# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

# BULLARD WASH OUTFALL FEASIBILITY STUDY (FCD 94-06)

# DESIGN CONCEPT REPORT FOR CHOSEN ALTERNATIVES

PREPARED FOR

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

PREPARED BY

STANLEY CONSULTANTS, INC.
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Phoenix, Arizona 85016
912-6500

PREPARED OCTOBER 1994
SCI #12278

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Note: Exhibits 1, 2 and 3 are included as full size exhibits in pocket Appendix A.

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1. Computer Diskette Containing HEC-1 and HEC-2 Input Models
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Revised White Tanks/Agua Fria ADMS HEC-1 Hydrology

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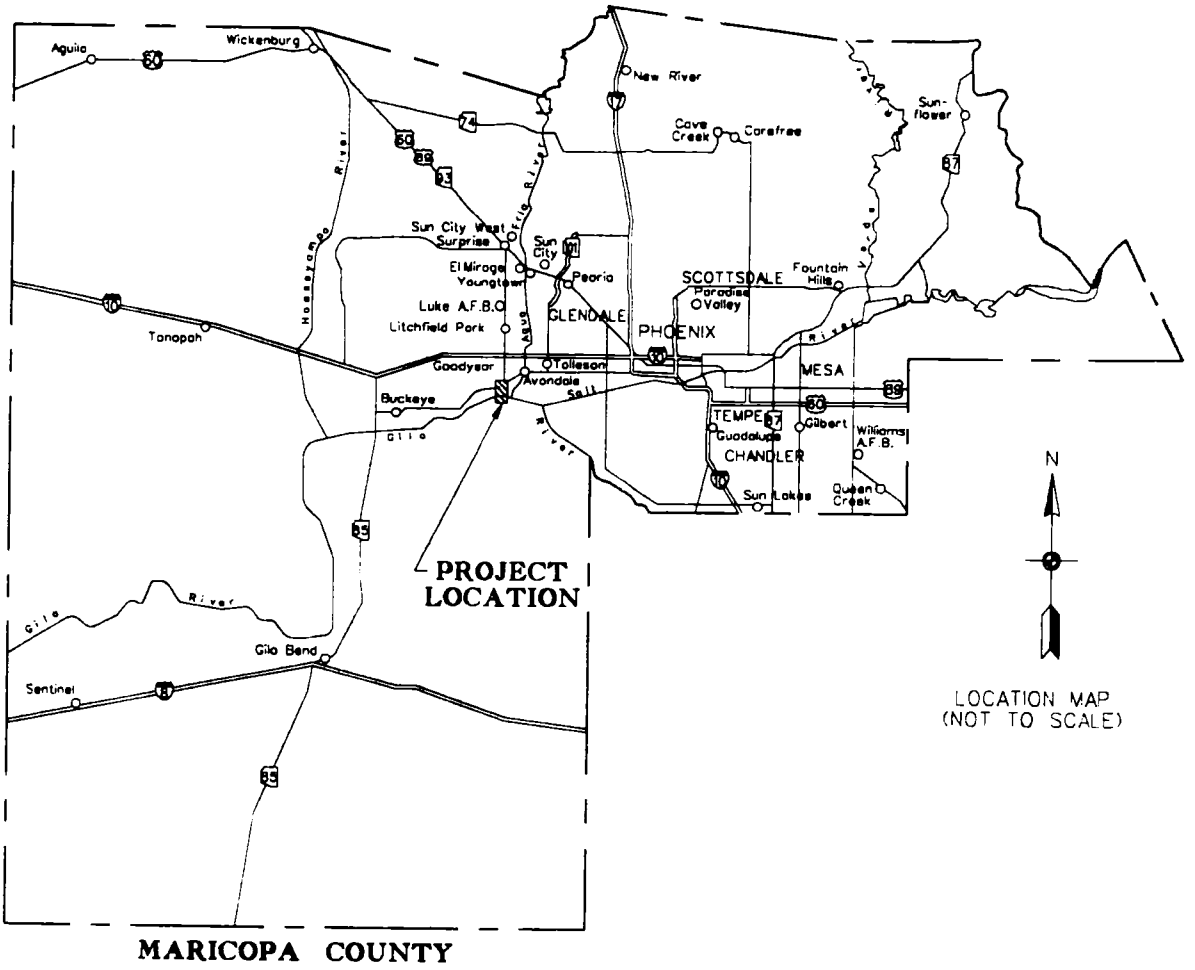
## INTRODUCTION

This design concept report (DCR) has been prepared for the Flood Control District of Maricopa County (District) under contract FCD 94-06 by Stanley Consultants Inc. (SCI). Stanley Consultants is the prime consultant for this project responsible for data collection, survey, hydrology, existing and future condition floodplain hydraulics, development of alternatives, overall coordination, reports and deliverables. Stanley Consultants has enlisted the help of sub-consultant Wood/Patel Associates to address hydraulics and sediment transport/scour analysis of proposed alternatives.

The Bullard Wash Outfall Feasibility Study evaluates preliminary alternatives to alleviate the flooding problems near the downstream end of Bullard Wash. Bullard Wash is located west of metropolitan Phoenix extending from U.S. 60 through Luke Airforce Base to the Gila River along the east side of Estrella Parkway (formerly Reems Road). The study area lies between Sarival Road on the west, Bullard Avenue on the East, Yuma Road on the north and the Gila River on the south. Figures 1 and 2 on the following pages indicate the location and vicinity of this project. This report serves as the Chosen Alternatives submittal according to the contracted Scope of Work dated April 11, 1994.

The study area lies entirely within the incorporated limits of the City of Goodyear. There are major transportation facilities located within the study area involving the jurisdictions of the Maricopa County Department of Transportation (MC 85), the City of Phoenix (Phoenix-Goodyear Municipal Airport), the Southern Pacific Transportation Company (Southern Pacific Railroad) as well as the local roadways within the City of Goodyear right-of-way. The study area also includes jurisdictions of the Buckeye Irrigation District and the Roosevelt Irrigation District. There are also numerous major utilities within the study area.

# BULLARD WASH OUTFALL FEASIBILITY STUDY
# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
# (FCD 94-06)

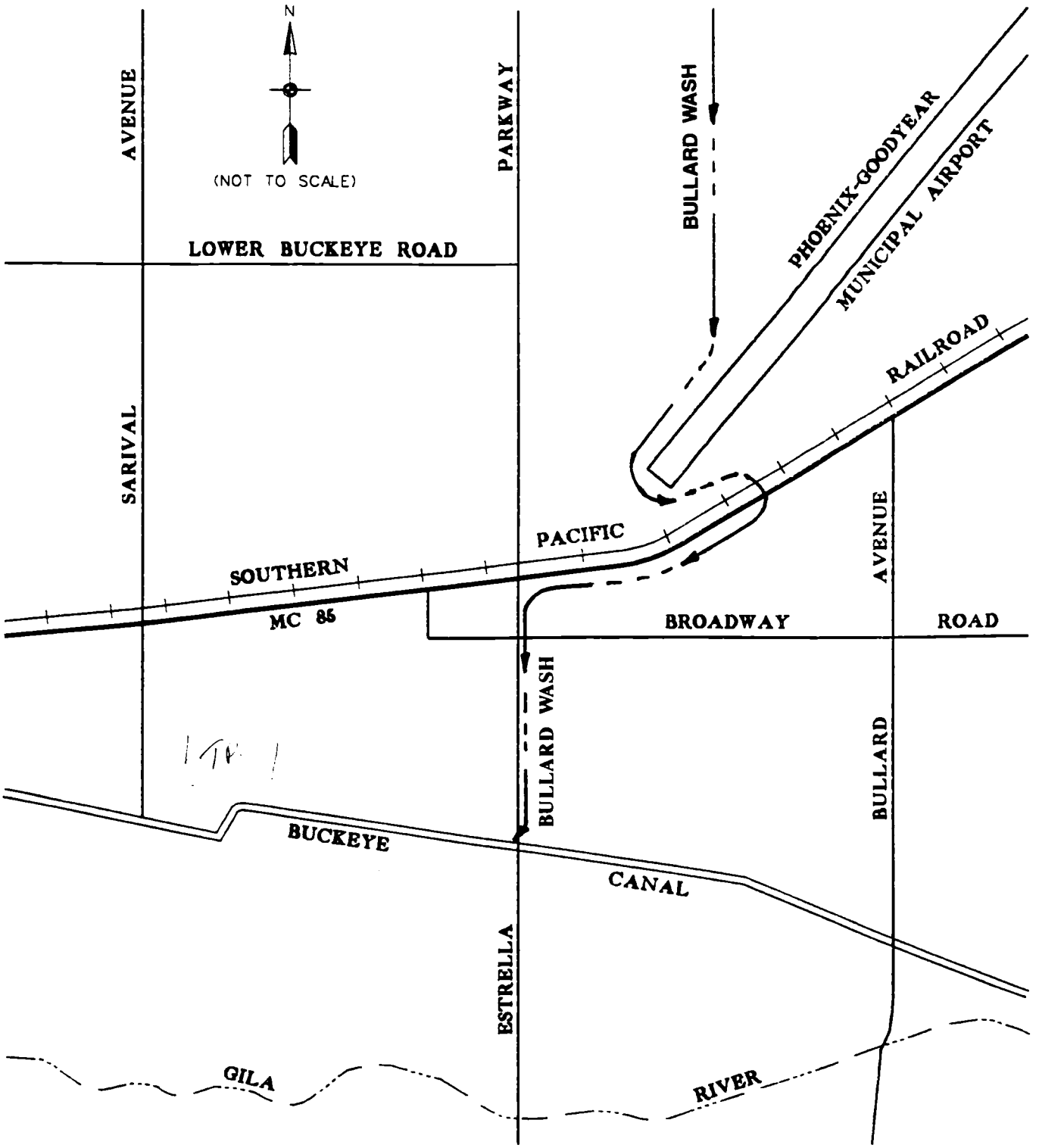



MARICOPA COUNTY

## MARICOPA COUNTY
## LOCATION MAP

FIGURE 1

# BULLARD WASH OUTFALL FEASIBILITY STUDY
# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
# (FCD 94-06)




VICINITY MAP

FIGURE 2

## PURPOSE AND SCOPE

The purpose of this design concept report is to analyze the existing drainage conditions and identify potential improvement alternatives to reduce or eliminate the flooding problems in the study area. Subsequent reports will incorporate the findings of this report, responses from public meetings, comments and direction from the District, and further design analysis of the alternatives.

The Bullard Wash channel essentially ends near the Maricopa County Highway Route 85 (MC85) - Estrella Parkway intersection forcing the wash flows to spread out and sheet flow across the adjacent and downstream agricultural fields. The White Tanks/Agua Fria Area Master Drainage Study (ADMS), conducted by the WLB Group for the District in October 1992, identified the study area as being subject to considerable flood hazards including the potential flooding of the MC85 - Estrella Parkway intersection, the Buckeye Irrigation District (BID) canal, and the City of Goodyear Wastewater Treatment Facility. The ADMS HEC-1 hydrology model and HEC-2 backwater model have been provided to SCI for use in evaluating the feasibility and design of proposed improvements.

This report contains the components and details of the potential alternatives necessary to select which alternatives should be developed further. The technical analysis has been conducted on a conceptual level at this stage of the study process. Other considerations such as utility conflicts, land ownership, rights-of-entry, relative cost comparisons, existing right-of-way, and the feasibility of alignment locations have also been incorporated into the evaluation of each potential alternative.

The following sections contain information related to the existing conditions, the White Tanks/Agua Fria ADMS hydrologic and hydraulic review, the evaluation of each potential alternative, relative cost comparisons of the alternatives, and the conclusion.

## EXISTING STUDY AREA AND DRAINAGE CONDITIONS

The study area consists primarily of industrial and agricultural land use. In the northern portion of the study area, north of the railroad and MC85, there are agricultural fields and a metals reclamation facility on the west side of the wash, and the Phoenix-Goodyear Municipal Airport on the east side of the wash. Located within the airport property is an existing Superfund Site. The extent, location and nature of clean-up facilities are not known at this time. However, it has been noted that much of the airport property is covered by the Superfund Site jurisdiction. Review comments and guidelines provided by the Environmental Protection Agency (EPA) will be accepted and considered in the next phase of this study.

Bullard Wash crosses both the Southern Pacific Railroad and MC85. Coordination with both the Southern Pacific Transportation Company and the Maricopa County Department of Transportation (MCDOT) is required throughout this study. The existing wash flows under the railroad and MC85 at two locations. The 100-year discharge will overtop both the railroad and highway for a length of approximately 1500 feet. MCDOT is currently planning two roadway improvement projects for MC85. First, the existing bridge located at the eastern wash crossing was to be replaced with a new bridge in order to meet current highway design standards. Second, MCDOT plans to raise the Estrella Parkway - MC85 intersection to improve existing sight conditions and general intersection driveability as well. The proposed bridge was designed for a flow rate of 4900 cfs which is the current ADMS flow rate. It would be placed at the existing bridge location. The bridge plans are currently on hold for the results developed from this study. The proposed intersection will be raised approximately 2 feet to an elevation just below the existing railroad. The vertical curves resulting from the intersection improvement will extend in all directions raising the roadway profiles which will directly affect the existing drainage conditions. Preliminary plans indicate that the roadway improvements for the eastern leg of the intersection will extend approximately 2000 feet to the east

towards Bullard Wash. Both of MCDOT's projects affect and will be affected by the outcome of this study.

South of MC85, the land use is primarily agriculture with several residential parcels and the City of Goodyear Wastewater Treatment Facility located west of Estrella Parkway and just north of the BID canal. Local drainage approaches the study area from the east and the north. Due to the agricultural nature of the area, extensive irrigation systems exist. The irrigation systems will require special consideration in order to maintain the existing irrigation flow as much as possible.

The BID canal conveys flows east to west through the study area. The canal ranges in width from about 30 feet to 40 feet. The normal operating discharge is on the order of 325 cfs. Flow depths are estimated to be between 3 feet and 5 feet. The canal flows under an existing bridge at Estrella Parkway. Several pipes have been supported from the bridge girders and cross the canal above the existing water surface. One of the pipes is a 42 inch diameter corrugated metal pipe which is used to convey irrigation tailwater and minor Bullard Wash flows arriving from the roadside ditch along the east side of Estrella Parkway.

South of the BID canal, the Bullard Wash flows enter the Gila River. Gila River floodplain and Corps 404 Waters of the U.S. Jurisdictional limits exist south of the canal. Consideration of both limits is incorporated into this study.

Bullard Wash essentially flows north to south through the study area. The wash experiences several unique flow conditions within the study area. As Bullard Wash enters the study area, it is forced to make several severe turns, it experiences divided flow, it approaches two sets of railroad/highway culverts/bridges which are significantly filled with sediment. Existing discharge to the Gila River is contained within defined conveyances only for very minor flows.

The ADMS delineation of Bullard Wash upstream of the airport indicates relatively contained flow with an existing 100-year floodplain approximately 1000 feet wide. The airport runway appears to encroach into Bullard Wash forcing it to make several severe bends prior to the Southern Pacific Railroad and MC85 crossings. The existing wash alignment forms an "S" curve with four approximately 90 degree bends to meander around the runway, through the existing railroad and MC85 structures, and along the south side of MC85. The channel capacity of this reach is significantly less than the estimated 100-year discharge from the ADMS. Therefore, out of bank flows are experienced on the north side of the railroad and MC85.

There are two crossings of both the railroad and MC85, a low flow culvert crossing and a main channel bridge crossing. The low flow structure is west of the main channel structure. A low flow channel conveys irrigation tailwater flows directly south through the low flow structures to the confluence of the low flow and main channels. The main channel conveys Bullard Wash flows in excess of the capacity of the low flow channel. This channel navigates the 90 degree bends mentioned previously, then passes through the bridge crossings at the railroad and MC85. The existing structures do not provide the capacity to pass the 100-year peak discharge and therefore restrict flows which forces the overtopping of the railroad and MC85 near the MC85 - Estrella Parkway intersection.

Significant sediment deposition has taken place upstream of the railroad and MC85 bridge structures. The structures appear to be approximately 70 percent filled with sediment. As the structures have become filled with sediment, flow is restricted further and the amount of flow potentially overtopping the railroad and MC85 has increased. The sediment deposition problem most likely occurs from the alteration of the flow path resulting in a flatter slope and corresponding lower flow velocities.

Downstream of MC85, near the intersection with Estrella Parkway, the Bullard Wash channel essentially ends. A portion of the flow will pass to the south after being impounded by a concrete retaining wall or check dam on the east side of Estrella Parkway. The wall has a trapezoidal notch on the south end which directs flow south along Estrella Parkway in a roadside ditch. This roadside ditch has very minor capacity and the Estrella Roadway is frequently flooded by minor flows. This is significant because Estrella Parkway is one of two major access routes to the existing Estrella Ranch residential community south of the Gila River. The majority of the 100-year flow sheets across Estrella Parkway and continues southwest towards the City of Goodyear Wastewater Treatment Facility. There are no major defined flow paths for the flows which cross the intersection.

Flows that reach the BID canal breach the north bank and are conveyed west down the canal until the capacity of the canal is exceeded and the flows break out over the south canal bank and into the Gila River. As mentioned previously, there is only a single 42" diameter CMP to convey low flows over the BID canal. Runoff which exceeds the 42" CMP capacity flows directly into the canal damaging the north bank and maintenance road and depositing silt and debris in the canal.

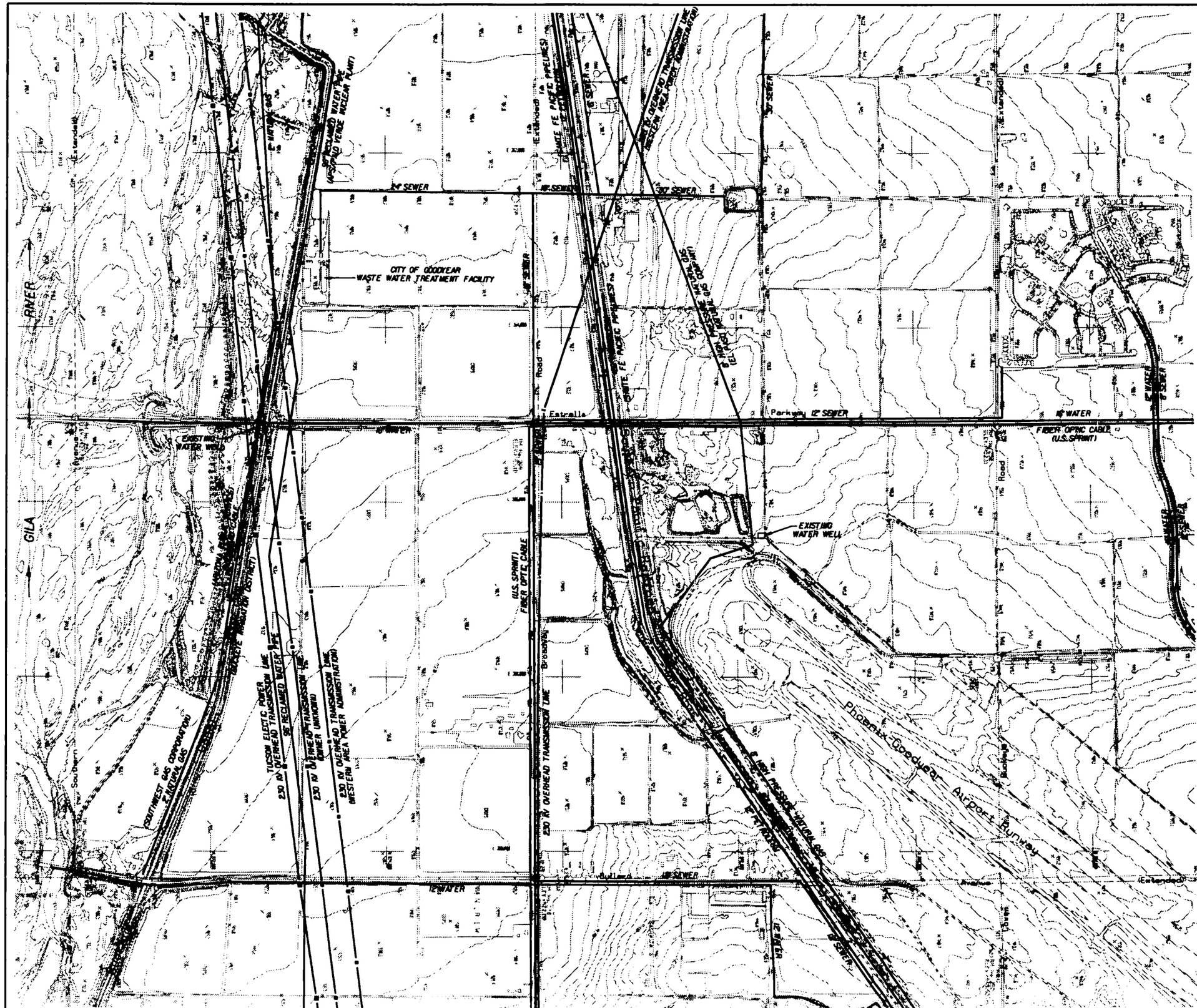
There are numerous utilities, both above ground and below ground which exist in the study area. Major below ground utilities include the following:

1. City of Goodyear public water lines ranging in size from 12" to 16" diameter.
2. City of Goodyear public sewer lines ranging in size from 6" to 30" diameter.
3. APS/Palo Verde Nuclear Power Plant 96" diameter re-use water line.
4. U.S. Sprint fiber optic communication line.
5. Santa Fe Pacific petroleum pipelines 12" and 20" diameter.
6. El Paso Natural Gas 8" diameter high pressure pipeline.
7. Southwest Gas 2" natural gas pipe.

Major above ground utilities include:

1. Western Area Power Administration 230 KV electrical transmission line (steel pole).
2. Western Area Power Administration 230 KV electrical transmission line (steel lattice tower).
3. 230 KV electrical transmission line (steel lattice tower) (unknown utility owner).
4. Tucson Electric Power 230 KV electrical transmission line (steel lattice tower).

In addition to these utilities, there are irrigation facilities consisting of delivery and tailwater ditches, pipes, control structures, canals and water wells. Potentially significant utility conflicts are anticipated. Some utilities such as water and small diameter natural gas lines can be relocated with relative ease. Other utilities such a sewer lines can be relocated but with significant cost and effort. Utilities such as the 230 KV electrical towers and the 96" diameter APS/Palo Verde pipeline are nearly impossible to relocate. Major utilities and their approximate locations are illustrated on Exhibit 3. Photographs 1 through 4 following Exhibit 3 illustrate various locations and features within the study area.




# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)

NOTES:

1. ALL UTILITY LOCATIONS SHOWN ARE APPROXIMATE. ONLY MAJOR UTILITIES HAVING A POTENTIAL CONFLICT WITH THIS PROPOSED PROJECT HAVE BEEN INVESTIGATED. OTHER LOCAL UTILITIES SUCH AS TELEPHONE, ELECTRIC, NATURAL GAS AND CABLE TELEVISION MAY BE PRESENT WITHIN THE PROJECT AREA.
2. ALL WATER AND SEWER UTILITIES SHOWN ARE CITY OF GOODYEAR.
3. THIS EXHIBIT DOES NOT ATTEMPT TO REFLECT THE NUMEROUS AGRICULTURAL IRRIGATION DELIVERY AND TAILWATER DITCHES, PIPE AND CONTROL FACILITIES PRESENT IN THE PROJECT AREA.

LEGEND

OVERHEAD ELECTRIC (WITH SELECTED POLES/TOWERS)

FIBER OPTIC CABLE (U.S. SPRINT)

UTILITY

UTILITY OWNER

N

400 200 0 400 800 1200

SCALE 1" = 400'

CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA ADMS (FCD 89-70)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-23-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

## EXHIBIT 1
## EXISTING MAJOR UTILITIES

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PHOENIX, ARIZONA 85018 • (602) 952-0500

| | |
|---|---|
| DES. S.W. | CKD. C.S.S. |
| DRN. P.J.P. | APP. |
| DATE 10-27-94 | |
| SHEET 1 OF 1 | |
| DWG. | |
| PROJ. NO. 12278 | |

Photo #1 Looking north (upstream) at the low flow channel of Bullard Wash from the Southern Pacific Railroad tracks. Fenced area directly north and to the east is the Phoenix-Goodyear Municipal Airport. To the west is IMSALCO, an aluminum recycling plant.

Photo #2 Looking north (upstream) at the low flow culvert crossings of MC85 in the foreground and the railroad in the background.

Photo #3 Looking east (upstream) at Bullard Wash as it approaches Estrella Parkway. The concrete wall is a check structure. Bullard Wash essentially ends at this point.

Photo #4 Looking east along the BID canal at the Estrella Parkway - BID canal bridge.

## EXISTING HYDROLOGY AND HYDRAULICS

The existing condition hydrology and hydraulics for the Bullard Wash Outfall Feasibility Study are based on the White Tanks/Agua Fria ADMS conducted by the WLB Group for the District and dated October, 1992. The ADMS was reviewed and updated by SCI based on proposed flood control improvements located in the northern portions of the ADMS. The Bullard Wash contributing area, after reflecting these flood control improvements, comprises approximately one quarter of the ADMS's total study area.

The ADMS utilizes both HEC-1 hydrologic modeling and HEC-2 hydraulic modeling. The methodology and basic model input parameters, as accepted and approved by the District and FEMA, will not be altered except where specifically addressed and documented. In general, the ADMS hydrology and hydraulics have remained essentially intact. The following sections discuss in more detail the existing hydrology and hydraulics for the Bullard Wash Outfall Feasibility Study.

### Hydrology

The ADMS HEC-1 model uses a 100-year, 24-hour event and an SCS Type II rainfall distribution. Depth-Area reduction values are from the NOAA Atlas 2, Volume VIII-Arizona. Green-Ampt and Phoenix Valley S-Graphs are used for the loss rate and unit hydrograph options respectively. The watershed consists of primarily agricultural land with some residential and industrial development. The current Bullard Wash contributing area includes sub-basins located as far north as Cactus Road, as far west as Jackrabbit Trail and as far east as Dysart Road. The contributing area which will be used for Bullard Wash is approximately 51 square miles. The contributing area prior to reflecting the flood control improvements of Dysart Drain and White Tanks #3 was approximately 100 square miles. The total ADMS study area is approximately 185 square miles.

The HEC-1 methodology was reviewed and several items were specifically addressed. A 24-hour storm distribution was used in the ADMS instead of a 6-hour storm distribution as recommended in the Maricopa County Drainage Design Manual, Volume I Hydrology. The primary reason for this is that the 24-hour storm produced a greater peak discharge and volume than the 6-hour event. For the Bullard Wash Outfall Feasibility Study, the contributing area is significantly less than it was in the ADMS. However, the 24-hour event still produced a greater peak discharge and volume than the 6-hour event. Also, the use of the 24-hour storm maintains consistency with the original ADMS and other studies currently being conducted.

The Depth-Area reduction factors used in the ADMS were from the NOAA Atlas 2. The factors shown in the District's hydrology manual reduce the rainfall amount more than the NOAA Atlas 2 factors. Again, the use of the ADMS reduction factors result in a greater peak discharge and volume for the study area and also maintain consistency with the ADMS and other local studies. Although not utilized further in this report, an input file of the HEC-1 model for the 6-hour distribution and the Hydrology Manual's Depth-Area reduction factors is located on disk in Appendix A. The peak discharges, times to peak, and volumes generated by all models are included in Table 1 at the end of this section.

The SCI revised HEC-1 model represents only those sub-areas which contribute directly to Bullard Wash. The Bullard Wash contributing area has essentially been cut out of the ADMS model. The cumulative area, TAREA in field 2, used in the combination of hydrographs, HC record, is adjusted to reflect the actual areas contributing to Bullard Wash for the existing condition model.

Runoff occurs predominantly as sheet flow across agricultural fields and generally collects at the southeast corner of each sub-basin. It is common for these concentration points to yield two-way or three-way flow splits. The flow splits which were within the Bullard Wash contributing area were

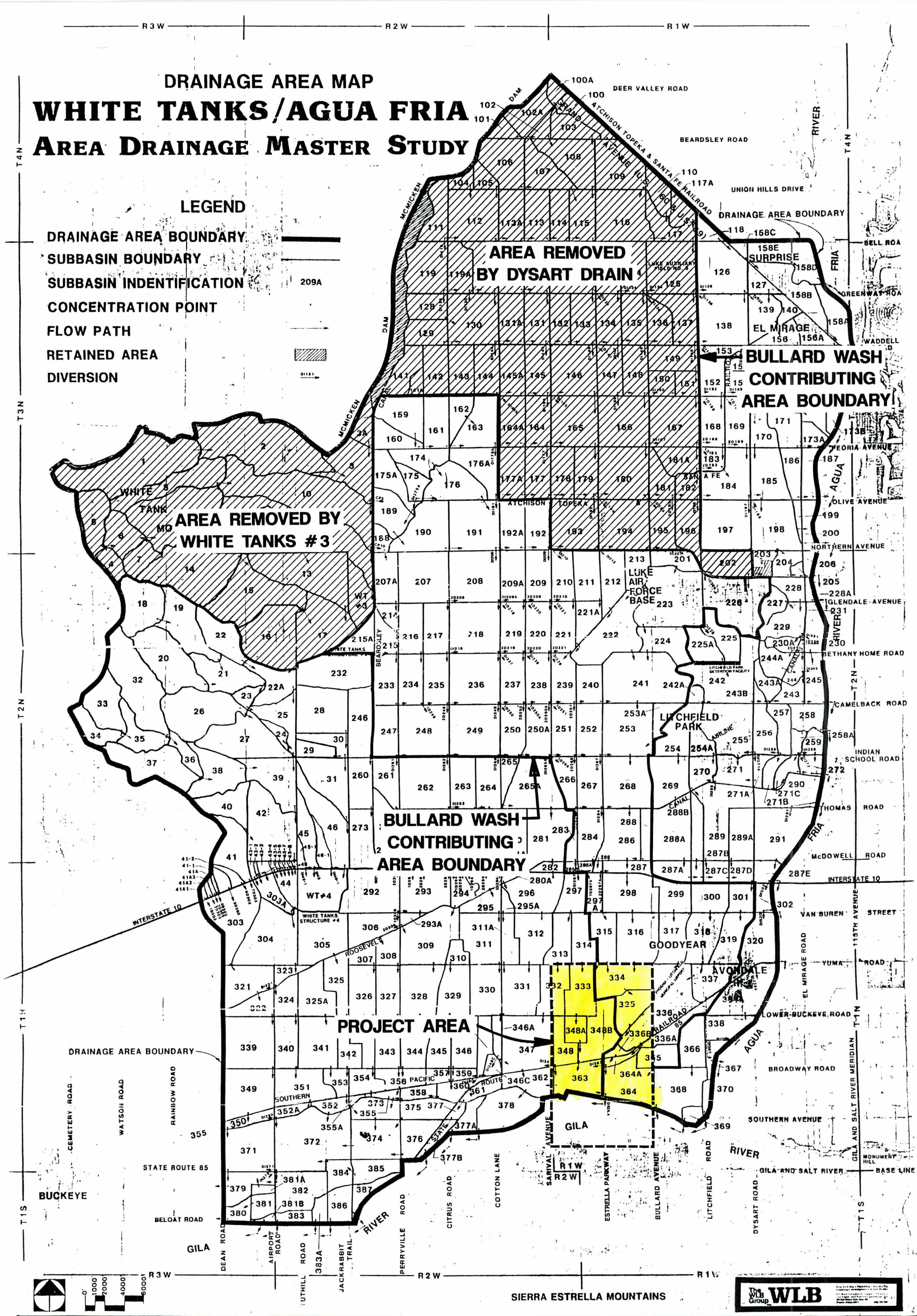
investigated. Specifically, those points at which flow was diverted out of the contributing area were reviewed in order to correctly assess the nature of the flow split. This review was coordinated with District Hydrology staff. No changes to the original ADMS flow splits resulted from this review.

The Bullard Wash Outfall Feasibility Study is concerned with flows at the southern end of the wash. Specifically, concentration points of sub-basins 335 and 364A will be used to estimate design flow rates for the development of the design concept alternatives. The flow rate at CP335 is used as the design inflow for the proposed detention basin alternative on the main channel of Bullard Wash.

The flow rate at CP364A is used to estimate the design flow rate for the proposed channel design. The flow split which occurs at CP364A was altered depending on the alignment being considered downstream. For example, the alignments east of Estrella Parkway will require the entire flow at CP364A to continue to the south instead of a portion being diverted to the west as in the original ADMS model. For similar reasons, the alignment west of Estrella Parkway will require the entire flow at CP364A to continue to the west instead of a portion flowing south. The procedure mentioned above does not increase the design flow rate obtained from CP364A. Therefore, the design flow rate for the channel is represented by CP364A of the SCI revised HEC-1 model.

Hydrology for the ADMS sub-basins which contribute to the local tributary joining the Bullard Wash main channel from the east at the main railroad bridge remains unchanged from the ADMS. The local hydrology for the immediate project area will be evaluated on a more detailed level for the design of the concept alternative(s). Potential items to consider include local inflow points, drainage area boundaries, flow splits, the Buckeye Irrigation District Canal flow conditions, and detention and/or routing reaches.

Refer to Figure 3 for the delineation of the contributing area of Bullard Wash and the effect of the proposed flood control improvements on the ADMS study area. Refer to Table 1 for a comparison of the ADMS flow rates and the modified Bullard Wash flow rates for the concentration points mentioned above. Refer to Figure 4 for a comparison of ADMS and SCI revised hydrographs at CP364A.




ORIGINAL WHITE TANKS/AGUA FRIA ADMS DRAINAGE AREA

BULLARD WASH OUTFALL FEASIBILITY STUDY CONTRIBUTING AREA

BULLARD WASH OUTFALL FEASIBILITY STUDY PROJECT AREA

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FCD 94-06

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FIGURE 3

# TABLE 1

## COMPARISON OF HEC-1 RESULTS

| | NORTH OF AIRPORT CP 335 | | | SE CORNER OF ESTRELLA PARKWAY-MC85 INTERSECTION CP 364A | | |
|---|---|---|---|---|---|---|
| | DISCHARGE | TIME TO PEAK | VOLUME | DISCHARGE | TIME TO PEAK | VOLUME |
| | Q | T | V | Q | T | V |
| MODEL | (CFS) | (HR) | (AC FT) | (CFS) | (HR) | (AC FT) |
| ORIGINAL WHITE TANK/AGUA FRIA ADMS 100-YR 24-HR STORM<br><br>FILENAME: ADMS_H1 | 4906 | 20.58 | 3534 | 4895 | 20.92 | 3730 |
| SCI REVISED FOR BULLARD WASH REFLECTS PROPOSED FLOOD CONTROL IMPROVEMENTS UPSTREAM AND REVISED DRAINAGE AREAS. 100-YR 24-HR STORM<br><br>FILENAME: 12278H1A | 3168 | 19.67 | 2230 | 3175 | 19.92 | 2430 |
| SCI REVISED FOR BULLARD WASH REFLECTS PROPOSED FLOOD CONTROL IMPROVEMENTS UPSTREAM AND REVISED DRAINAGE AREAS. 100-YR 6-HR STORM<br><br>FILENAME: 12278H1B | 2481 | 8.92 | 1814 | 2488 | 9.50 | 1955 |
| ALTERNATIVE DETENTION BASIN. 100-YR 24-HR STORM<br><br>FILENAME: 12278H1C | 1351 | 22.83 | 2230 | 1355 | 22.92 | 2430 |

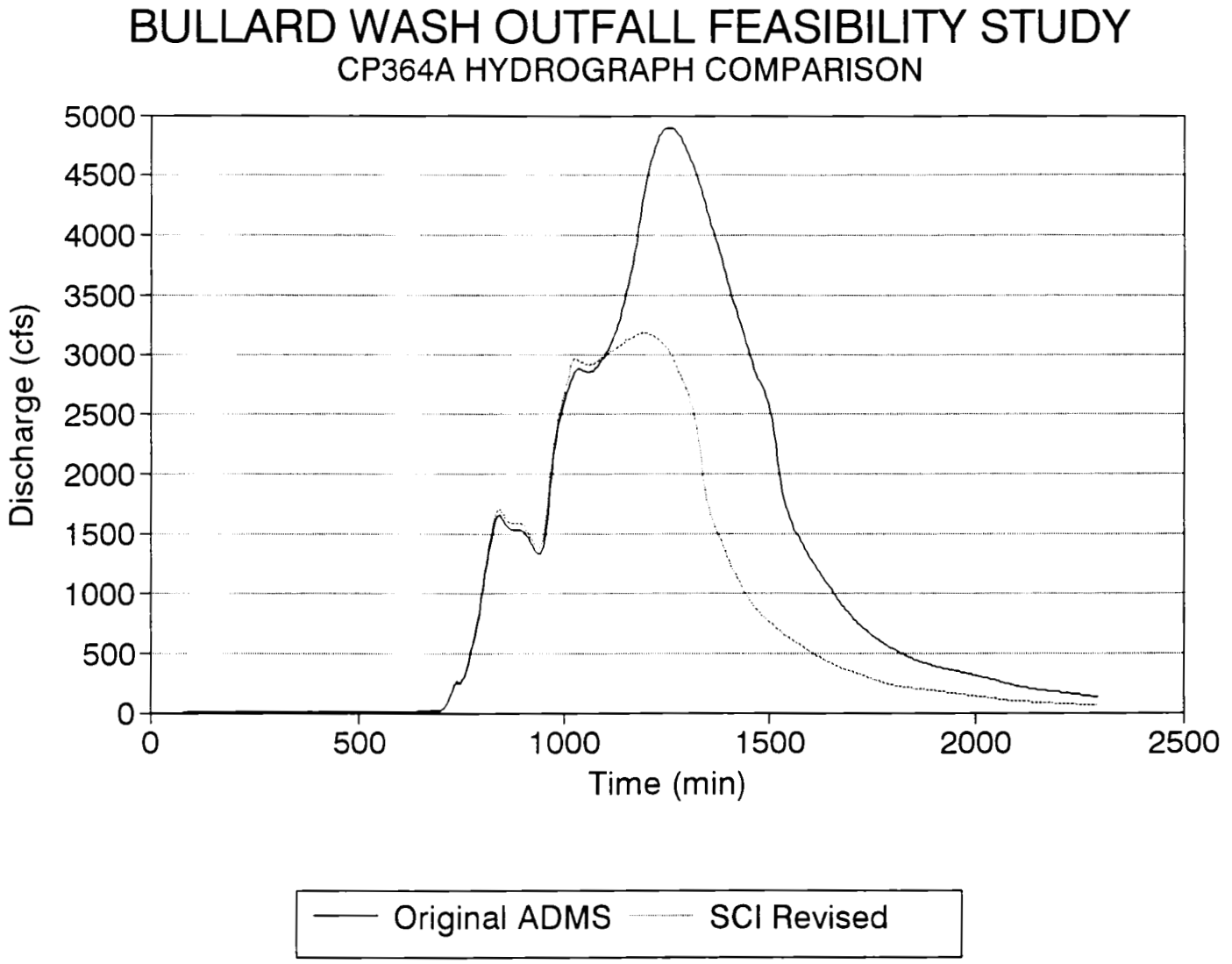

BULLARD WASH OUTFALL FEASIBILITY STUDY
CP364A HYDROGRAPH COMPARISON
Discharge (cfs)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
Time (min)
Original ADMS
SCI Revised

**FIGURE 4**

**Hydraulics**

The ADMS hydraulic analysis and floodplain delineation uses both HEC-2 modeling and approximate methods to evaluate the existing floodplain of Bullard Wash. The ADMS Floodplain study limits for Bullard Wash extend from Northern Avenue to the Buckeye Irrigation District Canal. This floodplain was studied in detail upstream from the end of the Phoenix-Litchfield Municipal Airport runway. Downstream from the end of the runway, a combination of detailed and approximate methods were used. The bullard Wash Outfall Feasibility Study considers only those portions of the wash located from Yuma Road downstream to the outfall into the Gila River. The hydraulics for the lower reaches of Bullard Wash, from the airport runway to the south, are rather complex and incorporate a great deal of hydraulic judgement.

In general, the hydraulic review for this feasibility study was concerned with details or elements of the ADMS which might have changed due to the revised hydrology. The purpose of this feasibility study is to update the floodplain limits within the study area based on revised hydrology to compare to and evaluate the proposed outfall alternatives. The revised floodplain limits are not intended to be submitted to the Federal Emergency Management Agency (FEMA) or for use in floodplain management.

Due to the modifications in the hydrology, the flow rates at the outfall of Bullard Wash will decrease resulting in a potential change of the ADMS delineation. This hydraulic review of the ADMS is intended to assess the effects of the reduced flow rate. However, several reaches in the ADMS were analyzed by defining the flow rate as "the channel capacity plus a maximum of 1 foot over the top where capacity is exceeded" instead of the peak discharge as estimated from the ADMS HEC-1 model. For the reaches where this occurred, the HEC-2 output does not change significantly because the flow rate does not change. The following paragraphs describe the differences between the

ADMS delineation and the updated delineation. Each cross section is analyzed based on a comparison of the HEC-2 models. As in the ADMS, engineering judgement and approximate methods were applied to aid in the analysis.

Cross sections 0.000 to 0.531 use a flow rate which has been set by the channel capacity plus a maximum of 1 foot over the top of bank. It is assumed that the channel capacity as estimated in the ADMS is adequate and the flow rate remains 850 cfs. The only comparison for this reach is the relative differences between the total peak discharge minus the channel flow. For the ADMS, the difference is equal to 4895 cfs minus 850 cfs or 4045 cfs. For the updated model, the difference is equal to 3200 cfs minus 850 cfs or 2350 cfs. It is apparent that flow will continue to break out to the west across Estrella Parkway. The depth of flow in the floodplain will presumably decrease due to the reduced amount of flow proceeding west (2350 cfs instead of 4045 cfs). However, the limits of the approximate delineation west of Estrella Parkway will probably not change significantly.

Cross sections 0.616 to 0.964 use the peak discharge of CP364A. Although this reach is affected by the reduced flow rate between the ADMS and the updated model, the floodplain limits remain essentially unchanged. Cross section 0.616 contains the flow for both the ADMS and revised flow rates. The only difference is in the water surface elevation which decreased approximately 0.4 feet.

Breakout flow occurs for both flow rates at cross section 0.668. The breakout depth, which refers to the depth of side-boarding or extended cross section depth, is reduced by approximately 0.5 feet using the revised flow rate. This could imply that the floodplain may be reduced slightly, however, as the following paragraphs explain, breakout flows continue to occur from upstream reaches. This results in essentially the same floodplain limits.

Cross sections 0.776 and 0.868 contain the entire flow within the cross section and experience divided flow for the updated model. The left side, which indicated a breakout depth of approximately 0.4 feet in the ADMS model, now contains the flow. However, as the previous section mentioned, breakout flows continue to occur upstream. The divided flow indicates that MC85 may not be overtopped in this reach. As modeled, MC85 is approximately 1 foot above the water surface. The floodplain limits on the north side of MC85 were an approximate delineation in the ADMS and remain unchanged due to potential ponding and local flows.

Cross section 0.964 indicates breakout depths for both ADMS and updated models. The breakout depth is reduced by approximately 0.6 feet but still indicates a breakout depth of 0.3 feet.

Cross sections 1.081 to 1.823 use a flow rate based on the channel capacity plus a maximum of 1 foot which equals, essentially, 2600 cfs. Cross section 1.081 is similar to cross section 0.964 in that it continues to indicate a breakout depth but the depth is reduced by approximately 0.4 feet. Cross sections 0.964 and 1.081 are the cross sections mentioned previously, in the discussion of cross sections 0.668 to 0.868, which maintain the floodplain limits due to the breakout potential.

The HEC-2 output for cross sections 1.153 to 1.823 does not show any differences because the flow rate does not change. It is assumed that the easterly floodplain limits for this reach are still effective based on the approximate delineation conducted for the ADMS. The westerly floodplain limit, essentially located from cross section 1.680 to 1.823, is delineated on the basis of the channel excess flow. For the ADMS model, the excess is approximately equal to 4899 cfs minus 2600 cfs, or 2299 cfs. For the updated model, the excess is approximately equal to 3200 cfs minus 2600 cfs, or 600 cfs. An approximate normal depth estimation of the overflow area for each flow rate excess resulted in the area continuing to be inundated for both conditions. It is anticipated that the floodplain limits will not change significantly but that the depth of flow in the floodplain will decrease slightly.

The difference in water surface elevations between the two models from cross section 1.893 to cross section 2.297 is minimal, decreasing in elevation by only 0.3 feet to 0.7 feet. Based on the topographic mapping and the ADMS floodplain delineation, this difference does not warrant a change of the floodplain limits. This reach concludes the approximate delineation portion of the ADMS study.

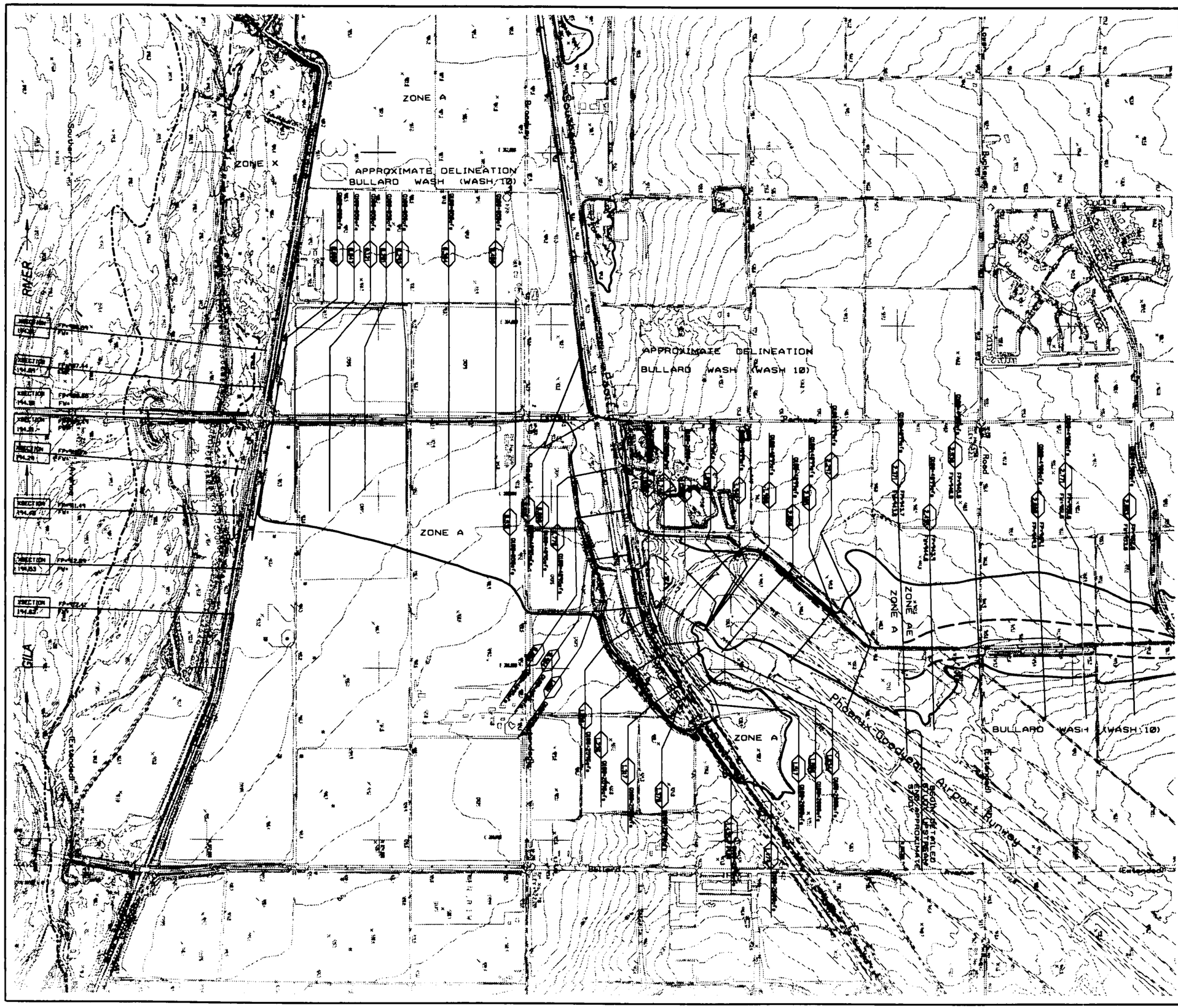
From cross section 2.371 to upstream of Yuma Road, a detailed study is conducted in the ADMS. The reduction in peak discharge accounts for an average decrease in water surface elevation of approximately 0.5 feet. This lower water surface elevation may cause the floodplain limits total width to be reduced by approximately 200 feet or an average reduction of width of 15 to 20 percent. The average revised floodplain width is on the order of 800 feet, reduced from 1000 feet. For the purpose of this study, the floodplain limits will not be re-delineated to reflect the reduced peak discharge because the above reaches are upstream of the project limits. The upstream reaches are included for the use of modeling the backwater effects of the potential detention basin or proposed channel.

In conclusion, the hydraulics and floodplain delineation documented in the White Tanks/Agua Fria ADMS as prepared by The WLB Group and on file with the Flood Control District of Maricopa County has been re-analyzed based on the reduced flow rate that will result from future flood control projects in the contributing watershed. Although there is a significant reduction in discharge, there is generally only a slight reduction in flow depths. The corresponding reduction in floodplain limits is essentially insignificant.

The ultimate outfall of Bullard Wash is the Gila River under both existing and proposed conditions. The Gila River floodplain will potentially impact the proposed Bullard Wash outfall since there is no well defined channel bank on the north side of the Gila River. The proposed Bullard Wash outfall

channel will need to traverse the Gila River Fringe District in order to provide a positive outfall grade. The current Gila River floodplain delineation and HEC-2 back water model which were prepared by Dames and More are in the process of revision to reflect new topographic mapping and slightly reduced post-Roosevelt Dam reconstruction hydrology. This revised floodplain analysis is being conducted by Michael Baker Jr., Inc. for the District. A preliminary floodplain limit and HEC-2 floodplain model dated July 1994 have been provided to SCI by the District. The District has also provided limits of the Corps of Engineers 404 Waters of the U.S. jurisdiction for the Gila River to SCI.

Refer to Exhibit 2 for the ADMS floodplain delineation and cross section locations, the approximate preliminary Gila River floodplain limits from Michael Baker Jr. Inc. dated July 1994, and the Corps 404 Waters of the U.S. Jurisdictional limits from the District dated August 1994.




# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)

NOTES:

(1) BULLARD WASH AND LOCALIZED FLOODPLAIN LIMITS ARE BASED ON WHITE TANKS/AGUA FRIA AD88 (FCD 89-90) PREPARED BY THE WLA GROUP. LIMITS AND Q100 DISCHARGES DO NOT REFLECT FUTURE DYSART DRAIN AND WHITE TANKS #6 FLOOD CONTROL PROJECTS.

(2) GILA RIVER FLOODPLAIN LIMITS AND HEC-4 CROSS SECTIONS SHOWN ARE APPROXIMATE BASED ON PRELIMINARY STUDY BY MICHAEL BAKER JR., INC. (FCD 90-60 AND 90-62). PRELIMINARY INFORMATION DATED JULY 1994 WAS PROVIDED BY FCDMC. FLOODWAY ELEVATIONS (FW) NOT YET AVAILABLE. FLOODPLAIN ELEVATIONS FROM BAKER'S STUDY HAVE BEEN ADJUSTED TO WHITE TANKS/AGUA FRIA AD88 TOPOGRAPHIC DATUM BY THE FOLLOWING DEVIATION:
BAKER + 6.71 FT = WHITE TANKS/AGUA FRIA

(3) CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMITS SHOWN ARE APPROXIMATE. LIMITS ARE BASED ON INFORMATION DATED AUGUST 1994 PROVIDED BY FCDMC.

**LEGEND**

- BULLARD WASH OR LOCALIZED FLOODPLAIN LIMIT
- BULLARD WASH FLOODWAY LIMIT
- CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMIT
- GILA RIVER FLOODPLAIN LIMIT
- ZONE A — FLOOD INSURANCE ZONE

N

400 200 0 400 800 1200

SCALE 1" = 400'
CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA AD88 (FCD 89-90)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-22-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

## EXHIBIT 2

## EXISTING FLOODPLAIN AND CORPS 404 LIMITS

STANLEY CONSULTANTS, INC.
7500 EAST CAMELBACK ROAD, SUITE 120
PHOENIX, ARIZONA 85251 • (602) 945-3500

| | |
|---|---|
| DES. S.W. | CKD. G.S.B. |
| DRN. P.J.F. | APP. |
| DATE 10-27-94 | |
| SHEET 1 OF 1 | |
| DWG. | |
| PROJ. NO. 12279 | |

## APPROACH

The alternatives developed and considered for this study incorporated several channel alignments, cross section geometrics and lining concepts. The concept of incorporating detention basins with these channels was also considered. While all the channel alignments have a similar objective and have the same estimated design flow rate, 3200 cfs, they present unique considerations and differ in effectiveness, design requirements and costs. The concept of a detention basin is based on the ability to reduce the design flow rate of the channel, thus, reducing the costs of the channelization and to provide sediment control. However, the effectiveness of the basin and its construction costs will be weighed against the cost savings for the channel and the need for sediment control.

All design analyses are conducted in a conceptual manner and are intended for the use of eliminating alternatives which appear to be not feasible or which are too costly. Those alternatives which result in potentially advantageous design solutions and are able to be constructed may be chosen for further development in the next phase of this study.

A number of general considerations are incorporated into the selection process for the chosen alternatives. The major considerations are as follows:

1. constructibility
2. operations and maintenance
3. hydraulic reliability
4. land, construction, and maintenance costs
5. aesthetics
6. potential joint use

7. existing utilities and surrounding land improvements

The above considerations are not presented in any particular order of importance. In addition to the above general considerations, specific concerns may be present that are unique to a particular alternative.

Hydraulic analysis of proposed channels was performed by normal depth methods. The design flow rate for all channels, estimated from the revised White Tanks/Agua Fria ADMS HEC-1 hydrology model, is 3200 cfs. Although the alternative alignments have minor differences of contributing areas and location, the peak discharge varies only slightly. The only change to the peak discharge occurs with the use of a detention facility. At best, the peak discharge used for the main channel design flow can only be reduced to approximately 850 cfs. This is the discharge produced by the local contributing area without any contribution from the Bullard Wash main channel upstream from their confluence.

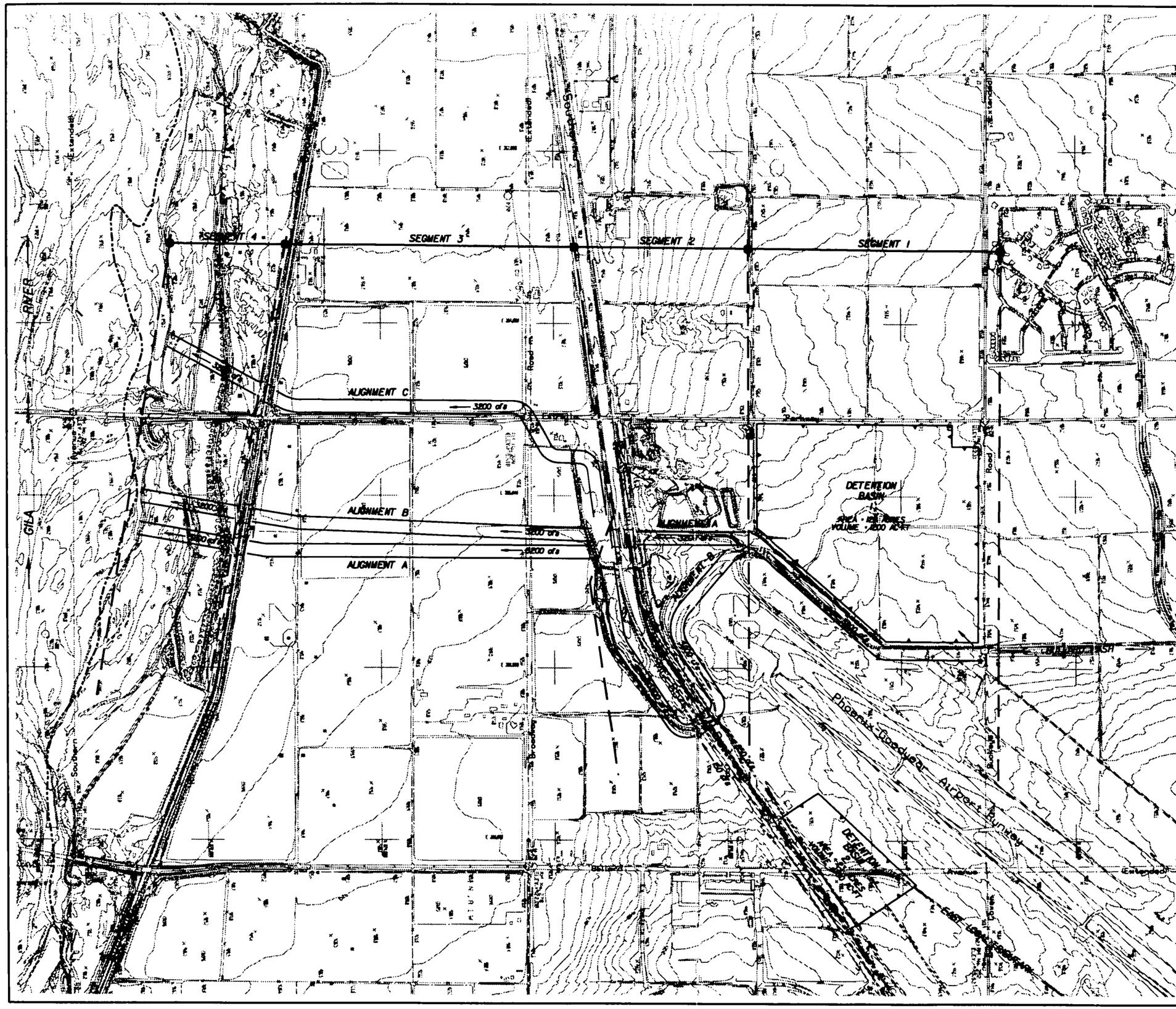
The channel concept is divided into four segments and issues for each reach will be discussed independently. Each segment may have one or more possible alignment locations along with one or more typical channel cross sections. Four basic channel cross section concepts are analyzed. These concepts are illustrated in Figures 5, 6 and 7 on the following pages. The cross section names and descriptions are as follows:

1. Earth - an unlined earth channel;

2. Composite - a composite channel consisting of protected channel sides and a protected low flow channel but generally unlined bottom;

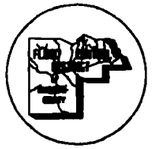
3. Riprap - a fully lined channel of grouted riprap;

4. Concrete - a fully lined channel of Gunite, Shotcrete, or reinforced concrete.




# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)



NOTES:

1. CHANNEL ALIGNMENTS ARE ILLUSTRATIVE AND DO NOT REPRESENT ACTUAL WIDTH.
2. DESIGN DISCHARGES ARE BASED ON WHITE TANKS/AGUA FRIA ADMS HEC-1 MODEL BY THE WLS GROUP REVISED BY STANLEY CONSULTANTS TO REFLECT FUTURE STUART DRAIN AND WHITE TANKS #1 FLOOD CONTROL PROJECTS.

