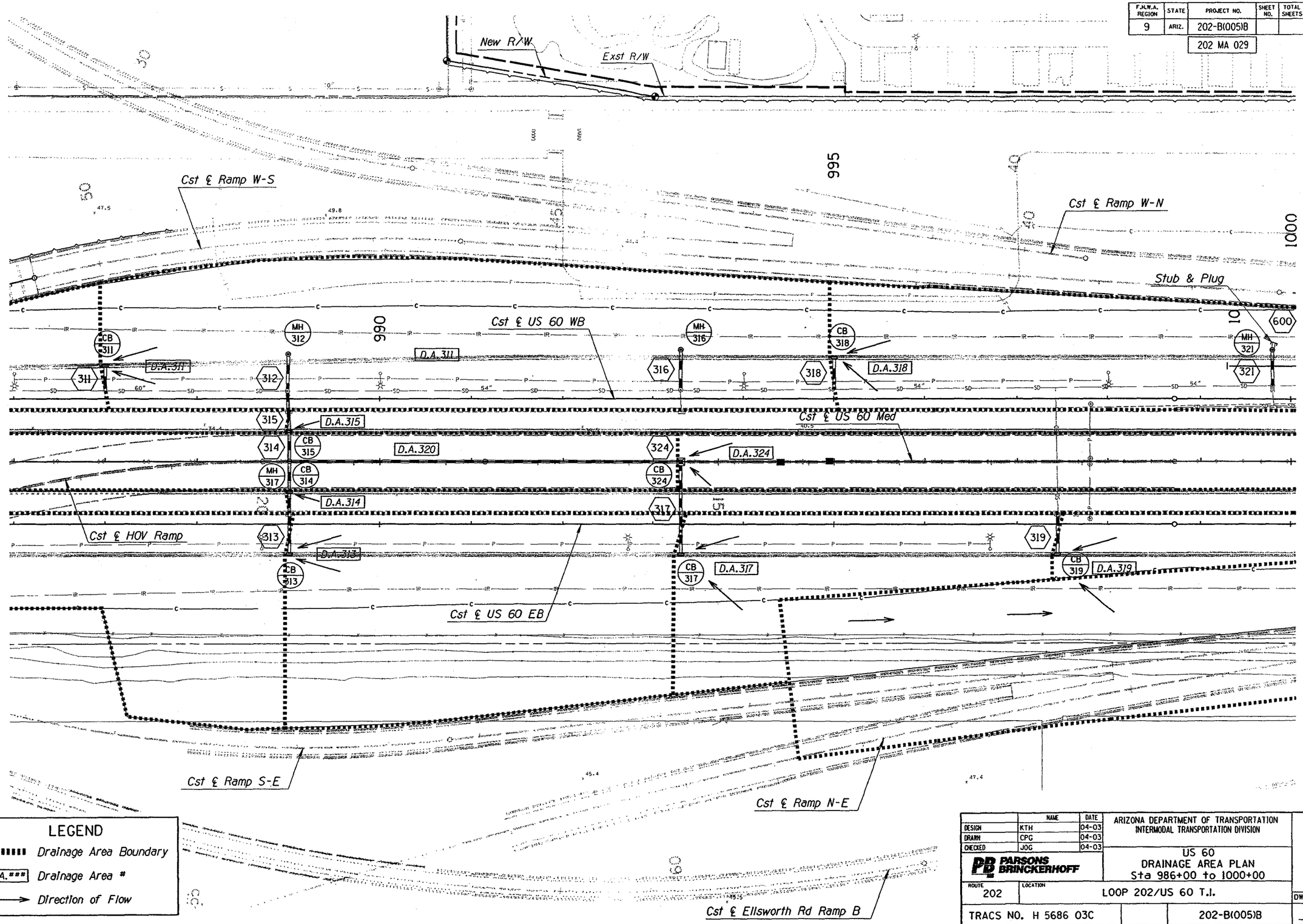
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.05

___ OF ___

Wed Apr 02 18:28:58 2003 H:\60_TI\phase_1\Drngarea\dap105.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.*** Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 986+00 to 1000+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

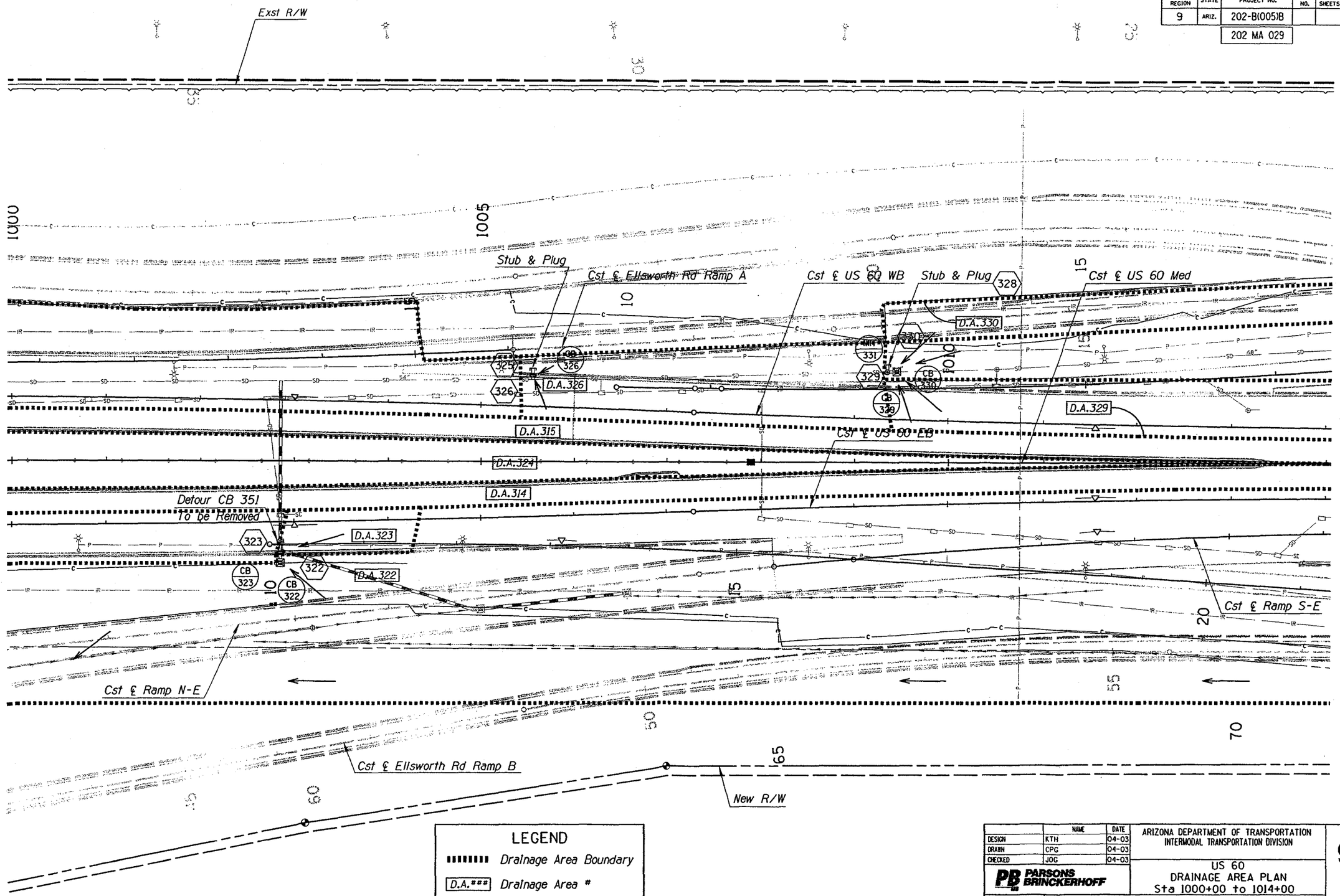
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.06

___ OF ___

Wed Apr 02 18:28:37 2003 H:\60_TI\phase_I\Drnqarea\dap106.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 1000+00 to 1014+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

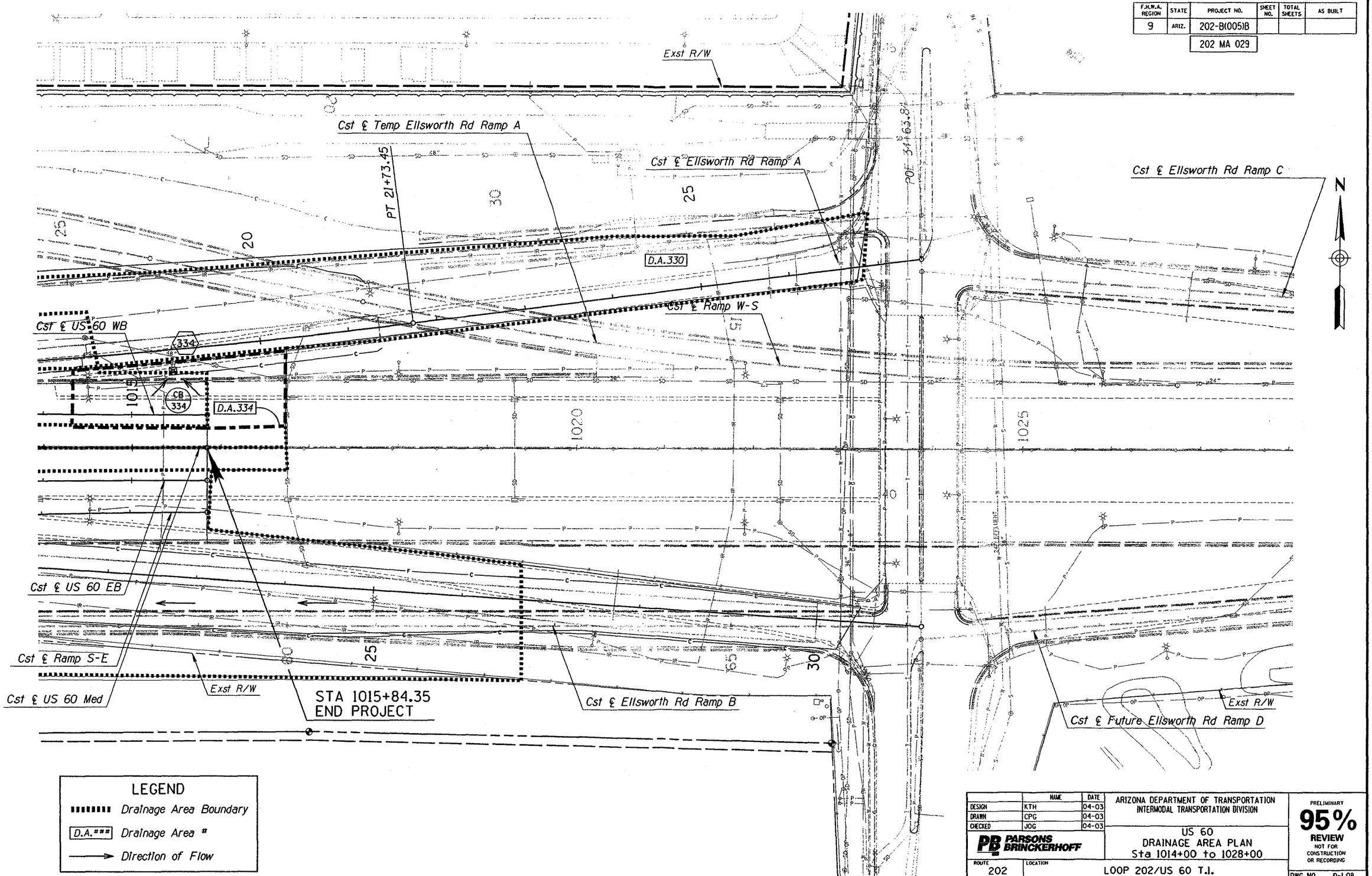
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.07

___ OF ___

Wed Apr 02 18:28:20 2003 H:\60_TI\phase_1\Drngarea\dap107.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE AREA PLAN
Sta 1014+00 to 1028+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY 95% REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.08

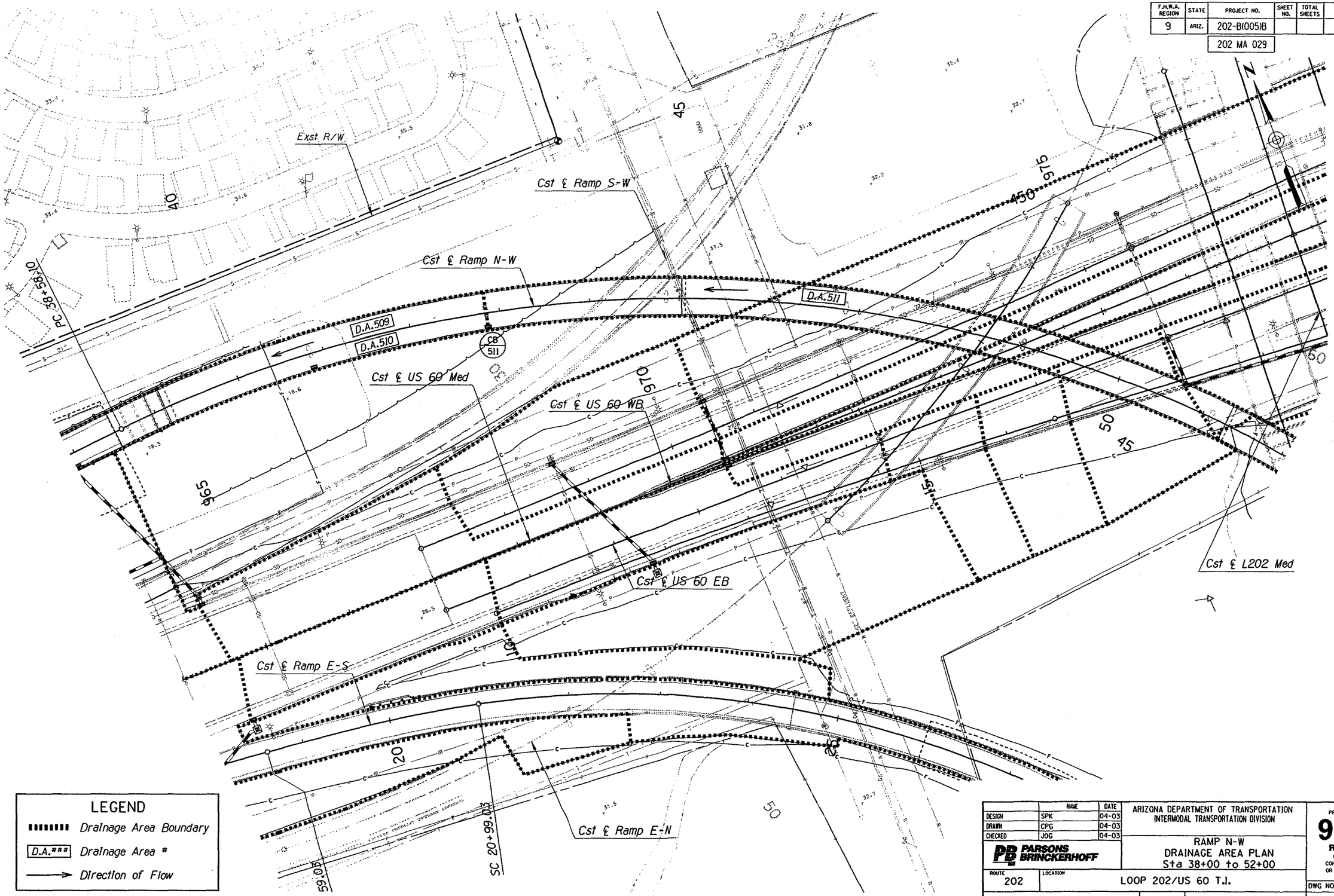
TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

Wed Apr 02 18:27:58 2003 H:\60_TI\phase_I\Drngarea\dap108.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
DRAINAGE AREA PLAN
Sta 38+00 to 52+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

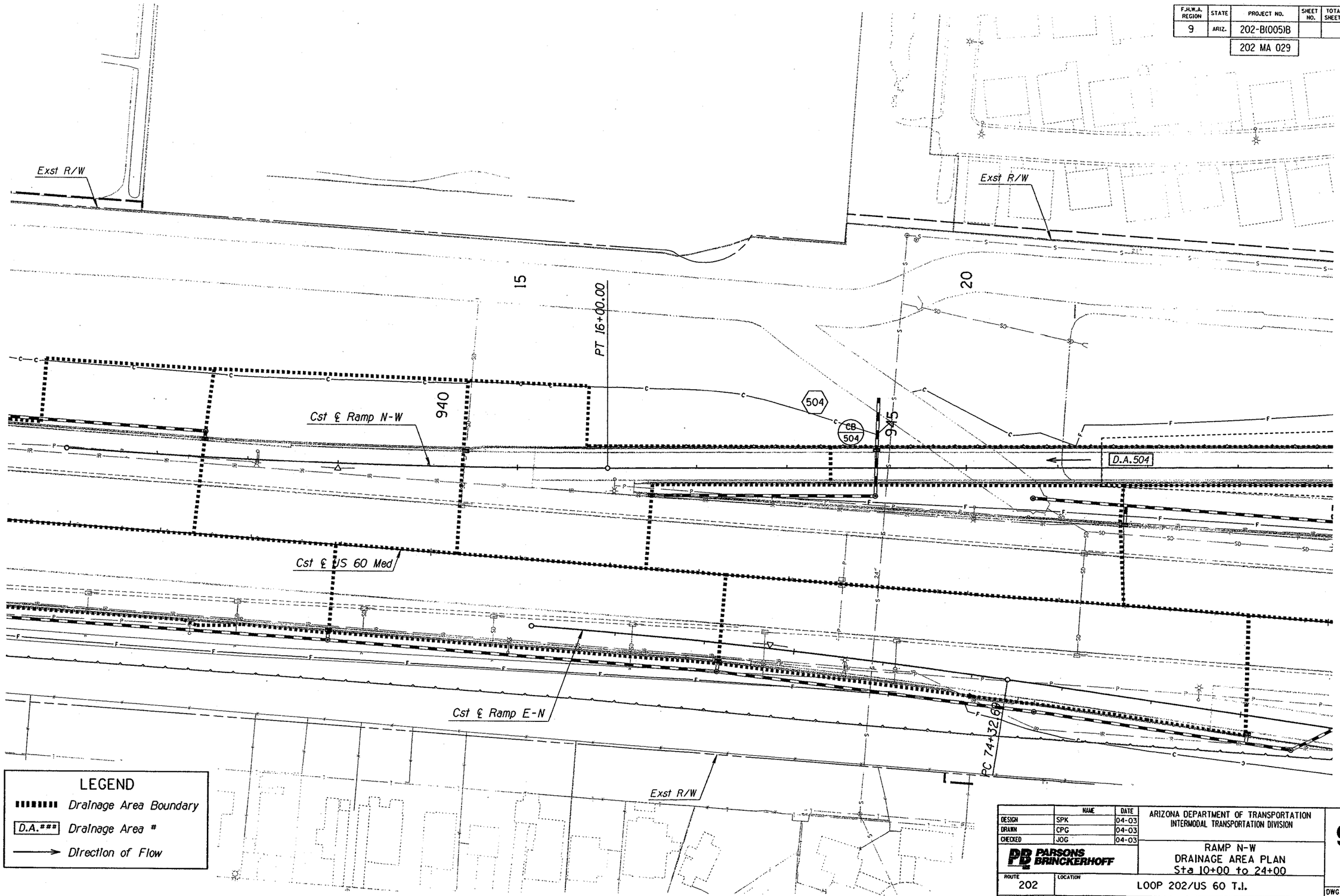
TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

DWG NO. ___ OF ___

Wed Apr 02 18:26:54 2003 H:\60_TI\phase_I\Drngarea\dap111.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
DRAINAGE AREA PLAN
Sta 10+00 to 24+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

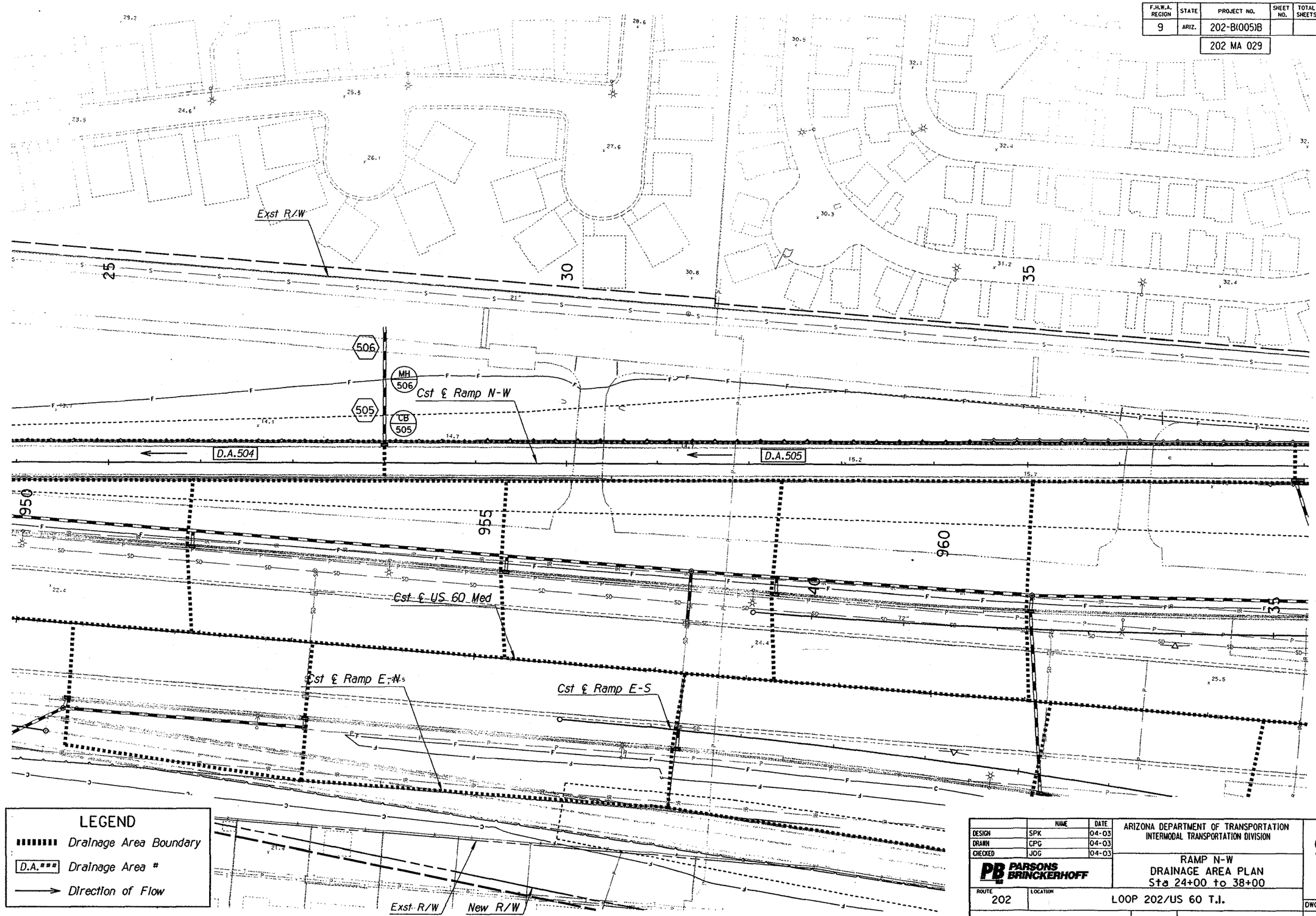
DWG NO. D-1.10

___ OF ___

Wed Apr 02 18:27:37 2003 H:\60_TI\phase_1\Drngarea\dap109.dgn

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
DRAINAGE AREA PLAN
Sta 24+00 to 38+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

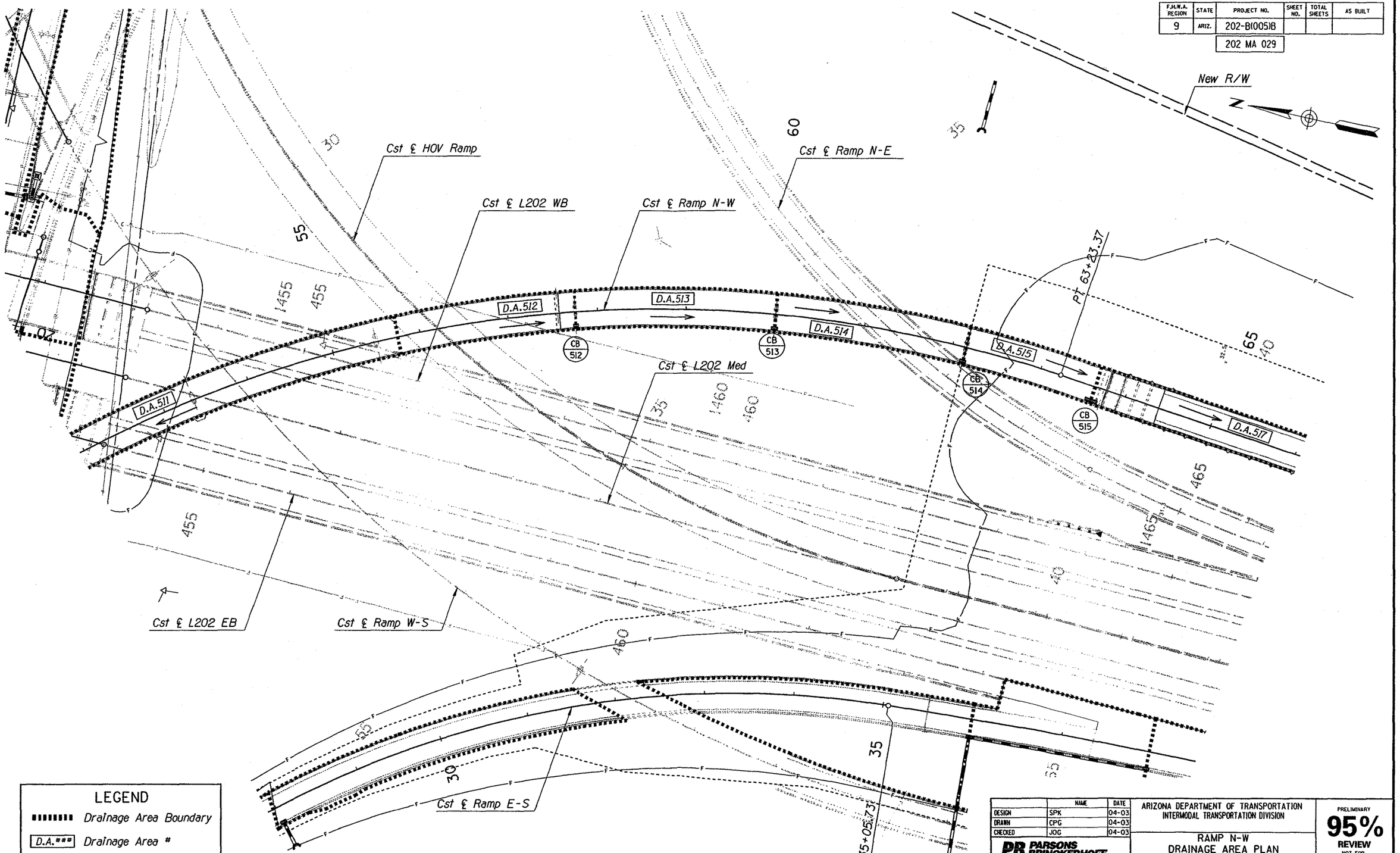
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.11

___ OF ___

Wed Apr 02 18:27:16 2003 H:\60_TI\phase_1\Drngarea\dap110.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



LEGEND

- Drainage Area Boundary
- D.A.### Drainage Area #
- Direction of Flow

	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
DRAINAGE AREA PLAN
Sta 52+00 to 66+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

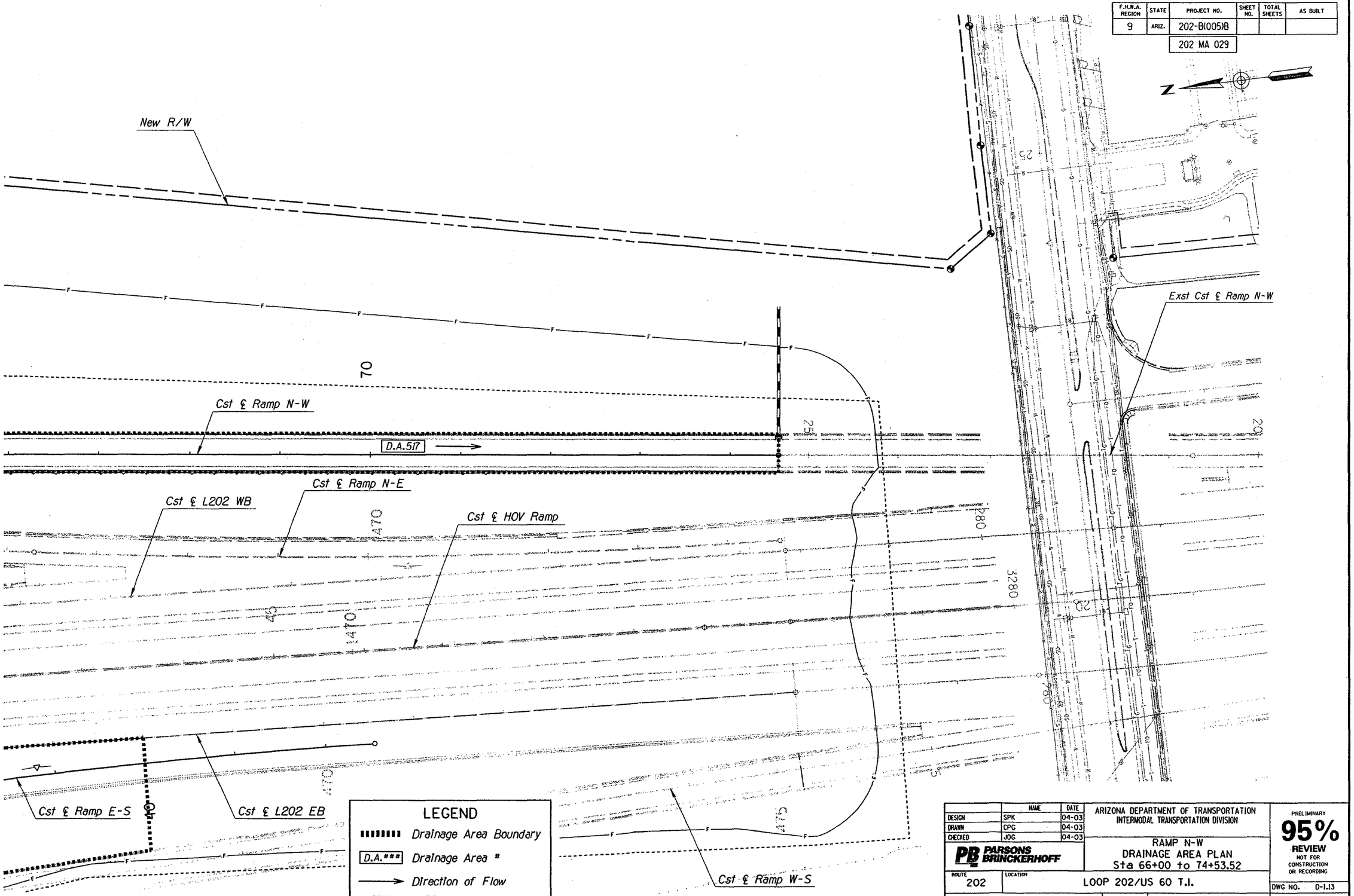
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.12

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 18:26:33 2003 H:\60_TI\phase_1\Drngarea\dap112.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
DRAINAGE AREA PLAN
Sta 66+00 to 74+53.52

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

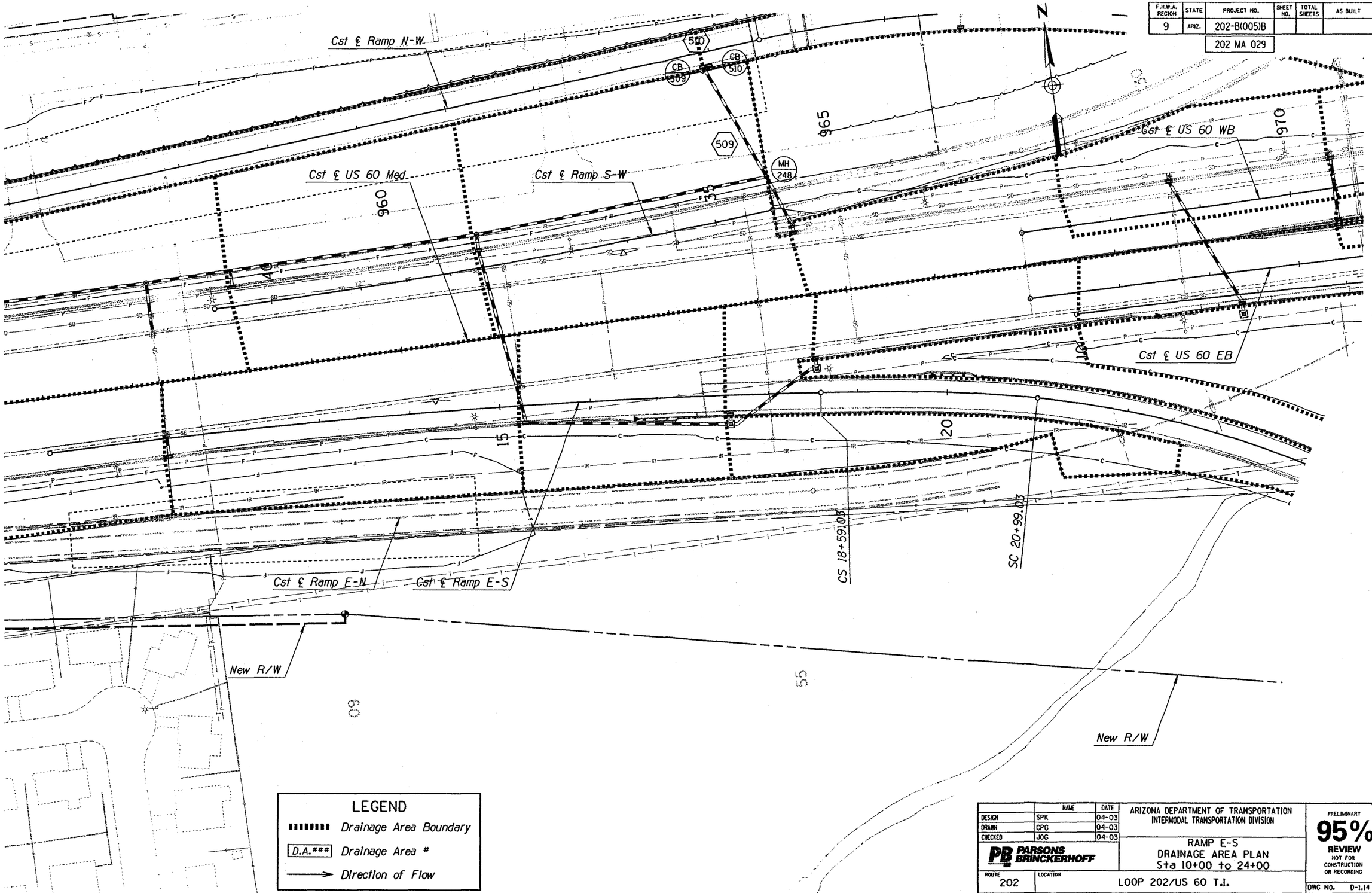
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.13

___ OF ___

Wed Apr 02 18:26:12 2003 H:\60_TI\phase_I\Drngarea\dap113.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
DRAINAGE AREA PLAN
Sta 10+00 to 24+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

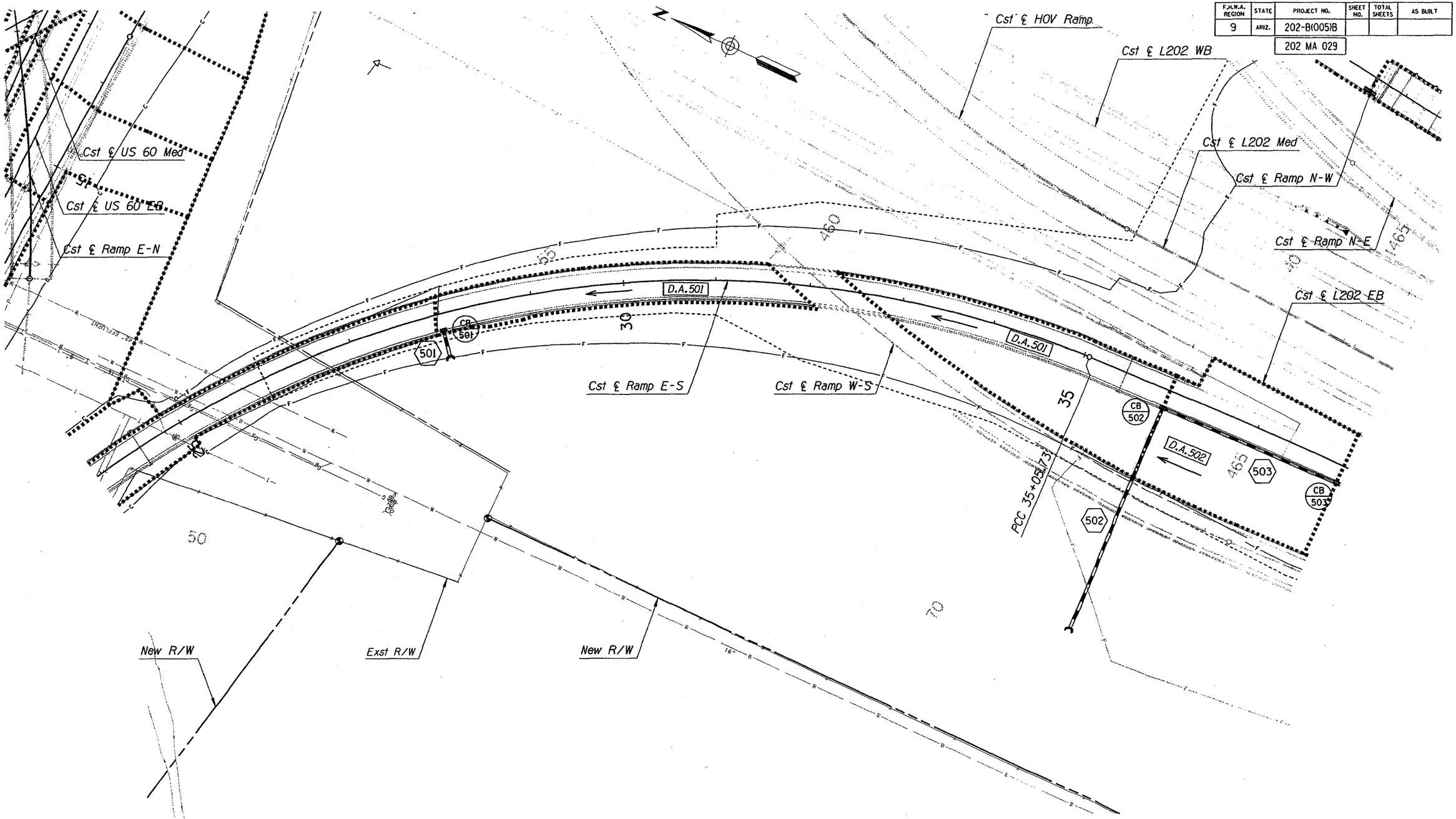
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.14

___ OF ___

Wed Apr 02 18:25:50 2003 H:\60_TI\phase_I\Drngarea\dap114.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
DRAINAGE AREA PLAN
Sta 24+00 to 38+00

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

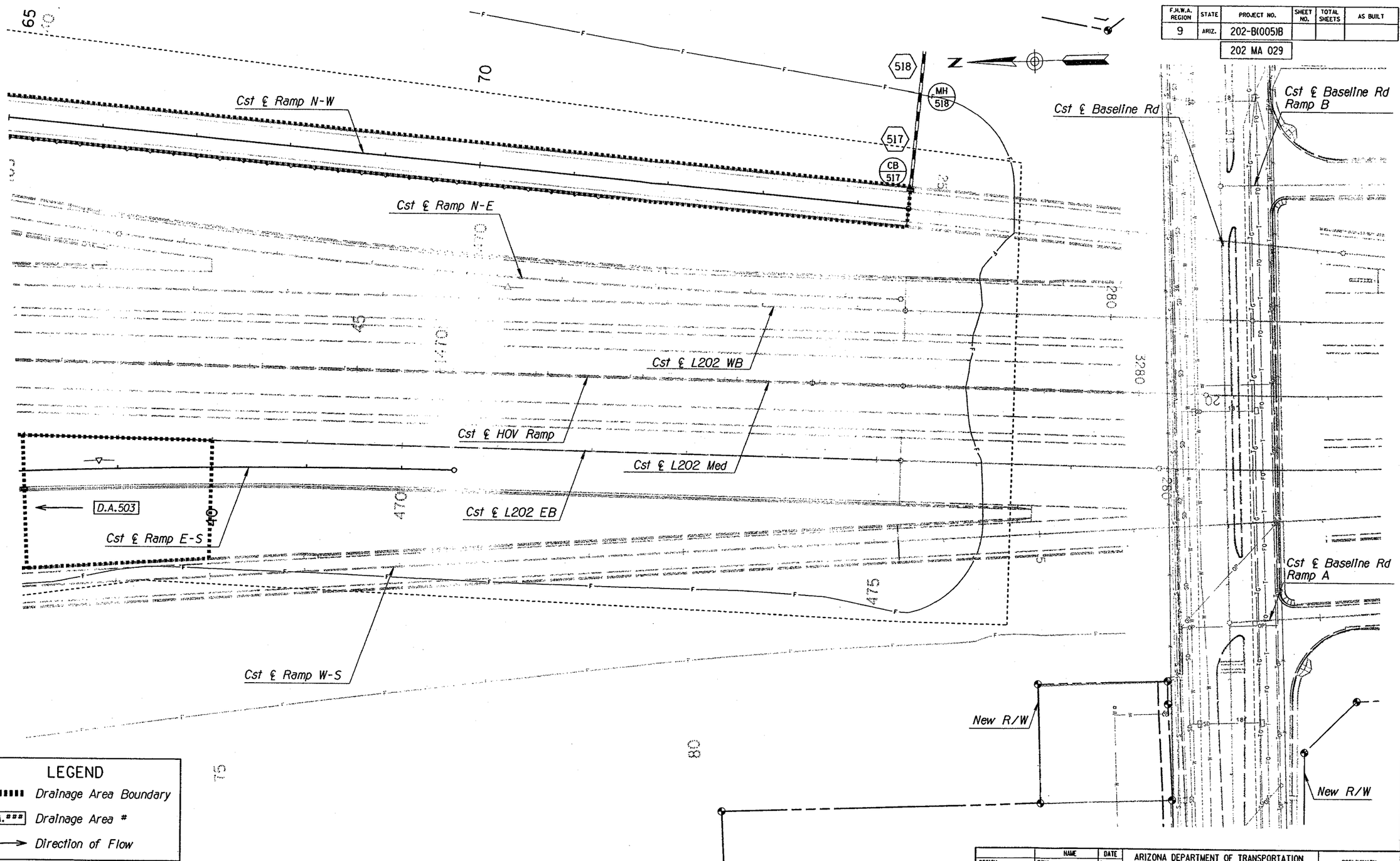
ROUTE: 202
LOCATION: LOOP 202/US 60 T.I.
DWG NO. D-1.15

TRACS NO. H 5686 03C
202-B(005)B
___ OF ___

Wed Apr 02 18:25:29 2003
H:\60_TI\phase_1\Drngarea\dap115.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
DRAINAGE AREA PLAN
Sta 38+00.00 to 42+54.93

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

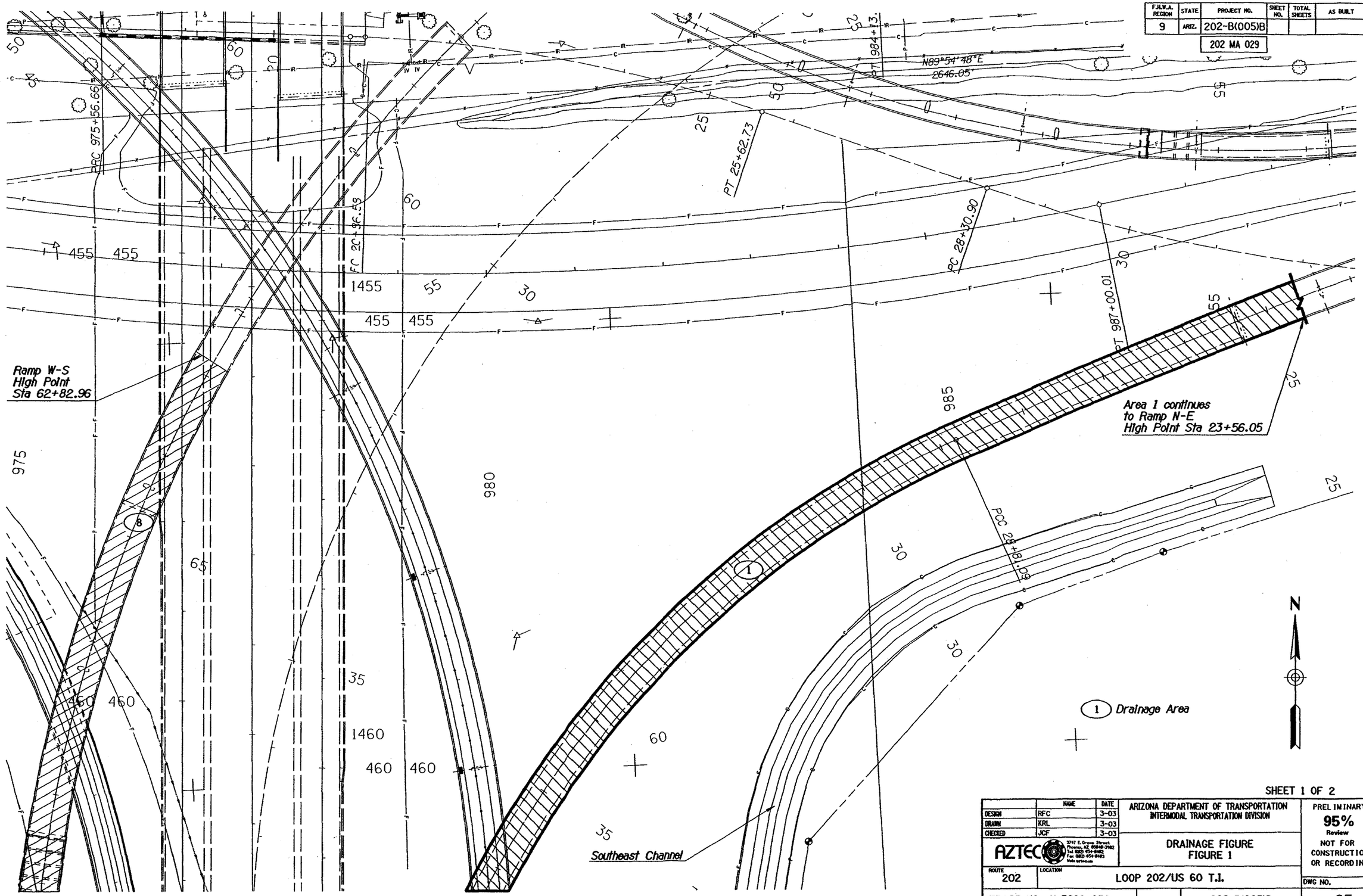
PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.16

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 18:30:19 2003 H:\60_TI\phase_I\Drngarea\dap116.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



SHEET 1 OF 2

	NAME	DATE
DESIGN	RFC	3-03
DRAWN	KRL	3-03
CHECKED	JCF	3-03

AZTEC 3747 E. Grove Street, Phoenix, AZ. 85040-3982 Tel: (602) 454-8482 Fax: (602) 454-8483 Web: aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DRAINAGE FIGURE
FIGURE 1

PRELIMINARY
95%
Review
NOT FOR CONSTRUCTION OR RECORDING

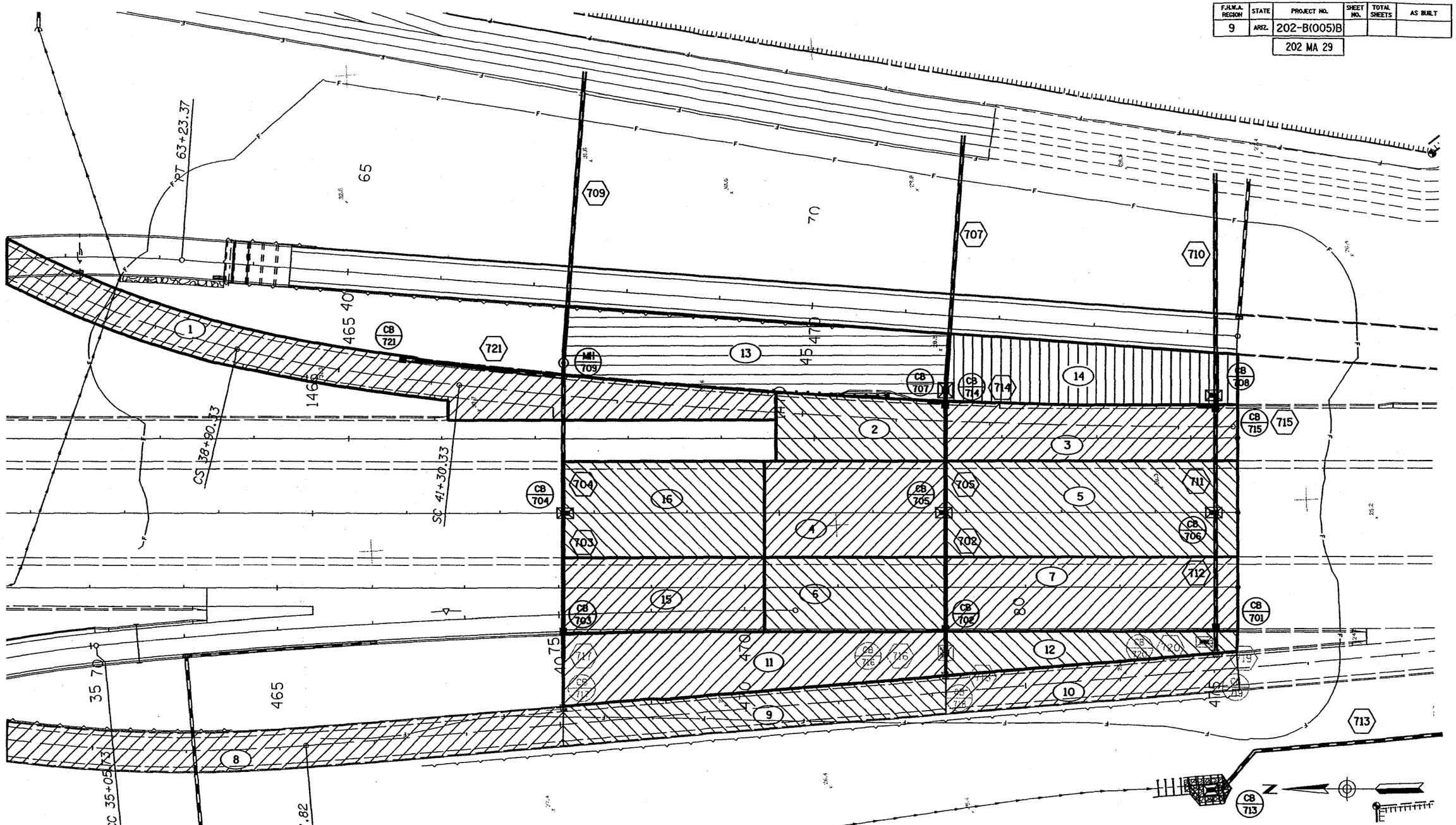
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO.