LEGEND

- ALTERNATIVE CHANNEL ALIGNMENT LOCATIONS
- CULVERT OR BRIDGE
- DETENTION BASIN
- 850 cfs — DESIGN DISCHARGE AND FLOW DIRECTION
- SEGMENT LIMITS
- CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMIT

N

400 200 0 400 800 1200

SCALE 1" = 400'
CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA ADMS (FCD 89-70)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-23-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

## EXHIBIT 3

## CONCEPT ALTERNATIVES

STANLEY CONSULTANTS, INC.
[illegible] EAST COOLIDGE ROAD, SUITE 120
PHOENIX, ARIZONA [illegible] • (602) [illegible]

| | | | |
|---|---|---|---|
| DES. S.W. | CKD. G.S.S. | | |
| DRN. P.J.P. | APP. | | |
| DATE 10-27-94 | | | |
| SHEET 1 OF 1 | | | |
| DWG. | | | |
| PROJ. NO. 12270 | | | |

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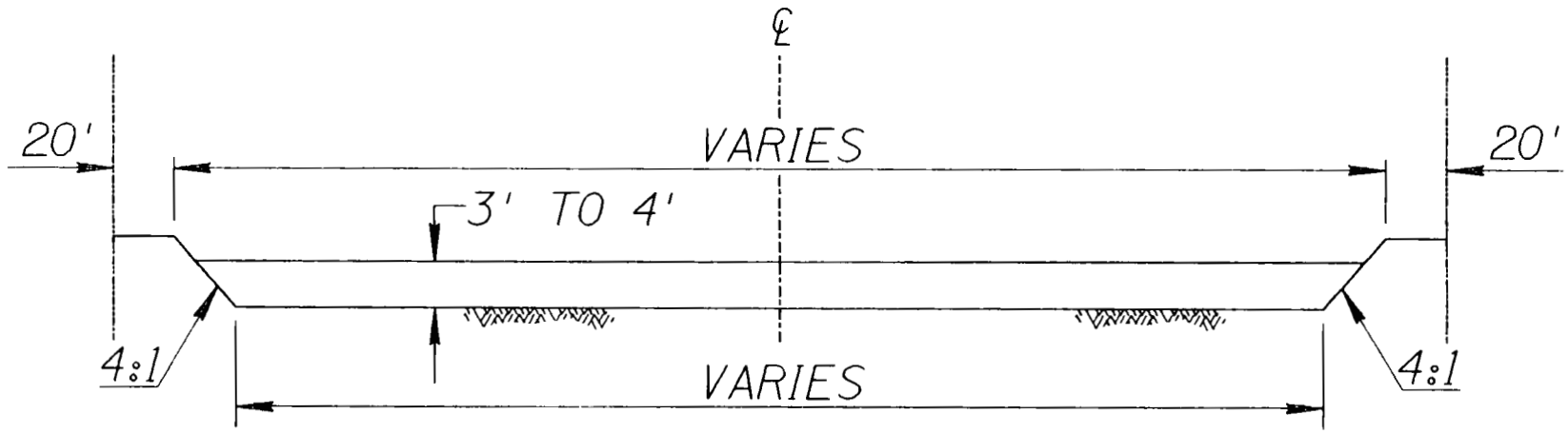



**FIGURE 5**

BULLARD WASH
OUTFALL STUDY

UNLINED
CHANNEL

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 234-1344

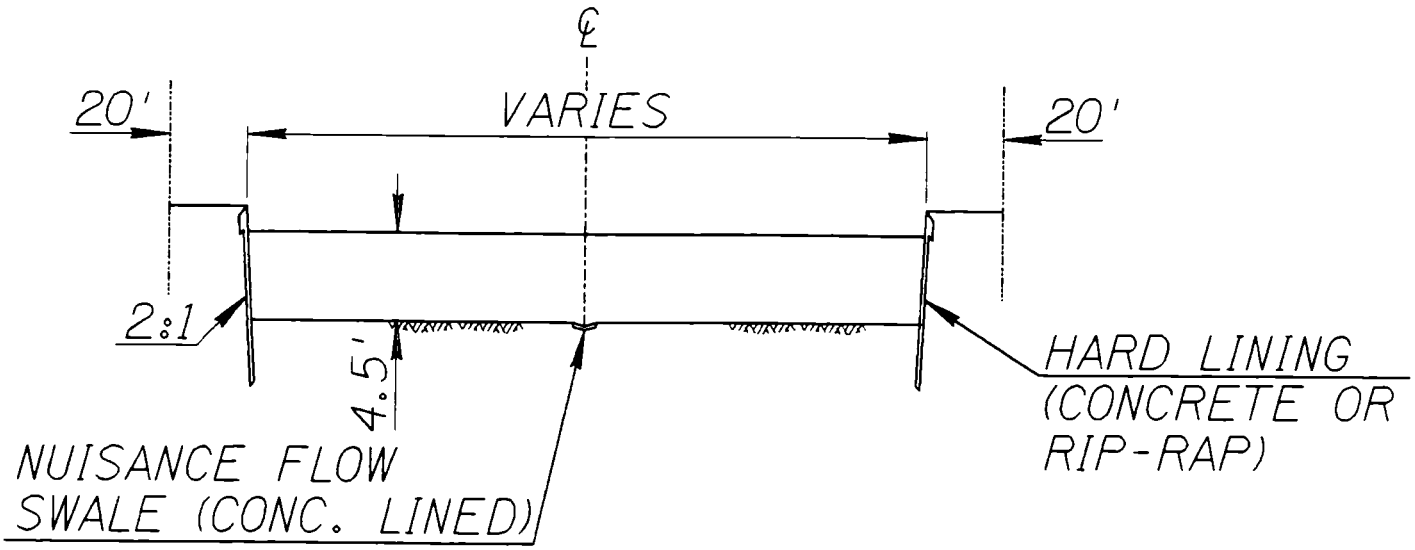


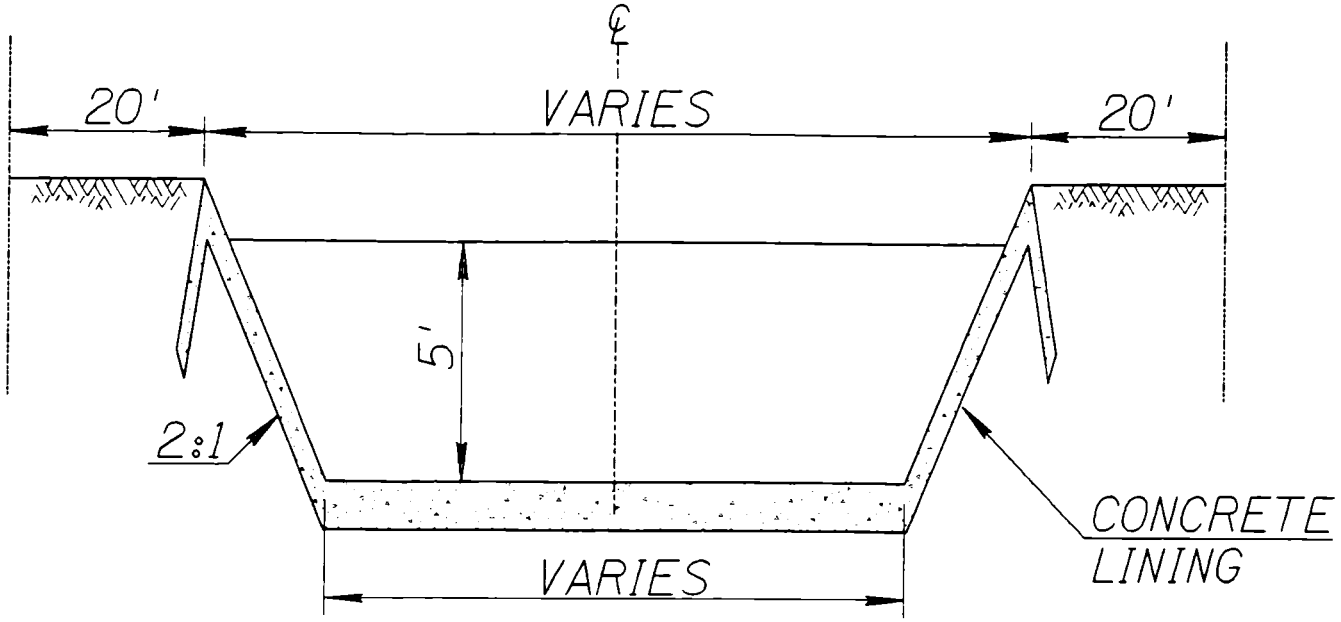

**FIGURE 6**

BULLARD WASH
OUTFALL STUDY

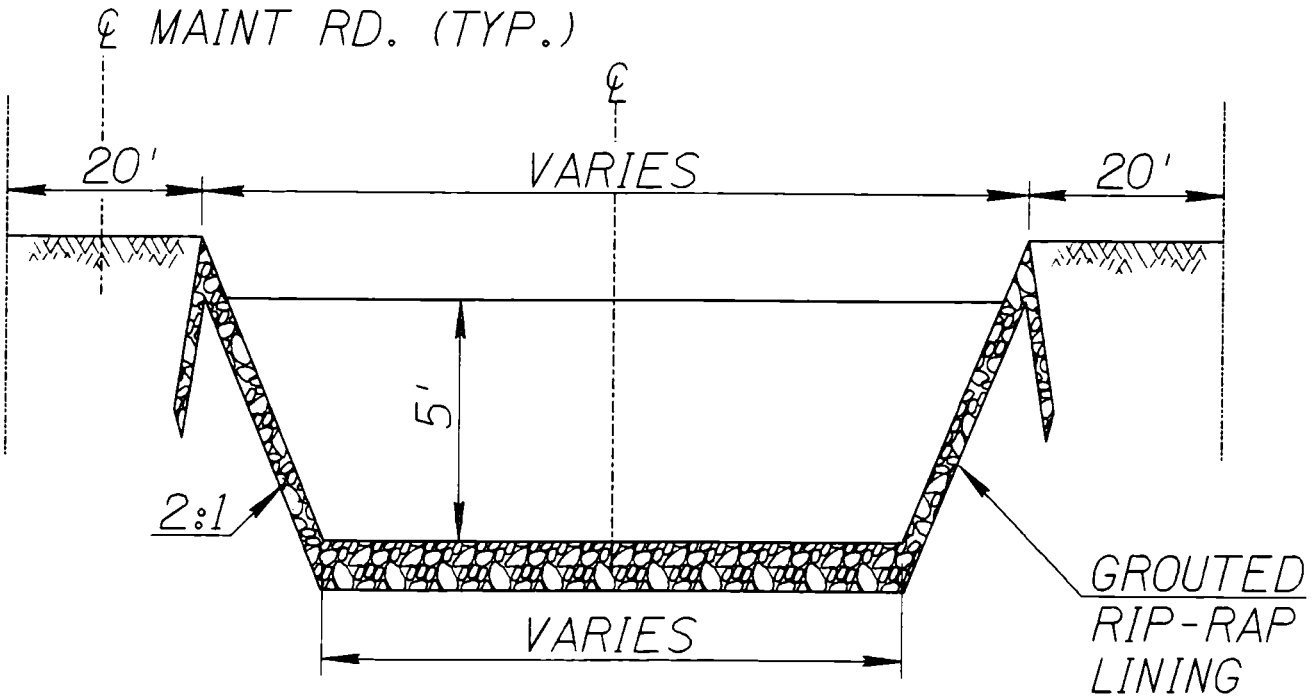
COMPOSITE
CHANNEL

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 234-1344

V:/941022/BULWASH2.DGN




CONCRETE CHANNEL




GROUTED RIP-RAP CHANNEL

**FIGURE 7**

BULLARD WASH
OUTFALL STUDY

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 234-1344

V:/941022/BULWASH2.DGN

The predominant existing slopes are used for preliminary design and adjusted thereafter to accommodate design criteria, the different channel cross sections and the various utility conflicts in the study area. The upstream limit of all alternative alignments is Lower Buckeye Road. The collection of floodplain flows entering the proposed channel will be discussed in the next phase of this study. For now it is assumed that the entire flow can and will be collected at or near Lower Buckeye Road.

The alternatives of each segment are not connected to form a continuous alignment at this point in the study process allowing for a variety of combinations to be considered. Quantity and cost estimates are preliminary and references made to relative cost comparisons are based on such things as estimated dimensions, approximate unit costs, alignment locations and estimated land requirements. This report should generate discussion of important design assumptions, criteria, and methodology as well as pertinent information regarding the alignment alternatives. Refer to Exhibit 3 on the following page for the locations of the four segments and the conceptual alternatives. Refer to Table 2 at the end of this section for a summary of costs for each segment and for the detention basin alternatives.

**TABLE 2**
**SUMMARY OF COSTS**

| Location | | Description | Total Cost |
|---|---|---|---|
| Segment 1 | | Concrete Channel | $ 1,775,600 |
| | | Riprap Channel | $ 2,923,400 |
| Segment 2 | Alignment A | Concrete Channel | $ 1,164,500 |
| | | Riprap Channel | $ 1,111,000 |
| | Alignment B | Concrete Channel | $ 2,900,300 |
| | | Riprap Channel | $ 3,537,200 |
| Segment 3 | Alignment A | Concrete | $ 2,798,900 |
| | | Riprap | $ 4,666,200 |
| | | Composite Section | $ 1,905,800 |
| | | Earth Section | $ 1,673,500 |
| | Alignment B | Concrete | $ 2,798,900 |
| | | Riprap | $ 4,666,200 |
| | | Composite Section | $ 1,905,800 |
| | | Earth Section | $ 1,673,500 |
| | Alignment C | Concrete | $ 4,824,600 |
| | | Earth Section | $ 2,885,900 |
| Segment 4 | Alignment A, B and C | Concrete Pilot Channel | $ 408,600 |
| | | Earth Dredged Channel | $ 155,600 |
| Detention Basin 1 | | Main Bullard Wash | $ 14,257,400 |
| Detention Basin 2 | | East Local Tributary | $ 2,428,100 |

Note: Costs include construction cost, construction contingency and right of way for channelization, major structures and land requirements. Utility relocation and protection, irrigation structures, and other special conditions such as potential costs associated with the superfund site are not included in this report because they represent similar costs for each alignment and do not contribute to the comparison of alternatives. Costs reflect the option of a culvert structure for the railroad, MC85, and the BID Canal instead of a clear span bridge structure.

## SEGMENT 1, FROM LOWER BUCKEYE ROAD TO END OF AIRPORT RUNWAY

This segment begins at Lower Buckeye Road and continues southwesterly to the Phoenix-Goodyear Municipal Airport. Because the airport runway encroached into the natural channel of Bullard Wash and because of other downstream design constraints, alignment alternatives were limited. In addition, the natural ground through this reach has a local high point that may require significant cut for channel construction.

As mentioned previously, collecting the flow from the Bullard Wash floodplain will be a significant consideration. The Bullard Wash floodplain upstream from Segment 1 is on the order of 800 feet in width. The widest channel alternative within Segment 1 will be bout 200 feet wide. At this point, the following concept is anticipated to transition flows from the upstream floodplain to the channel in Segment 1:

1. The proposed channel will be aligned with the existing low flow channel and will receive approximately 80% of the total discharge directly into the new channel.

2. The remaining overbank flows will continue in a southerly direction and enter the proposed channel at controlled design locations for a distance of perhaps 1/4 mile south of Lower Buckeye Road. Both the east and west overbanks will have hydraulic gradients that will direct flow to the proposed channel. Proposed bank lining in Segment 1 will provide protection form inflow scour.

3. Future development upstream from Lower Buckeye Road will be allowed to continue the channelization of Bullard Wash upstream, if desired.

The concept design for this reach utilized a narrow channel section with a flat longitudinal slope to minimize right-of-way and earthwork. The sediments (silts) deposited in the ancient Gila River

overbanks are easily transported by stormwater runoff. Preliminary analyses indicate that the allowable velocity for an earth lined channel is between 2 fps and 4 fps. The velocity constraint and limited right-of-way require the channel to be protected. Two types of protection (concrete lining and grouted riprap) were evaluated for this segment. Due to the previously mentioned constraints, only one alignment was considered in Segment 1.

**Concrete Lined**

The concrete lined channel through this section will have a bottom width and longitudinal slope of 60 feet and 0.00108 ft/ft, respectively. The total width of the drainage corridor will be approximately 130 feet. This includes 20 feet on each side of the channel for maintenance access. Additional joint use facilities (trails, parks, etc.) may require additional right-of-way. The 100-year event (3,200 cfs) will have a velocity and depth of 9.15 fps and 5 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros:**

1) Contained channel;
2) Increased sediment transport rate;
3) No ponding or vegetation problems around the airport;
4) Minimum right-of-way requirement.

**Cons:**

1) Increased capital cost;
2) Aesthetics;
3) Limited joint use opportunities.

**Grouted Riprap**

The grouted riprap channel performs the same function as the concrete lined channel. Due to the increased roughness (assume Manning's "n" = 0.038), the width will be increased. The grouted riprap channel will have a bottom width and longitudinal slope of 168 feet and 0.00108 ft/ft, respectively. The total width of the drainage corridor will be approximately 235 feet. This includes 20 feet on each side of the channel for maintenance access. The 100-year event will have a velocity and depth of 3.59 fps and 5 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros:**

1) Contained channel;

2) No ponding or vegetation problems around the airport;

**Cons:**

1) Increased capital cost;

2) Aesthetics;

3) Limited joint-use opportunities;

4) Lower sediment transport rate than concrete lined;

5) Potentially higher maintenance requirements than concrete lined.

A small channel parallel to the Bullard Wash improvements will be constructed to route irrigation runoff to an existing tailwater pond. This pond will be utilized to irrigate agricultural fields to the southwest. This system would maintain the existing irrigation pattern in the area.

A detention basin was evaluated as part of the segment 1 analyses. The basin reduced the 100-year peak discharge of Bullard Wash from 3200 cfs to 1400 cfs. This alternative reduced the channel size downstream of segment 1. A detailed discussion of the detention basin alternative is provided in a later section of this report.

## SEGMENT 2, FROM END OF AIRPORT RUNWAY TO MC85

The segment begins just north of the airport runway and continues to a point slightly south of MC85. This section is characterized by extremely narrow right-of-way and steep longitudinal slopes. The existing channel flows between the airport runway and the IMSALCO aluminum recycling facility. Downstream of the runway, the channel alignment includes several severe bends prior to crossing MC85. South of MC85, the channel turns 90° and flows west toward Estrella Parkway. Because this reach of Bullard Wash serves as a tailwater pond for irrigation of adjacent agricultural fields; the hydraulic capacity of the channel is greatly reduced. The existing condition flow pattern changes from channelized flow in Segment 2 to shallow sheetflow in Segment 3.

The two channel alignments investigated for segment 2 included the following: A) directly south to MC85 along the airport west boundary, or B) the existing main channel alignment around the end of the runway through the existing bridge at MC85. The following paragraphs describe each alignment alternative.

### Alignment "A"

The alignment follows an existing irrigation tailwater channel south to MC85. This alignment will significantly improve the horizontal configuration and minimize the length of the channel. It will also significantly increase the longitudinal slope (from 0.0034 to 0.0186 ft/ft).

This alignment will require new structures at the railroad and at MC85. The existing bridge structures could be used to maintain conveyance of low flows generated from local sub-basins (east tributary) or replaced with significantly smaller culvert crossings. If the existing structures are abandoned, a channel would be required to route runoff from the existing bridge structures to the new crossing.

The 100-year runoff through this reach is in the supercritical flow regime. Therefore, a fully protected channel section (concrete lined or grouted riprap) is required. Due to the occurrence of a hydraulic jump, an energy dissipation structure will be constructed immediately downstream of MC85. In addition, the lined channel options will reduce the width of the channel section and may reduce the cost of bridge/culvert structures.

**Concrete Lined**

The concrete lined channel through this section will have a bottom width and longitudinal slope of 25 feet and 0.0186 ft/ft, respectively. The available right-of-way limits the maintenance access and joint-use opportunity in this reach. The 100-year event (3200 cfs) will have a velocity and depth of 28.48 fps and 3.51 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros**

1) Straight alignment;

2) Reduced length of channel;

3) Minimizes right-of-way.

**Cons**

1) Supercritical flow with very high channel velocity;

2) New crossing location for railroad and MC85;

3) Coordination with railroad;

4) Aesthetics;

5) Limited joint-use opportunity;

6) Utility conflict.

**Grouted Riprap**

The grouted riprap channel performs the same function as the concrete lined channel. Due to the increased roughness (assume Manning's "n" = 0.038), the width will be increased. The grouted riprap channel will have a bottom width and longitudinal slope of 40 feet and 0.0186 ft/ft, respectively. The 100-year event will have a velocity and depth of 13.24 fps and 4.86 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros**

1) Straight alignment;

2) Reduced length of channel;

**Cons**

1) Supercritical flow (although manageable velocities);

2) New crossing location for railroad and MC85;

3) Coordination with railroad;

4) Aesthetics;

5) Limited joint-use opportunity;

6) Utility conflicts;

7) Greater right of way needs than concrete channel.

**Alignment "B"**

This alignment follows the existing flow path of Bullard Wash. Therefore, it utilizes the recent (post-airport) historical flow path in an established channel. Discussions with representatives of MCDOT indicate that the existing MC85 bridge structure will be replaced and that preliminary design has been completed. Further design efforts will not be performed until the District has completed the Bullard Wash Outfall Feasibility Study.

The existing flow path is a long winding path that includes several bends prior to MC85. This configuration contains inherent problems regarding horizontal alignment. The existing curves are much more severe than normally desired in design. Therefore, these sections will require bank protection and additional freeboard allowances to ensure acceptable hydraulic operation of the channel.

Two types of protection, concrete lining and grouted riprap, were evaluated for this segment.

**Concrete Lined**

The concrete lined channel through this section will have a bottom width and longitudinal slope of 50 feet and 0.0034 ft/ft, respectively. The available right-of-way limits the maintenance access and joint-use opportunity in this reach. The 100-year event (3200 cfs) will have a velocity and depth of 14.02 fps and 3.94 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros**

1) Utilize existing channel alignment;
2) Utilize existing bridge locations;
3) Minimum right-of-way width;
4) Less coordination with the railroad;
5) No need for channel to serve east tributary.

**Cons**

1) Longer length of channel than Alignment A;
2) Increased capital cost;
3) Horizontal alignment (sharp bends);
4) Utility conflicts;
5) Aesthetics.

**Grouted Riprap**

The grouted riprap channel performs the same function as the concrete lined channel. Due to the increased roughness (assume Manning's "n" = 0.038), the width will be increased. The grouted riprap channel will have a bottom width and longitudinal slope of 100 feet and 0.0034 ft/ft, respectively. The 100-year event will have a velocity and depth of 6.10 fps and 4.79 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros**

1) Utilize existing channel alignment;
2) Utilize existing bridge locations;
3) Maintain subcritical flow;
4) No need for channel to serve east tributary.

**Cons**

1) Longer length of channel than Alignment A;
2) Right-of-way limitations;
3) Horizontal alignment (sharp bends);
4) Utility conflicts;
5) Aesthetics.

The railroad crossing will be evaluated to determine its hydraulic capacity. If the structure is found to be inadequate, the District will be notified so that coordination can begin for design of a new crossing. The railroad crossing will have the same hydraulic requirements as the MC85 crossing, but will be designed for structural live loads associated with a railroad.

The new structures will not have less capacity than the existing structures and will be designed to pass the 100-year event (3200 cfs without detention basin). The existing bridge structure at MC85 will be replaced with either a bridge or culvert battery. It is anticipated that the culvert battery will be composed of at least 6 - 10 X 6 RCBC's. A bridge structure will span the typical channel section. Final sizing and location of the crossing will be performed once an alignment has been established.

## SEGMENT 3, FROM MC85 TO BUCKEYE CANAL

Segment 3 begins at MC85 and continues south to the Buckeye Irrigation District Canal (BIDC). Bullard Wash has been obliterated by the development of agricultural fields in this reach. Runoff is characterized by wide shallow sheetflow flooding. Initially, runoff flows across the fields and/or down Estrella Parkway to the BIDC, then it overtops the canal and outfalls to the Gila River.

This segment has numerous utility concerns that need to be addressed during the preliminary design phase. A few of the major utilities include:

1) Palo Verde 96-inch gravity waterline;
2) Buckeye Irrigation District Canal;
3) Agricultural irrigation;
4) City of Goodyear sewer line (Broadway Road);
5) Overhead power lines.

Three alignments were analyzed for segment 3. Alignments "A" and "B" flow south from MC85 to the BID Canal. These alternatives have similar hydraulic characteristics. Impact to utilities will dictate the final alignment. Also, a combination of the alignments may be considered. Alignment "C" routes flows west then south along Estrella Parkway to the Gila River. The primary objective of Alignment C was to provide an outfall that would be capable of collecting all of the flow that would pass over the railroad and MC85 per existing conditions if no Segment 1 or 2 flood control improvements could be established.

### Alignments "A" & "B"

Because alignments "A" and "B" are very similar they will be discussed jointly. These alignments route flows from MC85 directly south to the Gila River. The primary constraints limiting design

alternatives are: 1) geometry of the crossing at MC85; 2) elevation of the existing sewer line at Broadway Road; 3) elevation of the Palo Verde water line near the BID Canal; 4) location of overhead power structures; and 5) hydraulic requirements of the BID Canal.

Several types of channels were evaluated. These included 1) earth; 2) composite channel section; 3) concrete lined; 4) grouted riprap.

**Earth**

The earth channel was initially considered because it would allow the City of Goodyear flexibility in developing joint use facilities in the future. The sediments (silts) deposited in the historic Gila River overbanks are easily transported by stormwater runoff. Preliminary analyses indicate that the allowable velocity for a earth lined channel is between 2 fps and 4 fps. Because of the velocity constraint, the earth channel must be extremely wide (bottom width = 355 ft.) to pass the 100-year event. Also, the low allowable velocity may cause aggradation in the channel and increase maintenance. The earth channel will not be protected from lateral migration of Bullard Wash. Therefore, setbacks (easements) will need to be established as part of the maintenance program of the drainage facility. The earth channel width requires substantial amounts of rights-of way/easements and is difficult to align through the electrical power structures. In addition, the wide channel geometry requires the BID Canal crossing structure options to be significantly larger than for lined channels.

**Pros:**

1) Joint use opportunity;

2) Aesthetics.

**Cons:**

1) Land requirements;

2) Operation and maintenance;

3) Increased crossing structure cost;

4) Horizontal alignment concerns.

**Composite Section**

The composite section is composed of stable bank protection (concrete or grouted riprap) with an earth bottom. This section incorporates the protection of a lined channel with the aesthetics of an unlined channel. The sides of the channel are protected to prevent lateral migration and/or failure due to vertical scour, and the bottom of the channel is earth to allow joint-use opportunities such as parks, trails, etc.. The bottom width of the composite section is 150 feet. The velocity through this reach is approximately 4.4 fps. This velocity is slightly higher than the 2 fps - 4 fps value indicated in the preliminary allowable velocity analyses. This appears to be acceptable because the channel will have four "hard points" (BIDC overchute, Palo Verde pipeline, Broadway Road sewer line, and the energy dissipation basin at MC85). These hard points will involve concrete lining of the channel bottom at the upstream and downstream ends of Segment 3 and at the utility crossings to protect them from potential scour. It is general practice to design channels for slight degradation to ensure that no significant deposition occurs.

**Pros:**

1) Contained channel;

2) Joint-use opportunities;

3) Aesthetics.

**Cons:**

1) Operation and Maintenance costs;

2) Increased structure cost compared to fully lined channel.

**Concrete Lined**

This alternative minimizes the right-of-way required for the channel. The concrete lined channel through this section will have a bottom width and longitudinal slope of 70 feet and 0.0012 ft/ft, respectively. The total width of the drainage corridor will be approximately 130 feet. This includes 20 feet on each side of the channel for maintenance access. Additional joint-use facilities (trails, parks, etc.) may require additional right-of-way. The 100-year event (3200 cfs) will have a velocity and depth of 9.12 fps and 4.45 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros:**

1) Contained channel;

2) Minimize right-of-way;

3) Minimize structure cost;

4) Minimize operation and maintenance cost;

5) Minimize horizontal alignment concerns.

**Cons:**

1) Cost;

2) Aesthetics;

3) Reduced joint-use opportunities.

**Grouted Riprap**

The grouted riprap channel performs the same function as the concrete lined channel. Due to the increased roughness (assume Manning's "n" = 0.038), the width will be increased. The grouted riprap channel will have a bottom width and longitudinal slope of 190 feet and 0.0012 ft/ft, respectively. The total width of the drainage corridor will be approximately 250 feet. This includes 20 feet on each side of the channel for maintenance access. The 100-year event will have a velocity and depth of 3.57 fps and 4.51 feet, respectively. Additional hydraulic parameters are shown in Appendix D.

**Pros:**

1) Contained channel;
2) Reduce right-of-way;
3) Reduce structure cost;
4) Reduce operation and maintenance cost;
5) Reduce horizontal alignment concerns.

**Cons:**

1) Cost;
2) Aesthetics;
3) Reduced joint use opportunities.

**Alignment "C"**

This alignment possesses several problems that may eliminate it from further consideration. First, the slope of the natural ground along the proposed channel is extremely flat (0.0004 ft/ft) south of Broadway Road. This will require the channel to be very wide to pass the 100-year event. For example, the concrete lined channel alternative in this section will have a bottom width of 150 feet and the earth lined channel will have a bottom width of 600 feet. Second, the channel alignment is

adjacent to Estrella Parkway. This will be some of the most expensive right-of-way in the area. Also, access structures across the wide channel appears to be cost prohibitive.

For these reasons, the project team eliminated this option from consideration. Detailed hydraulic analyses will not be performed unless requested by the District for further justification.

**Pros:**

1) Outfall downstream of Estrella Parkway.

**Cons:**

1) Expensive right-of-way;
2) Expensive access structures;
3) Additional roadway crossing;
4) Inefficient hydraulics.

Segment 3 will require some type of culvert/overchute structure at the BID Canal and possibly an energy dissipation structure just downstream from the BID Canal. Preliminary analysis indicates that the two most promising methods of crossing the BID Canal with the proposed channel involve the following:

1. Construct a standard concrete box culvert within the canal to convey canal flows and then construct a concrete lined channel with reinforced concrete sides over the box culvert to carry the storm flows. The box culvert would be a three or four barrel structure the full width of the existing canal with a clear opening height of 6 to 8 feet and a length corresponding to the full width of the proposed channel plus enough additional length to provide for maintenance access of the canal.

2. Construct a clear span overchute of the canal with a pre-fabricated reinforced concrete girders and reinforced concrete sides.

The concrete box option would be constructed at the approximate existing grade of the canal bottom and, under normal delivery flows would have a freeboard "headroom" of between 2 to 4 feet. Based on preliminary channel elevations, the clear span option may not be capable of provided as much headroom between the normal canal water surface and the underside of the concrete girders as compared to the concrete box option. Both options would probably require some type of trash rack at the upstream as well as consideration of maintenance access for the canal.

Due to potential difference in grade between the canal overchute and Segment 4 downstream, an energy dissipation structure may be necessary immediately downstream of the overchute. A structure similar to the one in Photo #5 may be appropriate. Photo #6 illustrates a typical box culvert application for an irrigation canal. At this point in time, an inverted siphon option to convey flows over the BID Canal does not appear warranted.

Photo #5 Baffle chute energy dissipator structure located on downstream side of Cave Creek overchute structure at the Central Arizona Project Canal.

Photo #6 Concrete box culvert for the Western Canal under Interstate 10 in Tempe, Arizona. Structure is a double 14' wide by 5' high by several hundred foot long reinforced concrete box with a trash rack at the upstream end. Normal irrigation delivery flows for the Western Canal are on the order of 300 cfs.

## SEGMENT 4, FROM BUCKEYE CANAL TO GILA RIVER

Segment 4 extends from the BID Canal overchute to the Gila River. Segment 3 Alignments A and B would result in a Segment 4 outfall that is situated upstream in the Gila River from the existing Estrella Parkway Bridge. Segment 3 Alignment C results in a Gila River outfall that is downstream from the existing bridge. All three alignments are situated within the fringe district of the Gila River according to the current Dames and Moore floodplain delineation. All three alignments are subject to transverse flows and potential ponding from the Gila River.

Alignment C is somewhat protected from Gila River flows because it is positioned downstream from the Estrella Parkway bridge approach. Because of this bridge approach, all three Segment 4 alignments are located in an area that may be considered hydraulically ineffective. The north abutment of the Estrella Parkway bridge is situated approximately 1/4 mile south of the BID Canal. A lined spur dike has been constructed at this abutment to protect it from Gila River flows.

Segment 4 needs to provide a positive outfall from the BID Canal overchute to a location in the Gila River that will recognize the following concerns:

1) potential occasional Gila River flooding;
2) existing Estrella Parkway road, bridge and spur dike improvements;
3) Gila River low flow channel grades;
4) maintenance requirements;
5) existing utilities;
6) right-of-way requirements;
7) Corps 404 waters of the U.S.;
8) and sediment transport.

At this point in the study process, the following alternative design concepts have been considered:

1) A channel that would be capable of conveying the full 3200 cfs design flow with continuous bottom and sides to an existing Gila river low flow channel that flows adjacent to the existing spur dike.

2) Same channel as in 1) above except design flow rate would be for a 10-year discharge of approximately 1300 cfs.

3) Pilot channel with the same extent, alignment end point and design flow as in 2) above except only the bottom would have a continuous grade; the sides would be discontinuous and follow the existing grades found along the alignment. These grades vary significantly.

All three channel concepts would be subject to transverse flows from the Gila River. An additional design concept that could be considered with any of the three channels would be to place fill material on the upstream (east side) of the outfall channel to protect it from Gila River flows. This fill material should be readily available from proposed channel excavation. Another design concept that could be considered with any of the three channel concepts would be to provide a lined low flow channel within the Segment 4 outfall channel in order to maintain flow velocities capable of transporting sediment (silt) loads.

At this point, it appears that an end point for Segment 4 can be found within the Gila River that would provide a workable grade for channel design and also minimize or eliminate construction within the Corps' jurisdictional waters. Maintenance costs may potentially be higher in Segment 4 than any of the other segments because of the Gila River. Any Segment 4 channel alternative concepts which do not convey the full 3200 cfs may involve the need for flowage easements for that area within the

Gila River fringe district that would be subject to Bullard Wash overflow. Hydraulic analysis for Segment 4 will be developed in subsequent phases of this study.

## SEDIMENT TRANSPORT

### Existing Condition

Bullard Wash currently experiences severe aggradation within the proposed study reach. The primary reason for this aggradation is the development of agricultural fields and the encroachment of the airport runway into the wash.

Development of the agricultural fields south of MC85 may have the most severe impact on the sediment transport capacity of Bullard Wash. Construction of agricultural fields have obliterated the wash channel. The section of Bullard Wash from MC85 to Estrella Parkway has been blocked to create a tailwater pond for irrigation of adjacent fields.

The runway encroachment significantly altered the horizontal alignment of the wash. Specifically, three 90° bends were introduced to route flows around the runway and through the existing crossings. These curves were not designed in accordance with current design procedures. Therefore, they are not hydraulically efficient.

Runoff from the wash transitions from a hydraulically efficient channelized section to an inefficient ponded/shallow sheetflow section. The flow velocity in the sheetflow section is substantially less than in the channelized section. Therefore, the sediment transport capacity is reduced and aggradation occurs.

This process is responsible for the deposition of sediments in the channel downstream of MC85 and for the deposition within the structures. Field investigations indicate that the MC85 structure is approximately 70 percent clogged.

The reduced hydraulic capacity of the structures and ineffective horizontal alignment of the upstream channel cause ponding to occur at MC85 and the Southern Pacific Railroad. This ponding (reduced velocity) produces additional sediment deposition in this portion of the wash.

The study area will continue to have aggradation and shallow flooding problems until the hydraulic and sediment transport capacities are improved.

**Design Condition**

The goal of the proposed drainage improvements is to match or exceed the sediment transport capacity rate of the upstream sediment supply section. Theoretically, if the sediment transport capacity of the supply section and the design section are equivalent, the system is in equilibrium and deposition/aggradation will not occur.

If the sediment transport capacity of the supply section is less than the design section, sediment transport (degradation) will occur. The design section would require protection to prevent excessive erosion.

Because the study area is within the historic overbanks of the Gila River, the soils are primarily silt. Preliminary analyses indicate that the allowable velocity of unlined channels will be in the 2 to 4 fps range. Therefore, it appears that portions of the project will require protection.

Once preliminary alignments have been selected, detailed hydraulic and sediment transport analyses will be performed to determine lining requirements and channel geometry.

## DETENTION BASIN ALTERNATIVE

The previously discussed channelization alternatives may be modified by the inclusion of detention facilities on Bullard Wash upstream of the airport runway and along the local east tributary north and east of the existing MC85 bridge. The Bullard Wash basin is referred to as Basin 1. The east local tributary basin is referred to as Basin 2. The intent of this alternative is to reduce the size of channels required to route the flow from Bullard Wash to the Gila River and provide sediment control. As stated previously, the best reduction of peak discharge, using Basin 1 alone, results in a local peak discharge of approximately 850 cfs. Therefore, the use of Basin 2 is only beneficial if Basin 1 is capable of reducing the peak discharge in the main Bullard Wash below 850 cfs. The input model on the disk in Appendix A for Basin 1 on Bullard Wash only reduced the peak discharge to approximately 1400 cfs.

The basin presented as Basin 1 on Exhibit 3 is essentially the largest practical basin that has been modeled (obviously, smaller basins will have less of an effect on reducing the peak discharge). It is used for identifying the possible reduction of channel size due to the lower design flow rate and the cost savings associated with the smaller channel. Based on the results of Basin 1, it appears that Basin 2 would not provide any additional benefit because the downstream channel of Basin 1 would be designed for 1400 cfs which is greater than the total peak discharge, 850 cfs, from the east local tributary. The detention basins are evaluated by hypothetical basin characteristics being input into the revised HEC-1 model. This will allow determination if a detention basin can provide adequate or desired results. All assumptions are anticipated to be hydraulically and hydrologically feasible. The basins will be in-line or "flow through" basins. The basic basin characteristics are an unlined sloped basin bottom, unlined 4:1 basin sideslopes, basin water surface elevations restricted to the estimated water surface elevation estimated from the revised ADMS hydraulics for the adjacent wash, multiple

outlet pipes assuming inlet control and all flows into and out of the basin are estimated based on current SCI revised hydrology and channel alignment assumptions.

Approximate cost estimates and general design assumptions are provided in Appendix F for the hypothetical basins. Refer to Table 2 in the conclusion section for a summary of the estimated costs of Basin 1 and Basin 2. Hydrographs in Figures 8 and 9 associated with the detention basin operation are found at the end of this section.

The potential advantages associated with the detention basin alternatives are:

1. reduction in peak discharge, therefore, a reduction in channel size, right-of-way, drainage structure sizes, and overall construction costs of channel;

2. potential groundwater recharge;

3. open space available for multi-use facilities such as parks, recreation, or athletic fields;

4. provides buffer between airport and other potential land uses;

5. defined, effective location for sediment deposition.

The potential disadvantages associated with the detention basin alternatives are:

1. requires very large land area, therefore, increased right-of-way costs for basin area;

2. tremendous quantity of excavation which will require a disposal site;

3. potentially high maintenance cost;

4. requires regular removal of sediment;

5. potential for increased bird population due to the sediment deposition and vegetation growth which may have adverse impact on airport operations;

6. safety concerns due to the flood pool created during runoff events;

7. increased scour potential in downstream channel due to the clear water releases;

8. potential conflict with superfund environmental cleanup.

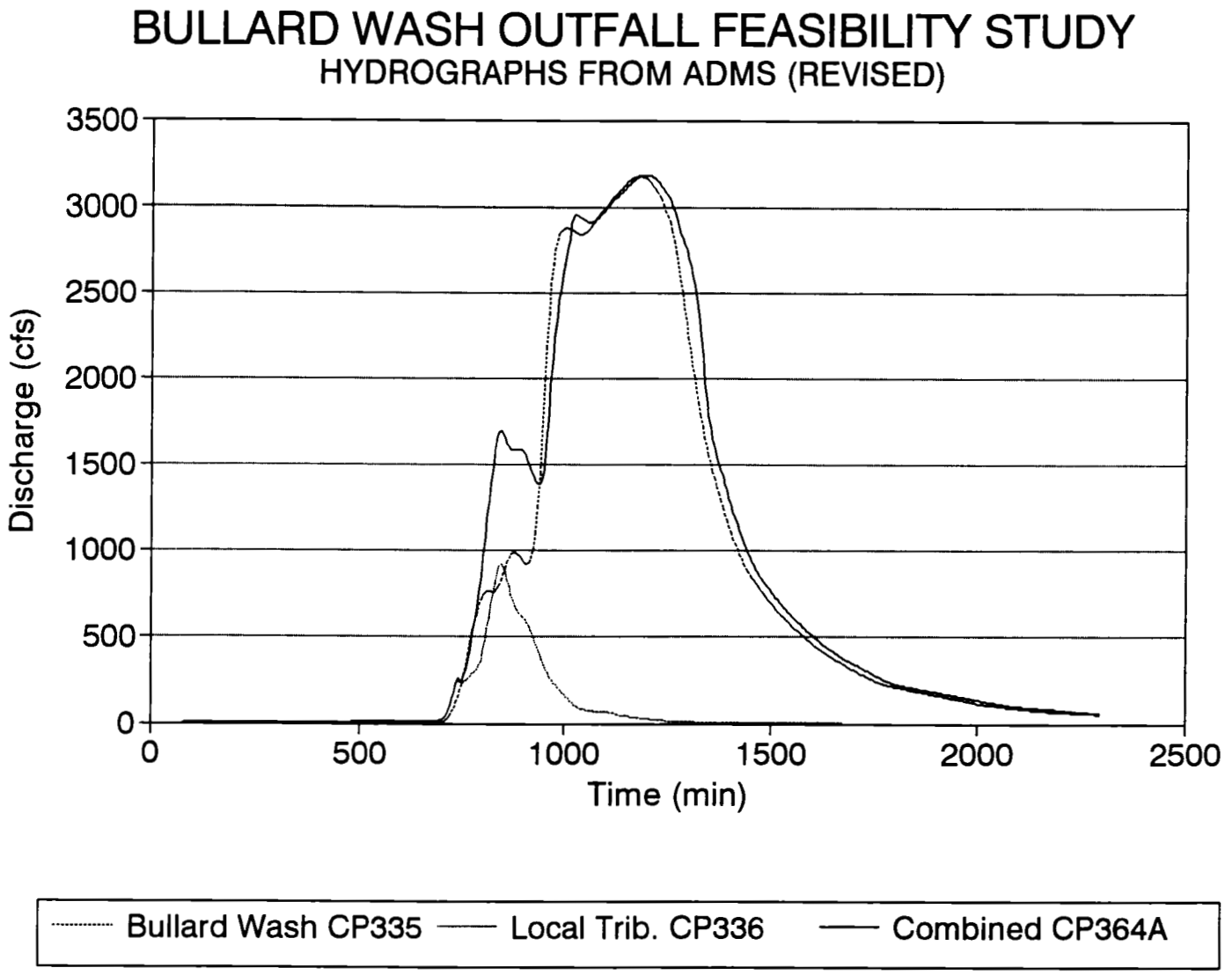

BULLARD WASH OUTFALL FEASIBILITY STUDY
HYDROGRAPHS FROM ADMS (REVISED)
Discharge (cfs)
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
Time (min)
Bullard Wash CP335
Local Trib. CP336
Combined CP364A

**FIGURE 8**

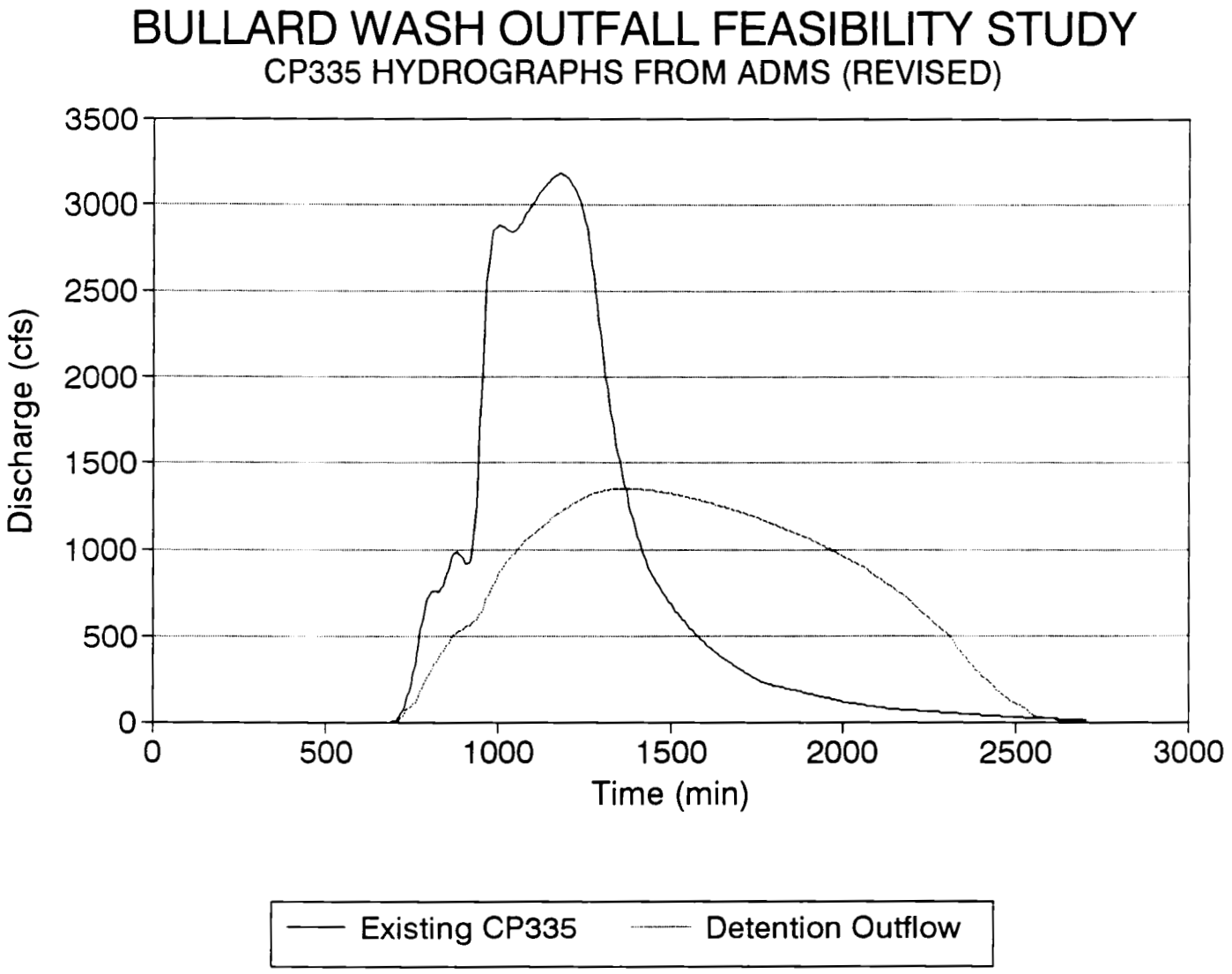

BULLARD WASH OUTFALL FEASIBILITY STUDY
CP335 HYDROGRAPHS FROM ADMS (REVISED)
Discharge (cfs)
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
3000
Time (min)
Existing CP335
Detention Outflow

**FIGURE 9**

## HEC-1 AND HEC-2 FILENAMES AND DESCRIPTIONS

HEC-1

| | |
|---|---|
| ADMS_H1 | Original White Tanks/Agua Fria ADMS HEC-1 by the WLB Group provided by the District. |
| 12278H1A | Revised HEC-1 for Bullard Wash reflecting flood control improvements, 100-year, 24-hour storm, and NOAA Atlas 2 depth-area reduction factors. |
| 12278H1B | Same as 12278H1A except for a 100-year, 6-hour storm and FCDMC Hydrology Manual depth-area reduction factors. |
| 12278H1C | HEC-1 model of Detention Basin 1. |

HEC-2

| | |
|---|---|
| ADMS_H2A | Original White Tanks/Agua Fria ADMS HEC-2 by the WLB Group provided by the District. The model includes the reach downstream of Yuma Road. |
| 12278H2A | Revised HEC-2 model incorporating revised 100-year peak flow rates from 12278H1A. |

## REFERENCES


1. White Tanks/Agua Fria Area Drainage Master Study, Flood Control District of Maricopa County, The WLB Group, Inc., October 1992.

2. Flood Delineation Study of Salt-Gila Rivers (Preliminary), Flood Control District of Maricopa County, Michael Baker Jr., Inc., July 1994.

3. Gila River Study, Flood Control District of Maricopa County, Dames & Moore, (no date).

4. Aerial Topography for White Tanks/Agua Fria Area Drainage Master Study, Flood Control District of Maricopa County, The WLB Group, Inc., Cooper Aerial of Phoenix, Inc., Flight Date: December 22, 1989, Contour Intervals: 2 Feet.

5. Standard Drawings, June 1992, Arizona Department of Transportation, Highways Division, Structures Section.

6. Construction Costs 1993, Arizona Department of Transportation, Highway Division, Contracts and Specifications Section.

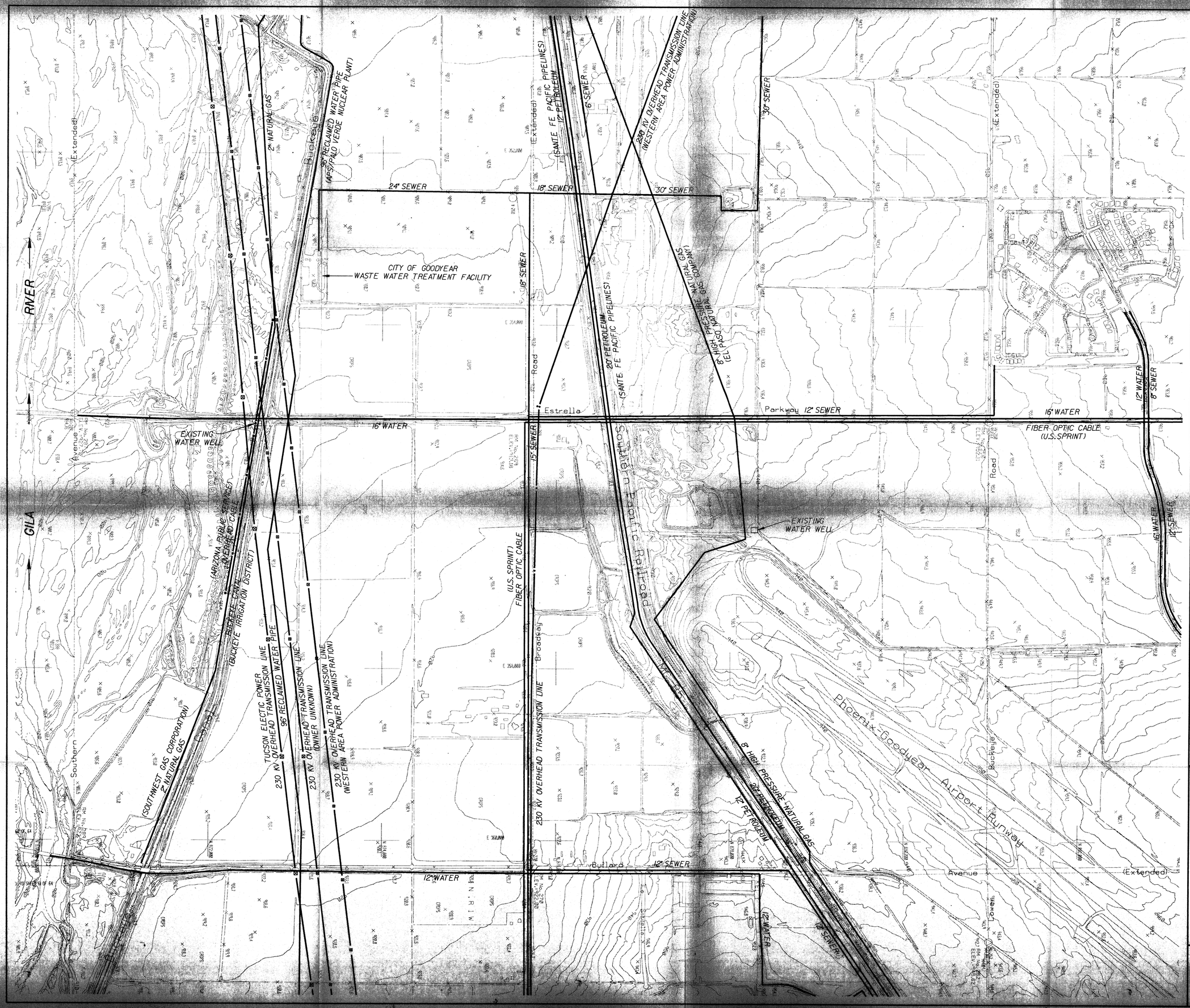
7. HEC-1 Flood Hydrograph Package, Version 4.0, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California, September 1990.

8. HEC-2 Water Surface Profiles, Version 4.6.2, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California, May 1991.

9. Drainage Design Manual for Maricopa County, Volume I - Hydrology, Flood Control District of Maricopa County, June 1992.

10. Drainage Design Manual for Maricopa County, Volume II - Hydraulics, Flood Control District of Maricopa County, November 1991.

11. Drainage Design Manual for Maricopa County, Volume III - Erosion Control, Flood Control District of Maricopa County, January 1993.




# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)

NOTES:

1. ALL UTILITY LOCATIONS SHOWN ARE APPROXIMATE. ONLY MAJOR UTILITIES HAVING A POTENTIAL CONFLICT WITH THIS PROPOSED PROJECT HAVE BEEN INVESTIGATED. OTHER LOCAL UTILITIES SUCH AS TELEPHONE, ELECTRIC, NATURAL GAS AND CABLE TELEVISION MAY BE PRESENT WITHIN THE PROJECT AREA.
2. ALL WATER AND SEWER UTILITIES SHOWN ARE CITY OF GOODYEAR.
3. THIS EXHIBIT DOES NOT ATTEMPT TO REFLECT THE NUMEROUS AGRICULTURAL IRRIGATION DELIVERY AND TAILWATER DITCHES, PIPE AND CONTROL FACILITIES PRESENT IN THE PROJECT AREA.

LEGEND

OVERHEAD ELECTRIC (WITH SELECTED POLES/TOWERS)

FIBER OPTIC CABLE (U.S. SPRINT) — UTILITY — UTILITY OWNER

N

400 200 0 400 800 1200

SCALE : 1" = 400'

CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA ADMS (FCD 89-70)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-22-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

# EXHIBIT 1
# EXISTING MAJOR UTILITIES

STANLEY CONSULTANTS, INC.
2929 EAST CAMELBACK ROAD, SUITE 150
PHOENIX, ARIZONA 85016 • (602) 912-8500

| | |
|---|---|
| DES. S.W. | CKD. G.S.B. |
| DRN. P.J.P. | APP. |
| DATE 10-27-94 | |
| SHEET 1 OF 1 | |
| DWG. | |
| PROJ. NO. 12278 | |

# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)

NOTES:

1. BULLARD WASH AND LOCALIZED FLOODPLAIN LIMITS ARE BASED ON WHITE TANKS/AGUA FRIA ADMS (FCD 89-70) PREPARED BY THE WLB GROUP. LIMITS AND Q100 DISCHARGES DO NOT REFLECT FUTURE DYSART DRAIN AND WHITE TANKS #3 FLOOD CONTROL PROJECTS.
2. GILA RIVER FLOODPLAIN LIMITS AND HEC-2 CROSS SECTIONS SHOWN ARE APPROXIMATE BASED ON PRELIMINARY STUDY BY MICHAEL BAKER JR., INC. (FCD 90-59 AND 92-01). PRELIMINARY INFORMATION DATED JULY 1994 WAS PROVIDED BY FCDMC. FLOODWAY ELEVATIONS (FW) NOT YET AVAILABLE. FLOODPLAIN ELEVATIONS FROM BAKER'S STUDY HAVE BEEN ADJUSTED TO WHITE TANKS/AGUA FRIA ADMS TOPOGRAPHIC DATUM BY THE FOLLOWING EQUATION:
   BAKER + 0.71 FT = WHITE TANKS/AGUA FRIA
3. CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMITS SHOWN ARE APPROXIMATE. LIMITS ARE BASED ON INFORMATION DATED AUGUST 1994 PROVIDED BY FCDMC.

LEGEND

- BULLARD WASH OR LOCALIZED FLOODPLAIN LIMIT
- BULLARD WASH FLOODWAY LIMIT
- CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMIT
- GILA RIVER FLOODPLAIN LIMIT
- ZONE A — FLOOD INSURANCE ZONE

N

400 200 0 400 800 1200

SCALE : 1" = 400'

CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA ADMS (FCD 89-70)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-22-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

# EXHIBIT 2

# EXISTING FLOODPLAIN AND CORPS 404 LIMITS

STANLEY CONSULTANTS, INC.
2929 EAST CAMELBACK ROAD, SUITE 130
PHOENIX, ARIZONA 85016 • (602) 912-6500

| | |
|---|---|
| DES. S.W. | CKD. G.S.B. |
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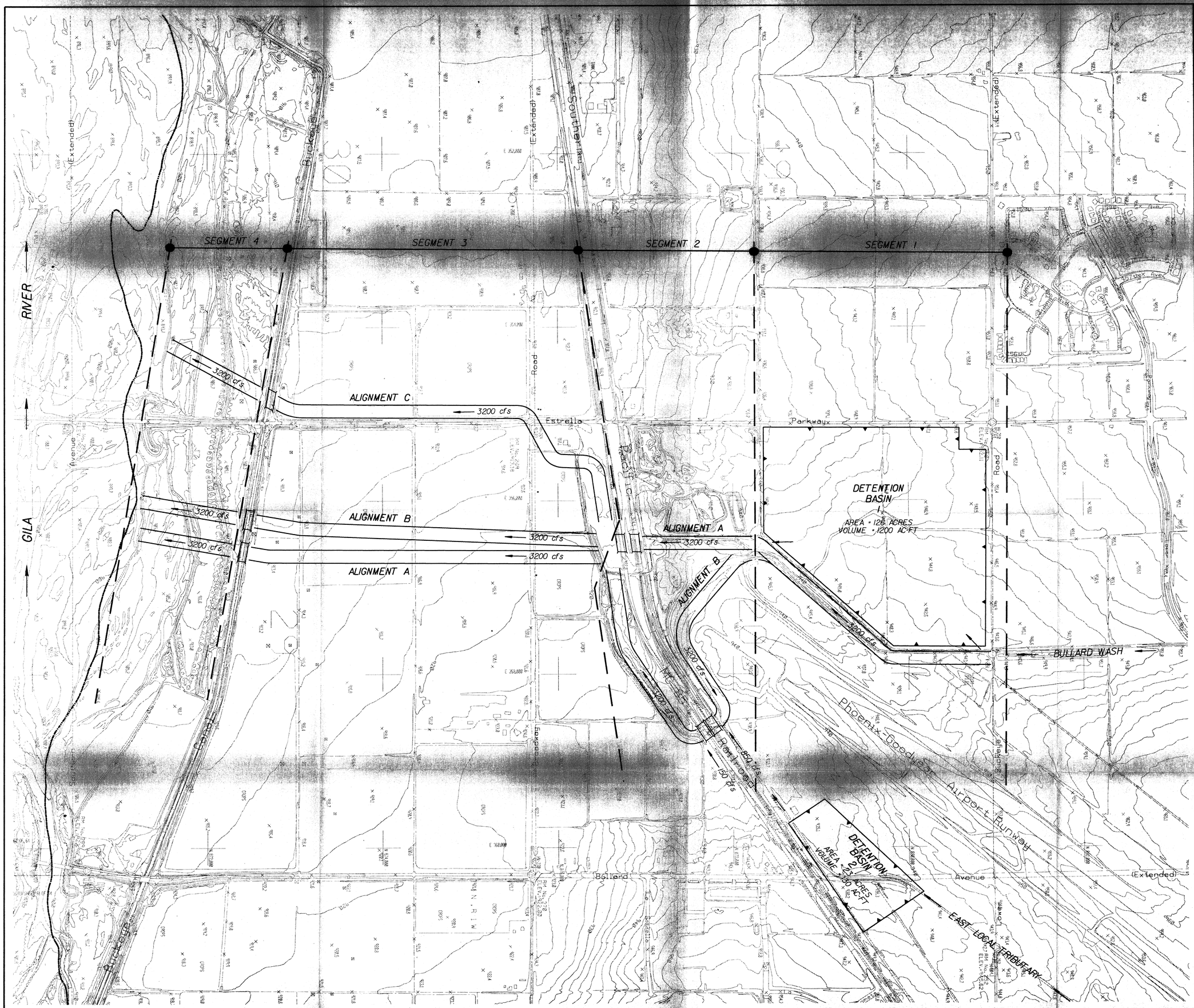
| DATE | 10-27-94 |
| SHEET | 1 OF 1 |
| DWG. | |
| PROJ. NO. | 12278 |




# BULLARD WASH OUTFALL FEASIBILITY STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FDC 94-06)

NOTES:

1. CHANNEL ALIGNMENTS ARE ILLUSTRATIVE AND DO NOT REPRESENT ACTUAL WIDTH.
2. DESIGN DISCHARGES ARE BASED ON WHITE TANKS/AGUA FRIA ADMS HEC-1 MODEL BY THE WLB GROUP REVISED BY STANLEY CONSULTANTS TO REFLECT FUTURE DYSART DRAIN AND WHITE TANKS #3 FLOOD CONTROL PROJECTS.