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Plotted By: Kleahy at 06:36:07 AM 03/27/2003 c:\pw_working\dms00816\AZ01107-01-DN-FG03.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 29			



SHEET 2 OF 2

	NAME	DATE
DESIGN	RFC	3-03
DRAWN	KRL	3-03
CHECKED	JCF	3-03

AZTEC 3747 E. Grove Street, Phoenix, AZ 85040-2162 Tel (602) 454-9482 Fax (602) 454-9483 Web: aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DRAINAGE FIGURE
FIGURE 2

PRELIMINARY
95%
Review
NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION L202/US 60 T.I.

DWG NO. ___ OF ___

TRACS NO. H 5686 03C | 202-B(005)B

Plotted By: Kleshy at 06:36:43 AM 03/27/2003 c:\pw_working\dms00816\AZ01107-01-DN-FG02.dgn

APPENDIX E

PAVEMENT DRAINAGE CALCULATIONS

ARIZONA DEPARTMENT OF TRANSPORTATION
HYDROLOGIC DESIGN DATA

Project No.	11194S	TRACS No.	
Project Name	Super Red Tan	Date	10/8/2002
Location/Station			
Designer	SPK	Checker	

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART A

Determine rainfall depths from the isopluvial maps (**Appendix B**):

2-year, 6-hour		$P_{2,6'}$=	1.10
2-year, 24-hour		$P_{2,24'}$=	1.35
100-year, 6-hour		$P_{100,6'}$=	3.00
100-year, 24-hour		$P_{100,24'}$=	3.60

PART B

Compute the following:

2-year, 1-hour	$-0.011+\frac{0.942(P_{2,6'})^2}{(P_{2,24'})}$	$P_{2,1'}$=	0.83
100-year, 1-hour	$0.494+\frac{0.755(P_{100,6'})^2}{(P_{100,24'})}$	$P_{100,1'}$=	2.38
2-year, 2-hour	$0.341(P_{2,6'})+0.659(P_{2,1'})$	$P_{2,2'}$=	0.92
2-year, 3-hour	$0.569(P_{2,6'})+0.431(P_{2,1'})$	$P_{2,3'}$=	0.99
2-year, 12-hour	$0.500(P_{2,6'})+0.500(P_{2,24'})$	$P_{2,12'}$=	1.23
100-year, 2-hour	$0.341(P_{100,6'})+0.659(P_{100,1'})$	$P_{100,2'}$=	2.59
100-year, 3-hour	$0.569(P_{100,6'})+0.431(P_{100,1'})$	$P_{100,3'}$=	2.73
100-year, 12-hour	$0.500(P_{100,6'})+0.500(P_{100,24'})$	$P_{100,12'}$=	3.30

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART C

Determine the short-duration rainfall zone (**Figure 1-1**):

Zone = 8

Determine the short duration rainfall ratios (**Table 1-1**):

Duration (Minutes)	Ratio			
	2-Year		100-Year	
5	A=	0.34	E=	0.30
10	B=	0.51	F=	0.46
15	C=	0.62	G=	0.59
30	D=	0.82	H=	0.80

Compute the following:

2-year, 5-min	(A)($P_{2,1'}$)=	$P_{2,5'}$=	0.28
2-year, 10-min	(B)($P_{2,1'}$)=	$P_{2,10'}$=	0.42
2-year, 15-min	(C)($P_{2,1'}$)=	$P_{2,15'}$=	0.52
2-year, 30-min	(D)($P_{2,1'}$)=	$P_{2,30'}$=	0.68
100-year, 5-min	(E)($P_{100,1'}$)=	$P_{100,5'}$=	0.71
100-year, 10-min	(F)($P_{100,1'}$)=	$P_{100,10'}$=	1.10
100-year, 15-min	(G)($P_{100,1'}$)=	$P_{100,15'}$=	1.41
100-year, 30-min	(H)($P_{100,1'}$)=	$P_{100,30'}$=	1.91

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART D

For any flood frequency (T-yr) other than the 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t}=(X)(P_{2,t})+(Y)(P_{100,t})$$

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected Frequency (T-year)

5 yr X= 0.674 Y= 0.278

5-min	$(X)(P_{2,5'})+(Y)(P_{100,5'})=$	$(P_{5,5'})=$	0.39
10-min	$(X)(P_{2,10'})+(Y)(P_{100,10'})=$	$(P_{5,10'})=$	0.59
15-min	$(X)(P_{2,15'})+(Y)(P_{100,15'})=$	$(P_{5,15'})=$	0.74
30-min	$(X)(P_{2,30'})+(Y)(P_{100,30'})=$	$(P_{5,30'})=$	0.99
1-hour	$(X)(P_{2,1'})+(Y)(P_{100,1'})=$	$(P_{5,1'})=$	1.22
2-hour	$(X)(P_{2,2'})+(Y)(P_{100,2'})=$	$(P_{5,2'})=$	1.34
3-hour	$(X)(P_{2,3'})+(Y)(P_{100,3'})=$	$(P_{5,3'})=$	1.42
6-hour	$(X)(P_{2,6'})+(Y)(P_{100,6'})=$	$(P_{5,6'})=$	1.58
12-hour	$(X)(P_{2,12'})+(Y)(P_{100,12'})=$	$(P_{5,12'})=$	1.74
24-hour	$(X)(P_{2,24'})+(Y)(P_{100,24'})=$	$(P_{5,24'})=$	1.91

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART D

For any flood frequency (T-yr) other than the 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t}=(X)(P_{2,t})+(Y)(P_{100,t})$$

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected Frequency (T-year)

10 yr X= 0.496 Y= 0.449

5-min	$(X)(P_{2,5'})+(Y)(P_{100,5'})=$	$(P_{10,5'})=$	0.46
10-min	$(X)(P_{2,10'})+(Y)(P_{100,10'})=$	$(P_{10,10'})=$	0.70
15-min	$(X)(P_{2,15'})+(Y)(P_{100,15'})=$	$(P_{10,15'})=$	0.89
30-min	$(X)(P_{2,30'})+(Y)(P_{100,30'})=$	$(P_{10,30'})=$	1.19
1-hour	$(X)(P_{2,1'})+(Y)(P_{100,1'})=$	$(P_{10,1'})=$	1.48
2-hour	$(X)(P_{2,2'})+(Y)(P_{100,2'})=$	$(P_{10,2'})=$	1.62
3-hour	$(X)(P_{2,3'})+(Y)(P_{100,3'})=$	$(P_{10,3'})=$	1.72
6-hour	$(X)(P_{2,6'})+(Y)(P_{100,6'})=$	$(P_{10,6'})=$	1.89
12-hour	$(X)(P_{2,12'})+(Y)(P_{100,12'})=$	$(P_{10,12'})=$	2.09
24-hour	$(X)(P_{2,24'})+(Y)(P_{100,24'})=$	$(P_{10,24'})=$	2.29

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART D

For any flood frequency (T-yr) other than the 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t}=(X)(P_{2,t})+(Y)(P_{100,t})$$

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected Frequency (T-year)

25 yr X= 0.293 Y= 0.669

5-min	$(X)(P_{2,5'})+(Y)(P_{100,5'})=$	$(P_{25,5'})=$	0.56
10-min	$(X)(P_{2,10'})+(Y)(P_{100,10'})=$	$(P_{25,10'})=$	0.86
15-min	$(X)(P_{2,15'})+(Y)(P_{100,15'})=$	$(P_{25,15'})=$	1.09
30-min	$(X)(P_{2,30'})+(Y)(P_{100,30'})=$	$(P_{25,30'})=$	1.47
1-hour	$(X)(P_{2,1'})+(Y)(P_{100,1'})=$	$(P_{25,1'})=$	1.84
2-hour	$(X)(P_{2,2'})+(Y)(P_{100,2'})=$	$(P_{25,2'})=$	2.01
3-hour	$(X)(P_{2,3'})+(Y)(P_{100,3'})=$	$(P_{25,3'})=$	2.12
6-hour	$(X)(P_{2,6'})+(Y)(P_{100,6'})=$	$(P_{25,6'})=$	2.33
12-hour	$(X)(P_{2,12'})+(Y)(P_{100,12'})=$	$(P_{25,12'})=$	2.57
24-hour	$(X)(P_{2,24'})+(Y)(P_{100,24'})=$	$(P_{25,24'})=$	2.80

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART D

For any flood frequency (T-yr) other than the 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t}=(X)(P_{2,t})+(Y)(P_{100,t})$$

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected Frequency (T-year)

50 yr X= 0.146 Y= 0.835

5-min	$(X)(P_{2,5'})+(Y)(P_{100,5'})=$	$(P_{50,5'})=$	0.64
10-min	$(X)(P_{2,10'})+(Y)(P_{100,10'})=$	$(P_{50,10'})=$	0.98
15-min	$(X)(P_{2,15'})+(Y)(P_{100,15'})=$	$(P_{50,15'})=$	1.25
30-min	$(X)(P_{2,30'})+(Y)(P_{100,30'})=$	$(P_{50,30'})=$	1.69
1-hour	$(X)(P_{2,1'})+(Y)(P_{100,1'})=$	$(P_{50,1'})=$	2.11
2-hour	$(X)(P_{2,2'})+(Y)(P_{100,2'})=$	$(P_{50,2'})=$	2.30
3-hour	$(X)(P_{2,3'})+(Y)(P_{100,3'})=$	$(P_{50,3'})=$	2.43
6-hour	$(X)(P_{2,6'})+(Y)(P_{100,6'})=$	$(P_{50,6'})=$	2.67
12-hour	$(X)(P_{2,12'})+(Y)(P_{100,12'})=$	$(P_{50,12'})=$	2.93
24-hour	$(X)(P_{2,24'})+(Y)(P_{100,24'})=$	$(P_{50,24'})=$	3.20

Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART D

For any flood frequency (T-yr) other than the 2-year or 100-year, calculate the rainfall depth for each rainfall duration (t) by the following equation:

$$P_{T,t}=(X)(P_{2,t})+(Y)(P_{100,t})$$

Frequency (T-yr)	X	Y
5-year	0.674	0.278
10-year	0.496	0.449
25-year	0.293	0.669
50-year	0.146	0.835
500-year	-0.337	1.381

Selected Frequency (T-year)

500 yr X= -0.337 Y= 1.381

5-min	$(X)(P_{2,5'})+(Y)(P_{100,5'})=$	$(P_{500,5'})=$	0.89
10-min	$(X)(P_{2,10'})+(Y)(P_{100,10'})=$	$(P_{500,10'})=$	1.37
15-min	$(X)(P_{2,15'})+(Y)(P_{100,15'})=$	$(P_{500,15'})=$	1.77
30-min	$(X)(P_{2,30'})+(Y)(P_{100,30'})=$	$(P_{500,30'})=$	2.40
1-hour	$(X)(P_{2,1'})+(Y)(P_{100,1'})=$	$(P_{500,1'})=$	3.01
2-hour	$(X)(P_{2,2'})+(Y)(P_{100,2'})=$	$(P_{500,2'})=$	3.27
3-hour	$(X)(P_{2,3'})+(Y)(P_{100,3'})=$	$(P_{500,3'})=$	3.44
6-hour	$(X)(P_{2,6'})+(Y)(P_{100,6'})=$	$(P_{500,6'})=$	3.77
12-hour	$(X)(P_{2,12'})+(Y)(P_{100,12'})=$	$(P_{500,12'})=$	4.14
24-hour	$(X)(P_{2,24'})+(Y)(P_{100,24'})=$	$(P_{500,24'})=$	4.52

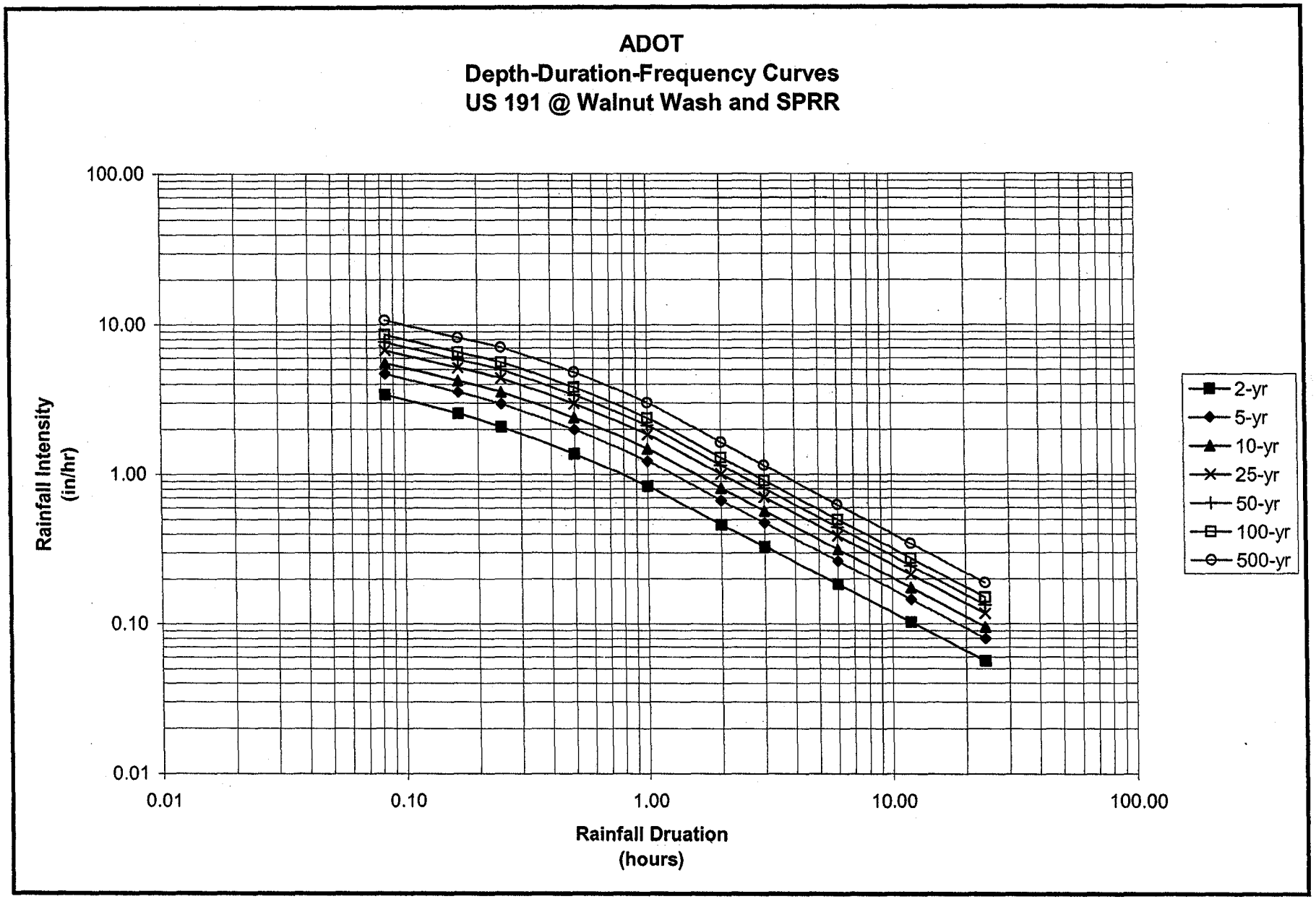
Figure 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

PART E

Tabulate the rainfall Depth-Duration-Frequency statistics below:

Duration	Rainfall Depth, In Inches						
	Frequency, In Years						
	2	5	10	25	50	100	500
5-min	0.28	0.39	0.46	0.56	0.64	0.71	0.89
10-min	0.42	0.59	0.70	0.86	0.98	1.10	1.37
15-min	0.52	0.74	0.89	1.09	1.25	1.41	1.77
30-min	0.68	0.99	1.19	1.47	1.69	1.91	2.40
1-hour	0.83	1.22	1.48	1.84	2.11	2.38	3.01
2-hour	0.92	1.34	1.62	2.01	2.30	2.59	3.27
3-hour	0.99	1.42	1.72	2.12	2.43	2.73	3.44
6-hour	1.10	1.58	1.89	2.33	2.67	3.00	3.77
12-hour	1.23	1.74	2.09	2.57	2.93	3.30	4.14
24-hour	1.35	1.91	2.29	2.80	3.20	3.60	4.52

Duration (hours)	Rainfall Intensity, In Inches per Hour						
	Frequency, In Years						
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
0.08	3.40	4.68	5.54	6.73	7.66	8.58	10.70
0.17	2.55	3.55	4.22	5.15	5.86	6.58	8.22
0.25	2.07	2.96	3.55	4.37	5.00	5.62	7.07
0.50	1.37	1.98	2.39	2.95	3.38	3.81	4.80
1	0.83	1.22	1.48	1.84	2.11	2.38	3.01
2	0.46	0.67	0.81	1.00	1.15	1.30	1.63
3	0.33	0.47	0.57	0.71	0.81	0.91	1.15
6	0.18	0.26	0.32	0.39	0.44	0.50	0.63
12	0.10	0.15	0.17	0.21	0.24	0.28	0.35
24	0.06	0.08	0.10	0.12	0.13	0.15	0.19


ADOT
Depth-Duration-Frequency Curves
US 191 @ Walnut Wash and SPRR
100.00
10.00
1.00
0.10
0.01
Rainfall Intensity
(in/hr)
0.01
0.10
1.00
10.00
100.00
Rainfall Druation
(hours)
2-yr
5-yr
10-yr
25-yr
50-yr
100-yr
500-yr

10-YEAR

5

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - US60 WB

18" Slotted

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	257	257	260	260	263	300	300
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	16	16	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	964+50	964+50	968+69	968+69	970+50	978+44	978+44
Location Description:	Grate	Slotted	Grate	Slotted	Grate	Grate	Slotted
Pavement Area (ac):	0.035	0.770	0.016	0.187	0.496	0.035	0.255
Sideslope Area (ac):	0.007	0.302	0.021	0.292	0.881	0.069	0.286
Contributing watershed area (acres):	0.042	1.072	0.037	0.479	1.377	0.104	0.541
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.91	0.88	0.81	0.80	0.79	0.78	0.82
CA	0.04	0.94	0.03	0.38	1.09	0.08	0.44
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	0.2	4.0	0.1	1.6	4.6	0.3	1.9
Previous by-pass flow (cfs):	0.3	0.0	0.2	1.9	0.3	1.2	2.2
Discharge added by operator:	—	—	—	—	—	—	—
Total discharge Q (cfs):	0.5	4.0	0.3	3.5	4.8	1.5	4.0
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	67%	50%	67%	50%	50%	67%
Inlet ADOT Std:	C-15.91	C-13.60	C-15.91	C-15.91	C-15.91	C-15.91	C-13.60
Grate width:	3	--	3	--	3	3	--
Grate length:	3.3	--	3.3	--	3.3	3.3	--
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	4.4	14.1	2.8	13.3	15.3	9.0	14.2
Depth at flowline (ft): before inlet	0.21	0.40	0.18	0.39	0.43	0.30	0.40
Water cross-area (sq.ft): before inlet	0.35	2.14	0.23	1.91	2.50	0.96	2.16
Velocity V for total discharge (fps): before inlet	1.40	1.86	1.33	1.82	1.94	1.58	1.87
Ratio of gutter depression flow to total Q (Eod):	97.0%	55.4%	100.0%	57.9%	51.9%	75.1%	55.1%
Equivalent cross-slope (Se):	0.067	0.047	0.068	0.048	0.045	0.056	0.046
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	98.6%	—	100.0%	—	56.7%	79.9%	—
Inlet frontal flow in cfs (Qw):	0.48	—	0.30	—	2.75	1.21	—
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2	7.2	—
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%	100.0%	—
Side flow in cfs (Qs):	0.01	—	0.00	—	2.10	0.30	—
Effective grate length w/clogging:	1.65	—	1.65	—	1.65	1.65	—
Fraction of side flow interception (Rs):	18.7%	—	0.0%	—	11.4%	15.6%	—
Grate Efficiency (E):	98.9%	—	100.0%	—	61.6%	83.0%	—
Total flow intercepted (cfs):	0.48	—	0.30	—	2.99	1.26	—
Grate flow-by (cfs):	0.01	—	0.00	—	1.86	0.26	—
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	—	20.0	—	18.6	—	—	20.1
Length of inlet provided L (ft):		15		15			10
Interception for length L (cfs):	—	3.66	—	3.29	—	—	2.87
Efficiency for length L:	—	0.92	—	0.95	—	—	0.71
Slotted drain or curb opening flow-by (cfs):	—	0.32	—	0.18	—	—	1.17
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—	—	—
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	—	—	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—	—	—

ULTIMATE ADOT
HEC-12 (10-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.							
Inlet Number:	305	311	311	318	318	326	326
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	16	16	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	981+50	987+00	987+00	995+00	995+00	1004+40	1004+40
Location Description:	Grate	Grate	Slotted	Grate	Slotted	Grate	Slotted
Pavement Area (ac):	0.446	0.035	1.020	0.035	1.380	0.017	0.563
Sideslope Area (ac):	0.532	0.069	1.780	0.046	1.120	0.000	0.293
Contributing watershed area (acres):	0.978	0.104	2.800	0.081	2.500	0.017	0.856
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.81	0.78	0.79	0.81	0.84	0.95	0.86
CA	0.80	0.08	2.22	0.07	2.10	0.02	0.74
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	3.4	0.3	9.3	0.3	8.8	0.1	3.1
Previous by-pass flow (cfs):	2.3	6.2	0.6	2.5	0.0	0.5	0.8
Discharge added by operator:	--	--	--	--	--	--	--
Total discharge Q (cfs):	5.7	6.6	9.9	2.8	8.8	0.6	3.9
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0044	0.0086	0.0086	0.0073	0.0073	0.0040	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	3	1	3	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	67%	50%	67%	50%	67%
Inlet ADOT Std:	C-15.91	C-15.91	C-13.60	C-15.91	C-13.60	C-15.91	C-13.60
Grate width:	3	3	--	3	--	3	--
Grate length:	3.3	3.3	--	3.3	--	3.3	--
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	14.6	13.4	16.0	9.3	15.8	4.3	12.6
Depth at flowline (ft): before inlet	0.41	0.39	0.44	0.31	0.44	0.21	0.37
Water cross-area (sq.ft): before inlet	2.27	1.94	2.71	1.02	2.64	0.33	1.75
Velocity V for total discharge (fps): before inlet	2.51	3.38	3.66	2.73	3.35	1.77	2.25
Ratio of gutter depression flow to total Q (Eod):	54.0%	57.6%	50.2%	73.5%	50.8%	97.4%	60.0%
Equivalent cross-slope (Se):	0.046	0.048	0.044	0.055	0.044	0.067	0.049
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	58.9%	62.6%	---	78.4%	---	98.9%	---
Inlet frontal flow in cfs (Qw):	3.36	4.10	---	2.17	---	0.58	---
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2	---	7.2	---	7.2	---
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%	---	100.0%	---	100.0%	---
Side flow in cfs (Qs):	2.34	2.46	---	0.60	---	0.01	---
Effective grate length w/clogging:	1.65	1.65	---	1.65	---	1.65	---
Fraction of side flow interception (Rs):	7.5%	4.5%	---	6.5%	---	13.1%	---
Grate Efficiency (E):	62.0%	64.2%	---	79.8%	---	99.1%	---
Total flow intercepted (cfs):	3.53	4.21	---	2.21	---	0.58	---
Grate flow-by (cfs):	2.17	2.34	---	0.56	---	0.01	---
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	---	---	43.8	---	39.6	---	22.2
Length of inlet provided L (ft):			10		20		15
Interception for length L (cfs):	---	---	3.69	---	6.35	---	3.41
Efficiency for length L:	---	---	0.37	---	0.72	---	0.87
Slotted drain or curb opening flow-by (cfs):	---	---	6.21	---	2.50	---	0.52
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	---	---	---	---	---	---	---
Capacity of grate in a sag (4-sided weir):	---	---	---	---	---	---	---
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---	---	---
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	---	---	---	---	---	---	---
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---	---	---	---	---
Flanking inlets maximum distance (ft):	---	---	---	---	---	---	---
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	---	---	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---	---	---

ULTIMATE ADOT
HEC-12 (10-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.		
Inlet Number:	329	329
Return Period:	10	10
Allowable Spread:	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	1009+37	1009+37
Location Description:	Grate	Slotted
Pavement Area (ac):	0.013	0.872
Sideslope Area (ac):	0.000	0.643
Contributing watershed area (acres):	0.013	1.515
Pavement Runoff Coefficient "C":	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.84
CA	0.01	1.28
Precipitation intensity (in/hr):	4.22	4.22
Subarea discharge Q (cfs):	0.1	5.4
Previous by-pass flow (cfs):	3.0	1.0
Discharge added by operator:	--	--
Total discharge Q (cfs):	3.0	6.4
SHOULDER AND GUTTER CONFIGURATION:		
Manning's n:	0.016	0.016
Longitudinal slope S (ft/ft):	0.0040	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3
Capture Ratio Used:	50%	67%
Inlet ADOT Std:	C-15.91	C-13.60
Grate width:	3	--
Grate length:	3.3	--
Pavement cross-slope (Sx):	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068
Flooded Width from flowline (ft): before inlet	11.2	15.6
Depth at flowline (ft): before inlet	0.34	0.43
Water cross-area (sq.ft): before inlet	1.41	2.59
Velocity V for total discharge (fps): before inlet	2.15	2.47
Ratio of gutter depression flow to total Q (Eod):	65.3%	51.2%
Equivalent cross-slope (Se):	0.051	0.045
GRATE INLETS ON-GRADE:		
Ratio of grate frontal flow to total flow:	70.4%	----
Inlet frontal flow in cfs (Qw):	2.13	----
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	----
Fraction of frontal flow intercepted (Rf):	100.0%	----
Side flow in cfs (Qs):	0.89	----
Effective grate length w/clogging:	1.65	----
Fraction of side flow interception (Rs):	9.6%	----
Grate Efficiency (E):	73.2%	----
Total flow intercepted (cfs):	2.21	----
Grate flow-by (cfs):	0.81	----
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:		
Length required for total interception (ft): w/clogging	----	28.8
Length of inlet provided L (ft):		10
Interception for length L (cfs):	----	3.43
Efficiency for length L:	----	0.54
Slotted drain or curb opening flow-by (cfs):	----	2.97
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:		
Head available for weir flow at sag (ft):		
Capacity of grate in a sag (3-sided weir):	----	----
Capacity of grate in a sag (4-sided weir):	----	----
Length provided of curb-opening or slotted drain at sag:		
Capacity of curb-opening or slotted drain in a sag (weir):	----	----
Length of the vertical curve (ft x 100):		
approach grade #1 (%):		
approach grade #2 (%):		
ABS (algebraic diff. in approach grades) (%):	----	----
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----
Flanking inlets maximum distance (ft):	----	----
TRIANGULAR MEDIAN HYDRAULICS:		
Manning's n for median finish:		
Cross-slope of median sides:		
Depth of flow at center of median (ft):	----	----
Flooded width in the median (ft):	----	----
Water velocity in the median (fps):	----	----

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - US60 EB

18" Slotted

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	251	251	254	254	256	256	259
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	16	16	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	957+30	957+30	961+25	961+25	964+56	964+56	969+31
Location Description:	Grate	Slotted	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.034	0.787	0.034	0.553	0.034	0.760	0.026
Sideslope Area (ac):	0.026	0.604	0.026	0.362	0.000	0.438	0.000
Contributing watershed area (acres):	0.060	1.391	0.060	0.915	0.034	1.198	0.026
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.84	0.84	0.84	0.85	0.95	0.86	0.95
CA	0.05	1.17	0.05	0.78	0.03	1.03	0.02
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	0.2	4.9	0.2	3.3	0.1	4.3	0.1
Previous by-pass flow (cfs):	0.1	0.0	0.4	0.9	0.3	0.0	0.0
Discharge added by operator:	—	—	—	—	—	—	—
Total discharge Q (cfs):	0.3	5.0	0.6	4.2	0.4	4.3	0.2
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	2	2	2
Capture Ratio Used:	50%	67%	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.91	C-15.91	C-15.91	C-13.60	C-15.92	C-13.60	C-15.92
Grate width:	3	–	3	–	2	–	2
Grate length:	3.3	–	3.3	–	3.3	–	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	4.50	4.50	4.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.038	0.038	0.038
Flooded Width from flowline (ft): before inlet	2.8	15.5	5.2	14.4	4.8	15.3	3.1
Depth at flowline (ft): before inlet	0.18	0.43	0.22	0.41	0.18	0.39	0.12
Water cross-area (sq.ft): before inlet	0.23	2.55	0.42	2.21	0.41	2.52	0.18
Velocity V for total discharge (fps): before inlet	1.32	1.94	1.43	1.88	1.10	1.73	0.84
Ratio of gutter depression flow to total Q (Eod):	100.0%	51.5%	94.0%	54.6%	100.0%	66.3%	100.0%
Equivalent cross-slope (Se):	0.068	0.045	0.065	0.046	0.038	0.032	0.038
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	100.0%	—	96.6%	—	91.1%	—	97.8%
Inlet frontal flow in cfs (Qw):	0.30	—	0.58	—	0.41	—	0.15
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2	—	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%	—	100.0%
Side flow in cfs (Qs):	0.00	—	0.02	—	0.04	—	0.00
Effective grate length w/clogging:	1.65	—	1.65	—	1.65	—	1.65
Fraction of side flow interception (Rs):	0.0%	—	18.2%	—	26.4%	—	36.7%
Grate Efficiency (E):	100.0%	—	97.2%	—	93.5%	—	98.6%
Total flow intercepted (cfs):	0.30	—	0.58	—	0.42	—	0.15
Grate flow-by (cfs):	0.00	—	0.02	—	0.03	—	0.00
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	—	22.4	—	20.4	—	26.0	—
Length of inlet provided L (ft):		20		15		20	
Interception for length L (cfs):	—	4.87	—	3.78	—	4.03	—
Efficiency for length L:	—	0.98	—	0.91	—	0.93	—
Slotted drain or curb opening flow-by (cfs):	—	0.09	—	0.38	—	0.31	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—	—	—
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	—	—	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—	—	—

ULTIMATE ADOT
HEC-12 (10-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.							
Inlet Number:	259	302	302	310	310	313	317
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	16	16	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	969+31	978+68	978+68	985+70	985+70	989+01	993+30
Location Description:	Slotted	Grate	Slotted	Grate	Slotted	Grate	Grate
Pavement Area (ac):	0.390	0.029	0.615	0.029	0.334	0.466	0.454
Sideslope Area (ac):	0.000	0.000	0.423	0.032	0.948	1.710	1.240
Contributing watershed area (acres):	0.390	0.029	1.038	0.061	1.282	2.176	1.694
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.85	0.82	0.77	0.75	0.77
CA	0.37	0.03	0.88	0.05	0.98	1.64	1.30
Precipitation Intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	1.6	0.1	3.7	0.2	4.1	6.9	5.5
Previous by-pass flow (cfs):	0.3	0.0	0.1	1.2	4.2	3.1	2.4
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	1.9	0.1	3.8	1.5	8.4	10.0	7.9
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0071	0.0071	0.0098	0.0084
Inlet type (1=grate, 2=curb opening, 3=slotted):	3	1	3	1	3	1	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	3	3	3	3
Capture Ratio Used:	67%	50%	67%	50%	67%	50%	50%
Inlet ADOT Std:	C-13.60	C-15.92	C-13.60	C-15.91	C-13.60	C-15.91	C-15.91
Grate width:	--	2	--	3	--	3	3
Grate length:	--	3.3	--	3.3	--	3.3	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	4.50	4.50	4.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.038	0.038	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	10.5	2.8	14.5	6.6	15.5	15.6	14.5
Depth at flowline (ft): before inlet	0.29	0.11	0.37	0.25	0.43	0.43	0.41
Water cross-area (sq.ft): before inlet	1.29	0.15	2.28	0.59	2.56	2.59	2.27
Velocity V for total discharge (fps): before inlet	1.44	0.78	1.68	2.49	3.28	3.86	3.46
Ratio of gutter depression flow to total Q (Eod):	83.4%	100.0%	68.7%	87.2%	51.4%	51.2%	54.0%
Equivalent cross-slope (Se):	0.035	0.038	0.032	0.062	0.045	0.045	0.046
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	---	98.8%	---	90.9%	---	56.0%	59.0%
Inlet frontal flow in cfs (Qw):	---	0.11	---	1.32	---	5.60	4.63
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	7.2	---	7.2	---	7.2	7.2
Fraction of frontal flow intercepted (Rf):	---	100.0%	---	100.0%	---	100.0%	100.0%
Side flow in cfs (Qs):	---	0.00	---	0.13	---	4.40	3.22
Effective grate length w/clogging:	---	1.65	---	1.65	---	1.65	1.65
Fraction of side flow interception (Rs):	---	39.6%	---	7.6%	---	3.6%	4.3%
Grate Efficiency (E):	---	99.3%	---	91.6%	---	57.6%	60.7%
Total flow intercepted (cfs):	---	0.12	---	1.33	---	5.76	4.77
Grate flow-by (cfs):	---	0.00	---	0.12	---	4.25	3.08
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	17.2	---	24.5	---	38.3	---	---
Length of inlet provided L (ft):	15		25		25		
Interception for length L (cfs):	1.81	---	3.84	---	7.14	---	---
Efficiency for length L:	0.97	---	1.00	---	0.85	---	---
Slotted drain or curb opening flow-by (cfs):	0.05	---	0.00	---	1.24	---	---
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	---	---	---	---	---	---	---
Capacity of grate in a sag (4-sided weir):	---	---	---	---	---	---	---
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---	---	---
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	---	---	---	---	---	---	---
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---	---	---	---	---
Flanking inlets maximum distance (ft):	---	---	---	---	---	---	---
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	---	---	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---	---	---

ULTIMATE ADOT
HEC-12 (10-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.		
Inlet Number:	319	323
Return Period:	10	10
Allowable Spread:	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	997+45	1002+85
Location Description:	Grate	Grate
Pavement Area (ac):	0.590	0.577
Sideslope Area (ac):	0.978	0.368
Contributing watershed area (acres):	1.568	0.945
Pavement Runoff Coefficient "C":	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70
Composite Runoff Coefficient "C":	0.79	0.85
CA	1.25	0.81
Precipitation intensity (in/hr):	4.22	4.22
Subarea discharge Q (cfs):	5.3	3.4
Previous by-pass flow (cfs):	1.0	0.0
Discharge added by operator:	--	--
Total discharge Q (cfs):	6.2	3.4
SHOULDER AND GUTTER CONFIGURATION:		
Manning's n:	0.016	0.016
Longitudinal slope S (ft/ft):	0.0057	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1
Longitudinal profile (1=on-grade, 2=sag):	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3
Capture Ratio Used:	50%	50%
Inlet ADOT Std:	C-15.91	C-15.91
Grate width:	3	3
Grate length:	3.3	3.3
Pavement cross-slope (Sx):	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068
Flooded Width from flowline (ft): before inlet	14.3	11.8
Depth at flowline (ft): before inlet	0.41	0.36
Water cross-area (sq.ft): before inlet	2.20	1.55
Velocity V for total discharge (fps): before inlet	2.83	2.19
Ratio of gutter depression flow to total Q (Eod):	54.7%	62.9%
Equivalent cross-slope (Se):	0.046	0.050
GRATE INLETS ON-GRADE:		
Ratio of grate frontal flow to total flow:	59.6%	68.0%
Inlet frontal flow in cfs (Qw):	3.72	2.31
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%
Side flow in cfs (Qs):	2.52	1.09
Effective grate length w/clogging:	1.65	1.65
Fraction of side flow interception (Rs):	6.1%	9.3%
Grate Efficiency (E):	62.1%	71.0%
Total flow intercepted (cfs):	3.87	2.41
Grate flow-by (cfs):	2.37	0.99
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:		
Length required for total interception (ft): w/clogging	----	----
Length of inlet provided L (ft):		
Interception for length L (cfs):	----	----
Efficiency for length L:	----	----
Slotted drain or curb opening flow-by (cfs):	----	----
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:		
Head available for weir flow at sag (ft):		
Capacity of grate in a sag (3-sided weir):	----	----
Capacity of grate in a sag (4-sided weir):	----	----
Length provided of curb-opening or slotted drain at sag:		
Capacity of curb-opening or slotted drain in a sag (weir):	----	----
Length of the vertical curve (ft x 100):		
approach grade #1 (%):		
approach grade #2 (%):		
ABS (algebraic diff. in approach grades) (%):	----	----
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----
Flanking inlets maximum distance (ft):	----	----
TRIANGULAR MEDIAN HYDRAULICS:		
Manning's n for median finish:		
Cross-slope of median sides:		
Depth of flow at center of median (ft):	----	----
Flooded width in the median (ft):	----	----
Water velocity in the median (fps):	----	----

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - US60 HOV WB

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	262	262	308	308	315
Return Period:	10	10	10	10	10
Allowable Spread:	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	970+50	970+50	981+96	981+96	989+01
Location Description:	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.014	0.647	0.010	0.402	1.560
Sideslope Area (ac):	0.000	0.000	0.000	0.000	0.000
Contributing watershed area (acres):	0.014	0.647	0.010	0.402	1.560
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
CA	0.01	0.61	0.01	0.38	1.48
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	0.1	2.6	0.0	1.6	6.3
Previous by-pass flow (cfs):	0.2	0.6	1.7	2.8	0.0
Discharge added by operator:	—	—	—	—	—
Total discharge Q (cfs):	0.2	3.2	1.8	4.4	6.3
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0041	0.0041	0.0098
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	2	4
Capture Ratio Used:	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.92	C-13.60	C-15.92	C-13.60	C-15.91
Grate width:	2	--	2	--	3
Grate length:	3.3	--	3.3	--	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.052
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.021
Flooded Width from flowline (ft): before inlet	2.5	13.5	9.2	13.9	13.8
Depth at flowline (ft): before inlet	0.17	0.39	0.30	0.40	0.28
Water cross-area (sq.ft): before inlet	0.20	1.96	1.01	2.08	1.90
Velocity V for total discharge (fps): before inlet	1.06	1.61	1.76	2.09	3.30
Ratio of gutter depression flow to total Q (Eod):	100.0%	51.6%	69.6%	50.1%	47.9%
Equivalent cross-slope (Se):	0.068	0.045	0.053	0.044	0.020
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	99.9%	—	63.3%	—	53.8%
Inlet frontal flow in cfs (Qw):	0.22	—	1.12	—	3.37
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%
Side flow in cfs (Qs):	0.00	—	0.65	—	2.89
Effective grate length w/clogging:	1.65	—	1.65	—	1.65
Fraction of side flow interception (Rs):	27.5%	—	13.2%	—	4.7%
Grate Efficiency (E):	99.9%	—	68.1%	—	56.0%
Total flow intercepted (cfs):	0.22	—	1.20	—	3.50
Grate flow-by (cfs):	0.00	—	0.56	—	2.75
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	—	18.5	—	24.9	—
Length of inlet provided L (ft):		15		10	
Interception for length L (cfs):	—	3.00	—	2.63	—
Efficiency for length L:	—	0.95	—	0.60	—
Slotted drain or curb opening flow-by (cfs):	—	0.16	—	1.73	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - US60 HOV EB

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	261	261	307	307	314
Return Period:	10	10	10	10	10
Allowable Spread:	16	16	16	16	16
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	970+50	970+50	981+96	981+96	989+01
Location Description:	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.014	0.656	0.010	0.404	1.580
Sideslope Area (ac):	0.000	0.000	0.000	0.000	0.000
Contributing watershed area (acres):	0.014	0.656	0.010	0.404	1.580
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
CA	0.01	0.62	0.01	0.38	1.50
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	0.1	2.6	0.0	1.6	6.3
Previous by-pass flow (cfs):	0.2	0.6	1.8	2.8	0.0
Discharge added by operator:	---	---	---	---	---
Total discharge Q (cfs):	0.2	3.2	1.8	4.4	6.3
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0041	0.0041	0.0098
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	2	4
Capture Ratio Used:	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.92	C-13.60	C-15.92	C-13.60	C-15.91
Grate width:	2	--	2	--	3
Grate length:	3.3	--	3.3	--	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.052
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.021
Flooded Width from flowline (ft): before inlet	2.6	13.6	9.3	14.0	13.8
Depth at flowline (ft): before inlet	0.17	0.39	0.31	0.40	0.28
Water cross-area (sq.ft): before inlet	0.22	1.99	1.02	2.10	1.92
Velocity V for total discharge (fps): before inlet	1.07	1.62	1.77	2.10	3.31
Ratio of gutter depression flow to total Q (Eod):	100.0%	51.3%	69.2%	49.9%	47.8%
Equivalent cross-slope (Se):	0.068	0.045	0.053	0.044	0.020
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	99.8%	---	62.8%	---	53.7%
Inlet frontal flow in cfs (Qw):	0.23	---	1.13	---	3.40
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	---	7.2	---	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	---	100.0%	---	100.0%
Side flow in cfs (Qs):	0.00	---	0.67	---	2.93
Effective grate length w/clogging:	1.65	---	1.65	---	1.65
Fraction of side flow interception (Rs):	27.1%	---	13.2%	---	4.7%
Grate Efficiency (E):	99.8%	---	67.7%	---	55.8%
Total flow intercepted (cfs):	0.23	---	1.22	---	3.54
Grate flow-by (cfs):	0.00	---	0.58	---	2.80
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	18.7	---	25.0	---
Length of inlet provided L (ft):		15		10	
Interception for length L (cfs):	---	3.04	---	2.65	---
Efficiency for length L:	---	0.95	---	0.60	---
Slotted drain or curb opening flow-by (cfs):	---	0.18	---	1.76	---
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	---	---	---	---	---
Capacity of grate in a sag (4-sided weir):	---	---	---	---	---
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	---	---	---	---	---
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---	---	---
Flanking inlets maximum distance (ft):	---	---	---	---	---
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - Ellsworth Ramp B

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%		
Inlet Number:	266	265	264	264	269	268	268
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	14	14	14	14	8	8	8
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of Ramp Med/Cst CL)	14+66	15+76	16+77	16+77	18+08	19+98	19+98
Location Description:	Grate	Grate	Grate	Slotted	Grate	Grate	Slotted
Pavement Area (ac):	0.079	0.142	0.018	0.095	0.202	0.018	0.089
Sideslope Area (ac):	0.218	0.275	0.014	0.284	0.145	0.014	0.065
Contributing watershed area (acres):	0.297	0.417	0.032	0.379	0.347	0.032	0.154
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.77	0.79	0.84	0.76	0.85	0.84	0.84
CA	0.23	0.33	0.03	0.29	0.29	0.03	0.13
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	1.0	1.4	0.1	1.2	1.2	0.1	0.5
Previous by-pass flow (cfs):	0.2	0.0	0.5	0.2	0.0	0.2	0.3
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	1.2	1.4	0.6	1.4	1.2	0.3	0.8
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0023	0.0023
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	3	1	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	50%	67%	50%	50%	67%
Inlet ADOT Std:	C-15.92	C-15.91	C-15.91	C-13.60	C-15.91	C-15.91	C-13.60
Grate width:	2	3	3	--	3	3	--
Grate length:	3.3	3.3	3.3	--	3.3	3.3	--
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	4.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	8.4	8.6	5.2	8.6	8.0	2.8	6.7
Depth at flowline (ft): before inlet	0.25	0.29	0.22	0.29	0.28	0.18	0.25
Water cross-area (sq.ft): before inlet	0.89	0.89	0.42	0.89	0.80	0.23	0.60
Velocity V for total discharge (fps): before inlet	1.32	1.56	1.43	1.56	1.54	1.27	1.42
Ratio of gutter depression flow to total Q (Eod):	91.6%	76.8%	94.0%	77.1%	79.7%	100.0%	86.7%
Equivalent cross-slope (Se):	0.036	0.057	0.065	0.057	0.058	0.068	0.062
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	68.8%	81.5%	96.5%	---	84.3%	100.0%	---
Inlet frontal flow in cfs (Qw):	0.81	1.14	0.58	---	1.04	0.29	---
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2	7.2	---	7.2	7.2	---
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%	100.0%	---	100.0%	100.0%	---
Side flow in cfs (Qs):	0.37	0.26	0.02	---	0.19	0.00	---
Effective grate length w/clogging:	1.65	1.65	1.65	---	1.65	1.65	---
Fraction of side flow interception (Rs):	20.3%	15.9%	18.2%	---	16.4%	0.0%	---
Grate Efficiency (E):	75.1%	84.5%	97.1%	---	86.9%	100.0%	---
Total flow intercepted (cfs):	0.88	1.18	0.58	---	1.08	0.29	---
Grate flow-by (cfs):	0.29	0.22	0.02	---	0.16	0.00	---
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	---	---	---	11.3	---	---	8.6
Length of inlet provided L (ft):				5			5
Interception for length L (cfs):	---	---	---	0.90	---	---	0.67
Efficiency for length L:	---	---	---	0.65	---	---	0.79
Slotted drain or curb opening flow-by (cfs):	---	---	---	0.49	---	---	0.18
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	---	---	---	---	---	---	---
Capacity of grate in a sag (4-sided weir):	---	---	---	---	---	---	---
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---	---	---
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	---	---	---	---	---	---	---
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---	---	---	---	---
Flanking inlets maximum distance (ft):	---	---	---	---	---	---	---
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	---	---	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---	---	---

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - RAMP E-S

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	500	500			
Return Period:	10	10			
Allowable Spread:	16	16			
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐			
Structure Station: (Stationing off of Ramp Med/Cst CL)	17+56	17+56			
Location Description:	Grate	Slotted			
Pavement Area (ac):	0.030	1.120			
Sideslope Area (ac):	0.000	0.102			
Contributing watershed area (acres):	0.030	1.222			
Pavement Runoff Coefficient "C":	0.95	0.95			
Sideslope Runoff Coefficient "C":	0.70	0.70			
Composite Runoff Coefficient "C":	0.95	0.93			
CA	0.03	1.14			
Precipitation intensity (in/hr):	4.22	4.22			
Subarea discharge Q (cfs):	0.1	4.8			
Previous by-pass flow (cfs):	2.2	0.0			
Discharge added by operator:	---	---			
Total discharge Q (cfs):	2.3	4.8			
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016			
Longitudinal slope S (ft/ft):	0.0028	0.0028			
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3			
Longitudinal profile (1=on-grade, 2=sag):	1	1			
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2			
Capture Ratio Used:	50%	67%			
Inlet ADOT Std:	C-15.92	C-13.60			
Grate width:	2	–			
Grate length:	3.3	–			
Pavement cross-slope (Sx):	0.020	0.020			
Width of gutter from flowline (ft):	4.50	4.50			
Gutter depression from horizontal (ft):	0.17	0.17			
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.038			
Flooded Width from flowline (ft): before inlet	11.3	15.6			
Depth at flowline (ft): before inlet	0.31	0.39			
Water cross-area (sq.ft): before inlet	1.46	2.62			
Velocity V for total discharge (fps): before inlet	1.56	1.83			
Ratio of gutter depression flow to total Q (Eod):	80.2%	65.3%			
Equivalent cross-slope (Se):	0.034	0.032			
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	54.5%	---			
Inlet frontal flow in cfs (Qw):	1.25	---			
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	---			
Fraction of frontal flow intercepted (Rf):	100.0%	---			
Side flow in cfs (Qs):	1.04	---			
Effective grate length w/clogging:	1.65	---			
Fraction of side flow interception (Rs):	15.9%	---			
Grate Efficiency (E):	61.7%	---			
Total flow intercepted (cfs):	1.41	---			
Grate flow-by (cfs):	0.87	---			
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	28.0			
Length of inlet provided L (ft):		10			
Interception for length L (cfs):	---	2.63			
Efficiency for length L:	---	0.55			
Slotted drain or curb opening flow-by (cfs):	---	2.16			
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	---	---			
Capacity of grate in a sag (4-sided weir):	---	---			
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---			
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	---	---			
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---			
Flanking inlets maximum distance (ft):	---	---			
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---			
Flooded width in the median (ft):	---	---			
Water velocity in the median (fps):	---	---			

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - Detour

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	351				
Return Period:	10				
Allowable Spread:	16				
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐				
Structure Station: (Stationing off of Med/Cst CL)	1003+34				
Location Description:	Grate				
Pavement Area (ac):	0.924				
Sideslope Area (ac):	0.000				
Contributing watershed area (acres):	0.924				
Pavement Runoff Coefficient "C":	0.95				
Sideslope Runoff Coefficient "C":	0.70				
Composite Runoff Coefficient "C":	0.95				
CA	0.88				
Precipitation intensity (in/hr):	4.22				
Subarea discharge Q (cfs):	3.7				
Previous by-pass flow (cfs):	0.0				
Discharge added by operator:	—				
Total discharge Q (cfs):	3.7				
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016				
Longitudinal slope S (ft/ft):	0.0025				
Inlet type (1=grate, 2=curb opening, 3=slotted):	1				
Longitudinal profile (1=on-grade, 2=sag):	1				
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2				
Capture Ratio Used:	50%				
Inlet ADOT Std:	C-15.30				
Grate width:	2				
Grate length:	3.0				
Pavement cross-slope (Sx):	0.020				
Width of gutter from flowline (ft):	2.50				
Gutter depression from horizontal (ft):	0.17				
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068				
Flooded Width from flowline (ft): before inlet	14.4				
Depth at flowline (ft): before inlet	0.41				
Water cross-area (sq.ft): before inlet	2.23				
Velocity V for total discharge (fps): before inlet	1.66				
Ratio of gutter depression flow to total Q (Eod):	48.6%				
Equivalent cross-slope (Se):	0.043				
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	42.6%				
Inlet frontal flow in cfs (Qw):	1.58				
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	6.9				
Fraction of frontal flow intercepted (Rf):	100.0%				
Side flow in cfs (Qs):	2.13				
Effective grate length w/clogging:	1.50				
Fraction of side flow interception (Rs):	11.9%				
Grate Efficiency (E):	49.4%				
Total flow intercepted (cfs):	1.83				
Grate flow-by (cfs):	1.87				
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	----				
Length of inlet provided L (ft):					
Interception for length L (cfs):	----				
Efficiency for length L:	----				
Slotted drain or curb opening flow-by (cfs):	----				
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	----				
Capacity of grate in a sag (4-sided weir):	----				
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	----				
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	----				
K = Min(Lc/A,167) (Table 5, HEC-12):	----				
Flanking inlets maximum distance (ft):	----				
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	----				
Flooded width in the median (ft):	----				
Water velocity in the median (fps):	----				

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - Ellsworth Ramp A

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	Future	Future	Future		
Return Period:	10	10	10		
Allowable Spread:	9	9	9		
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐		
Structure Station: (Stationing off of Santan Med/Cst CL)	5+68	5+68	10+64		
Location Description:	Grate	Slotted	Grate		
Pavement Area (ac):	0.007	0.352	0.744		
Sideslope Area (ac):	0.007	0.127	0.000		
Contributing watershed area (acres):	0.014	0.479	0.744		
Pavement Runoff Coefficient "C":	0.95	0.95	0.95		
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70		
Composite Runoff Coefficient "C":	0.83	0.88	0.95		
CA	0.01	0.42	0.71		
Precipitation intensity (in/hr):	4.22	4.22	4.22		
Subarea discharge Q (cfs):	0.0	1.8	3.0		
Previous by-pass flow (cfs):	0.8	0.8	0.5		
Discharge added by operator:	---	---	---		
Total discharge Q (cfs):	0.9	2.6	3.5		
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016		
Longitudinal slope S (ft/ft):	0.0086	0.0086	0.0422		
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1		
Longitudinal profile (1=on-grade, 2=sag):	1	1	1		
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	2		
Capture Ratio Used:	50%	67%	50%		
Inlet ADOT Std:	C-15.91	C-13.60	C-15.92		
Grate width:	3	--	2		
Grate length:	3.3	--	3.3		
Pavement cross-slope (Sx):	0.020	0.020	0.020		
Width of gutter from flowline (ft):	2.50	2.50	4.50		
Gutter depression from horizontal (ft):	0.17	0.17	0.167		
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.037		
Flooded Width from flowline (ft): before inlet	4.4	8.7	7.2		
Depth at flowline (ft): before inlet	0.21	0.29	0.22		
Water cross-area (sq.ft): before inlet	0.34	0.90	0.68		
Velocity V for total discharge (fps): before inlet	2.60	2.90	5.09		
Ratio of gutter depression flow to total Q (Eod):	97.0%	76.7%	95.9%		
Equivalent cross-slope (Se):	0.067	0.057	0.036		
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	98.7%	----	75.9%		
Inlet frontal flow in cfs (Qw):	0.88	----	2.64		
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	----	7.2		
Fraction of frontal flow intercepted (Rf):	100.0%	----	100.0%		
Side flow in cfs (Qs):	0.01	----	0.84		
Effective grate length w/clogging:	1.65	----	1.65		
Fraction of side flow interception (Rs):	7.0%	----	2.2%		
Grate Efficiency (E):	98.8%	----	76.5%		
Total flow intercepted (cfs):	0.88	----	2.66		
Grate flow-by (cfs):	0.01	----	0.82		
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	----	21.5	----		
Length of inlet provided L (ft):		10			
Interception for length L (cfs):	----	1.76	----		
Efficiency for length L:	----	0.68	----		
Slotted drain or curb opening flow-by (cfs):	----	0.84	----		
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	----	----	----		
Capacity of grate in a sag (4-sided weir):	----	----	----		
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	----	----	----		
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	----	----	----		
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----	----		
Flanking inlets maximum distance (ft):	----	----	----		
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	----	----	----		
Flooded width in the median (ft):	----	----	----		
Water velocity in the median (fps):	----	----	----		

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - EB Roadside

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	253	255	258	303	322	332	333
Return Period:	10	10	10	10	10	10	10
Allowable Spread:	na	na	na	na	na	na	na
RATIONAL METHOD HYDROLOGY COMPUTATION:							
Structure Station:	963+51	964+56	969+31	979+16	1002+85	1010+47	1014+48
Location Description:	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet
Pavement Area (ac):	0.000	0.000	0.000	0.000	0.536	1.500	0.660
Sideslope Area (ac):	0.582	0.400	1.040	0.701	0.772	1.620	0.332
Contributing watershed area (acres):	0.582	0.400	1.040	0.701	1.308	3.120	0.992
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.80	0.82	0.87
CA	0.41	0.28	0.73	0.49	1.05	2.56	0.86
Precipitation intensity (in/hr):	4.22	4.22	4.22	4.22	4.22	4.22	4.22
Subarea discharge Q (cfs):	1.7	1.2	3.1	2.1	4.4	10.8	3.6
Previous by-pass flow (cfs):	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discharge added by operator:	—	—	—	—	—	—	—
Total discharge Q (cfs):	1.7	1.2	3.1	2.1	4.4	10.8	3.6
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0250	0.0250	0.0250	0.0250	0.0400	0.0400	0.0400
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	1	1	1	1
Longitudinal profile (1=on-grade, 2=sag):	2	2	2	2	2	2	2
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	50%	50%	50%	50%	50%
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80
Grate width:	2	2	2	2	2	2	2
Grate length:	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Pavement cross-slope (Sx):	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Width of gutter from flowline (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutter depression from horizontal (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flooded Width from flowline (ft): before inlet	NA	NA	NA	NA	NA	NA	NA
Depth at flowline (ft): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Equivalent cross-slope (Se):	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	—	—	—	—	—	—	—
Inlet frontal flow in cfs (Qw):	—	—	—	—	—	—	—
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	—	—	—	—	—	—	—
Fraction of frontal flow intercepted (Rf):	—	—	—	—	—	—	—
Side flow in cfs (Qs):	—	—	—	—	—	—	—
Effective grate length w/clogging:	—	—	—	—	—	—	—
Fraction of side flow interception (Rs):	—	—	—	—	—	—	—
Grate Efficiency (E):	—	—	—	—	—	—	—
Total flow intercepted (cfs):	—	—	—	—	—	—	—
Grate flow-by (cfs):	—	—	—	—	—	—	—
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	—	—	—	—	—	—	—
Length of inlet provided L (ft):							
Interception for length L (cfs):	—	—	—	—	—	—	—
Efficiency for length L:	—	—	—	—	—	—	—
Slotted drain or curb opening flow-by (cfs):	—	—	—	—	—	—	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):	0.65	0.65	0.65	0.65	0.65	1.70	0.95
Capacity of grate in a sag (3-sided weir):	5.50	5.50	5.50	5.50	5.50	23.27	9.72
Capacity of grate in a sag (4-sided weir):	7.9	7.9	7.9	7.9	7.9	33.2	13.9
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—	—	—
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	—	—	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—	—	—

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - WB Roadside

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	330	334			
Return Period:	10	10			
Allowable Spread:	na	na			
RATIONAL METHOD HYDROLOGY COMPUTATION:					
Structure Station:	1009+47	1015+46			
Location Description:	Area Inlet	Area Inlet			
Pavement Area (ac):	2.380	0.195			
Sideslope Area (ac):	1.200	0.208			
Contributing watershed area (acres):	3.580	0.403			
Pavement Runoff Coefficient "C":	0.95	0.95			
Sideslope Runoff Coefficient "C":	0.70	0.70			
Composite Runoff Coefficient "C":	0.87	0.82			
CA	3.10	0.33			
Precipitation intensity (in/hr):	4.22	4.22			
Subarea discharge Q (cfs):	13.1	1.4			
Previous by-pass flow (cfs):	0.0	0.0			
Discharge added by operator:	---	---			
Total discharge Q (cfs):	13.1	1.4			
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016			
Longitudinal slope S (ft/ft):	0.0400	0.0400			
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1			
Longitudinal profile (1=on-grade, 2=sag):	2	2			
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3			
Capture Ratio Used:	50%	50%			
Inlet ADOT Std:	C-15.80	C-15.80			
Grate width:	2	2			
Grate length:	3.0	3.0			
Pavement cross-slope (Sx):	0.000	0.000			
Width of gutter from flowline (ft):	0.00	0.00			
Gutter depression from horizontal (ft):	0.00	0.00			
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000			
Flooded Width from flowline (ft): before inlet	NA	NA			
Depth at flowline (ft): before inlet	0.00	0.00			
Water cross-area (sq.ft): before inlet	0.00	0.00			
Velocity V for total discharge (fps): before inlet	0.00	0.00			
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%			
Equivalent cross-slope (Se):	0.000	0.000			
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	---	---			
Inlet frontal flow in cfs (Qw):	---	---			
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	---			
Fraction of frontal flow intercepted (Rf):	---	---			
Side flow in cfs (Qs):	---	---			
Effective grate length w/clogging:	---	---			
Fraction of side flow interception (Rs):	---	---			
Grate Efficiency (E):	---	---			
Total flow intercepted (cfs):	---	---			
Grate flow-by (cfs):	---	---			
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	---			
Length of inlet provided L (ft):					
Interception for length L (cfs):	---	---			
Efficiency for length L:	---	---			
Slotted drain or curb opening flow-by (cfs):	---	---			
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):	1.60	1.00			
Capacity of grate in a sag (3-sided weir):	21.25	10.50			
Capacity of grate in a sag (4-sided weir):	30.4	15.0			
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---			
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	0.00	0.00			
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!			
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!			
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---			
Flooded width in the median (ft):	---	---			
Water velocity in the median (fps):	---	---			

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - Median

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%
Inlet Number:	252	320	324	
Return Period:	10	10	10	
Allowable Spread:	na	na	na	
RATIONAL METHOD HYDROLOGY COMPUTATION:				
Structure Station:	972+15	978+90	993+30	
Location Description:	Area Inlet	Area Inlet	Area Inlet	
Pavement Area (ac):	0.540	2.020	2.000	
Sideslope Area (ac):	0.000	0.000	0.000	
Contributing watershed area (acres):	0.540	2.020	2.000	
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	
Composite Runoff Coefficient "C":	0.95	0.95	0.95	
CA	0.51	1.92	1.90	
Precipitation intensity (in/hr):	4.22	4.22	4.22	
Subarea discharge Q (cfs):	2.2	8.1	8.0	
Previous by-pass flow (cfs):	0.0	0.0	0.0	
Discharge added by operator:	---	---	---	
Total discharge Q (cfs):	2.2	8.1	8.0	
SHOULDER AND GUTTER CONFIGURATION:				
Manning's n:	0.016	0.016	0.016	
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0084	
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	
Longitudinal profile (1=on-grade, 2=sag):	2	2	2	
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	
Capture Ratio Used:	50%	50%	50%	
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80	
Grate width:	2	2	2	
Grate length:	3.0	3.0	3.0	
Pavement cross-slope (Sx):	0.000	0.000	0.000	
Width of gutter from flowline (ft):	0.00	0.00	0.00	
Gutter depression from horizontal (ft):	0.00	0.00	0.00	
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000	
Flooded Width from flowline (ft): before inlet	NA	NA	NA	
Depth at flowline (ft): before inlet	0.00	0.00	0.00	
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00	
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00	
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%	
Equivalent cross-slope (Se):	0.000	0.000	0.000	
GRATE INLETS ON-GRADE:				
Ratio of grate frontal flow to total flow:	----	----	----	
Inlet frontal flow in cfs (Qw):	----	----	----	
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	----	----	----	
Fraction of frontal flow intercepted (Rf):	----	----	----	
Side flow in cfs (Qs):	----	----	----	
Effective grate length w/clogging:	----	----	----	
Fraction of side flow interception (Rs):	----	----	----	
Grate Efficiency (E):	----	----	----	
Total flow intercepted (cfs):	----	----	----	
Grate flow-by (cfs):	----	----	----	
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:				
Length required for total interception (ft): w/clogging	----	----	----	
Length of inlet provided L (ft):				
Interception for length L (cfs):	----	----	----	
Efficiency for length L:	----	----	----	
Slotted drain or curb opening flow-by (cfs):	----	----	----	
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:				
Head available for weir flow at sag (ft):	3.00	3.00	3.00	
Capacity of grate in a sag (3-sided weir):	54.56	54.56	54.56	
Capacity of grate in a sag (4-sided weir):	77.9	77.9	77.9	
Length provided of curb-opening or slotted drain at sag:				
Capacity of curb-opening or slotted drain in a sag (weir):	----	----	----	
Length of the vertical curve (ft x 100):				
approach grade #1 (%):				
approach grade #2 (%):				
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00	
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!	
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!	
TRIANGULAR MEDIAN HYDRAULICS:				
Manning's n for median finish:				
Cross-slope of median sides:				
Depth of flow at center of median (ft):	----	----	----	
Flooded width in the median (ft):	----	----	----	
Water velocity in the median (fps):	----	----	----	

ULTIMATE ADOT HEC-12 (10-YR) Pavement Drainage

SRT - Detour

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	350	353	352		
Return Period:	10	10	10		
Allowable Spread:	na	na	na		
RATIONAL METHOD HYDROLOGY COMPUTATION:					
Structure Station:	973+65	1005+40	1007+00		
Location Description:	Area Inlet	Area Inlet	Area Inlet		
Pavement Area (ac):	3.530	2.100	3.900		
Sideslope Area (ac):	4.500	3.100	0.900		
Contributing watershed area (acres):	8.030	5.200	4.800		
Pavement Runoff Coefficient "C":	0.95	0.95	0.95		
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70		
Composite Runoff Coefficient "C":	0.81	0.80	0.90		
CA	6.50	4.17	4.34		
Precipitation intensity (in/hr):	4.22	4.22	4.22		
Subarea discharge Q (cfs):	27.4	17.6	18.3		
Previous by-pass flow (cfs):	0.0	0.0	0.0		
Discharge added by operator:	---	---	---		
Total discharge Q (cfs):	27.4	17.6	18.3		
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016		
Longitudinal slope S (ft/ft):	0.0025	0.0084	0.0084		
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1		
Longitudinal profile (1=on-grade, 2=sag):	2	2	2		
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3		
Capture Ratio Used:	50%	50%	50%		
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80		
Grate width:	2	2	2		
Grate length:	3.0	3.0	3.0		
Pavement cross-slope (Sx):	0.000	0.000	0.000		
Width of gutter from flowline (ft):	0.00	0.00	0.00		
Gutter depression from horizontal (ft):	0.00	0.00	0.00		
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000		
Flooded Width from flowline (ft): before inlet	NA	NA	NA		
Depth at flowline (ft): before inlet	0.00	0.00	0.00		
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00		
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00		
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%		
Equivalent cross-slope (Se):	0.000	0.000	0.000		
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	---	---	---		
Inlet frontal flow in cfs (Qw):	---	---	---		
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	---	---		
Fraction of frontal flow intercepted (Rf):	---	---	---		
Side flow in cfs (Qs):	---	---	---		
Effective grate length w/clogging:	---	---	---		
Fraction of side flow interception (Rs):	---	---	---		
Grate Efficiency (E):	---	---	---		
Total flow intercepted (cfs):	---	---	---		
Grate flow-by (cfs):	---	---	---		
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	---	---		
Length of inlet provided L (ft):					
Interception for length L (cfs):	---	---	---		
Efficiency for length L:	---	---	---		
Slotted drain or curb opening flow-by (cfs):	---	---	---		
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):	2.60	3.00	3.00		
Capacity of grate in a sag (3-sided weir):	44.02	54.56	54.56		
Capacity of grate in a sag (4-sided weir):	62.9	77.9	77.9		
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---		
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00		
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!		
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!		
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---	---		
Flooded width in the median (ft):	---	---	---		
Water velocity in the median (fps):	---	---	---		

25-YEAR

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - US60 WB

18" Slotted

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	257	257	260	260	263	300	300
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	22	22	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	964+50	964+50	967+55	967+55	970+50	978+44	978+44
Location Description:	Grate	Slotted	Grate	Slotted	Grate	Grate	Slotted
Pavement Area (ac):	0.035	0.646	0.016	0.308	0.496	0.035	0.255
Sideslope Area (ac):	0.007	0.168	0.021	0.429	0.881	0.069	0.286
Contributing watershed area (acres):	0.042	0.814	0.037	0.737	1.377	0.104	0.541
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.91	0.90	0.81	0.80	0.79	0.78	0.82
CA	0.04	0.73	0.03	0.59	1.09	0.08	0.44
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	0.2	3.8	0.2	3.1	5.6	0.4	2.3
Previous by-pass flow (cfs):	0.3	0.1	1.0	2.7	0.7	2.1	3.3
Discharge added by operator:	—	—	—	—	—	—	—
Total discharge Q (cfs):	0.5	3.9	1.2	5.7	6.3	2.5	5.6
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	67%	50%	67%	50%	50%	67%
Inlet ADOT Std:	C-15.91	C-13.60	C-15.91	C-15.91	C-15.91	C-15.91	C-13.60
Grate width:	3	–	3	–	3	3	–
Grate length:	3.3	–	3.3	–	3.3	3.3	–
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	4.5	14.0	7.8	16.5	17.1	11.5	16.3
Depth at flowline (ft): before inlet	0.21	0.40	0.28	0.45	0.46	0.35	0.45
Water cross-area (sq.ft): before inlet	0.35	2.11	0.76	2.86	3.08	1.48	2.81
Velocity V for total discharge (fps): before inlet	1.41	1.86	1.53	2.00	2.04	1.72	1.99
Ratio of gutter depression flow to total Q (Eod):	96.6%	55.7%	80.9%	49.1%	47.6%	64.1%	49.4%
Equivalent cross-slope (Se):	0.066	0.047	0.059	0.044	0.043	0.051	0.044
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	98.4%	—	85.3%	—	52.3%	69.1%	—
Inlet frontal flow in cfs (Qw):	0.49	—	0.99	—	3.28	1.76	—
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2	7.2	—
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%	100.0%	—
Side flow in cfs (Qs):	0.01	—	0.17	—	3.00	0.78	—
Effective grate length w/clogging:	1.65	—	1.65	—	1.65	1.65	—
Fraction of side flow interception (Rs):	18.6%	—	16.5%	—	10.5%	13.8%	—
Grate Efficiency (E):	98.7%	—	87.7%	—	57.3%	73.4%	—
Total flow intercepted (cfs):	0.49	—	1.02	—	3.60	1.86	—
Grate flow-by (cfs):	0.01	—	0.14	—	2.68	0.68	—
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	—	19.8	—	24.2	—	—	23.9
Length of inlet provided L (ft):		15		15			10
Interception for length L (cfs):	—	3.61	—	4.73	—	—	3.49
Efficiency for length L:	—	0.92	—	0.82	—	—	0.62
Slotted drain or curb opening flow-by (cfs):	—	0.30	—	1.01	—	—	2.12
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—	—	—
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	—	—	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—	—	—

ULTIMATE ADOT
HEC-12 (25-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.							
Inlet Number:	305	311	311	318	318	326	326
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	22	22	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	981+50	987+00	987+00	995+00	995+00	1004+40	1004+40
Location Description:	Grate	Grate	Slotted	Grate	Slotted	Grate	Slotted
Pavement Area (ac):	0.446	0.035	1.020	0.035	1.380	0.017	0.563
Sideslope Area (ac):	0.532	0.069	1.780	0.046	1.120	0.000	0.293
Contributing watershed area (acres):	0.978	0.104	2.800	0.081	2.500	0.017	0.856
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.81	0.78	0.79	0.81	0.84	0.95	0.86
CA	0.80	0.08	2.22	0.07	2.10	0.02	0.74
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	4.1	0.4	11.4	0.3	10.8	0.1	3.8
Previous by-pass flow (cfs):	3.6	8.3	1.1	3.7	0.1	1.0	1.2
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	7.7	8.8	12.5	4.0	10.9	1.1	5.0
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0044	0.0086	0.0086	0.0073	0.0073	0.0040	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	3	1	3	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	67%	50%	67%	50%	67%
Inlet ADOT Std:	C-15.91	C-15.91	C-13.60	C-15.91	C-13.60	C-15.91	C-13.60
Grate width:	3	3	--	3	--	3	--
Grate length:	3.3	3.3	--	3.3	--	3.3	--
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	16.6	15.2	17.6	11.1	17.2	6.6	14.1
Depth at flowline (ft): before inlet	0.45	0.42	0.47	0.34	0.46	0.25	0.40
Water cross-area (sq.ft): before inlet	2.89	2.45	3.26	1.39	3.11	0.58	2.14
Velocity V for total discharge (fps): before inlet	2.66	3.57	3.84	2.89	3.50	1.87	2.36
Ratio of gutter depression flow to total Q (Eod):	48.9%	52.3%	46.5%	65.7%	47.4%	87.2%	55.4%
Equivalent cross-slope (Se):	0.043	0.045	0.042	0.052	0.043	0.062	0.047
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	53.6%	57.2%	---	70.7%	---	91.0%	---
Inlet frontal flow in cfs (Qw):	4.12	5.01	---	2.84	---	0.99	---
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2	---	7.2	---	7.2	---
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%	---	100.0%	---	100.0%	---
Side flow in cfs (Qs):	3.57	3.75	---	1.18	---	0.10	---
Effective grate length w/clogging:	1.65	1.65	---	1.65	---	1.65	---
Fraction of side flow interception (Rs):	6.7%	4.1%	---	5.9%	---	12.1%	---
Grate Efficiency (E):	56.7%	58.9%	---	72.4%	---	92.1%	---
Total flow intercepted (cfs):	4.37	5.16	---	2.91	---	1.00	---
Grate flow-by (cfs):	3.33	3.60	---	1.11	---	0.09	---
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	---	---	49.5	---	44.2	---	25.4
Length of inlet provided L (ft):			10		20		15
Interception for length L (cfs):	---	---	4.17	---	7.20	---	4.03
Efficiency for length L:	---	---	0.33	---	0.66	---	0.80
Slotted drain or curb opening flow-by (cfs):	---	---	8.34	---	3.68	---	1.00
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	---	---	---	---	---	---	---
Capacity of grate in a sag (4-sided weir):	---	---	---	---	---	---	---
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---	---	---
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	---	---	---	---	---	---	---
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---	---	---	---	---
Flanking inlets maximum distance (ft):	---	---	---	---	---	---	---
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	---	---	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---	---	---

ULTIMATE ADOT
HEC-12 (25-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.		
Inlet Number:	329	329
Return Period:	25	25
Allowable Spread:	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	1009+37	1009+37
Location Description:	Grate	Slotted
Pavement Area (ac):	0.013	0.872
Sideslope Area (ac):	0.000	0.643
Contributing watershed area (acres):	0.013	1.515
Pavement Runoff Coefficient "C":	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.84
CA	0.01	1.28
Precipitation intensity (in/hr):	5.15	5.15
Subarea discharge Q (cfs):	0.1	6.6
Previous by-pass flow (cfs):	3.8	1.0
Discharge added by operator:	—	—
Total discharge Q (cfs):	3.9	7.6
SHOULDER AND GUTTER CONFIGURATION:		
Manning's n:	0.016	0.016
Longitudinal slope S (ft/ft):	0.0040	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3
Capture Ratio Used:	50%	67%
Inlet ADOT Std:	C-15.91	C-13.60
Grate width:	3	–
Grate length:	3.3	–
Pavement cross-slope (Sx):	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068
Flooded Width from flowline (ft): before inlet	12.6	16.8
Depth at flowline (ft): before inlet	0.37	0.46
Water cross-area (sq.ft): before inlet	1.73	2.97
Velocity V for total discharge (fps): before inlet	2.24	2.56
Ratio of gutter depression flow to total Q (Eod):	60.3%	48.4%
Equivalent cross-slope (Se):	0.049	0.043
GRATE INLETS ON-GRADE:		
Ratio of grate frontal flow to total flow:	65.3%	—
Inlet frontal flow in cfs (Qw):	2.53	—
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—
Fraction of frontal flow intercepted (Rf):	100.0%	—
Side flow in cfs (Qs):	1.34	—
Effective grate length w/clogging:	1.65	—
Fraction of side flow interception (Rs):	9.0%	—
Grate Efficiency (E):	68.5%	—
Total flow intercepted (cfs):	2.65	—
Grate flow-by (cfs):	1.22	—
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:		
Length required for total interception (ft): w/clogging	—	31.5
Length of inlet provided L (ft):		10
Interception for length L (cfs):	—	3.77
Efficiency for length L:	—	0.50
Slotted drain or curb opening flow-by (cfs):	—	3.81
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:		
Head available for weir flow at sag (ft):		
Capacity of grate in a sag (3-sided weir):	—	—
Capacity of grate in a sag (4-sided weir):	—	—
Length provided of curb-opening or slotted drain at sag:		
Capacity of curb-opening or slotted drain in a sag (weir):	—	—
Length of the vertical curve (ft x 100):		
approach grade #1 (%):		
approach grade #2 (%):		
ABS (algebraic diff. in approach grades) (%):	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—
Flanking inlets maximum distance (ft):	—	—
TRIANGULAR MEDIAN HYDRAULICS:		
Manning's n for median finish:		
Cross-slope of median sides:		
Depth of flow at center of median (ft):	—	—
Flooded width in the median (ft):	—	—
Water velocity in the median (fps):	—	—

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - US60 EB

18" Slotted

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	251	251	254	254	256	256	259
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	22	22	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	957+30	957+30	961+25	961+25	964+56	964+56	968+70
Location Description:	Grate	Slotted	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.034	0.787	0.034	0.553	0.034	0.460	0.026
Sideslope Area (ac):	0.026	0.604	0.026	0.362	0.000	0.161	0.000
Contributing watershed area (acres):	0.060	1.391	0.060	0.915	0.034	0.621	0.026
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.84	0.84	0.84	0.85	0.95	0.89	0.95
CA	0.05	1.17	0.05	0.78	0.03	0.55	0.02
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	0.3	6.0	0.3	4.0	0.2	2.8	0.1
Previous by-pass flow (cfs):	0.3	0.1	0.6	0.9	0.0	0.1	0.5
Discharge added by operator:	—	—	—	—	—	—	—
Total discharge Q (cfs):	0.6	6.1	0.9	4.9	0.2	2.9	0.7
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	2	2	2
Capture Ratio Used:	50%	67%	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.91	C-15.91	C-15.91	C-13.60	C-15.92	C-13.60	C-15.92
Grate width:	3	--	3	--	2	--	2
Grate length:	3.3	--	3.3	--	3.3	--	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	4.50	4.50	4.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.038	0.038	0.038
Flooded Width from flowline (ft): before inlet	5.2	16.9	6.8	15.4	3.4	12.9	6.1
Depth at flowline (ft): before inlet	0.22	0.46	0.26	0.43	0.13	0.34	0.20
Water cross-area (sq.ft): before inlet	0.42	3.01	0.61	2.52	0.21	1.84	0.55
Velocity V for total discharge (fps): before inlet	1.43	2.03	1.48	1.94	0.88	1.58	1.19
Ratio of gutter depression flow to total Q (Eod):	93.9%	48.1%	86.1%	51.8%	100.0%	74.3%	98.6%
Equivalent cross-slope (Se):	0.065	0.043	0.061	0.045	0.038	0.033	0.038
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	96.5%	—	90.0%	—	96.9%	—	83.0%
Inlet frontal flow in cfs (Qw):	0.58	—	0.82	—	0.18	—	0.55
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2	—	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%	—	100.0%
Side flow in cfs (Qs):	0.02	—	0.09	—	0.01	—	0.11
Effective grate length w/clogging:	1.65	—	1.65	—	1.65	—	1.65
Fraction of side flow interception (Rs):	18.2%	—	17.2%	—	34.5%	—	23.6%
Grate Efficiency (E):	97.1%	—	91.7%	—	98.0%	—	87.0%
Total flow intercepted (cfs):	0.58	—	0.83	—	0.19	—	0.57
Grate flow-by (cfs):	0.02	—	0.08	—	0.00	—	0.09
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	—	25.0	—	22.2	—	21.5	—
Length of inlet provided L (ft):		20		15		20	
Interception for length L (cfs):	—	5.76	—	4.24	—	2.89	—
Efficiency for length L:	—	0.94	—	0.87	—	0.99	—
Slotted drain or curb opening flow-by (cfs):	—	0.34	—	0.65	—	0.02	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—	—	—
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	—	—	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—	—	—

ULTIMATE ADOT
HEC-12 (25-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.							
Inlet Number:	259	302	302	310	310	313	317
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	22	22	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	968+70	978+68	978+68	985+70	985+70	989+01	993+30
Location Description:	Slotted	Grate	Slotted	Grate	Slotted	Grate	Grate
Pavement Area (ac):	0.643	0.029	0.615	0.029	0.334	0.466	0.454
Sideslope Area (ac):	0.000	0.000	0.423	0.032	0.948	1.710	1.240
Contributing watershed area (acres):	0.643	0.029	1.038	0.061	1.282	2.176	1.694
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.85	0.82	0.77	0.75	0.77
CA	0.61	0.03	0.88	0.05	0.98	1.64	1.30
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	3.1	0.1	4.5	0.3	5.1	8.4	6.7
Previous by-pass flow (cfs):	0.3	0.1	0.5	2.4	5.9	4.3	3.3
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	3.4	0.2	5.1	2.7	11.0	12.8	9.9
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0071	0.0071	0.0098	0.0084
Inlet type (1=grate, 2=curb opening, 3=slotted):	3	1	3	1	3	1	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	3	3	3	3
Capture Ratio Used:	67%	50%	67%	50%	67%	50%	50%
Inlet ADOT Std:	C-13.60	C-15.92	C-13.60	C-15.91	C-13.60	C-15.91	C-15.91
Grate width:	--	2	--	3	--	3	3
Grate length:	--	3.3	--	3.3	--	3.3	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	4.50	4.50	4.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.038	0.038	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	13.8	3.7	16.3	9.3	17.4	17.3	16.1
Depth at flowline (ft): before inlet	0.36	0.14	0.41	0.31	0.47	0.47	0.44
Water cross-area (sq.ft): before inlet	2.10	0.25	2.84	1.01	3.17	3.14	2.74
Velocity V for total discharge (fps): before inlet	1.64	0.94	1.79	2.69	3.47	4.06	3.63
Ratio of gutter depression flow to total Q (Eod):	71.0%	100.0%	63.2%	73.8%	47.0%	47.2%	50.0%
Equivalent cross-slope (Se):	0.033	0.038	0.031	0.055	0.043	0.043	0.044
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	----	95.8%	----	78.7%	----	51.8%	54.7%
Inlet frontal flow in cfs (Qw):	----	0.23	----	2.13	----	6.62	5.44
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	----	7.2	----	7.2	----	7.2	7.2
Fraction of frontal flow intercepted (Rf):	----	100.0%	----	100.0%	----	100.0%	100.0%
Side flow in cfs (Qs):	----	0.01	----	0.58	----	6.15	4.50
Effective grate length w/clogging:	----	1.65	----	1.65	----	1.65	1.65
Fraction of side flow interception (Rs):	----	32.2%	----	6.6%	----	3.3%	4.0%
Grate Efficiency (E):	----	97.1%	----	80.1%	----	53.4%	56.5%
Total flow intercepted (cfs):	----	0.23	----	2.17	----	6.82	5.62
Grate flow-by (cfs):	----	0.01	----	0.54	----	5.95	4.32
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	23.2	----	28.1	----	44.2	----	----
Length of inlet provided L (ft):	15		25		25		
Interception for length L (cfs):	2.91	----	4.98	----	8.55	----	----
Efficiency for length L:	0.85	----	0.98	----	0.78	----	----
Slotted drain or curb opening flow-by (cfs):	0.53	----	0.09	----	2.45	----	----
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	----	----	----	----	----	----	----
Capacity of grate in a sag (4-sided weir):	----	----	----	----	----	----	----
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	----	----	----	----	----	----	----
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	----	----	----	----	----	----	----
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----	----	----	----	----	----
Flanking inlets maximum distance (ft):	----	----	----	----	----	----	----
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	----	----	----	----	----	----	----
Flooded width in the median (ft):	----	----	----	----	----	----	----
Water velocity in the median (fps):	----	----	----	----	----	----	----

ULTIMATE ADOT
HEC-12 (25-YR)
Pavement Drainage

JOB: 202L/US 60 T.I.		
Inlet Number:	319	323
Return Period:	25	25
Allowable Spread:	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐
Structure Station: (Stationing off of US 60 Med/Cst CL)	997+45	1002+85
Location Description:	Grate	Grate
Pavement Area (ac):	0.590	0.577
Sideslope Area (ac):	0.978	0.368
Contributing watershed area (acres):	1.568	0.945
Pavement Runoff Coefficient "C":	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70
Composite Runoff Coefficient "C":	0.79	0.85
CA	1.25	0.81
Precipitation intensity (in/hr):	5.15	5.15
Subarea discharge Q (cfs):	6.4	4.1
Previous by-pass flow (cfs):	1.4	0.0
Discharge added by operator:	—	—
Total discharge Q (cfs):	7.8	4.1
SHOULDER AND GUTTER CONFIGURATION:		
Manning's n:	0.016	0.016
Longitudinal slope S (ft/ft):	0.0057	0.0040
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1
Longitudinal profile (1=on-grade, 2=sag):	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3
Capture Ratio Used:	50%	50%
Inlet ADOT Std:	C-15.91	C-15.91
Grate width:	3	3
Grate length:	3.3	3.3
Pavement cross-slope (Sx):	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068
Flooded Width from flowline (ft): before inlet	15.7	12.9
Depth at flowline (ft): before inlet	0.43	0.38
Water cross-area (sq.ft): before inlet	2.63	1.83
Velocity V for total discharge (fps): before inlet	2.96	2.27
Ratio of gutter depression flow to total Q (Eod):	50.9%	59.0%
Equivalent cross-slope (Se):	0.044	0.048
GRATE INLETS ON-GRADE:		
Ratio of grate frontal flow to total flow:	55.7%	64.0%
Inlet frontal flow in cfs (Qw):	4.33	2.66
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%
Side flow in cfs (Qs):	3.45	1.49
Effective grate length w/clogging:	1.65	1.65
Fraction of side flow interception (Rs):	5.6%	8.8%
Grate Efficiency (E):	58.2%	67.2%
Total flow intercepted (cfs):	4.52	2.79
Grate flow-by (cfs):	3.25	1.36
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:		
Length required for total interception (ft): w/clogging	—	—
Length of inlet provided L (ft):		
Interception for length L (cfs):	—	—
Efficiency for length L:	—	—
Slotted drain or curb opening flow-by (cfs):	—	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:		
Head available for weir flow at sag (ft):		
Capacity of grate in a sag (3-sided weir):	—	—
Capacity of grate in a sag (4-sided weir):	—	—
Length provided of curb-opening or slotted drain at sag:		
Capacity of curb-opening or slotted drain in a sag (weir):	—	—
Length of the vertical curve (ft x 100):		
approach grade #1 (%):		
approach grade #2 (%):		
ABS (algebraic diff. in approach grades) (%):	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—
Flanking inlets maximum distance (ft):	—	—
TRIANGULAR MEDIAN HYDRAULICS:		
Manning's n for median finish:		
Cross-slope of median sides:		
Depth of flow at center of median (ft):	—	—
Flooded width in the median (ft):	—	—
Water velocity in the median (fps):	—	—

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - US60 HOV WB

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	262	262	308	308	315
Return Period:	25	25	25	25	25
Allowable Spread:	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of Santan Med/Cst CL)	970+50	970+50	981+96	981+96	989+01
Location Description:	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.014	0.647	0.010	0.402	1.560
Sideslope Area (ac):	0.000	0.000	0.000	0.000	0.000
Contributing watershed area (acres):	0.014	0.647	0.010	0.402	1.560
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
CA	0.01	0.61	0.01	0.38	1.48
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	0.1	3.2	0.0	2.0	7.6
Previous by-pass flow (cfs):	0.5	1.0	2.5	3.6	0.0
Discharge added by operator:	---	---	---	---	---
Total discharge Q (cfs):	0.6	4.2	2.6	5.5	7.6
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0041	0.0041	0.0098
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	2	4
Capture Ratio Used:	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.92	C-13.60	C-15.92	C-13.60	C-15.91
Grate width:	2	--	2	--	3
Grate length:	3.3	--	3.3	--	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.052
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.021
Flooded Width from flowline (ft): before inlet	5.6	15.2	11.0	15.4	14.8
Depth at flowline (ft): before inlet	0.23	0.42	0.34	0.43	0.30
Water cross-area (sq.ft): before inlet	0.47	2.45	1.36	2.51	2.20
Velocity V for total discharge (fps): before inlet	1.21	1.71	1.88	2.20	3.46
Ratio of gutter depression flow to total Q (Eod):	90.4%	46.3%	61.1%	45.8%	45.6%
Equivalent cross-slope (Se):	0.063	0.042	0.049	0.042	0.020
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	85.8%	----	54.7%	----	51.3%
Inlet frontal flow in cfs (Qw):	0.49	----	1.40	----	3.92
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	----	7.2	----	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	----	100.0%	----	100.0%
Side flow in cfs (Qs):	0.08	----	1.16	----	3.72
Effective grate length w/clogging:	1.65	----	1.65	----	1.65
Fraction of side flow interception (Rs):	23.0%	----	11.9%	----	4.3%
Grate Efficiency (E):	89.0%	----	60.1%	----	53.4%
Total flow intercepted (cfs):	0.50	----	1.54	----	4.08
Grate flow-by (cfs):	0.06	----	1.02	----	3.56
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	----	21.6	----	28.3	----
Length of inlet provided L (ft):		15		10	
Interception for length L (cfs):	----	3.69	----	3.01	----
Efficiency for length L:	----	0.88	----	0.54	----
Slotted drain or curb opening flow-by (cfs):	----	0.50	----	2.52	----
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	----	----	----	----	----
Capacity of grate in a sag (4-sided weir):	----	----	----	----	----
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	----	----	----	----	----
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	----	----	----	----	----
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----	----	----	----
Flanking inlets maximum distance (ft):	----	----	----	----	----
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	----	----	----	----	----
Flooded width in the median (ft):	----	----	----	----	----
Water velocity in the median (fps):	----	----	----	----	----

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - US60 HOV EB

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	261	261	307	307	314
Return Period:	25	25	25	25	25
Allowable Spread:	22	22	22	22	22
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of Santan Med/Cst CL)	970+50	970+50	981+96	981+96	989+01
Location Description:	Grate	Slotted	Grate	Slotted	Grate
Pavement Area (ac):	0.014	0.656	0.010	0.404	1.580
Sideslope Area (ac):	0.000	0.000	0.000	0.000	0.000
Contributing watershed area (acres):	0.014	0.656	0.010	0.404	1.580
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95
CA	0.01	0.62	0.01	0.38	1.50
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	0.1	3.2	0.0	2.0	7.7
Previous by-pass flow (cfs):	0.5	1.1	2.6	3.6	0.0
Discharge added by operator:	—	—	—	—	—
Total discharge Q (cfs):	0.6	4.3	2.6	5.6	7.7
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0041	0.0041	0.0098
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1	3	1
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2	2	2	4
Capture Ratio Used:	50%	67%	50%	67%	50%
Inlet ADOT Std:	C-15.92	C-13.60	C-15.92	C-13.60	C-15.91
Grate width:	2	–	2	–	3
Grate length:	3.3	–	3.3	–	3.3
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.052
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.068	0.068	0.021
Flooded Width from flowline (ft): before inlet	5.8	15.3	11.1	15.4	14.9
Depth at flowline (ft): before inlet	0.24	0.43	0.34	0.43	0.30
Water cross-area (sq.ft): before inlet	0.49	2.48	1.38	2.53	2.23
Velocity V for total discharge (fps): before inlet	1.22	1.72	1.89	2.21	3.47
Ratio of gutter depression flow to total Q (Eod):	89.4%	46.0%	60.7%	45.6%	45.5%
Equivalent cross-slope (Se):	0.063	0.042	0.049	0.042	0.020
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	84.6%	—	54.3%	—	51.2%
Inlet frontal flow in cfs (Qw):	0.50	—	1.42	—	3.95
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—	7.2	—	7.2
Fraction of frontal flow intercepted (Rf):	100.0%	—	100.0%	—	100.0%
Side flow in cfs (Qs):	0.09	—	1.19	—	3.78
Effective grate length w/clogging:	1.65	—	1.65	—	1.65
Fraction of side flow interception (Rs):	22.8%	—	11.8%	—	4.3%
Grate Efficiency (E):	88.1%	—	59.7%	—	53.2%
Total flow intercepted (cfs):	0.52	—	1.56	—	4.12
Grate flow-by (cfs):	0.07	—	1.05	—	3.61
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	—	21.8	—	28.5	—
Length of inlet provided L (ft):		15		10	
Interception for length L (cfs):	—	3.74	—	3.03	—
Efficiency for length L:	—	0.88	—	0.54	—
Slotted drain or curb opening flow-by (cfs):	—	0.53	—	2.56	—
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	—	—	—	—	—
Capacity of grate in a sag (4-sided weir):	—	—	—	—	—
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	—	—	—	—	—
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	—	—	—	—	—
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—	—	—	—
Flanking inlets maximum distance (ft):	—	—	—	—	—
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	—	—	—	—	—
Flooded width in the median (ft):	—	—	—	—	—
Water velocity in the median (fps):	—	—	—	—	—

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - Ellsworth Ramp B

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%		
Inlet Number:	266	265	264	264	269	268	268
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	20	20	20	20	10	8	8
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐	⇐	⇐	⇐	⇐
Structure Station: (Stationing off of Santan Med/Cst CL)	14+66	15+76	16+77	16+77	18+32	19+98	19+98
Location Description:	Grate	Grate	Grate	Slotted	Grate	Grate	Slotted
Pavement Area (ac):	0.079	0.142	0.018	0.131	0.166	0.018	0.089
Sideslope Area (ac):	0.218	0.275	0.014	0.290	0.139	0.014	0.065
Contributing watershed area (acres):	0.297	0.417	0.032	0.421	0.305	0.032	0.154
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.77	0.79	0.84	0.78	0.84	0.84	0.84
CA	0.23	0.33	0.03	0.33	0.26	0.03	0.13
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	1.2	1.7	0.1	1.7	1.3	0.1	0.7
Previous by-pass flow (cfs):	0.4	0.1	0.8	0.2	0.0	0.2	0.3
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	1.5	1.8	0.9	1.9	1.3	0.4	1.0
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0025	0.0025	0.0025	0.0023	0.0023
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	3	1	1	3
Longitudinal profile (1=on-grade, 2=sag):	1	1	1	1	1	1	1
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	50%	67%	50%	50%	67%
Inlet ADOT Std:	C-15.92	C-15.91	C-15.91	C-13.60	C-15.91	C-15.91	C-13.60
Grate width:	2	3	3	--	3	3	--
Grate length:	3.3	3.3	3.3	--	3.3	3.3	--
Pavement cross-slope (Sx):	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Width of gutter from flowline (ft):	4.50	2.50	2.50	2.50	2.50	2.50	2.50
Gutter depression from horizontal (ft):	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.068	0.068	0.068	0.068	0.068	0.068
Flooded Width from flowline (ft): before inlet	9.6	9.7	7.0	10.0	8.4	3.7	7.2
Depth at flowline (ft): before inlet	0.27	0.31	0.26	0.32	0.29	0.19	0.26
Water cross-area (sq.ft): before inlet	1.10	1.09	0.63	1.15	0.85	0.28	0.67
Velocity V for total discharge (fps): before inlet	1.39	1.62	1.49	1.63	1.55	1.32	1.44
Ratio of gutter depression flow to total Q (Eod):	87.1%	71.7%	85.3%	70.4%	78.2%	99.0%	83.9%
Equivalent cross-slope (Se):	0.035	0.054	0.061	0.054	0.058	0.068	0.060
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	62.6%	76.6%	89.3%	----	82.8%	99.8%	----
Inlet frontal flow in cfs (Qw):	0.95	1.36	0.84	----	1.09	0.37	----
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	7.2	7.2	----	7.2	7.2	----
Fraction of frontal flow intercepted (Rf):	100.0%	100.0%	100.0%	----	100.0%	100.0%	----
Side flow in cfs (Qs):	0.57	0.41	0.10	----	0.23	0.00	----
Effective grate length w/clogging:	1.65	1.65	1.65	----	1.65	1.65	----
Fraction of side flow interception (Rs):	18.9%	15.1%	17.1%	----	16.1%	20.4%	----
Grate Efficiency (E):	69.7%	80.1%	91.1%	----	85.6%	99.8%	----
Total flow intercepted (cfs):	1.06	1.42	0.86	----	1.12	0.38	----
Grate flow-by (cfs):	0.46	0.35	0.08	----	0.19	0.00	----
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	----	----	----	13.3	----	----	9.2
Length of inlet provided L (ft):				5			5
Interception for length L (cfs):	----	----	----	1.07	----	----	0.73
Efficiency for length L:	----	----	----	0.57	----	----	0.76
Slotted drain or curb opening flow-by (cfs):	----	----	----	0.81	----	----	0.24
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):							
Capacity of grate in a sag (3-sided weir):	----	----	----	----	----	----	----
Capacity of grate in a sag (4-sided weir):	----	----	----	----	----	----	----
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	----	----	----	----	----	----	----
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	----	----	----	----	----	----	----
K = Min(Lc/A,167) (Table 5, HEC-12):	----	----	----	----	----	----	----
Flanking inlets maximum distance (ft):	----	----	----	----	----	----	----
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	----	----	----	----	----	----	----
Flooded width in the median (ft):	----	----	----	----	----	----	----
Water velocity in the median (fps):	----	----	----	----	----	----	----

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - RAMP E-S

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	500	500			
Return Period:	25	25			
Allowable Spread:	22	22			
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐			
Structure Station: (Stationing off of Santan Med/Cst CL)	17+56	17+56			
Location Description:	Grate	Slotted			
Pavement Area (ac):	0.030	1.120			
Sideslope Area (ac):	0.000	0.102			
Contributing watershed area (acres):	0.030	1.222			
Pavement Runoff Coefficient "C":	0.95	0.95			
Sideslope Runoff Coefficient "C":	0.70	0.70			
Composite Runoff Coefficient "C":	0.95	0.93			
CA	0.03	1.14			
Precipitation intensity (in/hr):	5.15	5.15			
Subarea discharge Q (cfs):	0.1	5.8			
Previous by-pass flow (cfs):	2.9	0.0			
Discharge added by operator:	—	—			
Total discharge Q (cfs):	3.0	5.8			
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016			
Longitudinal slope S (ft/ft):	0.0028	0.0028			
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3			
Longitudinal profile (1=on-grade, 2=sag):	1	1			
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2	2			
Capture Ratio Used:	50%	67%			
Inlet ADOT Std:	C-15.92	C-13.60			
Grate width:	2	--			
Grate length:	3.3	--			
Pavement cross-slope (Sx):	0.020	0.020			
Width of gutter from flowline (ft):	4.50	4.50			
Gutter depression from horizontal (ft):	0.17	0.17			
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.038	0.038			
Flooded Width from flowline (ft): before inlet	12.8	17.0			
Depth at flowline (ft): before inlet	0.34	0.42			
Water cross-area (sq.ft): before inlet	1.83	3.06			
Velocity V for total discharge (fps): before inlet	1.66	1.91			
Ratio of gutter depression flow to total Q (Eod):	74.5%	61.4%			
Equivalent cross-slope (Se):	0.033	0.031			
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	48.6%	—			
Inlet frontal flow in cfs (Qw):	1.48	—			
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	—			
Fraction of frontal flow intercepted (Rf):	100.0%	—			
Side flow in cfs (Qs):	1.56	—			
Effective grate length w/clogging:	1.65	—			
Fraction of side flow interception (Rs):	14.5%	—			
Grate Efficiency (E):	56.1%	—			
Total flow intercepted (cfs):	1.70	—			
Grate flow-by (cfs):	1.33	—			
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	—	30.9			
Length of inlet provided L (ft):		10			
Interception for length L (cfs):	—	2.96			
Efficiency for length L:	—	0.51			
Slotted drain or curb opening flow-by (cfs):	—	2.89			
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	—	—			
Capacity of grate in a sag (4-sided weir):	—	—			
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	—	—			
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	—	—			
K = Min(Lc/A,167) (Table 5, HEC-12):	—	—			
Flanking inlets maximum distance (ft):	—	—			
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	—	—			
Flooded width in the median (ft):	—	—			
Water velocity in the median (fps):	—	—			

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - Detour

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	351				
Return Period:	25				
Allowable Spread:	22				
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐				
Structure Station: (Stationing off of Santan Med/Cst CL)	1003+34				
Location Description:	Grate				
Pavement Area (ac):	0.924				
Sideslope Area (ac):	0.000				
Contributing watershed area (acres):	0.924				
Pavement Runoff Coefficient "C":	0.95				
Sideslope Runoff Coefficient "C":	0.70				
Composite Runoff Coefficient "C":	0.95				
CA	0.88				
Precipitation intensity (in/hr):	5.15				
Subarea discharge Q (cfs):	4.5				
Previous by-pass flow (cfs):	0.0				
Discharge added by operator:	—				
Total discharge Q (cfs):	4.5				
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016				
Longitudinal slope S (ft/ft):	0.0025				
Inlet type (1=grate, 2=curb opening, 3=slotted):	1				
Longitudinal profile (1=on-grade, 2=sag):	1				
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	2				
Capture Ratio Used:	50%				
Inlet ADOT Std:	C-15.30				
Grate width:	2				
Grate length:	3.0				
Pavement cross-slope (Sx):	0.020				
Width of gutter from flowline (ft):	2.50				
Gutter depression from horizontal (ft):	0.17				
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068				
Flooded Width from flowline (ft): before inlet	15.7				
Depth at flowline (ft): before inlet	0.43				
Water cross-area (sq.ft): before inlet	2.60				
Velocity V for total discharge (fps): before inlet	1.74				
Ratio of gutter depression flow to total Q (Eod):	45.0%				
Equivalent cross-slope (Se):	0.042				
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	39.2%				
Inlet frontal flow in cfs (Qw):	1.77				
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	6.9				
Fraction of frontal flow intercepted (Rf):	100.0%				
Side flow in cfs (Qs):	2.75				
Effective grate length w/clogging:	1.50				
Fraction of side flow interception (Rs):	11.1%				
Grate Efficiency (E):	46.0%				
Total flow intercepted (cfs):	2.08				
Grate flow-by (cfs):	2.44				
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	—				
Length of inlet provided L (ft):					
Interception for length L (cfs):	—				
Efficiency for length L:	—				
Slotted drain or curb opening flow-by (cfs):	—				
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	—				
Capacity of grate in a sag (4-sided weir):	—				
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	—				
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	—				
K = Min(Lc/A,167) (Table 5, HEC-12):	—				
Flanking inlets maximum distance (ft):	—				
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	—				
Flooded width in the median (ft):	—				
Water velocity in the median (fps):	—				

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - Ellsworth Ramp A

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	Future	Future	Future		
Return Period:	25	25	25		
Allowable Spread:	16	16	16		
RATIONAL METHOD HYDROLOGY COMPUTATION:	⇐	⇐	⇐		
Structure Station: (Stationing off of Santan Med/Cst CL)	5+68	5+68	10+64		
Location Description:	Grate	Slotted	Grate		
Pavement Area (ac):	0.007	0.352	0.744		
Sideslope Area (ac):	0.007	0.127	0.000		
Contributing watershed area (acres):	0.014	0.479	0.744		
Pavement Runoff Coefficient "C":	0.95	0.95	0.95		
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70		
Composite Runoff Coefficient "C":	0.83	0.88	0.95		
CA	0.01	0.42	0.71		
Precipitation intensity (in/hr):	5.15	5.15	5.15		
Subarea discharge Q (cfs):	0.1	2.2	3.6		
Previous by-pass flow (cfs):	1.3	1.1	0.5		
Discharge added by operator:	---	---	---		
Total discharge Q (cfs):	1.4	3.3	4.1		
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016		
Longitudinal slope S (ft/ft):	0.0086	0.0086	0.0422		
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	3	1		
Longitudinal profile (1=on-grade, 2=sag):	1	1	1		
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	2		
Capture Ratio Used:	50%	67%	50%		
Inlet ADOT Std:	C-15.91	C-13.60	C-15.92		
Grate width:	3	--	2		
Grate length:	3.3	--	3.3		
Pavement cross-slope (Sx):	0.020	0.020	0.020		
Width of gutter from flowline (ft):	2.50	2.50	4.50		
Gutter depression from horizontal (ft):	0.17	0.17	0.167		
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.068	0.068	0.037		
Flooded Width from flowline (ft): before inlet	5.9	9.8	7.8		
Depth at flowline (ft): before inlet	0.24	0.32	0.23		
Water cross-area (sq.ft): before inlet	0.50	1.11	0.79		
Velocity V for total discharge (fps): before inlet	2.69	3.01	5.25		
Ratio of gutter depression flow to total Q (Eod):	90.5%	71.4%	93.6%		
Equivalent cross-slope (Se):	0.063	0.054	0.036		
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	93.7%	---	71.7%		
Inlet frontal flow in cfs (Qw):	1.27	---	2.97		
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	7.2	---	7.2		
Fraction of frontal flow intercepted (Rf):	100.0%	---	100.0%		
Side flow in cfs (Qs):	0.08	---	1.17		
Effective grate length w/clogging:	1.65	---	1.65		
Fraction of side flow interception (Rs):	6.6%	---	2.1%		
Grate Efficiency (E):	94.2%	---	72.3%		
Total flow intercepted (cfs):	1.27	---	2.99		
Grate flow-by (cfs):	0.08	---	1.15		
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	24.5	---		
Length of inlet provided L (ft):		10			
Interception for length L (cfs):	---	2.04	---		
Efficiency for length L:	---	0.61	---		
Slotted drain or curb opening flow-by (cfs):	---	1.29	---		
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):					
Capacity of grate in a sag (3-sided weir):	---	---	---		
Capacity of grate in a sag (4-sided weir):	---	---	---		
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---		
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	---	---	---		
K = Min(Lc/A,167) (Table 5, HEC-12):	---	---	---		
Flanking inlets maximum distance (ft):	---	---	---		
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---	---		
Flooded width in the median (ft):	---	---	---		
Water velocity in the median (fps):	---	---	---		