LEGEND

- ALTERNATIVE CHANNEL ALIGNMENT LOCATIONS
- CULVERT OR BRIDGE
- DETENTION BASIN
- 850 cfs — DESIGN DISCHARGE AND FLOW DIRECTION
- SEGMENT LIMITS
- CORPS 404 WATERS OF THE U.S. JURISDICTIONAL LIMIT

N

400 200 0 400 800 1200

SCALE : 1" = 400'

CONTOUR INTERVAL = 2'

BASE MAP: WHITE TANKS/AGUA FRIA ADMS (FCD 89-70)

MAPPING COMPANY: COOPER AERIAL OF PHOENIX INC. FLIGHT DATE 12-22-89

BULLARD WASH OUTFALL FEASIBILITY STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD 94-06)

## EXHIBIT 3

## CONCEPT ALTERNATIVES

STANLEY CONSULTANTS, INC.
2929 EAST CAMELBACK ROAD, SUITE 130
PHOENIX, ARIZONA 85016 • (602) 912-6500

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| DES. S.W. | CKD. G.S.B. |
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| DATE 10-27-94 | |
| SHEET 1 OF 1 | |
| DWG. | |
| PROJ. NO. 12278 | |

# APPENDIX B

# REVISED WHITE TANKS/AGUA FRIA ADMS HEC-1 HYDROLOGY

```
1****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
*            SEPTEMBER 1990            *                                    *   HYDROLOGIC ENGINEERING CENTER      *
*             VERSION 4.0              *                                    *         609 SECOND STREET            *
*                                      *                                    *      DAVIS, CALIFORNIA 95616         *
* RUN DATE  10/29/1994  TIME  10:38:33 *                                    *          (916) 756-1104              *
*                                      *                                    *                                      *
****************************************                                    ****************************************

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

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

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

1                                                HEC-1 INPUT                                                    PAGE  1

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

    1           ID     BULLARD WASH OUTFALL FEASIBILITY STUDY          STANLEY CONSULTANTS, INC.
    2           ID     FLOOD CONTROL DISTRICT OF MARICOPA COUNTY                    SCI #12278
    3           ID     (FCD #94-06)                                       INPUT FILE: 12278H1A
    4           ID
    5           ID     100-YEAR, 24-HOUR STORM
    6           ID     SCS TYPE II RAINFALL DISTRIBUTION
    7           ID     NOAA ATLAS 2, VOLUME VIII-ARIZONA DEPTH-AREA REDUCTION
    8           ID     ONLY BULLARD WASH CONTRIB AREA CONSIDERED; HC FIELD 2, TAREA ADJUSTED
    9           ID
   10           ID     ****************************************************************************
   11           ID     THIS MODEL IS DERIVED FROM THE WHITE TANKS/AGUA FRIA AREA DRAINAGE MASTER
   12           ID     STUDY (ADMS) CONDUCTED BY THE WLB GROUP FOR FCDMC AND DATED OCTOBER 1992.
   13           ID     THE BASIC ADMS MODEL PARAMETERS AND METHODOLGY HAVE NOT BEEN CHANGED.  THE
   14           ID     SUB-BASINS CONTRIBUTING TO BULLARD WASH HAVE BEEN ISOLATED FROM THE REST
   15           ID     OF THE ORIGINAL WLB MODEL. THIS MODEL REFLECTS PROPOSED DYSART DRAIN AND
   16           ID     WHITE TANKS #3 FLOOD CONTROL IMPROVEMENTS.
   17           ID     ****************************************************************************
   18           ID
                *DIAGRAM
   19           IT       5                    300
   20           IO       5
   21           IN      15
   22           JD    4.03    .001
   23           PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
   24           PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   25           PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   26           PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   27           PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   28           PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   29           PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   30           PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   31           PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   32           PC    .983    .986    .989    .992    .995    .998    1.00   1.000   1.000   1.000
   33           JD    3.99      10
   34           JD    3.83      50
   35           JD    3.76     100
   36           JD    3.70     200

   37           KK     159
   38           KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 159
   39           BA     .58
   40           LG     .35     .34    3.81     .65     .00
   41           UI     66.    169.    316.    407.    539.    797.    641.    495.    375.    269.
   42           UI    139.    105.     66.     33.     20.     20.     20.      0.      0.      0.
   43           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

   44           KK    R159
   45           KM        ROUTE FLOW FROM CP159 TO CP160
   46           RS       1              -1       0
   47           RC    .022    .022    .025    .830   .0036
   48           RX    1000    1001    1002    1020    1060    1150    1320    1440
   49           RY    1265    1265    1265    1264    1264    1266    1268    1270
1                                                HEC-1 INPUT                                                    PAGE  2

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

   50           KK     160
   51           KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 160
   52           BA     .39
   53           LG     .35     .33    3.98     .34     .00
   54           UI     41.     92.    184.    238.    301.    435.    474.    354.    279.    216.
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 55          UI    150.     79.     64.     41.     22.     13.     13.     13.     13.      0.
 56          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 57          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 58          KK   CP160
 59          KM        ADD HYDROGRAPHS AT CP160
 60          HC       2     .97

 61          KK    R160
 62          KM        ROUTE FLOW FROM CP160 TO CP161
 63          RS       3              -1       0
 64          RC    .075     .04     .04    2650   .0072
 65          RX    1000    1001    1210    1630    1670    1688    1689    1690
 66          RY    1259    1259    1258    1256    1256    1257    1257    1257

 67          KK     161
 68          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 161
 69          BA     .50
 70          LG     .49     .03    4.09     .77     .00
 71          UI     24.     24.     24.     70.     92.    114.    127.    140.    155.    176.
 72          UI    195.    236.    297.    307.    258.    225.    202.    184.    161.    145.
 73          UI    127.    115.     93.     70.     43.     42.     40.     36.     24.     24.
 74          UI     23.      7.      7.      7.      7.      7.      7.      7.      7.      7.
 75          UI      7.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 76          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 77          KK   CP161
 78          KM        ADD HYDROGRAPHS AT CP161
 79          HC       2    1.47

 80          KK    R161
 81          KM        ROUTE FLOW FROM CP161 TO CP163
 82          RS       6              -1       0
 83          RC     .08     .04     .04    5280   .0074
 84          RX    1000    1500    1910    2455    2470    2488    2489    2490
 85          RY    1226    1224    1222    1220    1220    1221    1221    1221

 86          KK     162
 87          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 162
 88          BA     .25
 89          LG     .50     .00    3.96     .59     .00
 90          UI     22.     35.     86.    114.    137.    169.    233.    270.    206.    170.
 91          UI    138.    110.     78.     44.     37.     26.     22.      7.      7.      7.
 92          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 93          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE  3

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

 94          KK    R162
 95          KM        ROUTE FLOW FROM CP162 TO CP163
 96          RS       8              -1       0
 97          RC     .08     .04     .04    5460   .0062
 98          RX    1000    1500    1910    2455    2470    2488    2489    2490
 99          RY    1226    1224    1222    1220    1220    1221    1221    1221

100          KK     163
101          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 163
102          BA     .75
103          LG     .50     .00    3.70     .42     .00
104          UI     37.     37.     37.    107.    140.    173.    193.    212.    235.    267.
105          UI    296.    361.    456.    458.    383.    336.    303.    274.    240.    216.
106          UI    187.    170.    133.    101.     65.     63.     60.     51.     37.     37.
107          UI     30.     11.     11.     11.     11.     11.     11.     11.     11.     11.
108          UI     11.      0.      0.      0.      0.      0.      0.      0.      0.      0.
109          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

110          KK   1I163
111          KM        ADD HYDROGRAPHS AT CP163
112          HC       2    1.0

113          KK   CP163
114          KM        ADD HYDROGRAPHS AT CP163
115          HC       2    2.47

116          KK    D163
117          KM        DIVERT TO CP176A FROM CP163
118          DT  DI176A
119          DI       0      72     427    1229    2615    4708    5777    6545    8336   11092
120          DQ       0       0       0       0       0       0       9      95     329     762

121          KK    D163
122          KM        RETURN DIVERT AT CP163
123          DR  DI176A

124          KK    R163
125          KM        ROUTE FLOW FROM CP163 TO CP176A
126          RS       6              -1       0
127          RC    .035    .035    .075    5280   .0040
128          RX    1000    1001    1002    1010    1025    1320    1620    1845
129          RY    1197    1197    1197    1196    1196    1198    1200    1202

130          KK    176A
131          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 176A
132          BA     .62
133          LG     .50     .00    4.09     .42     .00
134          UI     24.     24.     24.     24.     79.     89.    106.    118.    131.    139.
135          UI    151.    166.    182.    200.    236.    283.    318.    279.    245.    221.
136          UI    203.    189.    171.    155.    142.    129.    117.    105.     87.     69.
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137          UI     46.     43.     41.     40.     37.     24.     24.     24.     21.      7.
138          UI      7.      7.      7.      7.      7.      7.      7.      7.      7.      7.
139          UI      7.      0.      0.      0.      0.      0.      0.      0.      0.      0.
140          UI      0.      0.      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


141          KK  CP176A
142          KM        ADD HYDROGRAPHS AT CP176A
143          HC       2    3.09

144          KK   D176A
145          KM        DIVERT TO CP191 FROM CP176A
146          DT   DI191
147          DI       0      47     164     349     497    1107    2599    4968    8289
148          DQ       0       0       0       0       0      60     278     719    1444

149          KK     174
150          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 174
151          BA     .45
152          LG     .35     .33    3.90     .33     .00
153          UI     62.    218.    346.    474.    735.    574.    418.    294.    145.     94.
154          UI     57.     19.     19.     19.      0.      0.      0.      0.      0.      0.
155          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

156          KK    R174
157          KM        ROUTE FLOW FROM CP174 TO CP176
158          RS       7              -1       0
159          RC    .025    .025    .025    7020   .0073
160          RX    1000    1040    1100    1200    1600    1620    1630    1750
161          RY    1223    1222    1220    1218    1218    1220    1222    1224

162          KK     175
163          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 175
164          BA     .28
165          LG     .35     .33    3.87     .33     .00
166          UI     38.    128.    207.    279.    440.    364.    267.    192.    103.     63.
167          UI     38.     15.     12.     12.      0.      0.      0.      0.      0.      0.
168          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

169          KK    D175
170          KM        DIVERT TO CP175A FROM CP175
171          DT  DI175A
172          DI       0      53     200     459     854    1367    2544    4308    6658    9613
173          DQ       0      53     200     459     854    1047    1478    2105    2915    3906

174          KK    R175
175          KM        ROUTE REMAINDER FROM CP175 TO CP176
176          RS       5              -1       0
177          RC    .025    .022    .022    6500   .0074
178          RX    1000    1100    1300    1420    1470    1558    1559    1560
179          RY    1226    1224    1222    1220    1220    1222    1222    1222

180          KK     176
181          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 176
182          BA     .67
183          LG     .35     .34    4.03     .35     .00
184          UI     66.    128.    279.    362.    449.    588.    817.    642.    515.    407.
185          UI    319.    208.    115.     99.     66.     37.     20.     20.     20.     20.
186          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
187          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE  5

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


188          KK   1I176
189          KM        ADD HYDROGRAPHS AT CP176
190          HC       2     .95

191          KK   CP176
192          KM        ADD HYDROGRAPHS AT CP176
193          HC       2    1.40

194          KK    R176
195          KM        ROUTE FLOW FROM CP176 TO CP191
196          RS       5              -1       0
197          RC    .035    .035    .075    5540   .0067
198          RX    1000    1001    1002    1025    1100    1400    1720    2050
199          RY    1163    1163    1163    1162    1162    1164    1166    1168

200          KK    D175
201          KM        RETURN DIVERT AT CP175
202          DR  DI175A

203          KK    R175
204          KM        ROUTE FLOW FROM CP175 TO CP175A
205          RS       2              -1       0
206          RC    .022    .022    .025    1560   .0013
207          RX    1000    1001    1002    1020    1055    1150    1190    1390
208          RY    1136    1136    1136    1134    1134    1136    1138    1140

209          KK    175A
210          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 175A
211          BA     .47
212          LG     .35     .33    3.80     .65     .00
213          UI     42.     66.    162.    215.    258.    317.    439.    507.    388.    320.
214          UI    258.    207.    147.     82.     69.     48.     41.     13.     13.     13.
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 215        UI     13.     13.      0.      0.      0.      0.      0.      0.      0.      0.
 216        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 217        KK  CP175A
 218        KM        ADD HYDROGRAPHS AT CP175A
 219        HC       2     .75

 220        KK   R175A
 221        KM        ROUTE FLOW FROM CP175A TO CP189
 222        RS      11              -1       0
 223        RC    .022    .022    .025    3300   .0009
 224        RX    1000    1001    1002    1020    1035    1170    1460    1720
 225        RY    1233    1233    1233    1232    1232    1234    1236    1238

 226        KK     189
 227        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 189
 228        BA     .51
 229        LG     .35     .35    4.17     .40     .00
 230        UI     52.    110.    229.    298.    372.    516.    631.    471.    376.    293.
 231        UI    219.    118.     88.     59.     43.     16.     16.     16.     16.      0.
 232        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 233        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE  6

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

 234        KK   CP189
 235        KM        ADD HYDROGRAPHS AT CP189
 236        HC       2    1.26

 237        KK    R189
 238        KM        ROUTE FLOW FROM CP189 TO CP190
 239        RS       8              -1       0
 240        RC     .08    .035    .035    6900   .0057
 241        RX    1000    1270    1700    2040    2090    2118    2119    2120
 242        RY    1212    1210    1208    1206    1206    1207    1207    1207

 243        KK     190
 244        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 190
 245        BA     .86
 246        LG     .50     .00    4.18     .42     .00
 247        UI     44.     44.     44.    141.    176.    209.    238.    261.    292.    331.
 248        UI    381.    482.    570.    492.    422.    374.    339.    297.    264.    232.
 249        UI    207.    167.    124.     77.     76.     72.     59.     44.     44.     31.
 250        UI     13.     13.     13.     13.     13.     13.     13.     13.     13.      0.
 251        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 252        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 253        KK   CP190
 254        KM        ADD HYDROGRAPHS AT CP190
 255        HC       2    2.12

 256        KK    R190
 257        KM        ROUTE FLOW FROM CP190 TO CP191
 258        RS       5              -1
 259        RC    .075    .035    .035    5280   .0076
 260        RX    1000    1260    2080    2310    2330    2358    2359    2360
 261        RY    1182    1180    1178    1176    1176    1177    1177    1177

 262        KK   D176A
 263        KM        RETURN DIVERT AT CP176A
 264        DR   DI191

 265        KK   R176A
 266        KM        ROUTE FLOW FROM CP176A TO CP191
 267        RS       4              -1       0
 268        RC    .035    .035     .08    5280   .0062
 269        RX    1000    1001    1002    1025    1100    1400    1720    2050
 270        RY    1163    1163    1163    1162    1162    1164    1166    1168

 271        KK   1I191
 272        KM        ADD HYDROGRAPHS AT CP191
 273        HC       3    6.33

 274        KK     191
 275        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 191
 276        BA     .99
 277        LG     .50     .00    3.59     .41     .00
 278        UI     39.     39.     39.     40.    127.    144.    170.    189.    210.    223.
 279        UI    243.    267.    293.    322.    381.    459.    509.    443.    389.    353.
1                                          HEC-1 INPUT                                          PAGE  7

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

 280        UI    324.    301.    272.    247.    227.    204.    186.    166.    135.    111.
 281        UI     70.     68.     65.     63.     56.     39.     39.     39.     30.     12.
 282        UI     12.     12.     12.     12.     12.     12.     12.     12.     12.     12.
 283        UI     12.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 284        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 285        KK   CP191
 286        KM        ADD HYDROGRAPHS AT CP191
 287        HC       2    7.32

 288        KK   CP191
 289        KM        DIVERT TO CP208 FROM CP191
 290        DT   DI208
 291        DI       0      80     468    1339    2000    3000    4000    5000    6000
 292        DQ       0      80     468    1339    1339    1339    1339    1339    1339
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293          KK    R191
294          KM        ROUTE REMAINDER FROM CP191 TO CP192A
295          RS       5              -1       0
296          RC     .08     .04     .04    2640   .0045
297          RX    1000    1350    1800    2200    2225    2278    2279    2280
298          RY    1148    1146    1144    1142    1142    1143    1143    1143

299          KK    192A
300          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 192A
301          BA     .50
302          LG     .50     .00    4.18     .41     .00
303          UI     22.     22.     22.     50.     79.     96.    110.    122.    133.    146.
304          UI    164.    180.    217.    267.    291.    246.    215.    194.    178.    160.
305          UI    142.    129.    114.    105.     85.     64.     43.     40.     37.     37.
306          UI     25.     22.     22.     17.      7.      7.      7.      7.      7.      7.
307          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
308          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

309          KK  CP192A
310          KM        ADD HYDROGRAPHS AT CP192A
311          HC       2    7.82

312          KK   R192A
313          KM        ROUTE REMAINDER FROM CP192A TO CP192
314          RS       9              -1       0
315          RC     .08     .04     .04    2640   .0045
316          RX    1000    1350    1800    2200    2225    2278    2279    2280
317          RY    1148    1146    1144    1142    1142    1143    1143    1143

318          KK     192
319          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 192
320          BA     .50
321          LG     .50     .00    4.18     .41     .00
322          UI     22.     22.     22.     51.     80.     96.    110.    123.    134.    147.
323          UI    165.    182.    219.    270.    290.    245.    215.    193.    178.    159.
324          UI    142.    129.    114.    104.     83.     64.     41.     40.     37.     37.
325          UI     24.     22.     22.     16.      7.      7.      7.      7.      7.      7.
326          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
327          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE  8

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


328          KK   CP192
329          KM        ADD HYDROGRAPHS AT CP192
330          HC       2    8.32

331          KK    D192
332          KM        DIVERT TO CP209 FROM CP192
333          DT   DI209
334          DI       0     126     480     965    3703    6169    9453
335          DQ       0     126     419     853    3404    5491    8154

336          KK    D192
337          KM        DIVERT TO CP210 FROM CP192
338          DT   DI210
339          DI       0      61     112     299     678    1299    2208
340          DQ       0       0       0       0       0     433     736

341          KK     188
342          KM        RUNOFFF HYDROGRAPH FROM SUB-BASIN 188
343          BA     .19
344          LG     .35     .33    4.11     .51     .00
345          UI     29.    120.    179.    274.    326.    221.    152.     76.     44.     24.
346          UI      9.      9.      0.      0.      0.      0.      0.      0.      0.      0.
347          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

348          KK    R188
349          KM        ROUTE FLOW FROM CP188 TO CP207A
350          RS       3              -1
351          RC    .025    .022    .025    5460   .0079
352          RX    1000    1100    1200    1210    1230    1335    1355    1510
353          RY    1240    1214    1212    1210    1210    1212    1214    1240

354          KK    207A
355          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 207A
356          BA     .50
357          LG     .35     .34    4.03     .55     .00
358          UI     53.    124.    244.    314.    400.    593.    595.    448.    350.    270.
359          UI    176.     93.     76.     53.     20.     16.     16.     16.      0.      0.
360          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

361          KK  CP207A
362          KM        ADD HYDROGRAPHS AT CP207A
363          HC       2    0.69

364          KK   R207A
365          KM        ROUTE FLOW FROM CP207A TO CP214
366          RS       2              -1
367          RC    .022    .022    .025    3200   .0069
368          RX    1000    1020    1030    1045    1065    1085    1325    1490
369          RY    1179    1176    1172    1170    1170    1172    1174    1176
1                                          HEC-1 INPUT                                          PAGE  9

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


370          KK     214
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371          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 214
372          BA     .16
373          LG     .35      .35     4.16      .38      .00
374          UI     22.      81.     127.     176.     267.     201.     146.     100.      47.      31.
375          UI     18.       7.       7.       7.       0.       0.       0.       0.       0.       0.
376          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

377          KK   CP214
378          KM        ADD HYDROGRAPHS AT CP214
379          HC       2    0.85

380          KK    R214
381          KM        ROUTE FLOW FROM CP214 TO CP215
382          RS       1               -1
383          RC    .022     .022     .025     2250    .0049
384          RX    1000     1010     1030     1045     1070     1150     1190     1310
385          RY    1061     1060     1058     1056     1056     1058     1060     1062

386          KK    215A
387          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 215A
388          BA     .35
389          LG     .35      .33     3.94      .34      .00
390          UI     68.     251.     379.     628.     557.     376.     232.     101.      62.      19.
391          UI     18.       0.       0.       0.       0.       0.       0.       0.       0.       0.

392          KK   R215A
393          KM        ROUTE FLOW FROM CP215A TO CP215
394          RS       2               -1
395          RC    .025      .02     .025     2800    .0046
396          RX    1000     1190     1425     1435     1455     1478     1479     1480
397          RY    1158     1156     1154     1152     1152     1159     1159     1159

398          KK     215
399          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 215
400          BA     .35
401          LG     .35      .34     3.71      .31      .00
402          UI     39.      95.     181.     233.     303.     457.     398.     306.     235.     177.
403          UI     98.      65.      45.      29.      12.      12.      12.      12.       0.       0.
404          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

405          KK   1I215
406          KM        ADD HYDROGRAPHS AT CP215
407          HC       2     .70

408          KK   CP215
409          KM        ADD HYDROGRAPHS AT CP215
410          HC       2    1.55
```



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

411          KK    R215
412          KM        ROUTE FLOW FROM CP215 TO CP233
413          RS       3               -1
414          RC     .02       .02     .025     5280    .0032
415          RX    1000     1010     1020     1030     1050     1070     1190     1540
416          RY    1043     1042     1040     1038     1038     1040     1042     1044

417          KK     233
418          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 233
419          BA     .50
420          LG     .35      .35     4.22      .39      .00
421          UI     49.      94.     206.     267.     331.     430.     604.     483.     386.     306.
422          UI    242.     163.      86.      76.      49.      31.      15.      15.      15.      15.
423          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
424          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

425          KK   CP233
426          KM        ADD HYDROGRAPHS AT CP233
427          HC       2    2.05

428          KK    R233
429          KM        ROUTE FLOW FROM CP233 TO CP234
430          RS       2               -1
431          RC    .075     .035     .035     2640    .0057
432          RX    1000     1200     1540     1930     1965     1980     2009     2010
433          RY    1031     1030     1028     1026     1026     1028     1029     1029

434          KK     216
435          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 216
436          BA     .51
437          LG     .46      .09     4.21      .40      .00
438          UI     26.      26.      27.      88.     108.     128.     145.     160.     180.     203.
439          UI    240.     304.     342.     285.     246.     220.     198.     172.     154.     134.
440          UI    117.      89.      63.      47.      44.      43.      27.      26.      26.       9.
441          UI      8.       8.       8.       8.       8.       8.       8.       8.       0.       0.
442          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

443          KK    R216
444          KM        ROUTE FLOW FROM CP216 TO CP234
445          RS       4               -1
446          RC     .02       .02      .04     5280    .0044
447          RX    1000     1015     1020     1035     1070     1080     1140     1400
448          RY    1031     1030     1028     1026     1026     1028     1030     1032

449          KK     234
450          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 234
451          BA     .53
452          LG     .50      .00     4.25      .40      .00
```

```
453          UI     22.     22.     22.     35.     74.     87.    103.    113.    124.    134.
454          UI    148.    164.    179.    214.    259.    289.    250.    219.    197.    181.
455          UI    167.    149.    136.    122.    110.    100.     82.     63.     43.     39.
456          UI     37.     36.     30.     22.     22.     22.     11.      7.      7.      7.
457          UI      7.      7.      7.      7.      7.      7.      7.      7.      0.      0.
458          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 11

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


459          KK   11234
460          KM        ADD HYDROGRAPHS AT CP234
461          HC       2    1.04

462          KK   CP234
463          KM        ADD HYDROGRAPHS AT CP234
464          HC       2    3.09

465          KK    D234
466          KM        DIVERT FROM CP234 TO CP248
467          DT   1D248
468          DI       0     290     677    3521   13393
469          DQ       0       0     174    1824   10224

470          KK    R234
471          KM        ROUTE REMAINDER FROM CP234 TO CP235
472          RS       3              -1
473          RC     .06    .025    .025    2640   .0023
474          RX    1000    1460    1900    1915    1930    1958    1959    1960
475          RY    1018    1016    1016    1014    1014    1015    1015    1015

476          KK     207
477          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 207
478          BA    1.00
479          LG     .50     .00    3.99     .39     .00
480          UI     39.     39.     39.     39.    125.    143.    169.    187.    209.    222.
481          UI    241.    263.    291.    316.    374.    445.    510.    454.    399.    358.
482          UI    329.    306.    280.    252.    231.    210.    191.    174.    145.    111.
483          UI     83.     68.     66.     63.     63.     40.     39.     39.     39.     14.
484          UI     12.     12.     12.     12.     12.     12.     12.     12.     12.     12.
485          UI     12.     12.      0.      0.      0.      0.      0.      0.      0.      0.
486          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

487          KK    D207
488          KM        DIVERT FROM CP207 TO CP208
489          DT   2D208
490          DI       0    1709   12182
491          DQ       0    1314    6607

492          KK    R207
493          KM        ROUTE REMAINDER FROM CP207 TO CP217
494          RS       8              -1
495          RC    .035    .035    .075    5280   .0057
496          RX    1000    1001    1002    1015    1060    1490    1740    2250
497          RY    1151    1151    1151    1150    1150    1152    1154    1156

498          KK     217
499          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 217
500          BA     .49
501          LG     .50     .00    4.19     .38     .00
502          UI     22.     22.     22.     54.     81.     98.    112.    124.    135.    150.
503          UI    167.    188.    233.    278.    278.    235.    207.    188.    172.    152.
504          UI    137.    122.    109.     95.     73.     54.     40.     38.     37.     31.
505          UI     22.     22.     22.      7.      7.      7.      7.      7.      7.      7.
1                                          HEC-1 INPUT                                          PAGE 12

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

506          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
507          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

508          KK   CP217
509          KM        ADD HYDROGRAPHS AT CP217
510          HC       2    1.49

511          KK    D217
512          KM        DIVERT FROM CP217 TO CP218
513          DT   DI218
514          DI       0      90     884    6576   28127
515          DQ       0      51     163    1840   10674

516          KK    R217
517          KM        ROUTE REMAINDER FROM CP217 TO CP235
518          RS       7              -1
519          RC     .02     .03    .075    5280   .0036
520          RX    1000    1020    1035    1040    1050    1300    1640    1790
521          RY    1015    1014    1015    1014    1014    1016    1018    1019

522          KK     235
523          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 235
524          BA     .47
525          LG     .50     .00    4.27     .40     .00
526          UI     19.     19.     19.     28.     63.     74.     89.     98.    106.    115.
527          UI    126.    140.    152.    178.    216.    251.    228.    198.    177.    162.
528          UI    150.    135.    122.    112.     99.     91.     79.     62.     49.     34.
529          UI     33.     31.     31.     21.     19.     19.     19.      6.      6.      6.
530          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
531          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
532          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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533          KK   1I235
534          KM        ADD HYDROGRAPHS AT CP235
535          HC       2    1.96

536          KK   CP235
537          KM        ADD HYDROGRAPHS AT CP235
538          HC       2    5.05

539          KK    D235
540          KM        DIVERT FROM CP235 TO CP248
541          DT   2D248
542          DI       0     158     313    4490    9737
543          DQ       0       0     155    2380    5077

544          KK    R235
545          KM        ROUTE REMAINDER FROM CP235 TO CP236
546          RS       5              -1
547          RC     .04     .02     .02    5280   .0051
548          RX    1000    1640    1660    1675    1685    1778    1779    1780
549          RY    1097    1094    1095    1094    1094    1095    1095    1095
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

550          KK    D191
551          KM         RETURN DIVERTED HYDROGRAPH AT CP291 IN THE WTPHS1 HEC-1 MODEL
552          DR   DI208

553          KK    R191
554          KM        ROUTE FLOW FROM CP191 TO CP208
555          RS       5              -1       0
556          RC    .022    .022    .050    5280   .0040
557          RX    1000    1001    1002    1045    1110    1130   1160    1890
558          RY    1143    1143    1143    1142    1142    1143  1141.5   1150

559          KK     208
560          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 208
561          BA    1.00
562          LG     .50     .00    4.18     .42     .00
563          UI     40.     40.     40.     57.    133.    156.    188.    206.    224.    243.
564          UI    265.    294.    320.    371.    453.    523.    489.    424.    379.    346.
565          UI    321.    290.    262.    239.    215.    195.    172.    137.    110.     72.
566          UI     72.     67.     67.     50.     40.     40.     40.     17.     12.     12.
567          UI     12.     12.     12.     12.     12.     12.     12.     12.     12.      0.
568          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
569          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

570          KK   1I208
571          KM        ADD HYDROGRAPHS AT CP208
572          HC       2    8.32

573          KK    D207
574          KM        RETURN DIVERT AT CP207
575          DR   2D208

576          KK    R207
577          KM        ROUTE FLOW FROM CP207 TO CP208
578          RS       8              -1
579          RC    .075    .035    .035    5280   .0059
580          RX    1000    1001    1350    2000    2020    2038    2039    2040
581          RY    1056    1056    1054    1052    1052    1053    1053    1053

582          KK   CP208
583          KM        ADD HYDROGRAPHS AT CP208
584          HC       2    9.32

585          KK    D208
586          KM        DIVERT FROM CP208 TO CP219
587          DT   1D219
588          DI       0     599    5129    9299
589          DQ       0     406    1039    1295

590          KK    D208
591          KM        DIVERT FROM CP208 TO CP209A
592          DT  DI209A
593          DI       0     193    4090    8004
594          DQ       0     193    4066    7610
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

595          KK    R208
596          KM        ROUTE REMAINDER FROM CP208 TO CP218
597          RS      13              -1
598          RC    .025    .025    .035    5280   .0047
599          RX    1000    1001    1002    1010    1040    1055    1100    2010
600          RY    1123    1123    1123    1122    1122    1125    1124    1130

601          KK     218
602          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 218
603          BA    1.00
604          LG     .50     .00    4.20     .39     .00
605          UI     39.     39.     39.     41.    128.    145.    172.    191.    212.    225.
606          UI    246.    269.    295.    325.    385.    463.    514.    447.    393.    356.
607          UI    327.    304.    275.    249.    229.    206.    188.    168.    136.    112.
608          UI     71.     69.     65.     64.     57.     39.     39.     39.     31.     12.
609          UI     12.     12.     12.     12.     12.     12.     12.     12.     12.     12.
```

```
 610          UI     12.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 611          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 612          KK   1I218
 613          KM        ADD HYDROGRAPHS AT CP218
 614          HC       2   10.32

 615          KK    D217
 616          KM        RETURN DIVERT AT CP217
 617          DR   DI218

 618          KK    R217
 619          KM        ROUTE FLOW FROM CP217 TO CP218
 620          RS      10              -1
 621          RC    .075    .035    .035    5280   .0047
 622          RX    1000    1190    1650    1980    2030    2048    2049    2050
 623          RY    1123    1122    1120    1118    1118    1119    1119    1119

 624          KK   CP218
 625          KM        ADD HYDROGRAPHS AT CP218
 626          HC       2   10.81

 627          KK    D218
 628          KM        DIVERT FROM CP218 TO CP237
 629          DT   DI237
 630          DI       0      68    1086   10670
 631          DQ       0      68     664    2533

 632          KK    D218
 633          KM        DIVERT FROM CP218 TO CP219
 634          DT   2D219
 635          DI       0       0     422    8137
 636          DQ       0       0      99    2461
1                                         HEC-1 INPUT                                                    PAGE 15

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

 637          KK    R218
 638          KM        ROUTE REMAINDER FROM CP218 TO CP236
 639          RS       5              -1
 640          RC     .02     .02     .075    5280   .0040
 641          RX    1000    1001    1002    1020    1090    1100    1210    1720
 642          RY    1097    1097    1097    1096    1096    1099    1098    1102

 643          KK     236
 644          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 236
 645          BA    1.00
 646          LG     .50     .00    3.88     .45     .00
 647          UI     38.     38.     38.     38.    113.    137.    160.    180.    199.    214.
 648          UI    229.    251.    276.    297.    343.    419.    470.    474.    411.    366.
 649          UI    334.    310.    288.    261.    236.    220.    196.    181.    161.    132.
 650          UI    108.     70.     67.     64.     62.     60.     38.     38.     38.     38.
 651          UI     12.     12.     12.     12.     12.     12.     12.     12.     12.     12.
 652          UI     12.     12.     12.      0.      0.      0.      0.      0.      0.      0.
 653          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 654          KK   1I236
 655          KM        ADD HYDROGRAPHS AT CP236
 656          HC       2   11.87

 657          KK   CP236
 658          KM        ADD HYDROGRAPHS AT CP236
 659          HC       2   15.37

 660          KK    D236
 661          KM        DIVERT FROM CP236 TO CP249
 662          DT   DI249
 663          DI       0     236     411    6597   30351
 664          DQ       0       0      38    2223    8777

 665          KK    D236
 666          KM        DIVERT FROM CP236 TO CP250
 667          DT   1D250
 668          DI       0     236     373    4374   21574
 669          DQ       0       0     124    2251    8636

 670          KK    R236
 671          KM        ROUTE REMAINDER FROM CP236 TO CP237
 672          RS       2              -1
 673          RC     .02     .02     .02    2640   .0038
 674          RX    1000    1070    1100    1120    1150    1178    1179    1180
 675          RY    1079    1075    1082    1076    1076    1077    1077    1077

 676          KK    209A
 677          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 209A
 678          BA     .50
 679          LG     .50     .00    4.27     .41     .00
 680          UI     22.     22.     22.     42.     75.     89.    103.    115.    124.    137.
 681          UI    152.    166.    191.    238.    275.    260.    224.    199.    181.    167.
 682          UI    149.    134.    121.    108.     99.     80.     62.     40.     38.     36.
 683          UI     35.     26.     22.     22.     20.      7.      7.      7.      7.      7.
1                                         HEC-1 INPUT                                                    PAGE 16

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

 684          UI      7.      7.      7.      7.      7.      7.      0.      0.      0.      0.
 685          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 686          KK    D208
```

```
687          KM        RETURN DIVERT AT CP208
688          DR   DI209A

689          KK    R208
690          KM        ROUTE FLOW FROM CP208 TO CP209A
691          RS       2              -1
692          RC     .75      .03      .03     2640    .0045
693          RX    1000     1490     1890     1950     1970     1998     1999     2000
694          RY    1130     1128     1126     1124     1124     1125     1125     1125

695          KK   CP209A
696          KM        ADD HYDROGRAPHS AT CP209A
697          HC       2    9.82

698          KK   D209A
699          KM        DIVERT FROM CP209A TO CP220
700          DT   1D220
701          DI       0       57     5215    28650
702          DQ       0       39     1907     3775

703          KK   D209A
704          KM        DIVERT FROM CP209A TO CP209
705          DT   2D209
706          DI       0       18     3308    24875
707          DQ       0        0      900    10854

708          KK   R209A
709          KM        ROUTE REMAINDER FROM CP209A TO CP219
710          RS       7              -1
711          RC    .035     .035     .075     5280    .0045
712          RX    1000     1001     1002     1010     1200     1500     1880     2100
713          RY    1113     1113     1113     1112     1112     1114     1116     1117

714          KK    D208
715          KM        RETURN DIVERT AT CP208
716          DR   1D219

717          KK    R208
718          KM        ROUTE FLOW FROM CP208 TO CP219
719          RS      22              -1
720          RC    .075     .075     .075     6070    .0059
721          RX    1000     1001     1002     1270     2570     2698     2699     2700
722          RY    1115     1115     1115     1114     1114     1115     1115     1115

723          KK     219
724          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 219
725          BA     .50
726          LG     .50      .00     4.21      .40      .00
727          UI     22.      22.      22.      45.      77.      92.     105.     119.     128.     140.
728          UI    158.     173.     202.     247.     289.     253.     220.     196.     180.     164.
729          UI    146.     132.     119.     106.      93.      72.      55.      39.      38.      36.
1                                                HEC-1 INPUT                                                    PAGE 17

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

730          UI     33.      22.      22.      22.      12.       7.       7.       7.       7.       7.
731          UI      7.       7.       7.       7.       7.       0.       0.       0.       0.       0.
732          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

733          KK   1I219
734          KM        ADD HYDROGRAPHS AT CP219
735          HC       2     9.82

736          KK   2I219
737          KM        ADD HYDROGRAPHS AT CP219
738          HC       2    10.32

739          KK    D218
740          KM        RETURN DIVERT AT CP218
741          DR   2D219

742          KK    R218
743          KM        ROUTE FLOW FROM CP218 TO CP219
744          RS      12              -1
745          RC    .075      .04      .04     2640    .0045
746          RX    1000     1110     1290     1600     2050     2108     2109     2110
747          RY    1101     1100     1098     1096     1096     1097     1097     1097

748          KK   CP219
749          KM        ADD HYDROGRAPHS AT CP219
750          HC       2   11.81

751          KK    D219
752          KM        DIVERT FROM CP219 TO CP238
753          DT   DI238
754          DI       0       70     1410    16774
755          DQ       0       68      990    10452

756          KK    D219
757          KM        DIVERT FROM CP219 TO CP220
758          DT   2D220
759          DI       0        2      420     6322
760          DQ       0        0      174     3073

761          KK    R219
762          KM        ROUTE REMAINDER FROM CP219 TO CP237
763          RS      14              -1
764          RC    .035     .035     .075     5280    .0036
765          RX    1000     1001     1002     1020     1300     1820     2099     2100
766          RY    1087     1087     1087     1086     1086     1088     1089     1089
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767          KK    D218
768          KM        RETURN DIVERT AT CP218
769          DR   DI237
1                                        HEC-1 INPUT                                                    PAGE 18

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


770          KK    R218
771          KM        ROUTE FLOW FROM CP218 TO CP237
772          RS      14              -1
773          RC    .035    .035    .075    6700   .0046
774          RX    1000    1001    1002    1020    1300    1820    2099    2100
775          RY    1087    1087    1087    1086    1086    1088    1089    1089

776          KK     237
777          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 237
778          BA     .50
779          LG     .50     .00    3.61     .46     .00
780          UI     20.     20.     20.     23.     65.     74.     88.     98.    108.    115.
781          UI    126.    139.    151.    169.    204.    241.    255.    219.    195.    176.
782          UI    162.    150.    135.    123.    113.    100.     93.     80.     62.     49.
783          UI     35.     35.     32.     32.     23.     20.     20.     20.      9.      6.
784          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      6.
785          UI      6.      0.      0.      0.      0.      0.      0.      0.      0.      0.
786          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

787          KK   1I237
788          KM        ADD HYDROGRAPHS AT CP237
789          HC       2   11.31

790          KK   2I237
791          KM        ADD HYDROGRAPHS AT CP237
792          HC       2   12.31

793          KK   CP237
794          KM        ADD HYDROGRAPHS AT CP237
795          HC       2   16.87

796          KK    D237
797          KM        DIVERT FROM CP237 TO CP250
798          DT   2D250
799          DI       0     292     346     629    3340   24038
800          DQ       0       0       0     103    1577   11878

801          KK    D237
802          KM        DIVERT FROM CP237 TO CP250A
803          DT  1D250A
804          DI       0     292     346     526    1763   12160
805          DQ       0       0      54     203     974    3738

806          KK    R237
807          KM        ROUTE REMAINDER FROM CP237 TO CP238
808          RS       1              -1
809          RC     .04     .02     .02    2640   .0049
810          RX    1000    1545    1560    1570    1585    1618    1619    1620
811          RY    1069    1066    1067  1062.5  1062.5    1067    1067    1067
1                                        HEC-1 INPUT                                                    PAGE 19

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


812          KK   1D192
813          KM        RETURN DIVERTED HYDROGRAPH FROM WTPHS1 HEC-1 MODEL
814          DR   DI209

815          KK    R192
816          KM        ROUTE FLOW FROM CP192 TO CP209
817          RS       5              -1       0
818          RC    .035    .035     .15    5280   .0045
819          RX    1000    1001    1002    1015    1200    1470    1840    2300
820          RY    1111    1111    1111    1110    1110    1112    1114    1116

821          KK     209
822          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 209
823          BA     .50
824          LG     .50     .00    3.85     .46     .00
825          UI     22.     22.     22.     51.     80.     97.    111.    123.    134.    148.
826          UI    166.    183.    221.    273.    289.    244.    215.    193.    178.    158.
827          UI    141.    128.    113.    103.     82.     64.     40.     40.     37.     37.
828          UI     23.     22.     22.     14.      7.      7.      7.      7.      7.      7.
829          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
830          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

831          KK   1I209
832          KM        ADD HYDROGRAPHS AT CP209
833          HC       2    8.82

834          KK   D209A
835          KM        RETURN DIVERT AT CP209A
836          DR   2D209

837          KK   R209A
838          KM        ROUTE FLOW FROM CP209A TO CP209
839          RS       7              -1
840          RC    .075    .035    .035    2640   .0057
841          RX    1000    1240    1700    1980    1990    3028    3029    3030
842          RY    1117    1116    1114    1112    1112    1113    1113    1113
```

```
843          KK   CP209
844          KM        ADD HYDROGRAPHS AT CP209
845          HC       2   11.32

846          KK    D209
847          KM        DIVERT FROM CP209 TO CP221
848          DT   1D221
849          DI       0      39    3983   16787
850          DQ       0      34    1666    5085

851          KK    D209
852          KM        DIVERT FROM CP209 TO CP210
853          DT   2D210
854          DI       0       5    2317   11702
855          DQ       0       0     703    5354
```



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

856          KK    R209
857          KM        ROUTE REMAINDER FROM CP209 TO CP220
858          RS       7              -1
859          RC    .035    .035    .075    5280   .0040
860          RX    1000    1001    1002    1015    1180    1560    1820    2050
861          RY    1091    1091    1091    1090    1090    1092    1094    1095

862          KK   D209A
863          KM        RETURN DIVERT AT CP209A
864          DR   1D220

865          KK   R209A
866          KM        ROUTE FLOW FROM CP209A TO CP220
867          RS      12              -1
868          RC    .075    .075    .075    6230   .0058
869          RX    1000    1001    1002    1090    1280    1298    1299    1300
870          RY    1140    1107    1107    1106    1106    1107    1107    1140

871          KK     220
872          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 220
873          BA     .50
874          LG     .50     .00    4.13     .41     .00
875          UI     22.     22.     22.     41.     74.     89.    103.    115.    124.    136.
876          UI    151.    166.    189.    237.    272.    262.    224.    199.    182.    167.
877          UI    150.    134.    122.    109.    100.     81.     62.     42.     38.     36.
878          UI     35.     27.     22.     22.     21.      7.      7.      7.      7.      7.
879          UI      7.      7.      7.      7.      7.      7.      0.      0.      0.      0.
880          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

881          KK   1I220
882          KM        ADD HYDROGRAPHS AT CP220
883          HC       2   10.32

884          KK   2I220
885          KM        ADD HYDROGRAPHS AT CP220
886          HC       2   11.82

887          KK    D219
888          KM        RETURN DIVERT AT CP219
889          DR   2D220

890          KK    R219
891          KM        ROUTE FLOW FROM CP219 TO CP220
892          RS       3              -1
893          RC    .075    .020    .020    2640   .0045
894          RX    1000    1460    1670    1700    1730    1768    1769    1770
895          RY    1088    1085    1087    1080    1080    1087    1087    1087

896          KK   CP220
897          KM        ADD HYDROGRAPHS AT CP220
898          HC       2   13.81
```



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

899          KK    D220
900          KM        DIVERT FROM CP220 TO CP239
901          DT   DI239
902          DI       0     735    9080   34764
903          DQ       0     537    3765    9314

904          KK    D220
905          KM        DIVERT FROM CP220 TO CP221
906          DT   2D221
907          DI       0     198    5315   25450
908          DQ       0     174    4011   17035

909          KK    R220
910          KM        ROUTE REMAINDER FROM CP220 TO CP238
911          RS      15              -1
912          RC    .035    .035    .075    5280   .0038
913          RX    1000    1001    1002    1020    1150    1670    1869    1870
914          RY    1033    1033    1033    1032    1032    1034    1036    1036

915          KK    D219
916          KM        RETURN DIVERT AT CP219
917          DR   DI238

918          KK    R219
```

```
919          KM        ROUTE FLOW FROM CP219 TO CP238
920          RS       8              -1
921          RC    .035     .035    .075    6230   .0051
922          RX    1000     1001    1002    1020    1150    1670    1869    1870
923          RY    1033     1033    1033    1032    1032    1034    1036    1036

924          KK     238
925          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 238
926          BA     .50
927          LG     .50      .00    3.52     .47     .00
928          UI     21.      21.     21.     34.     70.     83.     98.    108.    118.    127.
929          UI    140.     156.    170.    204.    247.    273.    234.    206.    185.    170.
930          UI    157.     140.    127.    115.    104.     93.     76.     60.     39.     37.
931          UI     35.      34.     27.     21.     21.     21.      9.      6.      6.      6.
932          UI      6.       6.      6.      6.      6.      6.      6.      6.      0.      0.
933          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.

934          KK   1I238
935          KM        ADD HYDROGRAPHS AT CP238
936          HC       2   12.31

937          KK   2I238
938          KM        ADD HYDROGRAPHS AT CP238
939          HC       2   14.31
```



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

940          KK   CP238
941          KM        ADD HYDROGRAPHS AT CP238
942          HC       2   19.37

943          KK    D238
944          KM        DIVERT FROM CP238 TO CP250A
945          DT  2D250A
946          DI       0     180     568    2711    8584   18252
947          DQ       0       0       0     184     837    2617

948          KK    D238
949          KM        DIVERT FROM CP238 TO CP251
950          DT   1D251
951          DI       0     568    2527    7747   15635
952          DQ       0       0     522    2262    4829

953          KK    R238
954          KM        ROUTE REMAINDER FROM CP238 TO CP239
955          RS       4              -1
956          RC    .075     .02     .02    2640   .0023
957          RX    1000    1230    1780    1790    1800    1810    1829    1830
958          RY    1062    1060    1058    1056    1056    1058    1059    1059

959          KK   2D192
960          KM        RETURN DIVERTED HYDROGRAPH FROM WTPHS1 HEC-1 MODEL
961          DR   DI210

962          KK    R192
963          KM        ROUTE FLOW FROM CP192 TO CP210
964          RS       7              -1       0
965          RC     .15     .15     .15    5900   .0054
966          RX    1000    1001    1002    1050    2400    2548    2549    2550
967          RY  1113.5    1113    1113    1112    1112    1113    1113  1113.5

968          KK     210
969          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 210
970          BA     .46
971          LG     .50      .00    3.84     .52     .00
972          UI     20.      20.     20.     42.     71.     85.     97.    110.    118.    130.
973          UI    146.     160.    188.    230.    266.    232.    202.    180.    165.    151.
974          UI    133.     121.    108.     97.     84.     65.     49.     36.     35.     33.
975          UI     29.      20.     20.     20.      9.      6.      6.      6.      6.      6.
976          UI      6.       6.      6.      6.      6.      0.      0.      0.      0.      0.
977          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.

978          KK   1I210
979          KM        ADD HYDROGRAPHS AT CP210
980          HC       2    8.78
```



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

981          KK    D209
982          KM        RETURN DIVERT AT CP209
983          DR   2D210

984          KK    R209
985          KM        ROUTE FLOW FROM CP209 TO CP210
986          RS       6              -1
987          RC    .075    .035    .035    2560   .0030
988          RX    1000    1001    1630    2120    2250    2268    2269    2270
989          RY    1102    1102    1100    1098    1098    1099    1099    1099

990          KK   CP210
991          KM        ADD HYDROGRAPHS AT CP210
992          HC       2   11.78

993          KK    R210
994          KM        ROUTE FLOW FROM CP210 TO CP221
995          RS      14              -1
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```
 996          RC    .035     .035     .075     5450    .0033
 997          RX    1000     1001     1002     1020     1280     1880     2469     2470
 998          RY    1083     1083     1083     1082     1082     1084     1086     1088

 999          KK    D209
1000          KM        RETURN DIVERT AT CP209
1001          DR   1D221

1002          KK    R209
1003          KM        ROUTE FLOW FROM CP209 TO CP221
1004          RS      22              -1
1005          RC    .075     .075     .075     5910    .0044
1006          RX    1000     1001     1002     1120     2150     2278     2279     2280
1007          RY    1091     1091     1091     1090     1090     1091     1091     1091

1008          KK     221
1009          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 221
1010          BA     .48
1011          LG     .50      .00     3.53      .48      .00
1012          UI     20.      20.      20.      36.      69.      82.      96.     106.     116.     126.
1013          UI    139.     154.     172.     210.     250.     258.     220.     194.     176.     162.
1014          UI    147.     132.     120.     107.      97.      84.      66.      50.      36.      35.
1015          UI     33.      33.      20.      20.      20.      15.       6.       6.       6.       6.
1016          UI      6.       6.       6.       6.       6.       6.       6.       0.       0.       0.
1017          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1018          KK   1I221
1019          KM        ADD HYDROGRAPHS AT CP221
1020          HC       2   11.80

1021          KK   2I221
1022          KM        ADD HYDROGRAPHS AT CP221
1023          HC       2   12.26
```



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

1024          KK    D220
1025          KM        RETURN DIVERT AT CP220
1026          DR   2D221

1027          KK    R220
1028          KM        ROUTE FLOW FROM CP220 TO CP221
1029          RS       4              -1
1030          RC    .075     .035     .035     2200    .0023
1031          RX    1000     1001     1470     1870     2160     2178     2179     2180
1032          RY    1082     1082     1080     1078     1078     1081     1081     1081

1033          KK   CP221
1034          KM        ADD HYDROGRAPHS AT CP221
1035          HC       2   14.75

1036          KK    R221
1037          KM        ROUTE FLOW FROM CP221 TO CP239
1038          RS      20              -1
1039          RC    .075     .075     .075     5750    .0032
1040          RX    1000     1001     1002     1320     2850     2998     2999     2999
1041          RY    1100     1071     1071     1070     1070     1071     1071     1100

1042          KK    D220
1043          KM        RETURN DIVERT AT CP220
1044          DR   DI239

1045          KK    R220
1046          KM        ROUTE FLOW FROM CP220 TO CP239
1047          RS      21              -1
1048          RC    .075     .075     .075     5750    .0045
1049          RX    1000     1001     1002     1320     2850     2998     2999     3000
1050          RY    1071     1071     1071     1070     1070     1071     1071     1071

1051          KK     239
1052          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 239
1053          BA     .48
1054          LG     .50      .00     3.56      .47      .00
1055          UI     21.      21.      21.      41.      72.      86.     100.     112.     120.     133.
1056          UI    148.     161.     188.     231.     269.     247.     213.     191.     173.     159.
1057          UI    142.     128.     115.     104.      92.      74.      59.      37.      37.      34.
1058          UI     34.      23.      21.      21.      17.       6.       6.       6.       6.       6.
1059          UI      6.       6.       6.       6.       6.       6.       0.       0.       0.       0.
1060          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1061          KK   1I239
1062          KM        ADD HYDROGRAPHS AT CP239
1063          HC       2   14.29

1064          KK   2I239
1065          KM        ADD HYDROGRAPHS AT CP239
1066          HC       2   15.23
```



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

1067          KK   CP239
1068          KM        ADD HYDROGRAPHS AT CP239
1069          HC       2   20.79

1070          KK    D239
1071          KM        DIVERT FROM CP239 TO CP251
```

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1072          DT   2D251
1073          DI       0     283     389     786    3215
1074          DQ       0       0      69     333    2481

1075          KK    R239
1076          KM        ROUTE REMAINDER FROM CP239 TO CP240
1077          RS       5              -1
1078          RC     .05     .02     .02    2640   .0007
1079          RX    1000    1510    1755    1765    1775    1785    1809    1810
1080          RY    1058    1056    1054    1052    1052    1054    1055    1055

1081          KK     240
1082          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 240
1083          BA     .40
1084          LG     .50     .00    3.59     .48     .00
1085          UI     19.     19.     19.     53.     71.     89.     99.    110.    121.    136.
1086          UI    151.    180.    225.    249.    209.    182.    163.    149.    131.    117.
1087          UI    104.     92.     79.     59.     41.     34.     32.     32.     21.     19.
1088          UI     19.     11.      6.      6.      6.      6.      6.      6.      6.      6.
1089          UI      6.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1090          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1091          KK   CP240
1092          KM        ADD HYDROGRAPHS AT CP240
1093          HC       2   21.19

1094          KK    R240
1095          KM        ROUTE FLOW FROM CP240 TO CP241
1096          RS       5              -1
1097          RC    .025     .02     .02    3600   .0011
1098          RX    1000    1280    1620    1745    1770    1798    1799    1800
1099          RY    1056    1054    1052    1050    1050    1051    1051    1051

1100          KK     213
1101          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 213
1102          BA     .35
1103          LG     .35     .35    3.50     .28     .00
1104          UI     31.     51.    124.    164.    197.    244.    345.    374.    285.    235.
1105          UI    189.    151.    103.     56.     52.     32.     26.     10.     10.     10.
1106          UI     10.     10.      0.      0.      0.      0.      0.      0.      0.      0.
1107          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1108          KK    R213
1109          KM        ROUTE FLOW FROM CP213 TO CP212
1110          RS       8              -1
1111          RC    .025    .022    .025    4060   .0002
1112          RX    1000    1001    1140    1220    1290    1478    1479    1480
1113          RY  1077.7  1077.7    1076    1074    1074    1076  1077.7  1077.7
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1114          KK     212
1115          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 212
1116          BA     .54
1117          LG     .50     .00    3.59     .49     .00
1118          UI     18.     18.     18.     18.     34.     59.     69.     80.     87.     95.
1119          UI    102.    109.    116.    127.    137.    148.    171.    205.    226.    232.
1120          UI    203.    183.    167.    155.    146.    135.    124.    114.    106.     97.
1121          UI     89.     84.     70.     57.     49.     32.     32.     31.     30.     30.
1122          UI     22.     18.     18.     18.     17.      6.      6.      6.      6.      6.
1123          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
1124          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1125          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1126          KK   SR212
1127          KM        STORAGE ROUTE THROUGH CP212
1128          RS       1    STOR       0       0
1129          SV       0    2.48   13.74   26.18   63.33
1130          SQ       0       0       0     483    6314
1131          SE  1077.1    1078  1079.4    1080    1081

1132          KK   CP212
1133          KM        ADD HYDROGRAPHS AT CP212
1134          HC       2    0.89

1135          KK    R212
1136          KM        ROUTE FLOW FROM CP212 TO CP221A
1137          RS      11              -1
1138          RC    .025    .022    .025    5000   .0002
1139          RX    1000    1001    1070    1090    1220    1287    1289    1290
1140          RY    1077    1077    1076    1074    1074    1079    1079    1079

1141          KK     211
1142          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 211
1143          BA     .49
1144          LG     .50     .00    3.69     .52     .00
1145          UI     21.     21.     21.     40.     72.     86.    100.    112.    121.    132.
1146          UI    147.    162.    183.    231.    264.    258.    220.    196.    178.    165.
1147          UI    147.    132.    120.    107.     98.     81.     60.     43.     37.     35.
1148          UI     35.     28.     21.     21.     21.      8.      6.      6.      6.      6.
1149          UI      6.      6.      6.      6.      6.      6.      0.      0.      0.      0.
1150          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1151          KK    R211
1152          KM        ROUTE FLOW FROM CP211 TO CP221A
1153          RS       9              -1
1154          RC    .035    .035    .075    5400   .0009
1155          RX    1000    1001    1002    1020    1100    1620    2119    2120
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1156          RY    1081    1081    1081    1080    1080    1082    1084    1084
1                                           HEC-1 INPUT                                                          PAGE 27

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

1157          KK    221A
1158          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 221A
1159          BA     .31
1160          LG     .50     .00    3.66     .53     .00
1161          UI     12.     12.     12.     12.     36.     43.     50.     57.     63.     67.
1162          UI     72.     79.     87.     94.    109.    132.    151.    145.    126.    113.
1163          UI    103.     96.     88.     80.     73.     67.     60.     56.     48.     38.
1164          UI     32.     21.     21.     20.     19.     17.     12.     12.     12.      9.
1165          UI      4.      4.      4.      4.      4.      4.      4.      4.      4.      4.
1166          UI      4.      4.      4.      0.      0.      0.      0.      0.      0.      0.
1167          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1168          KK   1I221A
1169          KM        ADD HYDROGRAPHS AT CP221A
1170          HC       2     .80

1171          KK   SR221A
1172          KM        STORAGE ROUTE THROUGH CP221A
1173          RS       1    STOR       0       0
1174          SV       0    1.31    8.04   28.16      40
1175          SQ       0       0       0    2250    5262
1176          SE    1077    1078  1078.9    1080  1080.5

1177          KK   CP221A
1178          KM        ADD HYDROGRAPHS AT CP221A
1179          HC       2    1.69

1180          KK    R221A
1181          KM        ROUTE FLOW FROM CP221A TO CP222
1182          RS       6              -1
1183          RC    .025    .022    .022    7800   .0024
1184          RX    1000    1001    1070    1090    1220    1287    1289    1290
1185          RY    1077    1077    1076    1074    1074    1079    1079    1079

1186          KK     222
1187          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 222
1188          BA    1.10
1189          LG     .31     .35    3.59     .29   15.00
1190          UI     34.     34.     34.     34.     34.    112.    121.    135.    158.    168.
1191          UI    184.    194.    205.    219.    237.    257.    272.    305.    354.    407.
1192          UI    455.    414.    370.    337.    311.    291.    274.    257.    236.    218.
1193          UI    204.    189.    173.    163.    148.    130.     98.     87.     60.     60.
1194          UI     58.     56.     56.     47.     34.     34.     34.     34.     24.     10.
1195          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.     10.
1196          UI     10.     10.     10.     10.      0.      0.      0.      0.      0.      0.
1197          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1198          KK   CP222
1199          KM        ADD HYDROGRAPHS AT CP222
1200          HC       2    2.79
1                                           HEC-1 INPUT                                                          PAGE 28

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

1201          KK    R222
1202          KM        ROUTE FLOW FROM CP222 TO CP241
1203          RS       8              -1
1204          RC     .03    .025     .03    5770   .0022
1205          RX    1000    1100    1320    1540    2350    2470    2630    2710
1206          RY    1057    1056    1054    1052    1052    1054    1056    1057

1207          KK     226
1208          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 226
1209          BA    1.18
1210          LG     .15     .26    3.53     .34   17.00
1211          UI    134.    343.    641.    827.   1094.   1619.   1306.   1008.    765.    549.
1212          UI    283.    214.    134.     68.     41.     41.     41.      0.      0.      0.
1213          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1214          KK   SR226
1215          KM        STORAGE ROUTE THROUGH CP226
1216          RS       1    STOR       0       0
1217          SV       0    0.24    3.34   18.04   51.44  102.84  171.74
1218          SQ       0       0      21     136     428     875    1487
1219          SE  1075.2  1075.5    1076  1076.5    1077  1077.5    1078

1220          KK    R226
1221          KM        ROUTE FLOW FROM CP226 TO CP223
1222          RS      26              -1       0
1223          RC     .05     .05     .05    7840   .0011
1224          RX    1000    1200    1300    1500    1600    1800    1900    2000
1225          RY    1100  1074.5    1074    1073    1073    1074  1074.5    1100

1226          KK     201
1227          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 201
1228          BA     .34
1229          LG     .35     .35    3.56     .29     .00
1230          UI     38.     96.    180.    233.    304.    457.    381.    294.    225.    166.
1231          UI     86.     64.     40.     24.     12.     12.     12.      0.      0.      0.
1232          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1233          KK    R201
1234          KM        ROUTE FLOW FROM CP201 TO CP223
```

```
1235          RS      19              -1       0
1236          RC     .05     .035    .050    7000   .0017
1237          RX    1000     1200    1300    1500    1600    1800    1900    2000
1238          RY    1078   1074.5    1074    1073    1073    1074  1074.5    1078

1239          KK     223
1240          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 223
1241          BA    1.26
1242          LG     .12      .33    5.09     .20   72.00
1243          UI    119.     218.    491.    643.    786.   1003.   1453.   1254.    993.    797.
1244          UI    634.     465.    257.    200.    140.    112.     37.     37.     37.     37.
1245          UI     37.       0.      0.      0.      0.      0.      0.      0.      0.      0.
1246          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 29

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

1247          KK   1I223
1248          KM        ADD HYDROGRAPHS AT CP223
1249          HC       2    1.60

1250          KK   CP223
1251          KM        ADD HYDROGRAPHS AT CP223
1252          HC       2    2.78

1253          KK    D223
1254          KM        DIVERT FROM CP223 TO CP225
1255          DT   DI225
1256          DI       0      60     400    1000    4000    8000
1257          DQ       0      60      60      60      60      60

1258          KK    R223
1259          KM        ROUTE REMAINDER FROM CP223 TO CP224
1260          RS       4              -1
1261          RC     .03     .025     .03    2900   .0017
1262          RX    1000     1120    1350    1590    1780    1960    2129    2130
1263          RY    1067     1066    1064    1063    1063    1064  1065.5  1065.5

1264          KK     224
1265          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 224
1266          BA     .80
1267          LG     .35      .32    4.03     .25     .00
1268          UI     94.     258.    469.    606.    833.   1145.    854.    655.    492.    310.
1269          UI    163.     121.     79.     29.     29.     29.     29.      0.      0.      0.
1270          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.

1271          KK   CP224
1272          KM        ADD HYDROGRAPHS AT CP224
1273          HC       2    3.58

1274          KK    R224
1275          KM        ROUTE FLOW FROM CP224 TO CP241
1276          RS       7              -1
1277          RC     .03     .025     .03    5460   .0027
1278          RX    1000     1100    1320    1540    2350    2470    2630    2710
1279          RY    1057     1056    1054    1052    1052    1054    1056    1057

1280          KK     241
1281          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 241
1282          BA    1.51
1283          LG     .38      .28    4.04     .40     .00
1284          UI    133.     206.    513.    682.    817.   1005.   1376.   1635.   1253.   1036.
1285          UI    834.     673.    488.    276.    223.    162.    133.     50.     41.     41.
1286          UI     41.      41.      0.      0.      0.      0.      0.      0.      0.      0.
1287          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 30

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

1288          KK   1I241
1289          KM        ADD HYDROGRAPHS AT CP241
1290          HC       2    5.09

1291          KK   2I241
1292          KM        ADD HYDROGRAPHS AT CP241
1293          HC       2    7.88

1294          KK   CP241
1295          KM        ADD HYDROGRAPHS AT CP241
1296          HC       2   29.07

1297          KK   SR241
1298          KM        STORAGE ROUTE THROUGH CP241
1299          RS       1    STOR       0       0
1300          SV       0     .09     .65     .94    8.45   16.94
1301          SQ       0       4     280     324    1773    7505
1302          SE  1042.2    1044    1046  1046.3    1048    1049

1303          KK    R241
1304          KM        ROUTE FLOW FROM CP241 TO CP253
1305          RS       4              -1
1306          RC    .075     .03    .075    5700   .0039
1307          RX    1000     1001    1440    1565    1585    1700    2324    2325
1308          RY    1030     1030    1028    1026    1026    1028    1030    1030

1309          KK     253
1310          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 253
1311          BA    1.00
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1312        LG     .50     .00    3.82     .43     .00
1313        UI     42.     42.     42.     67.    140.    164.    195.    214.    235.    253.
1314        UI    280.    310.    339.    406.    491.    545.    470.    413.    371.    341.
1315        UI    314.    280.    255.    230.    207.    188.    153.    119.     80.     73.
1316        UI     70.     68.     56.     42.     42.     42.     20.     13.     13.     13.
1317        UI     13.     13.     13.     13.     13.     13.     13.     13.      0.      0.
1318        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1319        KK   1I253
1320        KM        ADD HYDROGRAPHS AT CP253
1321        HC       2   30.07

1322        KK    253A
1323        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 253A
1324        BA     .25
1325        LG     .32     .33    4.04     .37     .00
1326        UI     29.     75.    139.    179.    239.    349.    274.    211.    160.    111.
1327        UI     57.     43.     29.     12.      9.      9.      9.      0.      0.      0.
1328        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 31

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

1329        KK   R253A
1330        KM        ROUTE FLOW FROM CP253A TO CP253
1331        RS      10              -1
1332        RC    .075    .075    .075    2800   .0030
1333        RX    1000    1001    1010    1110    1320    1480    1709    1710
1334        RY    1027    1027    1026    1025    1025    1026    1027    1027

1335        KK   2I253
1336        KM        ADD HYDROGRAPHS AT CP253
1337        HC       2   30.32

1338        KK     247
1339        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 247
1340        BA     .50
1341        LG     .50     .00    4.21     .40     .00
1342        UI     21.     21.     21.     38.     72.     85.    100.    111.    121.    131.
1343        UI    145.    161.    180.    219.    261.    269.    229.    203.    183.    169.
1344        UI    153.    137.    125.    111.    101.     88.     68.     52.     37.     37.
1345        UI     35.     34.     21.     21.     21.     15.      6.      6.      6.      6.
1346        UI      6.      6.      6.      6.      6.      6.      6.      0.      0.      0.
1347        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1348        KK    D247
1349        KM        DIVERT FROM CP247 TO CP261
1350        DT   DI261
1351        DI       0    3183    4006    8756   30610
1352        DQ       0       0       0     293    4086

1353        KK    R247
1354        KM        ROUTE REMAINDER FROM CP247 TO CP248
1355        RS       6              -1
1356        RC    .075     .03     .03    5280   .0049
1357        RX    1000    1370    1800    1950    2080    2108    2109    2110
1358        RY    1100    1098    1096    1094    1094    1095    1095    1095

1359        KK     248
1360        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 248
1361        BA    1.00
1362        LG     .50     .00    4.22     .40     .00
1363        UI     37.     37.     37.     37.    108.    134.    156.    177.    194.    210.
1364        UI    225.    245.    269.    290.    328.    399.    454.    482.    417.    371.
1365        UI    338.    312.    291.    264.    241.    221.    201.    184.    169.    142.
1366        UI    107.     84.     66.     65.     61.     61.     45.     37.     37.     37.
1367        UI     24.     11.     11.     11.     11.     11.     11.     11.     11.     11.
1368        UI     11.     11.     11.     11.      0.      0.      0.      0.      0.      0.
1369        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1370        KK    D234
1371        KM        RETURN DIVERT AT CP234
1372        DR   1D248
1                                          HEC-1 INPUT                                          PAGE 32

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

1373        KK    R234
1374        KM        ROUTE FLOW FROM CP234 TO CP248
1375        RS       5              -1
1376        RC     .02     .02     .04    6550   .0050
1377        RX    1000    1001    1002    1040    1090    1100    1130    2000
1378        RY    1101    1101    1101    1100    1100    1101    1100    1102

1379        KK   1I248
1380        KM        ADD HYDROGRAPHS AT CP248
1381        HC       2    4.09

1382        KK   2I248
1383        KM        ADD HYDROGRAPHS AT CP248
1384        HC       2    4.59

1385        KK    D235
1386        KM        RETURN DIVERT AT CP235
1387        DR   2D248

1388        KK    R235
1389        KM        ROUTE FLOW FROM CP235 TO CP248
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1390          RS       4              -1
1391          RC     .02      .02     .04     5280    .0051
1392          RX    1000     1001    1002     1040     1090     1100     1130     2000
1393          RY    1101     1101    1101     1100     1100     1101     1100     1102

1394          KK   CP248
1395          KM        ADD HYDROGRAPHS AT CP248
1396          HC       2   12.55

1397          KK    D248
1398          KM        DIVERT FROM CP248 TO CP262
1399          DT   DI262
1400          DI       0      691    6380    18685
1401          DQ       0      683    5565    15348

1402          KK    R248
1403          KM        ROUTE REMAINDER FROM CP248 TO CP249
1404          RS      10              -1
1405          RC    .075     .035    .035     5280    .0036
1406          RX    1000     1290    1690     1970     2000     2028     2029     2030
1407          RY    1085     1084    1082     1080     1080     1081     1081     1081

1408          KK     249
1409          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 249
1410          BA    1.00
1411          LG     .50      .00    3.98      .48      .00
1412          UI     37.      37.     37.      37.     112.     136.     159.     179.     197.     213.
1413          UI    228.     249.    274.     294.     338.     415.     461.     478.     412.     368.
1414          UI    335.     310.    290.     261.     238.     220.     198.     181.     163.     135.
1415          UI    108.      75.     66.      64.      62.      62.      39.      37.      37.      37.
1416          UI     17.      11.     11.      11.      11.      11.      11.      11.      11.      11.
1417          UI     11.      11.     11.       0.       0.       0.       0.       0.       0.       0.
1418          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

1419          KK   1I249
1420          KM        ADD HYDROGRAPHS AT CP249
1421          HC       2   13.55

1422          KK    D236
1423          KM        RETURN DIVERT AT CP236
1424          DR   DI249

1425          KK    R236
1426          KM        ROUTE FLOW FROM CP236 TO CP249
1427          RS       6              -1
1428          RC     .02      .02    .075     5280    .0036
1429          RX    1000     1001    1002     1040     1100     1110     1280     1520
1430          RY    1073     1073    1073     1072     1072     1074     1076     1078

1431          KK   CP249
1432          KM        ADD HYDROGRAPHS AT CP249
1433          HC       2   17.87

1434          KK    D249
1435          KM        DIVERT FROM CP249 TO CP264
1436          DT   DI264
1437          DI       0       72     654     2109     5685
1438          DQ       0        0      66      481     1754

1439          KK    R249
1440          KM        ROUTE REMAINDER FROM CP249 TO CP250
1441          RS       6              -1
1442          RC     .05      .03     .03     5280    .0040
1443          RX    1000     1580    1660     1670     1705     1728     1729     1730
1444          RY    1100     1058    1059     1058     1058     1059     1059     1100

1445          KK    D236
1446          KM        RETURN DIVERT AT CP236
1447          DR   1D250

1448          KK    R236
1449          KM        ROUTE FLOW FROM CP236 TO CP250
1450          RS      39              -1
1451          RC    .075     .075    .075     7540    .0047
1452          RX    1000     1001    1002     1140     2330     2718     2719     2720
1453          RY    1071     1071    1071     1070     1070     1071     1071     1071

1454          KK     250
1455          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 250
1456          BA     .49
1457          LG     .50      .00    3.73      .47      .00
1458          UI     21.      21.     21.      40.      72.      86.     100.     112.     121.     132.
1459          UI    147.     161.    183.     230.     263.     258.     221.     196.     178.     165.
1460          UI    147.     132.    121.     107.      98.      82.      60.      43.      37.      35.
1461          UI     35.      28.     21.      21.      21.       8.       6.       6.       6.       6.
1462          UI      6.       6.      6.       6.       6.       6.       0.       0.       0.       0.
1463          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

1464          KK   1I250
1465          KM        ADD HYDROGRAPHS AT CP250
1466          HC       2   15.86
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1467          KK    D237
1468          KM        RETURN DIVERT AT CP237
1469          DR   2D250

1470          KK    R237
1471          KM        ROUTE FLOW FROM CP237 TO CP250
1472          RS      10              -1
1473          RC    .035     .035     .075     5280    .0032
1474          RX    1000     1001     1002     1010     1120     1670     1929     1930
1475          RY  1058.5   1058.5   1058.5     1058     1058     1060     1061     1061

1476          KK   2I250
1477          KM        ADD HYDROGRAPHS AT CP250
1478          HC       2   17.36

1479          KK   CP250
1480          KM        ADD HYDROGRAPHS AT CP250
1481          HC       2   19.86

1482          KK    R250
1483          KM        ROUTE FLOW FROM CP250 TO CP250A
1484          RS       5              -1
1485          RC     .05      .03      .03     3050    .0036
1486          RX    1000     1580     1660     1670     1705     1728     1729     1730
1487          RY    1100     1050     1051     1050     1050     1051     1051     1100

1488          KK    D237
1489          KM        RETURN DIVERT AT CP237
1490          DR  1D250A

1491          KK    R237
1492          KM        ROUTE FLOW FROM CP237 TO CP250A
1493          RS      12              -1
1494          RC     .02     .035     .075     6550    .0040
1495          RX    1000     1030     1050     1070     1220     1580     1839     1840
1496          RY    1051     1050     1051     1050     1050     1052     1054     1054

1497          KK    250A
1498          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 250A
1499          BA     .51
1500          LG     .50      .00     3.59      .47      .00
1501          UI     20.      20.      20.      25.      67.      77.      92.     102.     111.     120.
1502          UI    130.     145.     157.     178.     220.     251.     257.     221.     196.     179.
1503          UI    165.     152.     136.     125.     113.     102.      94.      78.      59.      44.
1504          UI     36.      35.      33.      33.      20.      20.      20.      18.       6.       6.
1505          UI      6.       6.       6.       6.       6.       6.       6.       6.       6.       6.
1506          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
1507          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

1508          KK  1I250A
1509          KM        ADD HYDROGRAPHS AT CP250A
1510          HC       2   17.38

1511          KK    D238
1512          KM        RETURN DIVERT AT CP238
1513          DR  2D250A

1514          KK    R238
1515          KM        ROUTE FLOW FROM CP238 TO CP250A
1516          RS      20              -1
1517          RC     .02     .035     .075     5280    .0030
1518          RX    1000     1030     1050     1070     1220     1580     1839     1040
1519          RY    1051     1050     1051     1050     1050     1052     1054     1054

1520          KK  2I250A
1521          KM        ADD HYDROGRAPHS AT CP250A
1522          HC       2   19.88

1523          KK  CP250A
1524          KM        ADD HYDROGRAPHS AT CP250A
1525          HC       2   22.87

1526          KK   D250A
1527          KM        DIVERT FROM CP250A TO CP265A
1528          DT  DI265A
1529          DI       0      825     2520     4782    10712
1530          DQ       0        0       13      174      958

1531          KK   D250A
1532          KM        DIVERT FROM CP250A TO CP266
1533          DT   1D266
1534          DI       0      825     2507     4608     9754
1535          DQ       0        0     1091     2426     4520

1536          KK   R250A
1537          KM        ROUTE REMAINDER FROM CP250A TO CP251
1538          RS       3              -1
1539          RC    .075      .03      .03     2550    .0031
1540          RX    1000     1001     1440     1650     1680     1708     1709     1710
1541          RY    1043     1043     1042     1040     1040     1041     1041     1041

1542          KK    D238
1543          KM        RETURN DIVERT AT CP238
1544          DR   1D251

1545          KK    R238
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1546          KM        ROUTE FLOW FROM CP238 TO CP251
1547          RS     42              -1
1548          RC   .075    .075    .075    5910   .0041
1549          RX   1000    1001    1002    1120    2210    2488    2489    2490
1550          RY   1047    1047    1047    1046    1046    1047    1047    1047
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1551          KK    251
1552          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 251
1553          BA    .50
1554          LG    .50     .00    3.53     .48     .00
1555          UI    21.     21.     21.     34.     70.     83.     98.    108.    118.    127.
1556          UI   141.    156.    171.    204.    248.    273.    234.    206.    185.    170.
1557          UI   157.    140.    127.    115.    104.     93.     75.     60.     38.     37.
1558          UI    35.     34.     27.     21.     21.     21.      9.      6.      6.      6.
1559          UI     6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
1560          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1561          KK   1I251
1562          KM        ADD HYDROGRAPHS AT CP251
1563          HC       2   19.87

1564          KK    D239
1565          KM        RETURN DIVERT AT CP239
1566          DR   2D251

1567          KK    R239
1568          KM        ROUTE FLOW FROM CP239 TO CP251
1569          RS       6              -1
1570          RC    .035    .035    .075    5280   .0034
1571          RX    1000    1001    1002    1055    1095    1770    1959    1960
1572          RY    1049    1049    1049    1048    1048    1050    1051    1051

1573          KK   2I251
1574          KM        ADD HYDROGRAPHS AT CP251
1575          HC       2   21.29

1576          KK   CP251
1577          KM        ADD HYDROGRAPHS AT CP251
1578          HC       2   24.79

1579          KK    D251
1580          KM        DIVERT FROM CP251 TO CP266
1581          DT   2D266
1582          DI       0      70     825    2936
1583          DQ       0      48     687    2384

1584          KK    R251
1585          KM        ROUTE REMAINDER FROM CP251 TO CP252
1586          RS       6              -1
1587          RC    .075    .035    .035    2640   .0019
1588          RX    1000    1001    1240    1880    1970    1998    1999    2000
1589          RY    1039    1039    1038    1036    1036    1037    1037    1037

1590          KK     252
1591          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 252
1592          BA    .50
1593          LG    .50     .00    4.45     .40     .00
1594          UI    21.     21.     21.     33.     69.     81.     97.    106.    116.    125.
1595          UI   138.    153.    167.    199.    241.    272.    237.    207.    187.    171.
1596          UI   158.    141.    128.    116.    104.     96.     79.     59.     43.     37.
```