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - EB Roadside

JOB: 202L/US 60 T.I.	Capture Ratios:		50%	67%	80%	50%	
Inlet Number:	253	255	258	303	322	332	333
Return Period:	25	25	25	25	25	25	25
Allowable Spread:	na	na	na	na	na	na	na
RATIONAL METHOD HYDROLOGY COMPUTATION:							
Structure Station:	963+51	964+56	967+55	979+16	1002+85	1010+47	1014+48
Location Description:	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet	Area Inlet
Pavement Area (ac):	0.000	0.000	0.000	0.000	0.536	1.500	0.660
Sideslope Area (ac):	0.582	0.400	1.280	0.701	0.772	1.620	0.332
Contributing watershed area (acres):	0.582	0.400	1.280	0.701	1.308	3.120	0.992
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Composite Runoff Coefficient "C":	0.70	0.70	0.70	0.70	0.80	0.82	0.87
CA	0.41	0.28	0.90	0.49	1.05	2.56	0.86
Precipitation intensity (in/hr):	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Subarea discharge Q (cfs):	2.1	1.4	4.6	2.5	5.4	13.2	4.4
Previous by-pass flow (cfs):	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discharge added by operator:	---	---	---	---	---	---	---
Total discharge Q (cfs):	2.1	1.4	4.6	2.5	5.4	13.2	4.4
SHOULDER AND GUTTER CONFIGURATION:							
Manning's n:	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Longitudinal slope S (ft/ft):	0.0250	0.0250	0.0250	0.0250	0.0400	0.0400	0.0400
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	1	1	1	1
Longitudinal profile (1=on-grade, 2=sag):	2	2	2	2	2	2	2
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	3	3	3	3
Capture Ratio Used:	50%	50%	50%	50%	50%	50%	50%
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80	C-15.80
Grate width:	2	2	2	2	2	2	2
Grate length:	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Pavement cross-slope (Sx):	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Width of gutter from flowline (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutter depression from horizontal (ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flooded Width from flowline (ft): before inlet	NA	NA	NA	NA	NA	NA	NA
Depth at flowline (ft): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Equivalent cross-slope (Se):	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GRATE INLETS ON-GRADE:							
Ratio of grate frontal flow to total flow:	---	---	---	---	---	---	---
Inlet frontal flow in cfs (Qw):	---	---	---	---	---	---	---
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	---	---	---	---	---	---
Fraction of frontal flow intercepted (Rf):	---	---	---	---	---	---	---
Side flow in cfs (Qs):	---	---	---	---	---	---	---
Effective grate length w/clogging:	---	---	---	---	---	---	---
Fraction of side flow interception (Rs):	---	---	---	---	---	---	---
Grate Efficiency (E):	---	---	---	---	---	---	---
Total flow intercepted (cfs):	---	---	---	---	---	---	---
Grate flow-by (cfs):	---	---	---	---	---	---	---
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:							
Length required for total interception (ft): w/clogging	---	---	---	---	---	---	---
Length of inlet provided L (ft):							
Interception for length L (cfs):	---	---	---	---	---	---	---
Efficiency for length L:	---	---	---	---	---	---	---
Slotted drain or curb opening flow-by (cfs):	---	---	---	---	---	---	---
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:							
Head available for weir flow at sag (ft):	0.65	0.65	0.65	0.65	0.65	1.70	0.95
Capacity of grate in a sag (3-sided weir):	5.50	5.50	5.50	5.50	5.50	23.27	9.72
Capacity of grate in a sag (4-sided weir):	7.9	7.9	7.9	7.9	7.9	33.2	13.9
Length provided of curb-opening or slotted drain at sag:							
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	---	---	---	---
Length of the vertical curve (ft x 100):							
approach grade #1 (%):							
approach grade #2 (%):							
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
TRIANGULAR MEDIAN HYDRAULICS:							
Manning's n for median finish:							
Cross-slope of median sides:							
Depth of flow at center of median (ft):	---	---	---	---	---	---	---
Flooded width in the median (ft):	---	---	---	---	---	---	---
Water velocity in the median (fps):	---	---	---	---	---	---	---

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - WB Roadside

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	330	334			
Return Period:	25	25			
Allowable Spread:	na	na			
RATIONAL METHOD HYDROLOGY COMPUTATION:					
Structure Station:	1009+47	1015+46			
Location Description:	Area Inlet	Area Inlet			
Pavement Area (ac):	2.380	0.195			
Sideslope Area (ac):	1.200	0.208			
Contributing watershed area (acres):	3.580	0.403			
Pavement Runoff Coefficient "C":	0.95	0.95			
Sideslope Runoff Coefficient "C":	0.70	0.70			
Composite Runoff Coefficient "C":	0.87	0.82			
CA	3.10	0.33			
Precipitation intensity (in/hr):	5.15	5.15			
Subarea discharge Q (cfs):	16.0	1.7			
Previous by-pass flow (cfs):	0.0	0.0			
Discharge added by operator:	—	—			
Total discharge Q (cfs):	16.0	1.7			
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016			
Longitudinal slope S (ft/ft):	0.0400	0.0400			
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1			
Longitudinal profile (1=on-grade, 2=sag):	2	2			
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3			
Capture Ratio Used:	50%	50%			
Inlet ADOT Std:	C-15.80	C-15.80			
Grate width:	2	2			
Grate length:	3.0	3.0			
Pavement cross-slope (Sx):	0.000	0.000			
Width of gutter from flowline (ft):	0.00	0.00			
Gutter depression from horizontal (ft):	0.00	0.00			
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000			
Flooded Width from flowline (ft): before inlet	NA	NA			
Depth at flowline (ft): before inlet	0.00	0.00			
Water cross-area (sq.ft): before inlet	0.00	0.00			
Velocity V for total discharge (fps): before inlet	0.00	0.00			
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%			
Equivalent cross-slope (Se):	0.000	0.000			
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	—	—			
Inlet frontal flow in cfs (Qw):	—	—			
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	—	—			
Fraction of frontal flow intercepted (Rf):	—	—			
Side flow in cfs (Qs):	—	—			
Effective grate length w/clogging:	—	—			
Fraction of side flow interception (Rs):	—	—			
Grate Efficiency (E):	—	—			
Total flow intercepted (cfs):	—	—			
Grate flow-by (cfs):	—	—			
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	—	—			
Length of inlet provided L (ft):					
Interception for length L (cfs):	—	—			
Efficiency for length L:	—	—			
Slotted drain or curb opening flow-by (cfs):	—	—			
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):	1.60	1.00			
Capacity of grate in a sag (3-sided weir):	21.25	10.50			
Capacity of grate in a sag (4-sided weir):	30.4	15.0			
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	—	—			
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	0.00	0.00			
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!			
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!			
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	—	—			
Flooded width in the median (ft):	—	—			
Water velocity in the median (fps):	—	—			

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - Median

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%
Inlet Number:	252	320	324	
Return Period:	25	25	25	
Allowable Spread:	na	na	na	
RATIONAL METHOD HYDROLOGY COMPUTATION:				
Structure Station:	972+15	978+90	993+30	
Location Description:	Area Inlet	Area Inlet	Area Inlet	
Pavement Area (ac):	0.540	2.020	2.000	
Sideslope Area (ac):	0.000	0.000	0.000	
Contributing watershed area (acres):	0.540	2.020	2.000	
Pavement Runoff Coefficient "C":	0.95	0.95	0.95	
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70	
Composite Runoff Coefficient "C":	0.95	0.95	0.95	
CA	0.51	1.92	1.90	
Precipitation intensity (in/hr):	5.15	5.15	5.15	
Subarea discharge Q (cfs):	2.6	9.9	9.8	
Previous by-pass flow (cfs):	0.0	0.0	0.0	
Discharge added by operator:	---	---	---	
Total discharge Q (cfs):	2.6	9.9	9.8	
SHOULDER AND GUTTER CONFIGURATION:				
Manning's n:	0.016	0.016	0.016	
Longitudinal slope S (ft/ft):	0.0025	0.0025	0.0084	
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1	
Longitudinal profile (1=on-grade, 2=sag):	2	2	2	
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3	
Capture Ratio Used:	50%	50%	50%	
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80	
Grate width:	2	2	2	
Grate length:	3.0	3.0	3.0	
Pavement cross-slope (Sx):	0.000	0.000	0.000	
Width of gutter from flowline (ft):	0.00	0.00	0.00	
Gutter depression from horizontal (ft):	0.00	0.00	0.00	
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000	
Flooded Width from flowline (ft): before inlet	NA	NA	NA	
Depth at flowline (ft): before inlet	0.00	0.00	0.00	
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00	
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00	
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%	
Equivalent cross-slope (Se):	0.000	0.000	0.000	
GRATE INLETS ON-GRADE:				
Ratio of grate frontal flow to total flow:	---	---	---	
Inlet frontal flow in cfs (Qw):	---	---	---	
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	---	---	
Fraction of frontal flow intercepted (Rf):	---	---	---	
Side flow in cfs (Qs):	---	---	---	
Effective grate length w/clogging:	---	---	---	
Fraction of side flow interception (Rs):	---	---	---	
Grate Efficiency (E):	---	---	---	
Total flow intercepted (cfs):	---	---	---	
Grate flow-by (cfs):	---	---	---	
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:				
Length required for total interception (ft): w/clogging	---	---	---	
Length of inlet provided L (ft):				
Interception for length L (cfs):	---	---	---	
Efficiency for length L:	---	---	---	
Slotted drain or curb opening flow-by (cfs):	---	---	---	
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:				
Head available for weir flow at sag (ft):	3.00	3.00	3.00	
Capacity of grate in a sag (3-sided weir):	54.56	54.56	54.56	
Capacity of grate in a sag (4-sided weir):	77.9	77.9	77.9	
Length provided of curb-opening or slotted drain at sag:				
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---	
Length of the vertical curve (ft x 100):				
approach grade #1 (%):				
approach grade #2 (%):				
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00	
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!	
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!	
TRIANGULAR MEDIAN HYDRAULICS:				
Manning's n for median finish:				
Cross-slope of median sides:				
Depth of flow at center of median (ft):	---	---	---	
Flooded width in the median (ft):	---	---	---	
Water velocity in the median (fps):	---	---	---	

ULTIMATE ADOT HEC-12 (25-YR) Pavement Drainage

SRT - Detour

JOB: 202L/US 60 T.I.	Capture Ratios:	50%	67%	80%	50%
Inlet Number:	350	353	352		
Return Period:	25	25	25		
Allowable Spread:	na	na	na		
RATIONAL METHOD HYDROLOGY COMPUTATION:					
Structure Station:	973+65	1005+40	1007+00		
Location Description:	Area Inlet	Area Inlet	Area Inlet		
Pavement Area (ac):	3.530	2.100	3.900		
Sideslope Area (ac):	4.500	3.100	0.900		
Contributing watershed area (acres):	8.030	5.200	4.800		
Pavement Runoff Coefficient "C":	0.95	0.95	0.95		
Sideslope Runoff Coefficient "C":	0.70	0.70	0.70		
Composite Runoff Coefficient "C":	0.81	0.80	0.90		
CA	6.50	4.17	4.34		
Precipitation intensity (in/hr):	5.15	5.15	5.15		
Subarea discharge Q (cfs):	33.5	21.4	22.3		
Previous by-pass flow (cfs):	0.0	0.0	0.0		
Discharge added by operator:	---	---	---		
Total discharge Q (cfs):	33.5	21.4	22.3		
SHOULDER AND GUTTER CONFIGURATION:					
Manning's n:	0.016	0.016	0.016		
Longitudinal slope S (ft/ft):	0.0025	0.0084	0.0084		
Inlet type (1=grate, 2=curb opening, 3=slotted):	1	1	1		
Longitudinal profile (1=on-grade, 2=sag):	2	2	2		
Gutter Configuration (1=roll, 2=Type D vertical, 3=6" Type B, 4=3" Type C):	3	3	3		
Capture Ratio Used:	50%	50%	50%		
Inlet ADOT Std:	C-15.80	C-15.80	C-15.80		
Grate width:	2	2	2		
Grate length:	3.0	3.0	3.0		
Pavement cross-slope (Sx):	0.000	0.000	0.000		
Width of gutter from flowline (ft):	0.00	0.00	0.00		
Gutter depression from horizontal (ft):	0.00	0.00	0.00		
Gutter cross-slope Sw: (S'w=Sw-Sx)	0.000	0.000	0.000		
Flooded Width from flowline (ft): before inlet	NA	NA	NA		
Depth at flowline (ft): before inlet	0.00	0.00	0.00		
Water cross-area (sq.ft): before inlet	0.00	0.00	0.00		
Velocity V for total discharge (fps): before inlet	0.00	0.00	0.00		
Ratio of gutter depression flow to total Q (Eod):	100.0%	100.0%	100.0%		
Equivalent cross-slope (Se):	0.000	0.000	0.000		
GRATE INLETS ON-GRADE:					
Ratio of grate frontal flow to total flow:	---	---	---		
Inlet frontal flow in cfs (Qw):	---	---	---		
Vo for effective length (P-1-7/8, Chart 7 HEC 12):	---	---	---		
Fraction of frontal flow intercepted (Rf):	---	---	---		
Side flow in cfs (Qs):	---	---	---		
Effective grate length w/clogging:	---	---	---		
Fraction of side flow interception (Rs):	---	---	---		
Grate Efficiency (E):	---	---	---		
Total flow intercepted (cfs):	---	---	---		
Grate flow-by (cfs):	---	---	---		
SLOTTED DRAINS AND CURB OPENING INLETS ON-GRADE:					
Length required for total interception (ft): w/clogging	---	---	---		
Length of inlet provided L (ft):					
Interception for length L (cfs):	---	---	---		
Efficiency for length L:	---	---	---		
Slotted drain or curb opening flow-by (cfs):	---	---	---		
INTERCEPTION CAPACITY OF INLETS IN SAG LOCATION:					
Head available for weir flow at sag (ft):	2.60	3.00	3.00		
Capacity of grate in a sag (3-sided weir):	44.02	54.56	54.56		
Capacity of grate in a sag (4-sided weir):	62.9	77.9	77.9		
Length provided of curb-opening or slotted drain at sag:					
Capacity of curb-opening or slotted drain in a sag (weir):	---	---	---		
Length of the vertical curve (ft x 100):					
approach grade #1 (%):					
approach grade #2 (%):					
ABS (algebraic diff. in approach grades) (%):	0.00	0.00	0.00		
K = Min(Lc/A,167) (Table 5, HEC-12):	#DIV/0!	#DIV/0!	#DIV/0!		
Flanking inlets maximum distance (ft):	#DIV/0!	#DIV/0!	#DIV/0!		
TRIANGULAR MEDIAN HYDRAULICS:					
Manning's n for median finish:					
Cross-slope of median sides:					
Depth of flow at center of median (ft):	---	---	---		
Flooded width in the median (ft):	---	---	---		
Water velocity in the median (fps):	---	---	---		

Loop 202/US 60 T.I., Phase I
95% Submittal

Area Identifier	Concentration Point (CB)	*Area Limits	Soil Area (sq ft)	Pavement Area (sq ft)	Total Area (sq ft)	Total Area (acre)	Percentage of Soil Area	Percentage of Pavement Area	(Weighted) Runoff Coefficient
1	721	Ramp N-E Sta 23+56.05 to Ramp N-E Sta 44+70 (sag)	0	91,040	91,040	2.09	0	100	0.95
2	714	CB 721 to CB 714	0	12,150	12,150	0.28	0	100	0.95
3	715	CB 714 to CB 715	0	17,400	17,400	0.40	0	100	0.95
4	705	EB HP Sta 470+21.22 to CB 705	16,340	4,560	20,900	0.48	78	22	0.75
5	706	CB 705 to CB 706	24,940	3,480	28,420	0.65	88	12	0.73
6	702	EB HP Sta 470+21.22 to CB 702	2,280	13,330	15,610	0.36	15	85	0.91
7	701	CB 702 to End Project (south)	3,480	20,300	23,780	0.55	15	85	0.91
8	Future 717	Ramp W-S HP Sta 62+82.96 to Future CB 717	0	52,756	52,756	1.21	0	100	0.95
9	Future 718	Future CB 717 to Future CB 718	0	22,017	22,017	0.51	0	100	0.95
10	Future 719	Future CB 718 to Future CB 719	0	9,066	9,066	0.21	0	100	0.95
11	Future 716	Area between Ramp E-S and W-S	22,660	0	22,660	0.52	100	0	0.70
12	Future 720	Area between Ramp E-S and W-S	8,700	0	8,700	0.20	100	0	0.70
13	707	Area between Ramp N-W and N-E	30,900	0	30,900	0.71	100	0	0.70
14	708	Area between Ramp N-W and N-E	15,950	0	15,950	0.37	100	0	0.70
15	703	EB HP Sta 470+21.22 to CB 703	0	15,400	15,400	0.35	0	100	0.95
16	704	EB HP Sta 470+21.22 to CB 704	18,920	2,640	21,560	0.49	88	12	0.73

C=0.70 (soil), C=0.95 (pvmnt)
*See Drainage Figure (Figure 1, Shts 1 & 2 of 2)

Loop 202/US 60 T.I., Phase I
95% Submittal

10-Yr Discharges
Rational Method

Catch Basin	Contributing Area Identifier	Contributing Area "A" (acres)	10-Yr Intensity "I" (in/hr)	Runoff Coefficient "C"	Discharge (cfs)
701	7	0.55	4.22	0.91	2.11
702	6	0.36	4.22	0.91	1.38
703	15	0.35	4.22	0.95	1.40
704	16	0.49	4.22	0.73	1.51
705	4	0.48	4.22	0.75	1.52
706	5	0.65	4.22	0.73	2.00
707	13	0.71	4.22	0.70	2.10
708	14	0.37	4.22	0.70	1.09
*713	-	-	-	-	*32.6
714	2	0.28	4.22	0.95	1.12
715	3	0.40	4.22	0.95	1.60
Future 716	11	0.52	4.22	0.70	1.54
Future 717	8	1.21	4.22	0.95	4.85
Future 718	9	0.51	4.22	0.95	2.04
Future 719	10	0.21	4.22	0.95	0.84
Future 720	12	0.20	4.22	0.70	0.59
721	1	2.09	4.22	0.95	8.38

*Sedimentation Basin, see Detail DK. 50-Yr flow 44.4 cfs was used.

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: Super Red Tan | Project No: AZ01107
Computed by: RFC | Date: 1/16/03
Checked By: JCF | Date: 3/26/03
Sheet Name: Bridge High Points | Sheet: 1 | Of: 1

Ramp W-S Deck

High Point : VPI 63+50
$G_1 = 0.016094'/ft$
$G_2 = -0.020143'/ft$
$V_c = 1200'$

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.016094-0.020143}{0.016094+0.020143}\right)(600') = -67.04'$$

High Point = 63+50 − 67.04' = 62+82.96 ✓

Ramp S-E Deck

High Point : VPI 42+25
$G_1 = 0.024853'/ft$
$G_2 = -0.026776'/ft$
$V_c = 1500'$

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.024853-0.026776}{0.024853+0.026776}\right)(750') = -27.93'$$

High Point = 42+25 − 27.93' = 41+97.07

Ramp E-N Deck

High Point : VPI 37+50
$G_1 = 0.0090'/ft$
$G_2 = -0.0252'/ft$
$V_c = 1500'$

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.0090-0.0252}{0.0090+0.0252}\right)(750') = -355.26'$$

High Point = 37+50 − 355.26' = 33+94.74 ✓

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Project: Super Red Tan | Project No: A701107
Computed by: RFC | Date: 1/16/03
Checked By: JCF | Date: 3/26/03
Sheet Name: Ramp W-S Deck Drains | Sheet: 1 | Of: 1

Ramp W-S Deck Drainage

Bridge Anchor Slab Begin 50+71.95, End 69+10.05 } See Sht S-7.01

High Point 62+82.96 (see calc sht)

Downstation: L = 62+82.96 − 50+71.95 = 1211.01'
W = 43'2" (see sht S-7.01)
Super'd Lt
∴ A = (43.17')(1211.01') = 52,279.30 ft² = 1.20 acre

Allowable Spread = 12' (shoulder + 1/2 travel lane)

Downstation S = 0.016094'/ft cross-slope = 0.055'/ft

Q = ciA = (0.95)(4.22)(1.20) = 4.81 cfs

@ 4.81 cfs (Begin Anchor), Spread = 5.84' < 12' OK
(see Flowmaster results)

No Deck Drain needed between Begin Anchor & High Point

Upstation: L = 69+10.05 − 62+82.96 = 627.09'
W = 43.17'
∴ A = (43.17')(627.09') = 27,071.48 ft² = 0.62 acre

Upstation S = 0.020143'/ft cross-slope = 0.055'/ft

Q = ciA = (0.95)(4.22)(0.62) = 2.49 cfs

@ 2.49 cfs (End Anchor), Spread = 4.38' < 12' OK
(see Flowmaster results)

∴ No Deck Drain is needed between High Point & End Anchor.

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Phone (602) 454-0402
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Project: Super Red Tan | Project No: A701107
Computed by: RFC | Date: 1/16/03
Checked By: JCF | Date: 3/26/03
Sheet Name: Ramp S-E Deck | Sheet: 1 | Of: 1

Ramp S-E Deck Drainage

Bridge Anchor Slab Begin 28+12.04, End 54+79.96 } See Sht S-6.01

High Point @ 41+97 (see calc sht)

Down Station: $L = 41+97 - 28+12.04 = 1384.96'$
$W = 31'2''$ (See Sht S-6.01) Super'd Lt
$\therefore A = (31.17')(1384.96') = 43{,}169.20\ ft^2 = 0.99\ acre$

* Allowable Spread = 12' (shoulder + 1/2 travel lane)

$Q = c\,i\,A = (0.95)(4.22)(0.99) = 3.97\ cfs$

@ 3.97 cfs (Begin Anchor), Spread = 4.90' < 12' OK
(see Flowmaster results)

Downstation $S = 0.024853'/ft$ Cross-Slope = 0.057'/ft

$\therefore$ No Deck Drain is needed between High Point & Begin Anchor

Up Station: $L = 54+79.96 - 41+97 = 1282.96'$
$W = 31.17' \therefore A = (31.17')(1282.96') = 39{,}989.86\ ft^2 = 0.92\ acre$

Upstation $S = 0.026776'/ft$ Cross-Slope = 0.057'/ft

$c\,i\,A = (0.95)(4.22)(0.92) = 3.69\ cfs$

@ 3.69 cfs (End Anchor), Spread = 4.70' < 12' OK
(see Flowmaster results)

$\therefore$ No Deck Drain is needed between High Point & End Anchor.

W-S Sta 50+71.95 Begin Anchor
Worksheet for Gutter Section

Project Description	
Worksheet	W-S Sta 50+71.95 Begir
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	016094	ft/ft
Discharge	4.81	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	055000	ft/ft
Road Cross Slop	055000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	5.84	ft
Flow Area	0.9	ft²
Depth	0.32	ft
Gutter Depres	0.0	in
Velocity	5.13	ft/s

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W-S Sta 69+10.05 End Anchor
Worksheet for Gutter Section

Project Description	
Worksheet	W-S Sta 69+10.05 Enc
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	020143	ft/ft
Discharge	2.49	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	055000	ft/ft
Road Cross Slop	055000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	4.38	ft
Flow Area	0.5	ft^2
Depth	0.24	ft
Gutter Depress	0.0	in
Velocity	4.73	ft/s

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S-E Sta 28+12.04 Begin Anchor
Worksheet for Gutter Section

Project Description	
Worksheet	S-E Sta 28+12.04 Begin
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	024853	ft/ft
Discharge	3.97	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	057000	ft/ft
Road Cross Slop	057000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	4.90	ft
Flow Area	0.7	ft²
Depth	0.28	ft
Gutter Depress	0.0	in
Velocity	5.80	ft/s

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S-E Sta 54+79.96 End Anchor
Worksheet for Gutter Section

Project Description	
Worksheet	S-E Sta 54+79.96 End
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	026776	ft/ft
Discharge	3.69	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	057000	ft/ft
Road Cross Slop	057000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	4.70	ft
Flow Area	0.6	ft²
Depth	0.27	ft
Gutter Depress	0.0	in
Velocity	5.86	ft/s

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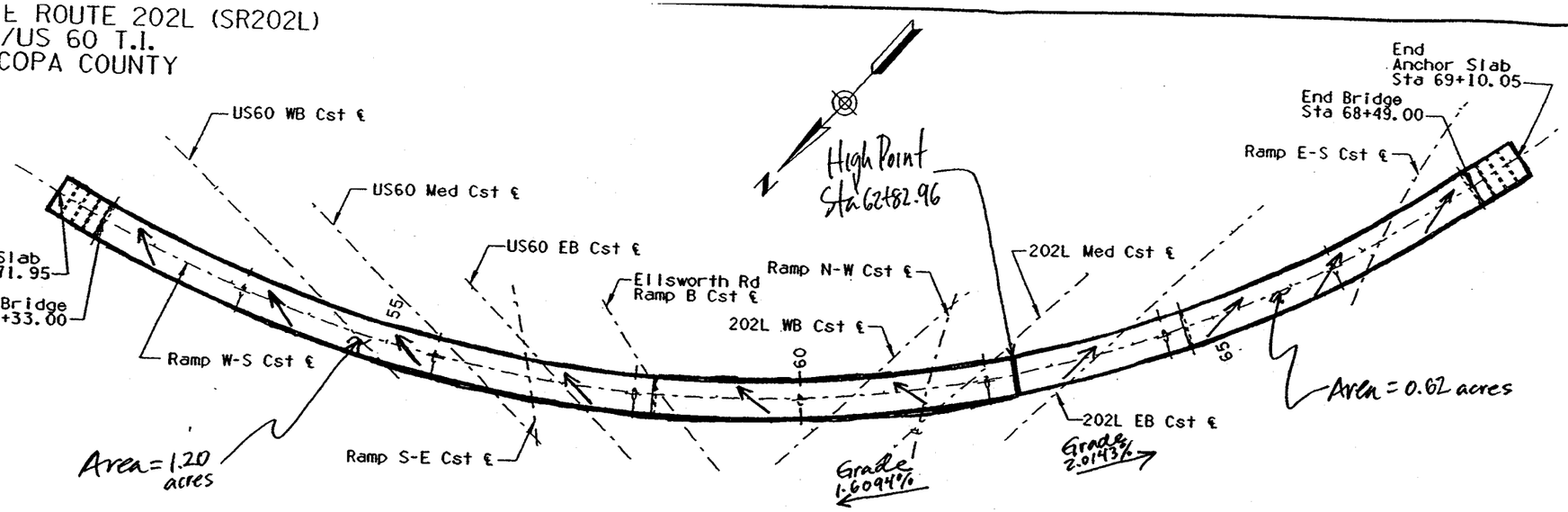
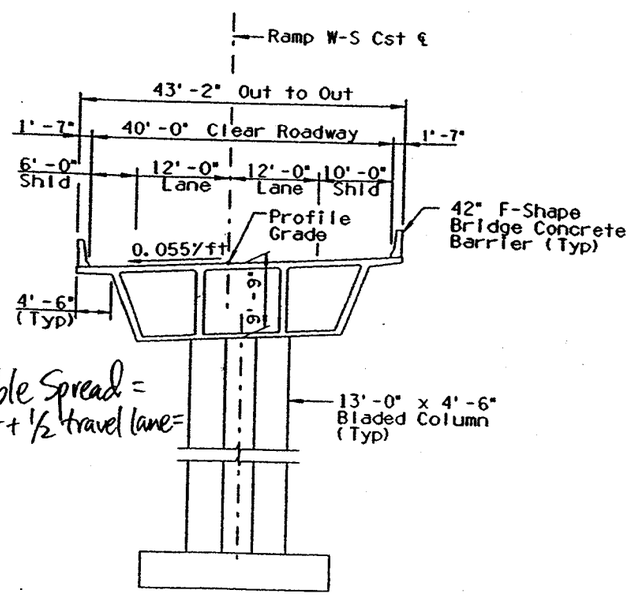
STATE ROUTE 202L (SR202L)
202L/US 60 T.I.
MARICOPA COUNTY

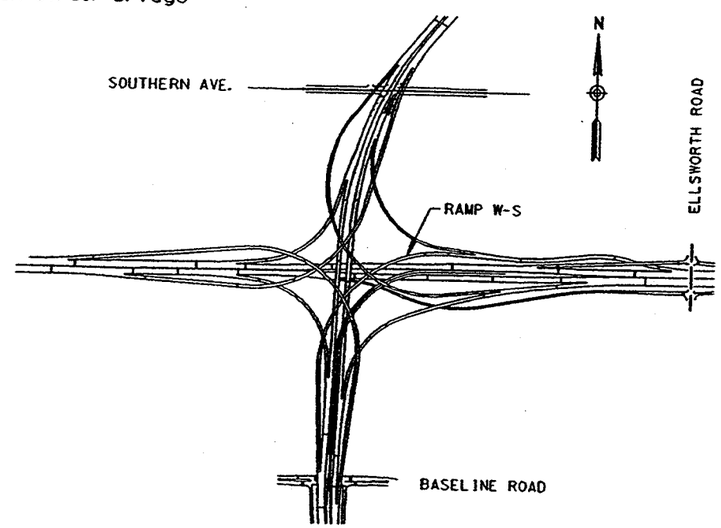
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)	695	757	
		202 MA 29			



GENERAL PLAN
New 8 Span Cast-In-Place
Post-Tensioned Concrete Box Girder Bridge
N.T.S.



TYPICAL SECTION
(Looking Upstation)
Scale: 1/8" = 1'-0"



KEY PLAN
N.T.S.

LEGEND:

DETAIL Marker — Detail Marker / Drawing Number

SECTION Marker — Section Letter / Drawing Number

NOTE:

A line (-) in place of the Drawing Number indicates that the SECTION or DETAIL is located on the same Drawing that the SECTION or DETAIL is cut.

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S-7.03	LOCATION PLAN 2
S-7.04	LOCATION PLAN 3
S-7.05	LOCATION PLAN 4
S-7.06	GEOMETRICS
S-7.07	GENERAL NOTES & QUANTITIES
S-7.08	STR EXC & BKFL PYMT LIMITS
S-7.09	FOUNDATION PLAN 1
S-7.10	FOUNDATION PLAN 2
S-7.11	FOUNDATION PLAN 3
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S-7.13	DRILLED SHAFT DETAILS
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S-7.21	FRAMING PLAN & WEB ELEV 1
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F-7.04	FOUNDATION DATA 4
F-7.05	FOUNDATION DATA 5

	NAME	DATE
DESIGN	DT	8-02
DRAWN	EF	8-02
CHECKED	GL	8-02

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STA 41+
RAMP W-S
GENERAL PLAN

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

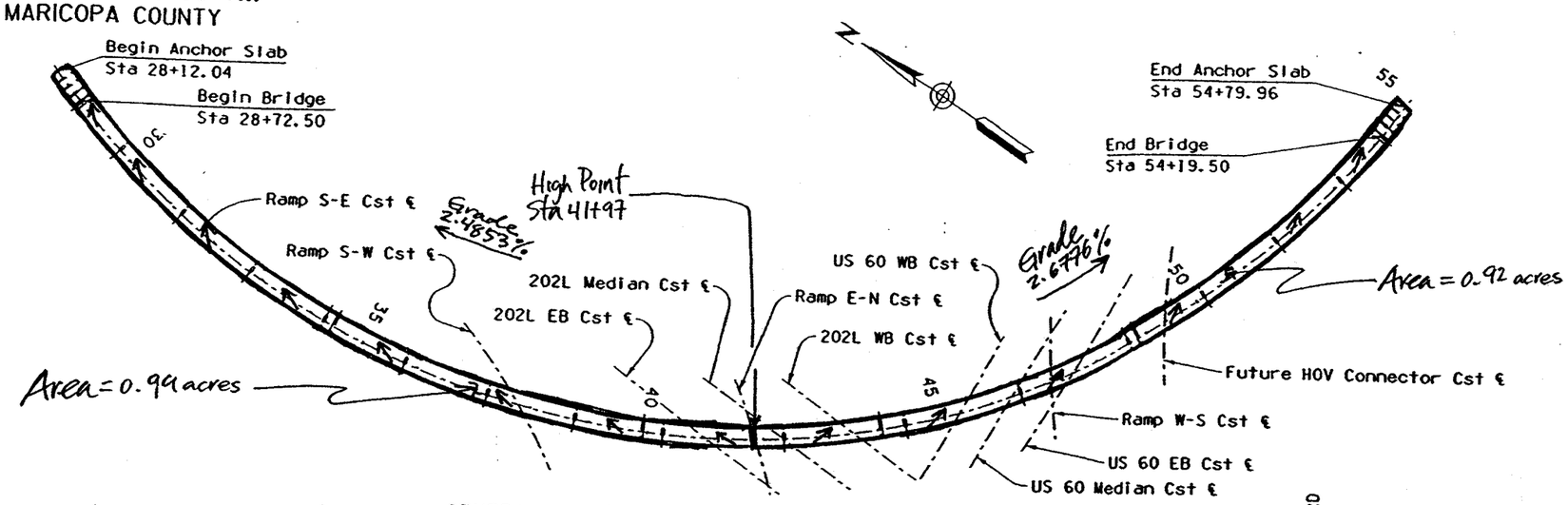
US 60 ROUTE	190.28 MILEPOST	2746 STRUCTURE NO.	LOCATION Loop 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005) | DWG NO. S-7.01 ___ OF ___

Thu Nov 07 14:24:49 2002 H:\60_TI\phase_2\STRUC\WStypsec.dgn

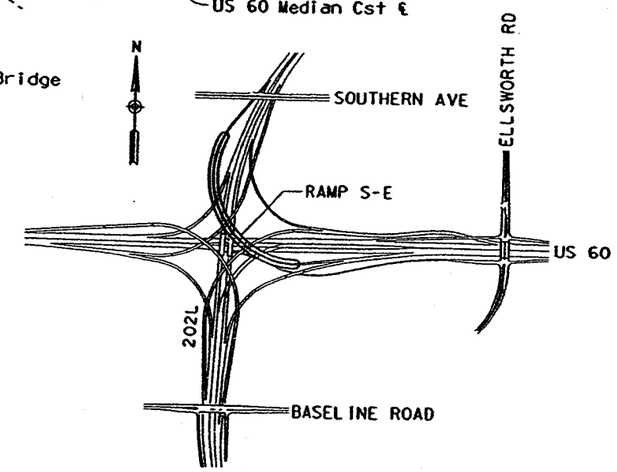
RED MOUNTAIN FREEWAY (SR LOOP 202)
LOOP 202/US 60 T.I.
MARICOPA COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B-507	623	757	
		202 MA 29			



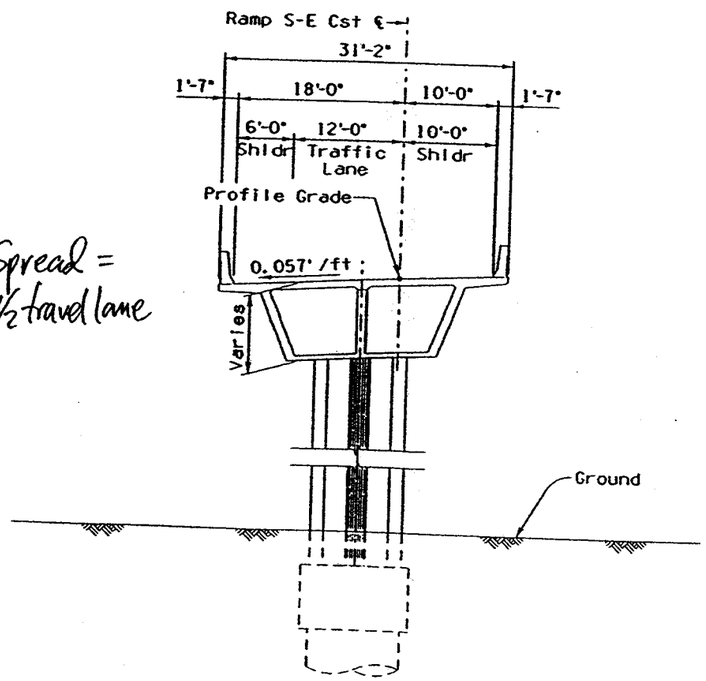
GENERAL PLAN

New 16 Span Cast-in-Place Post-Tensioned Concrete Box Girder Bridge
Not To Scale



KEY MAP

Not To Scale



Allowable Spread =
6' shldr + ½ travel lane
= 12'

TYPICAL SECTION

Scale: ⅛" = 1'-0"

LEGEND:

DETAIL Marker — 1 / 6.22 — Detail Number; Drawing Number

SECTION Marker — A / 6.22 — Section Letter; Drawing Number

NOTE:

A line (—) in place of the Drawing Number indicates that the SECTION or DETAIL is located on the same Drawing that the SECTION or DETAIL is cut.

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S-6.02 THRU S-6.07	LOCATION PLAN 1 THRU LOCATION PLAN 6
S-6.08	GEOMETRICS
S-6.09	GENERAL NOTES & QUANTITIES
S-6.10	STR EXC & BKFL PYMT LIMITS
S-6.11	FOUNDATION PLAN 1
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S-6.14	ABT DRILLED SHAFT DETAILS
S-6.15	PIER DRILLED SHAFT DETAILS
S-6.16	ABUTMENT 1 PLAN AND ELEVATION
S-6.17	ABUTMENT 2 PLAN AND ELEVATION
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S-6.52	CONSTRUCTION SEQUENCE 3
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S-6.54	EXPANSION JOINT DETAILS 1
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		DATE
DESIGN	RWK	9/02
DRAWN	RPC	5/02
CHECKED	DNH	9/02

TY LIN INTERNATIONAL
Civil and Structural Engineers

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA 28+
RAMP S-E
GENERAL PLAN

LOCATION: LOOP 202/US 60 T.I.

US 60 (ROUTE)	190.10 (MILEPOST)	2748 (STRUCTURE NO.)

TRACS NO. H 5686 03 C

202-B-507

PRELIMINARY
60%
Review
NOT FOR CONSTRUCTION OR RECORDING

DWG. S-6.01 OF 68

___ OF ___

FILENAME=FILMAP\1554 SUPERSTITION\RAMP S-E\32X\DP.DGN

AZTEC

Ramp Discharges
10-Yr Event

Ramp	Begin Anchor Slab (Sta)	End Anchor Slab (Sta)	VPI (Sta)	G1 ('/ft)	G2 ('/ft)	Vc (ft)	High Point Distance from VPI (ft)	Bridge High Point (Sta)	Downstation Superelevation Rate ('/ft)	Upstation Superelevation Rate ('/ft)	Downstation Length (High Point to Anchor) (ft)	Upstation Length (High Point to Anchor) (ft)	Bridge Width (including barrier) (ft)	Downstation Area (acres)	Upstation Area (acres)	10-Yr Intensity (in/hr)	Runoff Coefficient "C"	Downstation 10-Yr Q (cfs)	Upstation 10-Yr Q (cfs)
W-S	50+71.95	69+10.05	63+50.00	0.016094	-0.020143	1200	-67.04	62+82.96	0.055	0.055	1211.01	627.09	43.17	1.20	0.62	4.22	0.95	4.81	2.49
S-E	28+12.04	54+79.96	42+25.00	0.024853	-0.026776	1500	-27.93	41+97.07	0.057	0.057	1385.03	1282.89	31.17	0.99	0.92	4.22	0.95	3.97	3.68
E-N	28+72.21	52+69.79	37+50.00	0.009000	-0.025200	1500	-355.26	33+94.74	0.020	0.056	522.53	1875.05	43.17	0.52	1.86	4.22	0.95	2.08	7.45

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Phone (602) 454-0402
Fax (602) 454-0403

Project: SRT | Project No: AZ01107
Computed by: RFC | Date: 1/24/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Shed Upper Limits | Sheet: 1 | Of: 1

Upper Limits of Pvmt Drng for Loop 202 (immediately N. of Baseline)

Loop 202 Mainline : Upper Limit (EB)

VPI = 469+50.00
G_1 = 0.005733'/ft
G_2 = -0.00400'/ft
V_c = 800'

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.005733-0.00400}{0.005733+0.00400}\right)(400') = 71.22'$$

High Point = 469+50 + 71.22' = 470+21.22 ≈ Ramp N-E 44+70

Upper Limit (WB)
VPI = 469+50
G_1 = 0.004089'/ft
G_2 = -0.00400'/ft
V_c = 800'

High Point = 469+58.80

Aztec's Ramps N-E
W-S

N-E High Point :
VPI = 22+00.00
G_1 = 0.023999'/ft
G_2 = -0.014986'/ft
V_c = 1350'

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.023999-0.014986}{0.023999+0.014986}\right)(675') = 156.05'$$

High Point = 22+00 + 156.05' = 23+56.05

W-S High Point :
VPI = 63+50.00
G_1 = 0.016094'/ft
G_2 = -0.020143'/ft
V_c = 1200'

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{0.016094-0.020143}{0.016094+0.020143}\right)(600') = -67.04$$

High Point = 63+50 - 67.04' = 62+82.96

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Project: SRT-Ph I | Project No: AZ01107
Computed by: RFC | Date: 2/13/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Drng. N. of Baseline | Sheet: 1 | Of: 6

*Area ①: CB721 Low point (Ramp N-E @ L202) See plans
CB721
High Point North 23+56.05 (Ramp N-E)
High Point South 469+58.80 (WB L202) = 44+70 (Ramp N-E) } see plans

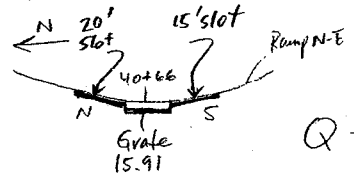
CB721 Low Point of Ramp N-E: VPI = 39+50.00
$G_1 = -0.014986'/ft$
$G_2 = 0.003984'/ft$
$V_c = 400'$

$$\left(\frac{G_1+G_2}{G_1-G_2}\right)\tfrac{1}{2}V_c = \left(\frac{-0.014986+0.003984}{-0.014986-0.003984}\right)(200') = 116'$$ ✓

∴ Low Point = 39+50 + 116' = 40+66 Super'd Lt (0.020'/ft); CB needed @ 40+66 Lt Curb

*Q_{10} from High Point North: W = 43.17'
L = 40+66 - 23+56.05 = 1709.95'
∴ A = (43.17')(1709.95') = 73,818.54 ft² = 1.69ac
C = 0.95
i_{10} = 4.22 in/hr (from Drng Rpt)
∴ $Q_{HP\ North}$ = C i A = (0.95)(4.22)(1.69) = 6.78 cfs
try 20' slot north: Long S = 0.014986'/ft
Bypass to Grate = 2.78 cfs (see Flowmaster results)

CB721 =>



Q from High Point South: W = 43.17'
L = 44+70 - 40+66 = 404'
∴ A = (43.17')(404') = 17,440.68 ft² = 0.40ac
∴ Q_{10} = (0.95)(4.22)(0.40) = 1.60 cfs
try 15' slot south: Long S = 0.003984'/ft
Bypass to Grate = 0.04 cfs (see Flowmaster results)

Allowable Spread = Shoulder + ½ travel lane = 12'

∴ Flow @ Grate = 2.78 cfs + 0.04 cfs = 2.82 cfs

Grate in Sag ∴ no bypass. Spread 10.40' < 12' ok
Depth = 0.31' < 0.50' ok } see Flowmaster results

Q from High points = 6.78 cfs + 1.60 cfs = 8.38 cfs (for StormCAD analysis)

* Note: Ramp N-E is in Phase II, CB 721 placed at sag at this time to allow collection of the majority of flow from Ramp N-E high point. Further analysis of Ramp N-E upstream of CB 721 will follow in Phase II. ✓

CB 721 Slot North
Worksheet for Slot Inlet On Grade

Project Description	
Worksheet	CB 721 Slot Nor
Type	Slot Inlet On Gra
Solve For	Efficiency

Input Data		
Discharge	6.78	cfs
Slope	014986	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	060000	ft/ft
Road Cross Slope	020000	ft/ft
Mannings Coefficie	0.013	
Slot Length	13.40	ft ← 20' slot w/ 0.67 capture ratio
Local Depression	0.0	in
Local Depression \	0.00	ft

Results		
Efficiency	0.59	
Intercepted Flow	4.00	cfs
Bypass Flow	2.78	cfs
Spread	11.82	ft
Depth	0.34	ft
Flow Area	1.5	ft^2
Gutter Depression	1.2	in
Total Depression	1.2	in
Velocity	4.45	ft/s
Equivalent Cross Slo	042420	ft/ft
Length Factor	0.39	
Total Interception Ler	34.28	ft

Notes: Bypass to CB 721 Grate

CB 721 Slot South
Worksheet for Slot Inlet On Grade

Project Description	
Worksheet	CB 721 Slot Sou
Type	Slot Inlet On Gra
Solve For	Efficiency

Input Data		
Discharge	1.60	cfs
Slope	003984	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	060000	ft/ft
Road Cross Slope	020000	ft/ft
Mannings Coefficie	0.013	
Slot Length	10.05	ft ← 15' slot w/ 0.67 capture ratio
Local Depression	0.0	in
Local Depression \	0.00	ft

Results		
Efficiency	0.98	
Intercepted Flow	1.56	cfs
Bypass Flow	0.04	cfs
Spread	8.28	ft
Depth	0.27	ft
Flow Area	0.8	ft^2
Gutter Depression	1.2	in
Total Depression	1.2	in
Velocity	1.97	ft/s
Equivalent Cross Slo	049280	ft/ft
Length Factor	0.88	
Total Interception Ler	11.48	ft

Notes: Bypass to CB 721 Grate

CB 721 Grate
Worksheet for Grate Inlet In Sag

Project Description	
Worksheet	CB 721 Grate
Type	Grate Inlet In S
Solve For	Spread

Input Data		
Discharge	2.82	cfs ← Flow from upstream slots
Gutter Width	2.50	ft
Gutter Cross Slope	0.060000	ft/ft
Road Cross Slope	0.020000	ft/ft
Grate Width	2.50	ft
Grate Length	3.00	ft
Local Depression	0.0	in
Local Depression \	0.00	ft
Grate Type	) mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	10.40	ft
Depth	0.31	ft
Gutter Depression	1.2	in
Total Depression	1.2	in
Open Grate Area	3.4	ft^2
Active Grate Weir Le	5.50	ft

Notes: Flow is from CB 721 Slot North & South bypass.
-15.91

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Computed by: RFC Date: 2/13/03
Checked By: VMW Date: 03/26/03
Sheet Name: Drng. N. of Baseline Sheet: 2 Of: 6

Area (2) CB 714: S. limit of Area 1 (CB 721) = 44+70 (Ramp N-E) to CB 714 (46+50, Ramp N-E) } For Limits See Drainage Figure Fig 1 (Typ)

$\therefore L = 46+50 - 44+70 = 180'$

$W = 67.5'$

$\therefore A = (67.5\,ft)(180\,ft) = 12{,}150\,ft^2 = 0.28$ acre

typ { $C = 0.70$ soil, $C = 0.95$ pvmt, $i_{10} = 4.22$ in/hr }

$Q_{10} = ciA = (0.95)(4.22)(0.28) = \underline{1.12\,cfs}$

Bypass flow to CB 715 = 0.01 cfs (see HY-12 results)

Catch Basin: C-15.91 & 10' slot

Area (3) CB 715: CB 714 to CB 715

$L = 290'$

$W = 60'$

$\therefore A = (60\,ft)(290\,ft) = 17{,}400\,ft^2 = 0.40$ acre

$\therefore Q_{10} = (0.95)(4.22)(0.40) = 1.60\,cfs + 0.01\,cfs = \underline{1.61\,cfs}$ (from CB 714)

Bypass flow to the south = 0.02 cfs, minimal (see HY-12 results)

Catch Basin: C-15.91 & 10' slot

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*****************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*****************************************************
```

DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 714

STATION: 46+50

DRAINAGE AREA: 0.28Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.004	0.020	0.013	1.12	6.57

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.847	0.25	1.91

INLET INTERCEPTION

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	8.81	6.70	0.920	1.03	0.09
P-1-7/8	1.50	1.68	0.990	0.08	0.01
Combination			0.991	1.11	0.01

```
*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
```

DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 715

STATION: 49+58

DRAINAGE AREA: 0.40Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.004	0.020	0.013	1.61	8.02

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.760	0.28	2.02

INLET INTERCEPTION

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	10.69	6.70	0.820	1.33	0.27
P-1-7/8	1.50	1.68	0.950	0.25	0.02
Combination			0.988	1.59	0.02

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Computed by: RFC Date: 2/13/03
Checked By: VMW Date: 03/26/03
Sheet Name Drng. N. of Baseline Sheet: 3 Of: 6

Area (4) : L202 Med
CB 705

EB HP 470+21.22 to CB 705
L = 190'

Soil A = (190')(86') = 16,340 ft² = 0.38 acres
Pvmt A = 2(190')(12') = 4560 ft² = 0.10 acres
total A = 0.48 ac

% soil = 79%
% pvmt = 21%
∴ weighted C = (0.21)(0.95) + (0.79)(0.70) = 0.75

∴ Q_{10} = CiA = (0.75)(4.22)(0.48) = 1.52 cfs

Bypass flow = 0.04 cfs to CB 706 (see FlowMaster results)

Catch Basin : Modified C-15.80 (Detail DJ)

Area (5) : CB 705 to CB 706
CB 706

L = 290'

Soil A = (290')(86') = 24,940 ft² = 0.57 ac
Pvmt A = (290')(12') = 3480 ft² = 0.08 ac
total A = 0.65 ac

% Soil = 88%
% Pvmt = 12% ∴ weighted C = 0.73

∴ Q_{10} = (0.73)(4.22)(0.65) = 2.00 cfs + 0.04 cfs (from CB 705) = 2.04 cfs

Bypass flow = 0.07 cfs to the south, minimal (see FlowMaster results)

Catch Basin : Modified C-15.80 (Detail DJ)

CB 705 (Double Grate) Modified 15.80
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 705 (Double Grate) Modifi
Type	Ditch Inlet On Grade
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.004000	ft/ft
Left Side Slope	8.00	H : V
Right Side Slope	8.00	H : V
Bottom Width	3.00	ft
Grate Width	3.00	ft
Grate Length	8.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	1.52	cfs

Options
Grate Flow Op:lude None

Results		
Efficiency	0.97	
Intercepted Flow	1.48	cfs
Bypass Flow	0.04	cfs
Flow Area	1.3	ft²
Wetted Perimeter	7.08	ft
Top Width	7.05	ft
Velocity	1.20	ft/s
Splash Over Velc	7.17	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.94	
Grate Flow Ratio	0.60	
Active Grate Len	4.00	ft
Critical Depth	0.17	ft
Critical Slope	0.018074	ft/ft
Froude Number	0.50	
Flow Type	Subcritical	
Specific Energy	0.28	ft
Velocity Head	0.02	ft
Depth	0.25	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Bypass flow to CB 706.
Modified C-15.80, see Detail

CB 706 (Double Grate) Modified 15.80
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 706 (Double Grate) Modifi
Type	Ditch Inlet On Grade
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.004000	ft/ft
Left Side Slope	8.00	H : V
Right Side Slope	8.00	H : V
Bottom Width	3.00	ft
Grate Width	3.00	ft
Grate Length	8.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	2.04	cfs

Options
Grate Flow Op:lude None

Results		
Efficiency	0.97	
Intercepted Flow	1.97	cfs
Bypass Flow	0.07	cfs
Flow Area	1.6	ft²
Wetted Perimeter	7.73	ft
Top Width	7.70	ft
Velocity	1.30	ft/s
Splash Over Velc	7.17	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.93	
Grate Flow Ratio	0.56	
Active Grate Leng	4.00	ft
Critical Depth	0.20	ft
Critical Slope	0.017255	ft/ft
Froude Number	0.51	
Flow Type	Subcritical	
Specific Energy	0.32	ft
Velocity Head	0.03	ft
Depth	0.29	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Minimal Bypass
Modified C-15.80, see Detail

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Computed by: RFC Date: 2/13/03
Checked By: VMW Date: 03/26/03
Sheet Name: Drng. N. of Baseline Sheet: 4 Of: 6

Area (6) : EB HP 470+21.22 to CB 702
CB702
L = 190'
W = 70'

Soil A = (190')(12') = 2280 ft² = 0.05 acre
Pvmt A = (190')(70') = 13330 ft² = 0.31 acre
total A = 0.36 ac

% Soil = 15%
% Pvmt = 85% ∴ weighted C = 0.91

∴ Q_{10} = (0.91)(4.22)(0.36) = 1.38 cfs

Spread = 7.40 ft
bypass = 0 to CB 701
} See HY-12 results

Catch Basin: C-15.91 & 15' slot

Area (7) : CB702 to End Project
CB701
L = 290'
W = 70'

Soil A = (290')(12') = 3480 ft² = 0.08 ac
Pvmt A = (290')(70') = 20,300 ft² = 0.47 ac
total A = 0.55 ac

% Soil = 15%, % Pvmt = 85% ⇒ weighted C = 0.91

∴ Q_{10} = (0.91)(4.22)(0.55) = 2.11 cfs

Spread = 9.22 ft, bypass = 0.06 to the south, minimal (see HY-12 results)
Catch Basin: C-15.91 & 15' slot

Area (8) : HP 62+82.96 (Ramp W-S) to CB 717
Future CB717
Ramp W-S
L = 75+05 - 62+82.96 = 1222.04'
W = 43'2" = 43.17'
∴ A = 43.17 ft (1222.04 ft) = 52,755.5 ft² = 1.21 acres

∴ Q_{10} = (0.95)(4.22)(1.21) = 4.85 cfs

Spread = 9.35 ft
bypass flow = 0.76 cfs to Future CB 718
} see HY-12 results

Future Catch Basin: C-15.92 + 15' slot

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Computed by: RFC | Date: 2/13/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Drng. N. of Baseline | Sheet: 5 | Of: 6

Area (9): Future CB717 to Future CB718
Future CB718 Ramp W-S
L = 412'
W = 43'2" = 43.17'

∴ A = (43.17 ft)(412 ft) = 17,786 ft² = 0.41 acres
∴ Q_{10} = (0.95)(4.22)(0.41) = 1.64 cfs + 0.76 cfs (from Future CB717) = 2.40 cfs

Spread = 6.42 ft
bypass flow = 0.14 to Future CB719, end project } see HY-12 results
Catch Basin C-15.91 & 15' slot

Area (10): Future CB718 to Future CB719
Future CB719 Ramp W-S
L = 290'
W = 43'2" = 43.17'
∴ A = (43.17 ft)(290 ft) = 12,519 ft² = 0.29 acres
∴ Q_{10} = (0.95)(4.22)(0.29) = 1.16 cfs + 0.14 cfs (from Future CB718) = 1.30 cfs

Spread = 4.21 ft
bypass flow = 0 to the south } see HY-12 results

Catch Basin: C-15.91 & 15' slot

Area (11): area between Ramp E-S & W-S
Future CB716

A = (75')(412') − ½ (40')(412') = 22,660 ft² = 0.52 acres

∴ Q_{10} = (0.70)(4.22)(0.52) = 1.54 cfs

Bypass flow = 0.35 cfs to Future CB720 (see FlowMaster results)
Catch Basin: C-15.80

Area (12): area between Ramp E-S & W-S (to end project)
Future CB720

A = (40')(290') − ½ (20')(290') = 8700 ft² = 0.20 acres

∴ Q_{10} = (0.70)(4.22)(0.20) = 0.59 cfs + 0.35 cfs (from Future CB716) = 0.94 cfs

Bypass flow = 0.02 cfs to the south (see FlowMaster results)

Catch Basin: Modified C-15.80 (Detail DJ)

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Project: SRT - Ph I | Project No: AZ01107
Computed by: RFC | Date: 2/13/03
Checked By: VMW | Date: 03/26/03
Sheet Name: Drng. N. of Baseline | Sheet: 6 | Of: 6

Area 13 (CB 707): area between Ramp N-W & N-E, south of swale flowing north

$A = (75\,ft)(412\,ft) = 30{,}900\,ft^2 = 0.71$ acres

$\therefore Q_{10} = (0.70)(4.22)(0.71) = 2.10$ cfs

Bypass flow = 0.53 cfs to CB 708 (see FlowMaster results)
Catch Basin : C-15.80

Area 14 (CB 708): area between Ramp N-W & N-E, to end project

$A = (50')(290') + 1/2(10')(290') = 15{,}950\,ft^2 = 0.37$ acres

$\therefore Q_{10} = (0.70)(4.22)(0.37) = 1.09$ cfs + 0.53 cfs (from CB 707) = 1.62 cfs

bypass flow = 0.04 cfs to the south (see FlowMaster results)
Catch Basin : Modified C-15.80 (Detail DJ)

Area 15 (CB 703): EB HP 470+21.22 to CB 703

L = 220'
W = 70'

$\therefore A = (70\,ft)(220\,ft) = 15{,}400\,ft^2 = 0.35$ acre

$\therefore Q_{10} = (0.95)(4.22)(0.35) = 1.40$ cfs

Spread = 5.69 ft
Bypass flow = 0.01 cfs (see HT-12 results) bypass north
Catch Basin : C-15.91 & 15' slot

Area 16 (CB 704): EB HP 470+21.22 to CB 704

Soil A = (220 ft)(86 ft) = 18,920 ft² = 0.43 acres
Pvmt A = (220 ft)(12 ft) = 2640 ft² = 0.06 acres
total A = 0.49 ac

% soil = 88%
% pvmt = 12% ∴ weighted C = 0.73

$\therefore Q_{10} = (0.73)(4.22)(0.49) = 1.51$ cfs

bypass flow = 0.09 cfs north (see FlowMaster results)

Catch Basin : Modified C-15.80 (Detail DJ)

```
*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
```

DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 701

STATION: 475+00

DRAINAGE AREA: 0.55Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.004	0.020	0.013	2.11	9.22

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.694	0.30	2.09

INLET INTERCEPTION

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	12.40	6.70	0.750	1.58	0.52
P-1-7/8	1.50	1.68	0.870	0.45	0.06
Combination			0.972	2.05	0.06

```
*****************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*****************************************************
```

DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 702

STATION: 472+00

DRAINAGE AREA: 0.36Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.004	0.020	0.013	1.38	7.40

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.797	0.27	1.98

INLET INTERCEPTION

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	9.84	10.05	1.000	1.37	0.00
P-1-7/8	1.50	1.68	0.000	0.00	0.00
Combination			1.000	1.38	0.00

```
*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
```

DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 703

STATION: 468+00

DRAINAGE AREA: 0.35Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.010	0.020	0.013	1.40	5.69

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.898	0.23	2.96

INLET INTERCEPTION 15' Slot actually provided

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	12.43	6.70	0.750	1.05	0.35
P-1-7/8	1.50	1.68	0.960	0.33	0.01
Combination			0.993	1.39	0.01

CB 704 (Double Grate) Modified 15.80
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 704 (Double Grate) Modifi
Type	Ditch Inlet On Grade
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.006000	ft/ft
Left Side Slope	8.00	H : V
Right Side Slope	16.00	H : V
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	8.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	1.51	cfs

Options
Grate Flow Op :lude None

Results		
Efficiency	0.94	
Intercepted Flow	1.42	cfs
Bypass Flow	0.09	cfs
Flow Area	1.2	ft²
Wetted Perimeter	7.75	ft
Top Width	7.73	ft
Velocity	1.30	ft/s
Splash Over Velc	7.17	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.89	
Grate Flow Ratio	0.41	
Active Grate Leng	4.00	ft
Critical Depth	0.18	ft
Critical Slope	0.018523	ft/ft
Froude Number	0.59	
Flow Type	Subcritical	
Specific Energy	0.27	ft
Velocity Head	0.03	ft
Depth	0.24	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Bypass flow to the north.
Modified C-15.80, see Detail

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CB 707
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 707
Type	Ditch Inlet On Gr:
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.001900	ft/ft
Left Side Slope	20.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	3.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	2.10	cfs

Options
Grate Flow Op:lude None

Results		
Efficiency	0.75	
Intercepted Flow	1.57	cfs
Bypass Flow	0.53	cfs
Flow Area	2.3	ft²
Wetted Perimeter	10.44	ft
Top Width	10.38	ft
Velocity	0.93	ft/s
Splash Over Velc	3.33	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.63	
Grate Flow Ratio	0.32	
Active Grate Leng	1.50	ft
Critical Depth	0.22	ft
Critical Slope	0.017656	ft/ft
Froude Number	0.35	
Flow Type	Subcritical	
Specific Energy	0.38	ft
Velocity Head	0.01	ft
Depth	0.36	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Bypass flow to CB 708

CB 708 (Double Grate) Modified 15.80
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 708 (Double Grate) Modifi
Type	Ditch Inlet On Grade
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.001900	ft/ft
Left Side Slope	20.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	3.00	ft
Grate Width	3.00	ft
Grate Length	8.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	1.62	cfs

Options
Grate Flow Op :lude None

Results		
Efficiency	0.97	
Intercepted Flow	1.58	cfs
Bypass Flow	0.04	cfs
Flow Area	1.9	ft^2
Wetted Perimeter	9.83	ft
Top Width	9.78	ft
Velocity	0.86	ft/s
Splash Over Velc	7.17	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.95	
Grate Flow Ratio	0.47	
Active Grate Leng	4.00	ft
Critical Depth	0.17	ft
Critical Slope	0.018563	ft/ft
Froude Number	0.35	
Flow Type	Subcritical	
Specific Energy	0.31	ft
Velocity Head	0.01	ft
Depth	0.29	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Double grate is modified C-15.80, see Detail

CB 716
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 716
Type	Ditch Inlet On Gr:
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.002000	ft/ft
Left Side Slope	20.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	3.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	1.54	cfs

Options
Grate Flow Op :lude None

Results		
Efficiency	0.78	
Intercepted Flow	1.19	cfs
Bypass Flow	0.35	cfs
Flow Area	1.8	ft²
Wetted Perimeter	9.27	ft
Top Width	9.21	ft
Velocity	0.88	ft/s
Splash Over Velc	3.33	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.65	
Grate Flow Ratio	0.36	
Active Grate Leng	1.50	ft
Critical Depth	0.19	ft
Critical Slope	0.018449	ft/ft
Froude Number	0.35	
Flow Type	Subcritical	
Specific Energy	0.33	ft
Velocity Head	0.01	ft
Depth	0.31	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Bypass flow to CB 720.

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*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
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DESIGNER: RFC

DATE: 03-26-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 717

STATION: 75+00

DRAINAGE AREA: 1.21Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.020	0.020	0.013	4.85	9.35

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.688	0.30	4.73

INLET INTERCEPTION

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	28.62	10.05	0.540	2.62	2.23
P-1-7/8	1.50	1.68	0.650	1.46	0.76
Combination			0.843	4.09	0.76

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*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
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DESIGNER: RFC

DATE: 03-27-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 718

STATION: 80+10

DRAINAGE AREA: 0.41Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.020	0.020	0.013	2.40	6.42

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.856	0.25	4.28

INLET INTERCEPTION 15' slot actually provided

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	19.57	6.70	0.520	1.27	1.13
P-1-7/8	1.50	1.68	0.870	0.98	0.14
Combination			0.942	2.26	0.14

bypass, therefore, is less

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*************************************************
*****   FHWA URBAN DRAINAGE DESIGN PROGRAMS   *****
*****          ROADWAY DRAINAGE DESIGN        *****
*************************************************
```

DESIGNER: RFC

DATE: 03-27-2003

PROJECT: SRT

PROJECT NO.: AZ01107

INLET NO.: CB 719

STATION: 475+25

DRAINAGE AREA: 0.29Acres

DESIGN FREQUENCY: 10 Years

ROADWAY & DISCHARGE DATA

Cross-Slope	S (ft/ft)	Sx (ft/ft)	n	Q (cfs)	T (ft)
Composite	0.020	0.020	0.013	1.30	4.21

GUTTER FLOW

W (ft)	Sw (ft/ft)	a (in)	Eo	d (ft)	V (fps)
2.50	0.067	0.00	0.970	0.20	4.00

INLET INTERCEPTION 15' Slot actually provided

Inlet Type	LT or W (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted Drain	14.38	6.70	0.670	0.87	0.42
P-1-7/8	1.50	1.68	0.970	0.41	0.00
Combination			1.000	1.30	0.00

CB 720 (Double Grate) Modified 15.80
Worksheet for Ditch Inlet On Grade

Project Description	
Worksheet	CB 720 (Double Grate) Modifi
Type	Ditch Inlet On Grade
Solve For	Efficiency

Input Data		
Mannings Coeffic	0.025	
Slope	0.002000	ft/ft
Left Side Slope	20.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	3.00	ft
Grate Width	3.00	ft
Grate Length	8.00	ft
Grate Type	Reticuline	
Clogging	50.0	%
Discharge	0.94	cfs

Options
Grate Flow Op:lude None

Results		
Efficiency	0.98	
Intercepted Flow	0.92	cfs
Bypass Flow	0.02	cfs
Flow Area	1.2	ft^2
Wetted Perimeter	8.17	ft
Top Width	8.13	ft
Velocity	0.76	ft/s
Splash Over Velc	7.17	ft/s
Frontal Flow Fact	1.00	
Side Flow Factor	0.96	
Grate Flow Ratio	0.54	
Active Grate Leng	4.00	ft
Critical Depth	0.12	ft
Critical Slope	0.020197	ft/ft
Froude Number	0.34	
Flow Type	Subcritical	
Specific Energy	0.23	ft
Velocity Head	0.01	ft
Depth	0.22	ft

Notes: See Calc Shts and Fig 1 for conributing areas.
Bypass flow to End Project.

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Phoenix, AZ 85040-3982
Phone (602) 454-0402
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Project: SRT
Project No: AZ01107
Computed by: RFC
Date: 2/26/03
Checked By: VMW
Date: 03/26/03
Sheet Name: S.E. Chnl @ Pipe 709, 707 & 710
Sheet: 1 Of: 1

S.E. Channel @ 709 (see sht D-4.06)

Pipe 709 440' upstream of PB's Begin Channel Sta 239+00 ⇒ Sta 243+40

S.E. Chnl PGL @ Pipe 709 = 1424.32 + [440'(0.005831'/ft)] = 1426.89

*Top of Chnl = 1426.89 + 5.5' = 1432.39

S.E. Channel @ 707 (see sht D-4.06)

Pipe 707 30' upstream of PB's Begin Channel Sta 239+00 ⇒ Sta 239+30

S.E. Chnl PGL @ Pipe 707 = 1424.32 + [30'(0.005831'/ft)] = 1424.49

*Top of Chnl = 1424.49 + 5.5' = 1429.99

S.E. Channel @ 710 (see Stanley Consultants sht D-4.10)

Pipe 710 240' downstream of Stanley's End Channel Sta 239+00 ⇒ Sta 236+60

S.E. Chnl PGL @ Pipe 110 = 1424.32 - [240'(0.008253'/ft)] = 1422.34

*Top of Chnl = 1422.34 + 5.5' = 1427.84

* These values used in StormCAD input for Ground El @ Outlet.

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3747 East Grove Street
Phoenix, AZ 85040-3982
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Project: SRT | Project No: AZ01107
Computed by: RFC | Date: 3/26/03
Checked By: VMW | Date: 03/26/03
Sheet Name: N. end of PH I (Baseline) | Sheet: 1 | Of: 2

North end of "Baseline portion of PHI" (north of CB 704)

Median Area
CB 704 to PI 464+24.00
CEBL202 sta 468+04
∴ L = 468+04 − 464+24 = 380'

Soil A = (380')(86') = 32,680 ft² = 0.75 ac
Pvmt A = (380')(12') = 4560 ft² = 0.10 ac
0.85 ac total

% soil = 88% $c_{soil} = 0.70$
% pvmt = 12% $c_{pvmt} = 0.95$

∴ Weighted C = (0.88)(0.70) + (0.12)(0.95) = 0.73

i = 4.22 in/hr (from Drng Rpt)

∴ Q = c i A = (0.73)(4.22)(0.85) = 2.62 cfs

Grade = 0.5733%

Flow depth = 0.91' (Below EP) see plans } See FlowMaster
V = 0.27 ft/s

WBL202 Pvmt Area (north end of PHI)
WBL202 High Point = Sta 469+58.80 ⇒ L = 469+58.80 − 463+50 = 609'
to end WBL202 Pvmt = 463+50
Super'd 0.020'/ft Lt
Pvmt width = 46' (FE to conc. strip)
∴ A = (46')(609') = 28,014 ft² = 0.64 ac
C = 0.95, i = 4.22 in/hr
∴ Q = (0.95)(4.22)(0.64) = 2.57 cfs
Grade = 0.4089'/ft
spread = 10.43' allows 1 dry lane } see FlowMaster
V = 2.15 ft/s

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Project: SRT
Project No: AZ01107
Computed by: RFC
Date: 3/26/03
Checked By: VMW
Date: 03/26/03
Sheet Name: N. end of PH 1 (Baseline)
Sheet: 2
Of: 2

EB C202 Pvmt Area (north end of PH 1)

from CB 703 468+00
to end Pvmt sta 464+25 ⇒ $L = 468+00 - 464+25 = 375'$

Pvmt Supe'd Rt 0.020'/ft

Conservative width of 80'

$\therefore A = (80')(375') = 30000\ ft^2 = 0.69\ ac$

$c = 0.95$, $i = 4.22\ in/hr$

$\therefore Q = ciA = (0.95)(4.22)(0.69) = 2.77\ cfs$

Grade = 0.5733 %

spread = 10.01' allows 1 dry lane } see Flowmaster

$V = 2.50\ ft/s$

Median North of CB 704 (to end of PHI)
Worksheet for Triangular Channel

Project Description	
Worksheet	Median North of CB 704 (to enc
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.250	
Slope	005733	ft/ft
Left Side Slope	8.00	H : V
Right Side Slope	16.00	H : V
Discharge	2.62	cfs

Results		
Depth	0.91	ft
Flow Area	9.9	ft²
Wetted Perim	21.87	ft
Top Width	21.78	ft
Critical Depth	0.31	ft
Critical Slope	1.700338	ft/ft
Velocity	0.27	ft/s
Velocity Head	1.09e-3	ft
Specific Energ	0.91	ft
Froude Numb	0.07	
Flow Type	Subcritical	

WBL202 at north end of PHI
Worksheet for Gutter Section

Project Description	
Worksheet	WBL202 at north end
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	004089	ft/ft
Discharge	2.57	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	054000	ft/ft
Road Cross Slop	020000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	10.43	ft
Flow Area	1.2	ft^2
Depth	0.29	ft
Gutter Depress	1.0	in
Velocity	2.15	ft/s

EBL202 at north end of PHI
Worksheet for Gutter Section

Project Description	
Worksheet	EBL202 at north end (
Type	Gutter Section
Solve For	Spread

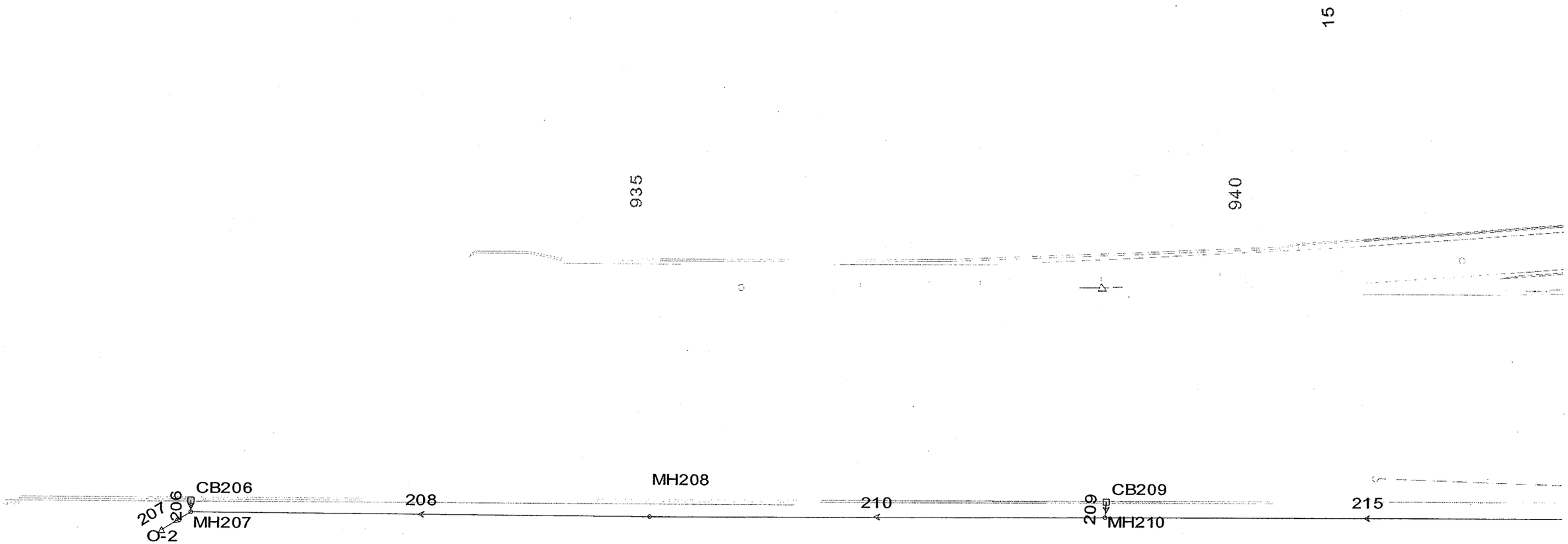
Input Data		
Slope	005733	ft/ft
Discharge	2.77	cfs
Gutter Width	2.50	ft
Gutter Cross Slo	054000	ft/ft
Road Cross Slop	020000	ft/ft
Mannings Coeffic	0.013	

Results		
Spread	10.01	ft
Flow Area	1.1	ft^2
Depth	0.29	ft
Gutter Depress	1.0	in
Velocity	2.50	ft/s

APPENDIX F

STORM SEWER HYDRAULICS (STORMCAD)

Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



Title: 202L/US60 TI Phase 1
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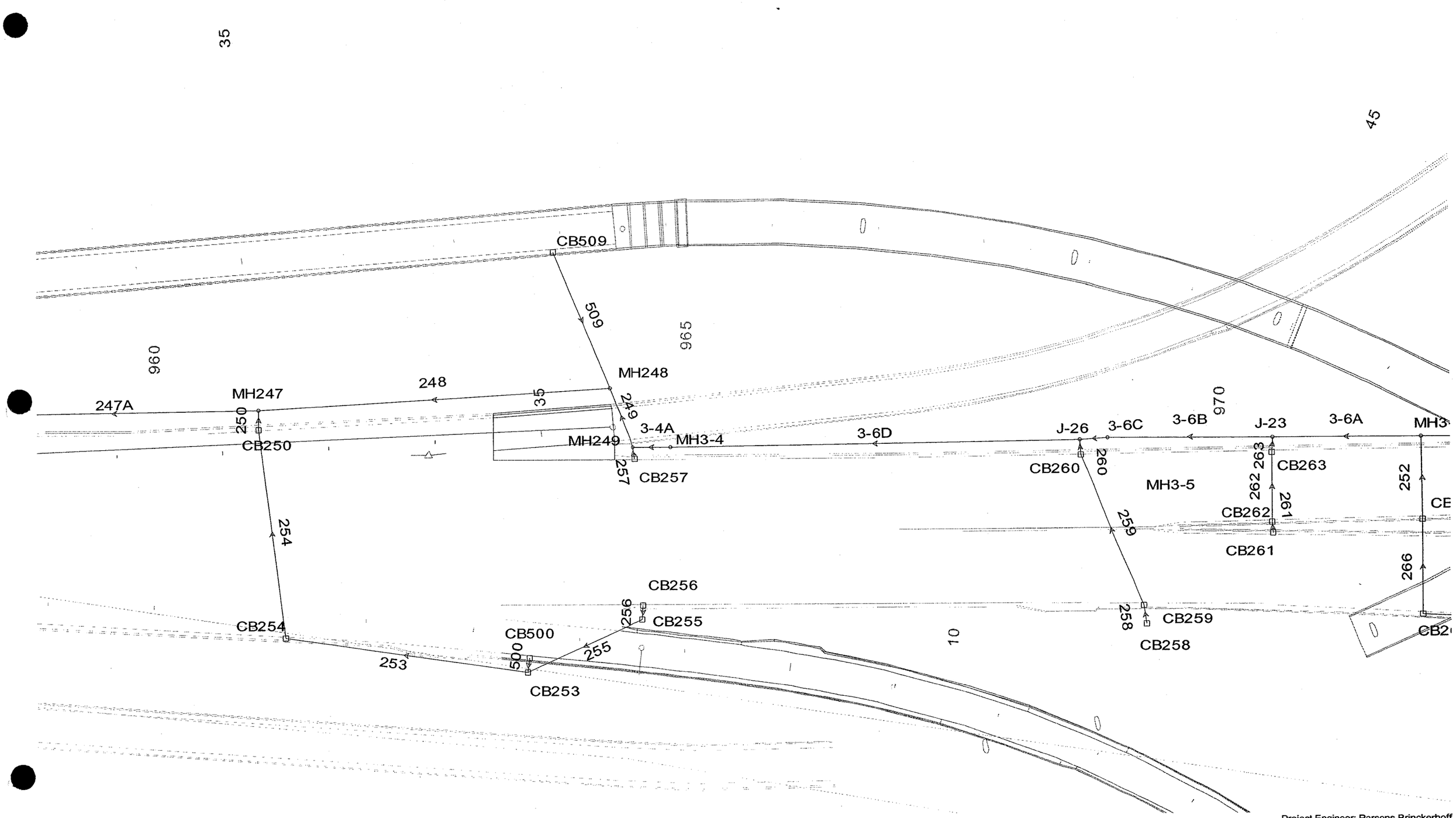
04/02/03 05:10:42 PM

Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



Title: 202L/US60 TI Phase 1
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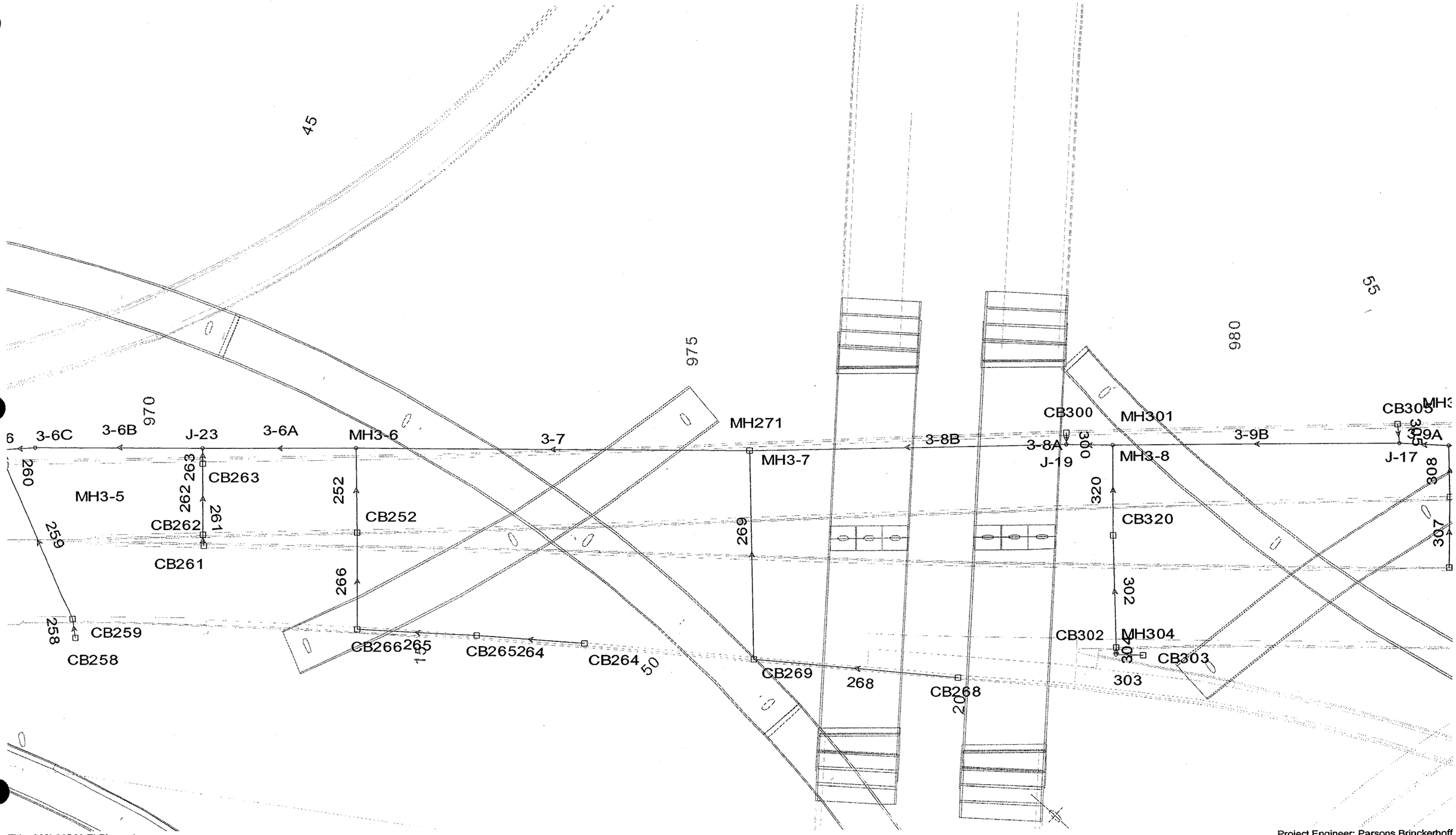
StormCAD v5.0 [5.0010]
Page 1 of 1

Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



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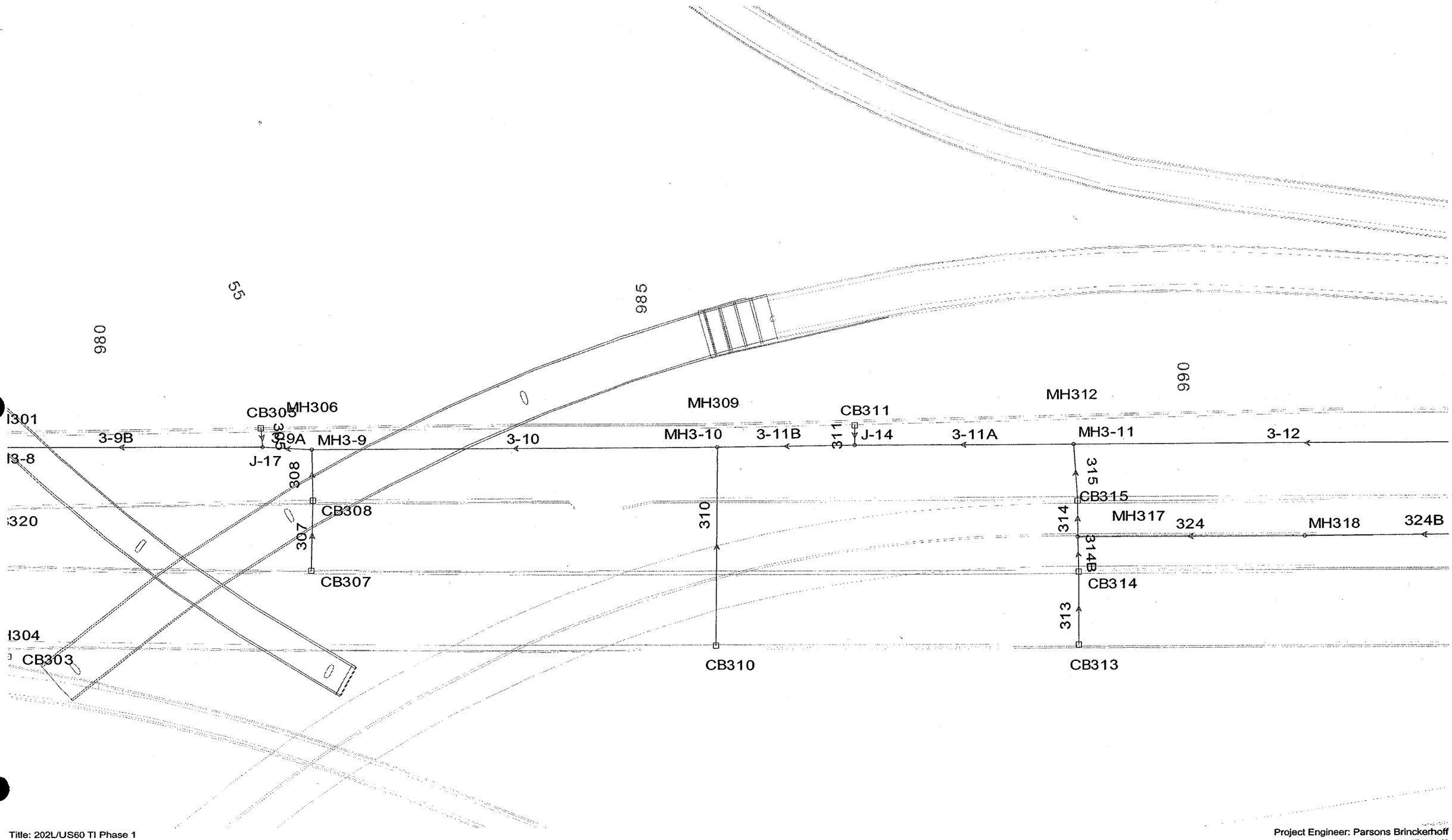
Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



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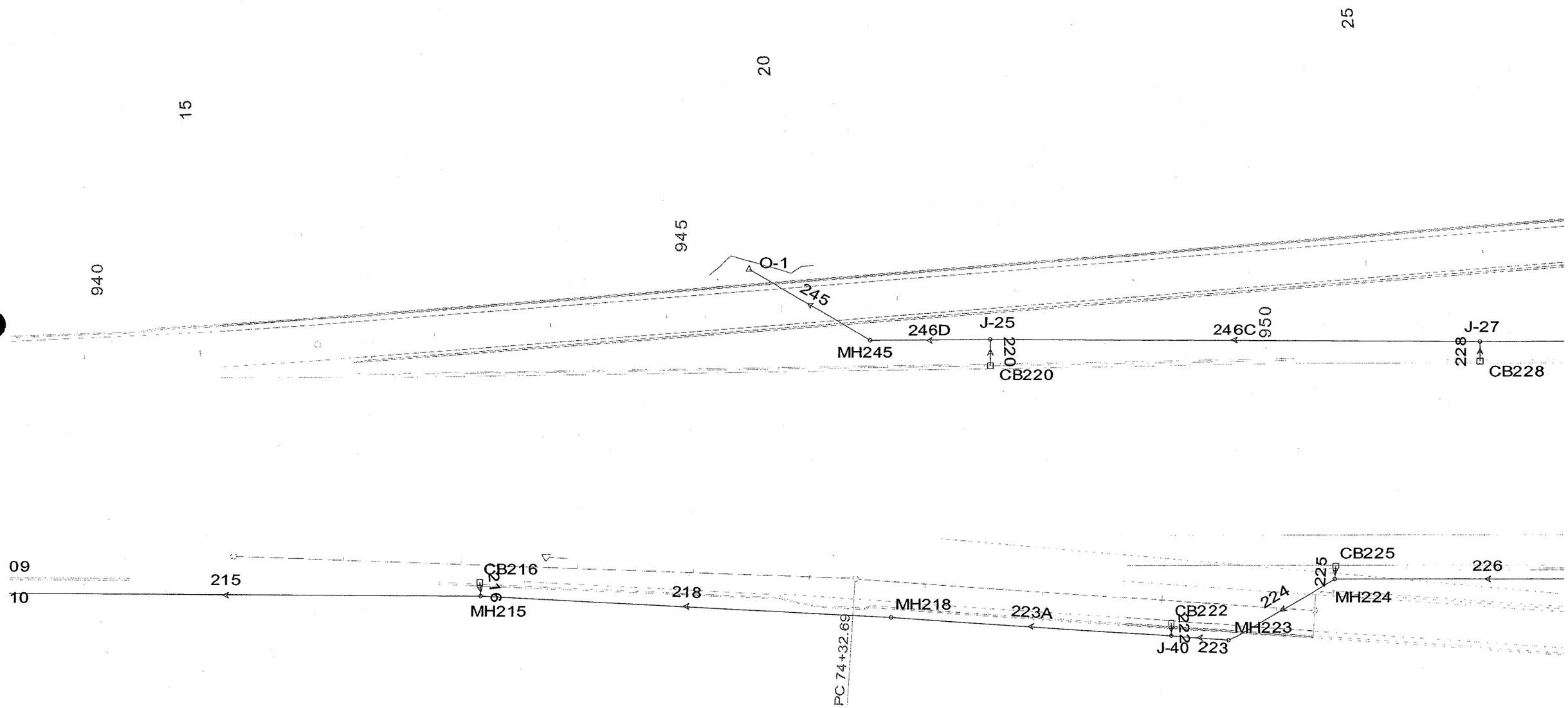
Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



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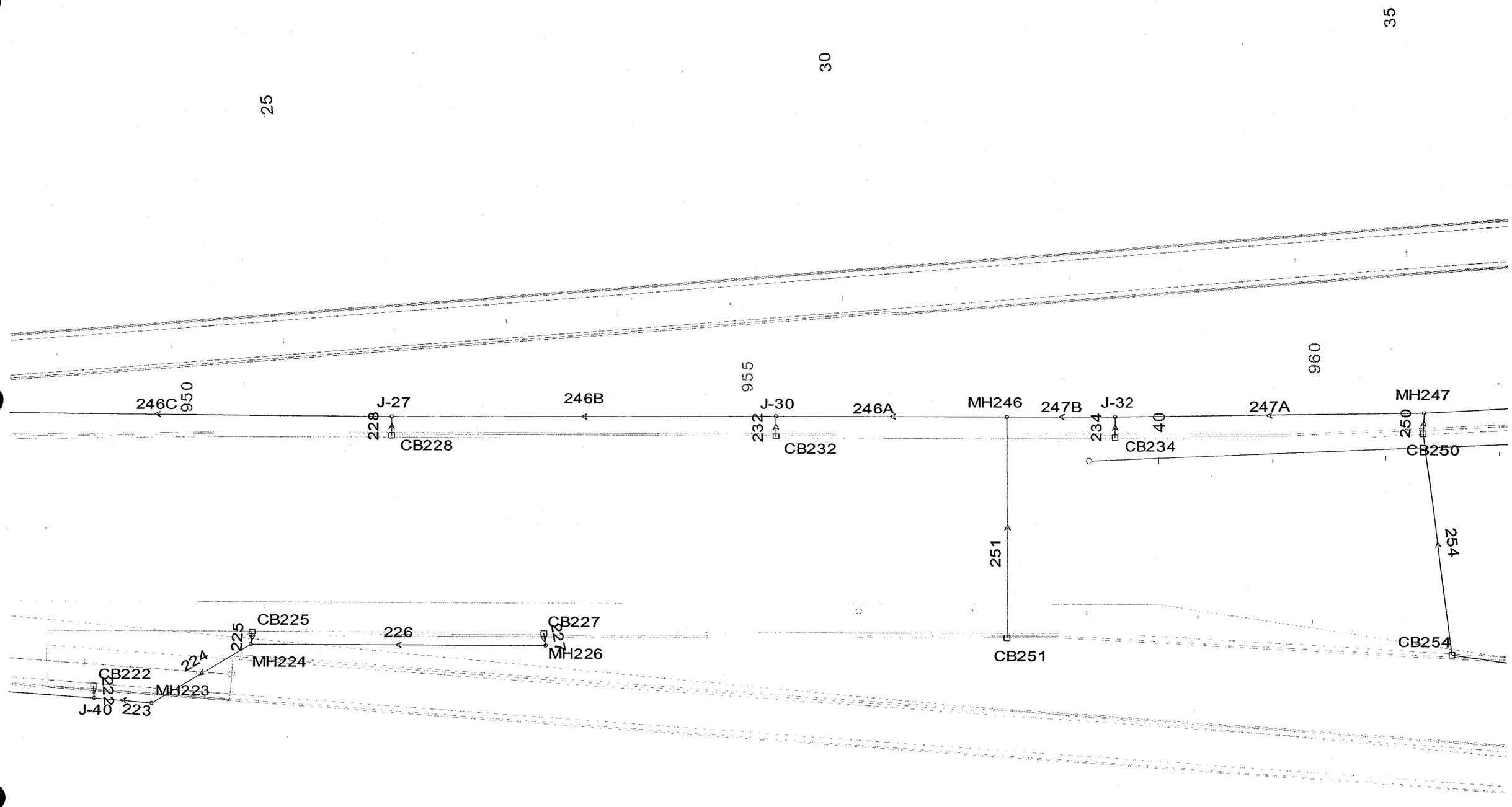
Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



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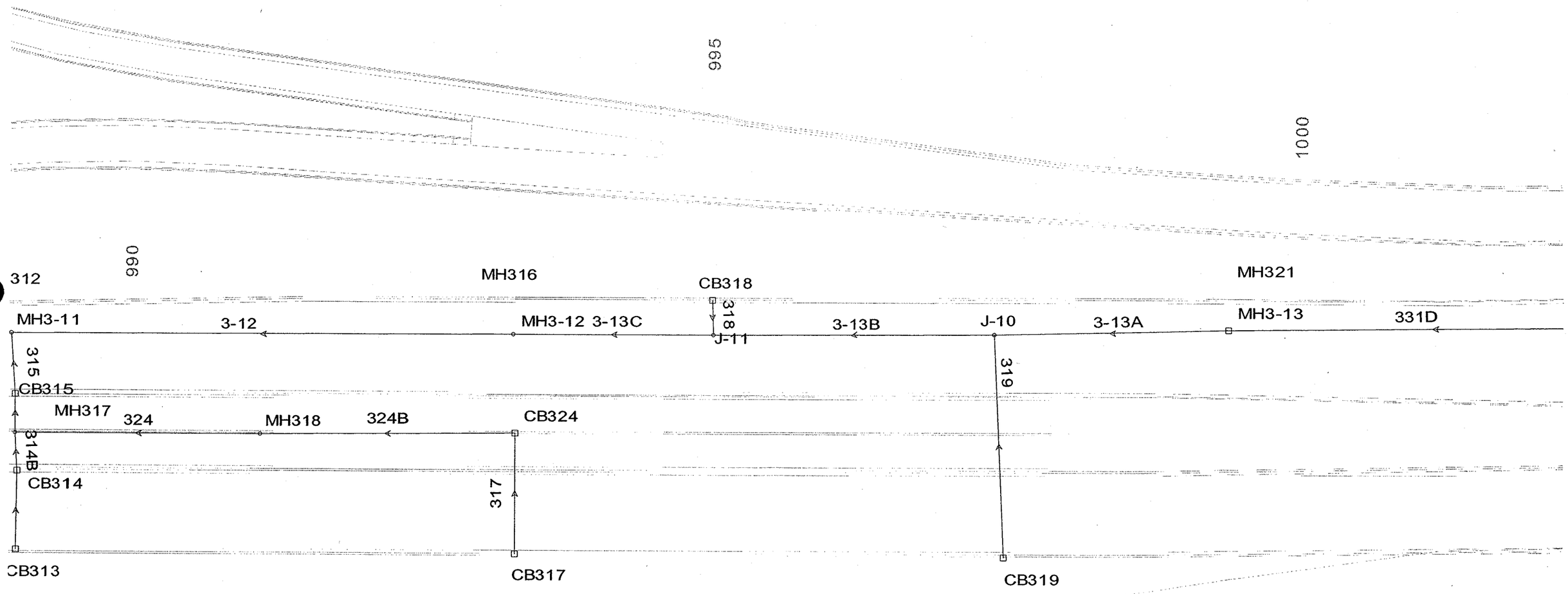
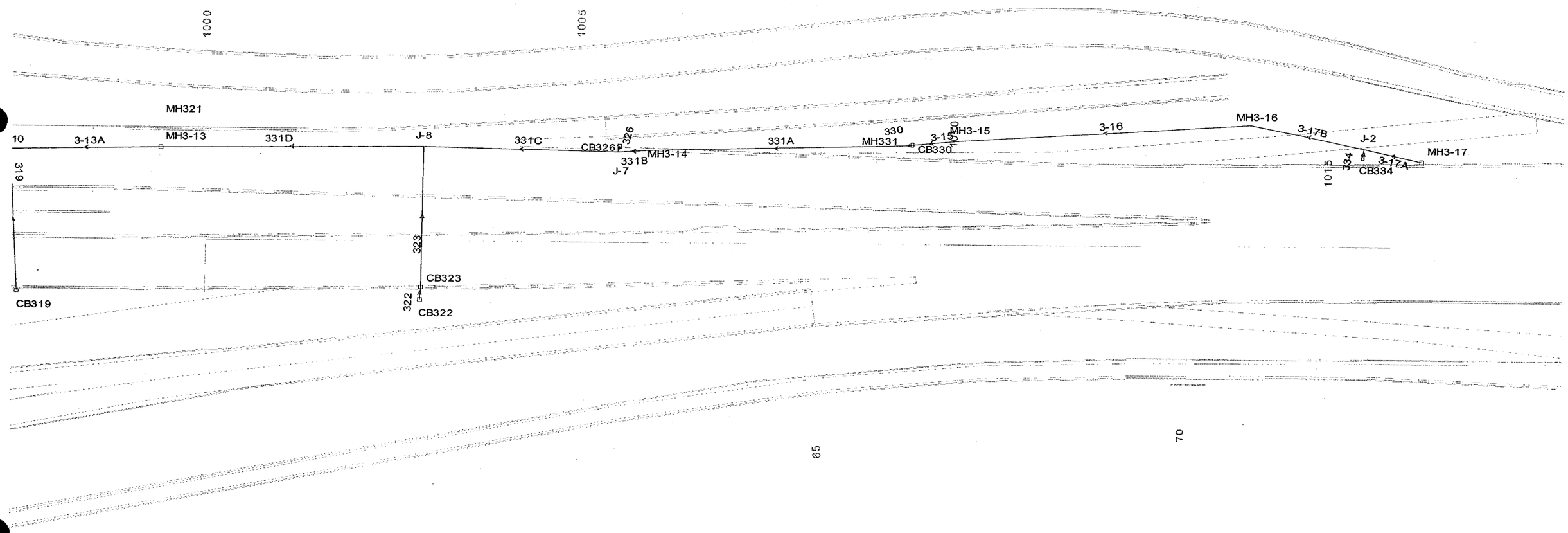
Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM