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

1597          UI    35.     34.     30.     21.     21.     21.     13.      6.      6.      6.
1598          UI     6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
1599          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1600          KK   CP252
1601          KM        ADD HYDROGRAPHS AT CP252
1602          HC       2   25.29

1603          KK    D252
1604          KM        DIVERT FROM CP252 TO CP267
1605          DT   DI267
1606          DI       0      67    2745    5417   10449
1607          DQ       0      66    2582    5037    8991

1608          KK    R252
1609          KM        ROUTE REMAINDER FROM CP252 TO CP253
1610          RS      11              -1
1611          RC    .075    0.35    .035    2900   .0028
1612          RX    1000    1001    1002    1910    1930    1958    1959    1960
1613          RY    1032    1032    1030    1028    1028    1029    1029    1029

1614          KK   CP253
1615          KM        ADD HYDROGRAPHS AT CP253
1616          HC       2   34.82

1617          KK   SR253
1618          KM        STORAGE ROUTE THROUGH CP253
1619          RS       1    STOR       0       0
1620          SV       0    .045    3.58   16.31   29.98   43.46   60.96
1621          SQ       0       2     190     380    1145    3731    6823
1622          SE  1021.1    1022    1024  1025.3    1026  1026.5  1027.0
```

```
1623          KK    R253
1624          KM        ROUTE FLOW FROM CP253 TO CP268
1625          RS       7             -1
1626          RC    .075     .03    .075    5280   .0023
1627          RX    1000    1001    1002    1400    1520    2630    2629    2628
1628          RY    1100    1022    1022    1020    1020    1022    1022    1100

1629          KK     268
1630          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 268
1631          BA     .95
1632          LG     .50     .00    5.00     .38     .00
1633          UI     36.     36.     36.     36.    116.    134.    158.    176.    196.    209.
1634          UI    226.    247.    273.    295.    346.    413.    479.    436.    381.    343.
1635          UI    314.    291.    269.    240.    222.    201.    182.    169.    141.    109.
1636          UI     86.     64.     64.     60.     60.     43.     36.     36.     36.     20.
1637          UI     11.     11.     11.     11.     11.     11.     11.     11.     11.     11.
1638          UI     11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
1639          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 38

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

1640          KK   1I268
1641          KM        ADD HYDROGRAPHS AT CP268
1642          HC       2   35.77

1643          KK   D250A
1644          KM        RETURN DIVERT AT CP250A
1645          DR   1D266

1646          KK   R250A
1647          KM        ROUTE FLOW FROM CP250A TO CP266
1648          RS      15             -1
1649          RC     .03     .03    .075    6230   .0034
1650          RX    1000    1001    1002    1060    1110    1838    1839    1840
1651          RY    1031    1031    1031    1030    1030    1032    1032    1032

1652          KK     266
1653          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 266
1654          BA     .33
1655          LG     .50     .00    3.50     .47     .00
1656          UI     12.     12.     12.     12.     28.     40.     46.     54.     59.     64.
1657          UI     68.     73.     79.     87.     94.    108.    131.    145.    150.    130.
1658          UI    116.    106.     98.     92.     85.     77.     71.     65.     59.     55.
1659          UI     48.     39.     34.     21.     21.     20.     19.     19.     13.     12.
1660          UI     12.     12.      8.      4.      4.      4.      4.      4.      4.      4.
1661          UI      4.      4.      4.      4.      4.      4.      0.      0.      0.      0.
1662          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1663          KK   1I266
1664          KM        ADD HYDROGRAPHS AT CP266
1665          HC       2   23.20

1666          KK    D251
1667          KM        RETURN DIVERT AT CP251
1668          DR   2D266

1669          KK    R251
1670          KM        ROUTE FLOW FROM CP251 TO CP266
1671          RS       6             -1
1672          RC     .03     .03    .075    5280   .0025
1673          RX    1000    1001    1002    1060    1110    1838    1839    1840
1674          RY    1100    1031    1031    1030    1030    1032    1032    1032

1675          KK   CP266
1676          KM        ADD HYDROGRAPHS AT CP266
1677          HC       2   25.12

1678          KK    D266
1679          KM        DIVERT FROM CP266 TO CP283
1680          DT   DI283
1681          DI       0     231     647    1811    5693
1682          DQ       0      38      73     203    1051
1                                          HEC-1 INPUT                                          PAGE 39

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

1683          KK    R266
1684          KM        ROUTE REMAINDER FROM CP266 TO CP267
1685          RS       4             -1
1686          RC    .075    .035    .035    2500   .0036
1687          RX    1000    1001    1002    1680    1890    1908    1909    1910
1688          RY    1100    1021    1021    1020    1020    1021    1021    1100

1689          KK    D252
1690          KM        RETURN DIVERT AT CP252
1691          DR   DI267

1692          KK    R252
1693          KM        ROUTE FLOW FROM CP252 TO CP267
1694          RS       8             -1
1695          RC     .02     .03    .075    5280   .0032
1696          RX    1000    1020    1050    1065    1085    1590    1919    1920
1697          RY    1027    1026    1027    1026    1026    1028    1029    1029

1698          KK     267
1699          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 267
1700          BA     .50
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1701          LG     .50     .00    5.36     .36     .00
1702          UI     21.     21.     21.     33.     69.     81.     97.    106.    116.    125.
1703          UI    138.    153.    167.    199.    241.    272.    237.    207.    187.    171.
1704          UI    158.    141.    128.    116.    104.     96.     79.     59.     43.     37.
1705          UI     35.     34.     30.     21.     21.     21.     13.      6.      6.      6.
1706          UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
1707          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1708          KK   1I267
1709          KM        ADD HYDROGRAPHS AT CP267
1710          HC       2   25.79

1711          KK   CP267
1712          KM        ADD HYDROGRAPHS AT CP267
1713          HC       2   26.12

1714          KK    D267
1715          KM        DIVERT FROM CP267 TO CP284
1716          DT   DI284
1717          DI       0     5.4     506    3382
1718          DQ       0     5.4     412    1981

1719          KK    R267
1720          KM        ROUTE REMAINDER FROM CP267 TO CP268
1721          RS       5              -1
1722          RC    .075    .035    .035    2350   .0013
1723          RX    1000    1001    1220    1600    1890    1928    1929    1930
1724          RY    1017    1017    1016    1014    1014    1015    1015    1015
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1725          KK   CP268
1726          KM        ADD HYDROGRAPHS AT CP268
1727          HC       2   36.60

1728          KK   SR268
1729          KM        STORAGE ROUTE THROUGH CP268
1730          RS       1    STOR       0       0
1731          SV       0    7.04   46.85   92.08  124.01
1732          SQ       0       0     288    3172    8930
1733          SE  1008.3  1009.3    1011    1012  1012.5

1734          KK    R268
1735          KM        ROUTE FLOW FROM CP268 TO CP286
1736          RS      11              -1
1737          RC    .075     .05    .075    6700   .0031
1738          RX    1000    1001    1260    1650    2410    2870    2059    2060
1739          RY    1003    1003    1002    1000    1000    1002    1004    1004

1740          KK     286
1741          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 286
1742          BA     .70
1743          LG     .50     .00    5.06     .37     .00
1744          UI     30.     30.     30.     53.    101.    120.    141.    156.    170.    185.
1745          UI    205.    226.    253.    312.    367.    375.    320.    283.    256.    236.
1746          UI    214.    191.    175.    155.    141.    121.     93.     71.     53.     51.
1747          UI     49.     46.     30.     30.     30.     19.      9.      9.      9.      9.
1748          UI      9.      9.      9.      9.      9.      9.      9.      0.      0.      0.
1749          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1750          KK   1I286
1751          KM        ADD HYDROGRAPHS AT CP286
1752          HC       2   37.30

1753          KK     288
1754          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 288
1755          BA     .22
1756          LG     .50     .00    7.50     .19     .00
1757          UI      8.      8.      8.      8.     27.     31.     37.     41.     46.     49.
1758          UI     53.     58.     64.     69.     82.     98.    112.    100.     88.     79.
1759          UI     72.     67.     62.     56.     51.     46.     42.     39.     32.     24.
1760          UI     18.     15.     15.     14.     14.      9.      8.      8.      8.      3.
1761          UI      3.      3.      3.      3.      3.      3.      3.      3.      3.      3.
1762          UI      3.      3.      0.      0.      0.      0.      0.      0.      0.      0.
1763          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1764          KK    R288
1765          KM        ROUTE FLOW FROM CP288 TO CP286
1766          RS       3              -1
1767          RC    .035    .035    .075    1500   .0033
1768          RX    1000    1001    1002    1040    1055    1280    1849    1850
1769          RY     997     997     997     996     996     998    1000    1000
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1770          KK   CP286
1771          KM        ADD HYDROGRAPHS AT CP286
1772          HC       2   37.52

1773          KK    R286
1774          KM        ROUTE FLOW FROM CP286 TO CP287
1775          RS       2              -1
1776          RC    .075    .075    .075    1100   .0027
1777          RX    1000    1001    1210    1510    1950    2360    2529    2530
1778          RY    1000     993     992     990     990     992     993    1000
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1779          KK     287
1780          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 287
1781          BA     .23
1782          LG     .50      .00     3.77      .38      .00
1783          UI     15.      15.      39.      63.      77.      89.     103.     121.     158.     194.
1784          UI    165.     138.     120.     102.      87.      74.      56.      36.      27.      25.
1785          UI     18.      15.      11.       5.       5.       5.       5.       5.       5.       5.
1786          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
1787          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1788          KK   1I287
1789          KM        ADD HYDROGRAPHS AT CP287
1790          HC       2   37.75

1791          KK    D266
1792          KM        RETURN DIVERT AT CP266
1793          DR   DI283

1794          KK    R266
1795          KM        ROUTE FLOW FROM CP266 TO CP283
1796          RS      12               -1
1797          RC     .03      .03     .075     5900    .0017
1798          RX    1000     1001     1002     1030     1050     1240     1479     1480
1799          RY    1021     1021     1021     1020     1020     1022     1023     1023

1800          KK     283
1801          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 283
1802          BA     .16
1803          LG     .50      .00     3.52      .47      .00
1804          UI      7.       7.       7.      12.      23.      28.      32.      36.      39.      42.
1805          UI     47.      52.      58.      72.      84.      85.      73.      65.      58.      54.
1806          UI     49.      44.      40.      35.      32.      28.      21.      16.      12.      12.
1807          UI     11.      10.       7.       7.       7.       4.       2.       2.       2.       2.
1808          UI      2.       2.       2.       2.       2.       2.       2.       0.       0.       0.
1809          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1810          KK   CP283
1811          KM        ADD HYDROGRAPHS AT CP283
1812          HC       2   25.28
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1813          KK    R283
1814          KM        ROUTE FLOW FROM CP283 TO CP285B
1815          RS       5               -1
1816          RC    .075     .075     .075     1100    .0045
1817          RX    1000     1001     1002     1070     1700     1748     1849     1850
1818          RY    1001     1001     1001     1000     1000     1001     1001     1001

1819          KK    285B
1820          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 285B
1821          BA     .06
1822          LG     .50      .00     3.50      .47      .00
1823          UI      7.      20.      36.      47.      65.      86.      63.      48.      36.      21.
1824          UI     12.       9.       5.       2.       2.       2.       0.       0.       0.       0.
1825          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1826          KK  CP285B
1827          KM        ADD HYDROGRAPHS AT CP285B
1828          HC       2   25.34

1829          KK  SR285B
1830          KM        STORAGE ROUTE THROUGH CP285B
1831          RS       1    STOR       0       0
1832          SV       0      .7    5.68    7.84    10.0
1833          SQ       0      16     227     435    1468
1834          SE  1005.5  1006.9  1009.5  1010.0  1011.0

1835          KK   D285B
1836          KM        DIVERT FROM CP285B TO CP297
1837          DT   DI297
1838          DI       0      16     227     435
1839          DQ       0      16     227     274

1840          KK   R285B
1841          KM        ROUTE REMAINDER FROM CP285B TO CP285A
1842          RS       7               -1
1843          RC    .075     .035     .035     1072    .0009
1844          RX    1000     1001     1002     1280     1550     1598     1599     1600
1845          RY    1011     1011     1011     1010     1010     1015     1015     1015

1846          KK    D267
1847          KM        RETURN DIVERT AT CP267
1848          DR   DI284

1849          KK    R267
1850          KM        ROUTE FLOW FROM CP267 TO CP284
1851          RS       9               -1
1852          RC    .025     .025      .05     6080    .0008
1853          RX    1000     1001     1002     1040     1060     1190     1740     1940
1854          RY    1013     1013     1013     1012     1012     1014     1016     1017
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1855          KK     284
1856          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 284
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1857          BA     .52
1858          LG     .50      .00     3.56      .46      .00
1859          UI     21.      21.      21.      33.      71.      84.     100.     110.     120.     130.
1860          UI    143.     158.     173.     204.     247.     282.     248.     216.     195.     178.
1861          UI    165.     148.     133.     122.     108.     100.      84.      63.      47.      38.
1862          UI     37.      35.      33.      21.      21.      21.      15.       7.       7.       7.
1863          UI      7.       7.       7.       7.       7.       7.       7.       7.       0.       0.
1864          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1865          KK   CP284
1866          KM        ADD HYDROGRAPHS AT CP284
1867          HC       2   26.64

1868          KK   SR284
1869          KM        STORAGE ROUTE THROUGH CP284
1870          RS       1    STOR       0       0
1871          SV       0     .18   25.77  34.058   60.22   83.97
1872          SQ       0       0       0       0     457    2222
1873          SE  1007.6    1008    1010  1010.3    1011  1011.5

1874          KK    R284
1875          KM        ROUTE FLOW FROM CP284 TO CP285A
1876          RS       2              -1
1877          RC    .075     .075    .075    1050   .0076
1878          RX    1000     1001    1002    1020    1440    1448    1449    1450
1879          RY    1050     1009    1009    1008    1008    1009    1009    1050

1880          KK    285A
1881          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 285A
1882          BA     .06
1883          LG     .50      .00     3.50      .47      .00
1884          UI      7.      18.      33.      43.      57.      84.      66.      51.      38.      27.
1885          UI     14.      10.       7.       3.       2.       2.       2.       0.       0.       0.
1886          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1887          KK  1I285A
1888          KM        ADD HYDROGRAPHS AT CP285A
1889          HC       2   26.70

1890          KK  CP285A
1891          KM        ADD HYDROGRAPHS AT CP285A
1892          HC       2   26.92

1893          KK  SR285A
1894          KM        STORAGE ROUTE THROUGH CP285A
1895          RS       1    STOR       0       0
1896          SV       0     .13    4.35    4.40    5.19    6.89   15.46
1897          SQ       0      35     193   196.5   246.5   925.5    3914
1898          SE   999.7  1000.7 1005.47  1005.5  1006.0  1006.5  1007.5
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1899          KK   D285A
1900          KM        DIVERT FROM CP285A TO CP297A
1901          DT  1D297A
1902          DI       0      35     193     196     246     925
1903          DQ       0      35     193     196     218     237

1904          KK   R285A
1905          KM        ROUTE REMAINDER FROM CP285A TO CP285
1906          RS       2              -1
1907          RC     .07     .02    .025    1745   .0029
1908          RX    1000    1001    1530    1540    1550    1560    1570    1610
1909          RY    1010     999     998     996     996     998    1000    1010

1910          KK     285
1911          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 285
1912          BA     .04
1913          LG     .50      .00     3.50      .47      .00
1914          UI      5.      14.      25.      32.      46.      58.      42.      32.      23.      12.
1915          UI      8.       5.       3.       1.       1.       1.       0.       0.       0.       0.
1916          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

1917          KK   CP285
1918          KM        ADD HYDROGRAPHS AT CP285
1919          HC       2   26.96

1920          KK   SR285
1921          KM        STORAGE ROUTE THROUGH CP285
1922          RS       1    STOR       0       0
1923          SV       0     .17    1.61    4.19
1924          SQ       0      82     694    1687
1925          SE  1002.8    1003  1003.5    1004

1926          KK    D285
1927          KM        DIVERT FROM CP285 TO CP297A
1928          DT  2D297A
1929          DI       0      82     694    1687
1930          DQ       0      23     188     462

1931          KK    R285
1932          KM        ROUTE REMAINDER  FROM CP285 TO CP287
1933          RS       2              -1       0
1934          RC    .075     .02    .025    2460   .0061
1935          RX    1000    1001    1530    1540    1550    1560    1570    1610
1936          RY     999     999     998     996     996     998    1000    1010

1937          KK   CP287
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1938          KM        ADD HYDROGRAPHS AT CP287
1939          HC       2   38.59
1                                   HEC-1 INPUT                                                    PAGE 45

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

1940          KK   SR287
1941          KM        STORAGE ROUTE THROUGH CP287
1942          RS       1    STOR       0       0
1943          SV       0   14.18   61.23  266.05  356.54  502.54
1944          SQ       0     373    2288    4167    5000    6570
1945          SE     988     990     992     994   994.5  995.23

1946          KK    R287
1947          KM        ROUTE FLOW FROM CP287 TO CP298
1948          RS       5              -1       0
1949          RC     .05     .03     .05    4370   .0023
1950          RX    1000    1200    1380    1500    1890    2090    2330    2560
1951          RY     990     988     986     984     984     986     988     990

1952          KK     298
1953          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 298
1954          BA     .84
1955          LG     .50     .00    3.53     .46     .00
1956          UI     40.     40.     40.    105.    146.    181.    203.    225.    247.    277.
1957          UI    306.    360.    445.    521.    449.    388.    347.    316.    282.    250.
1958          UI    224.    199.    175.    137.    102.     70.     68.     65.     54.     40.
1959          UI     40.     36.     12.     12.     12.     12.     12.     12.     12.     12.
1960          UI     12.     12.      0.      0.      0.      0.      0.      0.      0.      0.
1961          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

1962          KK   CP298
1963          KM        ADD HYDROGRAPHS AT CP298
1964          HC       2   39.43

1965          KK   SR298
1966          KM        STORAGE ROUTE THROUGH CP298
1967          RS       1    STOR       0       0
1968          SV       0     .08    7.03    9.28   32.19   53.97
1969          SQ       0       0       0       0    2881    8075
1970          SE   975.5     976     978   978.3     980     981

1971          KK    R298
1972          KM        ROUTE FLOW FROM CP298 TO CP316
1973          RS       6              -1       0
1974          RC     .05     .03     .05    5280    .003
1975          RX    1000    1100    1210    1410    1830    2030    2140    2310
1976          RY     980     978     976     974     974     976     978     980

1977          KK     316
1978          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 316
1979          BA     .82
1980          LG     .50     .00    3.57     .42     .00
1981          UI     33.     33.     33.     43.    108.    125.    151.    165.    181.    195.
1982          UI    212.    236.    255.    293.    363.    410.    409.    352.    314.    286.
1983          UI    264.    243.    217.    198.    180.    163.    147.    121.     94.     65.
1984          UI     58.     55.     54.     48.     33.     33.     33.     24.     10.     10.
1985          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.     10.
1986          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1987          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                   HEC-1 INPUT                                                    PAGE 46

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

1988          KK   CP316
1989          KM        ADD HYDROGRAPHS AT CP316
1990          HC       2   40.25

1991          KK    R316
1992          KM        ROUTE FLOW FROM CP316 TO CP334
1993          RS       4              -1       0
1994          RC     .06     .03     .06    3280    .003
1995          RX    1000    1360    1570    1590    1780    2070    2280    2400
1996          RY     966   960.5     961     960     960     962     964     965

1997          KK     334
1998          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 334
1999          BA     .64
2000          LG     .50     .00    3.57     .43     .00
2001          UI     30.     30.     30.     76.    109.    133.    151.    167.    182.    204.
2002          UI    227.    259.    327.    382.    351.    300.    267.    243.    219.    194.
2003          UI    176.    153.    140.    115.     86.     57.     53.     49.     49.     30.
2004          UI     30.     30.     16.      9.      9.      9.      9.      9.      9.      9.
2005          UI      9.      9.      9.      0.      0.      0.      0.      0.      0.      0.
2006          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2007          KK   1I334
2008          KM        ADD HYDROGRAPHS AT CP334
2009          HC       2   40.89

2010          KK    D285
2011          KM        RETURN DIVERT AT CP285
2012          DR  2D297A

2013          KK    R285
2014          KM        ROUTE FLOW FROM CP285 TO CP297A
2015          RS       5              -1       0
2016          RC     .03     .03     .07    3950    .003
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2017          RX    1000    1001    1002    1020    1050    1460    1819    1820
2018          RY    1050     997     997     996     996     998     999    1050

2019          KK   D285A
2020          KM         RETURN DIVERT AT 285A
2021          DR  1D297A

2022          KK   R285A
2023          KM         ROUTE FLOW FROM CP285A TO CP297A
2024          RS       5              -1       0
2025          RC     .03     .03     .07    4370   .0041
2026          RX    1000    1001    1002    1020    1050    1460    1819    1820
2027          RY   997.5     997     997     996     996     998     999     999

2028          KK    297A
2029          KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 297A
2030          BA     .27
2031          LG     .50     .00    3.50     .47     .00
2032          UI     14.     14.     17.     48.     59.     70.     79.     88.    100.    112.
2033          UI    136.    175.    178.    147.    128.    115.    102.     89.     78.     69.
1                                          HEC-1 INPUT                                          PAGE 47

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

2034          UI     58.     42.     26.     25.     23.     19.     14.     14.      9.      4.
2035          UI      4.      4.      4.      4.      4.      4.      4.      0.      0.      0.
2036          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2037          KK  11297A
2038          KM         ADD HYDROGRAPHS AT CP297A
2039          HC       2   27.19

2040          KK  CP297A
2041          KM         ADD HYDROGRAPHS AT CP297A
2042          HC       2   27.23

2043          KK   R297A
2044          KM         ROUTE FLOW FROM CP297A TO CP315
2045          RS      19              -1
2046          RC    .075    .075    .075    5620   .0032
2047          RX    1000    1001    1002    1090    1910    2148    2149    2150
2048          RY    1000     985     985     984     984     985     985    1000

2049          KK     315
2050          KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 315
2051          BA     .47
2052          LG     .50     .00    3.56     .47     .00
2053          UI     18.     18.     18.     18.     59.     67.     79.     88.     98.    104.
2054          UI    113.    124.    136.    148.    175.    209.    239.    214.    188.    168.
2055          UI    155.    144.    131.    119.    109.     99.     90.     82.     69.     52.
2056          UI     39.     32.     31.     30.     30.     19.     18.     18.     18.      7.
2057          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      6.
2058          UI      6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
2059          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2060          KK   CP315
2061          KM         ADD HYDROGRAPHS AT CP315
2062          HC       2   27.70

2063          KK    R315
2064          KM         ROUTE FLOW FROM CP315 TO CP334
2065          RS      11              -1
2066          RC     .06     .06     .06    4370   .0046
2067          RX    1000    1001    1002    1130    2070    2208    2209    2210
2068          RY     963     963     963     962     962     963     963     963

2069          KK   CP334
2070          KM         ADD HYDROGRAPHS AT CP334
2071          HC       2   41.63

2072          KK    R334
2073          KM         ROUTE FLOW FROM CP334 TO CP335
2074          RS       2              -1
2075          RC     .04     .02     .04    3450   .0035
2076          RX    1000    1380    1430    1450    1465    1470    1540    2040
2077          RY    1054    1050    1051    1050    1050    1051    1050    1054
1                                          HEC-1 INPUT                                          PAGE 48

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

2078          KK     335
2079          KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 335
2080          BA     .35
2081          LG     .50     .00    4.39     .39     .00
2082          UI     18.     18.     20.     61.     75.     89.    100.    111.    126.    141.
2083          UI    169.    214.    234.    194.    168.    150.    134.    117.    104.     91.
2084          UI     78.     59.     40.     32.     30.     29.     18.     18.     16.      6.
2085          UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
2086          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2087          KK   CP335
2088          KM         ADD HYDROGRAPHS AT CP335
2089          HC       2   41.98

2090          KK    R335
2091          KM         ROUTE FLOW FROM CP335 TO CP336
2092          RS       3              -1
2093          RC     .04     .02     .04    4520   .0022
2094          RX    1000    1070    1170    1210    1270    1290    1410    1450
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2095        RY    944     942     940     938     938     940     942     943

2096        KK    299
2097        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 299
2098        BA    .40
2099        LG    .50     .00    4.62     .40     .00
2100        UI    19.     19.     19.     49.     69.     84.     95.    106.    115.    129.
2101        UI   144.    166.    207.    243.    217.    186.    166.    151.    136.    120.
2102        UI   109.     95.     86.     68.     53.     33.     33.     31.     29.     19.
2103        UI    19.     19.      7.      6.      6.      6.      6.      6.      6.      6.
2104        UI     6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
2105        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2106        KK   R299
2107        KM        ROUTE FLOW FROM CP299 TO CP317
2108        RS    21              -1
2109        RC   .06     .06     .06    5460   .0033
2110        RX  1000    1001    1002    1420    1840    2220    2514    2515
2111        RY   980     980     980     978     978     980     982     982

2112        KK   317
2113        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 317
2114        BA   .57
2115        LG   .50     .00    3.52     .47     .00
2116        UI   22.     22.     22.     25.     73.     84.    100.    111.    122.    130.
2117        UI  142.    157.    171.    190.    226.    272.    292.    252.    223.    202.
2118        UI  186.    172.    155.    140.    130.    115.    106.     93.     73.     59.
2119        UI   40.     40.     37.     37.     29.     22.     22.     22.     13.      7.
2120        UI    7.      7.      7.      7.      7.      7.      7.      7.      7.      7.
2121        UI    7.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2122        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                          HEC-1 INPUT                                          PAGE 49

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

2123        KK  CP317
2124        KM        ADD HYDROGRAPHS AT CP317
2125        HC     2     .97

2126        KK   R317
2127        KM        ROUTE FLOW FROM CP317 TO CP336
2128        RS    13              -1
2129        RC   .04     .02     .04   12170   .0032
2130        RX  1000    1070    1170    1210    1270    1290    1410    1450
2131        RY   944     942     940     938     938     940     942     943

2132        KK   300
2133        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 300
2134        BA   .39
2135        LG   .50     .00    6.36     .30     .00
2136        UI   22.     22.     39.     80.    101.    118.    132.    150.    172.    208.
2137        UI  271.    278.    227.    197.    176.    152.    133.    114.     97.     72.
2138        UI   46.     39.     37.     29.     22.     22.      9.      7.      7.      7.
2139        UI    7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
2140        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2141        KK   R300
2142        KM        ROUTE FLOW FROM CP300 TO CP318
2143        RS    21              -1
2144        RC   .05     .05     .05    5620   .0028
2145        RX  1000    1001    1002    1190    1800    2268    2269    2270
2146        RY   975     975     975     974     974     976     976     976

2147        KK   318
2148        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 318
2149        BA   .62
2150        LG   .27     .14    3.66     .39   12.00
2151        UI   43.     43.    119.    181.    222.    254.    299.    354.    475.    537.
2152        UI  428.    363.    313.    264.    222.    183.    124.     76.     71.     58.
2153        UI   43.     36.     13.     13.     13.     13.     13.     13.     13.      0.
2154        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2155        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2156        KK  CP318
2157        KM        ADD HYDROGRAPHS AT CP318
2158        HC     2    1.01

2159        KK   R318
2160        KM        ROUTE FLOW FROM CP318 TO CP337
2161        RS     4              -1
2162        RC   .03     .03     .03    2000   .0029
2163        RX  1000    1001    1280    1440    2180    2420    2469    2470
2164        RY  1063    1063    1062    1061    1061    1062    1063    1063
1                                          HEC-1 INPUT                                          PAGE 50

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

2165        KK   301
2166        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 301
2167        BA   .30
2168        LG   .24     .28    5.79     .23   10.00
2169        UI   80.    269.    424.    644.    427.    263.    110.     61.     17.     17.
2170        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2171        UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2172        KK   R301
2173        KM        ROUTE FLOW FROM CP301 TO CP319
2174        RS    24              -1
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2175          RC     .05     .05     .05    6240   .0024
2176          RX    1000    1001    1002    1250    2020    2280    2349    2350
2177          RY     973     973     972     970     970     972     973     973

2178          KK     319
2179          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 319
2180          BA     .54
2181          LG     .23     .18    3.50     .40   14.00
2182          UI     45.     61.    167.    225.    268.    324.    414.    570.    471.    383.
2183          UI    317.    259.    208.    140.     80.     74.     48.     44.     14.     14.
2184          UI     14.     14.     14.     0.      0.      0.      0.      0.      0.      0.
2185          UI      0.      0.      0.     0.      0.      0.      0.      0.      0.      0.

2186          KK   CP319
2187          KM        ADD HYDROGRAPHS AT CP319
2188          HC       2     .84

2189          KK    R319
2190          KM        ROUTE FLOW FROM CP319 TO CP337
2191          RS       6              -1
2192          RC     .03     .03     .03    2400   .0027
2193          RX    1000    1001    1280    1440    2180    2420    2469    2470
2194          RY    1063    1063    1062    1061    1061    1062    1063    1063

2195          KK     337
2196          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 337
2197          BA     .49
2198          LG     .19     .30    3.60     .33   23.50
2199          UI     68.    238.    378.    519.    803.    624.    455.    319.    156.    101.
2200          UI     61.     21.     21.     21.     0.      0.      0.      0.      0.      0.
2201          UI      0.      0.      0.     0.      0.      0.      0.      0.      0.      0.

2202          KK   CP337
2203          KM        ADD HYDROGRAPHS AT CP337
2204          HC       3    2.34

2205          KK   SR337
2206          KM        STORAGE ROUTE THROUGH CP337
2207          RS       1    STOR       0       0
2208          SV       0     .06    3.14   15.08   45.28  110.59  221.78  290.44  449.81
2209          SQ       0      10     100     250     370     380     383     383    8928
2210          SE   951.3     952     954     956     958     960     962   962.8     964
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2211          KK    D337
2212          KM        DIVERT FLOW IN 96" STORM DRAIN TO AGUA FRIA RIVER AT CP367
2213          DT   DI367
2214          DI       0      10     100     250     370     380     383     383    8928
2215          DQ       0      10     100     250     370     380     383     383     383

2216          KK    R337
2217          KM        ROUTE FLOW FROM CP337 TO CP336
2218          RS      11              -1
2219          RC     .03     .03     .03    9830   .0034
2220          RX    1000    1080    1130    1240    1660    1770    1810    1830
2221          RY    1057    1056    1054    1052    1052    1054    1056    1057

2222          KK   1I336
2223          KM        ADD HYDROGRAPHS AT CP336
2224          HC       2    3.31

2225          KK   2I336
2226          KM        ADD HYDROGRAPHS AT CP336
2227          HC       2   45.29

2228          KK     336
2229          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 336
2230          BA    1.28
2231          LG     .43     .05    3.50     .43   13.50
2232          UI     32.     32.     32.     32.     32.     32.     98.    107.    124.    135.
2233          UI    150.    159.    171.    179.    188.    197.    208.    222.    237.    250.
2234          UI    264.    291.    330.    380.    408.    429.    386.    352.    326.    305.
2235          UI    288.    272.    260.    248.    230.    215.    203.    193.    181.    168.
2236          UI    159.    150.    135.    124.     94.     93.     63.     57.     57.     56.
2237          UI     53.     53.     53.     40.     32.     32.     32.     32.     32.     20.
2238          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.     10.
2239          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.      0.
2240          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2241          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2242          KK   CP336
2243          KM        ADD HYDROGRAPHS AT CP336
2244          HC       2   46.57

2245          KK   SR336
2246          KM        STORAGE ROUTE THROUGH CP336
2247          RS       1    STOR       0       0
2248          SV       0     .54    1.72    4.49    5.79   15.91   32.49
2249          SQ       0    1400    2075    2335    2414    2800    8534
2250          SE   922.3     930     932   932.8     933     934     935

2251          KK    336A
2252          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 336A
2253          BA     .37
2254          LG     .51     .02    3.86     .44    2.00
2255          UI      9.      9.      9.      9.      9.      9.     25.     30.     34.     37.
2256          UI     42.     44.     47.     50.     52.     55.     58.     61.     65.     69.
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2257        UI     72.     79.     88.    101.    107.    122.    116.    105.     97.     90.
1                                         HEC-1 INPUT                                          PAGE 52

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

2258        UI     85.     80.     76.     73.     69.     64.     60.     57.     54.     51.
2259        UI     47.     45.     42.     38.     35.     27.     26.     18.     16.     16.
2260        UI     16.     15.     15.     15.     12.      9.      9.      9.      9.      9.
2261        UI      8.      3.      3.      3.      3.      3.      3.      3.      3.      3.
2262        UI      3.      3.      3.      3.      3.      3.      3.      3.      3.      3.
2263        UI      3.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2264        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2265        KK  CP336A
2266        KM        ADD HYDROGRAPHS AT CP336A
2267        HC       2   46.94

2268        KK   R336A
2269        KM        ROUTE FLOW FROM CP336A TO CP364A
2270        RS       2              -1
2271        RC     .03     .02     .03    4210   .0056
2272        RX    1000    1020    1025    1030    1070    1100    1180    1310
2273        RY    1050    1030    1028    1026    1026  1028.5    1027    1050

2274        KK    364A
2275        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 364A
2276        BA     .07
2277        LG     .35     .35    3.50     .28     .00
2278        UI     10.     33.     53.     71.    112.     90.     66.     47.     24.     15.
2279        UI     10.      3.      3.      3.      0.      0.      0.      0.      0.      0.
2280        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2281        KK  1I364A
2282        KM        ADD HYDROGRAPHS AT CP364A
2283        HC       2   47.01

2284        KK    336B
2285        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 336B
2286        BA     .08
2287        LG     .35     .35    4.07     .36     .00
2288        UI     83.    262.    198.     57.     13.      0.      0.      0.      0.      0.
2289        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2290        KK  SR336B
2291        KM        STORAGE ROUTE THROUGH CP336B AT S.P.R.R.
2292        RS       1    STOR       0       0
2293        SV       0    2.37    5.42    7.76
2294        SQ       0     110     169    1249
2295        SE   921.3     924     925   925.5

2296        KK   R336B
2297        KM        ROUTE FLOW FROM CP336B TO CP364A
2298        RS       3              -1       0
2299        RC    .025    .025    .025    1250   .0048
2300        RX    1000    1001    1015    1030    1340    1380    1430    1510
2301        RY     921     921     920     918     918     921     919     920
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2302        KK  CP364A
2303        KM        ADD HYDROGRAPHS AT CP364A
2304        KO       1
2305        HC       2   47.09

2306        KK   D364A
2307        KM        DIVERT FROM CP364A TO CP363
2308        DT   DI363
2309        DI       0     112     925    3216
2310        DQ       0      12     325    1166

2311        KK   R364A
2312        KM        ROUTE REMAINDER FROM CP364A TO CP364
2313        RS       5              -1
2314        RC    .075    .035    .035    3400   .0015
2315        RX    1000    1001    1270    1800    2070    2088    2089    2090
2316        RY     917     917     916     914     914     915     915     915

2317        KK     365
2318        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 365
2319        BA     .38
2320        LG     .50     .00    4.11     .73     .00
2321        UI     22.     22.     37.     78.     98.    114.    128.    145.    167.    200.
2322        UI    261.    272.    222.    192.    172.    148.    130.    111.     96.     71.
2323        UI     47.     38.     36.     29.     22.     22.      9.      7.      7.      7.
2324        UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
2325        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2326        KK    R365
2327        KM        ROUTE FLOW FROM CP365 TO CP364
2328        RS      26              -1
2329        RC    .035    .035    .075    7020   .0017
2330        RX    1000    1001    1015    1140    1560    1700    2009    2010
2331        RY     915     915     914   913.5   913.5     914     915     915

2332        KK     364
2333        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 364
2334        BA     .78
2335        LG     .50     .00    4.22     .43     .00
```

```
2336          UI     37.     37.     37.     99.    136.    169.    190.    210.    230.    258.
2337          UI    286.    338.    418.    484.    415.    359.    321.    293.    261.    231.
2338          UI    207.    184.    161.    125.     92.     65.     63.     61.     49.     37.
2339          UI     37.     31.     11.     11.     11.     11.     11.     11.     11.     11.
2340          UI     11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
2341          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2342          KK   1I364
2343          KM        ADD HYDROGRAPHS AT CP364
2344          HC       2    1.16
1                                        HEC-1 INPUT                                          PAGE 54

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


2345          KK   CP364
2346          KM        ADD HYDROGRAPHS AT CP364
2347          HC       2   48.25

2348          KK   SR364
2349          KM        STORAGE ROUTE CP364 BEHIND BUCKEYE CANAL
2350          RS       1    STOR       0       0
2351          SV       0     .91    4.65    6.88   14.06   22.19   33.52
2352          SQ       0       0       0      21     506    4186    7154
2353          SE     908     910     911   911.3     912   912.5   913.0

2354          KK    D364
2355          KM        DIVERT FROM CP364 TO GILA RIVER
2356          DT  DIGILA
2357          DI       0      21     506    4186
2358          DQ       0      21     163     597

2359          KK    R364
2360          KM        ROUTE REMAINDER FROM CP364 TO CP363
2361          RS      16              -1
2362          RC    .075     .06    .075    5770   .0016
2363          RX    1000    1001    1040    1200    2040    2180    2239    2240
2364          RY     950     907     906     905     905     906     907     950

2365          KK   D364A
2366          KM        RETURN DIVERT AT CP364A
2367          DR   DI363

2368          KK   R364A
2369          KM        ROUTE FLOW FROM CP364A TO CP363
2370          RS      17              -1
2371          RC    .075     .06    .075    5460   .0020
2372          RX    1000    1001    1040    1200    2040    2180    2239    2240
2373          RY     907     907     906     905     905     906     907     907

2374          KK     363
2375          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 363
2376          BA     .63
2377          LG     .50     .00    3.71     .46     .00
2378          UI     23.     23.     23.     23.     68.     84.     98.    112.    122.    132.
2379          UI    142.    154.    170.    183.    207.    252.    286.    303.    262.    234.
2380          UI    213.    196.    183.    166.    152.    139.    127.    116.    106.     90.
2381          UI     67.     53.     41.     41.     38.     38.     28.     23.     23.     23.
2382          UI     15.      7.      7.      7.      7.      7.      7.      7.      7.      7.
2383          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
2384          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2385          KK   1I363
2386          KM        ADD HYDROGRAPHS AT CP363
2387          HC       2   47.72
1                                        HEC-1 INPUT                                          PAGE 55

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


2388          KK   2I363
2389          KM        ADD HYDROGRAPHS AT CP363
2390          HC       2   48.88

2391          KK     314
2392          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 314
2393          BA     .42
2394          LG     .50     .00    3.50     .47     .00
2395          UI     20.     20.     20.     51.     72.     89.    101.    111.    122.    136.
2396          UI    151.    176.    219.    257.    227.    195.    174.    158.    142.    126.
2397          UI    114.    100.     90.     71.     54.     35.     34.     32.     29.     20.
2398          UI     20.     20.      7.      6.      6.      6.      6.      6.      6.      6.
2399          UI      6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
2400          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2401          KK    R314
2402          KM        ROUTE FLOW FROM CP314 TO CP333
2403          RS      25              -1
2404          RC    .075    .075    .075    5770   .0040
2405          RX    1000    1001    1200    1690    2100    2788    2789    2790
2406          RY     967     967     966     964     964     966     966     966

2407          KK     333
2408          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 333
2409          BA     .58
2410          LG     .50     .00    3.50     .47     .00
2411          UI     26.     26.     26.     59.     93.    112.    128.    143.    156.    172.
2412          UI    192.    212.    256.    316.    336.    283.    249.    224.    206.    184.
2413          UI    164.    149.    132.    119.     95.     75.     46.     46.     43.     43.
2414          UI     27.     26.     26.     17.      8.      8.      8.      8.      8.      8.
```

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2415        UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
2416        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2417        KK   CP333
2418        KM        ADD HYDROGRAPHS AT CP333
2419        HC       2     1.0

2420        KK    R333
2421        KM        ROUTE FLOW FROM CP333 TO  CP348A
2422        RS       8              -1
2423        RC     .06     .04     .06    2700   .0048
2424        RX    1000    1001    1005    1600    2210    2560    2900    3020
2425        RY     947     947     946     944     944     946     948     949

2426        KK    348A
2427        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 348A
2428        BA     .22
2429        LG     .50     .00    3.62     .46     .00
2430        UI     17.     18.     61.     81.     97.    115.    138.    190.    211.    164.
2431        UI    138.    114.     95.     77.     52.     30.     28.     20.     17.      8.
2432        UI      5.      5.      5.      5.      5.      0.      0.      0.      0.      0.
2433        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                              HEC-1 INPUT                                          PAGE 56

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


2434        KK  CP348A
2435        KM        ADD HYDROGRAPHS AT CP348A
2436        HC       2    1.22

2437        KK   R348A
2438        KM        ROUTE FLOW FROM CP348A TO CP348B
2439        RS       4              -1
2440        RC     .03     .03    .075    4050   .0077
2441        RX    1000    1005    1010    1040    1100    1370    1450    1470
2442        RY  1032.5  1032.5    1032    1030    1030    1032    1034  1034.5

2443        KK    348B
2444        KM        RUNOFF FROM SUBBASIN 348B
2445        BA     .66
2446        LG     .49     .04    3.59     .45     .00
2447        UI     24.     24.     24.     24.     60.     82.     94.    110.    120.    130.
2448        UI    138.    150.    163.    178.    192.    223.    268.    303.    293.    257.
2449        UI    230.    211.    196.    184.    166.    153.    140.    128.    117.    109.
2450        UI     92.     72.     60.     42.     42.     39.     39.     36.     24.     24.
2451        UI     24.     24.      9.      7.      7.      7.      7.      7.      7.      7.
2452        UI      7.      7.      7.      7.      7.      7.      0.      0.      0.      0.
2453        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2454        KK  CP348B
2455        KM        ADD HYDROGRAPHS AT CP348B
2456        HC       2    1.88

2457        KK  SR348B
2458        KM        STORAGE ROUTE BEHIND S.P.R.R. AT CP348B
2459        RS       1    STOR       0       0
2460        SV       0     .08    8.33   14.16   23.37
2461        SQ       0      50     285     778    4586
2462        SE   908.5   910.1     914     915     916

2463        KK   R348B
2464        KM        ROUTE FLOW FROM CP348B TO CP363
2465        RS      10              -1       0
2466        RC    .075     .06    .075    3100   .0029
2467        RX    1000    1001    1040    1200    2040    2180    2239    2240
2468        RY     907     907     906     905     905     906     907     907

2469        KK   31363
2470        KM        ADD HYDROGRAPHS AT CP363
2471        HC       2   50.76

2472        KK     348
2473        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 348
2474        BA     .34
2475        LG     .50     .00    3.70     .45     .00
2476        UI     20.     20.     35.     71.     90.    104.    117.    133.    153.    187.
2477        UI    244.    239.    196.    171.    152.    131.    114.     98.     83.     60.
2478        UI     37.     34.     33.     22.     20.     18.      6.      6.      6.      6.
2479        UI      6.      6.      6.      6.      0.      0.      0.      0.      0.      0.
2480        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                              HEC-1 INPUT                                          PAGE 57

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


2481        KK   SR348
2482        KM        STORAGE ROUTE BEHIND SOUTHERN PACIFIC RAILROAD
2483        RS       1    STOR       0       0
2484        SV       0       0     .72    2.12   15.51   22.03
2485        SQ       0      .5       5       9    3101    5661
2486        SE   906.6   907.6     908   908.3   909.6     910

2487        KK    D348
2488        KM        DIVERT FROM CP348 TO CP347
2489        DT   DI347
2490        DI       0    3083    5640
2491        DQ       0       0     165

2492        KK    R348
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2493          KM        ROUTE REMAINDER FROM CP348 TO CP363
2494          RS       8              -1
2495          RC    .075     .06    .075    1600   .0025
2496          RX    1000    1001    1040    1200    2040    2180    2239    2240
2497          RY     907     907     906     905     905     906     907     907

2498          KK   CP363
2499          KM        ADD HYDROGRAPHS AT CP363
2500          HC       2   51.10
2501          ZZ
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1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   37          159
                V
                V
   44         R159
                .
                .
   50           .         160
                .           .
                .           .
   58       CP160............
                V
                V
   61         R160
                .
                .
   67           .         161
                .           .
                .           .
   77       CP161............
                V
                V
   80         R161
                .
                .
   86           .         162
                .           V
                .           V
   94           .        R162
                .           .
                .           .
  100           .           .         163
                .           .           .
                .           .           .
  110           .       II163............
                .           .
                .           .
  113       CP163............
                .
                .
  118           .-------> DI176A
  116        D163
                .
                .
  123           .           .<-------  DI176A
  121           .        D163
                .           V
                .           V
  124           .        R163
                .           .
                .           .
  130           .           .        176A
                .           .           .
                .           .           .
  141           .      CP176A............
                .           .
                .           .
  146           .           .------->   DI191
  144           .       D176A
                .           .
                .           .
  149           .           .         174
                .           .           V
                .           .           V
  156           .           .        R174
                .           .           .
                .           .           .
  162           .           .           .         175
                .           .           .           .
                .           .           .           .
  171           .           .           .           .-------> DI175A
  169           .           .           .       D175
                .           .           .         V
                .           .           .         V
  174           .           .           .       R175
                .           .           .           .
                .           .           .           .
  180           .           .           .           .         176
                .           .           .           .           .
                .           .           .           .           .
  188           .           .           .       II176............
                .           .           .           .
                .           .           .           .
  191           .           .        CP176............
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                 .         .         V
                 .         .         V
194              .         .      R176
                 .         .         .
                 .         .         .
202              .         .         .<-------  DI175A
200              .         .         .      D175
                 .         .         .         V
                 .         .         .         V
203              .         .         .      R175
                 .         .         .         .
                 .         .         .         .
209              .         .         .         .        175A
                 .         .         .         .          .
                 .         .         .         .          .
217              .         .         .    CP175A............
                 .         .         .         V
                 .         .         .         V
220              .         .         .     R175A
                 .         .         .         .
                 .         .         .         .
226              .         .         .         .        189
                 .         .         .         .          .
                 .         .         .         .          .
234              .         .         .     CP189............
                 .         .         .         V
                 .         .         .         V
237              .         .         .      R189
                 .         .         .         .
                 .         .         .         .
243              .         .         .         .        190
                 .         .         .         .          .
                 .         .         .         .          .
253              .         .         .     CP190............
                 .         .         .         V
                 .         .         .         V
256              .         .         .      R190
                 .         .         .         .
                 .         .         .         .
264              .         .         .         .          .<-------   DI191
262              .         .         .         .      D176A
                 .         .         .         .         V
                 .         .         .         .         V
265              .         .         .         .      R176A
                 .         .         .         .          .
                 .         .         .         .          .
271              .         .      1I191.......................
                 .         .         .
                 .         .         .
274              .         .         .        191
                 .         .         .         .
                 .         .         .         .
285              .         .      CP191............
                 .         .         .
                 .         .         .
290              .         .         .-------->   DI208
288              .         .      CP191
                 .         .         V
                 .         .         V
293              .         .      R191
                 .         .         .
                 .         .         .
299              .         .         .       192A
                 .         .         .         .
                 .         .         .         .
309              .         .     CP192A............
                 .         .         V
                 .         .         V
312              .         .     R192A
                 .         .         .
                 .         .         .
318              .         .         .        192
                 .         .         .         .
                 .         .         .         .
328              .         .     CP192............
                 .         .         .
                 .         .         .
333              .         .         .-------->   DI209
331              .         .      D192
                 .         .         .
                 .         .         .
338              .         .         .-------->   DI210
336              .         .      D192
                 .         .         .
                 .         .         .
341              .         .         .        188
                 .         .         .         V
                 .         .         .         V
348              .         .         .       R188
                 .         .         .         .
                 .         .         .         .
354              .         .         .         .        207A
                 .         .         .         .          .
                 .         .         .         .          .
361              .         .         .    CP207A............
                 .         .         .         V
                 .         .         .         V
364              .         .         .      R207A
                 .         .         .         .
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370                                  214
                                      .
                                      .
377                              CP214.....
                                     V
                                     V
380                               R214
                                      .
                                      .
386                                  215A
                                       V
                                       V
392                                 R215A
                                      .
                                      .
398                                      .          215
                                      .            .
                                      .            .
405                                 1I215.....
                                      .
                                      .
408                              CP215.....
                                     V
                                     V
411                               R215
                                      .
                                      .
417                                  233
                                      .
                                      .
425                              CP233.....
                                     V
                                     V
428                               R233
                                      .
                                      .
434                                  216
                                       V
                                       V
443                                 R216
                                      .
                                      .
449                                      .          234
                                      .            .
                                      .            .
459                                 1I234.....
                                      .
                                      .
462                              CP234.....
                                      .
                                      .
467                                   .-------> 1D248
465                               D234
                                     V
                                     V
470                               R234
                                      .
                                      .
476                                  207
                                      .
                                      .
489                                   .-------> 2D208
487                                 D207
                                       V
                                       V
492                                 R207
                                      .
                                      .
498                                      .          217
                                      .            .
                                      .            .
508                                 CP217.....
                                      .
                                      .
513                                   .-------> D1218
511                                 D217
                                       V
                                       V
516                                 R217
                                      .
                                      .
522                                      .          235
                                      .            .
                                      .            .
533                                 1I235.....
                                      .
                                      .
536                              CP235.....
                                      .
                                      .
541                                   .-------> 2D248
539                               D235
                                     V
                                     V
544                               R235
                                      .
                                      .
552                                   .<------- D1208
550                                 D191
                                       V
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553                                  V
                                   R191
                                     .
559                                  .          208
                                     .           .
570                                  .
                                   1I208.........
                                     .
575                                  .           .<-------   2D208
573                                  .        D207
                                     .           V
                                     .           V
576                                  .        R207
                                     .           .
582                                  .
                                   CP208.........
                                     .
587                                  .-------->   1D219
585                                  .
                                    D208
                                     .
592                                  .-------->  DI209A
590                                  .
                                    D208
                                       V
                                       V
595                                  .
                                    R208
                                     .
601                                  .          218
                                     .           .
612                                  .
                                   1I218.........
                                     .
617                                  .           .<-------   DI218
615                                  .        D217
                                     .           V
                                     .           V
618                                  .        R217
                                     .           .
624                                  .
                                   CP218.........
                                     .
629                                  .-------->   DI237
627                                  .
                                    D218
                                     .
634                                  .-------->   2D219
632                                  .
                                    D218
                                       V
                                       V
637                                  .
                                    R218
                                     .
643                                  .          236
                                     .           .
654                                  .
                                   1I236.........
                                     .
657                                  .
                                CP236.........
                                     .
662                                  .-------->   DI249
660                                  .
                                    D236
                                     .
667                                  .-------->   1D250
665                                  .
                                    D236
                                       V
                                       V
670                                  .
                                    R236
                                     .
676                                  .
                                    209A
                                     .
688                                  .           .<-------  DI209A
686                                  .        D208
                                     .           V
                                     .           V
689                                  .        R208
                                     .           .
695                                  .
                                  CP209A.........
                                     .
700                                  .-------->   1D220
698                                  .
                                   D209A
                                     .
705                                  .-------->   2D209
703                                  .
                                   D209A
                                       V
                                       V
708                                  .
                                   R209A
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716                                                  .<-------   1D219
714                                                D208
                                                     V
                                                     V
717                                                R208
                                                     .
                                                     .
723                                                  .         219
                                                     .           .
                                                     .           .
733                                                1I219............
                                                     .
                                                     .
736                                          2I219............
                                                     .
                                                     .
741                                                  .<-------   2D219
739                                                D218
                                                     V
                                                     V
742                                                R218
                                                     .
                                                     .
748                                          CP219............
                                                     .
                                                     .
753                                                  .------->   DI238
751                                           D219
                                                     .
                                                     .
758                                                  .------->   2D220
756                                           D219
                                                 V
                                                 V
761                                           R219
                                                     .
                                                     .
769                                                  .<-------   DI237
767                                                D218
                                                     V
                                                     V
770                                                R218
                                                     .
                                                     .
776                                                  .         237
                                                     .           .
                                                     .           .
787                                                1I237............
                                                     .
                                                     .
790                                          2I237............
                                                     .
                                                     .
793                                     CP237............
                                                 .
                                                 .
798                                              .------->   2D250
796                                      D237
                                                 .
                                                 .
803                                              .------->  1D250A
801                                      D237
                                             V
                                             V
806                                      R237
                                                 .
                                                 .
814                                              .<-------   DI209
812                                          1D192
                                                 V
                                                 V
815                                           R192
                                                     .
                                                     .
821                                                  .         209
                                                     .           .
                                                     .           .
831                                          1I209............
                                                     .
                                                     .
836                                                  .<-------   2D209
834                                                D209A
                                                     V
                                                     V
837                                                R209A
                                                     .
                                                     .
843                                          CP209............
                                                     .
                                                     .
848                                                  .------->   1D221
846                                           D209
                                                     .
                                                     .
853                                                  .------->   2D210
851                                           D209
                                                 V
                                                 V
```

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856                                  R209
                                       .
                                       .
864                                    .<-------   1D220
862                                    .      D209A
                                       .         V
                                       .         V
865                                    .      R209A
                                       .         .
                                       .         .
871                                    .         .        220
                                       .         .         .
                                       .         .         .
881                                    .      1I220............
                                       .         .
                                       .         .
884                                 2I220.........
                                       .
                                       .
889                                    .<-------   2D220
887                                    .      D219
                                       .         V
                                       .         V
890                                    .      R219
                                       .         .
                                       .         .
896                                 CP220.........
                                       .
                                       .
901                                    .------->   DI239
899                                 D220
                                       .
                                       .
906                                    .------->   2D221
904                                 D220
                                       V
                                       V
909                                 R220
                                       .
                                       .
917                                    .<-------   DI238
915                                    .      D219
                                       .         V
                                       .         V
918                                    .      R219
                                       .         .
                                       .         .
924                                    .         .        238
                                       .         .         .
                                       .         .         .
934                                    .      1I238............
                                       .         .
                                       .         .
937                                 2I238.........
                                       .
                                       .
940                              CP238.........
                                    .
                                    .
945                                 .------->  2D250A
943                              D238
                                    .
                                    .
950                                 .------->   1D251
948                              D238
                                    V
                                    V
953                              R238
                                    .
                                    .
961                                    .<-------   DI210
959                                 2D192
                                       V
                                       V
962                                 R192
                                       .
                                       .
968                                    .         210
                                       .          .
                                       .          .
978                                 1I210.........
                                       .
                                       .
983                                    .<-------   2D210
981                                    .      D209
                                       .         V
                                       .         V
984                                    .      R209
                                       .         .
                                       .         .
990                                 CP210.........
                                       V
                                       V
993                                 R210
                                       .
                                       .
1001                                   .<-------   1D221
999                                    .      D209
                                       .         V
                                       .         V
```

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1002                                                  R209
                                                        .
1008                                                    .        221
                                                        .         .
1018                                                 1I221.........
                                                        .
1021                                            2I221.........
                                                        .
1026                                                    .<-------  2D221
1024                                                 D220
                                                        V
                                                        V
1027                                                 R220
                                                        .
1033                                            CP221.........
                                                     V
                                                     V
1036                                             R221
                                                        .
1044                                                    .<-------  DI239
1042                                                 D220
                                                        V
                                                        V
1045                                                 R220
                                                        .
1051                                                    .        239
                                                        .         .
1061                                                 1I239.........
                                                        .
1064                                            2I239.........
                                                        .
1067                                        CP239.........
                                                 .
1072                                             .------->  2D251
1070                                         D239
                                                 V
                                                 V
1075                                         R239
                                                 .
1081                                                 .     240
                                                     .       .
1091                                        CP240.........
                                                 V
                                                 V
1094                                         R240
                                                 .
1100                                                 .     213
                                                     .       V
                                                     .       V
1108                                                 .    R213
                                                     .       .
1114                                                 .       .        212
                                                     .       .          V
                                                     .       .          V
1126                                                 .       .      SR212
                                                     .       .
1132                                                 .    CP212.........
                                                     .       V
                                                     .       V
1135                                                 .    R212
                                                     .       .
1141                                                 .       .        211
                                                     .       .          V
                                                     .       .          V
1151                                                 .       .      R211
                                                     .       .
1157                                                 .       .        .        221A
                                                     .       .        .          .
1168                                                 .       .     1I221A.........
                                                     .       .          V
                                                     .       .          V
1171                                                 .       .     SR221A
                                                     .       .
1177                                                 .       .   CP221A.........
                                                     .       .       V
                                                     .       .       V
1180                                                 .       .   R221A
                                                     .       .
1186                                                 .       .        222
```

```
1198                CP222............
                      V
                      V
1201                R222

1207                                226
                                     V
                                     V
1214                              SR226
                                     V
                                     V
1220                               R226

1226                                          201
                                               V
                                               V
1233                                          R201

1239                                                                223

1247                                         1I223............

1250                              CP223............

1255                                        .-------> DI225
1253                               D223
                                     V
                                     V
1258                               R223

1264                                          224

1271                              CP224............
                                     V
                                     V
1274                               R224

1280                                          241

1288                              1I241............

1291                        2I241............

1294                CP241............
                      V
                      V
1297                SR241
                      V
                      V
1303                 R241

1309                      253

1319                1I253............

1322                      253A
                            V
                            V
1329                      R253A

1335                2I253............

1338                      247

1350                            .-------> DI261
1348                      D247
                            V
                            V
1353                      R247

1359                                 248

1372                                                .<-------   1D248
1370                                          D234
                                               V
                                               V
1373                                          R234
```

```
1379                                  1I248............
                                         .
1382                              2I248...........
                                         .
1387                                         .<-------   2D248
1385                                   D235
                                          V
                                          V
1388                                   R235
                                         .
1394                              CP248...........
                                         .
1399                                     .------->   DI262
1397                               D248
                                    V
                                    V
1402                               R248
                                         .
1408                                    249
                                         .
1419                              1I249...........
                                         .
1424                                         .<-------   DI249
1422                                   D236
                                          V
                                          V
1425                                   R236
                                         .
1431                              CP249...........
                                         .
1436                                     .------->   DI264
1434                               D249
                                    V
                                    V
1439                               R249
                                         .
1447                                         .<-------   1D250
1445                                   D236
                                          V
                                          V
1448                                   R236
                                         .
1454                                         .          250
                                         .            .
1464                                   1I250...........
                                         .
1469                                         .            .<-------   2D250
1467                                         .         D237
                                             .            V
                                             .            V
1470                                         .         R237
                                             .            .
1476                                   2I250...........
                                         .
1479                              CP250...........
                                    V
                                    V
1482                               R250
                                         .
1490                                         .<-------  1D250A
1488                                   D237
                                          V
                                          V
1491                                   R237
                                         .
1497                                         .         250A
                                         .            .
1508                                  1I250A...........
                                         .
1513                                         .            .<-------  2D250A
1511                                         .         D238
                                             .            V
                                             .            V
1514                                         .         R238
                                             .            .
1520                                  2I250A...........
                                         .
1523                              CP250A...........
```

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1528                                  .-------> DI265A
1526                             D250A
                                      .
1533                                  .-------> 1D266
1531                             D250A
                                     V
                                     V
1536                             R250A
                                      .
1544                                  .<------- 1D251
1542                                  .     D238
                                      .       V
                                      .       V
1545                                  .     R238
                                      .       .
1551                                  .       .       251
                                      .       .        .
1561                                  .     1I251.......
                                      .       .
1566                                  .       .         .<------- 2D251
1564                                  .       .       D239
                                      .       .         V
                                      .       .         V
1567                                  .       .       R239
                                      .       .        .
1573                                  .     2I251.......
                                      .       .
1576                             CP251.......
                                      .
1581                                  .-------> 2D266
1579                              D251
                                     V
                                     V
1584                              R251
                                      .
1590                                  .       252
                                      .        .
1600                             CP252.......
                                      .
1605                                  .-------> DI267
1603                              D252
                                     V
                                     V
1608                              R252
                                      .
1614                        CP253.......
                                 V
                                 V
1617                        SR253
                                 V
                                 V
1623                         R253
                                 .
1629                                 .     268
                                     .      .
1640                        1I268.......
                                 .
1645                                 .<------- 1D266
1643                             D250A
                                     V
                                     V
1646                             R250A
                                      .
1652                                  .     266
                                      .      .
1663                             1I266.......
                                      .
1668                                  .<------- 2D266
1666                                  .     D251
                                      .       V
                                      .       V
1669                                  .     R251
                                      .       .
1675                             CP266.......
                                      .
1680                                  .-------> DI283
1678                              D266
                                     V
```

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                                                  V
1683                                            R266
                                                   .
                                                   .
1691                                               .<-------   DI267
1689                                               .       D252
                                                   .          V
                                                   .          V
1692                                               .       R252
                                                   .          .
                                                   .          .
1698                                               .          .         267
                                                   .          .           .
                                                   .          .           .
1708                                               .      1I267............
                                                   .          .
                                                   .          .
1711                                            CP267............
                                                   .
                                                   .
1716                                               .-------->   DI284
1714                                            D267
                                                   V
                                                   V
1719                                            R267
                                                   .
                                                   .
1725                                      CP268............
                                                  V
                                                  V
1728                                      SR268
                                                  V
                                                  V
1734                                       R268
                                                  .
                                                  .
1740                                               .        286
                                                   .          .
                                                   .          .
1750                                      1I286............
                                                  .
                                                  .
1753                                               .        288
                                                   .          V
                                                   .          V
1764                                               .       R288
                                                   .          .
                                                   .          .
1770                                      CP286............
                                                  V
                                                  V
1773                                       R286
                                                  .
                                                  .
1779                                               .        287
                                                   .          .
                                                   .          .
1788                                      1I287............
                                                  .
                                                  .
1793                                               .          .<-------   DI283
1791                                               .       D266
                                                   .          V
                                                   .          V
1794                                               .       R266
                                                   .          .
                                                   .          .
1800                                               .          .         283
                                                   .          .           .
                                                   .          .           .
1810                                               .      CP283............
                                                   .          V
                                                   .          V
1813                                               .       R283
                                                   .          .
                                                   .          .
1819                                               .          .       285B
                                                   .          .          .
                                                   .          .          .
1826                                               .     CP285B............
                                                   .          V
                                                   .          V
1829                                               .     SR285B
                                                   .          .
                                                   .          .
1837                                               .          .-------->   DI297
1835                                               .      D285B
                                                   .          V
                                                   .          V
1840                                               .      R285B
                                                   .          .
                                                   .          .
1848                                               .          .          .<-------   DI284
1846                                               .          .       D267
                                                   .          .          V
                                                   .          .          V
1849                                               .          .       R267
                                                   .          .          .
                                                   .          .          .
1855                                               .          .          .         284
```

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1865                                  CP284............
                                          V
                                          V
1868                                  SR284
                                          V
                                          V
1874                                   R284
                                          .
1880                                          .        285A
                                          .            .
1887                                  1I285A...........
                                          .
1890                            CP285A............
                                      V
                                      V
1893                            SR285A
                                      .
1901                                  .-------> 1D297A
1899                             D285A
                                      V
                                      V
1904                             R285A
                                      .
1910                                  .         285
                                      .           .
1917                             CP285............
                                      V
                                      V
1920                             SR285
                                      .
1928                                  .-------> 2D297A
1926                              D285
                                      V
                                      V
1931                              R285
                                      .
1937                        CP287............
                                V
                                V
1940                        SR287
                                V
                                V
1946                         R287
                                .
1952                                 298
                                      .
1962                        CP298............
                                V
                                V
1965                        SR298
                                V
                                V
1971                         R298
                                .
1977                                 316
                                      .
1988                        CP316............
                                V
                                V
1991                         R316
                                .
1997                                 334
                                      .
2007                        1I334............
                                .
2012                                  <------- 2D297A
2010                              D285
                                      V
                                      V
2013                              R285
                                      .
2021                                  .         <------- 1D297A
2019                                  .       D285A
                                      .           V
                                      .           V
2022                                  .       R285A
                                      .           .
2028                                  .           .        297A
                                      .           .          .
2037                                  .       1I297A...........
```

```
2040                    CP297A............
                           V
                           V
2043                    R297A
2049                                   315
2060                    CP315............
                           V
                           V
2063                    R315
2069                CP334............
                       V
                       V
2072                R334
2078                    335
2087                CP335............
                       V
                       V
2090                R335
2096                    299
                           V
                           V
2106                    R299
2112                                   317
2123                    CP317............
                           V
                           V
2126                    R317
2132                                   300
                                          V
                                          V
2141                                   R300
2147                                                318
2156                                   CP318............
                                          V
                                          V
2159                                   R318
2165                                                301
                                                       V
                                                       V
2172                                                R301
2178                                                                319
2186                                                CP319............
                                                       V
                                                       V
2189                                                R319
2195                                                                337
2202                                   CP337........................
                                          V
                                          V
2205                                   SR337
2213                                                -------> DI367
2211                                   D337
                                          V
                                          V
2216                                   R337
2222                    1I336............
2225                21336............
2228                    336
```

```
2242                CP336............
                      V
                      V
2245                SR336
                      .
2251                  .        336A
                      .          .
2265                CP336A..........
                      V
                      V
2268                R336A
                      .
2274                  .        364A
                      .          .
2281                1I364A..........
                      .
2284                  .        336B
                      .          V
                      .          V
2290                  .      SR336B
                      .          V
                      .          V
2296                  .       R336B
                      .          .
2302                CP364A..........
                      .
2308                  .-------> DI363
2306                D364A
                      V
                      V
2311                R364A
                      .
2317                  .         365
                      .          V
                      .          V
2326                  .        R365
                      .          .
2332                  .          .        364
                      .          .          .
2342                  .       1I364..........
                      .          .
2345                CP364..........
                      V
                      V
2348                SR364
                      .
2356                  .-------> DIGILA
2354                D364
                      V
                      V
2359                R364
                      .
2367                  .          .<-------  DI363
2365                  .       D364A
                      .          V
                      .          V
2368                  .       R364A
                      .          .
2374                  .          .        363
                      .          .          .
2385                  .       1I363..........
                      .          .
2388                2I363..........
                      .
2391                  .         314
                      .          V
                      .          V
2401                  .        R314
                      .          .
2407                  .          .        333
                      .          .          .
2417                  .       CP333..........
                      .          V
                      .          V
2420                  .        R333
                      .          .
2426                  .          .       348A
                      .          .          .
```

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2434                                  CP348A............
                                          V
                                          V
2437                                   R348A
                                          .
                                          .
2443                                      .        3488
                                          .          .
                                          .          .
2454                                  CP348B............
                                          V
                                          V
2457                                  SR3488
                                          V
                                          V
2463                                   R348B
                                          .
                                          .
2469                             31363............
                                          .
                                          .
2472                                     348
                                          V
                                          V
2481                                   SR348
                                          .
                                          .
2489                                      .-------->   DI347
2487                                    D348
                                          V
                                          V
2492                                    R348
                                          .
                                          .
2498                             CP363............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4.0               *
*                                       *
*  RUN DATE  10/29/1994  TIME  10:38:33 *
*                                       *
*****************************************
```

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

```
BULLARD WASH OUTFALL FEASIBILITY STUDY          STANLEY CONSULTANTS, INC.
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY                     SCI #12278
(FCD #94-06)                                     INPUT FILE: 12278H1A

100-YEAR, 24-HOUR STORM
SCS TYPE II RAINFALL DISTRIBUTION
NOAA ATLAS 2, VOLUME VIII-ARIZONA DEPTH-AREA REDUCTION
ONLY BULLARD WASH CONTRIB AREA CONSIDERED; HC FIELD 2, TAREA ADJUSTED

*************************************************************************
THIS MODEL IS DERIVED FROM THE WHITE TANKS/AGUA FRIA AREA DRAINAGE MASTER
STUDY (ADMS) CONDUCTED BY THE WLB GROUP FOR FCDMC AND DATED OCTOBER 1992.
THE BASIC ADMS MODEL PARAMETERS AND METHODOLGY HAVE NOT BEEN CHANGED.  THE
SUB-BASINS CONTRIBUTING TO BULLARD WASH HAVE BEEN ISOLATED FROM THE REST
OF THE ORIGINAL WLB MODEL. THIS MODEL REFLECTS PROPOSED DYSART DRAIN AND
WHITE TANKS #3 FLOOD CONTROL IMPROVEMENTS.
*************************************************************************


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

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0055  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

         ENGLISH UNITS
              DRAINAGE AREA         SQUARE MILES
              PRECIPITATION DEPTH   INCHES
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

 22 JD          INDEX STORM NO. 1
                       STRM       4.03  PRECIPITATION DEPTH
                       TRDA        .00  TRANSPOSITION DRAINAGE AREA
```

23 PI PRECIPITATION PATTERN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .03 | .03 |
| .03 | .09 | .09 | .09 | .01 | .01 | .01 | .01 | .01 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | | |

33 JD INDEX STORM NO. 2

STRM 3.99 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .03 | .03 |
| .03 | .09 | .09 | .09 | .01 | .01 | .01 | .01 | .01 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | | |

34 JD INDEX STORM NO. 3

STRM 3.83 PRECIPITATION DEPTH
TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .03 | .03 |
| .03 | .09 | .09 | .09 | .01 | .01 | .01 | .01 | .01 | .01 |
| .01 | .01 | .01 | .01 | .01 | .01 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

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                .00       .00       .00       .00       .00       .00       .00       .00

 35 JD         INDEX STORM NO. 4
                  STRM       3.76  PRECIPITATION DEPTH
                  TRDA     100.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00

 36 JD         INDEX STORM NO. 5
                  STRM       3.70  PRECIPITATION DEPTH
                  TRDA     200.00  TRANSPOSITION DRAINAGE AREA

  0 PI           PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .01       .00       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .03       .03
                .03       .09       .09       .09       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
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           *             *
2302 KK    *   CP364A    *
           *             *
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2304 KO        OUTPUT CONTROL VARIABLES
                  IPRNT          1  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

2305 HC        HYDROGRAPH COMBINATION
                  ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                      ***
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                                           HYDROGRAPH AT    CP364A
                                      TRANSPOSITION AREA        .0 SQ MI

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| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0000 | 1 | 0. | 1 | | 0615 | 76 | 7. | 1 | | 1230 | 151 | 270. | 1 | | 1845 | 226 | 3289. |
| 1 | | 0005 | 2 | 0. | 1 | | 0620 | 77 | 7. | 1 | | 1235 | 152 | 295. | 1 | | 1850 | 227 | 3304. |
| 1 | | 0010 | 3 | 0. | 1 | | 0625 | 78 | 7. | 1 | | 1240 | 153 | 335. | 1 | | 1855 | 228 | 3320. |
| 1 | | 0015 | 4 | 0. | 1 | | 0630 | 79 | 7. | 1 | | 1245 | 154 | 389. | 1 | | 1900 | 229 | 3337. |
| 1 | | 0020 | 5 | 0. | 1 | | 0635 | 80 | 7. | 1 | | 1250 | 155 | 468. | 1 | | 1905 | 230 | 3354. |
| 1 | | 0025 | 6 | 0. | 1 | | 0640 | 81 | 7. | 1 | | 1255 | 156 | 552. | 1 | | 1910 | 231 | 3369. |
| 1 | | 0030 | 7 | 0. | 1 | | 0645 | 82 | 7. | 1 | | 1300 | 157 | 637. | 1 | | 1915 | 232 | 33[illegible] |
| 1 | | 0035 | 8 | 0. | 1 | | 0650 | 83 | 7. | 1 | | 1305 | 158 | 726. | 1 | | 1920 | 233 | 33[illegible] |
| 1 | | 0040 | 9 | 0. | 1 | | 0655 | 84 | 7. | 1 | | 1310 | 159 | 821. | 1 | | 1925 | 234 | 34[illegible] |
| 1 | | 0045 | 10 | 0. | 1 | | 0700 | 85 | 7. | 1 | | 1315 | 160 | 927. | 1 | | 1930 | 235 | 3420. |
| 1 | | 0050 | 11 | 0. | 1 | | 0705 | 86 | 7. | 1 | | 1320 | 161 | 1046. | 1 | | 1935 | 236 | 3428. |
| 1 | | 0055 | 12 | 0. | 1 | | 0710 | 87 | 7. | 1 | | 1325 | 162 | 1171. | 1 | | 1940 | 237 | 3434. |
| 1 | | 0100 | 13 | 0. | 1 | | 0715 | 88 | 7. | 1 | | 1330 | 163 | 1291. | 1 | | 1945 | 238 | 3437. |
| 1 | | 0105 | 14 | 0. | 1 | | 0720 | 89 | 7. | 1 | | 1335 | 164 | 1399. | 1 | | 1950 | 239 | 3438. |
| 1 | | 0110 | 15 | 0. | 1 | | 0725 | 90 | 8. | 1 | | 1340 | 165 | 1506. | 1 | | 1955 | 240 | 3437. |
| 1 | | 0115 | 16 | 1. | 1 | | 0730 | 91 | 8. | 1 | | 1345 | 166 | 1637. | 1 | | 2000 | 241 | 3432. |
| 1 | | 0120 | 17 | 1. | 1 | | 0735 | 92 | 8. | 1 | | 1350 | 167 | 1719. | 1 | | 2005 | 242 | 3426. |
| 1 | | 0125 | 18 | 1. | 1 | | 0740 | 93 | 8. | 1 | | 1355 | 168 | 1777. | 1 | | 2010 | 243 | 3417. |
| 1 | | 0130 | 19 | 1. | 1 | | 0745 | 94 | 8. | 1 | | 1400 | 169 | 1814. | 1 | | 2015 | 244 | 3405. |
| 1 | | 0135 | 20 | 1. | 1 | | 0750 | 95 | 8. | 1 | | 1405 | 170 | 1824. | 1 | | 2020 | 245 | 3392. |
| 1 | | 0140 | 21 | 1. | 1 | | 0755 | 96 | 8. | 1 | | 1410 | 171 | 1810. | 1 | | 2025 | 246 | 3376. |
| 1 | | 0145 | 22 | 1. | 1 | | 0800 | 97 | 8. | 1 | | 1415 | 172 | 1782. | 1 | | 2030 | 247 | 3358. |
| 1 | | 0150 | 23 | 1. | 1 | | 0805 | 98 | 8. | 1 | | 1420 | 173 | 1757. | 1 | | 2035 | 248 | 3337. |
| 1 | | 0155 | 24 | 1. | 1 | | 0810 | 99 | 8. | 1 | | 1425 | 174 | 1743. | 1 | | 2040 | 249 | 3313. |
| 1 | | 0200 | 25 | 2. | 1 | | 0815 | 100 | 8. | 1 | | 1430 | 175 | 1738. | 1 | | 2045 | 250 | 3286. |
| 1 | | 0205 | 26 | 2. | 1 | | 0820 | 101 | 8. | 1 | | 1435 | 176 | 1738. | 1 | | 2050 | 251 | 3257. |
| 1 | | 0210 | 27 | 2. | 1 | | 0825 | 102 | 8. | 1 | | 1440 | 177 | 1743. | 1 | | 2055 | 252 | 3225. |
| 1 | | 0215 | 28 | 2. | 1 | | 0830 | 103 | 8. | 1 | | 1445 | 178 | 1749. | 1 | | 2100 | 253 | 3191. |
| 1 | | 0220 | 29 | 2. | 1 | | 0835 | 104 | 9. | 1 | | 1450 | 179 | 1753. | 1 | | 2105 | 254 | 3154. |
| 1 | | 0225 | 30 | 3. | 1 | | 0840 | 105 | 9. | 1 | | 1455 | 180 | 1749. | 1 | | 2110 | 255 | 3115. |
| 1 | | 0230 | 31 | 3. | 1 | | 0845 | 106 | 9. | 1 | | 1500 | 181 | 1732. | 1 | | 2115 | 256 | 3071. |
| 1 | | 0235 | 32 | 3. | 1 | | 0850 | 107 | 9. | 1 | | 1505 | 182 | 1702. | 1 | | 2120 | 257 | 3021. |
| 1 | | 0240 | 33 | 3. | 1 | | 0855 | 108 | 9. | 1 | | 1510 | 183 | 1661. | 1 | | 2125 | 258 | 2965. |
| 1 | | 0245 | 34 | 3. | 1 | | 0900 | 109 | 9. | 1 | | 1515 | 184 | 1617. | 1 | | 2130 | 259 | 2900. |
| 1 | | 0250 | 35 | 3. | 1 | | 0905 | 110 | 9. | 1 | | 1520 | 185 | 1576. | 1 | | 2135 | 260 | 2837. |
| 1 | | 0255 | 36 | 4. | 1 | | 0910 | 111 | 9. | 1 | | 1525 | 186 | 1543. | 1 | | 2140 | 261 | 2793. |
| 1 | | 0300 | 37 | 4. | 1 | | 0915 | 112 | 9. | 1 | | 1530 | 187 | 1523. | 1 | | 2145 | 262 | 2757. |
| 1 | | 0305 | 38 | 4. | 1 | | 0920 | 113 | 9. | 1 | | 1535 | 188 | 1525. | 1 | | 2150 | 263 | 2713. |
| 1 | | 0310 | 39 | 4. | 1 | | 0925 | 114 | 9. | 1 | | 1540 | 189 | 1560. | 1 | | 2155 | 264 | 2658. |
| 1 | | 0315 | 40 | 4. | 1 | | 0930 | 115 | 10. | 1 | | 1545 | 190 | 1637. | 1 | | 2200 | 265 | 2594. |
| 1 | | 0320 | 41 | 4. | 1 | | 0935 | 116 | 10. | 1 | | 1550 | 191 | 1758. | 1 | | 2205 | 266 | 2523. |
| 1 | | 0325 | 42 | 4. | 1 | | 0940 | 117 | 10. | 1 | | 1555 | 192 | 1913. | 1 | | 2210 | 267 | 2440. |
| 1 | | 0330 | 43 | 5. | 1 | | 0945 | 118 | 10. | 1 | | 1600 | 193 | 2066. | 1 | | 2215 | 268 | 2329. |
| 1 | | 0335 | 44 | 5. | 1 | | 0950 | 119 | 10. | 1 | | 1605 | 194 | 2196. | 1 | | 2220 | 269 | 2185. |
| 1 | | 0340 | 45 | 5. | 1 | | 0955 | 120 | 10. | 1 | | 1610 | 195 | 2320. | 1 | | 2225 | 270 | 2014. |
| 1 | | 0345 | 46 | 5. | 1 | | 1000 | 121 | 10. | 1 | | 1615 | 196 | 2433. | 1 | | 2230 | 271 | 1859. |
| 1 | | 0350 | 47 | 5. | 1 | | 1005 | 122 | 10. | 1 | | 1620 | 197 | 2531. | 1 | | 2235 | 272 | 1760 |
| 1 | | 0355 | 48 | 5. | 1 | | 1010 | 123 | 11. | 1 | | 1625 | 198 | 2624. | 1 | | 2240 | 273 | 16[illegible] |
| 1 | | 0400 | 49 | 5. | 1 | | 1015 | 124 | 11. | 1 | | 1630 | 199 | 2715. | 1 | | 2245 | 274 | 16[illegible] |
| 1 | | 0405 | 50 | 5. | 1 | | 1020 | 125 | 11. | 1 | | 1635 | 200 | 2856. | 1 | | 2250 | 275 | 1569. |
| 1 | | 0410 | 51 | 5. | 1 | | 1025 | 126 | 11. | 1 | | 1640 | 201 | 3035. | 1 | | 2255 | 276 | 1516. |
| 1 | | 0415 | 52 | 5. | 1 | | 1030 | 127 | 11. | 1 | | 1645 | 202 | 3133. | 1 | | 2300 | 277 | 1477. |
| 1 | | 0420 | 53 | 5. | 1 | | 1035 | 128 | 12. | 1 | | 1650 | 203 | 3150. | 1 | | 2305 | 278 | 1441. |
| 1 | | 0425 | 54 | 5. | 1 | | 1040 | 129 | 12. | 1 | | 1655 | 204 | 3149. | 1 | | 2310 | 279 | 1395. |
| 1 | | 0430 | 55 | 5. | 1 | | 1045 | 130 | 12. | 1 | | 1700 | 205 | 3139. | 1 | | 2315 | 280 | 1349. |
| 1 | | 0435 | 56 | 5. | 1 | | 1050 | 131 | 12. | 1 | | 1705 | 206 | 3127. | 1 | | 2320 | 281 | 1305. |
| 1 | | 0440 | 57 | 5. | 1 | | 1055 | 132 | 13. | 1 | | 1710 | 207 | 3115. | 1 | | 2325 | 282 | 1263. |
| 1 | | 0445 | 58 | 6. | 1 | | 1100 | 133 | 13. | 1 | | 1715 | 208 | 3106. | 1 | | 2330 | 283 | 1223. |
| 1 | | 0450 | 59 | 6. | 1 | | 1105 | 134 | 13. | 1 | | 1720 | 209 | 3098. | 1 | | 2335 | 284 | 1184. |
| 1 | | 0455 | 60 | 6. | 1 | | 1110 | 135 | 14. | 1 | | 1725 | 210 | 3093. | 1 | | 2340 | 285 | 1147. |
| 1 | | 0500 | 61 | 6. | 1 | | 1115 | 136 | 14. | 1 | | 1730 | 211 | 3090. | 1 | | 2345 | 286 | 1112. |
| 1 | | 0505 | 62 | 6. | 1 | | 1120 | 137 | 14. | 1 | | 1735 | 212 | 3091. | 1 | | 2350 | 287 | 1077. |
| 1 | | 0510 | 63 | 6. | 1 | | 1125 | 138 | 15. | 1 | | 1740 | 213 | 3095. | 1 | | 2355 | 288 | 1044. |
| 1 | | 0515 | 64 | 6. | 1 | | 1130 | 139 | 15. | 1 | | 1745 | 214 | 3103. | 2 | | 0000 | 289 | 1012. |
| 1 | | 0520 | 65 | 6. | 1 | | 1135 | 140 | 17. | 1 | | 1750 | 215 | 3115. | 2 | | 0005 | 290 | 982. |
| 1 | | 0525 | 66 | 6. | 1 | | 1140 | 141 | 21. | 1 | | 1755 | 216 | 3129. | 2 | | 0010 | 291 | 955. |
| 1 | | 0530 | 67 | 6. | 1 | | 1145 | 142 | 29. | 1 | | 1800 | 217 | 3145. | 2 | | 0015 | 292 | 930. |
| 1 | | 0535 | 68 | 6. | 1 | | 1150 | 143 | 44. | 1 | | 1805 | 218 | 3163. | 2 | | 0020 | 293 | 907. |
| 1 | | 0540 | 69 | 6. | 1 | | 1155 | 144 | 72. | 1 | | 1810 | 219 | 3181. | 2 | | 0025 | 294 | 886. |
| 1 | | 0545 | 70 | 6. | 1 | | 1200 | 145 | 109. | 1 | | 1815 | 220 | 3199. | 2 | | 0030 | 295 | 866. |
| 1 | | 0550 | 71 | 6. | 1 | | 1205 | 146 | 153. | 1 | | 1820 | 221 | 3217. | 2 | | 0035 | 296 | 848. |
| 1 | | 0555 | 72 | 6. | 1 | | 1210 | 147 | 205. | 1 | | 1825 | 222 | 3233. | 2 | | 0040 | 297 | 831. |
| 1 | | 0600 | 73 | 6. | 1 | | 1215 | 148 | 254. | 1 | | 1830 | 223 | 3249. | 2 | | 0045 | 298 | 814. |
| 1 | | 0605 | 74 | 6. | 1 | | 1220 | 149 | 281. | 1 | | 1835 | 224 | 3262. | 2 | | 0050 | 299 | 797. |
| 1 | | 0610 | 75 | 6. | 1 | | 1225 | 150 | 271. | 1 | | 1840 | 225 | 3275. | 2 | | 0055 | 300 | 781. |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| + 3438. | 19.83 | (CFS) | 3132. | 1160. | 1118. | 1118. |
| | | (INCHES) | .618 | .916 | .916 | .916 |
| | | (AC-FT) | 1553. | 2301. | 2301. | 2301. |

CUMULATIVE AREA = 47.09 SQ MI

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HYDROGRAPH AT CP364A
TRANSPOSITION AREA 10.0 SQ MI

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| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0000 | 1 | 0. | * | 1 | 0615 | 76 | 7. | * | 1 | 1230 | 151 | 266. | * | 1 | 1845 | 226 | 3239. |
| 1 | 0005 | 2 | 0. | * | 1 | 0620 | 77 | 7. | * | 1 | 1235 | 152 | 291. | * | 1 | 1850 | 227 | 3253. |
| 1 | 0010 | 3 | 0. | * | 1 | 0625 | 78 | 7. | * | 1 | 1240 | 153 | 330. | * | 1 | 1855 | 228 | 3267. |
| 1 | 0015 | 4 | 0. | * | 1 | 0630 | 79 | 7. | * | 1 | 1245 | 154 | 383. | * | 1 | 1900 | 229 | 3282. |
| 1 | 0020 | 5 | 0. | * | 1 | 0635 | 80 | 7. | * | 1 | 1250 | 155 | 459. | * | 1 | 1905 | 230 | 3297. |
| 1 | 0025 | 6 | 0. | * | 1 | 0640 | 81 | 7. | * | 1 | 1255 | 156 | 543. | * | 1 | 1910 | 231 | 3311. |
| 1 | 0030 | 7 | 0. | * | 1 | 0645 | 82 | 7. | * | 1 | 1300 | 157 | 627. | * | 1 | 1915 | 232 | 3325. |
| 1 | 0035 | 8 | 0. | * | 1 | 0650 | 83 | 7. | * | 1 | 1305 | 158 | 715. | * | 1 | 1920 | 233 | 3339. |
| 1 | 0040 | 9 | 0. | * | 1 | 0655 | 84 | 7. | * | 1 | 1310 | 159 | 808. | * | 1 | 1925 | 234 | 3351. |
| 1 | 0045 | 10 | 0. | * | 1 | 0700 | 85 | 7. | * | 1 | 1315 | 160 | 912. | * | 1 | 1930 | 235 | 3362. |
| 1 | 0050 | 11 | 0. | * | 1 | 0705 | 86 | 7. | * | 1 | 1320 | 161 | 1029. | * | 1 | 1935 | 236 | 3370. |
| 1 | 0055 | 12 | 0. | * | 1 | 0710 | 87 | 7. | * | 1 | 1325 | 162 | 1152. | * | 1 | 1940 | 237 | 3377. |
| 1 | 0100 | 13 | 0. | * | 1 | 0715 | 88 | 7. | * | 1 | 1330 | 163 | 1271. | * | 1 | 1945 | 238 | 3381. |
| 1 | 0105 | 14 | 0. | * | 1 | 0720 | 89 | 7. | * | 1 | 1335 | 164 | 1378. | * | 1 | 1950 | 239 | 3383. |
| 1 | 0110 | 15 | 0. | * | 1 | 0725 | 90 | 7. | * | 1 | 1340 | 165 | 1480. | * | 1 | 1955 | 240 | 3383. |
| 1 | 0115 | 16 | 1. | * | 1 | 0730 | 91 | 7. | * | 1 | 1345 | 166 | 1605. | * | 1 | 2000 | 241 | 3380. |
| 1 | 0120 | 17 | 1. | * | 1 | 0735 | 92 | 8. | * | 1 | 1350 | 167 | 1693. | * | 1 | 2005 | 242 | 3375. |
| 1 | 0125 | 18 | 1. | * | 1 | 0740 | 93 | 8. | * | 1 | 1355 | 168 | 1753. | * | 1 | 2010 | 243 | 3367. |
| 1 | 0130 | 19 | 1. | * | 1 | 0745 | 94 | 8. | * | 1 | 1400 | 169 | 1788. | * | 1 | 2015 | 244 | 3357. |
| 1 | 0135 | 20 | 1. | * | 1 | 0750 | 95 | 8. | * | 1 | 1405 | 170 | 1797. | * | 1 | 2020 | 245 | 3344. |
| 1 | 0140 | 21 | 1. | * | 1 | 0755 | 96 | 8. | * | 1 | 1410 | 171 | 1782. | * | 1 | 2025 | 246 | 3329. |
| 1 | 0145 | 22 | 1. | * | 1 | 0800 | 97 | 8. | * | 1 | 1415 | 172 | 1754. | * | 1 | 2030 | 247 | 3311. |
| 1 | 0150 | 23 | 1. | * | 1 | 0805 | 98 | 8. | * | 1 | 1420 | 173 | 1728. | * | 1 | 2035 | 248 | 3290. |
| 1 | 0155 | 24 | 1. | * | 1 | 0810 | 99 | 8. | * | 1 | 1425 | 174 | 1713. | * | 1 | 2040 | 249 | 3266. |
| 1 | 0200 | 25 | 2. | * | 1 | 0815 | 100 | 8. | * | 1 | 1430 | 175 | 1706. | * | 1 | 2045 | 250 | 3240. |
| 1 | 0205 | 26 | 2. | * | 1 | 0820 | 101 | 8. | * | 1 | 1435 | 176 | 1706. | * | 1 | 2050 | 251 | 3211. |
| 1 | 0210 | 27 | 2. | * | 1 | 0825 | 102 | 8. | * | 1 | 1440 | 177 | 1710. | * | 1 | 2055 | 252 | 3180. |
| 1 | 0215 | 28 | 2. | * | 1 | 0830 | 103 | 8. | * | 1 | 1445 | 178 | 1716. | * | 1 | 2100 | 253 | 3147. |
| 1 | 0220 | 29 | 2. | * | 1 | 0835 | 104 | 8. | * | 1 | 1450 | 179 | 1719. | * | 1 | 2105 | 254 | 3111. |
| 1 | 0225 | 30 | 3. | * | 1 | 0840 | 105 | 9. | * | 1 | 1455 | 180 | 1716. | * | 1 | 2110 | 255 | 3072. |
| 1 | 0230 | 31 | 3. | * | 1 | 0845 | 106 | 9. | * | 1 | 1500 | 181 | 1701. | * | 1 | 2115 | 256 | 3028. |
| 1 | 0235 | 32 | 3. | * | 1 | 0850 | 107 | 9. | * | 1 | 1505 | 182 | 1673. | * | 1 | 2120 | 257 | 2977. |
| 1 | 0240 | 33 | 3. | * | 1 | 0855 | 108 | 9. | * | 1 | 1510 | 183 | 1634. | * | 1 | 2125 | 258 | 2918. |
| 1 | 0245 | 34 | 3. | * | 1 | 0900 | 109 | 9. | * | 1 | 1515 | 184 | 1591. | * | 1 | 2130 | 259 | 2857. |
| 1 | 0250 | 35 | 3. | * | 1 | 0905 | 110 | 9. | * | 1 | 1520 | 185 | 1551. | * | 1 | 2135 | 260 | 2807. |
| 1 | 0255 | 36 | 4. | * | 1 | 0910 | 111 | 9. | * | 1 | 1525 | 186 | 1517. | * | 1 | 2140 | 261 | 2771. |
| 1 | 0300 | 37 | 4. | * | 1 | 0915 | 112 | 9. | * | 1 | 1530 | 187 | 1496. | * | 1 | 2145 | 262 | 2732. |
| 1 | 0305 | 38 | 4. | * | 1 | 0920 | 113 | 9. | * | 1 | 1535 | 188 | 1493. | * | 1 | 2150 | 263 | 2683. |
| 1 | 0310 | 39 | 4. | * | 1 | 0925 | 114 | 9. | * | 1 | 1540 | 189 | 1520. | * | 1 | 2155 | 264 | 2624. |
| 1 | 0315 | 40 | 4. | * | 1 | 0930 | 115 | 9. | * | 1 | 1545 | 190 | 1589. | * | 1 | 2200 | 265 | 2557. |
| 1 | 0320 | 41 | 4. | * | 1 | 0935 | 116 | 10. | * | 1 | 1550 | 191 | 1702. | * | 1 | 2205 | 266 | 2482. |
| 1 | 0325 | 42 | 4. | * | 1 | 0940 | 117 | 10. | * | 1 | 1555 | 192 | 1857. | * | 1 | 2210 | 267 | 2388. |
| 1 | 0330 | 43 | 5. | * | 1 | 0945 | 118 | 10. | * | 1 | 1600 | 193 | 2019. | * | 1 | 2215 | 268 | 2266. |
| 1 | 0335 | 44 | 5. | * | 1 | 0950 | 119 | 10. | * | 1 | 1605 | 194 | 2153. | * | 1 | 2220 | 269 | 2111. |
| 1 | 0340 | 45 | 5. | * | 1 | 0955 | 120 | 10. | * | 1 | 1610 | 195 | 2277. | * | 1 | 2225 | 270 | 1941. |
| 1 | 0345 | 46 | 5. | * | 1 | 1000 | 121 | 10. | * | 1 | 1615 | 196 | 2396. | * | 1 | 2230 | 271 | 1816. |
| 1 | 0350 | 47 | 5. | * | 1 | 1005 | 122 | 10. | * | 1 | 1620 | 197 | 2496. | * | 1 | 2235 | 272 | 1735. |
| 1 | 0355 | 48 | 5. | * | 1 | 1010 | 123 | 11. | * | 1 | 1625 | 198 | 2586. | * | 1 | 2240 | 273 | 1668. |
| 1 | 0400 | 49 | 5. | * | 1 | 1015 | 124 | 11. | * | 1 | 1630 | 199 | 2674. | * | 1 | 2245 | 274 | 1608. |
| 1 | 0405 | 50 | 5. | * | 1 | 1020 | 125 | 11. | * | 1 | 1635 | 200 | 2780. | * | 1 | 2250 | 275 | 1553. |
| 1 | 0410 | 51 | 5. | * | 1 | 1025 | 126 | 11. | * | 1 | 1640 | 201 | 2927. | * | 1 | 2255 | 276 | 1504. |
| 1 | 0415 | 52 | 5. | * | 1 | 1030 | 127 | 11. | * | 1 | 1645 | 202 | 3055. | * | 1 | 2300 | 277 | 1469. |
| 1 | 0420 | 53 | 5. | * | 1 | 1035 | 128 | 12. | * | 1 | 1650 | 203 | 3106. | * | 1 | 2305 | 278 | 1430. |
| 1 | 0425 | 54 | 5. | * | 1 | 1040 | 129 | 12. | * | 1 | 1655 | 204 | 3110. | * | 1 | 2310 | 279 | 1385. |
| 1 | 0430 | 55 | 5. | * | 1 | 1045 | 130 | 12. | * | 1 | 1700 | 205 | 3102. | * | 1 | 2315 | 280 | 1339. |
| 1 | 0435 | 56 | 5. | * | 1 | 1050 | 131 | 12. | * | 1 | 1705 | 206 | 3091. | * | 1 | 2320 | 281 | 1296. |
| 1 | 0440 | 57 | 5. | * | 1 | 1055 | 132 | 13. | * | 1 | 1710 | 207 | 3081. | * | 1 | 2325 | 282 | 1255. |
| 1 | 0445 | 58 | 5. | * | 1 | 1100 | 133 | 13. | * | 1 | 1715 | 208 | 3072. | * | 1 | 2330 | 283 | 1215. |
| 1 | 0450 | 59 | 5. | * | 1 | 1105 | 134 | 13. | * | 1 | 1720 | 209 | 3065. | * | 1 | 2335 | 284 | 1177. |
| 1 | 0455 | 60 | 6. | * | 1 | 1110 | 135 | 13. | * | 1 | 1725 | 210 | 3059. | * | 1 | 2340 | 285 | 1141. |
| 1 | 0500 | 61 | 6. | * | 1 | 1115 | 136 | 14. | * | 1 | 1730 | 211 | 3056. | * | 1 | 2345 | 286 | 1106. |
| 1 | 0505 | 62 | 6. | * | 1 | 1120 | 137 | 14. | * | 1 | 1735 | 212 | 3055. | * | 1 | 2350 | 287 | 1072. |
| 1 | 0510 | 63 | 6. | * | 1 | 1125 | 138 | 15. | * | 1 | 1740 | 213 | 3058. | * | 1 | 2355 | 288 | 1039. |
| 1 | 0515 | 64 | 6. | * | 1 | 1130 | 139 | 15. | * | 1 | 1745 | 214 | 3064. | * | 2 | 0000 | 289 | 1007. |
| 1 | 0520 | 65 | 6. | * | 1 | 1135 | 140 | 17. | * | 1 | 1750 | 215 | 3074. | * | 2 | 0005 | 290 | 978. |
| 1 | 0525 | 66 | 6. | * | 1 | 1140 | 141 | 21. | * | 1 | 1755 | 216 | 3087. | * | 2 | 0010 | 291 | 951. |
| 1 | 0530 | 67 | 6. | * | 1 | 1145 | 142 | 29. | * | 1 | 1800 | 217 | 3102. | * | 2 | 0015 | 292 | 926. |
| 1 | 0535 | 68 | 6. | * | 1 | 1150 | 143 | 43. | * | 1 | 1805 | 218 | 3119. | * | 2 | 0020 | 293 | 903. |
| 1 | 0540 | 69 | 6. | * | 1 | 1155 | 144 | 71. | * | 1 | 1810 | 219 | 3137. | * | 2 | 0025 | 294 | 883. |
| 1 | 0545 | 70 | 6. | * | 1 | 1200 | 145 | 107. | * | 1 | 1815 | 220 | 3154. | * | 2 | 0030 | 295 | 864. |
| 1 | 0550 | 71 | 6. | * | 1 | 1205 | 146 | 150. | * | 1 | 1820 | 221 | 3171. | * | 2 | 0035 | 296 | 845. |
| 1 | 0555 | 72 | 6. | * | 1 | 1210 | 147 | 201. | * | 1 | 1825 | 222 | 3187. | * | 2 | 0040 | 297 | 828. |
| 1 | 0600 | 73 | 6. | * | 1 | 1215 | 148 | 249. | * | 1 | 1830 | 223 | 3202. | * | 2 | 0045 | 298 | 811. |
| 1 | 0605 | 74 | 6. | * | 1 | 1220 | 149 | 277. | * | 1 | 1835 | 224 | 3215. | * | 2 | 0050 | 299 | 795. |
| 1 | 0610 | 75 | 6. | * | 1 | 1225 | 150 | 267. | * | 1 | 1840 | 225 | 3227. | * | 2 | 0055 | 300 | 779. |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| + 3383. | 19.83 | (CFS) | 3086. | 1143. | 1101. | 1101. |
| | | (INCHES) | .609 | .903 | .903 | .903 |
| | | (AC-FT) | 1530. | 2267. | 2267. | 2267. |

CUMULATIVE AREA = 47.09 SQ MI

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HYDROGRAPH AT CP364A
TRANSPOSITION AREA 50.0 SQ MI

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| DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0000 | 1 | 0. | * | 1 | | 0615 | 76 | 6. | * | 1 | | 1230 | 151 | 251. | * | 1 | | 1845 | 226 | 3047. |
| 1 | | 0005 | 2 | 0. | * | 1 | | 0620 | 77 | 6. | * | 1 | | 1235 | 152 | 275. | * | 1 | | 1850 | 227 | 3059. |

| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0010 | 3 | 0. | 1 | | 0625 | 78 | 6. | 1 | | 1240 | 153 | 310. | 1 | | 1855 | 228 | 3070. |
| 1 | | 0015 | 4 | 0. | 1 | | 0630 | 79 | 6. | 1 | | 1245 | 154 | 358. | 1 | | 1900 | 229 | 3082. |
| 1 | | 0020 | 5 | 0. | 1 | | 0635 | 80 | 7. | 1 | | 1250 | 155 | 424. | 1 | | 1905 | 230 | 3094. |
| 1 | | 0025 | 6 | 0. | 1 | | 0640 | 81 | 7. | 1 | | 1255 | 156 | 508. | 1 | | 1910 | 231 | 3106. |
| 1 | | 0030 | 7 | 0. | 1 | | 0645 | 82 | 7. | 1 | | 1300 | 157 | 588. | 1 | | 1915 | 232 | 3117. |
| 1 | | 0035 | 8 | 0. | 1 | | 0650 | 83 | 7. | 1 | | 1305 | 158 | 671. | 1 | | 1920 | 233 | 3127. |
| 1 | | 0040 | 9 | 0. | 1 | | 0655 | 84 | 7. | 1 | | 1310 | 159 | 758. | 1 | | 1925 | 234 | 3137. |
| 1 | | 0045 | 10 | 0. | 1 | | 0700 | 85 | 7. | 1 | | 1315 | 160 | 853. | 1 | | 1930 | 235 | 3146. |
| 1 | | 0050 | 11 | 0. | 1 | | 0705 | 86 | 7. | 1 | | 1320 | 161 | 960. | 1 | | 1935 | 236 | 3153. |
| 1 | | 0055 | 12 | 0. | 1 | | 0710 | 87 | 7. | 1 | | 1325 | 162 | 1076. | 1 | | 1940 | 237 | 315[illegible] |
| 1 | | 0100 | 13 | 0. | 1 | | 0715 | 88 | 7. | 1 | | 1330 | 163 | 1189. | 1 | | 1945 | 238 | 316[illegible] |
| 1 | | 0105 | 14 | 0. | 1 | | 0720 | 89 | 7. | 1 | | 1335 | 164 | 1294. | 1 | | 1950 | 239 | 3166. |
| 1 | | 0110 | 15 | 0. | 1 | | 0725 | 90 | 7. | 1 | | 1340 | 165 | 1387. | 1 | | 1955 | 240 | 3167. |
| 1 | | 0115 | 16 | 0. | 1 | | 0730 | 91 | 7. | 1 | | 1345 | 166 | 1476. | 1 | | 2000 | 241 | 3165. |
| 1 | | 0120 | 17 | 1. | 1 | | 0735 | 92 | 7. | 1 | | 1350 | 167 | 1582. | 1 | | 2005 | 242 | 3162. |
| 1 | | 0125 | 18 | 1. | 1 | | 0740 | 93 | 7. | 1 | | 1355 | 168 | 1652. | 1 | | 2010 | 243 | 3156. |
| 1 | | 0130 | 19 | 1. | 1 | | 0745 | 94 | 7. | 1 | | 1400 | 169 | 1687. | 1 | | 2015 | 244 | 3148. |
| 1 | | 0135 | 20 | 1. | 1 | | 0750 | 95 | 7. | 1 | | 1405 | 170 | 1693. | 1 | | 2020 | 245 | 3137. |
| 1 | | 0140 | 21 | 1. | 1 | | 0755 | 96 | 7. | 1 | | 1410 | 171 | 1676. | 1 | | 2025 | 246 | 3125. |
| 1 | | 0145 | 22 | 1. | 1 | | 0800 | 97 | 8. | 1 | | 1415 | 172 | 1646. | 1 | | 2030 | 247 | 3110. |
| 1 | | 0150 | 23 | 1. | 1 | | 0805 | 98 | 8. | 1 | | 1420 | 173 | 1617. | 1 | | 2035 | 248 | 3093. |
| 1 | | 0155 | 24 | 1. | 1 | | 0810 | 99 | 8. | 1 | | 1425 | 174 | 1596. | 1 | | 2040 | 249 | 3074. |
| 1 | | 0200 | 25 | 2. | 1 | | 0815 | 100 | 8. | 1 | | 1430 | 175 | 1584. | 1 | | 2045 | 250 | 3053. |
| 1 | | 0205 | 26 | 2. | 1 | | 0820 | 101 | 8. | 1 | | 1435 | 176 | 1579. | 1 | | 2050 | 251 | 3030. |
| 1 | | 0210 | 27 | 2. | 1 | | 0825 | 102 | 8. | 1 | | 1440 | 177 | 1580. | 1 | | 2055 | 252 | 3003. |
| 1 | | 0215 | 28 | 2. | 1 | | 0830 | 103 | 8. | 1 | | 1445 | 178 | 1583. | 1 | | 2100 | 253 | 2971. |
| 1 | | 0220 | 29 | 2. | 1 | | 0835 | 104 | 8. | 1 | | 1450 | 179 | 1585. | 1 | | 2105 | 254 | 2934. |
| 1 | | 0225 | 30 | 2. | 1 | | 0840 | 105 | 8. | 1 | | 1455 | 180 | 1582. | 1 | | 2110 | 255 | 2890. |
| 1 | | 0230 | 31 | 3. | 1 | | 0845 | 106 | 8. | 1 | | 1500 | 181 | 1572. | 1 | | 2115 | 256 | 2843. |
| 1 | | 0235 | 32 | 3. | 1 | | 0850 | 107 | 8. | 1 | | 1505 | 182 | 1553. | 1 | | 2120 | 257 | 2805. |
| 1 | | 0240 | 33 | 3. | 1 | | 0855 | 108 | 8. | 1 | | 1510 | 183 | 1525. | 1 | | 2125 | 258 | 2775. |
| 1 | | 0245 | 34 | 3. | 1 | | 0900 | 109 | 8. | 1 | | 1515 | 184 | 1492. | 1 | | 2130 | 259 | 2743. |
| 1 | | 0250 | 35 | 3. | 1 | | 0905 | 110 | 9. | 1 | | 1520 | 185 | 1465. | 1 | | 2135 | 260 | 2702. |
| 1 | | 0255 | 36 | 3. | 1 | | 0910 | 111 | 9. | 1 | | 1525 | 186 | 1433. | 1 | | 2140 | 261 | 2651. |
| 1 | | 0300 | 37 | 4. | 1 | | 0915 | 112 | 9. | 1 | | 1530 | 187 | 1403. | 1 | | 2145 | 262 | 2593. |
| 1 | | 0305 | 38 | 4. | 1 | | 0920 | 113 | 9. | 1 | | 1535 | 188 | 1383. | 1 | | 2150 | 263 | 2530. |
| 1 | | 0310 | 39 | 4. | 1 | | 0925 | 114 | 9. | 1 | | 1540 | 189 | 1381. | 1 | | 2155 | 264 | 2458. |
| 1 | | 0315 | 40 | 4. | 1 | | 0930 | 115 | 9. | 1 | | 1545 | 190 | 1404. | 1 | | 2200 | 265 | 2367. |
| 1 | | 0320 | 41 | 4. | 1 | | 0935 | 116 | 9. | 1 | | 1550 | 191 | 1462. | 1 | | 2205 | 266 | 2253. |
| 1 | | 0325 | 42 | 4. | 1 | | 0940 | 117 | 9. | 1 | | 1555 | 192 | 1598. | 1 | | 2210 | 267 | 2116. |
| 1 | | 0330 | 43 | 4. | 1 | | 0945 | 118 | 9. | 1 | | 1600 | 193 | 1781. | 1 | | 2215 | 268 | 1968. |
| 1 | | 0335 | 44 | 4. | 1 | | 0950 | 119 | 10. | 1 | | 1605 | 194 | 1960. | 1 | | 2220 | 269 | 1851. |
| 1 | | 0340 | 45 | 5. | 1 | | 0955 | 120 | 10. | 1 | | 1610 | 195 | 2109. | 1 | | 2225 | 270 | 1774. |
| 1 | | 0345 | 46 | 5. | 1 | | 1000 | 121 | 10. | 1 | | 1615 | 196 | 2234. | 1 | | 2230 | 271 | 1709. |
| 1 | | 0350 | 47 | 5. | 1 | | 1005 | 122 | 10. | 1 | | 1620 | 197 | 2349. | 1 | | 2235 | 272 | 1650. |
| 1 | | 0355 | 48 | 5. | 1 | | 1010 | 123 | 10. | 1 | | 1625 | 198 | 2446. | 1 | | 2240 | 273 | 1596. |
| 1 | | 0400 | 49 | 5. | 1 | | 1015 | 124 | 10. | 1 | | 1630 | 199 | 2526. | 1 | | 2245 | 274 | 1546. |
| 1 | | 0405 | 50 | 5. | 1 | | 1020 | 125 | 10. | 1 | | 1635 | 200 | 2600. | 1 | | 2250 | 275 | 1502. |
| 1 | | 0410 | 51 | 5. | 1 | | 1025 | 126 | 11. | 1 | | 1640 | 201 | 2670. | 1 | | 2255 | 276 | 1470. |
| 1 | | 0415 | 52 | 5. | 1 | | 1030 | 127 | 11. | 1 | | 1645 | 202 | 2732. | 1 | | 2300 | 277 | 143[illegible] |
| 1 | | 0420 | 53 | 5. | 1 | | 1035 | 128 | 11. | 1 | | 1650 | 203 | 2805. | 1 | | 2305 | 278 | 138[illegible] |
| 1 | | 0425 | 54 | 5. | 1 | | 1040 | 129 | 11. | 1 | | 1655 | 204 | 2891. | 1 | | 2310 | 279 | 1345. |
| 1 | | 0430 | 55 | 5. | 1 | | 1045 | 130 | 12. | 1 | | 1700 | 205 | 2944. | 1 | | 2315 | 280 | 1303. |
| 1 | | 0435 | 56 | 5. | 1 | | 1050 | 131 | 12. | 1 | | 1705 | 206 | 2951. | 1 | | 2320 | 281 | 1263. |
| 1 | | 0440 | 57 | 5. | 1 | | 1055 | 132 | 12. | 1 | | 1710 | 207 | 2943. | 1 | | 2325 | 282 | 1225. |
| 1 | | 0445 | 58 | 5. | 1 | | 1100 | 133 | 12. | 1 | | 1715 | 208 | 2934. | 1 | | 2330 | 283 | 1187. |
| 1 | | 0450 | 59 | 5. | 1 | | 1105 | 134 | 13. | 1 | | 1720 | 209 | 2925. | 1 | | 2335 | 284 | 1151. |
| 1 | | 0455 | 60 | 5. | 1 | | 1110 | 135 | 13. | 1 | | 1725 | 210 | 2916. | 1 | | 2340 | 285 | 1116. |
| 1 | | 0500 | 61 | 5. | 1 | | 1115 | 136 | 13. | 1 | | 1730 | 211 | 2909. | 1 | | 2345 | 286 | 1082. |
| 1 | | 0505 | 62 | 5. | 1 | | 1120 | 137 | 14. | 1 | | 1735 | 212 | 2904. | 1 | | 2350 | 287 | 1049. |
| 1 | | 0510 | 63 | 5. | 1 | | 1125 | 138 | 14. | 1 | | 1740 | 213 | 2902. | 1 | | 2355 | 288 | 1018. |
| 1 | | 0515 | 64 | 6. | 1 | | 1130 | 139 | 14. | 1 | | 1745 | 214 | 2904. | 2 | | 0000 | 289 | 988. |
| 1 | | 0520 | 65 | 6. | 1 | | 1135 | 140 | 16. | 1 | | 1750 | 215 | 2910. | 2 | | 0005 | 290 | 960. |
| 1 | | 0525 | 66 | 6. | 1 | | 1140 | 141 | 20. | 1 | | 1755 | 216 | 2918. | 2 | | 0010 | 291 | 935. |
| 1 | | 0530 | 67 | 6. | 1 | | 1145 | 142 | 27. | 1 | | 1800 | 217 | 2930. | 2 | | 0015 | 292 | 912. |
| 1 | | 0535 | 68 | 6. | 1 | | 1150 | 143 | 40. | 1 | | 1805 | 218 | 2944. | 2 | | 0020 | 293 | 890. |
| 1 | | 0540 | 69 | 6. | 1 | | 1155 | 144 | 66. | 1 | | 1810 | 219 | 2959. | 2 | | 0025 | 294 | 871. |
| 1 | | 0545 | 70 | 6. | 1 | | 1200 | 145 | 101. | 1 | | 1815 | 220 | 2974. | 2 | | 0030 | 295 | 852. |
| 1 | | 0550 | 71 | 6. | 1 | | 1205 | 146 | 141. | 1 | | 1820 | 221 | 2989. | 2 | | 0035 | 296 | 835. |
| 1 | | 0555 | 72 | 6. | 1 | | 1210 | 147 | 188. | 1 | | 1825 | 222 | 3003. | 2 | | 0040 | 297 | 818. |
| 1 | | 0600 | 73 | 6. | 1 | | 1215 | 148 | 229. | 1 | | 1830 | 223 | 3015. | 2 | | 0045 | 298 | 801. |
| 1 | | 0605 | 74 | 6. | 1 | | 1220 | 149 | 261. | 1 | | 1835 | 224 | 3026. | 2 | | 0050 | 299 | 785. |
| 1 | | 0610 | 75 | 6. | 1 | | 1225 | 150 | 252. | 1 | | 1840 | 225 | 3037. | 2 | | 0055 | 300 | 770. |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| + 3167. | 19.92 | (CFS) | 2901. | 1074. | 1034. | 1034. |
| | | (INCHES) | .573 | .848 | .848 | .848 |
| | | (AC-FT) | 1438. | 2130. | 2130. | 2130. |

CUMULATIVE AREA = 47.09 SQ MI

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HYDROGRAPH AT CP364A
TRANSPOSITION AREA 100.0 SQ MI

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| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0000 | 1 | 0. | 1 | | 0615 | 76 | 6. | 1 | | 1230 | 151 | 245. | 1 | | 1845 | 226 | 2962. |
| 1 | | 0005 | 2 | 0. | 1 | | 0620 | 77 | 6. | 1 | | 1235 | 152 | 268. | 1 | | 1850 | 227 | 2972. |
| 1 | | 0010 | 3 | 0. | 1 | | 0625 | 78 | 6. | 1 | | 1240 | 153 | 302. | 1 | | 1855 | 228 | 2983. |
| 1 | | 0015 | 4 | 0. | 1 | | 0630 | 79 | 6. | 1 | | 1245 | 154 | 348. | 1 | | 1900 | 229 | 2994. |

| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0020 | 5 | 0. | 1 | | 0635 | 80 | 6. | 1 | | 1250 | 155 | 409. | 1 | | 1905 | 230 | 3005. |
| 1 | | 0025 | 6 | 0. | 1 | | 0640 | 81 | 6. | 1 | | 1255 | 156 | 492. | 1 | | 1910 | 231 | 3015. |
| 1 | | 0030 | 7 | 0. | 1 | | 0645 | 82 | 7. | 1 | | 1300 | 157 | 572. | 1 | | 1915 | 232 | 3026. |
| 1 | | 0035 | 8 | 0. | 1 | | 0650 | 83 | 7. | 1 | | 1305 | 158 | 652. | 1 | | 1920 | 233 | 3036. |
| 1 | | 0040 | 9 | 0. | 1 | | 0655 | 84 | 7. | 1 | | 1310 | 159 | 736. | 1 | | 1925 | 234 | 3045. |
| 1 | | 0045 | 10 | 0. | 1 | | 0700 | 85 | 7. | 1 | | 1315 | 160 | 828. | 1 | | 1930 | 235 | 3053. |
| 1 | | 0050 | 11 | 0. | 1 | | 0705 | 86 | 7. | 1 | | 1320 | 161 | 931. | 1 | | 1935 | 236 | 3059. |
| 1 | | 0055 | 12 | 0. | 1 | | 0710 | 87 | 7. | 1 | | 1325 | 162 | 1042. | 1 | | 1940 | 237 | 3065. |
| 1 | | 0100 | 13 | 0. | 1 | | 0715 | 88 | 7. | 1 | | 1330 | 163 | 1154. | 1 | | 1945 | 238 | 3069. |
| 1 | | 0105 | 14 | 0. | 1 | | 0720 | 89 | 7. | 1 | | 1335 | 164 | 1257. | 1 | | 1950 | 239 | 3071. |
| 1 | | 0110 | 15 | 0. | 1 | | 0725 | 90 | 7. | 1 | | 1340 | 165 | 1350. | 1 | | 1955 | 240 | 3072. |
| 1 | | 0115 | 16 | 0. | 1 | | 0730 | 91 | 7. | 1 | | 1345 | 166 | 1435. | 1 | | 2000 | 241 | 3071. |
| 1 | | 0120 | 17 | 1. | 1 | | 0735 | 92 | 7. | 1 | | 1350 | 167 | 1522. | 1 | | 2005 | 242 | 3068. |
| 1 | | 0125 | 18 | 1. | 1 | | 0740 | 93 | 7. | 1 | | 1355 | 168 | 1606. | 1 | | 2010 | 243 | 3062. |
| 1 | | 0130 | 19 | 1. | 1 | | 0745 | 94 | 7. | 1 | | 1400 | 169 | 1642. | 1 | | 2015 | 244 | 3055. |
| 1 | | 0135 | 20 | 1. | 1 | | 0750 | 95 | 7. | 1 | | 1405 | 170 | 1648. | 1 | | 2020 | 245 | 3046. |
| 1 | | 0140 | 21 | 1. | 1 | | 0755 | 96 | 7. | 1 | | 1410 | 171 | 1630. | 1 | | 2025 | 246 | 3036. |
| 1 | | 0145 | 22 | 1. | 1 | | 0800 | 97 | 7. | 1 | | 1415 | 172 | 1600. | 1 | | 2030 | 247 | 3023. |
| 1 | | 0150 | 23 | 1. | 1 | | 0805 | 98 | 7. | 1 | | 1420 | 173 | 1569. | 1 | | 2035 | 248 | 3009. |
| 1 | | 0155 | 24 | 1. | 1 | | 0810 | 99 | 8. | 1 | | 1425 | 174 | 1547. | 1 | | 2040 | 249 | 2991. |
| 1 | | 0200 | 25 | 1. | 1 | | 0815 | 100 | 8. | 1 | | 1430 | 175 | 1533. | 1 | | 2045 | 250 | 2971. |
| 1 | | 0205 | 26 | 2. | 1 | | 0820 | 101 | 8. | 1 | | 1435 | 176 | 1527. | 1 | | 2050 | 251 | 2947. |
| 1 | | 0210 | 27 | 2. | 1 | | 0825 | 102 | 8. | 1 | | 1440 | 177 | 1526. | 1 | | 2055 | 252 | 2918. |
| 1 | | 0215 | 28 | 2. | 1 | | 0830 | 103 | 8. | 1 | | 1445 | 178 | 1528. | 1 | | 2100 | 253 | 2883. |
| 1 | | 0220 | 29 | 2. | 1 | | 0835 | 104 | 8. | 1 | | 1450 | 179 | 1529. | 1 | | 2105 | 254 | 2844. |
| 1 | | 0225 | 30 | 2. | 1 | | 0840 | 105 | 8. | 1 | | 1455 | 180 | 1526. | 1 | | 2110 | 255 | 2810. |
| 1 | | 0230 | 31 | 3. | 1 | | 0845 | 106 | 8. | 1 | | 1500 | 181 | 1517. | 1 | | 2115 | 256 | 2784. |
| 1 | | 0235 | 32 | 3. | 1 | | 0850 | 107 | 8. | 1 | | 1505 | 182 | 1501. | 1 | | 2120 | 257 | 2758. |
| 1 | | 0240 | 33 | 3. | 1 | | 0855 | 108 | 8. | 1 | | 1510 | 183 | 1482. | 1 | | 2125 | 258 | 2724. |
| 1 | | 0245 | 34 | 3. | 1 | | 0900 | 109 | 8. | 1 | | 1515 | 184 | 1457. | 1 | | 2130 | 259 | 2680. |
| 1 | | 0250 | 35 | 3. | 1 | | 0905 | 110 | 8. | 1 | | 1520 | 185 | 1425. | 1 | | 2135 | 260 | 2630. |
| 1 | | 0255 | 36 | 3. | 1 | | 0910 | 111 | 9. | 1 | | 1525 | 186 | 1390. | 1 | | 2140 | 261 | 2573. |
| 1 | | 0300 | 37 | 4. | 1 | | 0915 | 112 | 9. | 1 | | 1530 | 187 | 1358. | 1 | | 2145 | 262 | 2511. |
| 1 | | 0305 | 38 | 4. | 1 | | 0920 | 113 | 9. | 1 | | 1535 | 188 | 1334. | 1 | | 2150 | 263 | 2441. |
| 1 | | 0310 | 39 | 4. | 1 | | 0925 | 114 | 9. | 1 | | 1540 | 189 | 1325. | 1 | | 2155 | 264 | 2351. |
| 1 | | 0315 | 40 | 4. | 1 | | 0930 | 115 | 9. | 1 | | 1545 | 190 | 1341. | 1 | | 2200 | 265 | 2240. |
| 1 | | 0320 | 41 | 4. | 1 | | 0935 | 116 | 9. | 1 | | 1550 | 191 | 1387. | 1 | | 2205 | 266 | 2114. |
| 1 | | 0325 | 42 | 4. | 1 | | 0940 | 117 | 9. | 1 | | 1555 | 192 | 1475. | 1 | | 2210 | 267 | 1977. |
| 1 | | 0330 | 43 | 4. | 1 | | 0945 | 118 | 9. | 1 | | 1600 | 193 | 1655. | 1 | | 2215 | 268 | 1868. |
| 1 | | 0335 | 44 | 4. | 1 | | 0950 | 119 | 9. | 1 | | 1605 | 194 | 1856. | 1 | | 2220 | 269 | 1794. |
| 1 | | 0340 | 45 | 4. | 1 | | 0955 | 120 | 9. | 1 | | 1610 | 195 | 2030. | 1 | | 2225 | 270 | 1731. |
| 1 | | 0345 | 46 | 5. | 1 | | 1000 | 121 | 10. | 1 | | 1615 | 196 | 2160. | 1 | | 2230 | 271 | 1672. |
| 1 | | 0350 | 47 | 5. | 1 | | 1005 | 122 | 10. | 1 | | 1620 | 197 | 2273. | 1 | | 2235 | 272 | 1618. |
| 1 | | 0355 | 48 | 5. | 1 | | 1010 | 123 | 10. | 1 | | 1625 | 198 | 2380. | 1 | | 2240 | 273 | 1569. |
| 1 | | 0400 | 49 | 5. | 1 | | 1015 | 124 | 10. | 1 | | 1630 | 199 | 2465. | 1 | | 2245 | 274 | 1522. |
| 1 | | 0405 | 50 | 5. | 1 | | 1020 | 125 | 10. | 1 | | 1635 | 200 | 2537. | 1 | | 2250 | 275 | 1485. |
| 1 | | 0410 | 51 | 5. | 1 | | 1025 | 126 | 11. | 1 | | 1640 | 201 | 2603. | 1 | | 2255 | 276 | 1454. |
| 1 | | 0415 | 52 | 5. | 1 | | 1030 | 127 | 11. | 1 | | 1645 | 202 | 2664. | 1 | | 2300 | 277 | 1415. |
| 1 | | 0420 | 53 | 5. | 1 | | 1035 | 128 | 11. | 1 | | 1650 | 203 | 2716. | 1 | | 2305 | 278 | 1372. |
| 1 | | 0425 | 54 | 5. | 1 | | 1040 | 129 | 11. | 1 | | 1655 | 204 | 2759. | 1 | | 2310 | 279 | 1329. |
| 1 | | 0430 | 55 | 5. | 1 | | 1045 | 130 | 11. | 1 | | 1700 | 205 | 2800. | 1 | | 2315 | 280 | 1288. |
| 1 | | 0435 | 56 | 5. | 1 | | 1050 | 131 | 12. | 1 | | 1705 | 206 | 2844. | 1 | | 2320 | 281 | 1249. |
| 1 | | 0440 | 57 | 5. | 1 | | 1055 | 132 | 12. | 1 | | 1710 | 207 | 2870. | 1 | | 2325 | 282 | 1212. |
| 1 | | 0445 | 58 | 5. | 1 | | 1100 | 133 | 12. | 1 | | 1715 | 208 | 2872. | 1 | | 2330 | 283 | 1175. |
| 1 | | 0450 | 59 | 5. | 1 | | 1105 | 134 | 12. | 1 | | 1720 | 209 | 2863. | 1 | | 2335 | 284 | 1140. |
| 1 | | 0455 | 60 | 5. | 1 | | 1110 | 135 | 13. | 1 | | 1725 | 210 | 2854. | 1 | | 2340 | 285 | 1105. |
| 1 | | 0500 | 61 | 5. | 1 | | 1115 | 136 | 13. | 1 | | 1730 | 211 | 2845. | 1 | | 2345 | 286 | 1072. |
| 1 | | 0505 | 62 | 5. | 1 | | 1120 | 137 | 13. | 1 | | 1735 | 212 | 2839. | 1 | | 2350 | 287 | 1040. |
| 1 | | 0510 | 63 | 5. | 1 | | 1125 | 138 | 14. | 1 | | 1740 | 213 | 2835. | 1 | | 2355 | 288 | 1009. |
| 1 | | 0515 | 64 | 5. | 1 | | 1130 | 139 | 14. | 1 | | 1745 | 214 | 2835. | 2 | | 0000 | 289 | 979. |
| 1 | | 0520 | 65 | 5. | 1 | | 1135 | 140 | 16. | 1 | | 1750 | 215 | 2839. | 2 | | 0005 | 290 | 952. |
| 1 | | 0525 | 66 | 6. | 1 | | 1140 | 141 | 20. | 1 | | 1755 | 216 | 2846. | 2 | | 0010 | 291 | 928. |
| 1 | | 0530 | 67 | 6. | 1 | | 1145 | 142 | 26. | 1 | | 1800 | 217 | 2857. | 2 | | 0015 | 292 | 905. |
| 1 | | 0535 | 68 | 6. | 1 | | 1150 | 143 | 39. | 1 | | 1805 | 218 | 2870. | 2 | | 0020 | 293 | 885. |
| 1 | | 0540 | 69 | 6. | 1 | | 1155 | 144 | 64. | 1 | | 1810 | 219 | 2884. | 2 | | 0025 | 294 | 865. |
| 1 | | 0545 | 70 | 6. | 1 | | 1200 | 145 | 97. | 1 | | 1815 | 220 | 2899. | 2 | | 0030 | 295 | 847. |
| 1 | | 0550 | 71 | 6. | 1 | | 1205 | 146 | 137. | 1 | | 1820 | 221 | 2913. | 2 | | 0035 | 296 | 830. |
| 1 | | 0555 | 72 | 6. | 1 | | 1210 | 147 | 182. | 1 | | 1825 | 222 | 2925. | 2 | | 0040 | 297 | 813. |
| 1 | | 0600 | 73 | 6. | 1 | | 1215 | 148 | 221. | 1 | | 1830 | 223 | 2936. | 2 | | 0045 | 298 | 797. |
| 1 | | 0605 | 74 | 6. | 1 | | 1220 | 149 | 253. | 1 | | 1835 | 224 | 2945. | 2 | | 0050 | 299 | 781. |
| 1 | | 0610 | 75 | 6. | 1 | | 1225 | 150 | 245. | 1 | | 1840 | 225 | 2954. | 2 | | 0055 | 300 | 766. |