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Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	System Flow Time (min)
245	MH245	O-1	49.66	2.90	266.09	122.00	0.003525	84 inch	0.012	410.85	1,411.29	1,410.86	1,420.50	1,415.54	1,420.00	2.21	2.14	1,414.94	11.01	31.41
246D	J-25	MH245	49.66	2.90	266.42	103.00	0.003107	84 inch	0.012	385.73	1,411.61	1,411.29	1,419.84	1,416.09	1,420.50	1.23	2.21	1,416.03	9.81	31.24
246C	J-27	J-25	48.64	2.93	264.67	422.00	0.003009	84 inch	0.012	379.64	1,412.88	1,411.61	1,421.27	1,417.15	1,419.84	1.39	1.23	1,416.14	10.28	30.55
246B	J-30	J-27	47.49	2.95	262.24	344.00	0.003023	84 inch	0.012	380.51	1,413.92	1,412.88	1,422.08	1,418.16	1,421.27	1.16	1.39	1,417.20	10.51	30.01
246A	MH246	J-30	46.33	2.98	260.20	204.00	0.003039	84 inch	0.012	381.51	1,414.54	1,413.92	1,424.50	1,418.74	1,422.08	2.96	1.16	1,418.20	10.51	29.69
247B	J-32	MH246	45.11	2.99	257.18	95.00	0.003263	84 inch	0.012	395.32	1,414.85	1,414.54	1,422.78	1,419.02	1,424.50	0.93	2.96	1,418.79	10.46	29.53
247A	MH247	J-32	43.90	3.04	255.38	276.00	0.003297	84 inch	0.012	397.37	1,415.76	1,414.85	1,425.40	1,419.91	1,422.78	2.64	0.93	1,419.07	10.42	29.09
248	MH248	MH247	39.37	3.09	242.70	332.00	0.002861	84 inch	0.012	370.18	1,416.71	1,415.76	1,426.71	1,420.78	1,425.40	3.00	2.64	1,419.98	9.98	28.54
249	MH249	MH248	38.93	3.10	241.71	60.00	0.003333	72 inch	0.012	264.87	1,416.91	1,416.71	1,425.00	1,421.66	1,426.71	2.09	4.00	1,421.54	9.73	28.44
3-4A	MH3-4	MH249	38.16	3.10	239.57	36.00	0.003611	72 inch	0.012	275.69	1,417.04	1,416.91	1,425.05	1,422.56	1,425.00	2.01	2.09	1,422.49	8.54	28.37
3-6D	J-26	MH3-4	38.16	3.18	242.33	386.00	0.001528	72 inch	0.012	179.36	1,417.63	1,417.04	1,426.00	1,423.57	1,425.05	2.37	2.01	1,422.60	8.48	27.61
3-6C	MH3-5	J-26	36.01	3.18	232.14	28.00	0.013571	72 inch	0.012	534.46	1,418.01	1,417.63	1,426.30	1,423.64	1,426.00	2.29	2.37	1,423.63	8.09	27.55
3-6B	J-23	MH3-5	36.01	3.21	233.23	155.00	0.002065	72 inch	0.012	208.45	1,418.33	1,418.01	1,426.81	1,424.04	1,426.30	2.48	2.29	1,423.71	8.17	27.23
3-6A	MH3-6	J-23	33.67	3.24	226.60	141.00	0.002766	72 inch	0.012	241.28	1,418.72	1,418.33	1,427.30	1,424.33	1,426.81	2.58	2.48	1,424.08	7.97	26.94
3-7	MH3-7	MH3-6	32.24	3.31	224.26	365.00	0.002548	72 inch	0.012	231.58	1,419.65	1,418.72	1,428.00	1,425.03	1,427.30	2.35	2.58	1,424.38	8.04	26.18
3-8B	J-19	MH3-7	31.82	3.49	224.35	293.00	0.003242	72 inch	0.012	261.23	1,420.60	1,419.65	1,428.98	1,425.56	1,428.00	2.38	2.35	1,425.09	8.64	24.34
3-8A	MH3-8	J-19	31.30	3.49	222.77	45.00	0.002889	72 inch	0.012	246.58	1,420.73	1,420.60	1,428.80	1,425.71	1,428.98	2.07	2.38	1,425.62	8.83	24.25
3-9B	J-17	MH3-8	27.98	3.54	207.52	262.00	0.001679	72 inch	0.012	188.01	1,421.17	1,420.73	1,429.95	1,426.30	1,428.80	2.78	2.07	1,425.76	8.12	23.72
3-9A	MH3-9	J-17	27.18	3.55	201.32	46.00	0.001739	72 inch	0.012	191.32	1,421.25	1,421.17	1,429.72	1,426.46	1,429.95	2.47	2.78	1,426.37	7.72	23.62
3-10	MH3-10	MH3-9	26.40	3.61	197.46	378.00	0.004630	60 inch	0.012	191.97	1,424.00	1,422.25	1,431.82	1,428.24	1,429.72	2.82	2.47	1,426.53	11.08	23.05
3-11E	J-14	MH3-10	25.37	3.63	194.20	129.00	0.003488	60 inch	0.012	166.63	1,424.45	1,424.00	1,433.26	1,429.02	1,431.82	3.81	2.82	1,428.35	10.52	22.84
3-11A	MH3-11	J-14	23.07	3.66	186.55	201.00	0.003433	60 inch	0.012	165.30	1,425.14	1,424.45	1,434.48	1,429.91	1,433.26	4.34	3.81	1,429.11	9.72	22.50
3-12	MH3-12	MH3-11	15.62	3.72	160.06	432.00	0.007106	54 inch	0.012	179.58	1,428.71	1,425.64	1,438.54	1,432.41	1,434.48	5.33	4.34	1,429.99	10.80	21.83
3-13C	J-11	MH3-12	15.62	3.75	160.44	172.00	0.007500	54 inch	0.012	184.49	1,430.00	1,428.71	1,440.52	1,433.70	1,438.54	6.02	5.33	1,432.53	11.30	21.58
3-13E	J-10	J-11	13.45	3.78	149.72	241.00	0.005768	54 inch	0.012	161.78	1,431.39	1,430.00	1,442.06	1,434.98	1,440.52	6.17	6.02	1,433.82	10.70	21.20
3-13A	MH3-13	J-10	12.80	3.81	147.63	201.00	0.011294	54 inch	0.012	226.38	1,433.66	1,431.39	1,442.61	1,437.23	1,442.06	4.45	6.17	1,435.10	10.72	20.89
331D	J-8	MH3-13	12.80	3.87	139.57	352.00	0.003523	54 inch	0.012	126.44	1,434.90	1,433.66	1,444.29	1,438.96	1,442.61	4.89	4.45	1,437.32	9.66	20.28
323	CB323	J-8	8.61	3.89	38.49	185.00	0.011730	24 inch	0.012	26.54	1,437.07	1,434.90	1,443.82	1,443.74	1,444.29	4.75	7.39	1,439.17	12.25	20.03
322	CB322	CB323	7.80	3.90	35.34	22.00	0.008182	24 inch	0.012	22.17	1,437.25	1,437.07	1,443.75	1,444.28	1,443.82	4.50	4.75	1,443.82	11.25	20.00
269	CB269	MH3-7	0.42	3.91	1.66	194.00	0.018144	24 inch	0.012	33.01	1,423.17	1,419.65	1,427.22	1,425.04	1,428.00	2.05	6.35	1,425.04	0.51	19.81
207	MH207	O-2	5.84	4.05	23.87	29.00	0.015172	36 inch	0.012	89.00	1,404.30	1,403.86	1,411.80	1,405.87	1,406.86	4.50	0.00	1,405.08	7.60	18.33
208	MH208	MH207	4.20	4.18	17.68	382.00	0.008403	36 inch	0.012	66.23	1,407.51	1,404.30	1,415.24	1,408.86	1,411.80	4.73	4.50	1,406.06	4.93	17.04
210	MH210	MH208	4.20	4.28	18.12	382.00	0.006518	36 inch	0.012	58.33	1,410.00	1,407.51	1,417.50	1,411.36	1,415.24	4.50	4.73	1,408.88	5.78	15.94
252	CB252	MH3-6	1.43	4.41	6.36	79.00	0.042785	24 inch	0.012	50.69	1,422.10	1,418.72	1,426.50	1,424.40	1,427.30	2.40	6.58	1,424.35	1.99	14.72
89	MH215	MH210	3.26	4.45	14.63	438.00	0.006849	36 inch	0.012	59.80	1,413.00	1,410.00	1,418.47	1,414.22	1,417.50	2.47	4.50	1,411.39	4.98	14.48
266	CB266	CB252	0.92	4.58	4.25	85.00	0.003412	24 inch	0.012	14.31	1,422.39	1,422.10	1,426.72	1,424.43	1,426.50	2.33	2.40	1,424.41	1.32	13.65
250	CB250	MH247	4.53	4.65	22.13	18.00	0.001667	24 inch	0.012	10.00	1,418.03	1,418.00	1,423.24	1,420.90	1,425.40	3.21	5.40	1,420.76	7.04	13.21
218	MH218	MH215	1.79	4.70	8.49	355.00	0.002789	36 inch	0.012	38.16	1,413.99	1,413.00	1,419.60	1,414.95	1,418.47	2.61	2.47	1,414.26	3.68	12.87
331C	J-7	J-8	4.19	4.74	104.96	151.00	0.004636	54 inch	0.012	145.04	1,435.60	1,434.90	1,444.82	1,439.27	1,444.29	4.72	4.89	1,439.10	7.18	12.63
254	CB254	CB250	3.27	4.75	16.55	199.00	0.001960	24 inch	0.012	10.85	1,418.42	1,418.03	1,423.37	1,422.01	1,423.24	2.95	3.21	1,421.11	5.27	12.58
331B	MH3-14	J-7	3.43	4.79	96.39	147.00	0.006667	54 inch	0.012	173.93	1,436.58	1,435.60	1,445.44	1,439.46	1,444.82	4.36	4.72	1,439.36	7.87	12.32
315	CB315	MH3-11	7.45	4.82	36.22	53.00	0.007547	24 inch	0.012	21.29	1,427.06	1,426.66	1,434.81	1,432.32	1,434.48	5.75	5.82	1,431.16	11.53	12.09
314	MH317	CB315	5.97	4.83	29.08	33.00	0.029697	24 inch	0.012	42.23	1,428.04	1,427.06	1,431.50	1,433.34	1,434.81	1.46	5.75	1,432.88	9.26	12.03
265	CB265	CB266	0.69	4.83	3.36	110.00	0.004091	24 inch	0.012	15.67	1,422.84	1,422.39	1,427.00	1,424.47	1,426.72	2.16	2.33	1,424.46	1.13	12.03
223A	J-40	MH218	1.79	4.85	8.74	240.00	0.002750	36 inch	0.012	37.89	1,414.65	1,413.99	1,417.65	1,415.63	1,419.60	0.00	2.61	1,414.96	4.38	11.95
223	MH223	J-40	1.79	4.88	8.80	51.00	0.002941	36 inch	0.012	39.18	1,414.80	1,414.65	1,419.81	1,415.77	1,417.65	2.01	0.00	1,415.64	4.39	11.76
253	CB253	CB254	2.44	4.89	12.93	230.00	0.002957	24 inch	0.012	13.33	1,419.10	1,418.42	1,423.24	1,423.16	1,423.37	2.14	2.95	1,422.52	4.12	11.65
331A	MH331	MH3-14	3.43	4.90	96.79	350.00	0.001771	54 inch	0.012	89.66	1,437.20	1,436.58	1,446.45	1,440.82	1,445.44	4.75	4.36	1,439.55	7.88	11.58
224	MH224	MH223	1.79	4.94	8.91	104.00	0.009808	36 inch	0.012	71.55	1,415.82	1,414.80	1,421.27	1,416.76	1,419.81	2.45	2.01	1,415.84	4.40	11.37
3-15	MH3-15	MH331	0.33	4.94	71.98	72.00	0.003333	54 inch	0.012	122.99	1,437.44	1,437.20	1,447.19	1,440.95	1,446.45	5.25	4.75	1,440.91	5.27	11.35
324	MH318	MH317	2.83	4.95	14.13	210.00	0.008095	24 inch	0.012	22.05	1,429.74	1,428.04	1,433.43	1,432.20	1,431.50	1.69	1.46	1,431.50	4.50	11.26

Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	System Flow Time (min)
260	CB260	J-26	2.15	5.02	14.38	15.00	0.019333	24 inch	0.012	34.07	1,420.55	1,420.26	1,425.71	1,424.40	1,426.00	3.16	3.74	1,424.35	4.58	10.83
308	CB308	MH3-9	0.78	5.03	6.46	48.00	0.002083	24 inch	0.012	11.19	1,422.86	1,422.76	1,430.00	1,427.19	1,429.72	5.14	4.96	1,427.15	2.06	10.75
263	CB263	J-23	2.34	5.04	11.89	14.00	0.051429	24 inch	0.012	55.57	1,422.20	1,421.48	1,426.45	1,424.82	1,426.81	2.25	3.33	1,424.79	3.78	10.71
320	CB320	MH3-8	3.32	5.05	21.89	84.00	0.001429	24 inch	0.012	9.26	1,422.86	1,422.74	1,425.86	1,427.28	1,428.80	1.00	4.06	1,426.61	6.97	10.66
324B	CB324	MH318	2.83	5.06	14.43	220.00	0.007364	24 inch	0.012	21.03	1,431.36	1,429.74	1,435.36	1,432.73	1,433.43	2.00	1.69	1,432.24	5.45	10.58
3-16	MH3-16	MH3-15	0.33	5.07	72.03	396.00	0.004621	48 inch	0.012	105.78	1,439.77	1,437.94	1,449.37	1,442.34	1,447.19	5.60	5.25	1,440.98	7.74	10.50
314B	CB314	MH317	3.14	5.08	16.09	33.00	0.030909	24 inch	0.012	43.08	1,429.06	1,428.04	1,434.81	1,431.64	1,431.50	3.75	1.46	1,431.50	5.12	10.42
255	CB255	CB253	0.86	5.11	4.43	119.00	0.002773	24 inch	0.012	12.91	1,419.43	1,419.10	1,424.31	1,423.28	1,423.24	2.88	2.14	1,423.24	1.41	10.24
302	CB302	CB320	1.40	5.12	12.22	103.00	0.007961	24 inch	0.012	21.87	1,423.68	1,422.86	1,428.63	1,426.12	1,425.86	2.95	1.00	1,425.86	3.89	10.22
3-17E	J-2	MH3-16	0.33	5.12	72.04	154.00	0.003312	48 inch	0.012	89.55	1,440.28	1,439.77	1,450.00	1,443.00	1,449.37	5.72	5.60	1,442.54	7.84	10.17
262	CB262	CB263	1.25	5.12	6.46	66.00	0.009545	24 inch	0.012	23.94	1,422.83	1,422.20	1,426.96	1,424.90	1,426.45	2.13	2.25	1,424.86	2.05	10.17
304	MH304	CB302	0.49	5.12	7.53	7.00	0.006000	24 inch	0.012	18.98	1,423.72	1,423.68	1,428.52	1,426.15	1,428.63	2.80	2.95	1,426.15	2.40	10.17
259	CB259	CB260	1.53	5.13	11.41	156.00	0.004936	24 inch	0.012	17.22	1,421.32	1,420.55	1,426.23	1,424.93	1,425.71	2.91	3.16	1,424.59	3.63	10.12
226	MH226	MH224	1.10	5.14	5.70	264.00	0.002879	36 inch	0.012	38.77	1,416.58	1,415.82	1,421.70	1,417.36	1,421.27	2.12	2.45	1,416.83	3.32	10.04
227	CB227	MH226	1.10	5.15	5.71	11.00	0.056364	24 inch	0.012	58.18	1,417.20	1,416.58	1,421.60	1,418.04	1,421.70	2.40	3.12	1,417.43	4.50	10.00
225	CB225	MH224	0.69	5.15	3.58	11.00	0.079091	24 inch	0.012	68.92	1,416.69	1,415.82	1,421.11	1,417.35	1,421.27	2.42	3.45	1,416.82	3.11	10.00
209	CB209	MH210	0.94	5.15	4.88	13.00	0.300000	24 inch	0.012	134.23	1,413.90	1,410.00	1,417.83	1,414.68	1,417.50	1.93	5.50	1,411.41	3.19	10.00
311	CB311	J-14	2.30	5.15	11.94	19.00	0.134211	24 inch	0.012	89.78	1,428.75	1,426.20	1,432.50	1,430.38	1,433.26	1.75	5.06	1,430.40	4.08	10.00
206	CB206	MH207	1.64	5.15	8.51	17.00	0.170000	24 inch	0.012	101.04	1,407.19	1,404.30	1,412.77	1,408.23	1,411.80	3.58	5.50	1,406.00	4.07	10.00
307	CB307	CB308	0.39	5.15	4.52	65.00	0.007692	24 inch	0.012	21.49	1,423.36	1,422.86	1,429.91	1,427.22	1,430.00	4.55	5.14	1,427.20	1.44	10.00
310	CB310	MH3-10	1.03	5.15	5.35	186.00	0.015161	24 inch	0.012	30.17	1,426.82	1,424.00	1,431.57	1,428.33	1,431.82	2.75	5.82	1,428.26	1.90	10.00
216	CB216	MH215	1.47	5.15	7.63	12.00	0.162500	24 inch	0.012	98.79	1,414.95	1,413.00	1,418.88	1,415.93	1,418.47	1.93	3.47	1,414.29	4.26	10.00
264	CB264	CB265	0.36	5.15	1.87	99.00	0.004444	24 inch	0.012	16.34	1,423.28	1,422.84	1,427.03	1,424.48	1,427.00	1.75	2.16	1,424.48	0.81	10.00
256	CB256	CB255	0.58	5.15	3.01	14.00	0.002143	24 inch	0.012	11.34	1,419.46	1,419.43	1,424.87	1,423.31	1,424.31	3.41	2.88	1,423.31	0.96	10.00
268	CB268	CB269	0.16	5.15	0.83	190.00	0.002895	24 inch	0.012	13.19	1,423.72	1,423.17	1,427.47	1,425.05	1,427.22	1.75	2.05	1,425.05	0.32	10.00
305	CB305	J-17	0.80	5.15	7.75	18.00	0.141111	24 inch	0.012	92.06	1,425.54	1,423.00	1,429.29	1,427.02	1,429.95	1.75	4.95	1,427.05	2.79	10.00
300	CB300	J-19	0.52	5.15	2.70	11.00	0.154545	24 inch	0.012	96.34	1,424.68	1,422.98	1,428.43	1,426.47	1,428.98	1.75	4.00	1,426.47	0.88	10.00
313	CB313	CB314	1.64	5.15	8.51	68.00	0.008235	24 inch	0.012	22.24	1,429.62	1,429.06	1,434.37	1,431.78	1,434.81	2.75	3.75	1,431.70	2.71	10.00
317	CB317	CB324	0.93	5.15	4.83	104.00	0.027981	24 inch	0.012	40.99	1,434.27	1,431.36	1,438.52	1,435.04	1,435.36	2.25	2.00	1,433.14	2.97	10.00
509	CB509	MH248	0.44	5.15	2.28	139.00	0.304317	24 inch	0.012	135.19	1,464.00	1,421.70	1,469.71	1,464.53	1,426.71	3.71	3.01	1,421.88	9.83	10.00
500	CB500	CB253	1.17	5.15	6.07	13.00	-0.084615	24 inch	0.012	-71.29	1,418.00	1,419.10	1,423.82	1,423.25	1,423.24	3.82	2.14	1,423.24	1.93	10.00
303	CB303	MH304	0.49	5.15	7.54	24.00	0.018250	24 inch	0.012	33.11	1,424.16	1,423.72	1,428.16	1,426.26	1,428.52	2.00	2.80	1,426.23	2.40	10.00
318	CB318	J-11	2.17	5.15	14.26	30.00	0.144333	24 inch	0.012	93.10	1,435.87	1,431.54	1,439.62	1,437.23	1,440.52	1.75	6.98	1,435.42	5.40	10.00
257	CB257	MH249	0.77	5.15	4.00	12.00	0.014167	24 inch	0.012	29.17	1,417.08	1,416.91	1,424.73	1,422.03	1,425.00	5.65	6.09	1,422.02	1.27	10.00
258	CB258	CB259	0.90	5.15	8.17	18.00	0.006111	24 inch	0.012	19.16	1,421.43	1,421.32	1,425.43	1,425.05	1,426.23	2.00	2.91	1,425.03	2.60	10.00
234	CB234	J-32	1.21	5.15	6.28	18.00	0.074444	24 inch	0.012	66.86	1,419.03	1,417.69	1,422.78	1,419.92	1,422.78	1.75	3.09	1,419.88	3.33	10.00
251	CB251	MH246	1.22	5.15	6.33	198.00	0.021869	24 inch	0.012	36.24	1,418.87	1,414.54	1,422.67	1,419.76	1,424.50	1.80	7.96	1,418.75	3.35	10.00
232	CB232	J-30	1.16	5.15	6.02	17.00	0.088235	24 inch	0.012	72.79	1,418.33	1,416.83	1,422.08	1,419.20	1,422.08	1.75	3.25	1,419.05	3.26	10.00
261	CB261	CB262	0.63	5.15	3.27	11.00	0.027273	24 inch	0.012	40.47	1,423.13	1,422.83	1,426.96	1,424.92	1,426.96	1.83	2.13	1,424.92	1.07	10.00
326	CB326	J-7	0.76	5.15	9.05	6.00	0.271667	24 inch	0.012	127.73	1,439.19	1,437.56	1,444.44	1,440.26	1,444.82	3.25	5.26	1,439.93	4.07	10.00
319	CB319	J-10	0.65	5.15	3.37	192.00	0.007813	24 inch	0.012	21.66	1,437.70	1,436.20	1,441.45	1,438.34	1,442.06	1.75	3.86	1,436.73	4.44	10.00
330	CB330	MH331	3.10	5.15	25.59	11.00	0.003636	24 inch	0.012	14.78	1,442.98	1,442.94	1,446.48	1,444.96	1,446.45	1.50	1.51	1,444.72	8.42	10.00
3-17A	MH3-17	J-2	0.00	0.00	68.64	81.00	0.007654	48 inch	0.012	136.14	1,440.90	1,440.28	1,450.10	1,443.40	1,450.00	5.20	5.72	1,443.04	7.85	10.00
334	CB334	J-2	0.33	5.15	3.41	12.00	0.172500	24 inch	0.012	101.78	1,443.64	1,441.57	1,447.64	1,444.29	1,450.00	2.00	6.43	1,443.55	2.49	10.00
228	CB228	J-27	1.15	5.15	5.97	16.00	0.105000	24 inch	0.012	79.41	1,417.52	1,415.84	1,421.27	1,418.38	1,421.27	1.75	3.43	1,418.05	3.25	10.00
220	CB220	J-25	1.02	5.15	5.30	22.00	0.076818	24 inch	0.012	67.92	1,416.14	1,414.45	1,419.84	1,416.95	1,419.84	1.70	3.39	1,416.93	3.06	10.00
222	CB222	J-40	0.00	0.00	0.00	10.00	0.134000	24 inch	0.012	89.71	1,415.99	1,414.65	1,420.00	1,415.99	1,417.65	2.01	1.00	1,415.63	0.00	0.00

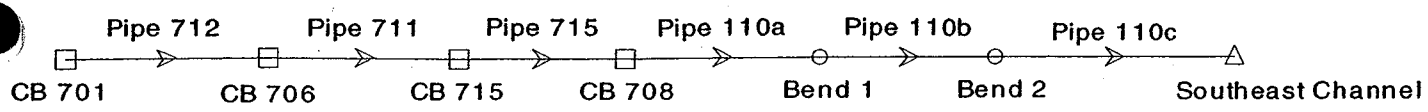
Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM
Element Calculation Message Browser

Element Label	Message
330	Warning: Pipe discharge is above full flow capacity.
330	Warning: Pipe discharge is above design capacity.
256	Warning: Pipe does not meet minimum velocity constraint.
CB322	Warning: Structure is flooded.
CB323	Warning: Structure is flooded.
257	Warning: Pipe does not meet minimum velocity constraint.
CB253	Warning: Structure is flooded.
322	Warning: Pipe discharge is above full flow capacity.
322	Warning: Pipe discharge is above design capacity.
323	Warning: Pipe discharge is above full flow capacity.
323	Warning: Pipe discharge is above design capacity.
331A	Warning: Pipe discharge is above full flow capacity.
331A	Warning: Pipe discharge is above design capacity.
254	Warning: Pipe discharge is above full flow capacity.
254	Warning: Pipe discharge is above design capacity.
CB509	No bypass target specified. Bypass is assumed to travel to O-1.
331D	Warning: Pipe discharge is above full flow capacity.
331D	Warning: Pipe discharge is above design capacity.
266	Warning: Pipe does not meet minimum velocity constraint.
252	Warning: Pipe does not meet minimum velocity constraint.
500	Warning: Pipe does not meet minimum slope constraint.
500	Info: Pipe slope is adverse (negative).
500	Warning: Pipe does not meet minimum velocity constraint.
500	Warning: Pipe discharge is above full flow capacity.
500	Warning: Pipe discharge is above design capacity.
262	Warning: Pipe does not meet minimum velocity constraint.
255	Warning: Pipe does not meet minimum velocity constraint.
315	Warning: Pipe discharge is above full flow capacity.
315	Warning: Pipe discharge is above design capacity.
313	Warning: Pipe does not meet minimum velocity constraint.
223	Warning: Pipe does not meet minimum cover constraint.
CB320	Warning: Structure is flooded.
3-11A	Warning: Pipe discharge is above full flow capacity.
3-11A	Warning: Pipe discharge is above design capacity.
320	Warning: Pipe discharge is above full flow capacity.
320	Warning: Pipe discharge is above design capacity.
3-11B	Warning: Pipe discharge is above full flow capacity.
3-11B	Warning: Pipe discharge is above design capacity.
310	Warning: Pipe does not meet minimum velocity constraint.
3-10	Warning: Pipe discharge is above full flow capacity.
3-10	Warning: Pipe discharge is above design capacity.
3-6B	Warning: Pipe discharge is above full flow capacity.
3-6B	Warning: Pipe discharge is above design capacity.
3-9A	Warning: Pipe discharge is above full flow capacity.
3-9A	Warning: Pipe discharge is above design capacity.
317	Warning: Pipe does not meet minimum velocity constraint.
CB227	No bypass target specified. Bypass is assumed to travel to O-2.
3-9B	Warning: Pipe discharge is above full flow capacity.
3-9B	Warning: Pipe discharge is above design capacity.
CB225	No bypass target specified. Bypass is assumed to travel to O-2.
307	Warning: Pipe does not meet minimum velocity constraint.
CB222	No bypass target specified. Bypass is assumed to travel to O-2.
308	Warning: Pipe does not meet minimum velocity constraint.
CB216	No bypass target specified. Bypass is assumed to travel to O-2.
305	Warning: Pipe does not meet minimum velocity constraint.

Scenario: LOOP 202/US 60 PHASE 1 STORM DRAIN SYSTEM
Element Calculation Message Browser

	Element Label	Message
	CB209	No bypass target specified. Bypass is assumed to travel to O-2.
	304	Warning: Pipe does not meet minimum velocity constraint.
	CB206	No bypass target specified. Bypass is assumed to travel to O-2.
	303	Warning: Pipe does not meet minimum velocity constraint.
	300	Warning: Pipe does not meet minimum velocity constraint.
	223A	Warning: Pipe does not meet minimum cover constraint.
	207	Warning: Pipe does not meet minimum cover constraint.
	268	Warning: Pipe does not meet minimum velocity constraint.
	269	Warning: Pipe does not meet minimum velocity constraint.
	222	Warning: Pipe does not meet minimum velocity constraint.
	3-6D	Warning: Pipe discharge is above full flow capacity.
	3-6D	Warning: Pipe discharge is above design capacity.
	264	Warning: Pipe does not meet minimum velocity constraint.
	265	Warning: Pipe does not meet minimum velocity constraint.
	MH317	Warning: Structure is flooded.
	250	Warning: Pipe discharge is above full flow capacity.
	250	Warning: Pipe discharge is above design capacity.
	261	Warning: Pipe does not meet minimum velocity constraint.
	334	Warning: Pipe does not meet minimum velocity constraint.
	258	Warning: Pipe does not meet minimum velocity constraint.

Scenario: Base



Calculation Results Summary

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Scenario: Base

>>>> Info: CB 701 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 715 No bypass target specified. Bypass is assumed to travel to Southeast Channel.

>>>> Info: Subsurface Network Rooted by: Southeast Channel
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
CB 701	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 715	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 708	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 706	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: Southeast Channel

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
Pipe 110c	1	24 inch	Circular	40.00	7.39	2.89	1,425.33	1,425.06
Pipe 110b	1	24 inch	Circular	64.00	7.39	19.28	1,438.91	1,425.44
Pipe 110a	1	24 inch	Circular	128.00	7.39	10.40	1,443.74	1,439.09
Pipe 715	1	24 inch	Circular	6.00	5.76	4.03	1,443.93	1,443.92
Pipe 711	1	24 inch	Circular	112.50	4.15	3.48	1,444.07	1,444.00
Pipe 712	1	24 inch	Circular	122.00	2.11	4.49	1,444.81	1,444.13

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
Southeast Channel	7.39	1,427.84	1,422.34	1,422.34
Bend 2	7.39	1,433.80	1,425.44	1,425.33
Bend 1	7.39	1,446.00	1,439.09	1,438.91
CB 708	7.39	1,450.77	1,443.92	1,443.74
CB 715	5.76	1,450.01	1,444.00	1,443.93
CB 706	4.15	1,447.11	1,444.13	1,444.07
CB 701	2.11	1,451.14	1,444.90	1,444.81

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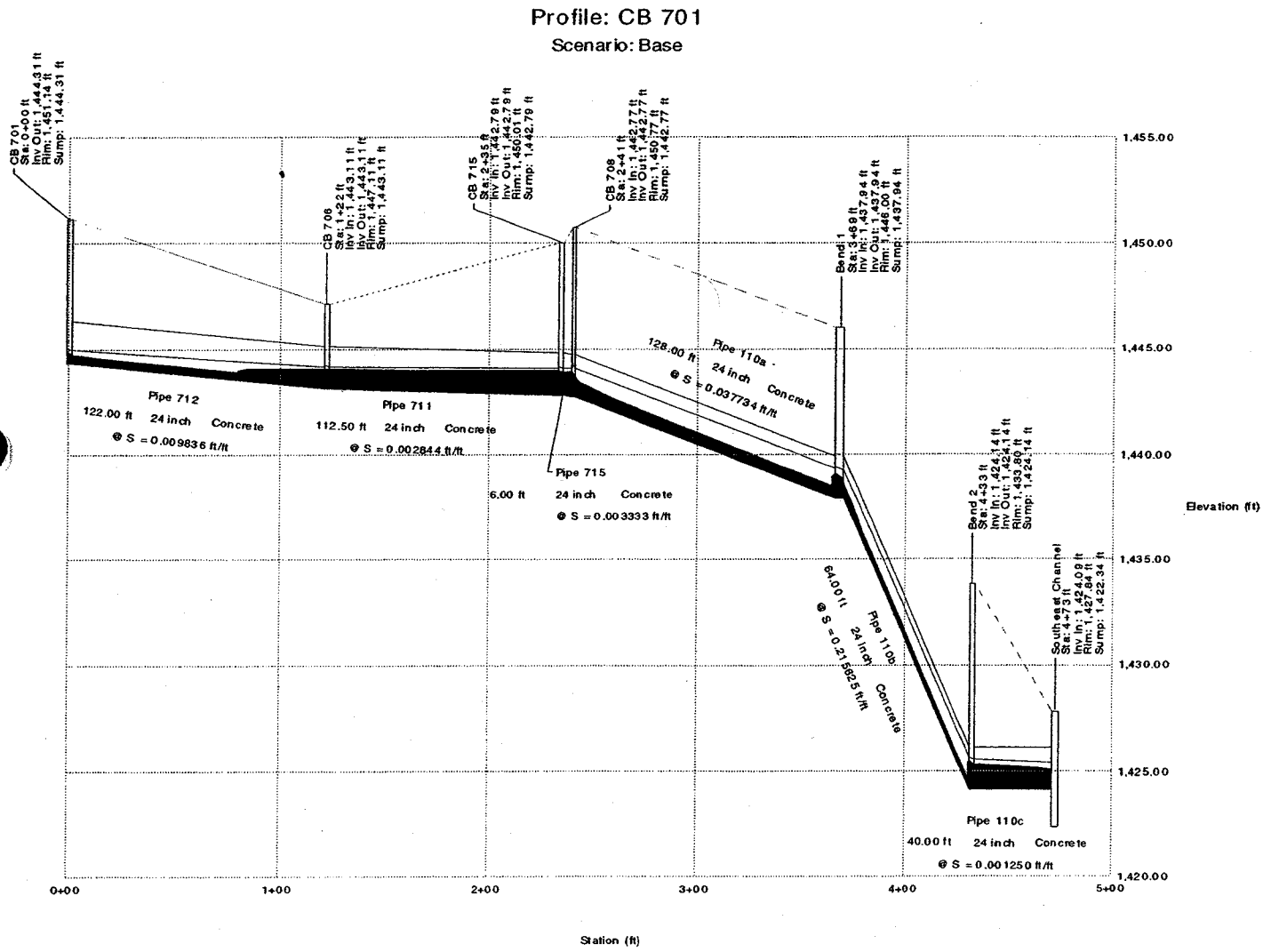
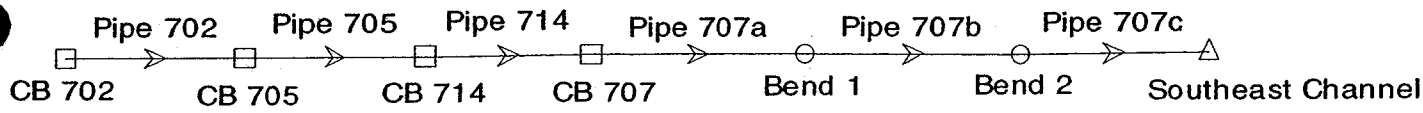
Completed: 03/27/2003 07:31:26 AM

Profile
Scenario: Base



Scenario: Base



Calculation Results Summary

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Scenario: Base

>>>> Info: CB 707 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 714 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 705 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 702 No bypass target specified. Bypass is assumed to travel to Southeast Channel.

>>>> Info: Subsurface Network Rooted by: Southeast Channel
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
CB 707	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 714	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 705	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 702	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: Southeast Channel

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
Pipe 707c	1	24 inch	Circular	32.00	6.12	4.75	1,426.90	1,426.72
Pipe 707b	1	24 inch	Circular	47.00	6.12	20.04	1,440.15	1,427.06
Pipe 707a	1	24 inch	Circular	184.00	6.12	8.27	1,444.41	1,440.31
Pipe 714	1	24 inch	Circular	8.29	4.02	4.18	1,444.57	1,444.57
Pipe 705	1	24 inch	Circular	116.60	2.90	3.86	1,444.74	1,444.62
Pipe 702	1	24 inch	Circular	124.50	1.38	4.19	1,446.00	1,444.85

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
Southeast Channel	6.12	1,429.99	1,424.49	1,424.49
Bend 2	6.12	1,429.99	1,427.06	1,426.90
Bend 1	6.12	1,445.00	1,440.31	1,440.15
CB 707	6.12	1,449.86	1,444.57	1,444.41
CB 714	4.02	1,450.86	1,444.62	1,444.57
CB 705	2.90	1,448.15	1,444.85	1,444.74
CB 702	1.38	1,451.97	1,446.07	1,446.00

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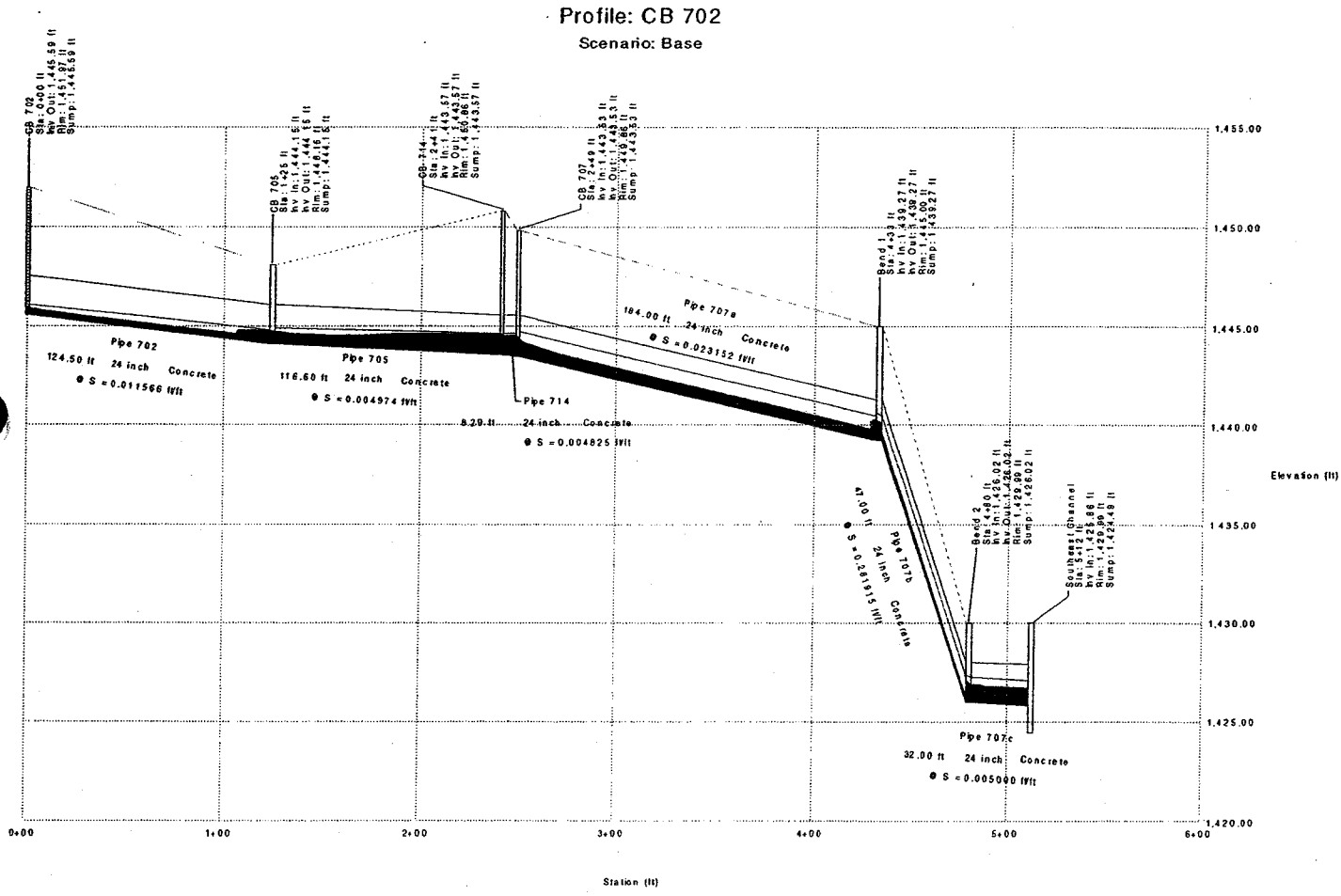
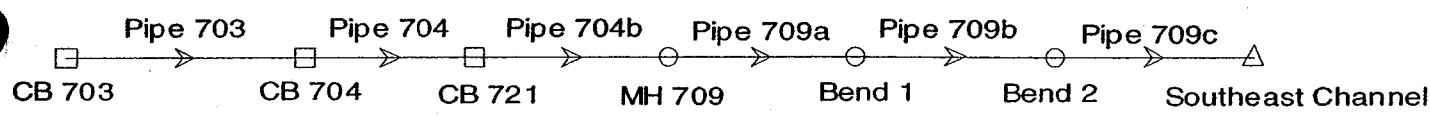
Completed: 03/27/2003 07:34:39 AM

Profile
Scenario: Base



Scenario: Base



Calculation Results Summary

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Scenario: Base

>>>> Info: CB 721 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 704 No bypass target specified. Bypass is assumed to travel to Southeast Channel.
>>>> Info: CB 703 No bypass target specified. Bypass is assumed to travel to Southeast Channel.

>>>> Info: Subsurface Network Rooted by: Southeast Channel
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
CB 721	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 704	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00
CB 703	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: Southeast Channel

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
Pipe 709c	1	24 inch	Circular	16.00	11.29	5.52	1,429.45	1,429.34
Pipe 709b	1	24 inch	Circular	66.00	11.29	20.43	1,441.22	1,429.69
Pipe 709a	1	24 inch	Circular	216.00	11.29	8.43	1,444.52	1,441.47
Pipe 704b	1	24 inch	Circular	15.02	11.29	5.37	1,444.80	1,444.77
Pipe 704	1	24 inch	Circular	143.98	2.91	3.85	1,444.98	1,444.97
Pipe 703	1	24 inch	Circular	126.60	1.40	4.29	1,446.05	1,445.01

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
Southeast Channel	11.29	1,432.39	1,426.89	1,426.89
Bend 2	11.29	1,432.39	1,429.69	1,429.45
Bend 1	11.29	1,444.00	1,441.47	1,441.22
MH 709	11.29	1,450.23	1,444.77	1,444.52
CB 721	11.29	1,449.00	1,444.97	1,444.80
CB 704	2.91	1,448.09	1,445.01	1,444.98
CB 703	1.40	1,451.87	1,446.12	1,446.05

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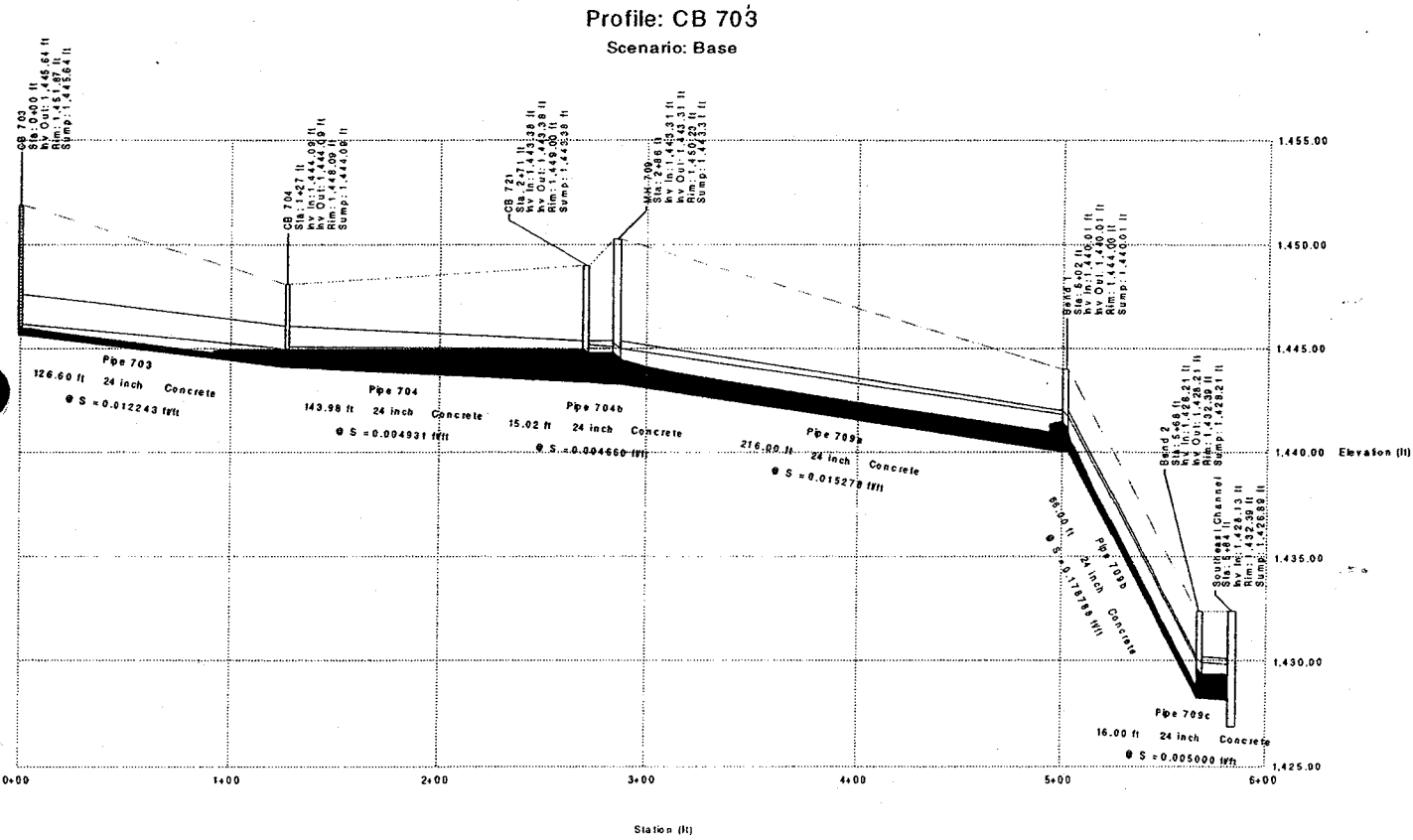
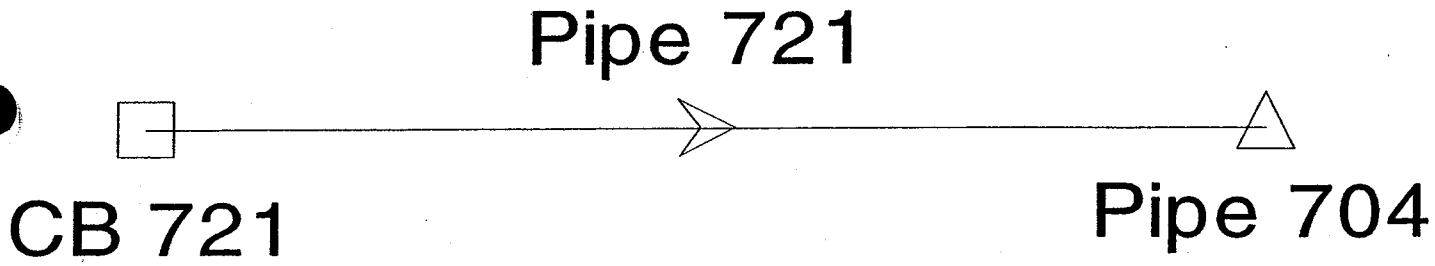
Profile
Scenario: Base




Pipe 721
CB 721
Pipe 704

Calculation Results Summary

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Scenario: Base

>>>> Info: Subsurface Network Rooted by: Pipe 704
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
CB 721	Grate Inlet	Grate DI-1	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: Pipe 704

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
Pipe 721	1	24 inch	Circular	170.80	8.38	3.59	1,445.06	1,444.41

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
Pipe 704	8.38	1,449.00	1,443.38	1,443.38
CB 721	8.38	1,449.76	1,445.17	1,445.06

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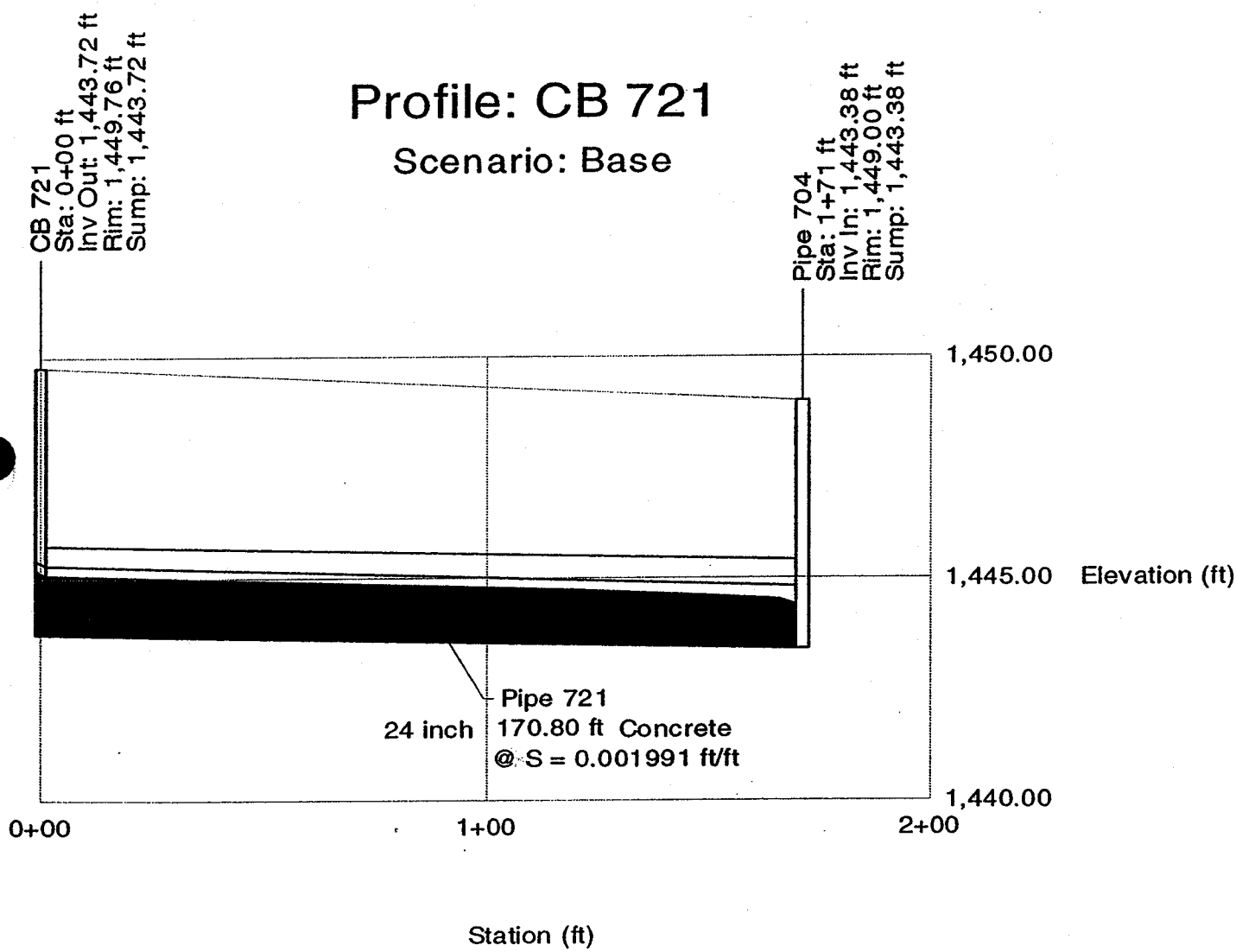
Completed: 03/15/2003 01:55:17 PM


Profile: CB 721
Scenario: Base
CB 721
Sta: 0+00 ft
Inv Out: 1,443.72 ft
Rim: 1,449.76 ft
Sump: 1,443.72 ft
Pipe 704
Sta: 1+71 ft
Inv In: 1,443.38 ft
Rim: 1,449.00 ft
Sump: 1,443.38 ft
1,450.00
1,445.00
Elevation (ft)
1,440.00
Pipe 721
24 inch
170.80 ft Concrete
@ S = 0.001991 ft/ft
0+00
1+00
2+00
Station (ft)

PLANS

APPENDIX G

RIPRAP CALCULATIONS

PARSONS BRINCKERHOFF COMPUTATION SHEET

Subject: Super Red Tan - Riprap Sizing Calcs

Page 1 of 5 | 11194
Made by: Jeff Black
Date: 10/7/02
Checked by: S. Kemna
Date: 10/8/02

Use methodology in "Drainage and Channel Design Standards For Local Drainage For Flood Plain Management Within Pima County, Arizona", June 1, 1984.

Outlet Structure For Basin NE-1

Flow over Emergency Spillway.

Use Equations 5-VI and 6-VI for rip rap at culvert outlets - use flow depth into basin as the culvert diameter or depth.

$L = D_c(8 + 55 \log F)$ Eqn. 5-VI

for maximum Tailwater, ie > 0.5D to 1D.

From Flowmaster output for 4:1 sloping section of emergency spillway:

$F = 3.25$, $D_c = y = 0.84$ ft

$L = 0.84(8 + 55 \log 3.25) = 30$ ft

Length of riprap apron = 30 ft

PARSONS BRINCKERHOFF COMPUTATION SHEET

Page 2 of 5 | 11194

Subject: Super Red Tan - Riprap Calcs.

Made by: J. Blay

Date: 10/7/02

Checked by: SPK

Date: 10/8/02

$$d_{50} = 0.02\left[\frac{D_c^2}{TW}\right] R^{1.33} \quad \text{Eqn. 6-VI}$$

$$R = \frac{q}{D_c^{1.5}} = \frac{279/18}{0.84^{1.5}} = 20.1$$

$$d_{50} = 0.02\left[\frac{0.84^2}{0.84}\right] 20.1^{1.33} = 0.9 = \underline{11 \text{ inches}}$$

Check Riprap Sizing for flow through the 2-30" Pipe outlets.

From DMJM's report Q through culverts is 60 cfs, Outlet velocity is 6.1 fps and TW depth = 3.6 ft.

$$F = \frac{V}{\sqrt{gY_n}} = \frac{6.1}{\sqrt{32.2(2.5)}} = 0.7$$

$$L_{SB} = 2.5(8 + 5S \log 0.7) = 2.5 \times 8 = 20 \text{ ft}$$

Use 30 ft

$$R = \frac{Q}{D_c^{2.5}} = \frac{30}{2.5^{2.5}} = 3.0.$$

$$D_{50} = 0.02\left[\frac{2.5^2}{3.6}\right] 3.0^{1.33} = 0.15 \text{ ft} = 2 \text{ inches}$$

Use 11 inches.

PARSONS BRINCKERHOFF COMPUTATION SHEET

Page 3 of 5 | 11194

Made by J. Blair

Date 10/7/02

Checked by SPK

Date 10/8/02

Subject Super Red Tan - Riprap Calcs.