**********

| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| + 3072. | 19.92 | (CFS) | 2817. | 1043. | 1005. | 1005. |
| | | (INCHES) | .556 | .824 | .824 | .824 |
| | | (AC-FT) | 1397. | 2069. | 2070. | 2070. |

CUMULATIVE AREA = 47.09 SQ MI

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HYDROGRAPH AT CP364A
TRANSPOSITION AREA 200.0 SQ MI

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| DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW | DA | MON | HRMN | ORD | FLOW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0000 | 1 | 0. | 1 | | 0615 | 76 | 6. | 1 | | 1230 | 151 | 240. | 1 | | 1845 | 226 | 2892. |
| 1 | | 0005 | 2 | 0. | 1 | | 0620 | 77 | 6. | 1 | | 1235 | 152 | 262. | 1 | | 1850 | 227 | 2901. |
| 1 | | 0010 | 3 | 0. | 1 | | 0625 | 78 | 6. | 1 | | 1240 | 153 | 295. | 1 | | 1855 | 228 | 2910. |
| 1 | | 0015 | 4 | 0. | 1 | | 0630 | 79 | 6. | 1 | | 1245 | 154 | 339. | 1 | | 1900 | 229 | 2919. |
| 1 | | 0020 | 5 | 0. | 1 | | 0635 | 80 | 6. | 1 | | 1250 | 155 | 396. | 1 | | 1905 | 230 | 2928. |
| 1 | | 0025 | 6 | 0. | 1 | | 0640 | 81 | 6. | 1 | | 1255 | 156 | 479. | 1 | | 1910 | 231 | 2937. |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0030 | 7 | 0. | * | 1 | 0645 | 82 | 6. | * | 1 | 1300 | 157 | 557. | * | 1 | 1915 | 232 | 2946. |
| 1 | 0035 | 8 | 0. | * | 1 | 0650 | 83 | 6. | * | 1 | 1305 | 158 | 636. | * | 1 | 1920 | 233 | 2955. |
| 1 | 0040 | 9 | 0. | * | 1 | 0655 | 84 | 7. | * | 1 | 1310 | 159 | 718. | * | 1 | 1925 | 234 | 2963. |
| 1 | 0045 | 10 | 0. | * | 1 | 0700 | 85 | 7. | * | 1 | 1315 | 160 | 807. | * | 1 | 1930 | 235 | 2970. |
| 1 | 0050 | 11 | 0. | * | 1 | 0705 | 86 | 7. | * | 1 | 1320 | 161 | 906. | * | 1 | 1935 | 236 | 2977. |
| 1 | 0055 | 12 | 0. | * | 1 | 0710 | 87 | 7. | * | 1 | 1325 | 162 | 1014. | * | 1 | 1940 | 237 | 2982. |
| 1 | 0100 | 13 | 0. | * | 1 | 0715 | 88 | 7. | * | 1 | 1330 | 163 | 1124. | * | 1 | 1945 | 238 | 2987. |
| 1 | 0105 | 14 | 0. | * | 1 | 0720 | 89 | 7. | * | 1 | 1335 | 164 | 1226. | * | 1 | 1950 | 239 | 2990. |
| 1 | 0110 | 15 | 0. | * | 1 | 0725 | 90 | 7. | * | 1 | 1340 | 165 | 1318. | * | 1 | 1955 | 240 | 2993. |
| 1 | 0115 | 16 | 0. | * | 1 | 0730 | 91 | 7. | * | 1 | 1345 | 166 | 1401. | * | 1 | 2000 | 241 | 29[illegible] |
| 1 | 0120 | 17 | 1. | * | 1 | 0735 | 92 | 7. | * | 1 | 1350 | 167 | 1478. | * | 1 | 2005 | 242 | 299[illegible] |
| 1 | 0125 | 18 | 1. | * | 1 | 0740 | 93 | 7. | * | 1 | 1355 | 168 | 1561. | * | 1 | 2010 | 243 | 2986. |
| 1 | 0130 | 19 | 1. | * | 1 | 0745 | 94 | 7. | * | 1 | 1400 | 169 | 1605. | * | 1 | 2015 | 244 | 2980. |
| 1 | 0135 | 20 | 1. | * | 1 | 0750 | 95 | 7. | * | 1 | 1405 | 170 | 1611. | * | 1 | 2020 | 245 | 2972. |
| 1 | 0140 | 21 | 1. | * | 1 | 0755 | 96 | 7. | * | 1 | 1410 | 171 | 1592. | * | 1 | 2025 | 246 | 2962. |
| 1 | 0145 | 22 | 1. | * | 1 | 0800 | 97 | 7. | * | 1 | 1415 | 172 | 1560. | * | 1 | 2030 | 247 | 2950. |
| 1 | 0150 | 23 | 1. | * | 1 | 0805 | 98 | 7. | * | 1 | 1420 | 173 | 1527. | * | 1 | 2035 | 248 | 2935. |
| 1 | 0155 | 24 | 1. | * | 1 | 0810 | 99 | 7. | * | 1 | 1425 | 174 | 1503. | * | 1 | 2040 | 249 | 2917. |
| 1 | 0200 | 25 | 1. | * | 1 | 0815 | 100 | 8. | * | 1 | 1430 | 175 | 1491. | * | 1 | 2045 | 250 | 2895. |
| 1 | 0205 | 26 | 2. | * | 1 | 0820 | 101 | 8. | * | 1 | 1435 | 176 | 1487. | * | 1 | 2050 | 251 | 2869. |
| 1 | 0210 | 27 | 2. | * | 1 | 0825 | 102 | 8. | * | 1 | 1440 | 177 | 1484. | * | 1 | 2055 | 252 | 2838. |
| 1 | 0215 | 28 | 2. | * | 1 | 0830 | 103 | 8. | * | 1 | 1445 | 178 | 1484. | * | 1 | 2100 | 253 | 2810. |
| 1 | 0220 | 29 | 2. | * | 1 | 0835 | 104 | 8. | * | 1 | 1450 | 179 | 1484. | * | 1 | 2105 | 254 | 2789. |
| 1 | 0225 | 30 | 2. | * | 1 | 0840 | 105 | 8. | * | 1 | 1455 | 180 | 1483. | * | 1 | 2110 | 255 | 2768. |
| 1 | 0230 | 31 | 3. | * | 1 | 0845 | 106 | 8. | * | 1 | 1500 | 181 | 1477. | * | 1 | 2115 | 256 | 2740. |
| 1 | 0235 | 32 | 3. | * | 1 | 0850 | 107 | 8. | * | 1 | 1505 | 182 | 1465. | * | 1 | 2120 | 257 | 2703. |
| 1 | 0240 | 33 | 3. | * | 1 | 0855 | 108 | 8. | * | 1 | 1510 | 183 | 1447. | * | 1 | 2125 | 258 | 2660. |
| 1 | 0245 | 34 | 3. | * | 1 | 0900 | 109 | 8. | * | 1 | 1515 | 184 | 1420. | * | 1 | 2130 | 259 | 2610. |
| 1 | 0250 | 35 | 3. | * | 1 | 0905 | 110 | 8. | * | 1 | 1520 | 185 | 1389. | * | 1 | 2135 | 260 | 2555. |
| 1 | 0255 | 36 | 3. | * | 1 | 0910 | 111 | 8. | * | 1 | 1525 | 186 | 1354. | * | 1 | 2140 | 261 | 2496. |
| 1 | 0300 | 37 | 4. | * | 1 | 0915 | 112 | 8. | * | 1 | 1530 | 187 | 1320. | * | 1 | 2145 | 262 | 2428. |
| 1 | 0305 | 38 | 4. | * | 1 | 0920 | 113 | 9. | * | 1 | 1535 | 188 | 1292. | * | 1 | 2150 | 263 | 2340. |
| 1 | 0310 | 39 | 4. | * | 1 | 0925 | 114 | 9. | * | 1 | 1540 | 189 | 1277. | * | 1 | 2155 | 264 | 2235. |
| 1 | 0315 | 40 | 4. | * | 1 | 0930 | 115 | 9. | * | 1 | 1545 | 190 | 1284. | * | 1 | 2200 | 265 | 2120. |
| 1 | 0320 | 41 | 4. | * | 1 | 0935 | 116 | 9. | * | 1 | 1550 | 191 | 1321. | * | 1 | 2205 | 266 | 1996. |
| 1 | 0325 | 42 | 4. | * | 1 | 0940 | 117 | 9. | * | 1 | 1555 | 192 | 1392. | * | 1 | 2210 | 267 | 1891. |
| 1 | 0330 | 43 | 4. | * | 1 | 0945 | 118 | 9. | * | 1 | 1600 | 193 | 1521. | * | 1 | 2215 | 268 | 1817. |
| 1 | 0335 | 44 | 4. | * | 1 | 0950 | 119 | 9. | * | 1 | 1605 | 194 | 1741. | * | 1 | 2220 | 269 | 1756. |
| 1 | 0340 | 45 | 4. | * | 1 | 0955 | 120 | 9. | * | 1 | 1610 | 195 | 1933. | * | 1 | 2225 | 270 | 1698. |
| 1 | 0345 | 46 | 4. | * | 1 | 1000 | 121 | 9. | * | 1 | 1615 | 196 | 2088. | * | 1 | 2230 | 271 | 1644. |
| 1 | 0350 | 47 | 5. | * | 1 | 1005 | 122 | 10. | * | 1 | 1620 | 197 | 2210. | * | 1 | 2235 | 272 | 1594. |
| 1 | 0355 | 48 | 5. | * | 1 | 1010 | 123 | 10. | * | 1 | 1625 | 198 | 2320. | * | 1 | 2240 | 273 | 1548. |
| 1 | 0400 | 49 | 5. | * | 1 | 1015 | 124 | 10. | * | 1 | 1630 | 199 | 2413. | * | 1 | 2245 | 274 | 1505. |
| 1 | 0405 | 50 | 5. | * | 1 | 1020 | 125 | 10. | * | 1 | 1635 | 200 | 2485. | * | 1 | 2250 | 275 | 1474. |
| 1 | 0410 | 51 | 5. | * | 1 | 1025 | 126 | 10. | * | 1 | 1640 | 201 | 2548. | * | 1 | 2255 | 276 | 1440. |
| 1 | 0415 | 52 | 5. | * | 1 | 1030 | 127 | 11. | * | 1 | 1645 | 202 | 2607. | * | 1 | 2300 | 277 | 1399. |
| 1 | 0420 | 53 | 5. | * | 1 | 1035 | 128 | 11. | * | 1 | 1650 | 203 | 2659. | * | 1 | 2305 | 278 | 1357. |
| 1 | 0425 | 54 | 5. | * | 1 | 1040 | 129 | 11. | * | 1 | 1655 | 204 | 2702. | * | 1 | 2310 | 279 | 1315. |
| 1 | 0430 | 55 | 5. | * | 1 | 1045 | 130 | 11. | * | 1 | 1700 | 205 | 2735. | * | 1 | 2315 | 280 | 1276. |
| 1 | 0435 | 56 | 5. | * | 1 | 1050 | 131 | 11. | * | 1 | 1705 | 206 | 2758. | * | 1 | 2320 | 281 | 12[illegible] |
| 1 | 0440 | 57 | 5. | * | 1 | 1055 | 132 | 12. | * | 1 | 1710 | 207 | 2775. | * | 1 | 2325 | 282 | 120[illegible] |
| 1 | 0445 | 58 | 5. | * | 1 | 1100 | 133 | 12. | * | 1 | 1715 | 208 | 2786. | * | 1 | 2330 | 283 | 1165. |
| 1 | 0450 | 59 | 5. | * | 1 | 1105 | 134 | 12. | * | 1 | 1720 | 209 | 2792. | * | 1 | 2335 | 284 | 1130. |
| 1 | 0455 | 60 | 5. | * | 1 | 1110 | 135 | 12. | * | 1 | 1725 | 210 | 2795. | * | 1 | 2340 | 285 | 1096. |
| 1 | 0500 | 61 | 5. | * | 1 | 1115 | 136 | 13. | * | 1 | 1730 | 211 | 2795. | * | 1 | 2345 | 286 | 1063. |
| 1 | 0505 | 62 | 5. | * | 1 | 1120 | 137 | 13. | * | 1 | 1735 | 212 | 2793. | * | 1 | 2350 | 287 | 1031. |
| 1 | 0510 | 63 | 5. | * | 1 | 1125 | 138 | 14. | * | 1 | 1740 | 213 | 2790. | * | 1 | 2355 | 288 | 1001. |
| 1 | 0515 | 64 | 5. | * | 1 | 1130 | 139 | 14. | * | 1 | 1745 | 214 | 2788. | * | 2 | 0000 | 289 | 972. |
| 1 | 0520 | 65 | 5. | * | 1 | 1135 | 140 | 15. | * | 1 | 1750 | 215 | 2787. | * | 2 | 0005 | 290 | 946. |
| 1 | 0525 | 66 | 5. | * | 1 | 1140 | 141 | 19. | * | 1 | 1755 | 216 | 2788. | * | 2 | 0010 | 291 | 922. |
| 1 | 0530 | 67 | 5. | * | 1 | 1145 | 142 | 26. | * | 1 | 1800 | 217 | 2790. | * | 2 | 0015 | 292 | 900. |
| 1 | 0535 | 68 | 6. | * | 1 | 1150 | 143 | 38. | * | 1 | 1805 | 218 | 2795. | * | 2 | 0020 | 293 | 880. |
| 1 | 0540 | 69 | 6. | * | 1 | 1155 | 144 | 62. | * | 1 | 1810 | 219 | 2806. | * | 2 | 0025 | 294 | 861. |
| 1 | 0545 | 70 | 6. | * | 1 | 1200 | 145 | 95. | * | 1 | 1815 | 220 | 2826. | * | 2 | 0030 | 295 | 843. |
| 1 | 0550 | 71 | 6. | * | 1 | 1205 | 146 | 133. | * | 1 | 1820 | 221 | 2846. | * | 2 | 0035 | 296 | 826. |
| 1 | 0555 | 72 | 6. | * | 1 | 1210 | 147 | 178. | * | 1 | 1825 | 222 | 2860. | * | 2 | 0040 | 297 | 809. |
| 1 | 0600 | 73 | 6. | * | 1 | 1215 | 148 | 215. | * | 1 | 1830 | 223 | 2870. | * | 2 | 0045 | 298 | 793. |
| 1 | 0605 | 74 | 6. | * | 1 | 1220 | 149 | 245. | * | 1 | 1835 | 224 | 2878. | * | 2 | 0050 | 299 | 777. |
| 1 | 0610 | 75 | 6. | * | 1 | 1225 | 150 | 239. | * | 1 | 1840 | 225 | 2885. | * | 2 | 0055 | 300 | 762. |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| + 2992. | 19.92 | (CFS) | 2745. | 1018. | 980. | 980. |
| | | (INCHES) | .542 | .804 | .804 | .804 |
| | | (AC-FT) | 1361. | 2018. | 2018. | 2018. |

CUMULATIVE AREA = 47.09 SQ MI

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INTERPOLATED HYDROGRAPH AT CP364A

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| DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FLOW | * | DA | MON | HRMN | ORD | FL[illegible] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0000 | 1 | 0. | * | 1 | | 0615 | 76 | 6. | * | 1 | | 1230 | 151 | 252. | * | 1 | | 1845 | 226 | 3055. |
| 1 | | 0005 | 2 | 0. | * | 1 | | 0620 | 77 | 6. | * | 1 | | 1235 | 152 | 275. | * | 1 | | 1850 | 227 | 3066. |
| 1 | | 0010 | 3 | 0. | * | 1 | | 0625 | 78 | 6. | * | 1 | | 1240 | 153 | 311. | * | 1 | | 1855 | 228 | 3078. |
| 1 | | 0015 | 4 | 0. | * | 1 | | 0630 | 79 | 6. | * | 1 | | 1245 | 154 | 359. | * | 1 | | 1900 | 229 | 3090. |
| 1 | | 0020 | 5 | 0. | * | 1 | | 0635 | 80 | 7. | * | 1 | | 1250 | 155 | 425. | * | 1 | | 1905 | 230 | 3102. |
| 1 | | 0025 | 6 | 0. | * | 1 | | 0640 | 81 | 7. | * | 1 | | 1255 | 156 | 509. | * | 1 | | 1910 | 231 | 3114. |
| 1 | | 0030 | 7 | 0. | * | 1 | | 0645 | 82 | 7. | * | 1 | | 1300 | 157 | 590. | * | 1 | | 1915 | 232 | 3125. |
| 1 | | 0035 | 8 | 0. | * | 1 | | 0650 | 83 | 7. | * | 1 | | 1305 | 158 | 673. | * | 1 | | 1920 | 233 | 3136. |
| 1 | | 0040 | 9 | 0. | * | 1 | | 0655 | 84 | 7. | * | 1 | | 1310 | 159 | 760. | * | 1 | | 1925 | 234 | 3145. |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0045 | 10 | 0. | * | 1 | 0700 | 85 | 7. | * | 1 | 1315 | 160 | 855. | * | 1 | 1930 | 235 | 3154. |
| 1 | 0050 | 11 | 0. | * | 1 | 0705 | 86 | 7. | * | 1 | 1320 | 161 | 963. | * | 1 | 1935 | 236 | 3162. |
| 1 | 0055 | 12 | 0. | * | 1 | 0710 | 87 | 7. | * | 1 | 1325 | 162 | 1079. | * | 1 | 1940 | 237 | 3168. |
| 1 | 0100 | 13 | 0. | * | 1 | 0715 | 88 | 7. | * | 1 | 1330 | 163 | 1193. | * | 1 | 1945 | 238 | 3172. |
| 1 | 0105 | 14 | 0. | * | 1 | 0720 | 89 | 7. | * | 1 | 1335 | 164 | 1297. | * | 1 | 1950 | 239 | 3175. |
| 1 | 0110 | 15 | 0. | * | 1 | 0725 | 90 | 7. | * | 1 | 1340 | 165 | 1391. | * | 1 | 1955 | 240 | 3175. |
| 1 | 0115 | 16 | 0. | * | 1 | 0730 | 91 | 7. | * | 1 | 1345 | 166 | 1481. | * | 1 | 2000 | 241 | 3174. |
| 1 | 0120 | 17 | 1. | * | 1 | 0735 | 92 | 7. | * | 1 | 1350 | 167 | 1587. | * | 1 | 2005 | 242 | 3170. |
| 1 | 0125 | 18 | 1. | * | 1 | 0740 | 93 | 7. | * | 1 | 1355 | 168 | 1656. | * | 1 | 2010 | 243 | 3164. |
| 1 | 0130 | 19 | 1. | * | 1 | 0745 | 94 | 7. | * | 1 | 1400 | 169 | 1691. | * | 1 | 2015 | 244 | 3156. |
| 1 | 0135 | 20 | 1. | * | 1 | 0750 | 95 | 7. | * | 1 | 1405 | 170 | 1697. | * | 1 | 2020 | 245 | 3145. |
| 1 | 0140 | 21 | 1. | * | 1 | 0755 | 96 | 7. | * | 1 | 1410 | 171 | 1681. | * | 1 | 2025 | 246 | 3133. |
| 1 | 0145 | 22 | 1. | * | 1 | 0800 | 97 | 8. | * | 1 | 1415 | 172 | 1650. | * | 1 | 2030 | 247 | 3118. |
| 1 | 0150 | 23 | 1. | * | 1 | 0805 | 98 | 8. | * | 1 | 1420 | 173 | 1621. | * | 1 | 2035 | 248 | 3101. |
| 1 | 0155 | 24 | 1. | * | 1 | 0810 | 99 | 8. | * | 1 | 1425 | 174 | 1600. | * | 1 | 2040 | 249 | 3082. |
| 1 | 0200 | 25 | 2. | * | 1 | 0815 | 100 | 8. | * | 1 | 1430 | 175 | 1588. | * | 1 | 2045 | 250 | 3061. |
| 1 | 0205 | 26 | 2. | * | 1 | 0820 | 101 | 8. | * | 1 | 1435 | 176 | 1584. | * | 1 | 2050 | 251 | 3037. |
| 1 | 0210 | 27 | 2. | * | 1 | 0825 | 102 | 8. | * | 1 | 1440 | 177 | 1585. | * | 1 | 2055 | 252 | 3010. |
| 1 | 0215 | 28 | 2. | * | 1 | 0830 | 103 | 8. | * | 1 | 1445 | 178 | 1588. | * | 1 | 2100 | 253 | 2978. |
| 1 | 0220 | 29 | 2. | * | 1 | 0835 | 104 | 8. | * | 1 | 1450 | 179 | 1590. | * | 1 | 2105 | 254 | 2941. |
| 1 | 0225 | 30 | 2. | * | 1 | 0840 | 105 | 8. | * | 1 | 1455 | 180 | 1587. | * | 1 | 2110 | 255 | 2897. |
| 1 | 0230 | 31 | 3. | * | 1 | 0845 | 106 | 8. | * | 1 | 1500 | 181 | 1577. | * | 1 | 2115 | 256 | 2850. |
| 1 | 0235 | 32 | 3. | * | 1 | 0850 | 107 | 8. | * | 1 | 1505 | 182 | 1558. | * | 1 | 2120 | 257 | 2812. |
| 1 | 0240 | 33 | 3. | * | 1 | 0855 | 108 | 8. | * | 1 | 1510 | 183 | 1530. | * | 1 | 2125 | 258 | 2781. |
| 1 | 0245 | 34 | 3. | * | 1 | 0900 | 109 | 9. | * | 1 | 1515 | 184 | 1496. | * | 1 | 2130 | 259 | 2748. |
| 1 | 0250 | 35 | 3. | * | 1 | 0905 | 110 | 9. | * | 1 | 1520 | 185 | 1469. | * | 1 | 2135 | 260 | 2706. |
| 1 | 0255 | 36 | 3. | * | 1 | 0910 | 111 | 9. | * | 1 | 1525 | 186 | 1436. | * | 1 | 2140 | 261 | 2656. |
| 1 | 0300 | 37 | 4. | * | 1 | 0915 | 112 | 9. | * | 1 | 1530 | 187 | 1406. | * | 1 | 2145 | 262 | 2599. |
| 1 | 0305 | 38 | 4. | * | 1 | 0920 | 113 | 9. | * | 1 | 1535 | 188 | 1387. | * | 1 | 2150 | 263 | 2536. |
| 1 | 0310 | 39 | 4. | * | 1 | 0925 | 114 | 9. | * | 1 | 1540 | 189 | 1386. | * | 1 | 2155 | 264 | 2465. |
| 1 | 0315 | 40 | 4. | * | 1 | 0930 | 115 | 9. | * | 1 | 1545 | 190 | 1411. | * | 1 | 2200 | 265 | 2374. |
| 1 | 0320 | 41 | 4. | * | 1 | 0935 | 116 | 9. | * | 1 | 1550 | 191 | 1472. | * | 1 | 2205 | 266 | 2262. |
| 1 | 0325 | 42 | 4. | * | 1 | 0940 | 117 | 9. | * | 1 | 1555 | 192 | 1608. | * | 1 | 2210 | 267 | 2127. |
| 1 | 0330 | 43 | 4. | * | 1 | 0945 | 118 | 9. | * | 1 | 1600 | 193 | 1791. | * | 1 | 2215 | 268 | 1979. |
| 1 | 0335 | 44 | 4. | * | 1 | 0950 | 119 | 10. | * | 1 | 1605 | 194 | 1968. | * | 1 | 2220 | 269 | 1862. |
| 1 | 0340 | 45 | 5. | * | 1 | 0955 | 120 | 10. | * | 1 | 1610 | 195 | 2116. | * | 1 | 2225 | 270 | 1781. |
| 1 | 0345 | 46 | 5. | * | 1 | 1000 | 121 | 10. | * | 1 | 1615 | 196 | 2240. | * | 1 | 2230 | 271 | 1714. |
| 1 | 0350 | 47 | 5. | * | 1 | 1005 | 122 | 10. | * | 1 | 1620 | 197 | 2355. | * | 1 | 2235 | 272 | 1654. |
| 1 | 0355 | 48 | 5. | * | 1 | 1010 | 123 | 10. | * | 1 | 1625 | 198 | 2452. | * | 1 | 2240 | 273 | 1599. |
| 1 | 0400 | 49 | 5. | * | 1 | 1015 | 124 | 10. | * | 1 | 1630 | 199 | 2532. | * | 1 | 2245 | 274 | 1549. |
| 1 | 0405 | 50 | 5. | * | 1 | 1020 | 125 | 11. | * | 1 | 1635 | 200 | 2608. | * | 1 | 2250 | 275 | 1504. |
| 1 | 0410 | 51 | 5. | * | 1 | 1025 | 126 | 11. | * | 1 | 1640 | 201 | 2680. | * | 1 | 2255 | 276 | 1471. |
| 1 | 0415 | 52 | 5. | * | 1 | 1030 | 127 | 11. | * | 1 | 1645 | 202 | 2745. | * | 1 | 2300 | 277 | 1434. |
| 1 | 0420 | 53 | 5. | * | 1 | 1035 | 128 | 11. | * | 1 | 1650 | 203 | 2817. | * | 1 | 2305 | 278 | 1391. |
| 1 | 0425 | 54 | 5. | * | 1 | 1040 | 129 | 11. | * | 1 | 1655 | 204 | 2900. | * | 1 | 2310 | 279 | 1347. |
| 1 | 0430 | 55 | 5. | * | 1 | 1045 | 130 | 12. | * | 1 | 1700 | 205 | 2950. | * | 1 | 2315 | 280 | 1305. |
| 1 | 0435 | 56 | 5. | * | 1 | 1050 | 131 | 12. | * | 1 | 1705 | 206 | 2956. | * | 1 | 2320 | 281 | 1264. |
| 1 | 0440 | 57 | 5. | * | 1 | 1055 | 132 | 12. | * | 1 | 1710 | 207 | 2948. | * | 1 | 2325 | 282 | 1226. |
| 1 | 0445 | 58 | 5. | * | 1 | 1100 | 133 | 12. | * | 1 | 1715 | 208 | 2939. | * | 1 | 2330 | 283 | 1189. |
| 1 | 0450 | 59 | 5. | * | 1 | 1105 | 134 | 13. | * | 1 | 1720 | 209 | 2930. | * | 1 | 2335 | 284 | 1152. |
| 1 | 0455 | 60 | 5. | * | 1 | 1110 | 135 | 13. | * | 1 | 1725 | 210 | 2922. | * | 1 | 2340 | 285 | 1117. |
| 1 | 0500 | 61 | 5. | * | 1 | 1115 | 136 | 13. | * | 1 | 1730 | 211 | 2915. | * | 1 | 2345 | 286 | 1083. |
| 1 | 0505 | 62 | 5. | * | 1 | 1120 | 137 | 14. | * | 1 | 1735 | 212 | 2910. | * | 1 | 2350 | 287 | 1050. |
| 1 | 0510 | 63 | 5. | * | 1 | 1125 | 138 | 14. | * | 1 | 1740 | 213 | 2909. | * | 1 | 2355 | 288 | 1019. |
| 1 | 0515 | 64 | 6. | * | 1 | 1130 | 139 | 14. | * | 1 | 1745 | 214 | 2910. | * | 2 | 0000 | 289 | 989. |
| 1 | 0520 | 65 | 6. | * | 1 | 1135 | 140 | 16. | * | 1 | 1750 | 215 | 2916. | * | 2 | 0005 | 290 | 961. |
| 1 | 0525 | 66 | 6. | * | 1 | 1140 | 141 | 20. | * | 1 | 1755 | 216 | 2925. | * | 2 | 0010 | 291 | 935. |
| 1 | 0530 | 67 | 6. | * | 1 | 1145 | 142 | 27. | * | 1 | 1800 | 217 | 2937. | * | 2 | 0015 | 292 | 912. |
| 1 | 0535 | 68 | 6. | * | 1 | 1150 | 143 | 40. | * | 1 | 1805 | 218 | 2951. | * | 2 | 0020 | 293 | 891. |
| 1 | 0540 | 69 | 6. | * | 1 | 1155 | 144 | 66. | * | 1 | 1810 | 219 | 2966. | * | 2 | 0025 | 294 | 871. |
| 1 | 0545 | 70 | 6. | * | 1 | 1200 | 145 | 101. | * | 1 | 1815 | 220 | 2981. | * | 2 | 0030 | 295 | 853. |
| 1 | 0550 | 71 | 6. | * | 1 | 1205 | 146 | 141. | * | 1 | 1820 | 221 | 2996. | * | 2 | 0035 | 296 | 835. |
| 1 | 0555 | 72 | 6. | * | 1 | 1210 | 147 | 188. | * | 1 | 1825 | 222 | 3010. | * | 2 | 0040 | 297 | 818. |
| 1 | 0600 | 73 | 6. | * | 1 | 1215 | 148 | 230. | * | 1 | 1830 | 223 | 3023. | * | 2 | 0045 | 298 | 802. |
| 1 | 0605 | 74 | 6. | * | 1 | 1220 | 149 | 262. | * | 1 | 1835 | 224 | 3034. | * | 2 | 0050 | 299 | 785. |
| 1 | 0610 | 75 | 6. | * | 1 | 1225 | 150 | 252. | * | 1 | 1840 | 225 | 3044. | * | 2 | 0055 | 300 | 770. |
| | | | | * | | | | | * | | | | | * | | | | |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| 3175. | 19.92 | (CFS) | 2908. | 1076. | 1037. | 1037. |
| | | (INCHES) | .574 | .850 | .850 | .850 |
| | | (AC-FT) | 1442. | 2135. | 2135. | 2135. |

CUMULATIVE AREA = 47.09 SQ MI

1

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 | 159 | 531. | 12.33 | 51. | 13. | 12. | .58 | | |
| ROUTED TO | R159 | 525. | 12.42 | 51. | 13. | 12. | .58 | | |
| HYDROGRAPH AT | 160 | 432. | 12.42 | 47. | 12. | 11. | .39 | | |
| 2 COMBINED AT | CP160 | 955. | 12.42 | 98. | 25. | 24. | .97 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | R160 | 847. | 12.58 | 98. | 25. | 24. | .97 |
| + | HYDROGRAPH AT | 161 | 294. | 13.00 | 58. | 14. | 14. | .50 |
| + | 2 COMBINED AT | CP161 | 1032. | 12.58 | 156. | 39. | 38. | 1.47 |
| + | ROUTED TO | R161 | 877. | 13.08 | 156. | 39. | 38. | 1.47 |
| + | HYDROGRAPH AT | 162 | 268. | 12.50 | 34. | 8. | 8. | .25 |
| + | ROUTED TO | R162 | 197. | 13.17 | 34. | 8. | 8. | .25 |
| + | HYDROGRAPH AT | 163 | 551. | 12.92 | 112. | 28. | 27. | .75 |
| + | 2 COMBINED AT | 1I163 | 726. | 13.00 | 146. | 36. | 35. | 1.00 |
| + | 2 COMBINED AT | CP163 | 1575. | 13.00 | 301. | 75. | 72. | 2.47 |
| + | DIVERSION TO | DI176A | 0. | .08 | 0. | 0. | 0. | 2.47 |
| + | HYDROGRAPH AT | D163 | 1575. | 13.00 | 301. | 75. | 72. | 2.47 |
| + | HYDROGRAPH AT | D163 | 0. | .08 | 0. | 0. | 0. | 2.47 |
| + | ROUTED TO | R163 | 0. | .08 | 0. | 0. | 0. | 2.47 |
| + | HYDROGRAPH AT | 176A | 378. | 13.25 | 92. | 23. | 22. | .62 |
| + | 2 COMBINED AT | CP176A | 378. | 13.25 | 92. | 23. | 22. | 3.09 |
| + | DIVERSION TO | DI191 | 0. | .08 | 0. | 0. | 0. | 3.09 |
| + | HYDROGRAPH AT | D176A | 378. | 13.25 | 92. | 23. | 22. | 3.09 |
| + | HYDROGRAPH AT | 174 | 612. | 12.25 | 55. | 14. | 13. | .45 |
| + | ROUTED TO | R174 | 410. | 12.75 | 55. | 14. | 13. | .45 |
| + | HYDROGRAPH AT | 175 | 375. | 12.25 | 34. | 9. | 8. | .28 |
| + | DIVERSION TO | DI175A | 375. | 12.25 | 34. | 9. | 8. | .28 |
| + | HYDROGRAPH AT | D175 | 0. | .08 | 0. | 0. | 0. | .28 |
| + | ROUTED TO | R175 | 0. | .08 | 0. | 0. | 0. | .28 |
| + | HYDROGRAPH AT | 176 | 701. | 12.42 | 79. | 20. | 19. | .67 |
| + | 2 COMBINED AT | 1I176 | 700. | 12.42 | 79. | 20. | 19. | .95 |
| + | 2 COMBINED AT | CP176 | 792. | 12.50 | 134. | 34. | 32. | 1.40 |
| + | ROUTED TO | R176 | 708. | 12.92 | 134. | 34. | 32. | 1.40 |
| + | HYDROGRAPH AT | D175 | 375. | 12.25 | 34. | 9. | 8. | .28 |
| + | ROUTED TO | R175 | 342. | 12.42 | 34. | 9. | 8. | .28 |
| + | HYDROGRAPH AT | 175A | 362. | 12.50 | 42. | 10. | 10. | .47 |
| + | 2 COMBINED AT | CP175A | 687. | 12.42 | 76. | 19. | 18. | .75 |
| + | ROUTED TO | R175A | 650. | 12.67 | 76. | 19. | 18. | .75 |
| + | HYDROGRAPH AT | 189 | 521. | 12.42 | 57. | 14. | 14. | .51 |
| | 2 COMBINED AT | | | | | | | |

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|---|---|---|---|---|---|---|---|
| + | CP189 | 942. | 12.58 | 133. | 33. | 32. | 1.26 |
| + ROUTED TO | R189 | 777. | 13.17 | 133. | 33. | 32. | 1.26 |
| + HYDROGRAPH AT | 190 | 657. | 12.92 | 128. | 32. | 31. | .86 |
| + 2 COMBINED AT | CP190 | 1336. | 13.00 | 260. | 65. | 63. | 2.12 |
| + ROUTED TO | R190 | 1271. | 13.33 | 260. | 65. | 63. | 2.12 |
| + HYDROGRAPH AT | D176A | 0. | .08 | 0. | 0. | 0. | 3.09 |
| + ROUTED TO | R176A | 0. | .08 | 0. | 0. | 0. | 3.09 |
| + 3 COMBINED AT | 1I191 | 1771. | 13.25 | 393. | 99. | 95. | 6.33 |
| + HYDROGRAPH AT | 191 | 610. | 13.25 | 149. | 37. | 36. | .99 |
| + 2 COMBINED AT | CP191 | 2379. | 13.25 | 541. | 136. | 131. | 7.32 |
| + DIVERSION TO | DI208 | 1339. | 12.83 | 440. | 110. | 106. | 7.32 |
| + HYDROGRAPH AT | CP191 | 1040. | 13.25 | 101. | 25. | 24. | 7.32 |
| + ROUTED TO | R191 | 949. | 13.50 | 101. | 25. | 24. | 7.32 |
| + HYDROGRAPH AT | 192A | 345. | 13.08 | 75. | 19. | 18. | .50 |
| + 2 COMBINED AT | CP192A | 1164. | 13.50 | 176. | 44. | 42. | 7.82 |
| + ROUTED TO | R192A | 1116. | 13.75 | 176. | 44. | 42. | 7.82 |
| + HYDROGRAPH AT | 192 | 346. | 13.08 | 75. | 19. | 18. | .50 |
| + 2 COMBINED AT | CP192 | 1280. | 13.67 | 251. | 63. | 60. | 8.32 |
| + DIVERSION TO | DI209 | 1146. | 13.67 | 225. | 56. | 54. | 8.32 |
| + HYDROGRAPH AT | D192 | 134. | 13.67 | 26. | 7. | 6. | 8.32 |
| + DIVERSION TO | DI210 | 0. | .08 | 0. | 0. | 0. | 8.32 |
| + HYDROGRAPH AT | D192 | 134. | 13.67 | 26. | 7. | 6. | 8.32 |
| + HYDROGRAPH AT | 188 | 240. | 12.25 | 19. | 5. | 5. | .19 |
| + ROUTED TO | R188 | 188. | 12.42 | 19. | 5. | 5. | .19 |
| + HYDROGRAPH AT | 207A | 469. | 12.42 | 48. | 12. | 12. | .50 |
| + 2 COMBINED AT | CP207A | 656. | 12.42 | 67. | 17. | 16. | .69 |
| + ROUTED TO | R207A | 626. | 12.50 | 67. | 17. | 16. | .69 |
| + HYDROGRAPH AT | 214 | 208. | 12.25 | 18. | 5. | 4. | .16 |
| + 2 COMBINED AT | CP214 | 729. | 12.42 | 85. | 21. | 21. | .85 |
| + ROUTED TO | R214 | 688. | 12.50 | 85. | 21. | 21. | .85 |
| + HYDROGRAPH AT | 215A | 528. | 12.17 | 42. | 11. | 10. | .35 |
| + ROUTED TO | R215A | 493. | 12.25 | 42. | 11. | 10. | .35 |
| + HYDROGRAPH AT | 215 | 419. | 12.33 | 44. | 11. | 11. | .35 |
| + 2 COMBINED AT | 1I215 | 901. | 12.33 | 87. | 22. | 21. | .70 |

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|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | CP215 | 1417. | 12.42 | 172. | 43. | 41. | 1.55 |
| + | ROUTED TO | R215 | 1296. | 12.58 | 172. | 43. | 41. | 1.55 |
| + | HYDROGRAPH AT | 233 | 496. | 12.42 | 56. | 14. | 13. | .50 |
| + | 2 COMBINED AT | CP233 | 1710. | 12.50 | 227. | 57. | 55. | 2.05 |
| + | ROUTED TO | R233 | 1576. | 12.67 | 227. | 57. | 55. | 2.05 |
| + | HYDROGRAPH AT | 216 | 366. | 12.92 | 69. | 17. | 17. | .51 |
| + | ROUTED TO | R216 | 350. | 13.08 | 69. | 17. | 17. | .51 |
| + | HYDROGRAPH AT | 234 | 347. | 13.17 | 81. | 20. | 19. | .53 |
| + | 2 COMBINED AT | 1I234 | 689. | 13.08 | 150. | 37. | 36. | 1.04 |
| + | 2 COMBINED AT | CP234 | 2026. | 12.75 | 377. | 94. | 91. | 3.09 |
| + | DIVERSION TO | 1D248 | 957. | 12.75 | 136. | 34. | 33. | 3.09 |
| + | HYDROGRAPH AT | D234 | 1069. | 12.75 | 240. | 60. | 58. | 3.09 |
| + | ROUTED TO | R234 | 932. | 13.25 | 240. | 60. | 58. | 3.09 |
| + | HYDROGRAPH AT | 207 | 619. | 13.25 | 153. | 38. | 37. | 1.00 |
| + | DIVERSION TO | 2D208 | 476. | 13.25 | 118. | 29. | 28. | 1.00 |
| + | HYDROGRAPH AT | D207 | 143. | 13.25 | 35. | 9. | 9. | 1.00 |
| + | ROUTED TO | R207 | 122. | 13.92 | 35. | 9. | 9. | 1.00 |
| + | HYDROGRAPH AT | 217 | 350. | 13.00 | 76. | 19. | 18. | .49 |
| + | 2 COMBINED AT | CP217 | 372. | 13.08 | 111. | 28. | 27. | 1.49 |
| + | DIVERSION TO | DI218 | 91. | 13.08 | 38. | 9. | 9. | 1.49 |
| + | HYDROGRAPH AT | D217 | 281. | 13.08 | 73. | 18. | 18. | 1.49 |
| + | ROUTED TO | R217 | 258. | 13.58 | 73. | 18. | 18. | 1.49 |
| + | HYDROGRAPH AT | 235 | 303. | 13.17 | 71. | 18. | 17. | .47 |
| + | 2 COMBINED AT | 1I235 | 483. | 13.42 | 144. | 36. | 35. | 1.96 |
| + | 2 COMBINED AT | CP235 | 1411. | 13.25 | 383. | 96. | 93. | 5.05 |
| + | DIVERSION TO | 2D248 | 740. | 13.25 | 182. | 46. | 44. | 5.05 |
| + | HYDROGRAPH AT | D235 | 671. | 13.25 | 201. | 51. | 49. | 5.05 |
| + | ROUTED TO | R235 | 635. | 13.67 | 200. | 51. | 49. | 5.05 |
| + | HYDROGRAPH AT | D191 | 1339. | 12.83 | 440. | 110. | 106. | 7.32 |
| + | ROUTED TO | R191 | 1339. | 13.75 | 438. | 110. | 106. | 7.32 |
| + | HYDROGRAPH AT | 208 | 632. | 13.17 | 149. | 37. | 36. | 1.00 |
| + | 2 COMBINED AT | 1I208 | 1929. | 13.25 | 585. | 147. | 142. | 8.32 |
| + | HYDROGRAPH AT | D207 | 476. | 13.25 | 118. | 29. | 28. | 1.00 |

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|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | R207 | 428. | 13.75 | 118. | 29. | 28. | 1.00 |
| + | 2 COMBINED AT | CP208 | 2188. | 13.33 | 702. | 177. | 170. | 9.32 |
| + | DIVERSION TO | 1D219 | 628. | 13.33 | 277. | 70. | 68. | 9.32 |
| + | HYDROGRAPH AT | D208 | 1560. | 13.33 | 424. | 107. | 103. | 9.32 |
| + | DIVERSION TO | DI209A | 1551. | 13.33 | 422. | 106. | 102. | 9.32 |
| + | HYDROGRAPH AT | D208 | 8. | 13.33 | 2. | 0. | 0. | 9.32 |
| + | ROUTED TO | R208 | 8. | 14.17 | 2. | 0. | 0. | 9.32 |
| + | HYDROGRAPH AT | 218 | 624. | 13.25 | 153. | 38. | 37. | 1.00 |
| + | 2 COMBINED AT | 1I218 | 621. | 13.25 | 154. | 39. | 37. | 10.32 |
| + | HYDROGRAPH AT | D217 | 91. | 13.08 | 38. | 9. | 9. | 1.49 |
| + | ROUTED TO | R217 | 86. | 13.83 | 38. | 9. | 9. | 1.49 |
| + | 2 COMBINED AT | CP218 | 676. | 13.25 | 191. | 48. | 46. | 10.81 |
| + | DIVERSION TO | DI237 | 424. | 13.25 | 133. | 33. | 32. | 10.81 |
| + | HYDROGRAPH AT | D218 | 252. | 13.25 | 58. | 14. | 14. | 10.81 |
| + | DIVERSION TO | 2D219 | 59. | 13.25 | 14. | 3. | 3. | 10.81 |
| + | HYDROGRAPH AT | D218 | 193. | 13.25 | 44. | 11. | 11. | 10.81 |
| + | ROUTED TO | R218 | 181. | 13.50 | 44. | 11. | 11. | 10.81 |
| + | HYDROGRAPH AT | 236 | 582. | 13.25 | 146. | 37. | 35. | 1.00 |
| + | 2 COMBINED AT | 1I236 | 718. | 13.33 | 189. | 47. | 46. | 11.87 |
| + | 2 COMBINED AT | CP236 | 1228. | 13.50 | 383. | 97. | 93. | 15.37 |
| + | DIVERSION TO | DI249 | 327. | 13.50 | 69. | 17. | 17. | 15.37 |
| + | HYDROGRAPH AT | D236 | 902. | 13.50 | 314. | 79. | 77. | 15.37 |
| + | DIVERSION TO | 1D250 | 405. | 13.50 | 102. | 26. | 25. | 15.37 |
| + | HYDROGRAPH AT | D236 | 497. | 13.50 | 212. | 54. | 52. | 15.37 |
| + | ROUTED TO | R236 | 493. | 13.67 | 211. | 54. | 52. | 15.37 |
| + | HYDROGRAPH AT | 209A | 335. | 13.08 | 75. | 19. | 18. | .50 |
| + | HYDROGRAPH AT | D208 | 1551. | 13.33 | 422. | 106. | 102. | 9.32 |
| + | ROUTED TO | R208 | 1526. | 13.67 | 422. | 106. | 102. | 9.32 |
| + | 2 COMBINED AT | CP209A | 1720. | 13.50 | 496. | 125. | 120. | 9.82 |
| + | DIVERSION TO | 1D220 | 641. | 13.50 | 195. | 49. | 48. | 9.82 |
| + | HYDROGRAPH AT | D209A | 1079. | 13.50 | 301. | 75. | 73. | 9.82 |
| + | DIVERSION TO | 2D209 | 290. | 13.50 | 78. | 20. | 19. | 9.82 |
| + | HYDROGRAPH AT | D209A | 789. | 13.50 | 223. | 56. | 54. | 9.82 |
| | ROUTED TO | | | | | | | |

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|---|---|---|---|---|---|---|---|
| + | R209A | 775. | 14.00 | 222. | 56. | 54. | 9.82 |
| + HYDROGRAPH AT | D208 | 628. | 13.33 | 277. | 70. | 68. | 9.32 |
| + ROUTED TO | R208 | 613. | 14.83 | 260. | 69. | 66. | 9.32 |
| + HYDROGRAPH AT | 219 | 343. | 13.08 | 76. | 19. | 18. | .50 |
| + 2 COMBINED AT | 1I219 | 631. | 14.75 | 309. | 88. | 85. | 9.80 |
| + 2 COMBINED AT | 2I219 | 1237. | 14.58 | 530. | 144. | 138. | 10.30 |
| + HYDROGRAPH AT | D218 | 59. | 13.25 | 14. | 3. | 3. | 10.81 |
| + ROUTED TO | R218 | 52. | 14.00 | 14. | 3. | 3. | 10.81 |
| + 2 COMBINED AT | CP219 | 1268. | 14.58 | 542. | 147. | 141. | 11.81 |
| + DIVERSION TO | DI238 | 892. | 14.58 | 393. | 109. | 105. | 11.81 |
| + HYDROGRAPH AT | D219 | 376. | 14.58 | 149. | 38. | 37. | 11.81 |
| + DIVERSION TO | 2D220 | 156. | 14.58 | 61. | 15. | 15. | 11.81 |
| + HYDROGRAPH AT | D219 | 220. | 14.58 | 88. | 22. | 22. | 11.81 |
| + ROUTED TO | R219 | 199. | 15.42 | 87. | 22. | 22. | 11.81 |
| + HYDROGRAPH AT | D218 | 424. | 13.25 | 133. | 33. | 32. | 10.81 |
| + ROUTED TO | R218 | 383. | 14.00 | 130. | 33. | 32. | 10.81 |
| + HYDROGRAPH AT | 237 | 300. | 13.25 | 73. | 18. | 18. | .50 |
| + 2 COMBINED AT | 1I237 | 519. | 13.83 | 197. | 51. | 50. | 11.31 |
| + 2 COMBINED AT | 2I237 | 525. | 13.92 | 274. | 74. | 71. | 12.31 |
| + 2 COMBINED AT | CP237 | 993. | 13.83 | 482. | 127. | 122. | 16.87 |
| + DIVERSION TO | 2D250 | 301. | 13.83 | 83. | 21. | 20. | 16.87 |
| + HYDROGRAPH AT | D237 | 692. | 13.83 | 399. | 106. | 102. | 16.87 |
| + DIVERSION TO | 1D250A | 307. | 13.83 | 123. | 31. | 30. | 16.87 |
| + HYDROGRAPH AT | D237 | 386. | 13.83 | 276. | 75. | 73. | 16.87 |
| + ROUTED TO | R237 | 385. | 13.83 | 275. | 75. | 73. | 16.87 |
| + HYDROGRAPH AT | 1D192 | 1146. | 13.67 | 225. | 56. | 54. | 8.32 |
| + ROUTED TO | R192 | 990. | 14.08 | 225. | 56. | 54. | 8.32 |
| + HYDROGRAPH AT | 209 | 336. | 13.08 | 73. | 18. | 17. | .50 |
| + 2 COMBINED AT | 1I209 | 1053. | 14.08 | 297. | 74. | 72. | 8.82 |
| + HYDROGRAPH AT | D209A | 290. | 13.50 | 78. | 20. | 19. | 9.82 |
| + ROUTED TO | R209A | 286. | 13.92 | 78. | 20. | 19. | 9.82 |
| + 2 COMBINED AT | CP209 | 1320. | 14.08 | 372. | 93. | 90. | 11.32 |
| + DIVERSION TO | 1D221 | 564. | 14.08 | 170. | 43. | 41. | 11.32 |
| + HYDROGRAPH AT | D209 | 756. | 14.08 | 202. | 51. | 49. | 11.32 |

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|---|---|---|---|---|---|---|---|---|
| + | DIVERSION TO | 2D210 | 228. | 14.08 | 60. | 15. | 14. | 11.32 |
| + | HYDROGRAPH AT | D209 | 527. | 14.08 | 142. | 36. | 34. | 11.32 |
| + | ROUTED TO | R209 | 487. | 14.58 | 142. | 36. | 34. | 11.32 |
| + | HYDROGRAPH AT | D209A | 641. | 13.50 | 195. | 49. | 48. | 9.82 |
| + | ROUTED TO | R209A | 614. | 14.50 | 195. | 49. | 48. | 9.82 |
| + | HYDROGRAPH AT | 220 | 335. | 13.08 | 75. | 19. | 18. | .50 |
| + | 2 COMBINED AT | 1I220 | 655. | 14.42 | 268. | 68. | 66. | 10.32 |
| + | 2 COMBINED AT | 2I220 | 1132. | 14.50 | 407. | 103. | 99. | 11.82 |
| + | HYDROGRAPH AT | D219 | 156. | 14.58 | 61. | 15. | 15. | 11.81 |
| + | ROUTED TO | R219 | 154. | 14.75 | 61. | 15. | 15. | 11.81 |
| + | 2 COMBINED AT | CP220 | 1253. | 14.58 | 465. | 118. | 114. | 13.81 |
| + | DIVERSION TO | DI239 | 737. | 14.58 | 311. | 79. | 76. | 13.81 |
| + | HYDROGRAPH AT | D220 | 516. | 14.58 | 154. | 39. | 37. | 13.81 |
| + | DIVERSION TO | 2D221 | 412. | 14.58 | 129. | 33. | 31. | 13.81 |
| + | HYDROGRAPH AT | D220 | 103. | 14.58 | 25. | 6. | 6. | 13.81 |
| + | ROUTED TO | R220 | 93. | 15.50 | 25. | 6. | 6. | 13.81 |
| + | HYDROGRAPH AT | D219 | 892. | 14.58 | 393. | 109. | 105. | 11.81 |
| + | ROUTED TO | R219 | 827. | 15.17 | 389. | 108. | 104. | 11.81 |
| + | HYDROGRAPH AT | 238 | 314. | 13.17 | 72. | 18. | 17. | .50 |
| + | 2 COMBINED AT | 1I238 | 834. | 15.17 | 440. | 125. | 121. | 12.31 |
| + | 2 COMBINED AT | 2I238 | 907. | 15.17 | 463. | 131. | 126. | 14.31 |
| + | 2 COMBINED AT | CP238 | 1220. | 15.17 | 733. | 206. | 198. | 19.37 |
| + | DIVERSION TO | 2D250A | 56. | 15.17 | 19. | 5. | 5. | 19.37 |
| + | HYDROGRAPH AT | D238 | 1164. | 15.17 | 714. | 201. | 193. | 19.37 |
| + | DIVERSION TO | 1D251 | 159. | 15.17 | 54. | 13. | 13. | 19.37 |
| + | HYDROGRAPH AT | D238 | 1005. | 15.17 | 660. | 187. | 180. | 19.37 |
| + | ROUTED TO | R238 | 982. | 15.58 | 659. | 187. | 180. | 19.37 |
| + | HYDROGRAPH AT | 2D192 | 0. | .08 | 0. | 0. | 0. | 8.32 |
| + | ROUTED TO | R192 | 0. | .08 | 0. | 0. | 0. | 8.32 |
| + | HYDROGRAPH AT | 210 | 296. | 13.08 | 64. | 16. | 16. | .46 |
| + | 2 COMBINED AT | 1I210 | 295. | 13.08 | 64. | 16. | 15. | 8.78 |
| + | HYDROGRAPH AT | D209 | 228. | 14.08 | 60. | 15. | 14. | 11.32 |
| + | ROUTED TO | R209 | 217. | 14.42 | 60. | 15. | 14. | 11.32 |

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|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | CP210 | 308. | 13.08 | 124. | 31. | 30. | 11.78 |
| + | ROUTED TO | R210 | 279. | 14.00 | 123. | 31. | 30. | 11.78 |
| + | HYDROGRAPH AT | D209 | 564. | 14.08 | 170. | 43. | 41. | 11.32 |
| + | ROUTED TO | R209 | 494. | 15.33 | 158. | 42. | 40. | 11.32 |
| + | HYDROGRAPH AT | 221 | 303. | 13.08 | 69. | 17. | 17. | .48 |
| + | 2 COMBINED AT | 1I221 | 500. | 15.33 | 203. | 59. | 57. | 11.80 |
| + | 2 COMBINED AT | 2I221 | 725. | 15.25 | 325. | 89. | 86. | 12.26 |
| + | HYDROGRAPH AT | D220 | 412. | 14.58 | 129. | 33. | 31. | 13.81 |
| + | ROUTED TO | R220 | 400. | 14.83 | 128. | 33. | 31. | 13.81 |
| + | 2 COMBINED AT | CP221 | 1031. | 15.17 | 448. | 121. | 117. | 14.75 |
| + | ROUTED TO | R221 | 928. | 16.33 | 447. | 121. | 116. | 14.75 |
| + | HYDROGRAPH AT | D220 | 737. | 14.58 | 311. | 79. | 76. | 13.81 |
| + | ROUTED TO | R220 | 704. | 15.83 | 291. | 77. | 74. | 13.81 |
| + | HYDROGRAPH AT | 239 | 313. | 13.08 | 69. | 17. | 17. | .48 |
| + | 2 COMBINED AT | 1I239 | 705. | 15.75 | 315. | 94. | 91. | 14.29 |
| + | 2 COMBINED AT | 2I239 | 1549. | 16.25 | 750. | 214. | 206. | 15.23 |
| + | 2 COMBINED AT | CP239 | 2377. | 16.08 | 1395. | 398. | 384. | 20.79 |
| + | DIVERSION TO | 2D251 | 1740. | 16.08 | 876. | 224. | 215. | 20.79 |
| + | HYDROGRAPH AT | D239 | 637. | 16.08 | 519. | 175. | 168. | 20.79 |
| + | ROUTED TO | R239 | 635. | 16.42 | 518. | 174. | 168. | 20.79 |
| + | HYDROGRAPH AT | 240 | 282. | 13.00 | 57. | 14. | 14. | .40 |
| + | 2 COMBINED AT | CP240 | 635. | 16.42 | 552. | 188. | 181. | 21.19 |
| + | ROUTED TO | R240 | 634. | 16.67 | 550. | 187. | 180. | 21.19 |
| + | HYDROGRAPH AT | 213 | 373. | 12.50 | 46. | 12. | 11. | .35 |
| + | ROUTED TO | R213 | 225. | 13.42 | 46. | 12. | 11. | .35 |
| + | HYDROGRAPH AT | 212 | 279. | 13.42 | 77. | 19. | 19. | .54 |
| + | ROUTED TO | SR212 | 200. | 13.83 | 49. | 12. | 12. | .54 |
| + | 2 COMBINED AT | CP212 | 378. | 13.67 | 95. | 24. | 23. | .89 |
| + | ROUTED TO | R212 | 333. | 14.50 | 93. | 24. | 23. | .89 |
| + | HYDROGRAPH AT | 211 | 309. | 13.08 | 69. | 17. | 17. | .49 |
| + | ROUTED TO | R211 | 220. | 14.33 | 68. | 17. | 17. | .49 |
| + | HYDROGRAPH AT | 221A | 175. | 13.25 | 43. | 11. | 10. | .31 |
| + | 2 COMBINED AT | 1I221A | 276. | 14.17 | 109. | 28. | 27. | .80 |
| | ROUTED TO | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| + | | SR221A | 271. | 14.25 | 95. | 24. | 23. | .80 |
| + | 2 COMBINED AT | CP221A | 589. | 14.50 | 185. | 48. | 46. | 1.69 |
| + | ROUTED TO | R221A | 549. | 14.92 | 182. | 48. | 46. | 1.69 |
| + | HYDROGRAPH AT | 222 | 541. | 13.58 | 172. | 48. | 46. | 1.10 |
| + | 2 COMBINED AT | CP222 | 701. | 14.83 | 338. | 96. | 92. | 2.79 |
| + | ROUTED TO | R222 | 643. | 15.58 | 333. | 95. | 92. | 2.79 |
| + | HYDROGRAPH AT | 226 | 1573. | 12.33 | 192. | 54. | 52. | 1.18 |
| + | ROUTED TO | SR226 | 503. | 12.75 | 185. | 54. | 52. | 1.18 |
| + | ROUTED TO | R226 | 407. | 15.17 | 183. | 53. | 51. | 1.18 |
| + | HYDROGRAPH AT | 201 | 420. | 12.33 | 44. | 11. | 11. | .34 |
| + | ROUTED TO | R201 | 226. | 13.75 | 44. | 11. | 11. | .34 |
| + | HYDROGRAPH AT | 223 | 1763. | 12.42 | 327. | 110. | 106. | 1.26 |
| + | 2 COMBINED AT | 1I223 | 1763. | 12.42 | 367. | 121. | 117. | 1.60 |
| + | 2 COMBINED AT | CP223 | 1775. | 12.42 | 519. | 174. | 168. | 2.78 |
| + | DIVERSION TO | DI225 | 60. | 8.67 | 60. | 50. | 48. | 2.78 |
| + | HYDROGRAPH AT | D223 | 1715. | 12.42 | 459. | 124. | 120. | 2.78 |
| + | ROUTED TO | R223 | 1589. | 12.67 | 457. | 124. | 120. | 2.78 |
| + | HYDROGRAPH AT | 224 | 1054. | 12.33 | 109. | 27. | 26. | .80 |
| + | 2 COMBINED AT | CP224 | 2138. | 12.50 | 564. | 151. | 146. | 3.58 |
| + | ROUTED TO | R224 | 1978. | 12.92 | 552. | 151. | 146. | 3.58 |
| + | HYDROGRAPH AT | 241 | 1436. | 12.50 | 176. | 44. | 42. | 1.51 |
| + | 2 COMBINED AT | 1I241 | 2565. | 12.83 | 707. | 195. | 188. | 5.09 |
| + | 2 COMBINED AT | 2I241 | 2592. | 12.83 | 1015. | 290. | 279. | 7.88 |
| + | 2 COMBINED AT | CP241 | 2764. | 12.83 | 1470. | 464. | 447. | 29.07 |
| + | ROUTED TO | SR241 | 2759. | 12.92 | 1469. | 464. | 447. | 29.07 |
| + | ROUTED TO | R241 | 2444. | 13.33 | 1460. | 462. | 445. | 29.07 |
| + | HYDROGRAPH AT | 253 | 641. | 13.17 | 148. | 37. | 36. | 1.00 |
| + | 2 COMBINED AT | 1I253 | 2976. | 13.25 | 1579. | 497. | 478. | 30.07 |
| + | HYDROGRAPH AT | 253A | 291. | 12.33 | 29. | 7. | 7. | .25 |
| + | ROUTED TO | R253A | 190. | 13.08 | 29. | 7. | 7. | .25 |
| + | 2 COMBINED AT | 2I253 | 3136. | 13.25 | 1607. | 504. | 485. | 30.32 |
| + | HYDROGRAPH AT | 247 | 330. | 13.08 | 76. | 19. | 18. | .50 |
| + | DIVERSION TO | DI261 | 0. | .08 | 0. | 0. | 0. | .50 |
| + | HYDROGRAPH AT | D247 | 330. | 13.08 | 76. | 19. | 18. | .50 |

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| + | ROUTED TO | R247 | 303. | 13.50 | 76. | 19. | 18. | .50 |
| + | HYDROGRAPH AT | 248 | 592. | 13.25 | 152. | 38. | 37. | 1.00 |
| + | HYDROGRAPH AT | D234 | 957. | 12.75 | 136. | 34. | 33. | 3.09 |
| + | ROUTED TO | R234 | 705. | 13.50 | 136. | 34. | 33. | 3.09 |
| + | 2 COMBINED AT | 1I248 | 1259. | 13.42 | 287. | 72. | 69. | 4.09 |
| + | 2 COMBINED AT | 2I248 | 1553. | 13.42 | 363. | 91. | 87. | 4.59 |
| + | HYDROGRAPH AT | D235 | 740. | 13.25 | 182. | 46. | 44. | 5.05 |
| + | ROUTED TO | R235 | 661. | 13.83 | 182. | 46. | 44. | 5.05 |
| + | 2 COMBINED AT | CP248 | 2028. | 13.50 | 539. | 135. | 130. | 12.55 |
| + | DIVERSION TO | DI262 | 1830. | 13.50 | 504. | 126. | 121. | 12.55 |
| + | HYDROGRAPH AT | D248 | 198. | 13.50 | 35. | 9. | 8. | 12.55 |
| + | ROUTED TO | R248 | 176. | 14.25 | 35. | 9. | 8. | 12.55 |
| + | HYDROGRAPH AT | 249 | 571. | 13.25 | 143. | 36. | 35. | 1.00 |
| + | 2 COMBINED AT | 1I249 | 564. | 13.25 | 176. | 44. | 43. | 13.55 |
| + | HYDROGRAPH AT | D236 | 327. | 13.50 | 69. | 17. | 17. | 15.37 |
| + | ROUTED TO | R236 | 322. | 13.75 | 69. | 17. | 17. | 15.37 |
| + | 2 COMBINED AT | CP249 | 709. | 13.58 | 243. | 61. | 59. | 17.87 |
| + | DIVERSION TO | DI264 | 82. | 13.58 | 23. | 6. | 5. | 17.87 |
| + | HYDROGRAPH AT | D249 | 627. | 13.58 | 220. | 55. | 53. | 17.87 |
| + | ROUTED TO | R249 | 618. | 14.08 | 220. | 55. | 53. | 17.87 |
| + | HYDROGRAPH AT | D236 | 405. | 13.50 | 102. | 26. | 25. | 15.37 |
| + | ROUTED TO | R236 | 290. | 16.08 | 92. | 25. | 24. | 15.37 |
| + | HYDROGRAPH AT | 250 | 316. | 13.08 | 71. | 18. | 17. | .49 |
| + | 2 COMBINED AT | 1I250 | 310. | 13.08 | 138. | 42. | 40. | 15.86 |
| + | HYDROGRAPH AT | D237 | 301. | 13.83 | 83. | 21. | 20. | 16.87 |
| + | ROUTED TO | R237 | 276. | 14.50 | 83. | 21. | 20. | 16.87 |
| + | 2 COMBINED AT | 2I250 | 385. | 16.08 | 219. | 63. | 60. | 17.36 |
| + | 2 COMBINED AT | CP250 | 903. | 14.42 | 436. | 117. | 113. | 19.86 |
| + | ROUTED TO | R250 | 893. | 14.58 | 436. | 117. | 113. | 19.86 |
| + | HYDROGRAPH AT | D237 | 307. | 13.83 | 123. | 31. | 30. | 16.87 |
| + | ROUTED TO | R237 | 296. | 14.50 | 123. | 31. | 30. | 16.87 |
| + | HYDROGRAPH AT | 250A | 308. | 13.17 | 74. | 18. | 18. | .51 |
| + | 2 COMBINED AT | 1I250A | 347. | 14.25 | 191. | 49. | 47. | 17.38 |