Northeast Channel outfall into Basin NE-1

From HEC-RAS results for TW elevation in Basin = 1438; Hydraulic characteristics of flow at outlet to basin: Y = 0.74 ft, V = 13.2 fps, TW = 38 ft, Flow Area = 21.1 ft, BW = 32 ft

$$Y_h = \frac{A}{TW} = \frac{21.1}{38} = 0.56$$

$$F = \frac{V}{\sqrt{g Y_h}} = \frac{13.2}{\sqrt{32.2(0.56)}} = 3.11$$

$$L = 0.74(8 + 55 \log 3.11) = \underline{26 \text{ ft}}$$

Length of riprap apron = 26 ft

$$R = \frac{q}{D_c^{1.5}} = \frac{279/32}{0.74^{1.5}} = 13.7$$

$$D_{50} = 0.02\left[\frac{0.74^2}{0.74}\right] 13.7^{1.33} = 0.48 \text{ ft} = \underline{6 \text{ inches}}$$

4/4

Sloping Face of Emergency Spillway
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	NE-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.038
Slope	0.250000 ft/ft
Left Side Slope	4.00 H : V
Right Side Slope	4.00 H : V
Bottom Width	18.00 ft
Discharge	279.00 cfs

Results	
Depth	0.84 ft
Flow Area	17.8 ft²
Wetted Perimeter	24.89 ft
Top Width	24.68 ft
Critical Depth	1.71 ft
Critical Slope	0.019421 ft/ft
Velocity	15.65 ft/s
Velocity Head	3.81 ft
Specific Energy	4.64 ft
Froude Number	3.25
Flow Type	Supercritical

NE-1 5/5

T DATE: 01-02-2002 FILE DATE: 01-02-2002
TIME: 15:10:28 FILE NAME: NEPOND1C

PERFORMANCE CURVE FOR CULVERT 1 - 2(2.50 (ft) BY 2.50 (ft)) RCP

S- GE W S)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
.00	1438.73	0.00	2.53	0-NF	0.00	0.00	0.00	3.63	0.00	0.00
.00	1438.82	1.09	2.62	4-FFt	0.83	0.80	2.50	3.63	1.22	0.00
.00	1439.11	1.69	2.91	4-FFt	1.22	1.16	2.50	3.63	2.44	0.00
.00	1439.61	2.17	3.41	4-FFt	1.57	1.43	2.50	3.63	3.67	0.00
.00	1440.30	2.64	4.10	4-FFt	1.97	1.66	2.50	3.63	4.89	0.00
60 .00	1441.19	3.16	4.99	4-FFt	2.50	1.86	2.50	3.63	6.11	0.00
.00	1442.27	3.80	6.07	4-FFt	2.50	2.03	2.50	3.63	7.33	0.00
.00	1443.55	4.56	7.35	4-FFt	2.50	2.15	2.50	3.63	8.56	0.00
.00	1445.03	5.45	8.83	4-FFt	2.50	2.28	2.50	3.63	9.78	0.00
.00	1446.71	6.47	10.51	4-FFt	2.50	2.41	2.50	3.63	11.00	0.00
20 .00	1448.58	7.61	12.38	4-FFt	2.50	2.50	2.50	3.63	12.22	0.00

El. inlet face invert 1436.20 ft El. outlet invert 1435.10 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

TE DATA ***** CULVERT INVERT **********

INLET STATION	300.00 ft
INLET ELEVATION	1436.20 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1435.10 ft
NUMBER OF BARRELS	2
SLOPE (V/H)	0.0037
CULVERT LENGTH ALONG SLOPE	300.00 ft

CULVERT DATA SUMMARY **********

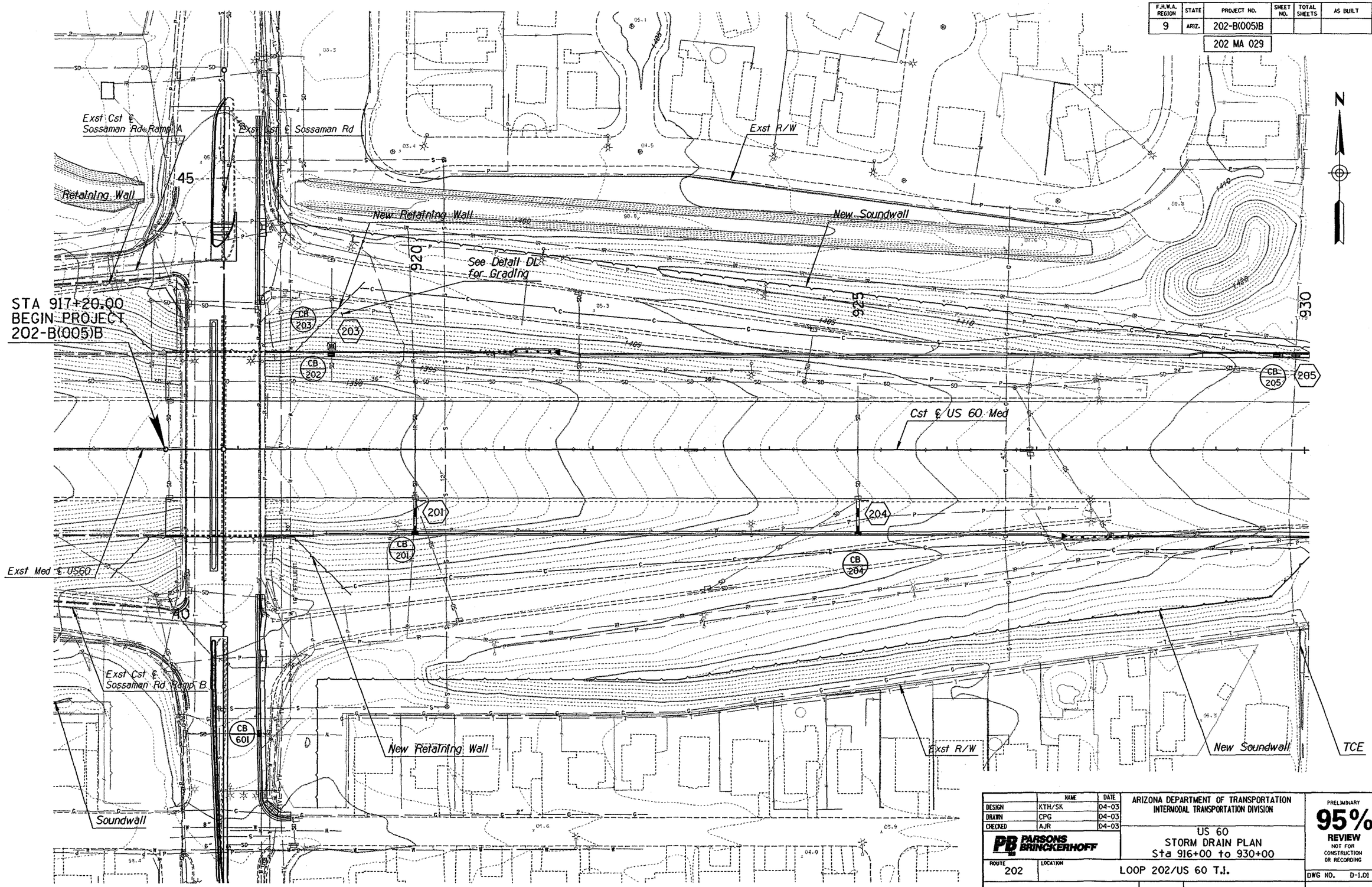
BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

APPENDIX H

STAGE IV PLANS

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



	NAME	DATE
DESIGN	KTH/SK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 916+00 to 930+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.01

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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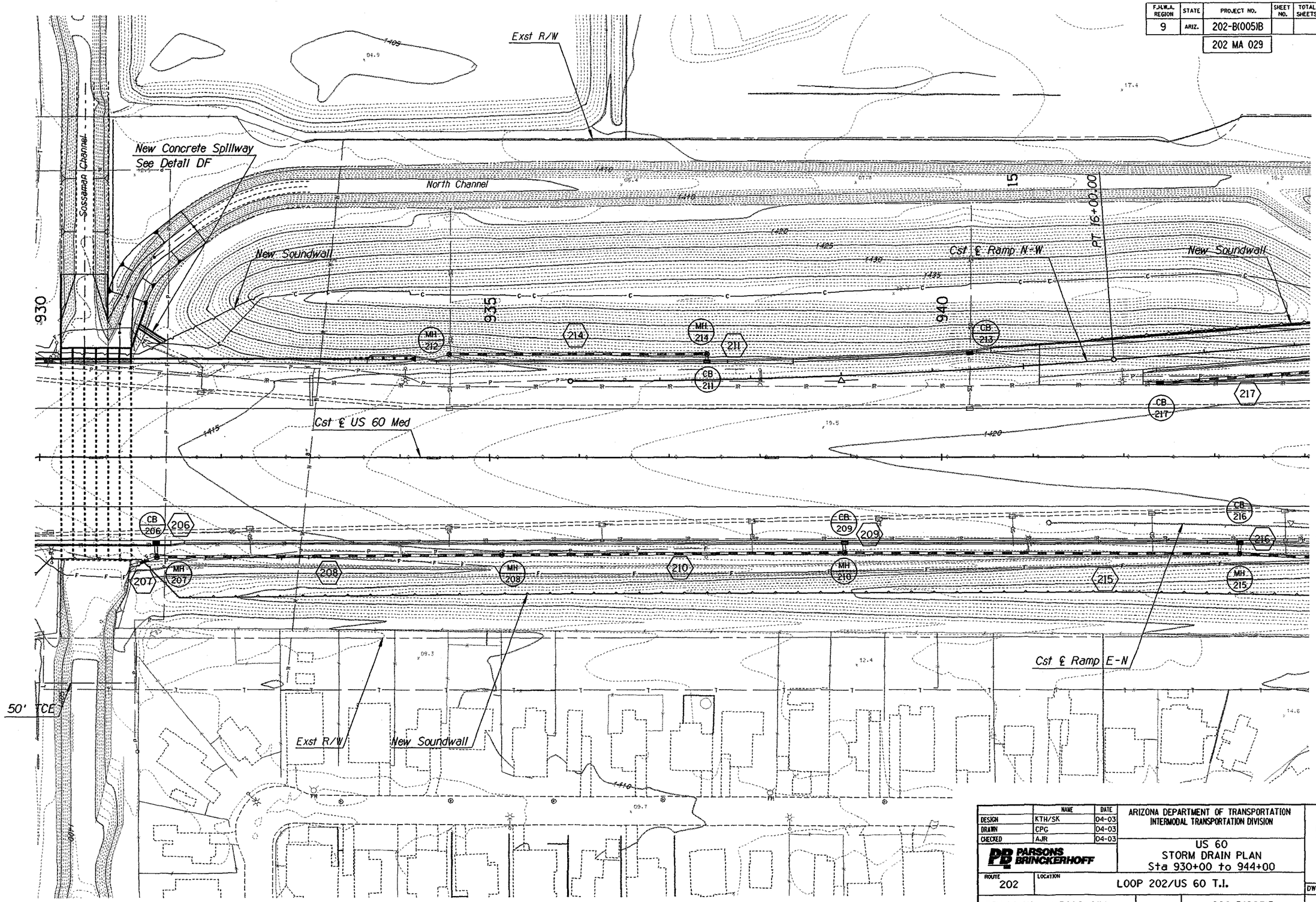
		202 MA 029			



	NAME	DATE
DESIGN	KTH/SK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 930+00 to 944+00

ROUTE 202 — LOCATION: LOOP 202/US 60 T.I.

PRELIMINARY **95%** REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.02

TRACS NO. H 5686 03C — 202-B(005)B — ___ OF ___

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

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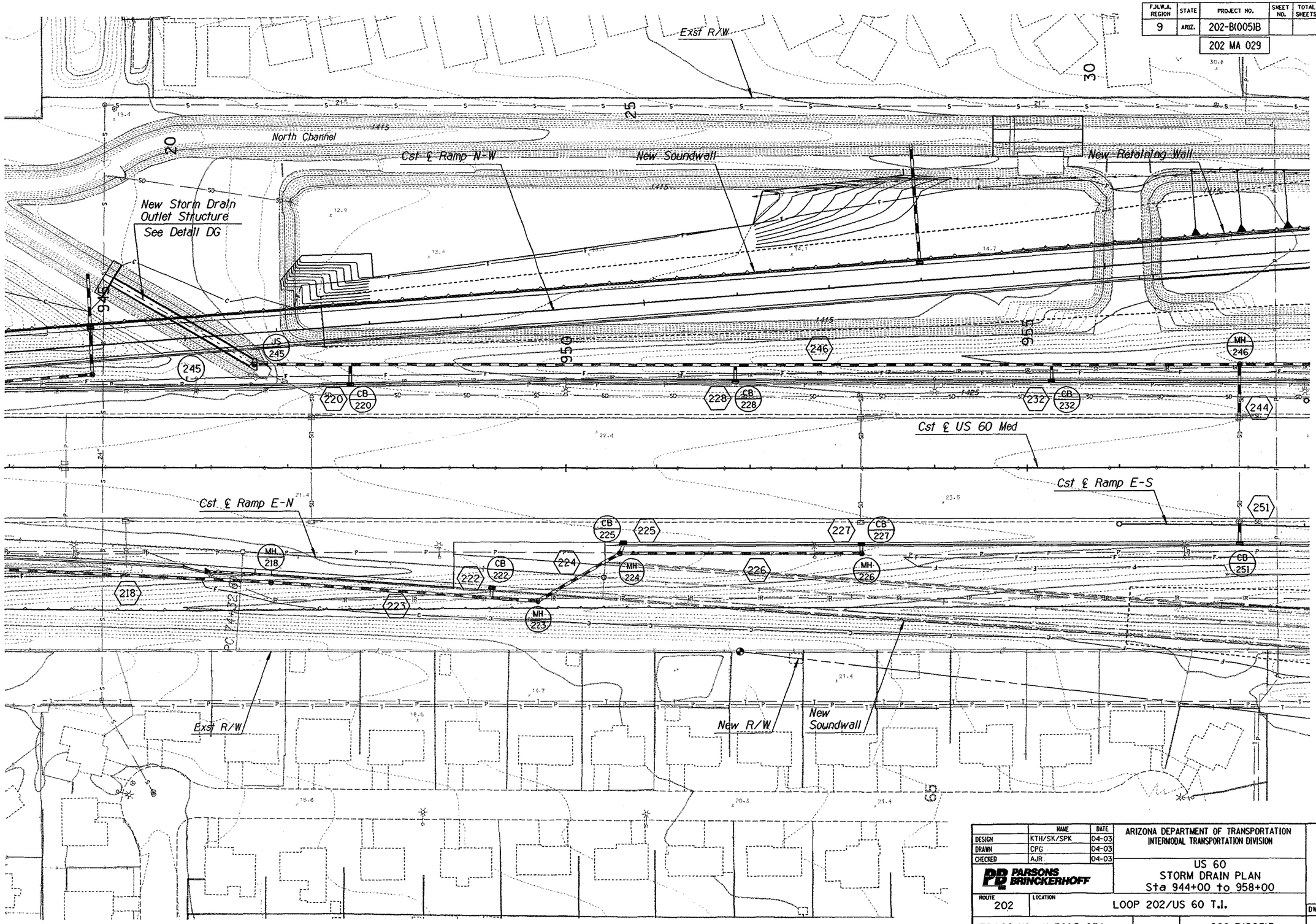

	NAME	DATE
DESIGN	KTH/SK/SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 944+00 to 958+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.03

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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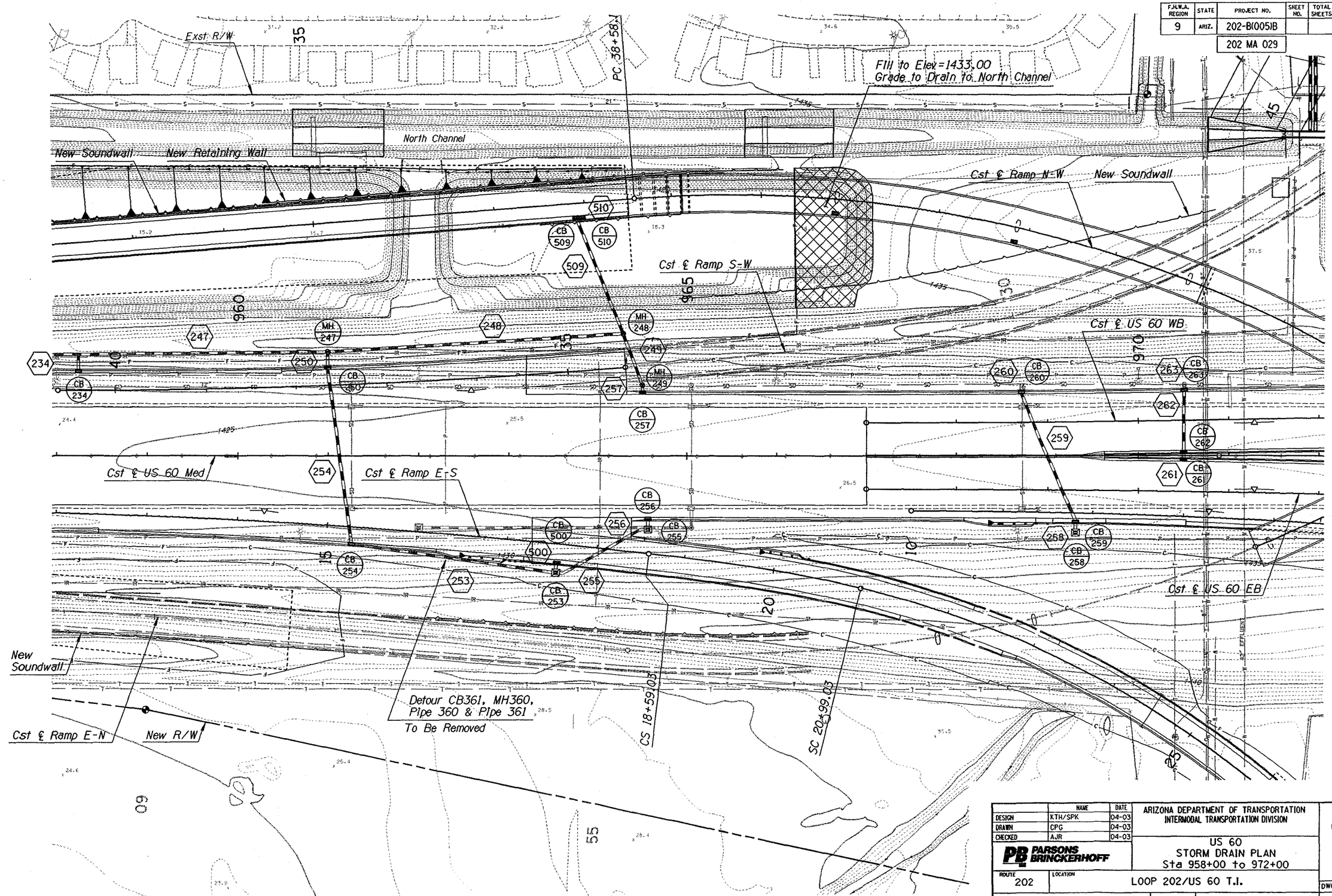
		202 MA 029			



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DESIGN	KTH/SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 958+00 to 972+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.04

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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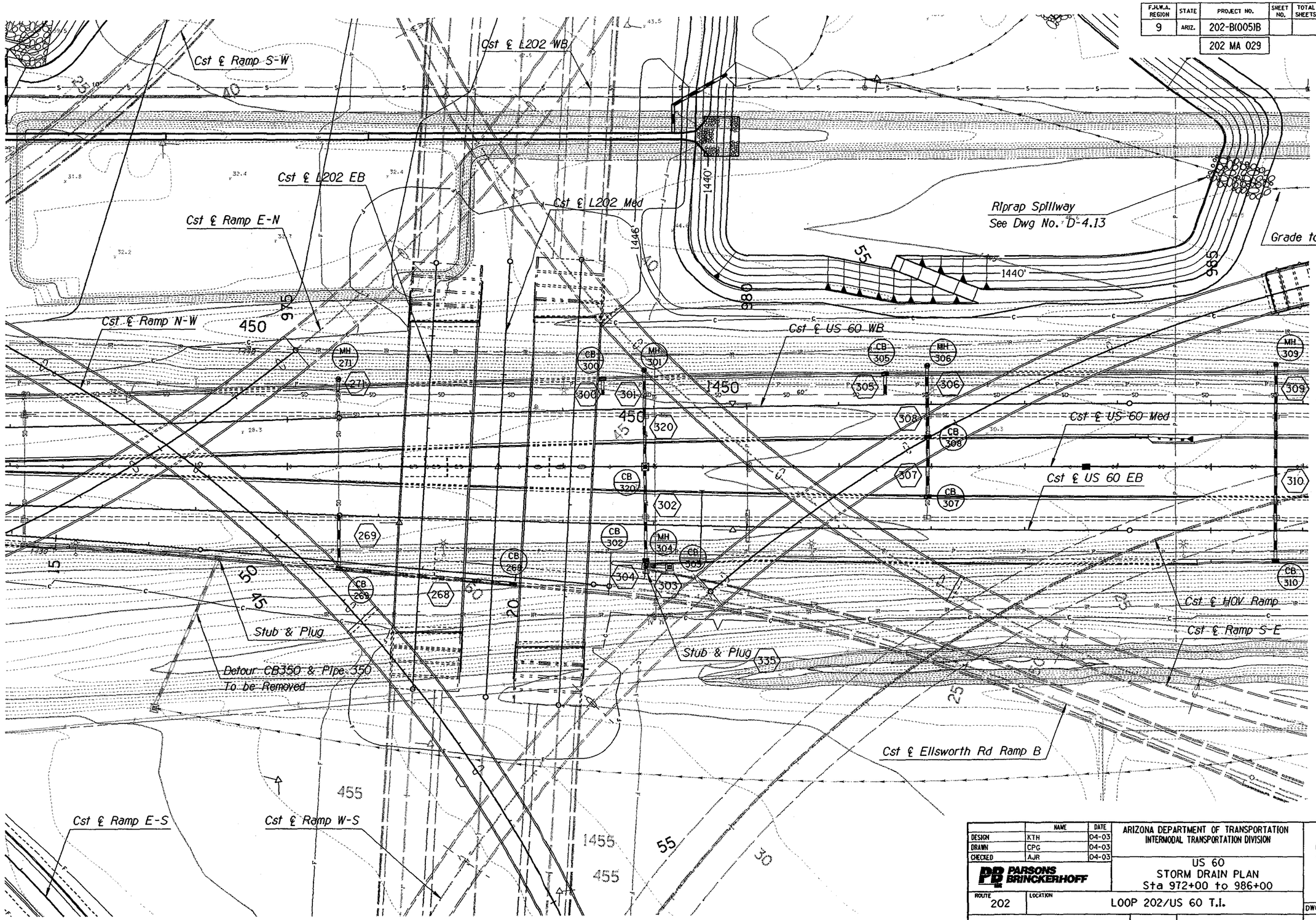

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DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 972+00 to 986+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.05

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

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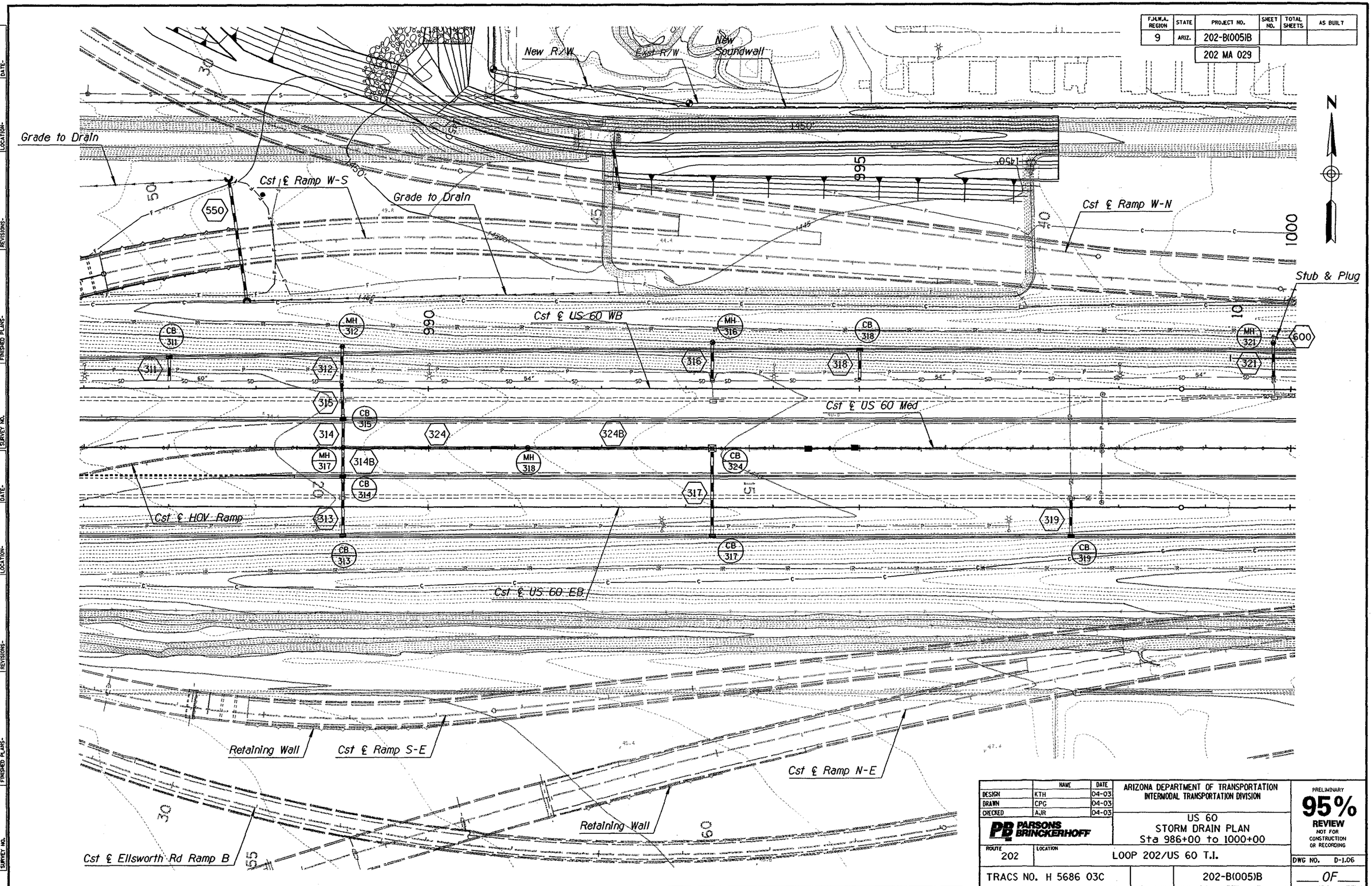
202 MA 029



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DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 986+00 to 1000+00

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.06

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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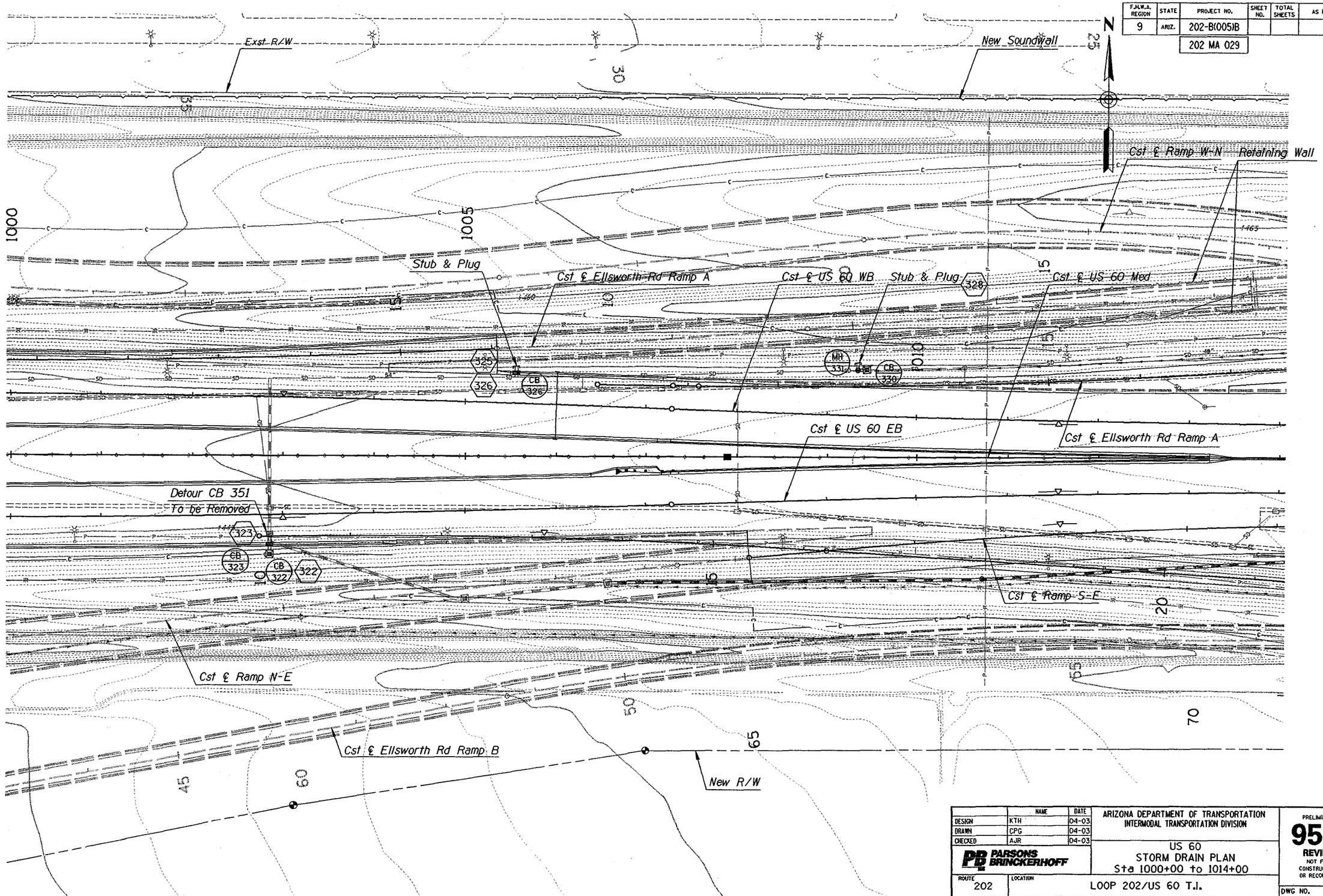
		202 MA 029			



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DRAWN	CPG	04-03
CHECKED	AJR	04-03

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INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 1000+00 to 1014+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.07

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:13:57 2003 H:\60_TI\phase_I\Drng\dp107.dgn

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

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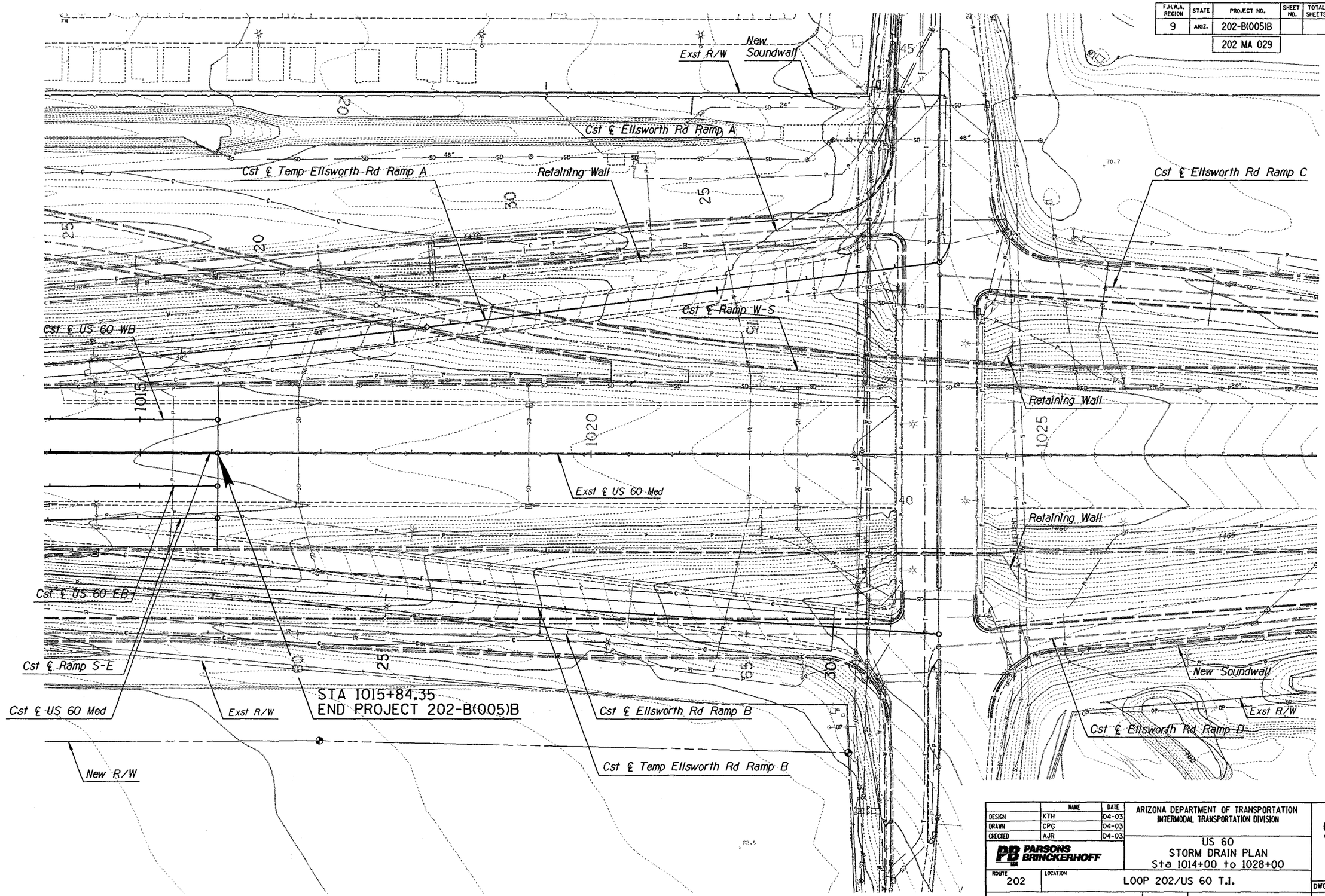

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DRAWN	CPG	04-03
CHECKED	AJR	04-03

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ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
STORM DRAIN PLAN
Sta 1014+00 to 1028+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.08

___ OF ___

Wed Apr 02 14:14:26 2003 H:\60_TI\phase_1\Drng\dp108.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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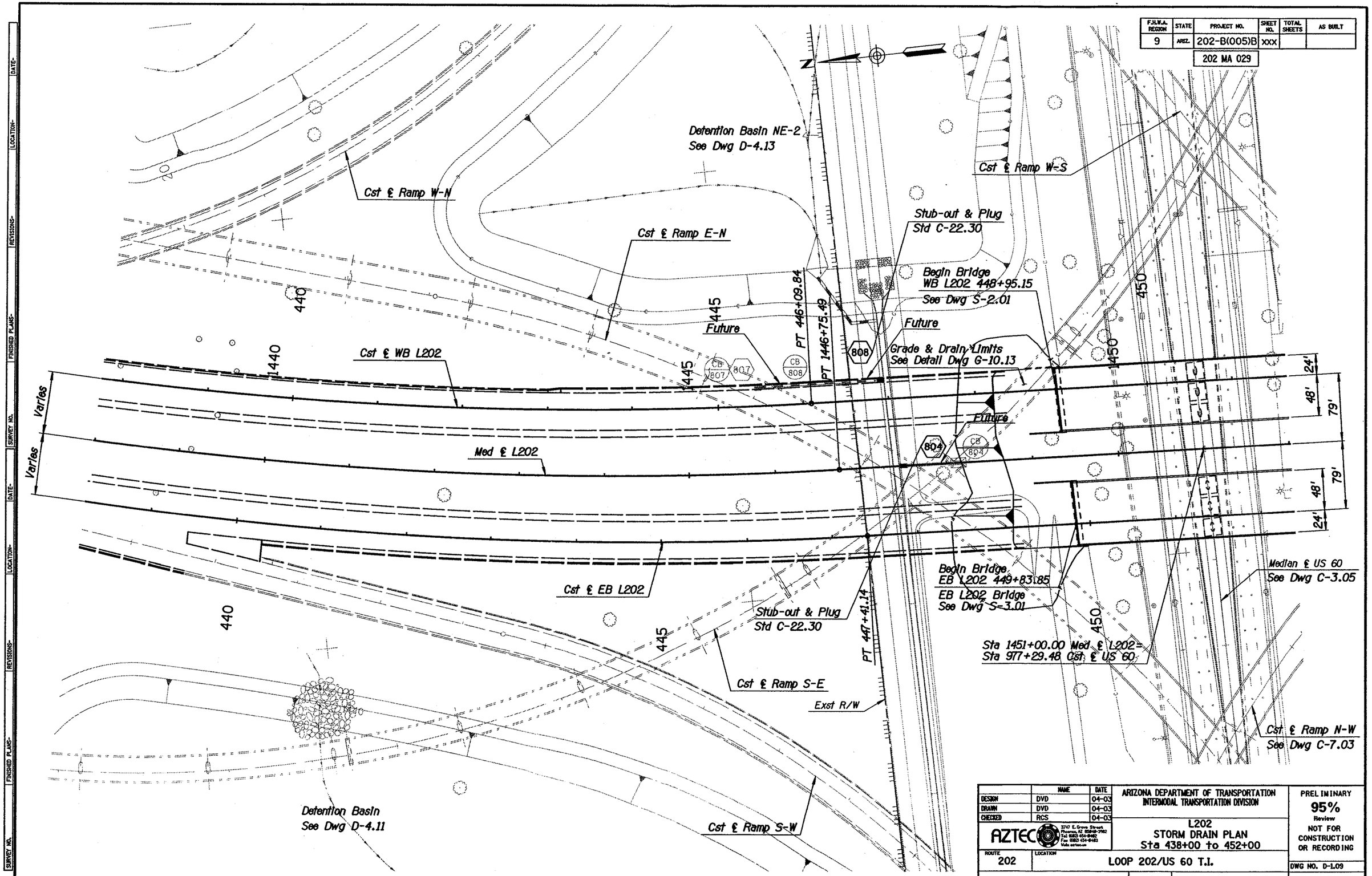
202 MA 029



	NAME	DATE
DESIGN	DVD	04-03
DRAWN	DVD	04-03
CHECKED	RCS	04-03

AZTEC 3747 E. Grove Street Phoenix, AZ 85040-7962 Tel (602) 454-8462 Fax (602) 454-8483 Web: aztecusa.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

L202
STORM DRAIN PLAN
Sta 438+00 to 452+00

PRELIMINARY
95%
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NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION: LOOP 202/US 60 T.I.

DWG NO. D-1.09

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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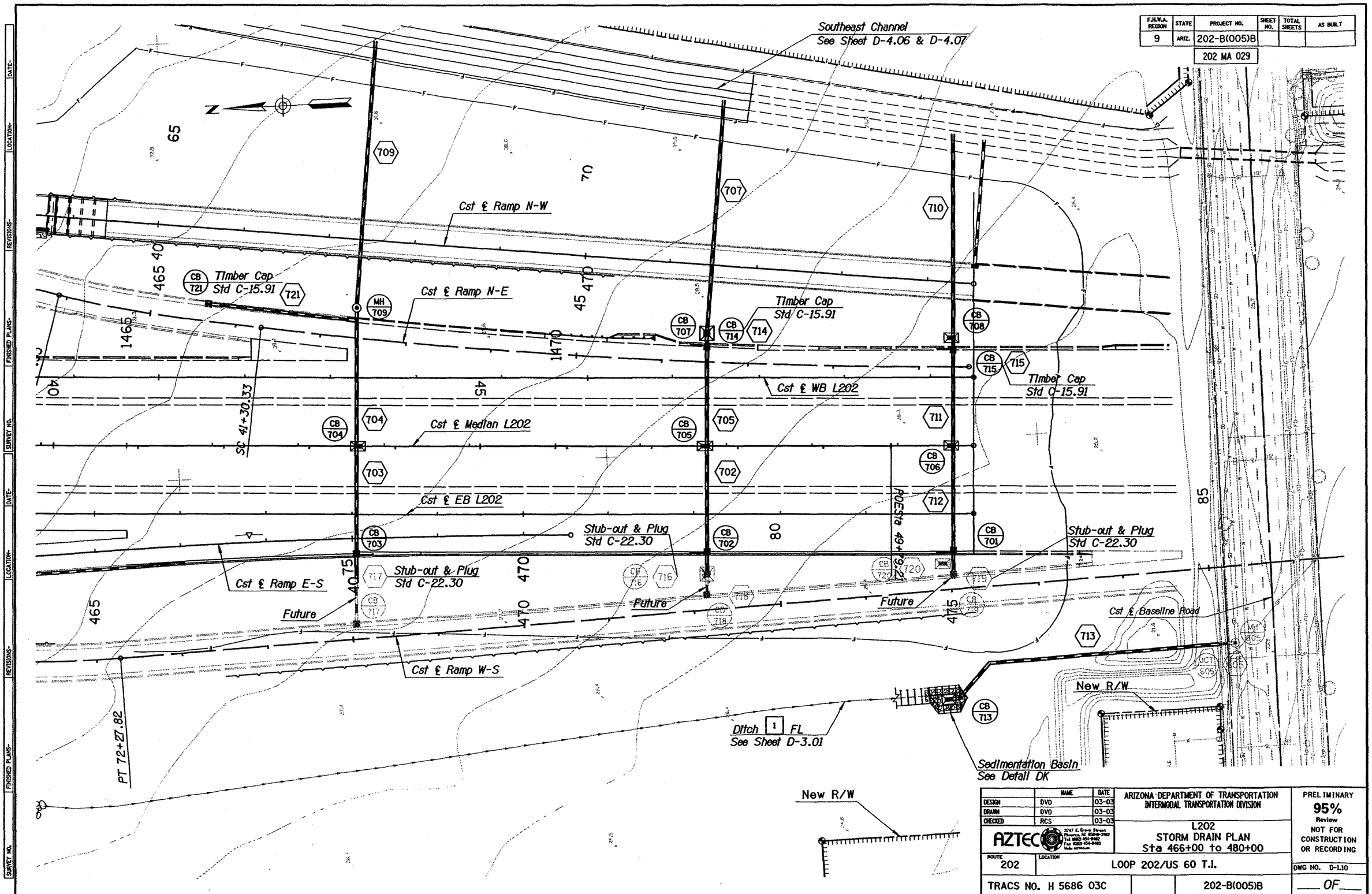
202 MA 029



	NAME	DATE
DESIGN	DVD	03-03
DRAWN	DVD	03-03
CHECKED	RCS	03-03

AZTEC 3747 E. Grove Street, Phoenix, AZ 85018-3162 Tel (602) 954-9402 Fax (602) 954-9403 Web: aztecusa.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

L202
STORM DRAIN PLAN
Sta 466+00 to 480+00

PRELIMINARY
95%
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NOT FOR CONSTRUCTION OR RECORDING

ROUTE: 202
LOCATION: LOOP 202/US 60 T.I.
DWG NO. D-1.10
TRACS NO. H 5686 03C
202-B(005)B
___ OF ___

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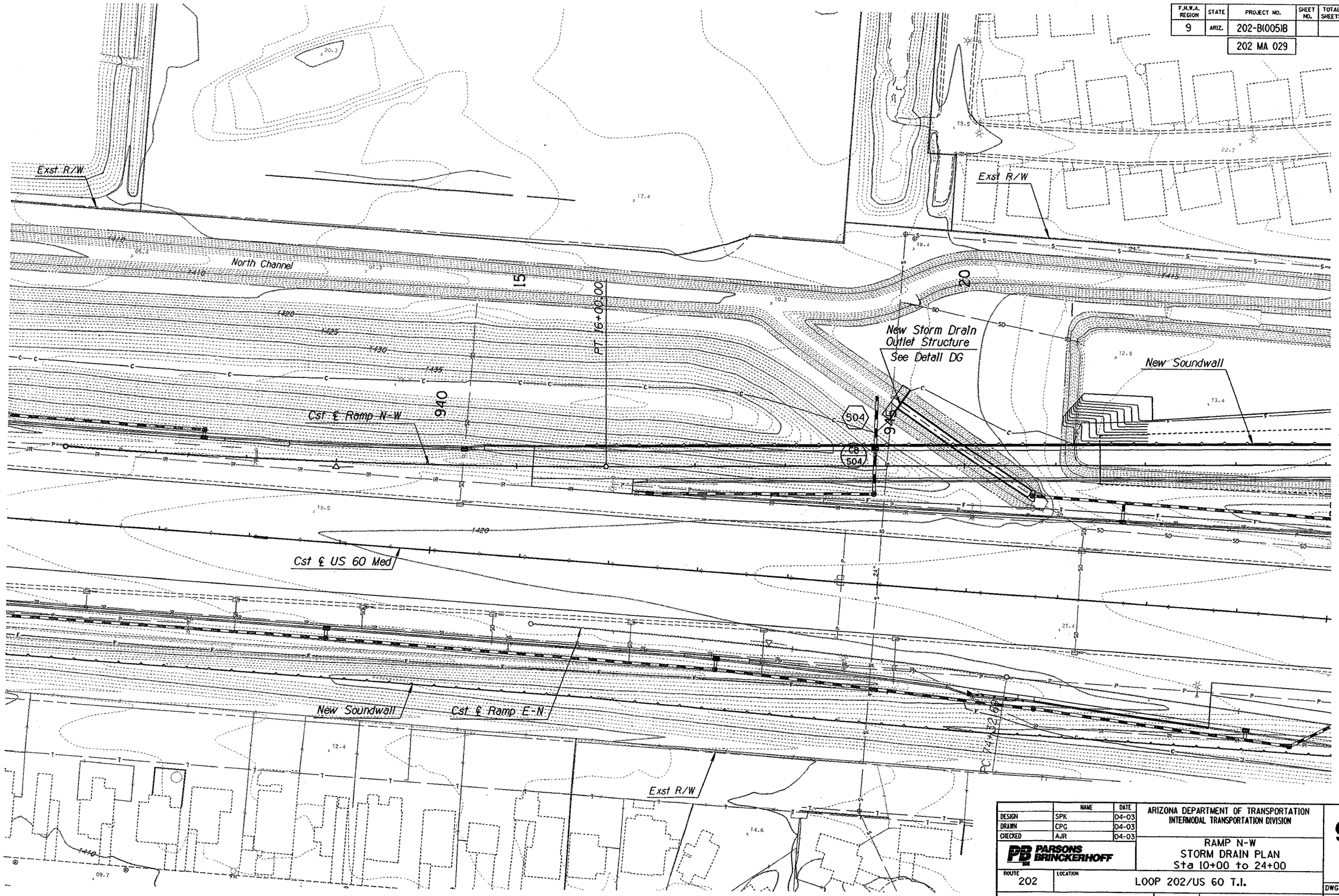


	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
STORM DRAIN PLAN
Sta 10+00 to 24+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

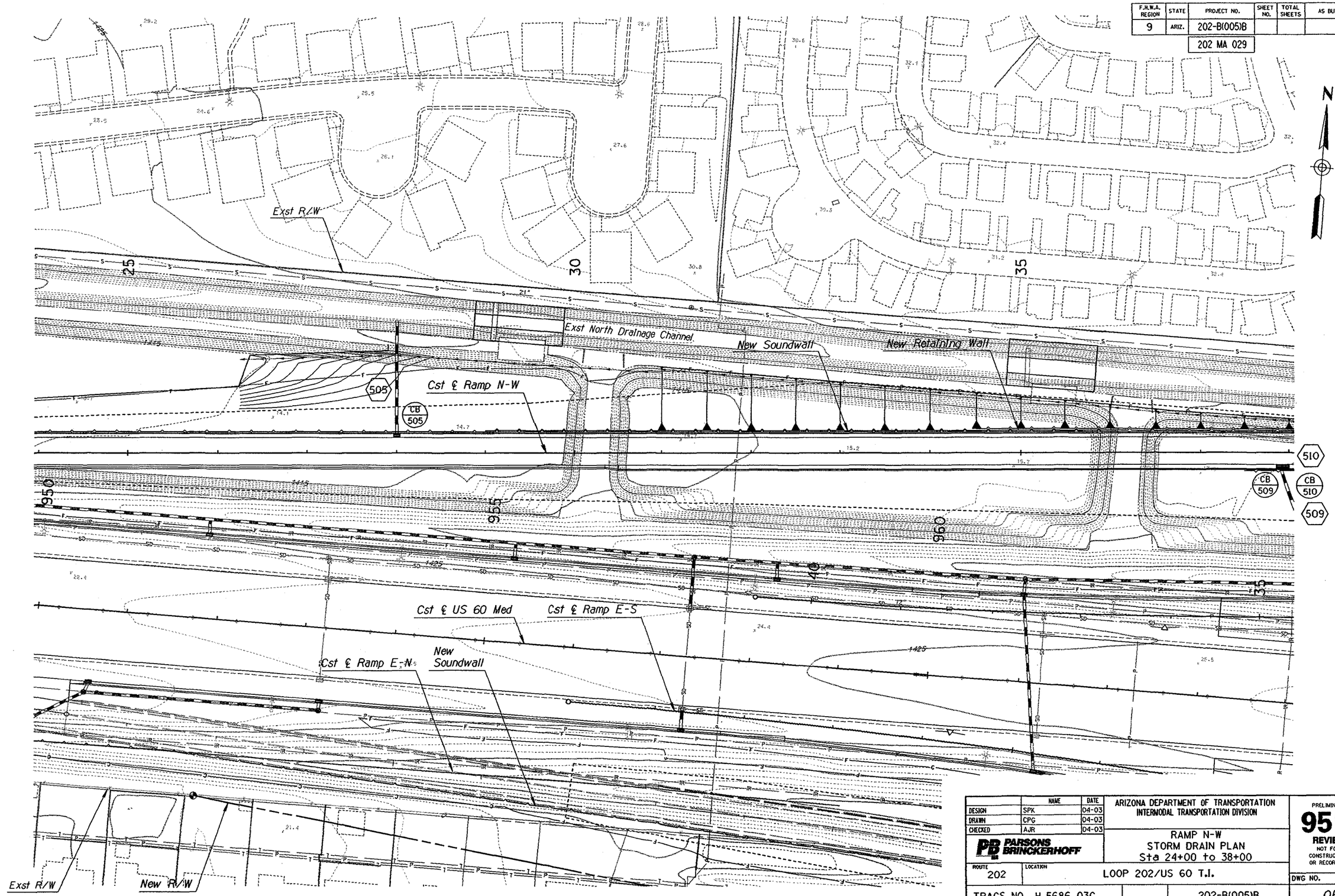
DWG NO. D-1.11

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:14:54 2003 H:\60_TI\phase_1\Drng\dp109.dgn

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



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DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
STORM DRAIN PLAN
Sta 24+00 to 38+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.12

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:15:20 2003 H:\60_TI\phase_I\Drng\dp110.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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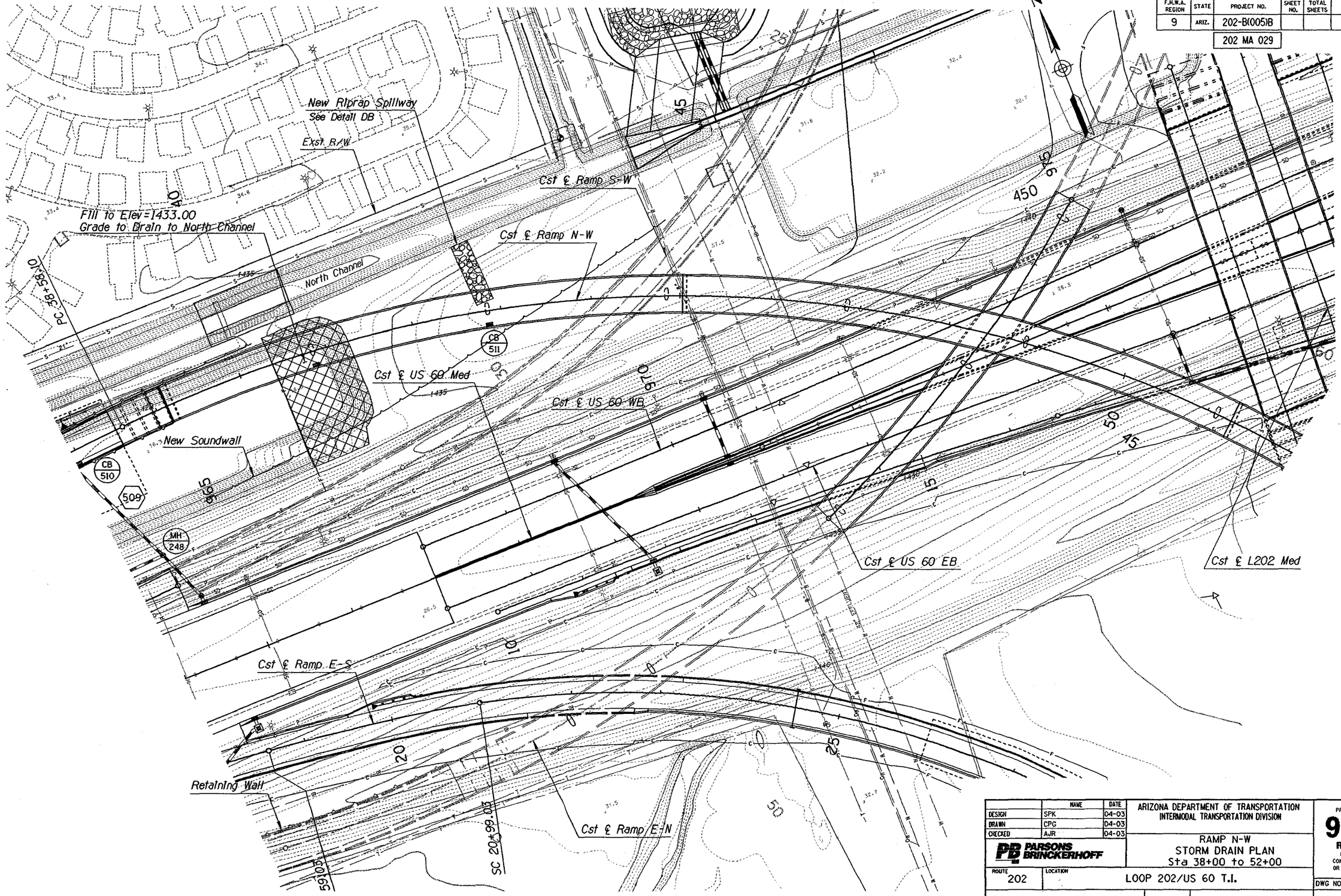
		202 MA 029			



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DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
STORM DRAIN PLAN
Sta 38+00 to 52+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