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|---|---|---|---|---|---|---|---|---|
| + | HYDROGRAPH AT | D238 | 56. | 15.17 | 19. | 5. | 5. | 19.37 |
| + | ROUTED TO | R238 | 55. | 15.58 | 19. | 5. | 5. | 19.37 |
| + | 2 COMBINED AT | 2I250A | 367. | 14.42 | 209. | 53. | 51. | 19.88 |
| + | 2 COMBINED AT | CP250A | 1251. | 14.58 | 639. | 169. | 163. | 22.87 |
| + | DIVERSION TO | DI265A | 3. | 14.58 | 1. | 0. | 0. | 22.87 |
| + | HYDROGRAPH AT | D250A | 1247. | 14.58 | 638. | 169. | 163. | 22.87 |
| + | DIVERSION TO | 1D266 | 274. | 14.58 | 46. | 11. | 11. | 22.87 |
| + | HYDROGRAPH AT | D250A | 973. | 14.58 | 593. | 158. | 152. | 22.87 |
| + | ROUTED TO | R250A | 970. | 14.75 | 591. | 157. | 151. | 22.87 |
| + | HYDROGRAPH AT | D238 | 159. | 15.17 | 54. | 13. | 13. | 19.37 |
| + | ROUTED TO | R238 | 135. | 17.50 | 48. | 13. | 12. | 19.37 |
| + | HYDROGRAPH AT | 251 | 313. | 13.17 | 72. | 18. | 17. | .50 |
| + | 2 COMBINED AT | 1I251 | 305. | 13.17 | 88. | 30. | 29. | 19.87 |
| + | HYDROGRAPH AT | D239 | 1740. | 16.08 | 876. | 224. | 215. | 20.79 |
| + | ROUTED TO | R239 | 1721. | 16.50 | 868. | 224. | 215. | 20.79 |
| + | 2 COMBINED AT | 2I251 | 1719. | 16.50 | 926. | 254. | 244. | 21.29 |
| + | 2 COMBINED AT | CP251 | 2310. | 16.50 | 1498. | 409. | 394. | 24.79 |
| + | DIVERSION TO | 2D266 | 1881. | 16.50 | 1228. | 333. | 321. | 24.79 |
| + | HYDROGRAPH AT | D251 | 429. | 16.50 | 271. | 75. | 72. | 24.79 |
| + | ROUTED TO | R251 | 423. | 16.83 | 270. | 75. | 72. | 24.79 |
| + | HYDROGRAPH AT | 252 | 326. | 13.17 | 76. | 19. | 18. | .50 |
| + | 2 COMBINED AT | CP252 | 423. | 16.83 | 320. | 93. | 90. | 25.29 |
| + | DIVERSION TO | DI267 | 400. | 16.83 | 303. | 89. | 85. | 25.29 |
| + | HYDROGRAPH AT | D252 | 23. | 16.83 | 16. | 4. | 4. | 25.29 |
| + | ROUTED TO | R252 | 16. | 21.25 | 12. | 3. | 3. | 25.29 |
| + | 2 COMBINED AT | CP253 | 3136. | 13.25 | 1607. | 507. | 488. | 34.82 |
| + | ROUTED TO | SR253 | 3093. | 13.33 | 1583. | 504. | 485. | 34.82 |
| + | ROUTED TO | R253 | 3034. | 13.67 | 1579. | 503. | 484. | 34.82 |
| + | HYDROGRAPH AT | 268 | 589. | 13.25 | 147. | 37. | 35. | .95 |
| + | 2 COMBINED AT | 1I268 | 3438. | 13.58 | 1677. | 538. | 518. | 35.77 |
| + | HYDROGRAPH AT | D250A | 274. | 14.58 | 46. | 11. | 11. | 22.87 |
| + | ROUTED TO | R250A | 242. | 15.33 | 46. | 11. | 11. | 22.87 |
| + | HYDROGRAPH AT | 266 | 181. | 13.33 | 48. | 12. | 12. | .33 |
| | 2 COMBINED AT | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| + | | 1I266 | 253. | 15.33 | 91. | 23. | 22. | 23.20 |
| + | HYDROGRAPH AT | D251 | 1881. | 16.50 | 1228. | 333. | 321. | 24.79 |
| + | ROUTED TO | R251 | 1865. | 16.75 | 1226. | 333. | 321. | 24.79 |
| + | 2 COMBINED AT | CP266 | 1890. | 16.75 | 1303. | 356. | 343. | 25.12 |
| + | DIVERSION TO | DI283 | 220. | 16.75 | 148. | 41. | 40. | 25.12 |
| + | HYDROGRAPH AT | D266 | 1670. | 16.75 | 1156. | 314. | 303. | 25.12 |
| + | ROUTED TO | R266 | 1668. | 16.83 | 1155. | 314. | 303. | 25.12 |
| + | HYDROGRAPH AT | D252 | 400. | 16.83 | 303. | 89. | 85. | 25.29 |
| + | ROUTED TO | R252 | 394. | 17.33 | 301. | 88. | 85. | 25.29 |
| + | HYDROGRAPH AT | 267 | 335. | 13.17 | 79. | 20. | 19. | .50 |
| + | 2 COMBINED AT | 1I267 | 492. | 13.67 | 349. | 107. | 103. | 25.79 |
| + | 2 COMBINED AT | CP267 | 2033. | 16.92 | 1498. | 421. | 405. | 26.12 |
| + | DIVERSION TO | DI284 | 1245. | 16.92 | 953. | 276. | 265. | 26.12 |
| + | HYDROGRAPH AT | D267 | 788. | 16.92 | 545. | 145. | 140. | 26.12 |
| + | ROUTED TO | R267 | 782. | 17.17 | 541. | 145. | 139. | 26.12 |
| + | 2 COMBINED AT | CP268 | 3714. | 13.67 | 2192. | 679. | 654. | 36.60 |
| + | ROUTED TO | SR268 | 3638. | 13.83 | 2164. | 662. | 637. | 36.60 |
| + | ROUTED TO | R268 | 3466. | 14.33 | 2119. | 644. | 620. | 36.60 |
| + | HYDROGRAPH AT | 286 | 473. | 13.08 | 109. | 27. | 26. | .70 |
| + | 2 COMBINED AT | 1I286 | 3533. | 14.33 | 2129. | 669. | 644. | 37.30 |
| + | HYDROGRAPH AT | 288 | 160. | 13.25 | 44. | 11. | 10. | .22 |
| + | ROUTED TO | R288 | 153. | 13.42 | 43. | 11. | 10. | .22 |
| + | 2 COMBINED AT | CP286 | 3601. | 14.33 | 2141. | 679. | 654. | 37.52 |
| + | ROUTED TO | R286 | 3497. | 14.58 | 2129. | 675. | 650. | 37.52 |
| + | HYDROGRAPH AT | 287 | 223. | 12.67 | 36. | 9. | 9. | .23 |
| + | 2 COMBINED AT | 1I287 | 3496. | 14.58 | 2128. | 683. | 658. | 37.75 |
| + | HYDROGRAPH AT | D266 | 220. | 16.75 | 148. | 41. | 40. | 25.12 |
| + | ROUTED TO | R266 | 216. | 17.33 | 146. | 41. | 40. | 25.12 |
| + | HYDROGRAPH AT | 283 | 102. | 13.08 | 23. | 6. | 6. | .16 |
| + | 2 COMBINED AT | CP283 | 216. | 17.33 | 149. | 47. | 45. | 25.28 |
| + | ROUTED TO | R283 | 214. | 17.58 | 149. | 46. | 45. | 25.28 |
| + | HYDROGRAPH AT | 285B | 83. | 12.33 | 9. | 2. | 2. | .06 |
| + | 2 COMBINED AT | CP285B | 214. | 17.58 | 149. | 48. | 47. | 25.34 |
| + | ROUTED TO | SR285B | 211. | 17.75 | 149. | 48. | 46. | 25.34 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | DIVERSION TO | DI297 | 210. | 17.83 | 149. | 48. | 46. | 25.34 |
| + | HYDROGRAPH AT | D285B | 1. | 17.75 | 0. | 0. | 0. | 25.34 |
| + | ROUTED TO | R285B | 0. | 18.25 | 0. | 0. | 0. | 25.34 |
| + | HYDROGRAPH AT | D267 | 1245. | 16.92 | 953. | 276. | 265. | 26.12 |
| + | ROUTED TO | R267 | 1226. | 17.50 | 950. | 274. | 264. | 26.12 |
| + | HYDROGRAPH AT | 284 | 326. | 13.17 | 76. | 19. | 18. | .52 |
| + | 2 COMBINED AT | CP284 | 1226. | 17.50 | 972. | 292. | 281. | 26.64 |
| + | ROUTED TO | SR284 | 1219. | 17.67 | 938. | 274. | 263. | 26.64 |
| + | ROUTED TO | R284 | 1218. | 17.75 | 937. | 273. | 263. | 26.64 |
| + | HYDROGRAPH AT | 285A | 82. | 12.33 | 9. | 2. | 2. | .06 |
| + | 2 COMBINED AT | 1I285A | 1218. | 17.75 | 937. | 275. | 265. | 26.70 |
| + | 2 COMBINED AT | CP285A | 1217. | 17.75 | 937. | 275. | 265. | 26.92 |
| + | ROUTED TO | SR285A | 1217. | 17.83 | 937. | 275. | 265. | 26.92 |
| + | DIVERSION TO | 1D297A | 245. | 17.83 | 237. | 93. | 90. | 26.92 |
| + | HYDROGRAPH AT | D285A | 972. | 17.83 | 699. | 182. | 176. | 26.92 |
| + | ROUTED TO | R285A | 967. | 18.00 | 698. | 182. | 176. | 26.92 |
| + | HYDROGRAPH AT | 285 | 56. | 12.33 | 6. | 1. | 1. | .04 |
| + | 2 COMBINED AT | CP285 | 967. | 18.00 | 698. | 184. | 177. | 26.96 |
| + | ROUTED TO | SR285 | 966. | 18.00 | 698. | 184. | 177. | 26.96 |
| + | DIVERSION TO | 2D297A | 263. | 18.00 | 190. | 50. | 48. | 26.96 |
| + | HYDROGRAPH AT | D285 | 703. | 18.00 | 509. | 134. | 129. | 26.96 |
| + | ROUTED TO | R285 | 697. | 18.33 | 508. | 134. | 129. | 26.96 |
| + | 2 COMBINED AT | CP287 | 3688. | 14.58 | 2615. | 813. | 783. | 38.59 |
| + | ROUTED TO | SR287 | 2782. | 15.58 | 2578. | 808. | 778. | 38.59 |
| + | ROUTED TO | R287 | 2778. | 15.83 | 2566. | 796. | 767. | 38.59 |
| + | HYDROGRAPH AT | 298 | 591. | 13.00 | 122. | 30. | 29. | .84 |
| + | 2 COMBINED AT | CP298 | 2777. | 15.83 | 2566. | 825. | 795. | 39.43 |
| + | ROUTED TO | SR298 | 2774. | 15.92 | 2561. | 819. | 789. | 39.43 |
| + | ROUTED TO | R298 | 2768. | 16.33 | 2550. | 805. | 775. | 39.43 |
| + | HYDROGRAPH AT | 316 | 512. | 13.17 | 122. | 31. | 29. | .82 |
| + | 2 COMBINED AT | CP316 | 2767. | 16.33 | 2550. | 834. | 803. | 40.25 |
| + | ROUTED TO | R316 | 2764. | 16.50 | 2541. | 825. | 794. | 40.25 |
| + | HYDROGRAPH AT | 334 | 452. | 13.00 | 95. | 24. | 23. | .64 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | 1I334 | 2764. | 16.50 | 2541. | 847. | 816. | 40.89 |
| + | HYDROGRAPH AT | D285 | 263. | 18.00 | 190. | 50. | 48. | 26.96 |
| + | ROUTED TO | R285 | 262. | 18.33 | 189. | 50. | 48. | 26.96 |
| + | HYDROGRAPH AT | D285A | 245. | 17.83 | 237. | 93. | 90. | 26.92 |
| + | ROUTED TO | R285A | 245. | 18.25 | 237. | 91. | 88. | 26.92 |
| + | HYDROGRAPH AT | 297A | 206. | 12.92 | 39. | 10. | 9. | .27 |
| + | 2 COMBINED AT | 1I297A | 245. | 18.25 | 237. | 100. | 97. | 27.19 |
| + | 2 COMBINED AT | CP297A | 507. | 18.33 | 426. | 150. | 145. | 27.23 |
| + | ROUTED TO | R297A | 499. | 19.92 | 421. | 143. | 138. | 27.23 |
| + | HYDROGRAPH AT | 315 | 278. | 13.25 | 68. | 17. | 16. | .47 |
| + | 2 COMBINED AT | CP315 | 499. | 19.92 | 421. | 160. | 154. | 27.70 |
| + | ROUTED TO | R315 | 496. | 20.58 | 418. | 146. | 141. | 27.70 |
| + | 2 COMBINED AT | CP334 | 3173. | 19.42 | 2884. | 991. | 954. | 41.63 |
| + | ROUTED TO | R334 | 3168. | 19.67 | 2872. | 977. | 941. | 41.63 |
| + | HYDROGRAPH AT | 335 | 277. | 12.92 | 54. | 13. | 13. | .35 |
| + | 2 COMBINED AT | CP335 | 3168. | 19.67 | 2872. | 990. | 954. | 41.98 |
| + | ROUTED TO | R335 | 3165. | 19.83 | 2867. | 981. | 945. | 41.98 |
| + | HYDROGRAPH AT | 299 | 289. | 13.00 | 61. | 15. | 15. | .40 |
| + | ROUTED TO | R299 | 227. | 14.33 | 61. | 15. | 15. | .40 |
| + | HYDROGRAPH AT | 317 | 341. | 13.25 | 82. | 21. | 20. | .57 |
| + | 2 COMBINED AT | CP317 | 341. | 13.25 | 141. | 36. | 34. | .97 |
| + | ROUTED TO | R317 | 311. | 13.83 | 138. | 36. | 34. | .97 |
| + | HYDROGRAPH AT | 300 | 353. | 12.83 | 66. | 16. | 16. | .39 |
| + | ROUTED TO | R300 | 264. | 14.17 | 65. | 16. | 16. | .39 |
| + | HYDROGRAPH AT | 318 | 581. | 12.67 | 97. | 27. | 26. | .62 |
| + | 2 COMBINED AT | CP318 | 580. | 12.67 | 156. | 43. | 41. | 1.01 |
| + | ROUTED TO | R318 | 530. | 12.92 | 154. | 43. | 41. | 1.01 |
| + | HYDROGRAPH AT | 301 | 535. | 12.17 | 46. | 12. | 12. | .30 |
| + | ROUTED TO | R301 | 175. | 14.00 | 46. | 12. | 12. | .30 |
| + | HYDROGRAPH AT | 319 | 577. | 12.50 | 84. | 23. | 23. | .54 |
| + | 2 COMBINED AT | CP319 | 578. | 12.50 | 127. | 36. | 34. | .84 |
| + | ROUTED TO | R319 | 520. | 12.83 | 126. | 36. | 34. | .84 |
| + | HYDROGRAPH AT | 337 | 744. | 12.25 | 84. | 25. | 24. | .49 |
| | 3 COMBINED AT | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| + | | CP337 | 1120. | 12.83 | 357. | 103. | 99. | 2.34 |
| + | ROUTED TO | SR337 | 373. | 13.50 | 335. | 103. | 99. | 2.34 |
| + | DIVERSION TO | DI367 | 373. | 13.50 | 335. | 103. | 99. | 2.34 |
| + | HYDROGRAPH AT | D337 | 0. | .08 | 0. | 0. | 0. | 2.34 |
| + | ROUTED TO | R337 | 0. | .08 | 0. | 0. | 0. | 2.34 |
| + | 2 COMBINED AT | 1I336 | 311. | 13.83 | 138. | 36. | 34. | 3.31 |
| + | 2 COMBINED AT | 2I336 | 3172. | 19.75 | 2892. | 1012. | 975. | 45.29 |
| + | HYDROGRAPH AT | 336 | 552. | 13.92 | 206. | 57. | 55. | 1.28 |
| + | 2 COMBINED AT | CP336 | 3177. | 19.75 | 2909. | 1065. | 1026. | 46.57 |
| + | ROUTED TO | SR336 | 3177. | 19.83 | 2907. | 1065. | 1026. | 46.57 |
| + | HYDROGRAPH AT | 336A | 149. | 14.00 | 54. | 14. | 13. | .37 |
| + | 2 COMBINED AT | CP336A | 3176. | 19.83 | 2910. | 1078. | 1038. | 46.94 |
| + | ROUTED TO | R336A | 3175. | 19.92 | 2908. | 1072. | 1033. | 46.94 |
| + | HYDROGRAPH AT | 364A | 99. | 12.25 | 9. | 2. | 2. | .07 |
| + | 2 COMBINED AT | 1I364A | 3175. | 19.92 | 2908. | 1074. | 1035. | 47.01 |
| + | HYDROGRAPH AT | 336B | 168. | 12.00 | 9. | 2. | 2. | .08 |
| + | ROUTED TO | SR336B | 101. | 12.17 | 9. | 2. | 2. | .08 |
| + | ROUTED TO | R336B | 90. | 12.33 | 9. | 2. | 2. | .08 |
| + | 2 COMBINED AT | CP364A | 3175. | 19.92 | 2908. | 1076. | 1037. | 47.09 |
| + | DIVERSION TO | DI363 | 1151. | 19.92 | 1053. | 386. | 372. | 47.09 |
| + | HYDROGRAPH AT | D364A | 2024. | 19.92 | 1855. | 690. | 665. | 47.09 |
| + | ROUTED TO | R364A | 2022. | 20.25 | 1850. | 675. | 650. | 47.09 |
| + | HYDROGRAPH AT | 365 | 272. | 12.83 | 47. | 12. | 11. | .38 |
| + | ROUTED TO | R365 | 179. | 14.50 | 45. | 12. | 11. | .38 |
| + | HYDROGRAPH AT | 364 | 559. | 13.00 | 115. | 29. | 28. | .78 |
| + | 2 COMBINED AT | 1I364 | 558. | 13.00 | 157. | 41. | 39. | 1.16 |
| + | 2 COMBINED AT | CP364 | 2027. | 20.17 | 1858. | 712. | 686. | 48.25 |
| + | ROUTED TO | SR364 | 2027. | 20.25 | 1858. | 705. | 679. | 48.25 |
| + | DIVERSION TO | DIGILA | 342. | 20.25 | 322. | 137. | 132. | 48.25 |
| + | HYDROGRAPH AT | D364 | 1685. | 20.25 | 1535. | 569. | 548. | 48.25 |
| + | ROUTED TO | R364 | 1681. | 21.17 | 1528. | 549. | 529. | 48.25 |
| + | HYDROGRAPH AT | D364A | 1151. | 19.92 | 1053. | 386. | 372. | 47.09 |
| + | ROUTED TO | R364A | 1149. | 20.75 | 1046. | 355. | 342. | 47.09 |
| + | HYDROGRAPH AT | 363 | 360. | 13.25 | 91. | 23. | 22. | .63 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | 1I363 | 1149. | 20.75 | 1046. | 377. | 363. | 47.72 |
| + | 2 COMBINED AT | 2I363 | 2820. | 21.00 | 2569. | 925. | 891. | 48.88 |
| + | HYDROGRAPH AT | 314 | 293. | 13.00 | 61. | 15. | 15. | .42 |
| + | ROUTED TO | R314 | 212. | 14.75 | 60. | 15. | 15. | .42 |
| + | HYDROGRAPH AT | 333 | 388. | 13.08 | 84. | 21. | 20. | .58 |
| + | 2 COMBINED AT | CP333 | 388. | 13.08 | 137. | 36. | 35. | 1.00 |
| + | ROUTED TO | R333 | 361. | 13.42 | 136. | 36. | 35. | 1.00 |
| + | HYDROGRAPH AT | 348A | 229. | 12.58 | 32. | 8. | 8. | .22 |
| + | 2 COMBINED AT | CP348A | 379. | 13.42 | 165. | 44. | 42. | 1.22 |
| + | ROUTED TO | R348A | 363. | 13.67 | 164. | 44. | 42. | 1.22 |
| + | HYDROGRAPH AT | 348B | 355. | 13.33 | 92. | 23. | 22. | .66 |
| + | 2 COMBINED AT | CP348B | 667. | 13.42 | 253. | 67. | 65. | 1.88 |
| + | ROUTED TO | SR348B | 645. | 13.58 | 253. | 67. | 65. | 1.88 |
| + | ROUTED TO | R348B | 617. | 14.25 | 246. | 67. | 64. | 1.88 |
| + | 2 COMBINED AT | 3I363 | 2842. | 21.00 | 2618. | 987. | 950. | 50.76 |
| + | HYDROGRAPH AT | 348 | 283. | 12.75 | 50. | 12. | 12. | .34 |
| + | ROUTED TO | SR348 | 280. | 12.83 | 49. | 12. | 12. | .34 |
| + | DIVERSION TO | DI347 | 0. | .08 | 0. | 0. | 0. | .34 |
| + | HYDROGRAPH AT | D348 | 280. | 12.83 | 49. | 12. | 12. | .34 |
| + | ROUTED TO | R348 | 248. | 13.33 | 48. | 12. | 12. | .34 |
| + | 2 COMBINED AT | CP363 | 2843. | 21.00 | 2620. | 998. | 961. | 51.10 |

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

# APPENDIX C

# ORIGINAL AND REVISED WHITE TANKS/AGUA FRIA ADMS HEC-2 RUNS FOR BULLARD WASH

```
1*******************************************                    ************************************
 *  HEC-2 WATER SURFACE PROFILES            *                    *  U.S. ARMY CORPS OF ENGINEERS
 *                                          *                    *  HYDROLOGIC ENGINEERING CENTER
 *  Version   4.6.2;  May 1991              *                    *  609 SECOND STREET, SUITE D
 *                                          *                    *  DAVIS, CALIFORNIA 95616-4687
 *  RUN DATE    29OCT94    TIME   10:58:49  *                    *          (916) 756-1104
 *******************************************                    ************************************

                                        X     X  XXXXXXX   XXXXX              XXXXX
                                        X     X  X        X     X            X     X
                                        X     X  X        X                        X
                                        XXXXXXX  XXXX     X           XXXXX    XXXXX
                                        X     X  X        X                  X
                                        X     X  X        X     X            X
                                        X     X  XXXXXXX   XXXXX             XXXXXXX
1
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                                                                                THIS RUN EXECUTED 29OCT94    10:58:49
 ************************************
  HEC-2 WATER SURFACE PROFILES

  Version   4.6.2;  May 1991
 ************************************


T1      BULLARD WASH OUTFALL FEASIBILITY STUDY        STANLEY CONSULTANTS, INC.
T2      FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD #94-06)       SCI #12278
T3      BULLARD WASH (WASH 10)                                 INPUT FILE: ADMS_H2A
T4
T4   ***************************************************************************
T4   THIS MODEL IS THE SAME AS WLB'S WHITE TANKS/AGUA FRIA WASH 10.H21 EXCEPT
T4   THAT ALL CROSS SECTIONS UPSTREAM OF 3.602 (YUMA ROAD) HAVE BEEN REMOVED
T4   IN ORDER TO REDUCE THE SIZE OF THE MODEL.
T4   ***************************************************************************
T4
T4   T1      WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY
T4   T2      100 - YEAR STORM EVENT   FLOODPLAIN RUN  FILE: 10.H2I
T4   T3      BULLARD WASH  (WASH 10) - FROM BUCKEYE CANAL TO DYSART DRAIN.
T4
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0      .0025        0         0         0        912        0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0        -1         0         0         0         0         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1        53        21        22        54        51         4         8
     42         5        26         0       110         0       200

NC      .07       .07       .04       .1        .3
QT        3       850       850      3110
          ***  DUE TO THE COMPLEXITY OF THE DOWNSTREAM REACH (CROSS-SECTIONS
               0.000 TO 2.297),AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN
               SHOWN IN THIS REACH.HOWEVER,A HEC-2 MODEL WAS SET UP INCLUDING
               THESE X-SECTIONS TO AID IN PRODUCING A REASONABLE APPROXIMATE
               DELINEATION.THIS APPROXIMATE DELINEATION IS AS SHOWN ON THE MAPS
               AND IS BASED ON ENGINEERING JUDGEMENT REFLCTING THE EXISTING
               TOPOGRAPHY,AND USING INFORMATION FROM THE HEC-2 MODEL TO
1
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               ESTIMATE WHERE BREAKOUT FLOWS WILL OCCUR.
               ALSO, AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN FOR
               THE UPPERMOST REACH OF BULLARD WASH (CROSS-SECTIONS 10.269 TO
               14.023). THE HEC-2 MODEL WAS ALSO UTILIZED TO ESTIMATE THE
               APPROXIMATE DELINEATION IN THIS REACH.
               A DETAILED ANALYSIS WAS PERFORMED ON BULLARD WASH FROM CROSS-
               SECTION 2.371 TO 6.320 AND FROM 9.189 TO 10.197.

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

               THE AREA BETWEEN X-SECTION 6.320 AND X-SECTION
               9.189 IS CURRENTLY UNDER CONSTRUCTION.  NO FLOODPLAIN HAS BEEN
               PREPARED FOR THIS AREA OF BULLARD WASH, HOWEVER, THE HEC-2
               ANALYSIS WAS CONTINUED BASED ON EXISTING CONDITIONS AT THE TIME
               OF THE AERIAL MAPPING TO COMPUTE WATER SURFACE ELEVATIONS
               UPSTREAM AND DOWNSTREAM OF THIS REACH.

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***  THE DISCHARGE IN FIELD 4 OF THE QT CARDS IS THE ACTUAL DISCHRAGE
     DERIVED FROM THE 100-YEAR 24-HOUR HEC1 MODEL. THIS DISCHRGE IS
     FOR COMPARISON PURPOSES ONLY AND NO PROFILE IS BEING COMPUTED
     FOR IT. DISCHARGES FOR PROFILES 1 & 2 ARE USED TO DELINEATE THE
     FLOODPLAIN AND FLOODWAY RESPECTIVELY. THESE DISCHARGES ARE BASED
     UPON THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER
     THE TOP WHERE CAPACITY IS EXCEEDED. THESE SITUATIONS ARE
     DOCUMENTED THROUGHOUT THE HEC-2 MODEL.

**   BEGIN APPROXIMATE FLOODPLAIN DELINEATION

     CROSS-SECTION AT BUKEYE CANAL

     Q = Q AT CP364       (= 3110 CFS).
     THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
     MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
     OVERBANK.
     EXCEEDED FLOW WILL CONTINUE AS SHEET FLOW TO THE WEST.

X1    0.000      12    9980   10120       0       0       0
GR      914    8620     912    9460   910.5    9950     912    9980   910.5   10000
GR      912   10030   912.3   10050     912   10080   910.5   10100     912   10120
GR      912   10510     914   10900

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     ANY WSEL EXTENSION AT X1= 0.047 TO X1= 0.616 IS DUE TO THE
     LIMITING ELEVATION AT THE RIGHT OVERBANK.

X1    0.047      14    9960   10100     265     240     250
GR      914    8440   913.8    8900     912    9235   911.8    9550   910.6    9875
GR      912    9950   912.3    9960     912    9975     910   10000   911.3   10035
GR      910   10070   910.3   10100     912   10370   912.5   10820

X1    0.121      14    9980   10100     390     390     390
GR      914    8845     912    9800   911.6    9920     912    9970   912.7    9980
GR      912    9985     910   10000     912   10030   912.1   10040     912   10055
GR      910   10080   910.4   10100     912   10545   912.5   10820

X1    0.201      12    9970   10100     420     420     420
GR      914    9245   912.6    9935     913    9970     912    9985     910   10000
GR      912   10025   912.1   10040     912   10055     910   10075   910.5   10100
GR      912   10240   912.5   10820

X1    0.292      12    9960   10070     480     480     480
GR      914    9525   913.5    9850   912.8    9915   913.3    9960     912    9980
GR    910.5   10000   911.9   10025   910.5   10050   912.1   10070   911.8   10150
GR      912   10220   912.5   10800

     DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
     HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
     X1= 0.668
X1    0.384      17    9970   10095     490     490     490
GR      916    9060     914    9620   913.2    9795     914    9965   914.3    9970
GR      914    9975     912    9985     911   10000     912   10015   912.4   10025
GR      912   10040   911.5   10050     912   10065   912.7   10095   912.3   10210
GR    912.7   10700   913.2   11370

X1    0.488      13    9970   10090     545     545     545
GR      916    9235   914.8    9580     914    9880   913.8    9925     914    9960
GR    915.2    9970     914    9980     912   10000   913.3   10035   912.3   10070
GR    913.5   10090   912.7   10500   913.2   11365

X1    0.531      12    9965   10090     230     230     230
GR      916    9360   914.1    9920   915.4    9965     914    9990   913.5   10000
GR      914   10015   914.1   10030   912.8   10065   914.2   10090     914   10105
GR    912.8   10470   913.2   11350

QT        3    4895    4895    4895

     Q = Q AT CP364A      (= 4895 CFS).

X1    0.616      13    9960   10090     405     480     450
GR    917.3    9665  916.04    9670   917.1    9830   916.5    9960     916    9990
GR      915   10000   915.4   10030   913.8   10070   915.2   10090     914   10100
GR    913.8   10350     914   10790     916   10830
1
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NC     .045    .045     .03      .1      .3

     ANY WSEL EXTENSION AT X1= 0.668 TO X1= 1.378 IS DUE TO THE
     LIMITING ELEVATION AT THE LEFT BANK.

X1    0.668      10    9950   10035     200     290     270
GR    917.3    9620   916.8    9750   917.3    9950   916.4   10000   916.8   10035
GR      916   10080   915.5   10115     916   10160     918   10250   918.3   10290

X1    0.776      13    9975   10025     535     570     570
GR    920.6    9975     920    9985     918    9990   917.3   10000   917.9   10025
GR    916.4   10185     918   10315     920   10325   920.8   10350   919.3   10400
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GR      920      10435      919.8      10470       924      10525

X1    0.868         11       9970      10020       495        485        490
GR    921.7       9970        920       9980     918.3      10000      919.8      10020        918      10220
GR      920      10295        922      10315     922.1      10335      919.9      10380        922      10485
GR    924.5      10495

X1    0.964         15       9970      10045       505        505        505
GR    923.2       9970        922       9980       920       9985      919.2      10000        920      10015
GR      922      10020      922.5      10045       922      10060      921.5      10140        922      10235
GR    922.8      10265        922      10320     921.7      10345        922      10390        925      10420

QT        3       2596       2596       4895
                Q = Q AT CP364A      (= 4895 CFS).
                THIS Q  HAS BEEN REDUCED BY THE SAME AMOUNT THAT EXCEEDED THE
                CAPACITY OF THE CHANNEL AT THE UPSTREAM REACH  X1= 1.474 TO
                X1= 1.823,    THAT EXCEEDED FLOW WILL RETURN AT X1= 0.964

X1    1.081         13       9955      10090       595        610        620
GR    925.7       9955        924       9965       924      10000        924      10055        925      10090
GR      923      10140        923      10250       924      10260        926      10270        924      10295
GR    923.4      10355        924      10395       930      10425


                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 1.435

X1    1.153         16       9945      10060       410        355        380
GR    928.4       9945        928       9955       924       9970        924      10000        924      10025
GR    925.8      10060        924      10100       923      10140        923      10240        924      10265
GR      926      10285        927      10300       924      10340      923.7      10380        924      10410
GR    930.5      10440

X1    1.236         15       9960      10060       435        435        435
GR    930.2       9960        930       9970       924       9980        924      10000        924      10025
GR      926      10040        928      10050     928.3      10060        928      10070      924.5      10130
GR      926      10160        928      10210     928.4      10250      925.9      10310      932.3      10375
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X1    1.317         15       9960      10050       430        430        430
GR    930.4       9960        930       9970       924       9985        924      10000        924      10010
GR      928      10035      928.5      10050       928      10060        927      10140        928      10210
GR      930      10240      930.4      10260     928.9      10300        930      10320        933      10365

X1    1.378         15       9960      10035       345        295        320
GR    930.8       9960        930       9970       924       9985        924      10000        924      10010
GR      928      10020      928.8      10035       928      10050      927.5      10120        928      10180
GR      930      10250      930.9      10280     929.4      10320        930      10365      934.1      10385


                CROSS-SECTION AT STATE ROUTE 85

X1    1.435         12       9965      10070       330        180        300
GR      934       9300        932       9780     931.4       9965      926.3       9995      926.3      10000
GR    926.3      10005        928      10030       931      10070      930.5      10120        932      10140
GR      934      10175      934.5      10185

QT        3       2600       2600       4899

                Q = Q AT CP336       (= 4899 CFS).
                THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
                MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
                OVERBANK.      EXCEEDED FLOW WILL RETURN AT X1= 0.964

                ANY WSEL EXTENSION AT X1= 1.474 TO X1= 1.823 IS DUE TO THE
                LIMITING ELEVATION AT THE RIGHT OVERBANK.

X1    1.474          7       9985      10015       210        210        210
GR      934       8825        932       9985       930       9990        928      10000        930      10010
GR      932      10015        933      10080

NC     .045       .045        .03         .3        .5
X1    1.517          8       9905      10080       500        160        225
GR      936       9200        934       9320     932.7       9600      932.8       9800      933.2       9905
GR    932.2      10000        934      10055     934.7      10080

X1    1.566          7       9955      10045       320        210        260
GR      938       9870        936       9920       934       9955      932.5      10000        934      10045
GR      936      10060      936.1      10065

NC     .045       .045        .03         .1        .3
X1    1.634          8       9970      10025       360        360        360
GR      940       9690        938       9855       936       9910        934       9970        933      10000
GR      934      10025        936      10050     937.3      10065

X1    1.680          9       9970      10025       200        285        240
GR      940       9700        938       9800       936       9930        934       9970      933.4      10000
GR      934      10025        936      10055       938      10080      938.2      10100
1
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X1    1.745         12       9960      10040       280        400        345
GR    940.3       9660        940       9760       938       9825        936       9900      934.5       9960
GR      934       9975      933.8      10000       934      10025      934.5      10040        936      10090
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GR      938      10195      938.2      10210

X1    1.823         12       9970      10050        370        425        410
GR    940.3       9385        940       9425        938       9450      937.5       9500        938       9600
GR    938.2       9740        938       9785        936       9970      934.9      10000        936      10050
GR      938      10230      938.6      10255

QT        3       4899       4899       4899

                Q = Q AT CP336       (=4899 CFS).

                DIVIDED FLOW OCCURS FOR THE NEXT FIVE UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 2.371

X1    1.893         17       9960      10040        280        370        370
GR    940.3       9055        940       9090        938       9115      937.5       9170        938       9235
GR    938.3       9390        938       9545      936.3       9650        938       9715        940       9770
GR      938       9895        937       9960      936.1      10000        937      10040        938      10110
GR      940      10215        941      10370

X1    1.941         20       9975      10025         40        290        255
GR    940.3       8925        940       8960        938       8985      937.5       9040        938       9100
GR    938.4       9255        938       9430      936.3       9510        938       9580        944       9685
GR    944.6       9820        944       9890        942       9960        940       9975        938       9990
GR    937.9      10000        938      10010        940      10025        942      10040        943      10055

NC     .045        .07        .03         .1         .3
X1    1.988         20       9950      10030         35        280        245
GR    940.3       8890        940       8930        938       8955      937.5       9000        938       9065
GR    938.4       9220        938       9420      936.3       9485        938       9540        940       9575
GR      942       9595        944       9630      944.8       9750      944.7       9810        944       9950
GR      940       9980      938.2      10000        940      10015        944      10030      944.9      10125

                ANY WSEL EXTENSION AT X1= 2.058 TO X1= 2.185 IS DUE TO THE
                LIMITING ELEVATIONS AT THE LEFT OVERBANK.

X1    2.058         18       9970      10035        350        370        370
GR      941       8850        940       8950        939       9020      939.5       9190        938       9500
GR    936.6       9520        938       9540        940       9565        942       9585        944       9650
GR      944       9755      945.6       9835        944       9970        940       9985      938.4      10000
GR      940      10020        944      10035        946      10085

X1    2.185         21       9965      10045        430        670        670
GR    942.5       9310        942       9360        940       9445        938       9545      937.2       9565
GR      938       9580        940       9595        942       9630        943       9765      944.1       9860
GR    944.5       9925        944       9965        942       9975        940       9985        939      10000
GR      940      10015        942      10030        944      10045        945      10185        946      10680
GR    946.2      10690
1
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            **  END OF APPROXIMATE FLOODPLAIN DELINEATION .

X1    2.297         22       9975      10040        610        450        595
GR    946.3       9310        946       9335        944       9425        942       9480        940       9530
GR    937.9       9570      938.3       9605      937.8       9655      938.1       9700      937.9       9775
GR      938       9840        940       9930      941.3       9975        940       9990      939.4      10000
GR      940      10015      940.2      10040      940.8      10040        942      10480        944      10700
GR      946      11415        947      11430

ET                            9.1                                                                9650      10070

            **  BEGIN DETAILED FLOODPLAIN\FLOODWAY ANALYSIS.

X1    2.371         25       9975      10030        400        500        390
GR    949.7       8815        948       8940        946       9060        944       9145      944.5       9185
GR      944       9270        942       9315        940       9435      939.8       9520        940       9585
GR    940.6       9655        940       9710      939.4       9775        940       9815        942       9890
GR    942.3       9930        942       9975        940       9995      939.7      10000        940      10005
GR    940.7      10030        942      10385        944      10860        946      11400      949.7      11450

ET                            9.1                                                                9835      10210
X1    2.435         20       9985      10085        335        335        335
GR      950       8650        948       8790        946       8890      945.2       9000        946       9090
GR      944       9250        942       9485      941.1       9720        942       9835      942.4       9950
GR      942       9985        940       9995      939.9      10000        940      10005      941.7      10085
GR      942      10360        944      10760        946      11320        948      11395      949.8      11420

QT        3       4906       4906       4906
ET                            9.1                                                                9850      10250

                CROSS-SECTION 30 FEET SOUTH OF LOWER BUKEYE RD. "EXTENDED"

                Q = Q AT CP335       (= 4906 CFS).

X1    2.536         15       9965      10060        535        535        535
GR      951       9185        950       9300        948       9555        946       9710      945.5       9865
GR      944       9920      943.5       9935      943.8       9965      943.5      10000      943.7      10060
GR      944      10155      944.8      10500        946      10800        948      11280      950.2      11340

ET                            9.1                                                                9800      10205

                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 2.883
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X1    2.680       17      9925     10050       735       725       760
GR      954     9265       952      9400       950      9505       948      9645     947.2      9735
GR      948     9790     949.9      9805     948.8      9900       948      9905     947.3      9925
GR      946     9940     945.2     10000     945.6     10050       946     10165       948     10565
GR      950    10935       952     11160
```



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ET                          9.1                                                   9880     10225
X1    2.771       16      9985     10020       480       480       480
GR      954     9440       952      9545       950      9660     948.1      9810       950      9880
GR    951.4     9890       950      9900     949.4      9985     947.4     10000     948.2     10020
GR    947.3    10075       948     10210       950     10505     950.9     10795       952     11105
GR    953.5    11255

ET                          9.1                                                   9830     10180
X1    2.883       15      9985     10015       580       580       590
GR      958     9190       956      9360       954      9535       952      9640       950      9840
GR    949.6     9920     950.2      9985     948.5     10000     950.1     10015     949.2     10035
GR      950    10165       952     10385       954     10600       956     11230     956.5     11270

QT        3     4915      4915      4915
ET                          9.1                                                   9820     10055

                Q = Q AT CP334        (= 4915 CFS).

X1    2.977       15      9980     10050       500       500       500
GR      960     9170       958      9345       956      9530       954      9660       952      9830
GR      951     9960     951.5      9980       950      9990     949.9     10000       950     10010
GR    952.1    10050       954     10480       956     10740       958     11200     958.5     11305

ET                          9.1                                                   9790     10180
X1    3.070       13      9945     10025       485       495       490
GR    958.5     9510     953.8      9545     954.5      9600     954.5      9945       954      9960
GR    952.5     9975     954.2      9985     952.3     10000     953.2     10025     952.7     10060
GR      954    10290       956     10635       958     10875

QT        3     4432      4432      4432
ET                          9.1                                                   9730     10190

                Q = Q AT 1I334        (= 4432 CFS).

X1    3.167       18      9970     10020       475       515       510
GR    960.7     9530       956      9585       955      9625     955.4      9730     954.9      9865
GR    955.8     9935     955.1      9970       954      9990     953.9     10000       954     10005
GR    954.9    10020     954.5     10080     955.1     10120     954.8     10220       956     10425
GR      958    10770       960     10990       962     11230

ET                          9.1                                                   9987     10330

                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 3.602

X1    3.291       23      9970     10020       660       650       655
GR      964     9530       962      9670     961.3      9690     961.8      9725     960.4      9770
GR    961.8     9785     960.1      9940     960.5      9970       960      9985       958      9995
GR    957.2    10000       958     10005       960     10015     960.1     10020       960     10025
GR      958    10040     957.2     10110     957.8     10360     957.6     10460       958     10700
GR      960    10910       962     10970       964     11600
```



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ET                          9.1                                                   9840     10365
X1    3.376       17      9985     10015       460       440       450
GR    967.9     9300       966      9370       964      9520       962      9630     960.5      9900
GR    961.9     9985       960      9995     958.3     10000       960     10005       961     10015
GR      960    10030     958.4     10055     958.6     10170     958.8     10365       960     10590
GR      962    10930       964     11490

ET                          9.1                                                   9870     10260
X1    3.491       17      9980     10020       605       605       605
GR      968     9255       966      9435       964      9555       962      9660     960.5      9930
GR    961.9     9980       960      9995     959.5     10000       960     10005     961.9     10020
GR      960    10040     959.6     10130       960     10240       962     10540       964     10735
GR      966    11000       968     11780

QT        3     4438      4438      4438
NC      .07      .07       .04        .1        .3
ET                          9.1                                                   9840     10170

                CROSS-SECTION AT YUMA RD.

                Q = Q AT CP316        (= 4438 CFS).

X1    3.602       13      9880     10100       590       590       590
GR      970     9225       968      9450       966      9600       964      9750       962      9880
GR    961.9    10000       962     10100     963.2     10330       964     10445       966     10625
GR      968    10770     968.9     10945       970     11005
```



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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
```

| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
|---|---|---|---|---|---|---|---|---|---|
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

*PROF 1

CCHV= .100 CEHV= .300
*SECNO .000

*** DUE TO THE COMPLEXITY OF THE DOWNSTREAM REACH (CROSS-SECTIONS 0.000 TO 2.297),AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN IN THIS REACH.HOWEVER,A HEC-2 MODEL WAS SET UP INCLUDING THESE X-SECTIONS TO AID IN PRODUCING A REASONABLE APPROXIMATE DELINEATION.THIS APPROXIMATE DELINEATION IS AS SHOWN ON THE MAPS AND IS BASED ON ENGINEERING JUDGEMENT REFLCTING THE EXISTING TOPOGRAPHY,AND USING INFORMATION FROM THE HEC-2 MODEL TO ESTIMATE WHERE BREAKOUT FLOWS WILL OCCUR.
ALSO, AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN FOR THE UPPERMOST REACH OF BULLARD WASH (CROSS-SECTIONS 10.269 TO 14.023). THE HEC-2 MODEL WAS ALSO UTILIZED TO ESTIMATE THE APPROXIMATE DELINEATION IN THIS REACH.
A DETAILED ANALYSIS WAS PERFORMED ON BULLARD WASH FROM CROSS-SECTION 2.371 TO 6.320 AND FROM 9.189 TO 10.197.

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**********

THE AREA BETWEEN X-SECTION 6.320 AND X-SECTION 9.189 IS CURRENTLY UNDER CONSTRUCTION. NO FLOODPLAIN HAS BEEN PREPARED FOR THIS AREA OF BULLARD WASH, HOWEVER, THE HEC-2 ANALYSIS WAS CONTINUED BASED ON EXISTING CONDITIONS AT THE TIME OF THE AERIAL MAPPING TO COMPUTE WATER SURFACE ELEVATIONS UPSTREAM AND DOWNSTREAM OF THIS REACH.

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**********

*** THE DISCHARGE IN FIELD 4 OF THE QT CARDS IS THE ACTUAL DISCHRAGE DERIVED FROM THE 100-YEAR 24-HOUR HEC1 MODEL. THIS DISCHRGE IS FOR COMPARISON PURPOSES ONLY AND NO PROFILE IS BEING COMPUTED FOR IT. DISCHARGES FOR PROFILES 1 & 2 ARE USED TO DELINEATE THE FLOODPLAIN AND FLOODWAY RESPECTIVELY. THESE DISCHARGES ARE BASED UPON THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER THE TOP WHERE CAPACITY IS EXCEEDED. THESE SITUATIONS ARE DOCUMENTED THROUGHOUT THE HEC-2 MODEL.

1



** BEGIN APPROXIMATE FLOODPLAIN DELINEATION

CROSS-SECTION AT BUKEYE CANAL

Q = Q AT CP364 (= 3110 CFS).
THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT OVERBANK.
EXCEEDED FLOW WILL CONTINUE AS SHEET FLOW TO THE WEST.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .000 | 1.82 | 912.32 | .00 | 912.00 | 912.34 | .02 | .00 | .00 | 912.00 |
| 850.0 | 625.2 | 160.3 | 64.6 | 576.3 | 104.5 | 133.7 | .0 | .0 | 912.00 |
| .00 | 1.08 | 1.53 | .48 | .070 | .040 | .070 | .000 | 910.50 | 9326.62 |
| .002525 | 0. | 0. | 0. | 0 | 0 | 6 | .00 | 1245.30 | 10571.93 |

*SECNO .047
3280 CROSS SECTION .05 EXTENDED .05 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.48

ANY WSEL EXTENSION AT X1= 0.047 TO X1= 0.616 IS DUE TO THE LIMITING ELEVATION AT THE RIGHT OVERBANK.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .047 | 2.55 | 912.55 | .00 | .00 | 912.55 | .01 | .21 | .00 | 912.30 |
| 850.0 | 347.1 | 275.1 | 227.8 | 766.2 | 249.2 | 510.2 | 6.9 | 8.5 | 910.30 |
| .11 | .45 | 1.10 | .45 | .070 | .040 | .070 | .000 | 910.00 | 9133.37 |
| .000410 | 265. | 250. | 240. | 3 | 0 | 0 | .00 | 1686.63 | 10820.00 |

*SECNO .121
3280 CROSS SECTION .12 EXTENDED .23 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .121 | 2.73 | 912.73 | .00 | .00 | 912.74 | .01 | .19 | .00 | 912.70 |
| 850.0 | 111.4 | 232.9 | 505.7 | 287.5 | 190.2 | 810.6 | 19.5 | 22.2 | 910.40 |
| .25 | .39 | 1.22 | .62 | .070 | .040 | .070 | .000 | 910.00 | 9452.89 |
| .000590 | 390. | 390. | 390. | 2 | 0 | 0 | .00 | 1367.11 | 10820.00 |

*SECNO .201
3280 CROSS SECTION .20 EXTENDED .53 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .201 | 3.03 | 913.03 | .00 | .00 | 913.05 | .02 | .30 | .00 | 913.00 |
| 850.0 | 12.0 | 366.8 | 471.2 | 52.8 | 228.2 | 699.3 | 30.4 | 34.1 | 910.50 |
| .36 | .23 | 1.61 | .67 | .070 | .040 | .070 | .000 | 910.00 | 9724.61 |
| .000887 | 420. | 420. | 420. | 2 | 0 | 0 | .00 | 1095.39 | 10820.00 |

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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO  .292
3280 CROSS SECTION        .29 EXTENDED        .89 FEET

      .292       2.89     913.39        .00        .00     913.41        .02        .36        .00     913.30
     850.0        7.9      301.6      540.6       31.4      208.8      880.3       42.0       45.3     912.10
       .51        .25       1.44        .61       .070       .040       .070       .000     910.50    9860.27
   .000645       480.       480.       480.          1          0          0        .00     939.73   10800.00

*SECNO  .384

3265 DIVIDED FLOW

3280 CROSS SECTION        .38 EXTENDED        .49 FEET

                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 0.668
      .384       2.69     913.69        .00        .00     913.70        .01        .29        .00     914.30
     850.0        9.9      241.9      598.1       51.5      198.6     1214.2       56.5       59.6     912.70
       .70        .19       1.22        .49       .070       .040       .070       .000     911.00    9688.08
   .000541       490.       490.       490.          2          0          0        .00    1604.23   11370.00

*SECNO  .488

3265 DIVIDED FLOW

3280 CROSS SECTION        .49 EXTENDED        .81 FEET

      .488       2.01     914.01        .00        .00     914.02        .01        .32        .00     915.20
     850.0        1.1      141.8      707.0        9.0      132.6     1293.2       74.7       78.8     913.50
       .94        .13       1.07        .55       .070       .040       .070       .000     912.00    9875.31
   .000648       545.       545.       545.          0          0          0        .00    1469.90   11365.00

*SECNO  .531

3265 DIVIDED FLOW

3280 CROSS SECTION        .53 EXTENDED        .98 FEET
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

      .531       1.38     914.18        .00        .00     914.18        .01        .16        .00     915.40
     850.0         .1       37.2      812.8         .9       55.1     1319.2       82.1       86.4     914.20
      1.05        .06        .67        .62       .070       .040       .070       .000     912.80    9897.62
   .000757       230.       230.       230.          2          0          0        .00    1385.91   11350.00

*SECNO  .616

3265 DIVIDED FLOW

3280 CROSS SECTION        .62 EXTENDED        .05 FEET

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.90

                Q = Q AT CP364A      (= 4895 CFS).

      .616       2.25     916.05        .00        .00     916.19        .14       1.97        .04     916.50
    4895.0         .0      411.6     4483.4         .0      120.0     1539.8       98.7       98.6     915.20
      1.09        .02       3.43       2.91       .070       .040       .070       .000     913.80    9669.96
   .006955       405.       450.       480.          6          0          0        .00     844.48   10830.00

CCHV=      .100 CEHV=      .300
*SECNO  .668
3280 CROSS SECTION        .67 EXTENDED        .97 FEET

                ANY WSEL EXTENSION AT X1= 0.668 TO X1= 1.378 IS DUE TO THE
                LIMITING ELEVATION AT THE LEFT BANK.

      .668       2.76     918.26     918.09        .00     918.74        .48       2.45        .10     917.30
    4895.0     1659.0      930.4     2305.7      401.3      129.1      403.9      106.9      103.2     916.80
      1.10       4.13       7.21       5.71       .045       .030       .045       .000     915.50    9620.00
```

```
   .012123      200.      270.      290.        11        11         0       .00    665.47  10285.47

*SECNO  .776
3280 CROSS SECTION       .78 EXTENDED       .35 FEET

1
   29OCT94      10:58:49                                                                                PAGE   14

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.39

      .776      4.55    920.95       .00       .00    921.14       .19      2.37       .03    920.60
    4895.0        .0     577.2    4317.8        .0     133.2    1266.6     122.0     110.8    917.90
     1.15       .00      4.33      3.41      .000      .030      .045      .000    916.40   9975.00
   .002116      535.      570.      570.         4         0         0       .00    510.12  10485.12

*SECNO  .868
3280 CROSS SECTION       .87 EXTENDED       .47 FEET

      .868      4.17    922.17       .00       .00    922.43       .26      1.27       .02    921.70
    4895.0        .0     747.2    4147.8        .0     136.1    1099.3     136.7     116.5    919.80
     1.18       .00      5.49      3.77      .000      .030      .045      .000    918.00   9970.00
   .003296      495.      490.      485.         4         0         0       .00    515.69  10485.69

*SECNO  .964
3280 CROSS SECTION       .96 EXTENDED       .92 FEET

      .964      4.92    924.12       .00       .00    924.61       .49      2.11       .07    923.20
    4895.0        .0    1739.3    3155.7        .0     229.1     771.9     149.7     122.0    922.50
     1.21       .00      7.59      4.09      .000      .030      .045      .000    919.20   9970.00
   .005474      505.      505.      505.         2         0         0       .00    441.24  10411.24

*SECNO 1.081
3280 CROSS SECTION      1.08 EXTENDED       .58 FEET

                Q = Q AT CP364A      (= 4895 CFS).
                THIS Q  HAS BEEN REDUCED BY THE SAME AMOUNT THAT EXCEEDED THE
                CAPACITY OF THE CHANNEL AT THE UPSTREAM REACH  X1= 1.474 TO
                X1= 1.823,    THAT EXCEEDED FLOW WILL RETURN AT X1= 0.964

     1.081      3.28    926.28       .00       .00    926.37       .09      1.72       .04    925.70
    2596.0        .0     779.9    1816.1        .0     281.2     817.0     164.4     128.3    925.00
     1.28       .00      2.77      2.22      .000      .030      .045      .000    923.00   9955.00
   .001187      595.      620.      610.         2         0         0       .00    451.38  10406.38

*SECNO 1.153
1
   29OCT94      10:58:49                                                                                PAGE   15

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3265 DIVIDED FLOW


                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 1.435

     1.153      3.68    926.68       .00       .00    926.76       .08       .39       .00    928.40
    2596.0        .0     586.6    2009.4        .0     223.0     945.0     173.8     132.1    925.80
     1.32       .00      2.63      2.13      .000      .030      .045      .000    923.00   9959.96
   .000973      410.      380.      355.         3         0         0       .00    453.30  10422.36

*SECNO 1.236

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     1.236      3.45    927.45    927.45       .00    928.35       .90       .93       .25    930.20
    2596.0        .0    1818.0     778.0        .0     207.0     207.6     181.7     135.5    928.30
     1.34       .00      8.78      3.75      .000      .030      .045      .000    924.00   9974.25
   .008002      435.      435.      435.        20        12         0       .00    242.61  10325.72

*SECNO 1.317
```

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.90

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.317 | 5.70 | 929.70 | .00 | .00 | 930.04 | .34 | 1.63 | .06 | 930.40 |
| 2596.0 | .0 | 1655.1 | 940.9 | .0 | 297.7 | 381.5 | 187.1 | 138.2 | 928.50 |
| 1.37 | .00 | 5.56 | 2.47 | .000 | .030 | .045 | .000 | 924.00 | 9970.74 |
| .002209 | 430. | 430. | 430. | 3 | 0 | 0 | .00 | 300.91 | 10314.63 |



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

*SECNO 1.378

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.378 | 6.38 | 930.38 | .00 | .00 | 930.64 | .26 | .59 | .01 | 930.80 |
| 2596.0 | .0 | 1444.6 | 1151.4 | .0 | 285.0 | 516.1 | 192.3 | 140.5 | 928.80 |
| 1.39 | .00 | 5.07 | 2.23 | .000 | .030 | .045 | .000 | 924.00 | 9965.18 |
| .001666 | 345. | 320. | 295. | 3 | 0 | 0 | .00 | 370.84 | 10366.88 |

*SECNO 1.435

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

CROSS-SECTION AT STATE ROUTE 85

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.435 | 4.87 | 931.17 | 931.17 | .00 | 932.39 | 1.22 | .87 | .29 | 931.40 |
| 2596.0 | .0 | 2555.5 | 40.5 | .0 | 285.9 | 24.1 | 195.4 | 141.9 | 931.00 |
| 1.40 | .00 | 8.94 | 1.68 | .000 | .030 | .045 | .000 | 926.30 | 9966.34 |
| .008479 | 330. | 300. | 180. | 20 | 15 | 0 | .00 | 162.61 | 10128.96 |

*SECNO 1.474
3280 CROSS SECTION 1.47 EXTENDED .62 FEET

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

Q = Q AT CP336 (= 4899 CFS).
THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
OVERBANK. EXCEEDED FLOW WILL RETURN AT X1= 0.964

ANY WSEL EXTENSION AT X1= 1.474 TO X1= 1.823 IS DUE TO THE
LIMITING ELEVATION AT THE RIGHT OVERBANK.



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.474 | 5.62 | 933.62 | 933.62 | .00 | 934.04 | .42 | 1.27 | .08 | 932.00 |
| 2600.0 | 1465.5 | 961.6 | 172.9 | 760.5 | 118.6 | 72.8 | 198.4 | 144.8 | 932.00 |
| 1.41 | 1.93 | 8.11 | 2.38 | .045 | .030 | .045 | .000 | 928.00 | 9045.76 |
| .004512 | 210. | 210. | 210. | 4 | 12 | 0 | .00 | 1034.24 | 10080.00 |

CCHV= .300 CEHV= .500
*SECNO 1.517
3280 CROSS SECTION 1.52 EXTENDED .19 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.98

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.517 | 2.68 | 934.88 | .00 | .00 | 934.94 | .06 | .80 | .11 | 933.20 |
| 2600.0 | 1796.4 | 803.6 | .0 | 1083.0 | 320.4 | .0 | 210.2 | 154.5 | 934.70 |
| 1.47 | 1.66 | 2.51 | .00 | .045 | .030 | .000 | .000 | 932.20 | 9266.45 |
| .001146 | 500. | 225. | 160. | 1 | 0 | 0 | .00 | 813.55 | 10080.00 |

*SECNO 1.566
3280 CROSS SECTION 1.57 EXTENDED .11 FEET

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3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     1.566      3.71    936.21    936.21       .00    937.38      1.17       .67       .56    934.00
    2600.0     140.4    2399.1      60.4      42.9     266.5      19.0     216.2     157.8    934.00
      1.48      3.27      9.00      3.19      .045      .030      .045      .000    932.50   9914.72
   .007773      320.      260.      210.        20        11         0       .00    150.28  10065.00


CCHV=     .100 CEHV=     .300
*SECNO 1.634
3280 CROSS SECTION      1.63 EXTENDED       .97 FEET


3301 HV CHANGED MORE THAN HVINS
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.06

     1.634      5.27    938.27       .00       .00    938.66       .38      1.19       .08    934.00
    2600.0     727.3    1573.5     299.2     269.4     262.5     106.2     220.2     159.4    934.00
      1.50      2.70      5.99      2.82      .045      .030      .045      .000    933.00   9832.50
   .001824      360.      360.      360.         3         0         0       .00    232.50  10065.00


*SECNO 1.680
3280 CROSS SECTION      1.68 EXTENDED       .57 FEET

     1.680      5.37    938.77       .00       .00    939.01       .24       .34       .01    934.00
    2600.0     805.5    1399.3     395.2     396.5     279.1     171.0     224.1     160.8    934.00
      1.52      2.03      5.01      2.31      .045      .030      .045      .000    933.40   9761.32
   .001176      200.      240.      285.         2         0         0       .00    338.68  10100.00


*SECNO 1.745
3280 CROSS SECTION      1.75 EXTENDED       .97 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.56

     1.745      5.37    939.17       .00       .00    939.27       .10       .24       .01    934.50
    2600.0     631.1    1329.0     639.9     419.4     410.7     439.1     232.3     163.7    934.50
      1.56      1.50      3.24      1.46      .045      .030      .045      .000    933.80   9787.12
   .000482      280.      345.      400.         2         0         0       .00    422.88  10210.00


*SECNO 1.823
3280 CROSS SECTION      1.82 EXTENDED       .81 FEET

     1.823      4.51    939.41       .00       .00    939.47       .06       .20       .00    936.00
    2600.0    1094.0     896.1     609.9     950.7     317.0     461.9     245.9     169.3    936.00
      1.62      1.15      2.83      1.32      .045      .030      .045      .000    934.90   9432.35
   .000520      370.      410.      425.         2         0         0       .00    822.65  10255.00


*SECNO 1.893

3265 DIVIDED FLOW
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                Q = Q AT CP336       (=4899 CFS).

                DIVIDED FLOW OCCURS FOR THE NEXT FIVE UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 2.371

     1.893      3.61    939.71       .00       .00    939.85       .14       .36       .02    937.00
    4899.0    3225.2    1190.3     483.5    1448.1     252.9     231.6     259.0     176.0    937.00
      1.65      2.23      4.71      2.09      .045      .030      .045      .000    936.10   9093.62
   .001947      280.      370.      370.         2         0         0       .00   1080.16  10199.81


*SECNO 1.941

3265 DIVIDED FLOW


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .66

     1.941      3.60    939.90       .00       .00    940.11       .21       .24       .02    940.00
    4899.0    4627.7     271.3        .0    1277.9      66.3        .0     261.9     177.6    940.00
      1.66      3.62      4.09       .00      .045      .030      .000      .000    936.30   8961.19
   .004537       40.      255.      290.         2         0         0       .00    700.71  10024.29
```

```
CCHV=     .100 CEHV=     .300
*SECNO 1.988

3265 DIVIDED FLOW

     1.988      3.80    940.10       .00       .00    940.30       .19       .18       .00    944.00
    4899.0    4790.9     108.1        .0    1359.5      35.4        .0     263.3     178.3    944.00
      1.66      3.52      3.06       .00      .045      .030      .000      .000    936.30   8915.50
   .003961       35.      245.      280.         2         0         0       .00    696.81  10015.41

*SECNO 2.058

3265 DIVIDED FLOW

3280 CROSS SECTION      2.06 EXTENDED       .27 FEET

                ANY WSEL EXTENSION AT X1= 2.058 TO X1= 2.185 IS DUE TO THE
                LIMITING ELEVATIONS AT THE LEFT OVERBANK.

     2.058      4.67    941.27       .00       .00    941.42       .14      1.12       .00    944.00
    4899.0    4612.2     286.8        .0    1546.4      78.3        .0     275.4     184.3    944.00
      1.69      2.98      3.66       .00      .045      .030      .000      .000    936.60   8850.00
   .002608      350.      370.      370.         2         0         0       .00    772.16  10024.75
```



```
    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 2.185

3265 DIVIDED FLOW

3280 CROSS SECTION      2.18 EXTENDED       .16 FEET

     2.185      5.46    942.66       .00       .00    943.05       .39      1.56       .07    944.00
    4899.0    4109.4     789.6        .0     846.6     139.0        .0     288.9     190.7    944.00
      1.72      4.85      5.68       .00      .045      .030      .000      .000    937.20   9310.00
   .004656      430.      670.      670.         2         0         0       .00    472.18  10034.94

*SECNO 2.297

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.93

            **  END OF APPROXIMATE FLOODPLAIN DELINEATION .

     2.297      5.70    943.50       .00       .00    943.54       .04       .46       .03    941.30
    4899.0    3868.5     433.0     597.5    2357.1     222.9    1049.4     319.2     201.3    940.80
      1.83      1.64      1.94       .57      .045      .030      .070      .000    937.80   9438.68
   .000301      610.      595.      450.         3         0         0       .00   1206.62  10645.29

*SECNO 2.371

            **  BEGIN DETAILED FLOODPLAIN\FLOODWAY ANALYSIS.

     2.371      4.26    943.66       .00       .00    943.71       .04       .17       .00    942.00
    4899.0    3581.6     443.4     874.0    2078.7     174.1    1148.2     354.0     215.3    940.70
      1.90      1.72      2.55       .76      .045      .030      .070      .000    939.40   9277.62
   .000570      400.      390.      500.         2         0         0       .00   1501.93  10779.55

*SECNO 2.435

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .62

     2.435      4.01    943.91       .00       .00    944.02       .10       .29       .02    942.00
    4899.0    2586.9    1274.9    1037.2    1299.5     313.9     933.7     376.9     226.8    941.70
      1.94      1.99      4.06      1.11      .045      .030      .070      .000    939.90   9260.15
   .001467      335.      335.      335.         2         0         0       .00   1482.58  10742.73
```



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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 2.536
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

                CROSS-SECTION 30 FEET SOUTH OF LOWER BUKEYE RD. "EXTENDED"
```

Q = Q AT CP335 (= 4906 CFS).

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.536 | 2.30 | 945.80 | 945.80 | .00 | 946.40 | .60 | 1.71 | .15 | 943.80 |
| 4906.0 | 791.1 | 1873.1 | 2241.8 | 167.5 | 207.5 | 795.1 | 399.7 | 241.9 | 943.70 |
| 1.97 | 4.72 | 9.03 | 2.82 | .045 | .030 | .070 | .000 | 943.50 | 9771.15 |
| .011717 | 535. | 535. | 535. | 20 | 11 | 0 | .00 | 979.53 | 10750.68 |

*SECNO 2.680

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.47

DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
X1= 2.883

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.680 | 3.93 | 949.13 | .00 | .00 | 949.33 | .20 | 2.89 | .04 | 947.30 |
| 4906.0 | 539.6 | 2177.7 | 2188.7 | 310.1 | 435.8 | 1354.6 | 427.2 | 259.7 | 945.60 |
| 2.03 | 1.74 | 5.00 | 1.62 | .045 | .030 | .070 | .000 | 945.20 | 9565.75 |
| .001927 | 735. | 760. | 725. | 5 | 0 | 0 | .00 | 1136.32 | 10774.45 |

*SECNO 2.771

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .58

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.771 | 3.31 | 950.61 | .00 | .00 | 950.81 | .20 | 1.48 | .00 | 949.40 |
| 4906.0 | 1353.9 | 624.2 | 2927.8 | 435.3 | 89.5 | 1094.5 | 447.7 | 271.8 | 948.20 |
| 2.07 | 3.11 | 6.98 | 2.68 | .045 | .030 | .070 | .000 | 947.30 | 9624.70 |
| .005705 | 480. | 480. | 480. | 3 | 0 | 0 | .00 | 1066.90 | 10702.82 |



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

*SECNO 2.883

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.47

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.883 | 4.33 | 952.83 | .00 | .00 | 952.99 | .16 | 2.18 | .00 | 950.20 |
| 4906.0 | 2464.6 | 614.4 | 1827.0 | 815.6 | 105.0 | 921.6 | 470.8 | 284.7 | 950.10 |
| 2.12 | 3.02 | 5.85 | 1.98 | .045 | .030 | .070 | .000 | 948.50 | 9596.60 |
| .002643 | 580. | 590. | 580. | 1 | 0 | 0 | .00 | 877.27 | 10473.87 |

*SECNO 2.977

Q = Q AT CP334 (= 4915 CFS).