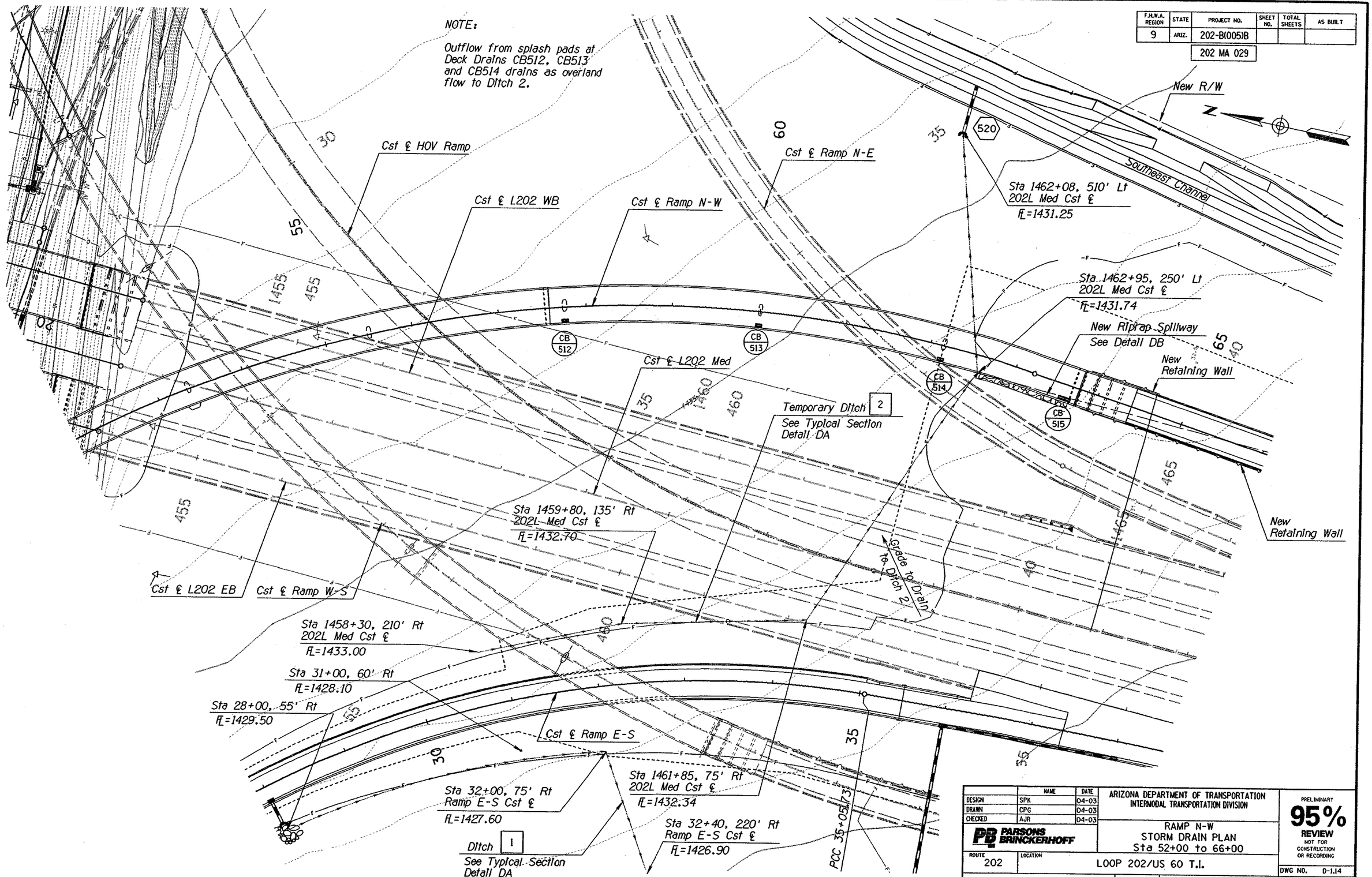
DWG NO. D-1.13

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:15:45 2003 H:\60_TI\phase_1\Drng\dp111.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
STORM DRAIN PLAN
Sta 52+00 to 66+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

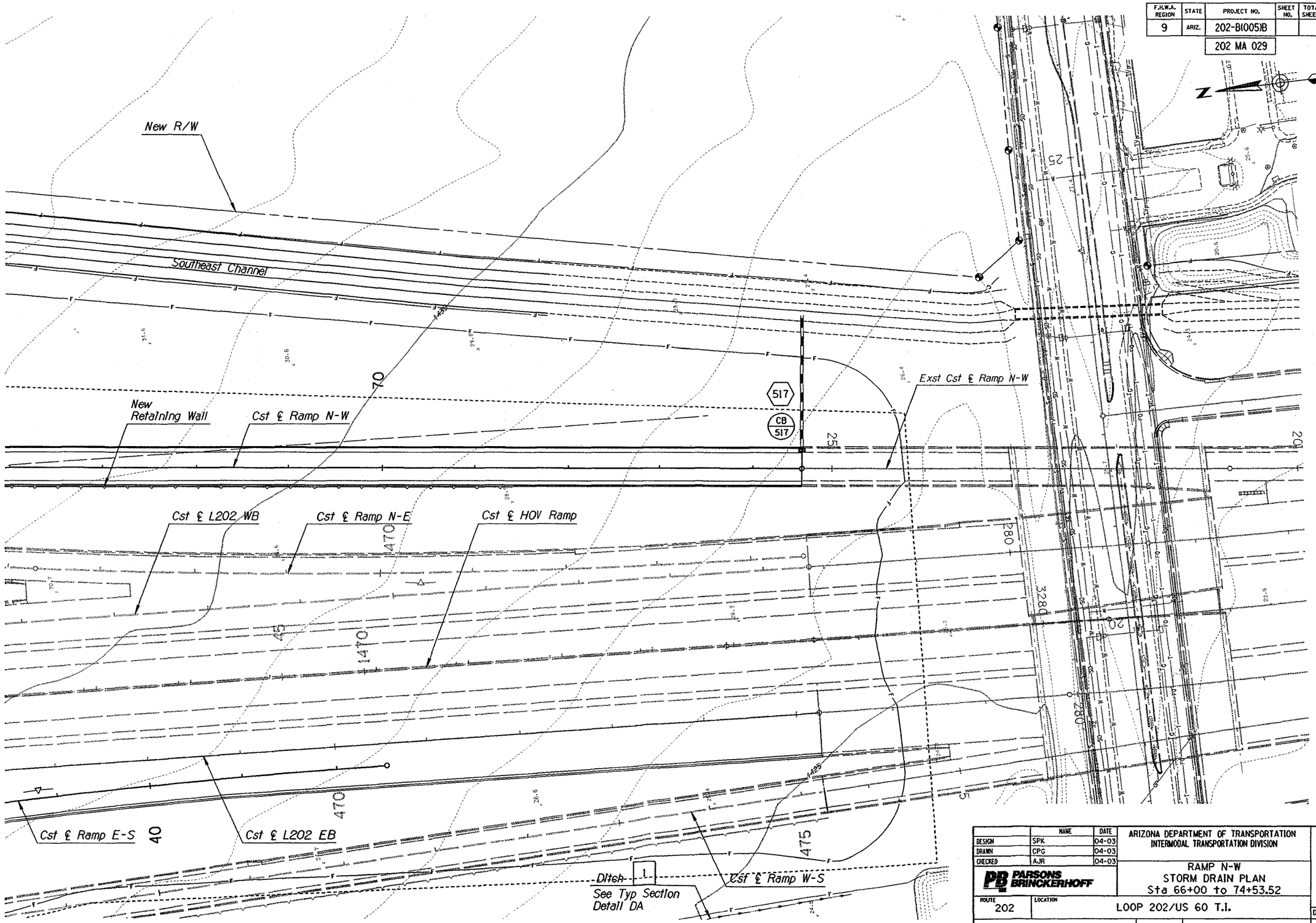
DWG NO. D-1.14

___ OF ___

Wed Apr 02 14:16:11 2003 H:\60_TI\phase_I\Drng\dp112.dgn

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP N-W
STORM DRAIN PLAN
Sta 66+00 to 74+53.52

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

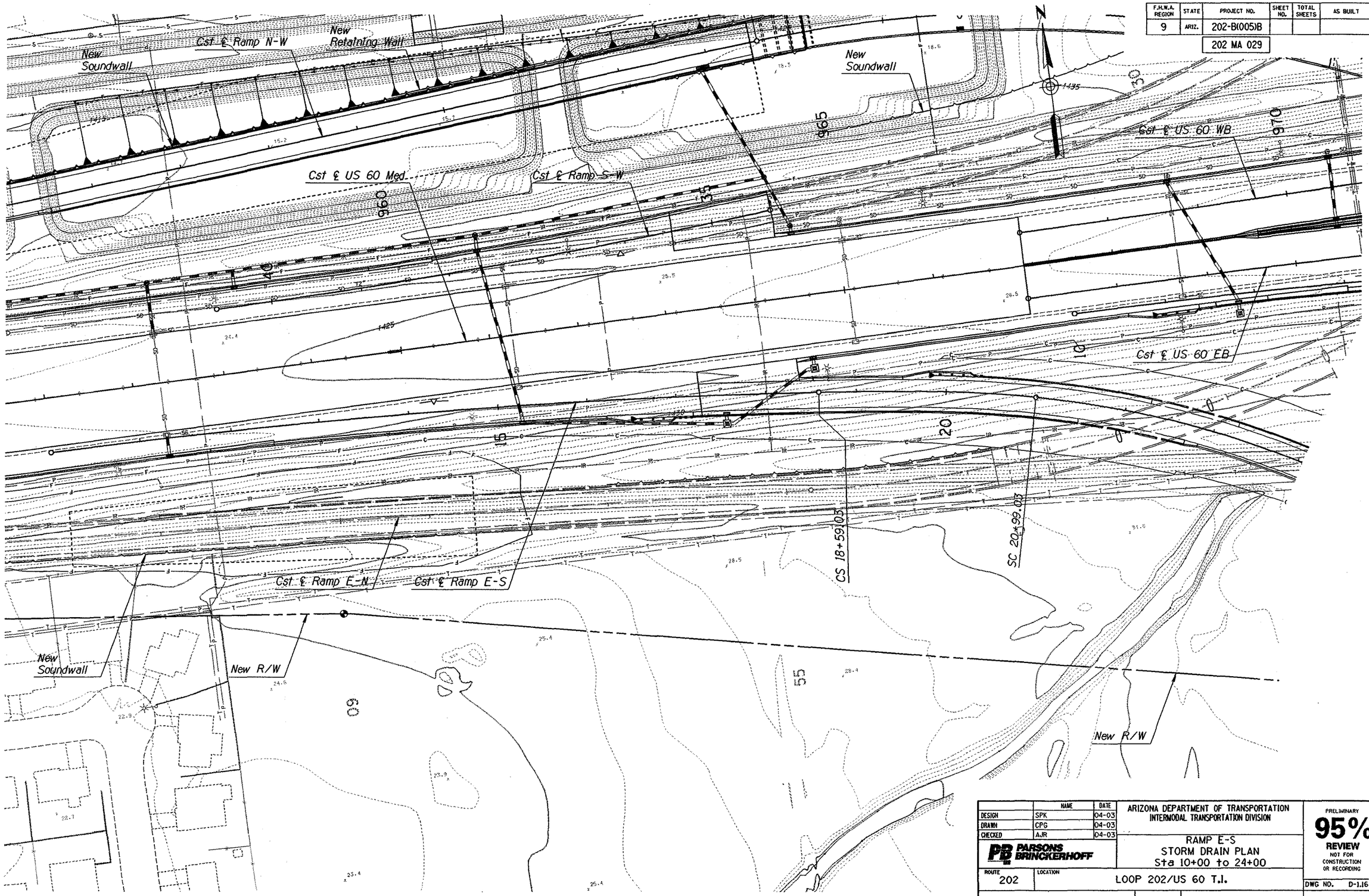
DWG NO. D-1.15

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

Wed Apr 02 14:16:37 2003 H:\60_TI\phase_1\Drng\dp113.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
STORM DRAIN PLAN
Sta 10+00 to 24+00

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

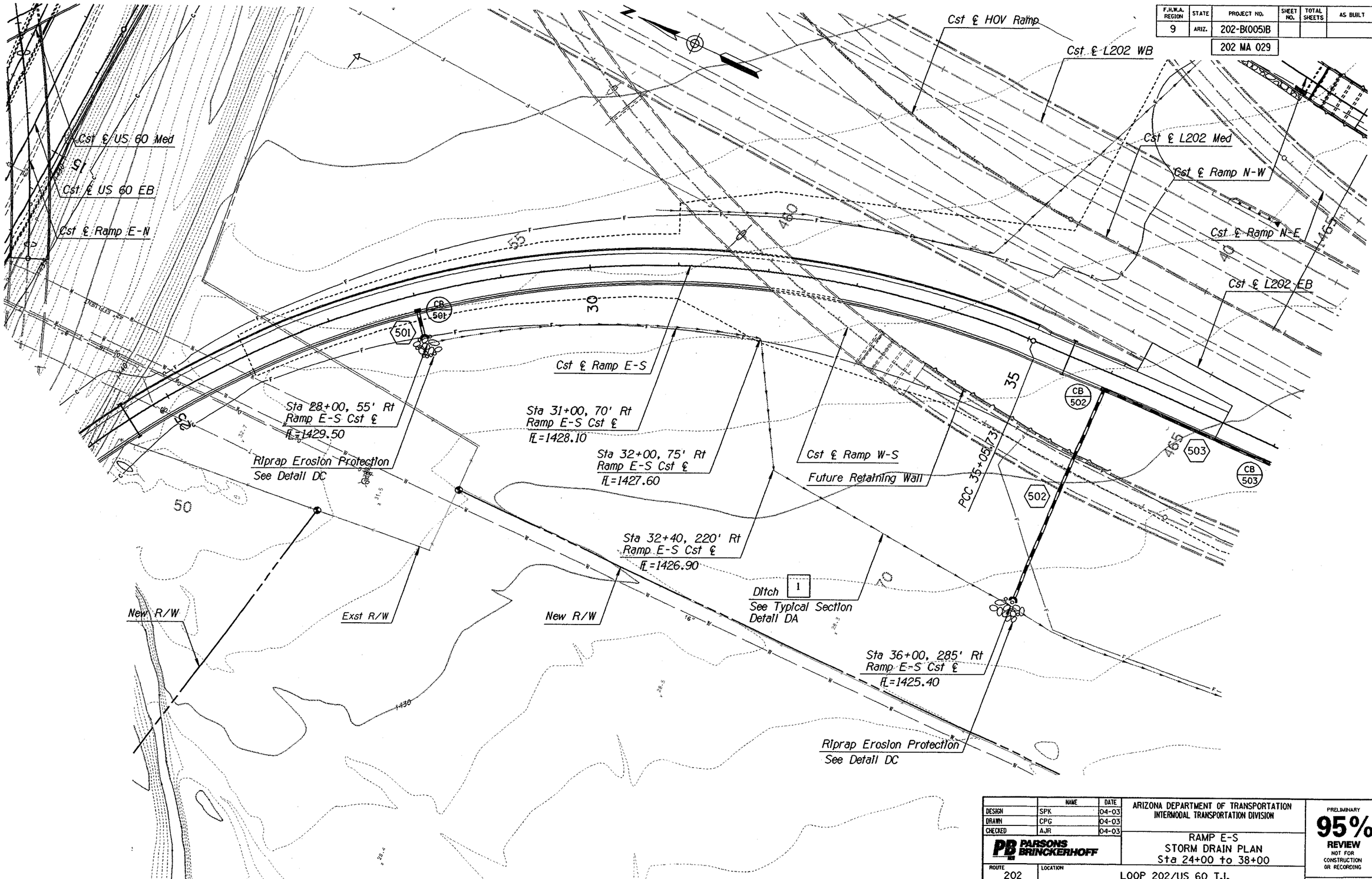
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.16

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:17:02 2003 H:\60_TI\phase_1\Drng\dp114.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
STORM DRAIN PLAN
Sta 24+00 to 38+00

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

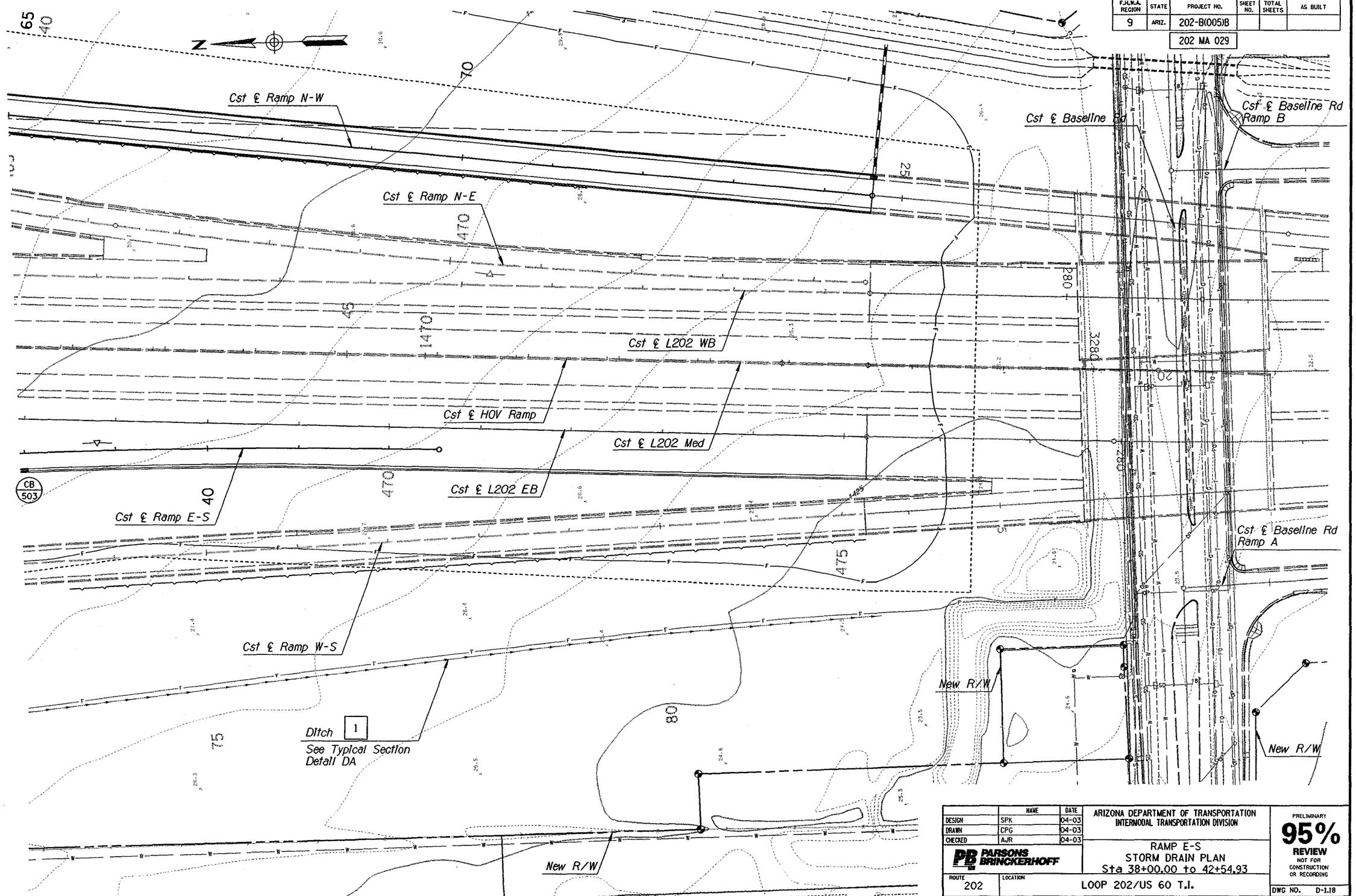
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.17

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:17:29 2003 H:\60_TI\phase_1\Drng\dp115.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	SPK	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP E-S
STORM DRAIN PLAN
Sta 38+00.00 to 42+54.93

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

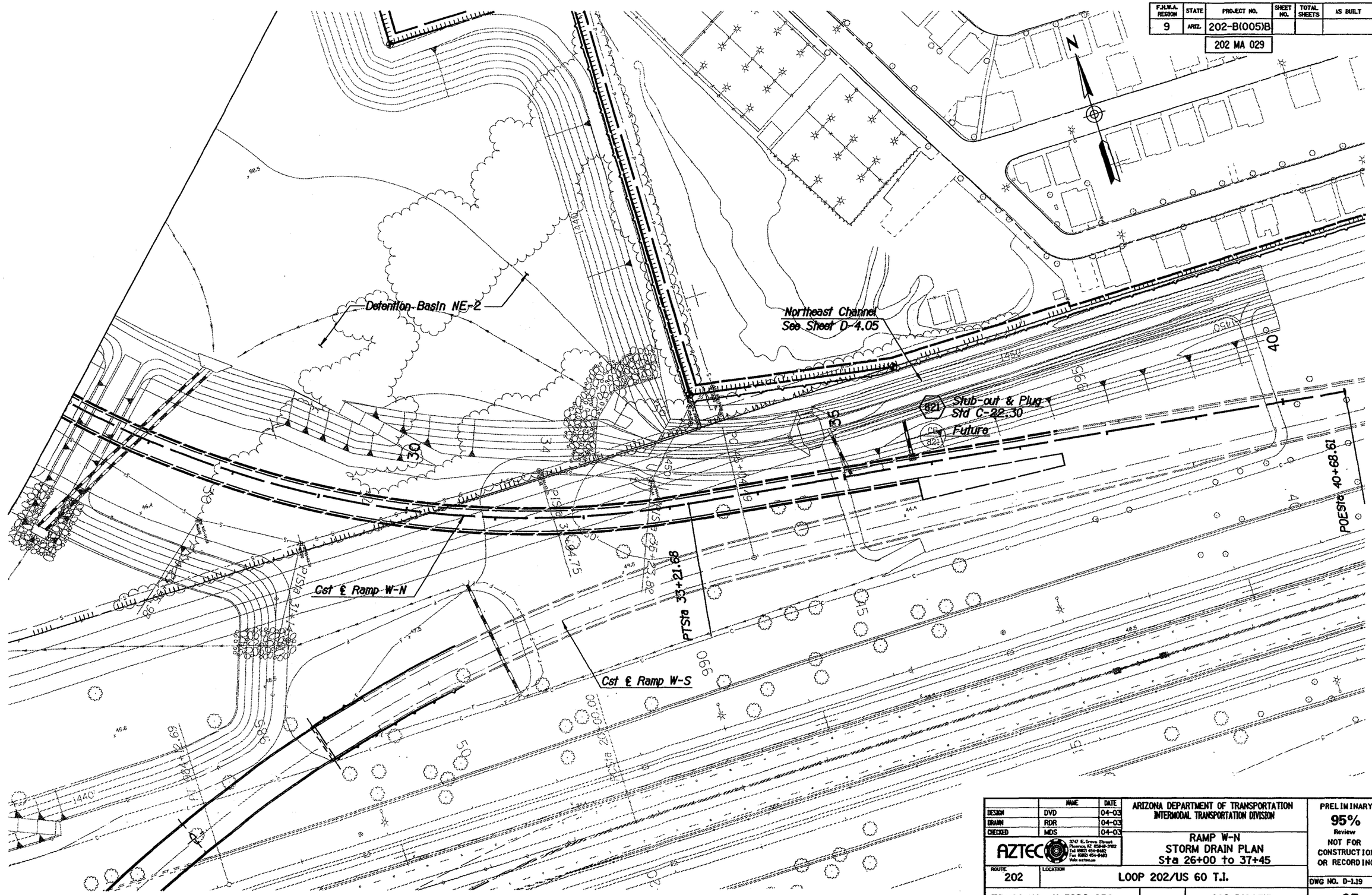
DWG NO. D-1.18

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:17:55 2003 H:\60_TI\phase_1\Drng\dp116.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



	NAME	DATE
DESIGN	DVD	04-03
DRAWN	RDR	04-03
CHECKED	MDS	04-03

AZTEC 3747 E. Grove Street Phoenix, AZ 85018-3162 Tel (602) 454-9482 Fax (602) 454-9483 Web: aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP W-N
STORM DRAIN PLAN
Sta 26+00 to 37+45

PRELIMINARY
95%
Review
NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

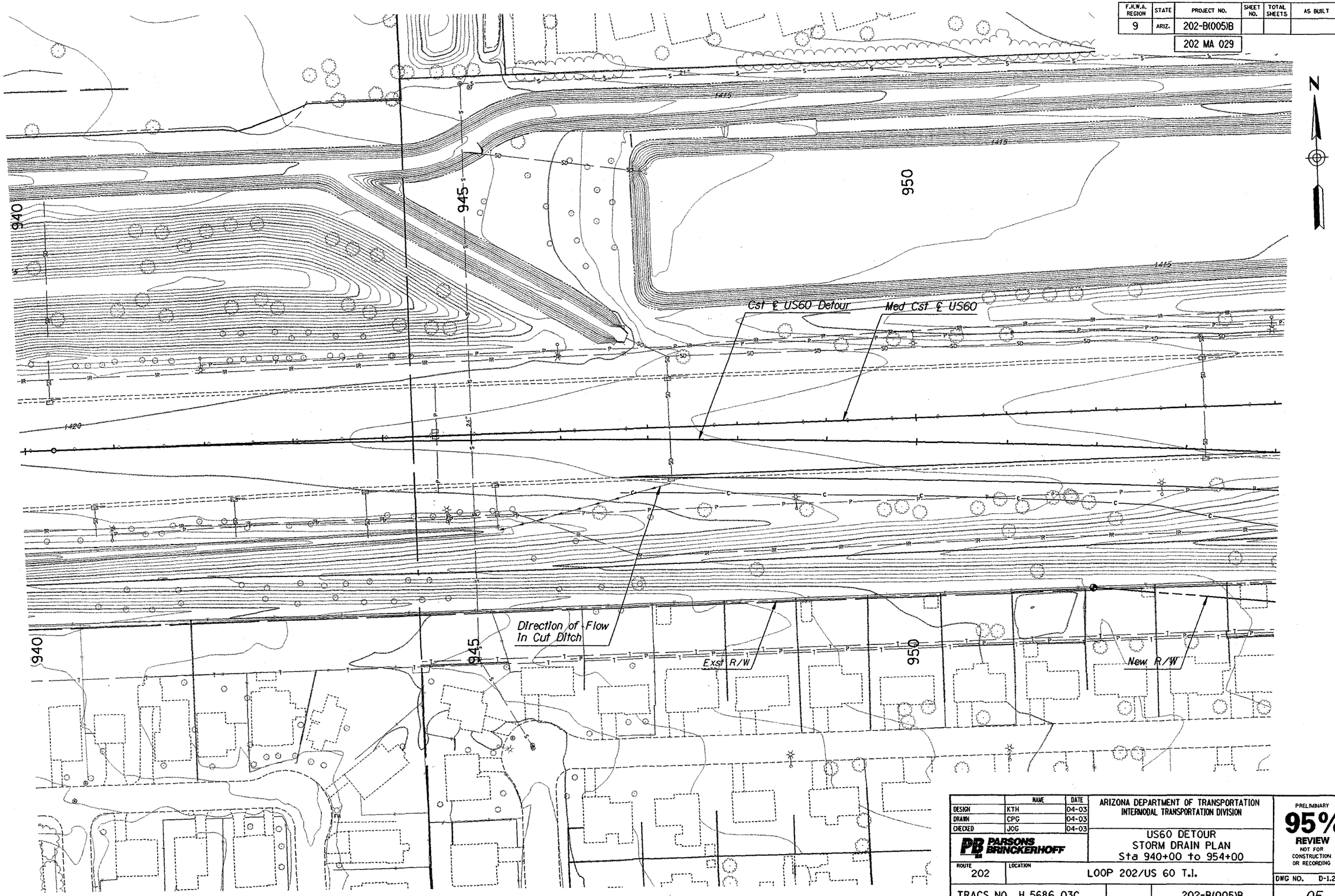
DWG NO. D-1.19

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

Plotted By: roons at 04:29:19 PM 04/02/2003 o:\pw_working\dms00816\AZ01107-01-DL-52.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US60 DETOUR
STORM DRAIN PLAN
Sta 940+00 to 954+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.20

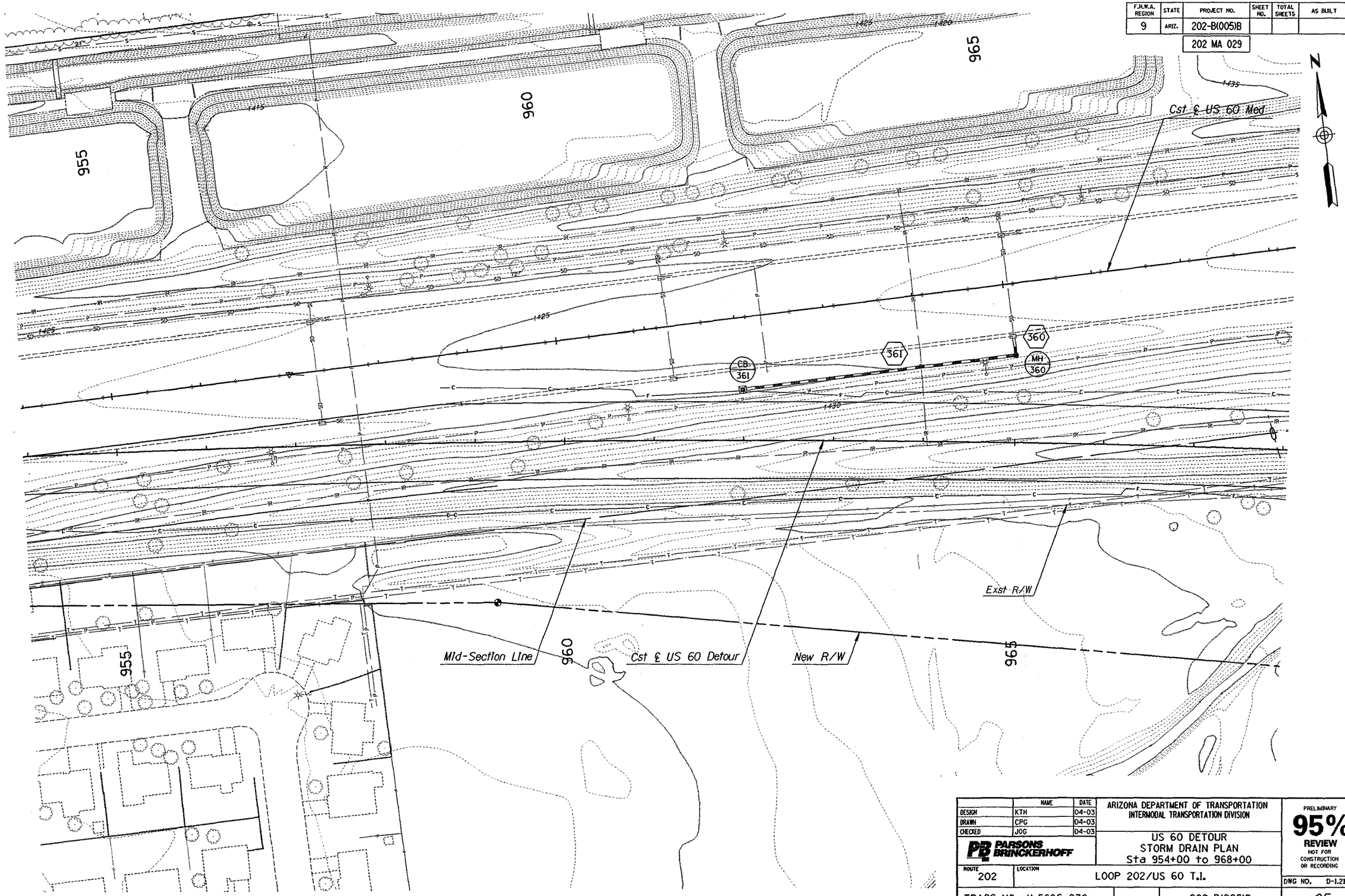
___ OF ___

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

Wed Apr 02 15:28:03 2003 H:\60_TI\phase_1\Detour\detdp101.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			

202 MA 029



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60 DETOUR
STORM DRAIN PLAN
Sta 954+00 to 968+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

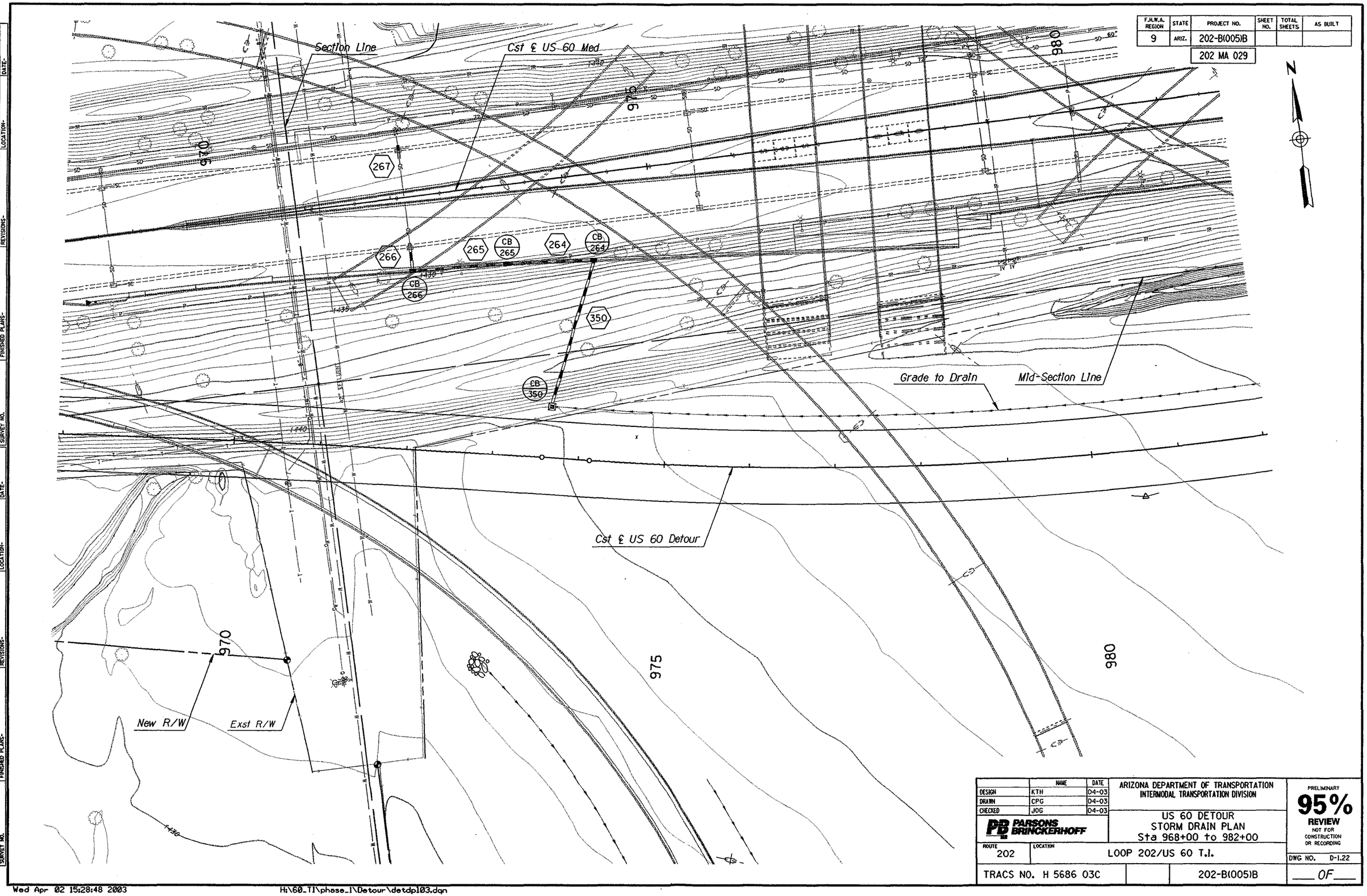
PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.21

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 15:28:26 2003 H:\60_TI\phase_1\Detour\detdpl02.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60 DETOUR
STORM DRAIN PLAN
Sta 968+00 to 982+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

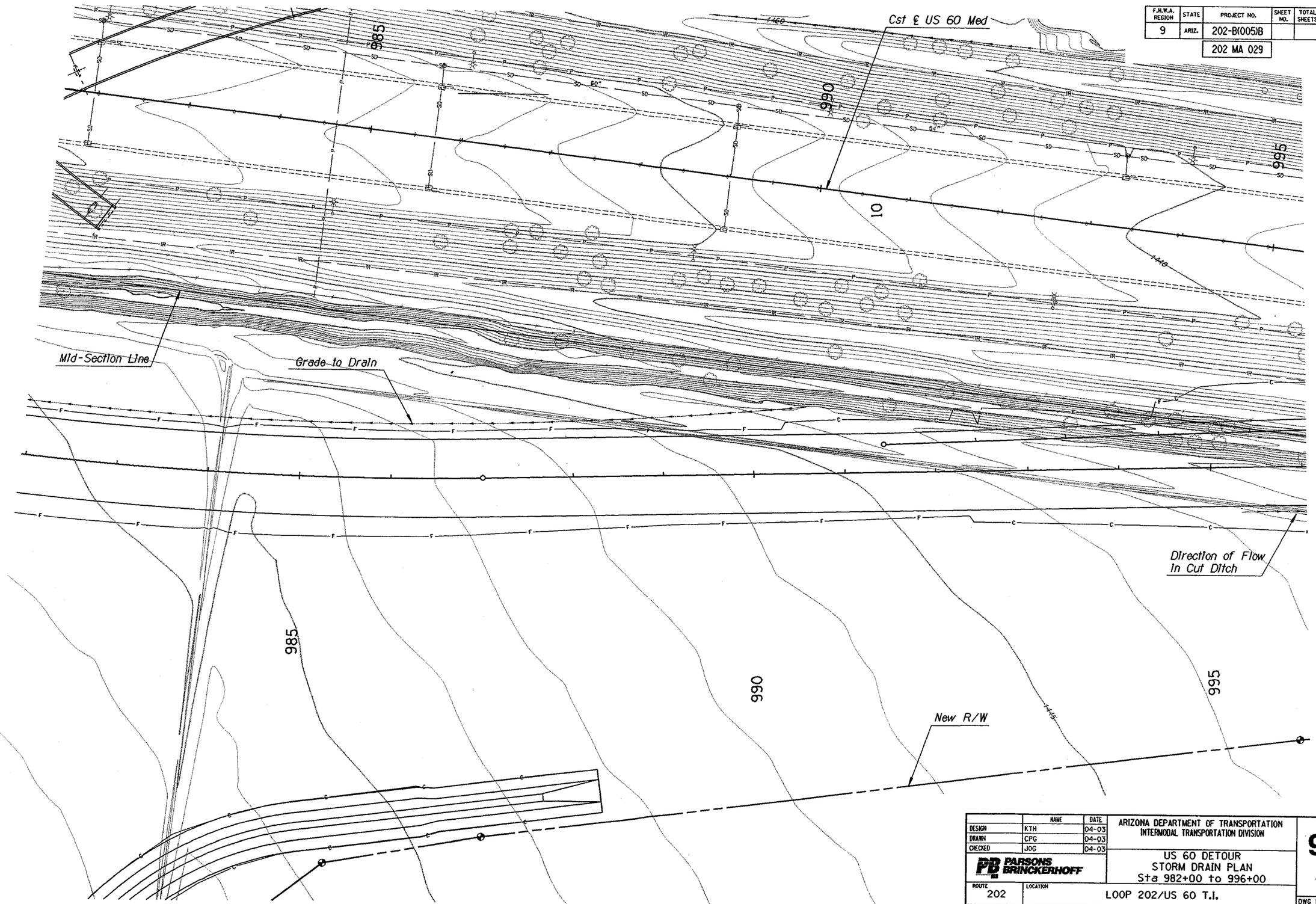
DWG NO. D-1.22

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

Wed Apr 02 15:28:48 2003 H:\60_TI\phase_1\Detour\detdp103.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60 DETOUR
STORM DRAIN PLAN
Sta 982+00 to 996+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.23

___ OF ___

Wed Apr 02 15:29:13 2003 H:\60_TI\phase_I\Detour\detdp104.dgn

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			

	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60 DETOUR
STORM DRAIN PLAN
Sta 996+00 to 1010+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 03C | 202-B(005)B

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

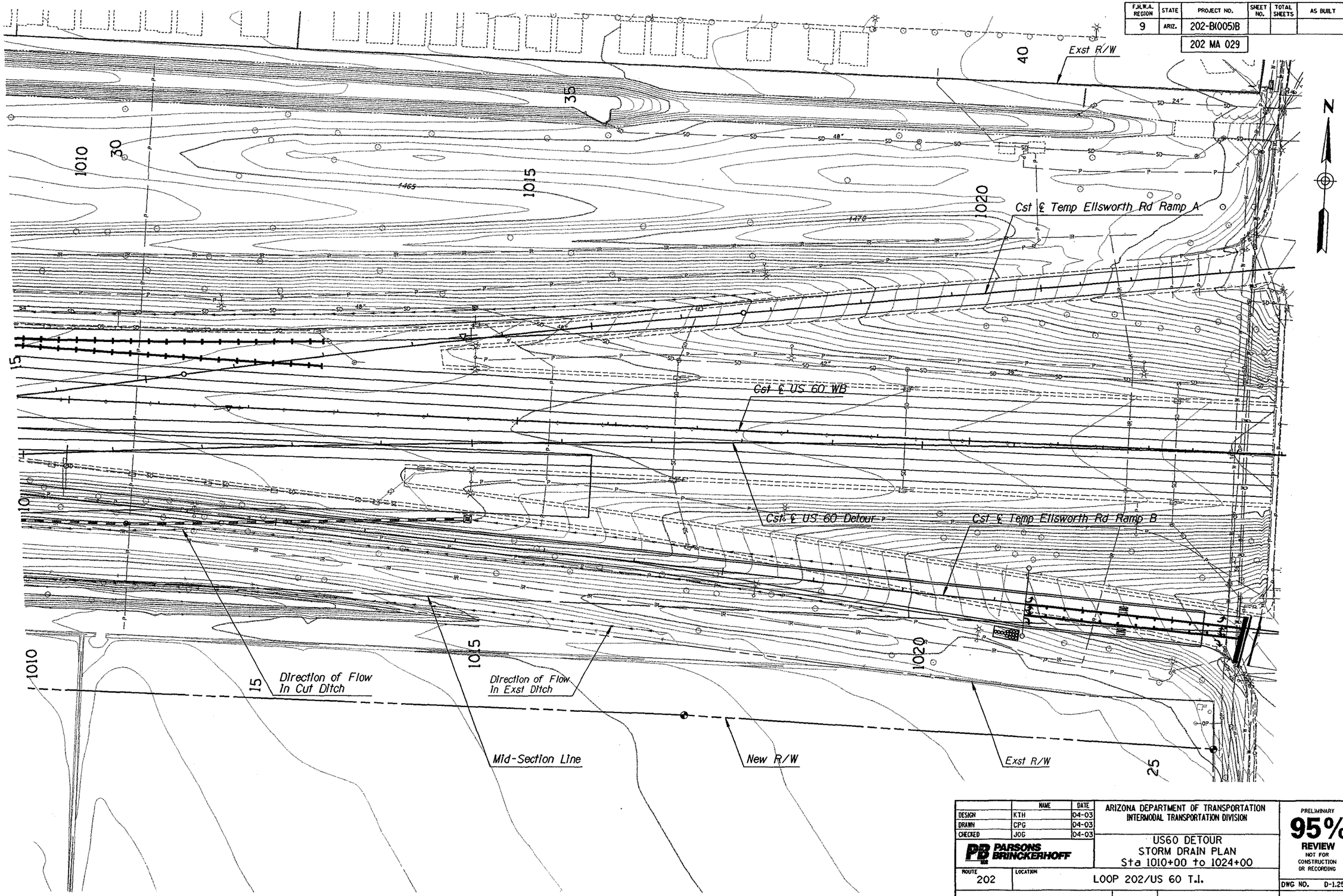
DWG NO. D-1.24

___ OF ___

Wed Apr 02 15:29:37 2003 H:\60_TI\phase_1\Detour\detdp105.dgn

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	JOG	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US60 DETOUR
STORM DRAIN PLAN
Sta 1010+00 to 1024+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

PRELIMINARY 95% REVIEW NOT FOR CONSTRUCTION OR RECORDING

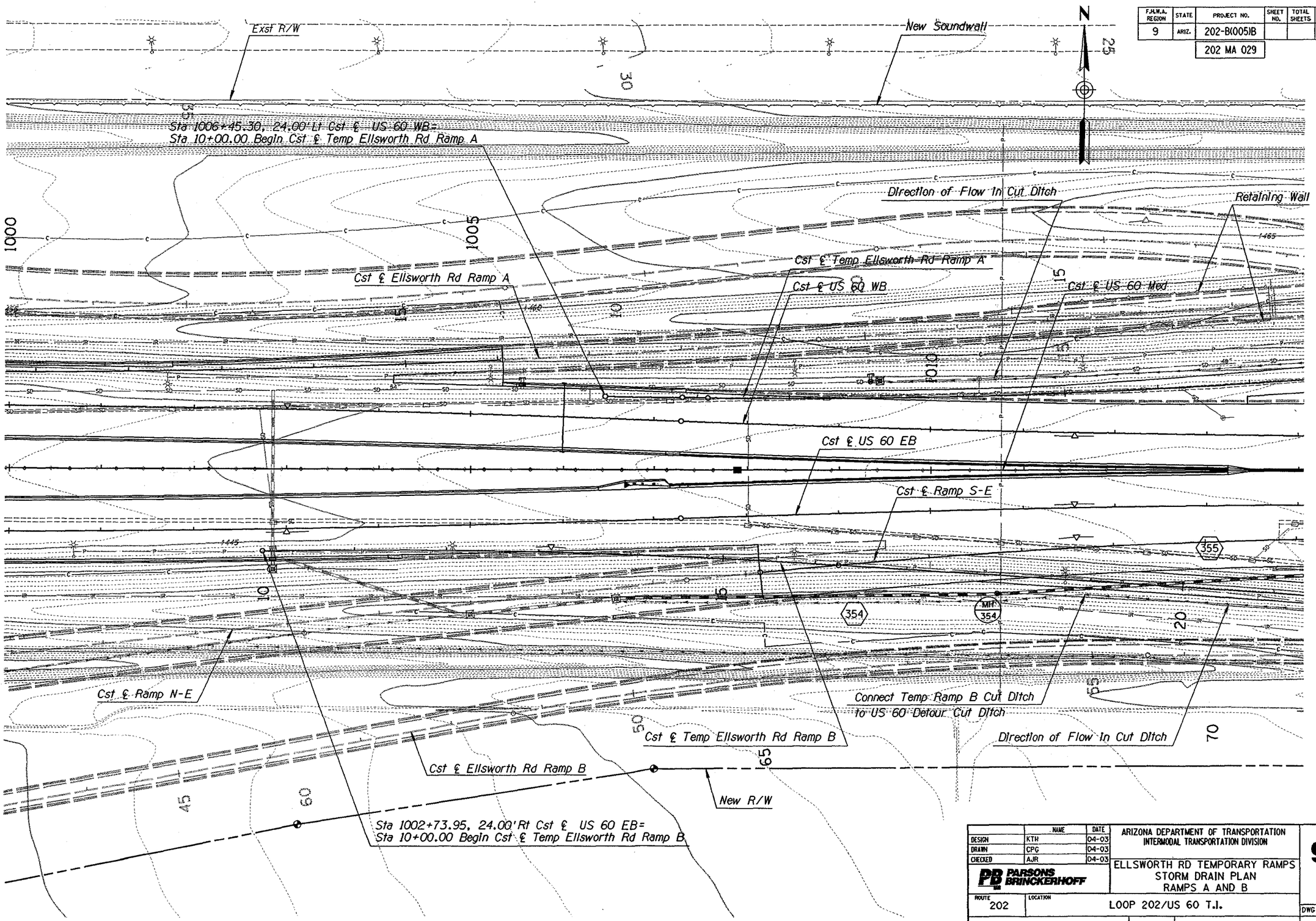
DWG NO. D-1.25

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

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

Wed Apr 02 15:30:01 2003 H:\60_TI\phase_I\Detour\detdp106.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

ELLSWORTH RD TEMPORARY RAMPS
STORM DRAIN PLAN
RAMPS A AND B

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

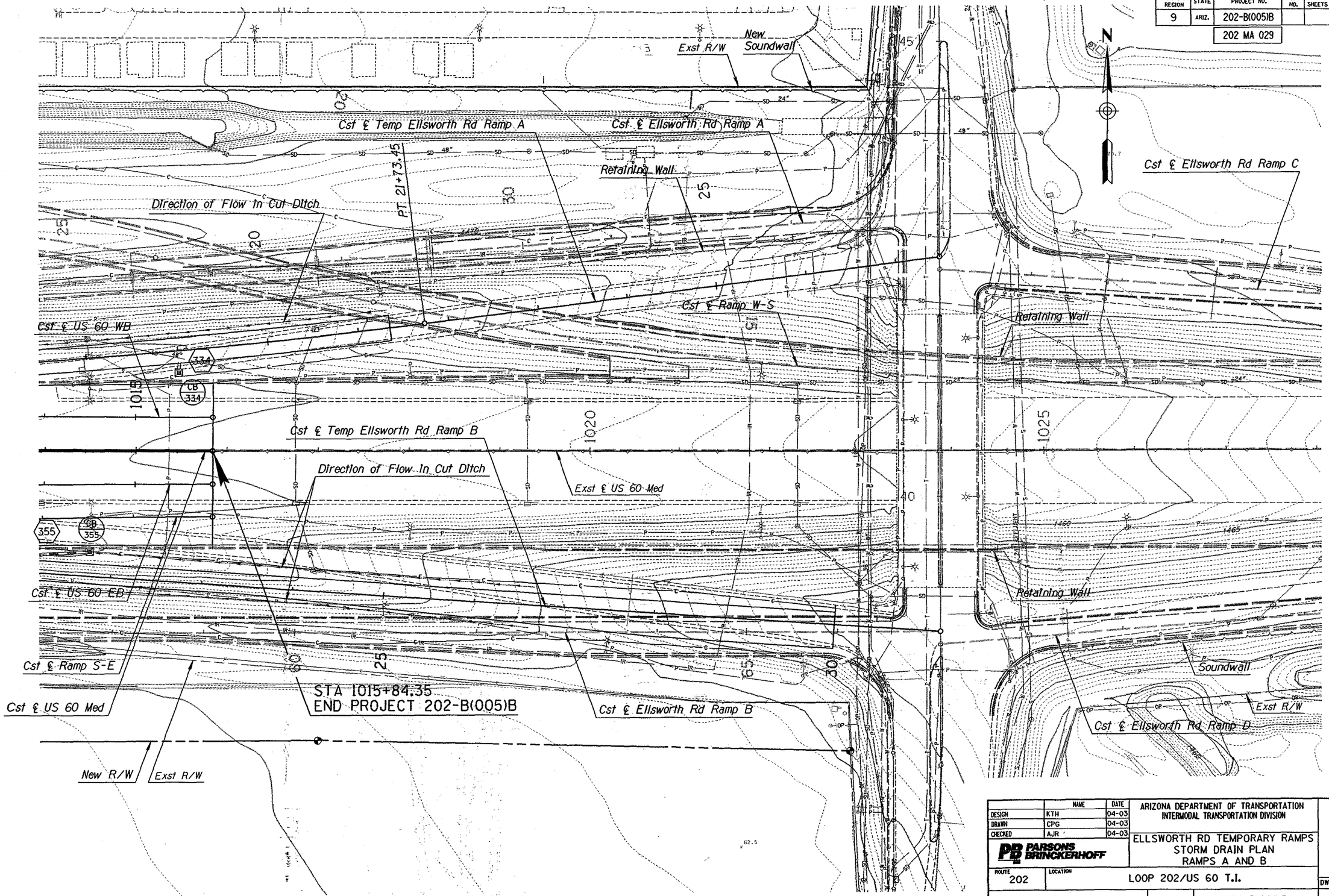
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.26

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:19:04 2003 H:\60_TI\phase_I\Drng\dp119.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(005)B			
		202 MA 029			



	NAME	DATE
DESIGN	KTH	04-03
DRAWN	CPG	04-03
CHECKED	AJR	04-03

PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

ELLSWORTH RD TEMPORARY RAMPS
STORM DRAIN PLAN
RAMPS A AND B

ROUTE 202 | LOCATION: LOOP 202/US 60 T.I.

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-1.27

TRACS NO. H 5686 03C | 202-B(005)B | ___ OF ___

Wed Apr 02 14:19:30 2003 H:\60_TI\phase_I\Drng\dp120.dgn