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.977 | 4.37 | 954.27 | .00 | .00 | 954.68 | .41 | 1.62 | .08 | 951.50 |
| 4915.0 | 2276.9 | 1835.6 | 802.5 | 636.5 | 249.9 | 526.2 | 489.5 | 294.8 | 952.10 |
| 2.15 | 3.58 | 7.34 | 1.53 | .045 | .030 | .070 | .000 | 949.90 | 9642.89 |
| .004041 | 500. | 500. | 500. | 2 | 0 | 0 | .00 | 871.33 | 10514.22 |

*SECNO 3.070

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.070 | 3.83 | 956.13 | .00 | .00 | 956.28 | .15 | 1.57 | .03 | 954.50 |
| 4915.0 | 1655.7 | 1153.4 | 2105.9 | 694.8 | 227.5 | 1146.6 | 509.1 | 306.0 | 953.20 |
| 2.20 | 2.38 | 5.07 | 1.84 | .045 | .030 | .070 | .000 | 952.30 | 9527.59 |
| .002614 | 485. | 490. | 495. | 2 | 0 | 0 | .00 | 1123.98 | 10651.57 |

*SECNO 3.167

Q = Q AT 1I334 (= 4432 CFS).

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.167 | 3.46 | 957.36 | .00 | .00 | 957.48 | .12 | 1.19 | .00 | 955.10 |
| 4432.0 | 2044.8 | 727.1 | 1660.1 | 814.1 | 150.5 | 1058.3 | 532.5 | 318.7 | 954.90 |
| 2.26 | 2.51 | 4.83 | 1.57 | .045 | .030 | .070 | .000 | 953.90 | 9569.20 |
| .002191 | 475. | 510. | 515. | 2 | 0 | 0 | .00 | 1088.78 | 10657.98 |

*SECNO 3.291

3265 DIVIDED FLOW



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .55

DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
X1= 3.602

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.291 | 2.52 | 959.72 | .00 | .00 | 959.85 | .13 | 2.37 | .00 | 960.50 |
| 4432.0 | .0 | 179.2 | 4252.8 | .0 | 36.0 | 1531.6 | 559.4 | 333.5 | 960.10 |
| 2.32 | .00 | 4.98 | 2.78 | .000 | .030 | .070 | .000 | 957.20 | 9986.41 |
| .007133 | 660. | 655. | 650. | 3 | 0 | 0 | .00 | 880.55 | 10880.48 |

*SECNO 3.376

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.52

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.376 | 3.46 | 961.76 | .00 | .00 | 961.83 | .08 | 1.98 | .01 | 961.90 |
| 4432.0 | 255.6 | 172.7 | 4003.7 | 190.2 | 46.8 | 1846.2 | 577.9 | 344.1 | 961.00 |
| 2.38 | 1.34 | 3.69 | 2.17 | .045 | .030 | .070 | .000 | 958.30 | 9673.73 |
| .003077 | 460. | 450. | 440. | 2 | 0 | 0 | .00 | 1205.55 | 10888.70 |

*SECNO 3.491

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.491 | 3.70 | 963.20 | .00 | .00 | 963.27 | .08 | 1.44 | .00 | 961.90 |
| 4432.0 | 1449.7 | 409.1 | 2573.2 | 664.1 | 102.0 | 1454.9 | 607.8 | 359.8 | 961.90 |
| 2.46 | 2.18 | 4.01 | 1.77 | .045 | .030 | .070 | .000 | 959.50 | 9597.03 |
| .001901 | 605. | 605. | 605. | 4 | 0 | 0 | .00 | 1059.92 | 10656.95 |

CCHV= .100 CEHV= .300
*SECNO 3.602

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .68

CROSS-SECTION AT YUMA RD.

Q = Q AT CP316 (= 4438 CFS).



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.602 | 2.78 | 964.68 | .00 | .00 | 964.90 | .23 | 1.58 | .05 | 962.00 |
| 4438.0 | 426.8 | 2771.4 | 1239.8 | 234.6 | 599.2 | 620.9 | 632.7 | 372.4 | 962.00 |
| 2.50 | 1.82 | 4.63 | 2.00 | .070 | .040 | .070 | .000 | 961.90 | 9699.47 |
| .004075 | 590. | 590. | 590. | 1 | 0 | 0 | .00 | 806.16 | 10505.63 |



T1 WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY
T2 100 - YEAR STORM EVENT FLOODWAY RUN FILE: 10.H2I
T3 BULLARD WASH (WASH 10) - FROM BUCKEYE CANAL TO DYSART DRAIN.

| J1 | ICHECK | INQ | NINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 | | | | | | | 912.32 | |

| J2 | NPROF | IPLOT | PRFVS | XSECV | XSECH | FN | ALLDC | IBW | CHNIM | ITRACE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 14 | | -1 | | | | | | | |

1



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

*PROF 2
C

CCHV= .100 CEHV= .300
*SECNO .000

*** DUE TO THE COMPLEXITY OF THE DOWNSTREAM REACH (CROSS-SECTIONS
0.000 TO 2.297),AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN
SHOWN IN THIS REACH.HOWEVER,A HEC-2 MODEL WAS SET UP INCLUDING
THESE X-SECTIONS TO AID IN PRODUCING A REASONABLE APPROXIMATE
DELINEATION.THIS APPROXIMATE DELINEATION IS AS SHOWN ON THE MAPS
AND IS BASED ON ENGINEERING JUDGEMENT REFLCTING THE EXISTING
TOPOGRAPHY,AND USING INFORMATION FROM THE HEC-2 MODEL TO
ESTIMATE WHERE BREAKOUT FLOWS WILL OCCUR.
ALSO, AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN FOR
THE UPPERMOST REACH OF BULLARD WASH (CROSS-SECTIONS 10.269 TO
14.023). THE HEC-2 MODEL WAS ALSO UTILIZED TO ESTIMATE THE
APPROXIMATE DELINEATION IN THIS REACH.
A DETAILED ANALYSIS WAS PERFORMED ON BULLARD WASH FROM CROSS-
SECTION 2.371 TO 6.320 AND FROM 9.189 TO 10.197.

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

                    THE AREA BETWEEN X-SECTION 6.320 AND X-SECTION
                    9.189 IS CURRENTLY UNDER CONSTRUCTION.  NO FLOODPLAIN HAS BEEN
                    PREPARED FOR THIS AREA OF BULLARD WASH, HOWEVER, THE HEC-2
                    ANALYSIS WAS CONTINUED BASED ON EXISTING CONDITIONS AT THE TIME
                    OF THE AERIAL MAPPING TO COMPUTE WATER SURFACE ELEVATIONS
                    UPSTREAM AND DOWNSTREAM OF THIS REACH.

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


                ***  THE DISCHARGE IN FIELD 4 OF THE QT CARDS IS THE ACTUAL DISCHRAGE
                     DERIVED FROM THE 100-YEAR 24-HOUR HEC1 MODEL. THIS DISCHRGE IS
                     FOR COMPARISON PURPOSES ONLY AND NO PROFILE IS BEING COMPUTED
                     FOR IT. DISCHARGES FOR PROFILES 1 & 2 ARE USED TO DELINEATE THE
                     FLOODPLAIN AND FLOODWAY RESPECTIVELY. THESE DISCHARGES ARE BASED
                     UPON THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER
                     THE TOP WHERE CAPACITY IS EXCEEDED. THESE SITUATIONS ARE
1
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                     DOCUMENTED THROUGHOUT THE HEC-2 MODEL.

                **   BEGIN APPROXIMATE FLOODPLAIN DELINEATION

                     CROSS-SECTION AT BUKEYE CANAL

                     Q = Q AT CP364        (= 3110 CFS).
                     THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
                     MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
                     OVERBANK.
                     EXCEEDED FLOW WILL CONTINUE AS SHEET FLOW TO THE WEST.

      .000      1.82    912.32      .00    912.32    912.34      .02      .00      .00    912.00
     850.0     624.6     160.3     65.1     577.9     104.8    134.8       .0       .0    912.00
       .00      1.08      1.53      .48      .070      .040     .070     .000   910.50   9325.60
   .002500        0.        0.       0.         0         0        0      .00  1246.80  10572.40

*SECNO  .047
3280 CROSS SECTION        .05 EXTENDED        .05 FEET

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.47

                     ANY WSEL EXTENSION AT X1= 0.047 TO X1= 0.616 IS DUE TO THE
                     LIMITING ELEVATION AT THE RIGHT OVERBANK.

      .047      2.55    912.55      .00       .00    912.55      .01      .21      .00    912.30
     850.0     347.1     275.0    227.9     767.1     249.4    511.0      6.9      8.5    910.30
       .11       .45      1.10      .45      .070      .040     .070     .000   910.00   9133.16
   .000409      265.      250.     240.         3         0        0      .00  1686.84  10820.00

*SECNO  .121
3280 CROSS SECTION        .12 EXTENDED        .23 FEET

      .121      2.73    912.73      .00       .00    912.74      .01      .19      .00    912.70
     850.0     111.5     232.8    505.7     288.0     190.3    811.2     19.5     22.2    910.40
       .25       .39      1.22      .62      .070      .040     .070     .000   910.00   9452.48
   .000588      390.      390.     390.         2         0        0      .00  1367.52  10820.00

*SECNO  .201
3280 CROSS SECTION        .20 EXTENDED        .53 FEET

      .201      3.03    913.03      .00       .00    913.05      .02      .30      .00    913.00
     850.0      12.0     366.8    471.2      52.9     228.3    699.4     30.4     34.1    910.50
       .36       .23      1.61      .67      .070      .040     .070     .000   910.00   9724.55
   .000886      420.      420.     420.         2         0        0      .00  1095.45  10820.00

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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

*SECNO  .292
3280 CROSS SECTION        .29 EXTENDED        .89 FEET

      .292      2.89    913.39      .00       .00    913.41      .02      .36      .00    913.30
     850.0       7.9     301.6    540.6      31.4     208.8    880.3     42.0     45.3    912.10
       .51       .25      1.44      .61      .070      .040     .070     .000   910.50   9860.27
   .000645      480.      480.     480.         1         0        0      .00   939.73  10800.00

*SECNO  .384
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                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 0.668
      .384      2.69    913.69      .00      .00   913.70      .01      .29      .00   914.30
     850.0       9.9     241.9    598.1     51.5    198.7   1214.3     56.6     59.6   912.70
       .70       .19      1.22      .49     .070     .040     .070     .000   911.00  9688.05
   .000541      490.      490.     490.        2        0        0      .00  1604.28 11370.00

*SECNO  .488

3265 DIVIDED FLOW

3280 CROSS SECTION       .49 EXTENDED       .81 FEET

      .488      2.01    914.01      .00      .00   914.02      .01      .32      .00   915.20
     850.0       1.1     141.8    707.0      9.0    132.6   1293.2     74.7     78.8   913.50
       .94       .13      1.07      .55     .070     .040     .070     .000   912.00  9875.31
   .000648      545.      545.     545.        0        0        0      .00  1469.90 11365.00

*SECNO  .531

3265 DIVIDED FLOW

3280 CROSS SECTION       .53 EXTENDED       .98 FEET
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

      .531      1.38    914.18      .00      .00   914.18      .01      .16      .00   915.40
     850.0        .1      37.2    812.8       .9     55.1   1319.2     82.1     86.4   914.20
      1.05       .06       .67      .62     .070     .040     .070     .000   912.80  9897.62
   .000757      230.      230.     230.        2        0        0      .00  1385.91 11350.00

*SECNO  .616

3265 DIVIDED FLOW

3280 CROSS SECTION       .62 EXTENDED       .05 FEET

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.90

                Q = Q AT CP364A      (= 4895 CFS).

      .616      2.25    916.05      .00      .00   916.19      .14     1.97      .04   916.50
    4895.0        .0     411.6   4483.4       .0    120.0   1539.8     98.8     98.6   915.20
      1.09       .02      3.43     2.91     .070     .040     .070     .000   913.80  9669.96
   .006955      405.      450.     480.        6        0        0      .00   844.48 10830.00

CCHV=     .100 CEHV=     .300
*SECNO  .668
3280 CROSS SECTION       .67 EXTENDED       .97 FEET

                ANY WSEL EXTENSION AT X1= 0.668 TO X1= 1.378 IS DUE TO THE
                LIMITING ELEVATION AT THE LEFT BANK.

      .668      2.76    918.26   918.09      .00   918.74      .48     2.45      .10   917.30
    4895.0    1659.0     930.4   2305.7     401.3    129.1     403.9    106.9     103.2   916.80
      1.10      4.13      7.21     5.71     .045     .030     .045     .000   915.50  9620.00
   .012123      200.      270.     290.       11       11        0      .00   665.47 10285.47

*SECNO  .776
3280 CROSS SECTION       .78 EXTENDED       .35 FEET
```



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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.39

      .776      4.55    920.95      .00      .00   921.14      .19     2.37      .03   920.60
    4895.0        .0     577.2   4317.8       .0    133.2   1266.6    122.0     110.8   917.90
      1.15       .00      4.33     3.41     .000     .030     .045     .000   916.40  9975.00
   .002116      535.      570.     570.        4        0        0      .00   510.12 10485.12
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*SECNO  .868
3280 CROSS SECTION        .87 EXTENDED        .47 FEET

      .868      4.17    922.17       .00       .00    922.43       .26      1.27       .02    921.70
    4895.0        .0     747.2    4147.8        .0     136.1    1099.3     136.7     116.5    919.80
      1.18       .00      5.49      3.77      .000      .030      .045      .000    918.00   9970.00
   .003296      495.      490.      485.         4         0         0       .00    515.69  10485.69


*SECNO  .964
3280 CROSS SECTION        .96 EXTENDED        .92 FEET

      .964      4.92    924.12       .00       .00    924.61       .49      2.11       .07    923.20
    4895.0        .0    1739.3    3155.7        .0     229.1     771.9     149.7     122.0    922.50
      1.21       .00      7.59      4.09      .000      .030      .045      .000    919.20   9970.00
   .005474      505.      505.      505.         2         0         0       .00    441.24  10411.24


*SECNO 1.081
3280 CROSS SECTION       1.08 EXTENDED        .58 FEET

                Q = Q AT CP364A       (= 4895 CFS).
                THIS Q  HAS BEEN REDUCED BY THE SAME AMOUNT THAT EXCEEDED THE
                CAPACITY OF THE CHANNEL AT THE UPSTREAM REACH  X1= 1.474 TO
                X1= 1.823,     THAT EXCEEDED FLOW WILL RETURN AT X1= 0.964

     1.081      3.28    926.28       .00       .00    926.37       .09      1.72       .04    925.70
    2596.0        .0     779.9    1816.1        .0     281.2     817.0     164.5     128.3    925.00
      1.28       .00      2.77      2.22      .000      .030      .045      .000    923.00   9955.00
   .001187      595.      620.      610.         2         0         0       .00    451.38  10406.38


*SECNO 1.153
1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3265 DIVIDED FLOW


                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 1.435

     1.153      3.68    926.68       .00       .00    926.76       .08       .39       .00    928.40
    2596.0        .0     586.6    2009.4        .0     223.0     945.0     173.8     132.1    925.80
      1.32       .00      2.63      2.13      .000      .030      .045      .000    923.00   9959.96
   .000973      410.      380.      355.         3         0         0       .00    453.30  10422.36


*SECNO 1.236

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     1.236      3.45    927.45    927.45       .00    928.35       .90       .93       .25    930.20
    2596.0        .0    1818.0     778.0        .0     207.0     207.6     181.7     135.5    928.30
      1.34       .00      8.78      3.75      .000      .030      .045      .000    924.00   9974.25
   .008002      435.      435.      435.        20        12         0       .00    242.61  10325.72


*SECNO 1.317

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.90

     1.317      5.70    929.70       .00       .00    930.04       .34      1.63       .06    930.40
    2596.0        .0    1655.1    940.9        .0     297.7     381.5     187.1     138.2    928.50
      1.37       .00      5.56      2.47      .000      .030      .045      .000    924.00   9970.74
   .002209      430.      430.      430.         3         0         0       .00    300.91  10314.63


1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST
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*SECNO 1.378

3265 DIVIDED FLOW

     1.378      6.38    930.38       .00       .00    930.64       .26       .59       .01    930.80
    2596.0        .0    1444.6    1151.4        .0     285.0     516.1     192.3     140.5    928.80
      1.39       .00      5.07      2.23      .000      .030      .045      .000    924.00   9965.18
   .001666      345.      320.      295.         3         0         0       .00    370.84  10366.88


*SECNO 1.435

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

                CROSS-SECTION AT STATE ROUTE 85

     1.435      4.87    931.17    931.17       .00    932.39      1.22       .87       .29    931.40
    2596.0        .0    2555.5      40.5        .0     285.9      24.1     195.4     141.9    931.00
      1.40       .00      8.94      1.68      .000      .030      .045      .000    926.30   9966.34
   .008479      330.      300.      180.        20        15         0       .00    162.61  10128.96


*SECNO 1.474
3280 CROSS SECTION      1.47 EXTENDED       .62 FEET


3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

                Q = Q AT CP336       (= 4899 CFS).
                THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
                MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
                OVERBANK.      EXCEEDED FLOW WILL RETURN AT X1= 0.964

                ANY WSEL EXTENSION AT X1= 1.474 TO X1= 1.823 IS DUE TO THE
                LIMITING ELEVATION AT THE RIGHT OVERBANK.

1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

     1.474      5.62    933.62    933.62       .00    934.04       .42      1.27       .08    932.00
    2600.0    1465.5     961.6     172.9     760.5     118.6      72.8     198.4     144.8    932.00
      1.41      1.93      8.11      2.38      .045      .030      .045      .000    928.00   9045.76
   .004512      210.      210.      210.         4        12         0       .00   1034.24  10080.00


CCHV=     .300 CEHV=     .500
*SECNO 1.517
3280 CROSS SECTION      1.52 EXTENDED       .19 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.98

     1.517      2.68    934.88       .00       .00    934.94       .06       .80       .11    933.20
    2600.0    1796.4     803.6        .0    1083.0     320.4        .0     210.3     154.5    934.70
      1.47      1.66      2.51       .00      .045      .030      .000      .000    932.20   9266.45
   .001146      500.      225.      160.         1         0         0       .00    813.55  10080.00


*SECNO 1.566
3280 CROSS SECTION      1.57 EXTENDED       .11 FEET


3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     1.566      3.71    936.21    936.21       .00    937.38      1.17       .67       .56    934.00
    2600.0     140.4    2399.1      60.4      42.9     266.5      19.0     216.2     157.8    934.00
      1.48      3.27      9.00      3.19      .045      .030      .045      .000    932.50   9914.72
   .007773      320.      260.      210.        20        11         0       .00    150.28  10065.00


CCHV=     .100 CEHV=     .300
*SECNO 1.634
3280 CROSS SECTION      1.63 EXTENDED       .97 FEET


3301 HV CHANGED MORE THAN HVINS

1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
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     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.06

      1.634      5.27     938.27       .00        .00     938.66       .38       1.19        .08     934.00
     2600.0     727.3     1573.5     299.2      269.4      262.5     106.2      220.2      159.4     934.00
       1.50      2.70       5.99      2.82       .045       .030      .045       .000     933.00    9832.50
    .001824      360.       360.      360.          3          0         0        .00     232.50   10065.00


*SECNO 1.680
3280 CROSS SECTION       1.68 EXTENDED        .57 FEET

      1.680      5.37     938.77       .00        .00     939.01       .24        .34        .01     934.00
     2600.0     805.5     1399.3     395.2      396.5      279.1     171.0      224.1      160.9     934.00
       1.52      2.03       5.01      2.31       .045       .030      .045       .000     933.40    9761.32
    .001176      200.       240.      285.          2          0         0        .00     338.68   10100.00


*SECNO 1.745
3280 CROSS SECTION       1.75 EXTENDED        .97 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.56

      1.745      5.37     939.17       .00        .00     939.27       .10        .24        .01     934.50
     2600.0     631.1     1329.0     639.9      419.4      410.7     439.1      232.3      163.7     934.50
       1.56      1.50       3.24      1.46       .045       .030      .045       .000     933.80    9787.12
    .000482      280.       345.      400.          2          0         0        .00     422.88   10210.00


*SECNO 1.823
3280 CROSS SECTION       1.82 EXTENDED        .81 FEET

      1.823      4.51     939.41       .00        .00     939.47       .06        .20        .00     936.00
     2600.0    1094.0      896.1     609.9      950.7      317.0     461.9      245.9      169.3     936.00
       1.62      1.15       2.83      1.32       .045       .030      .045       .000     934.90    9432.35
    .000520      370.       410.      425.          2          0         0        .00     822.65   10255.00


*SECNO 1.893

3265 DIVIDED FLOW

-
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                 Q = Q AT CP336        (=4899 CFS).

                 DIVIDED FLOW OCCURS FOR THE NEXT FIVE UPSTREAM CROSS-SECTIONS,
                 HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                 X1= 2.371

      1.893      3.61     939.71       .00        .00     939.85       .14        .36        .02     937.00
     4899.0    3225.2     1190.3     483.5     1448.1      252.9     231.6      259.0      176.0     937.00
       1.65      2.23       4.71      2.09       .045       .030      .045       .000     936.10    9093.62
    .001947      280.       370.      370.          2          0         0        .00    1080.16   10199.81


*SECNO 1.941

3265 DIVIDED FLOW


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .66

      1.941      3.60     939.90       .00        .00     940.11       .21        .24        .02     940.00
     4899.0    4627.7      271.3        .0     1277.9       66.3        .0      262.0      177.6     940.00
       1.66      3.62       4.09       .00       .045       .030      .000       .000     936.30    8961.19
    .004537       40.       255.      290.          2          0         0        .00     700.71   10024.29


CCHV=      .100 CEHV=      .300
*SECNO 1.988

3265 DIVIDED FLOW

      1.988      3.80     940.10       .00        .00     940.30       .19        .18        .00     944.00
     4899.0    4790.9      108.1        .0     1359.5       35.4        .0      263.3      178.4     944.00
       1.66      3.52       3.06       .00       .045       .030      .000       .000     936.30    8915.50
    .003961       35.       245.      280.          2          0         0        .00     696.81   10015.41


*SECNO 2.058

3265 DIVIDED FLOW

3280 CROSS SECTION       2.06 EXTENDED        .27 FEET


                 ANY WSEL EXTENSION AT X1= 2.058 TO X1= 2.185 IS DUE TO THE
                 LIMITING ELEVATIONS AT THE LEFT OVERBANK.

      2.058      4.67     941.27       .00        .00     941.42       .14       1.12        .00     944.00
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    4899.0    4612.2     286.8        .0    1546.4      78.3        .0     275.5     184.3    944.00
      1.69      2.98      3.66       .00      .045      .030      .000      .000    936.60   8850.00
   .002608      350.      370.      370.         2         0         0       .00    772.16  10024.75
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 2.185

3265 DIVIDED FLOW

3280 CROSS SECTION      2.18 EXTENDED       .16 FEET

     2.185      5.46    942.66       .00       .00    943.05       .39      1.56       .07    944.00
    4899.0    4109.4     789.6        .0     846.6     139.0        .0     289.0     190.7    944.00
      1.72      4.85      5.68       .00      .045      .030      .000      .000    937.20   9310.00
   .004656      430.      670.      670.         2         0         0       .00    472.18  10034.94

*SECNO 2.297

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.93

            **  END OF APPROXIMATE FLOODPLAIN DELINEATION .

     2.297      5.70    943.50       .00       .00    943.54       .04       .46       .03    941.30
    4899.0    3868.5     433.0     597.5    2357.1     222.9    1049.4     319.3     201.3    940.80
      1.83      1.64      1.94       .57      .045      .030      .070      .000    937.80   9438.68
   .000301      610.      595.      450.         3         0         0       .00   1206.62  10645.29

*SECNO 2.371

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .31

3470 ENCROACHMENT STATIONS=     9650.0   10070.0  TYPE=      1  TARGET=      420.000

            **  BEGIN DETAILED FLOODPLAIN\FLOODWAY ANALYSIS.

     2.371      4.21    943.61       .00    943.66    943.90       .29       .29       .08    942.00
    4899.0    3635.7    1006.2     257.1     927.7     171.3     113.5     342.8     209.5    940.70
      1.85      3.92      5.87      2.27      .045      .030      .070      .000    939.40   9650.00
   .003100      400.      390.      500.         3         0         0       .00    420.00  10070.00

*SECNO 2.435

3470 ENCROACHMENT STATIONS=     9835.0   10210.0  TYPE=      1  TARGET=      375.000
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

     2.435      4.67    944.57       .00    943.91    945.10       .53      1.13       .07    942.00
    4899.0    1250.1    2766.5     882.4     355.6     379.6     350.3     351.6     212.6    941.70
      1.87      3.52      7.29      2.52      .045      .030      .070      .000    939.90   9835.00
   .003667      335.      335.      335.         2         0         0       .00    375.00  10210.00

*SECNO 2.536

3470 ENCROACHMENT STATIONS=     9850.0   10250.0  TYPE=      1  TARGET=      400.000

                CROSS-SECTION 30 FEET SOUTH OF LOWER BUKEYE RD. "EXTENDED"

                Q = Q AT CP335       (= 4906 CFS).

     2.536      3.32    946.82       .00    945.80    947.30       .48      2.19       .01    943.80
    4906.0    1140.2    2219.2    1546.6     274.4     304.1     539.5     365.2     217.4    943.70
      1.90      4.16      7.30      2.87      .045      .030      .070      .000    943.50   9850.00
   .004601      535.      535.      535.         2         0         0       .00    400.00  10250.00

*SECNO 2.680

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=     9800.0   10205.0  TYPE=      1  TARGET=      405.000

                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 2.883

     2.680      4.33    949.53       .00    949.13    950.02       .49      2.72       .00    947.30
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    4906.0      135.2     3235.7     1535.1       66.5      485.5      566.2      384.1      223.9     945.60
      1.94       2.03       6.66       2.71       .045       .030       .070       .000     945.20    9800.00
   .002967       735.       760.       725.          1          0          0        .00     370.13   10205.00

 *SECNO 2.771

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .70

 3470 ENCROACHMENT STATIONS=     9880.0   10225.0  TYPE=      1  TARGET=      345.000
1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

     2.771       4.24     951.54        .00     950.61     952.01        .46       1.98        .00     949.40
    4906.0      644.7     1083.9     3'77.4      173.3      121.9      786.2      396.2      227.8     948.20
      1.97       3.72       8.89       4.04       .045       .030       .070       .000     947.30    9880.00
   .006131       480.       480.       480.          2          0          0        .00     345.00   10225.00

 *SECNO 2.883

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.67

 3470 ENCROACHMENT STATIONS=     9830.0   10180.0  TYPE=      1  TARGET=      350.000
     2.883       5.29     953.79        .00     952.83     954.04        .25       2.01        .02     950.20
    4906.0     2326.6      841.0     1738.4      608.8      133.8      682.6      413.0      232.4     950.10
      2.01       3.82       6.28       2.55       .045       .030       .070       .000     948.50    9830.00
   .002210       580.       590.       580.          2          0          0        .00     350.00   10180.00

 *SECNO 2.977

 3470 ENCROACHMENT STATIONS=     982C.0   10055.0  TYPE=      1  TARGET=      235.000

                Q = Q AT CP334       (= 4915 CFS).

     2.977       5.04     954.94        .00     954.27     955.58        .65       1.42        .12     951.50
    4915.0     2520.5     2367.1       27.3      547.9      296.5       14.1      426.1      235.8     952.10
      2.03       4.60       7.98       1.94       .045       .030       .070       .000     949.90    9820.00
   .003803       500.       500.       500.          2          0          0        .00     235.00   10055.00

 *SECNO 3.070

 3470 ENCROACHMENT STATIONS=     9790.0   10180.0  TYPE=      1  TARGET=      390.000
     3.070       4.64     956.94        .00     956.13     957.29        .35       1.68        .03     954.50
    4915.0     1248.9     1903.3     1762.8      378.0      291.6      607.5      438.1      239.3     953.20
      2.06       3.30       6.53       2.90       .045       .030       .070       .000     952.30    9790.00
   .003115       485.       490.       495.          2          0          0        .00     390.00   10180.00

 *SECNO 3.167

 3470 ENCROACHMENT STATIONS=     9730.0   10190.0  TYPE=      1  TARGET=      460.000

1
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                Q = Q AT 1I334       (= 4432 CFS).

     3.167       4.41     958.31        .00     957.36     958.50        .19       1.19        .02     955.10
    4432.0     2166.6     1054.3     1211.2      732.0      198.1      587.7      454.0      244.1     954.90
      2.10       2.96       5.32       2.06       .045       .030       .070       .000     953.90    9730.00
   .001844       475.       510.       515.          2          0          0        .00     460.00   10190.00

 *SECNO 3.291

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .43

 3470 ENCROACHMENT STATIONS=     9987.0   10330.0  TYPE=      1  TARGET=      343.000

                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 3.602

     3.291       3.35     960.55        .00     959.72     960.89        .35       2.35        .05  100000.00
    4432.0         .0      447.1     3984.9         .0       61.6      912.0      472.7      250.2     960.10
      2.14        .00       7.26       4.37       .000       .030       .070       .000     957.20    9987.00
   .009894       660.       655.       650.          2          0          0        .00     343.00   10330.00

 *SECNO 3.376

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.05

 3470 ENCROACHMENT STATIONS=     9840.0   10365.0  TYPE=      1  TARGET=      525.000
     3.376       4.39     962.69        .00     961.76     962.80        .11       1.88        .02     961.90
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    4432.0     568.4     323.7    3539.9     247.7      74.6    1379.2     486.3     254.6    961.00
      2.19      2.29      4.34      2.57      .045      .030      .070      .000    958.30   9840.00
   .002354      460.      450.      440.         1         0         0       .00    525.00  10365.00

*SECNO 3.491

3470 ENCROACHMENT STATIONS=     9870.0   10260.0  TYPE=      1  TARGET=      390.000
     3.491      4.54    964.04       .00    963.20    964.22       .18      1.40       .02    961.90
    4432.0    1144.0    721.3    2566.6     344.8     135.7     990.1     508.3     260.9    961.90
      2.24      3.32      5.31      2.59      .045      .030      .070      .000    959.50   9870.00
   .002279      605.      605.      605.         4         0         0       .00    390.00  10260.00

CCHV=     .100 CEHV=     .300
*SECNO 3.602
1
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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3470 ENCROACHMENT STATIONS=     9840.0   10170.0  TYPE=      1  TARGET=      330.000

                CROSS-SECTION AT YUMA RD.

                Q = Q AT CP316       (= 4438 CFS).

     3.602      3.57    965.47       .00    964.68    965.76       .28      1.51       .03    962.00
    4438.0     296.9    3577.2     563.8     126.6     775.1     230.4     526.0     265.8    962.00
      2.28      2.34      4.61      2.45      .070      .040      .070      .000    961.90   9840.00
   .002878      590.      590.      590.         2         0         0       .00    330.00  10170.00

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                                                                    THIS RUN EXECUTED 29OCT94     10:58:59
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************

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

BULLARD WASH (WASH 10)

SUMMARY PRINTOUT

      SECNO       Q        CWSEL      SSTA       STCHL      STCHR      ENDST      DIFWSX     TOPWID     DEPTH      ELMIN      10*KS      VCH

        .000    850.00    912.32    9326.62    9980.00   10120.00   10571.93       .00    1245.30      1.82     910.50     25.25      1.5
        .000    850.00    912.32    9325.60    9980.00   10120.00   10572.40       .00    1246.80      1.82     910.50     25.00      1.5

*       .047    850.00    912.55    9133.37    9960.00   10100.00   10820.00       .23    1686.63      2.55     910.00      4.10      1.1
*       .047    850.00    912.55    9133.16    9960.00   10100.00   10820.00       .23    1686.84      2.55     910.00      4.09      1.1

        .121    850.00    912.73    9452.89    9980.00   10100.00   10820.00       .19    1367.11      2.73     910.00      5.90      1.2
        .121    850.00    912.73    9452.48    9980.00   10100.00   10820.00       .19    1367.52      2.73     910.00      5.88      1.2

        .201    850.00    913.03    9724.61    9970.00   10100.00   10820.00       .29    1095.39      3.03     910.00      8.87      1.6
        .201    850.00    913.03    9724.55    9970.00   10100.00   10820.00       .29    1095.45      3.03     910.00      8.86      1.6

        .292    850.00    913.39    9860.27    9960.00   10070.00   10800.00       .37     939.73      2.89     910.50      6.45      1.4
        .292    850.00    913.39    9860.27    9960.00   10070.00   10800.00       .37     939.73      2.89     910.50      6.45      1.4

        .384    850.00    913.69    9688.08    9970.00   10095.00   11370.00       .30    1604.23      2.69     911.00      5.41      1.2
        .384    850.00    913.69    9688.05    9970.00   10095.00   11370.00       .30    1604.28      2.69     911.00      5.41      1.2

        .488    850.00    914.01    9875.31    9970.00   10090.00   11365.00       .32    1469.90      2.01     912.00      6.48      1.0
        .488    850.00    914.01    9875.31    9970.00   10090.00   11365.00       .32    1469.90      2.01     912.00      6.48      1.0

        .531    850.00    914.18    9897.62    9965.00   10090.00   11350.00       .16    1385.91      1.38     912.80      7.57       .6
        .531    850.00    914.18    9897.62    9965.00   10090.00   11350.00       .16    1385.91      1.38     912.80      7.57       .6

*       .616   4895.00    916.05    9669.96    9960.00   10090.00   10830.00      1.88     844.48      2.25     913.80     69.55      3.4
*       .616   4895.00    916.05    9669.96    9960.00   10090.00   10830.00      1.88     844.48      2.25     913.80     69.55      3.4

        .668   4895.00    918.26    9620.00    9950.00   10035.00   10285.47      2.21     665.47      2.76     915.50    121.23      7.2
        .668   4895.00    918.26    9620.00    9950.00   10035.00   10285.47      2.21     665.47      2.76     915.50    121.23      7.2

*       .776   4895.00    920.95    9975.00    9975.00   10025.00   10485.12      2.69     510.12      4.55     916.40     21.16      4.3
*       .776   4895.00    920.95    9975.00    9975.00   10025.00   10485.12      2.69     510.12      4.55     916.40     21.16      4.3

1
   29OCT94      10:58:49                                                                          PAGE   42
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| | SECNO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .868 | 4895.00 | 922.17 | 9970.00 | 9970.00 | 10020.00 | 10485.69 | 1.22 | 515.69 | 4.17 | 918.00 | 32.96 | 5.4 |
| | .868 | 4895.00 | 922.17 | 9970.00 | 9970.00 | 10020.00 | 10485.69 | 1.22 | 515.69 | 4.17 | 918.00 | 32.96 | 5.4 |
| | .964 | 4895.00 | 924.12 | 9970.00 | 9970.00 | 10045.00 | 10411.24 | 1.95 | 441.24 | 4.92 | 919.20 | 54.74 | 7.5 |
| | .964 | 4895.00 | 924.12 | 9970.00 | 9970.00 | 10045.00 | 10411.24 | 1.95 | 441.24 | 4.92 | 919.20 | 54.74 | 7.5 |
| | 1.081 | 2596.00 | 926.28 | 9955.00 | 9955.00 | 10090.00 | 10406.38 | 2.15 | 451.38 | 3.28 | 923.00 | 11.87 | 2.7 |
| | 1.081 | 2596.00 | 926.28 | 9955.00 | 9955.00 | 10090.00 | 10406.38 | 2.15 | 451.38 | 3.28 | 923.00 | 11.87 | 2.7 |
| | 1.153 | 2596.00 | 926.68 | 9959.96 | 9945.00 | 10060.00 | 10422.36 | .40 | 453.30 | 3.68 | 923.00 | 9.73 | 2.6 |
| | 1.153 | 2596.00 | 926.68 | 9959.96 | 9945.00 | 10060.00 | 10422.36 | .40 | 453.30 | 3.68 | 923.00 | 9.73 | 2.6 |
| * | 1.236 | 2596.00 | 927.45 | 9974.25 | 9960.00 | 10060.00 | 10325.72 | .77 | 242.61 | 3.45 | 924.00 | 80.02 | 8.7 |
| * | 1.236 | 2596.00 | 927.45 | 9974.25 | 9960.00 | 10060.00 | 10325.72 | .77 | 242.61 | 3.45 | 924.00 | 80.02 | 8.7 |
| * | 1.317 | 2596.00 | 929.70 | 9970.74 | 9960.00 | 10050.00 | 10314.63 | 2.25 | 300.91 | 5.70 | 924.00 | 22.09 | 5.5 |
| * | 1.317 | 2596.00 | 929.70 | 9970.74 | 9960.00 | 10050.00 | 10314.63 | 2.25 | 300.91 | 5.70 | 924.00 | 22.09 | 5.5 |
| | 1.378 | 2596.00 | 930.38 | 9965.18 | 9960.00 | 10035.00 | 10366.88 | .68 | 370.84 | 6.38 | 924.00 | 16.66 | 5.0 |
| | 1.378 | 2596.00 | 930.38 | 9965.18 | 9960.00 | 10035.00 | 10366.88 | .68 | 370.84 | 6.38 | 924.00 | 16.66 | 5.0 |
| * | 1.435 | 2596.00 | 931.17 | 9966.34 | 9965.00 | 10070.00 | 10128.96 | .79 | 162.61 | 4.87 | 926.30 | 84.79 | 8.9 |
| * | 1.435 | 2596.00 | 931.17 | 9966.34 | 9965.00 | 10070.00 | 10128.96 | .79 | 162.61 | 4.87 | 926.30 | 84.79 | 8.9 |
| * | 1.474 | 2600.00 | 933.62 | 9045.76 | 9985.00 | 10015.00 | 10080.00 | 2.45 | 1034.24 | 5.62 | 928.00 | 45.12 | 8.1 |
| * | 1.474 | 2600.00 | 933.62 | 9045.76 | 9985.00 | 10015.00 | 10080.00 | 2.45 | 1034.24 | 5.62 | 928.00 | 45.12 | 8.1 |
| * | 1.517 | 2600.00 | 934.88 | 9266.45 | 9905.00 | 10080.00 | 10080.00 | 1.26 | 813.55 | 2.68 | 932.20 | 11.46 | 2.5 |
| * | 1.517 | 2600.00 | 934.88 | 9266.45 | 9905.00 | 10080.00 | 10080.00 | 1.26 | 813.55 | 2.68 | 932.20 | 11.46 | 2.5 |
| * | 1.566 | 2600.00 | 936.21 | 9914.72 | 9955.00 | 10045.00 | 10065.00 | 1.33 | 150.28 | 3.71 | 932.50 | 77.73 | 9.0 |
| * | 1.566 | 2600.00 | 936.21 | 9914.72 | 9955.00 | 10045.00 | 10065.00 | 1.33 | 150.28 | 3.71 | 932.50 | 77.73 | 9.0 |
| * | 1.634 | 2600.00 | 938.27 | 9832.50 | 9970.00 | 10025.00 | 10065.00 | 2.06 | 232.50 | 5.27 | 933.00 | 18.24 | 5.9 |
| * | 1.634 | 2600.00 | 938.27 | 9832.50 | 9970.00 | 10025.00 | 10065.00 | 2.06 | 232.50 | 5.27 | 933.00 | 18.24 | 5.9 |
| | 1.680 | 2600.00 | 938.77 | 9761.32 | 9970.00 | 10025.00 | 10100.00 | .49 | 338.68 | 5.37 | 933.40 | 11.76 | 5.0 |
| | 1.680 | 2600.00 | 938.77 | 9761.32 | 9970.00 | 10025.00 | 10100.00 | .49 | 338.68 | 5.37 | 933.40 | 11.76 | 5.0 |
| * | 1.745 | 2600.00 | 939.17 | 9787.12 | 9960.00 | 10040.00 | 10210.00 | .40 | 422.88 | 5.37 | 933.80 | 4.82 | 3.2 |
| * | 1.745 | 2600.00 | 939.17 | 9787.12 | 9960.00 | 10040.00 | 10210.00 | .40 | 422.88 | 5.37 | 933.80 | 4.82 | 3.2 |
| | 1.823 | 2600.00 | 939.41 | 9432.35 | 9970.00 | 10050.00 | 10255.00 | .25 | 822.65 | 4.51 | 934.90 | 5.20 | 2.8 |
| | 1.823 | 2600.00 | 939.41 | 9432.35 | 9970.00 | 10050.00 | 10255.00 | .25 | 822.65 | 4.51 | 934.90 | 5.20 | 2.8 |
| | 1.893 | 4899.00 | 939.71 | 9093.62 | 9960.00 | 10040.00 | 10199.81 | .30 | 1080.16 | 3.61 | 936.10 | 19.47 | 4.7 |
| | 1.893 | 4899.00 | 939.71 | 9093.62 | 9960.00 | 10040.00 | 10199.81 | .30 | 1080.16 | 3.61 | 936.10 | 19.47 | 4.7 |
| * | 1.941 | 4899.00 | 939.90 | 8961.19 | 9975.00 | 10025.00 | 10024.29 | .19 | 700.71 | 3.60 | 936.30 | 45.37 | 4.0 |
| * | 1.941 | 4899.00 | 939.90 | 8961.19 | 9975.00 | 10025.00 | 10024.29 | .19 | 700.71 | 3.60 | 936.30 | 45.37 | 4.0 |



| | SECNO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.988 | 4899.00 | 940.10 | 8915.50 | 9950.00 | 10030.00 | 10015.41 | .20 | 696.81 | 3.80 | 936.30 | 39.61 | 3.0 |
| | 1.988 | 4899.00 | 940.10 | 8915.50 | 9950.00 | 10030.00 | 10015.41 | .20 | 696.81 | 3.80 | 936.30 | 39.61 | 3.0 |
| | 2.058 | 4899.00 | 941.27 | 8850.00 | 9970.00 | 10035.00 | 10024.75 | 1.17 | 772.16 | 4.67 | 936.60 | 26.08 | 3.6 |
| | 2.058 | 4899.00 | 941.27 | 8850.00 | 9970.00 | 10035.00 | 10024.75 | 1.17 | 772.16 | 4.67 | 936.60 | 26.08 | 3.6 |
| | 2.185 | 4899.00 | 942.66 | 9310.00 | 9965.00 | 10045.00 | 10034.94 | 1.39 | 472.18 | 5.46 | 937.20 | 46.56 | 5.6 |
| | 2.185 | 4899.00 | 942.66 | 9310.00 | 9965.00 | 10045.00 | 10034.94 | 1.39 | 472.18 | 5.46 | 937.20 | 46.56 | 5.6 |
| * | 2.297 | 4899.00 | 943.50 | 9438.68 | 9975.00 | 10040.00 | 10645.29 | .84 | 1206.62 | 5.70 | 937.80 | 3.01 | 1.9 |
| * | 2.297 | 4899.00 | 943.50 | 9438.68 | 9975.00 | 10040.00 | 10645.29 | .84 | 1206.62 | 5.70 | 937.80 | 3.01 | 1.9 |
| | 2.371 | 4899.00 | 943.66 | 9277.62 | 9975.00 | 10030.00 | 10779.55 | .16 | 1501.93 | 4.26 | 939.40 | 5.70 | 2.5 |
| * | 2.371 | 4899.00 | 943.61 | 9650.00 | 9975.00 | 10030.00 | 10070.00 | .11 | 420.00 | 4.21 | 939.40 | 31.00 | 5.8 |
| * | 2.435 | 4899.00 | 943.91 | 9260.15 | 9985.00 | 10085.00 | 10742.73 | .25 | 1482.58 | 4.01 | 939.90 | 14.67 | 4.0 |
| | 2.435 | 4899.00 | 944.57 | 9835.00 | 9985.00 | 10085.00 | 10210.00 | .96 | 375.00 | 4.67 | 939.90 | 36.67 | 7.2 |
| * | 2.536 | 4906.00 | 945.80 | 9771.15 | 9965.00 | 10060.00 | 10750.68 | 1.89 | 979.53 | 2.30 | 943.50 | 117.17 | 9.0 |
| | 2.536 | 4906.00 | 946.82 | 9850.00 | 9965.00 | 10060.00 | 10250.00 | 2.25 | 400.00 | 3.32 | 943.50 | 46.01 | 7.3 |
| * | 2.680 | 4906.00 | 949.13 | 9565.75 | 9925.00 | 10050.00 | 10774.45 | 3.33 | 1136.32 | 3.93 | 945.20 | 19.27 | 5.0 |
| | 2.680 | 4906.00 | 949.53 | 9800.00 | 9925.00 | 10050.00 | 10205.00 | 2.71 | 370.13 | 4.33 | 945.20 | 29.67 | 6.6 |
| * | 2.771 | 4906.00 | 950.61 | 9624.70 | 9985.00 | 10020.00 | 10702.82 | 1.47 | 1066.90 | 3.31 | 947.30 | 57.05 | 6.9 |
| * | 2.771 | 4906.00 | 951.54 | 9880.00 | 9985.00 | 10020.00 | 10225.00 | 2.01 | 345.00 | 4.24 | 947.30 | 61.31 | 8.8 |
| * | 2.883 | 4906.00 | 952.83 | 9596.60 | 9985.00 | 10015.00 | 10473.87 | 2.22 | 877.27 | 4.33 | 948.50 | 26.43 | 5.8 |
| * | 2.883 | 4906.00 | 953.79 | 9830.00 | 9985.00 | 10015.00 | 10180.00 | 2.25 | 350.00 | 5.29 | 948.50 | 22.10 | 6.2 |
| | 2.977 | 4915.00 | 954.27 | 9642.89 | 9980.00 | 10050.00 | 10514.22 | 1.44 | 871.33 | 4.37 | 949.90 | 40.41 | 7.3 |
| | 2.977 | 4915.00 | 954.94 | 9820.00 | 9980.00 | 10050.00 | 10055.00 | 1.15 | 235.00 | 5.04 | 949.90 | 38.03 | 7.9 |
| | 3.070 | 4915.00 | 956.13 | 9527.59 | 9945.00 | 10025.00 | 10651.57 | 1.86 | 1123.98 | 3.83 | 952.30 | 26.14 | 5.0 |
| | 3.070 | 4915.00 | 956.94 | 9790.00 | 9945.00 | 10025.00 | 10180.00 | 2.01 | 390.00 | 4.64 | 952.30 | 31.15 | 6.5 |
| | 3.167 | 4432.00 | 957.36 | 9569.20 | 9970.00 | 10020.00 | 10657.98 | 1.22 | 1088.78 | 3.46 | 953.90 | 21.91 | 4.8 |
| | 3.167 | 4432.00 | 958.31 | 9730.00 | 9970.00 | 10020.00 | 10190.00 | 1.36 | 460.00 | 4.41 | 953.90 | 18.44 | 5.3 |
| * | 3.291 | 4432.00 | 959.72 | 9986.41 | 9970.00 | 10020.00 | 10880.48 | 2.36 | 880.55 | 2.52 | 957.20 | 71.33 | 4.9 |
| * | 3.291 | 4432.00 | 960.55 | 9987.00 | 9970.00 | 10020.00 | 10330.00 | 2.24 | 343.00 | 3.35 | 957.20 | 98.94 | 7.2 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 3.376 | 4432.00 | 961.76 | 9673.73 | 9985.00 | 10015.00 | 10888.70 | 2.04 | 1205.55 | 3.46 | 958.30 | 30.77 | 3.6 |
| * | 3.376 | 4432.00 | 962.69 | 9840.00 | 9985.00 | 10015.00 | 10365.00 | 2.14 | 525.00 | 4.39 | 958.30 | 23.54 | 4.3 |
| | 3.491 | 4432.00 | 963.20 | 9597.03 | 9980.00 | 10020.00 | 10656.95 | 1.44 | 1059.92 | 3.70 | 959.50 | 19.01 | 4.0 |
| | 3.491 | 4432.00 | 964.04 | 9870.00 | 9980.00 | 10020.00 | 10260.00 | 1.36 | 390.00 | 4.54 | 959.50 | 22.79 | 5.3 |
| * | 3.602 | 4438.00 | 964.68 | 9699.47 | 9880.00 | 10100.00 | 10505.63 | 1.48 | 806.16 | 2.78 | 961.90 | 40.75 | 4.6 |
| | 3.602 | 4438.00 | 965.47 | 9840.00 | 9880.00 | 10100.00 | 10170.00 | 1.43 | 330.00 | 3.57 | 961.90 | 28.78 | .6 |



BULLARD WASH (WASH 10)

SUMMARY PRINTOUT TABLE 110

| | SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .000 | 912.32 | .32 | 912.34 | 1245.30 | 625.17 | 160.26 | 64.57 | .00 | .00 | 9980.00 | 10120.00 | .0 |
| | .000 | 912.32 | .00 | 912.34 | 1246.80 | 624.56 | 160.34 | 65.10 | .00 | .00 | 9980.00 | 10120.00 | .0 |
| * | .047 | 912.55 | .00 | 912.55 | 1686.63 | 347.06 | 275.13 | 227.81 | .00 | .00 | 9960.00 | 10100.00 | .0 |
| * | .047 | 912.55 | .00 | 912.55 | 1686.84 | 347.12 | 275.00 | 227.88 | .00 | .00 | 9960.00 | 10100.00 | .0 |
| | .121 | 912.73 | .00 | 912.74 | 1367.11 | 111.36 | 232.90 | 505.73 | .00 | .00 | 9980.00 | 10100.00 | .0 |
| | .121 | 912.73 | .00 | 912.74 | 1367.52 | 111.46 | 232.84 | 505.70 | .00 | .00 | 9980.00 | 10100.00 | .0 |
| | .201 | 913.03 | .00 | 913.05 | 1095.39 | 12.00 | 366.79 | 471.21 | .00 | .00 | 9970.00 | 10100.00 | .0 |
| | .201 | 913.03 | .00 | 913.05 | 1095.45 | 12.01 | 366.77 | 471.22 | .00 | .00 | 9970.00 | 10100.00 | .0 |
| | .292 | 913.39 | .00 | 913.41 | 939.73 | 7.85 | 301.57 | 540.57 | .00 | .00 | 9960.00 | 10070.00 | .0 |
| | .292 | 913.39 | .00 | 913.41 | 939.73 | 7.85 | 301.57 | 540.57 | .00 | .00 | 9960.00 | 10070.00 | .0 |
| | .384 | 913.69 | .00 | 913.70 | 1604.23 | 9.94 | 241.92 | 598.14 | .00 | .00 | 9970.00 | 10095.00 | .0 |
| | .384 | 913.69 | .00 | 913.70 | 1604.28 | 9.95 | 241.90 | 598.15 | .00 | .00 | 9970.00 | 10095.00 | .0 |
| | .488 | 914.01 | .00 | 914.02 | 1469.90 | 1.13 | 141.84 | 707.02 | .00 | .00 | 9970.00 | 10090.00 | .0 |
| | .488 | 914.01 | .00 | 914.02 | 1469.90 | 1.13 | 141.84 | 707.02 | .00 | .00 | 9970.00 | 10090.00 | .0 |
| | .531 | 914.18 | .00 | 914.18 | 1385.91 | .06 | 37.19 | 812.75 | .00 | .00 | 9965.00 | 10090.00 | .0 |
| | .531 | 914.18 | .00 | 914.18 | 1385.91 | .06 | 37.19 | 812.75 | .00 | .00 | 9965.00 | 10090.00 | .0 |
| * | .616 | 916.05 | .00 | 916.19 | 844.48 | .00 | 411.57 | 4483.43 | .00 | .00 | 9960.00 | 10090.00 | .0 |
| * | .616 | 916.05 | .00 | 916.19 | 844.48 | .00 | 411.57 | 4483.43 | .00 | .00 | 9960.00 | 10090.00 | .0 |
| | .668 | 918.26 | .00 | 918.74 | 665.47 | 1658.98 | 930.36 | 2305.66 | .00 | .00 | 9950.00 | 10035.00 | .0 |
| | .668 | 918.26 | .00 | 918.74 | 665.47 | 1658.98 | 930.36 | 2305.66 | .00 | .00 | 9950.00 | 10035.00 | .0 |
| * | .776 | 920.95 | .00 | 921.14 | 510.12 | .00 | 577.24 | 4317.76 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| * | .776 | 920.95 | .00 | 921.14 | 510.12 | .00 | 577.24 | 4317.76 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| | .868 | 922.17 | .00 | 922.43 | 515.69 | .00 | 747.24 | 4147.75 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| | .868 | 922.17 | .00 | 922.43 | 515.69 | .00 | 747.24 | 4147.75 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| | .964 | 924.12 | .00 | 924.61 | 441.24 | .00 | 1739.32 | 3155.68 | .00 | .00 | 9970.00 | 10045.00 | .0 |
| | .964 | 924.12 | .00 | 924.61 | 441.24 | .00 | 1739.32 | 3155.68 | .00 | .00 | 9970.00 | 10045.00 | .0 |
| | 1.081 | 926.28 | .00 | 926.37 | 451.38 | .00 | 779.91 | 1816.08 | .00 | .00 | 9955.00 | 10090.00 | .0 |
| | 1.081 | 926.28 | .00 | 926.37 | 451.38 | .00 | 779.91 | 1816.08 | .00 | .00 | 9955.00 | 10090.00 | .0 |
| | 1.153 | 926.68 | .00 | 926.76 | 453.30 | .00 | 586.65 | 2009.35 | .00 | .00 | 9945.00 | 10060.00 | .0 |
| | 1.153 | 926.68 | .00 | 926.76 | 453.30 | .00 | 586.65 | 2009.35 | .00 | .00 | 9945.00 | 10060.00 | .0 |
| * | 1.236 | 927.45 | .00 | 928.35 | 242.61 | .00 | 1818.01 | 777.99 | .00 | .00 | 9960.00 | 10060.00 | .0 |
| * | 1.236 | 927.45 | .00 | 928.35 | 242.61 | .00 | 1818.01 | 777.99 | .00 | .00 | 9960.00 | 10060.00 | .0 |



| | SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 1.317 | 929.70 | .00 | 930.04 | 300.91 | .00 | 1655.12 | 940.88 | .00 | .00 | 9960.00 | 10050.00 | .0 |
| * | 1.317 | 929.70 | .00 | 930.04 | 300.91 | .00 | 1655.12 | 940.88 | .00 | .00 | 9960.00 | 10050.00 | .0 |
| | 1.378 | 930.38 | .00 | 930.64 | 370.84 | .00 | 1444.64 | 1151.36 | .00 | .00 | 9960.00 | 10035.00 | .0 |
| | 1.378 | 930.38 | .00 | 930.64 | 370.84 | .00 | 1444.64 | 1151.36 | .00 | .00 | 9960.00 | 10035.00 | .0 |
| * | 1.435 | 931.17 | .00 | 932.39 | 162.61 | .00 | 2555.55 | 40.45 | .00 | .00 | 9965.00 | 10070.00 | .0 |
| * | 1.435 | 931.17 | .00 | 932.39 | 162.61 | .00 | 2555.55 | 40.45 | .00 | .00 | 9965.00 | 10070.00 | .0 |
| * | 1.474 | 933.62 | .00 | 934.04 | 1034.24 | 1465.46 | 961.65 | 172.89 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| * | 1.474 | 933.62 | .00 | 934.04 | 1034.24 | 1465.46 | 961.65 | 172.89 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| * | 1.517 | 934.88 | .00 | 934.94 | 813.55 | 1796.39 | 803.61 | .00 | .00 | .00 | 9905.00 | 10080.00 | .0 |
| * | 1.517 | 934.88 | .00 | 934.94 | 813.55 | 1796.39 | 803.61 | .00 | .00 | .00 | 9905.00 | 10080.00 | .0 |
| * | 1.566 | 936.21 | .00 | 937.38 | 150.28 | 140.43 | 2399.14 | 60.43 | .00 | .00 | 9955.00 | 10045.00 | .0 |
| * | 1.566 | 936.21 | .00 | 937.38 | 150.28 | 140.43 | 2399.14 | 60.43 | .00 | .00 | 9955.00 | 10045.00 | .0 |
| * | 1.634 | 938.27 | .00 | 938.66 | 232.50 | 727.29 | 1573.53 | 299.18 | .00 | .00 | 9970.00 | 10025.00 | .0 |
| * | 1.634 | 938.27 | .00 | 938.66 | 232.50 | 727.29 | 1573.53 | 299.18 | .00 | .00 | 9970.00 | 10025.00 | .0 |
| | 1.680 | 938.77 | .00 | 939.01 | 338.68 | 805.50 | 1399.31 | 395.19 | .00 | .00 | 9970.00 | 10025.00 | .0 |
| | 1.680 | 938.77 | .00 | 939.01 | 338.68 | 805.50 | 1399.31 | 395.19 | .00 | .00 | 9970.00 | 10025.00 | .0 |
| * | 1.745 | 939.17 | .00 | 939.27 | 422.88 | 631.15 | 1328.97 | 639.89 | .00 | .00 | 9960.00 | 10040.00 | .0 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 1.745 | 939.17 | .00 | 939.27 | 422.88 | 631.15 | 1328.97 | 639.89 | .00 | .00 | 9960.00 | 10040.00 | .0 |
| | 1.823 | 939.41 | .00 | 939.47 | 822.65 | 1094.01 | 896.10 | 609.89 | .00 | .00 | 9970.00 | 10050.00 | .0 |
| | 1.823 | 939.41 | .00 | 939.47 | 822.65 | 1094.01 | 896.10 | 609.89 | .00 | .00 | 9970.00 | 10050.00 | .0 |
| | 1.893 | 939.71 | .00 | 939.85 | 1080.16 | 3225.21 | 1190.25 | 483.54 | .00 | .00 | 9960.00 | 10040.00 | .0 |
| | 1.893 | 939.71 | .00 | 939.85 | 1080.16 | 3225.21 | 1190.25 | 483.54 | .00 | .00 | 9960.00 | 10040.00 | .0 |
| * | 1.941 | 939.90 | .00 | 940.11 | 700.71 | 4627.73 | 271.27 | .00 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| * | 1.941 | 939.90 | .00 | 940.11 | 700.71 | 4627.73 | 271.27 | .00 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| | 1.988 | 940.10 | .00 | 940.30 | 696.81 | 4790.88 | 108.12 | .00 | .00 | .00 | 9950.00 | 10030.00 | .0 |
| | 1.988 | 940.10 | .00 | 940.30 | 696.81 | 4790.88 | 108.12 | .00 | .00 | .00 | 9950.00 | 10030.00 | .0 |
| | 2.058 | 941.27 | .00 | 941.42 | 772.16 | 4612.20 | 286.80 | .00 | .00 | .00 | 9970.00 | 10035.00 | .0 |
| | 2.058 | 941.27 | .00 | 941.42 | 772.16 | 4612.20 | 286.80 | .00 | .00 | .00 | 9970.00 | 10035.00 | .0 |
| | 2.185 | 942.66 | .00 | 943.05 | 472.18 | 4109.41 | 789.59 | .00 | .00 | .00 | 9965.00 | 10045.00 | .0 |
| | 2.185 | 942.66 | .00 | 943.05 | 472.18 | 4109.41 | 789.59 | .00 | .00 | .00 | 9965.00 | 10045.00 | .0 |
| * | 2.297 | 943.50 | .00 | 943.54 | 1206.62 | 3868.54 | 432.96 | 597.50 | .00 | .00 | 9975.00 | 10040.00 | .0 |
| * | 2.297 | 943.50 | .00 | 943.54 | 1206.62 | 3868.54 | 432.96 | 597.50 | .00 | .00 | 9975.00 | 10040.00 | .0 |
| | 2.371 | 943.66 | .00 | 943.71 | 1501.93 | 3581.64 | 443.40 | 873.96 | .00 | .00 | 9975.00 | 10030.00 | .0 |
| * | 2.371 | 943.61 | -.05 | 943.90 | 420.00 | 3635.70 | 1006.20 | 257.10 | 420.00 | 9650.00 | 9975.00 | 10030.00 | 10070.0 |



| | SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 2.435 | 943.91 | .00 | 944.02 | 1482.58 | 2586.88 | 1274.89 | 1037.23 | .00 | .00 | 9985.00 | 10085.00 | .0 |
| | 2.435 | 944.57 | .66 | 945.10 | 375.00 | 1250.14 | 2766.49 | 882.37 | 375.00 | 9835.00 | 9985.00 | 10085.00 | 10210.0 |
| * | 2.536 | 945.80 | .00 | 946.40 | 979.53 | 791.13 | 1873.09 | 2241.78 | .00 | .00 | 9965.00 | 10060.00 | .0 |
| | 2.536 | 946.82 | 1.02 | 947.30 | 400.00 | 1140.16 | 2219.21 | 1546.63 | 400.00 | 9850.00 | 9965.00 | 10060.00 | 10250.0 |
| * | 2.680 | 949.13 | .00 | 949.33 | 1136.32 | 539.63 | 2177.67 | 2188.70 | .00 | .00 | 9925.00 | 10050.00 | .0 |
| | 2.680 | 949.53 | .40 | 950.02 | 370.13 | 135.17 | 3235.72 | 1535.10 | 405.00 | 9800.00 | 9925.00 | 10050.00 | 10205.0 |
| * | 2.771 | 950.61 | .00 | 950.81 | 1066.90 | 1353.94 | 624.25 | 2927.81 | .00 | .00 | 9985.00 | 10020.00 | .0 |
| * | 2.771 | 951.54 | .94 | 952.01 | 345.00 | 644.68 | 1083.90 | 3177.42 | 345.00 | 9880.00 | 9985.00 | 10020.00 | 10225.0 |
| * | 2.883 | 952.83 | .00 | 952.99 | 877.27 | 2464.59 | 614.42 | 1826.99 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| * | 2.883 | 953.79 | .96 | 954.04 | 350.00 | 2326.61 | 841.02 | 1738.37 | 350.00 | 9830.00 | 9985.00 | 10015.00 | 10180.0 |
| | 2.977 | 954.27 | .00 | 954.68 | 871.33 | 2276.91 | 1835.62 | 802.47 | .00 | .00 | 9980.00 | 10050.00 | .0 |
| | 2.977 | 954.94 | .66 | 955.58 | 235.00 | 2520.55 | 2367.13 | 27.33 | 235.00 | 9820.00 | 9980.00 | 10050.00 | 10055.0 |
| | 3.070 | 956.13 | .00 | 956.28 | 1123.98 | 1655.72 | 1153.43 | 2105.86 | .00 | .00 | 9945.00 | 10025.00 | .0 |
| | 3.070 | 956.94 | .81 | 957.29 | 390.00 | 1248.90 | 1903.29 | 1762.81 | 390.00 | 9790.00 | 9945.00 | 10025.00 | 10180.0 |
| | 3.167 | 957.36 | .00 | 957.48 | 1088.78 | 2044.80 | 727.08 | 1660.11 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| | 3.167 | 958.31 | .95 | 958.50 | 460.00 | 2166.55 | 1054.25 | 1211.20 | 460.00 | 9730.00 | 9970.00 | 10020.00 | 10190.0 |
| * | 3.291 | 959.72 | .00 | 959.85 | 880.55 | .00 | 179.21 | 4252.79 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| * | 3.291 | 960.55 | .83 | 960.89 | 343.00 | .00 | 447.15 | 3984.85 | 343.00 | 9987.00 | 9970.00 | 10020.00 | 10330.0 |
| * | 3.376 | 961.76 | .00 | 961.83 | 1205.55 | 255.61 | 172.66 | 4003.73 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| * | 3.376 | 962.69 | .93 | 962.80 | 525.00 | 568.39 | 323.67 | 3539.94 | 525.00 | 9840.00 | 9985.00 | 10015.00 | 10365.0 |
| | 3.491 | 963.20 | .00 | 963.27 | 1059.92 | 1449.73 | 409.07 | 2573.20 | .00 | .00 | 9980.00 | 10020.00 | .0 |
| | 3.491 | 964.04 | .84 | 964.22 | 390.00 | 1144.03 | 721.32 | 2566.65 | 390.00 | 9870.00 | 9980.00 | 10020.00 | 10260.0 |
| * | 3.602 | 964.68 | .00 | 964.90 | 806.16 | 426.76 | 2771.40 | 1239.84 | .00 | .00 | 9880.00 | 10100.00 | .0 |
| | 3.602 | 965.47 | .80 | 965.76 | 330.00 | 296.93 | 3577.23 | 563.84 | 330.00 | 9840.00 | 9880.00 | 10100.00 | 10170.0 |



SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      .047  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .047  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .616  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .616  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .776  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .776  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     1.236  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.236  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.236  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     1.236  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.236  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.236  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     1.317  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     1.317  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     1.435  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.435  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.435  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     1.435  PROFILE=  2  CRITICAL DEPTH ASSUMED
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CAUTION SECNO=      1.435  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      1.435  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=      1.474  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      1.474  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      1.474  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      1.474  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      1.517  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      1.517  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      1.566  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      1.566  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      1.566  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=      1.566  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      1.566  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      1.566  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=      1.634  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      1.634  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      1.745  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      1.745  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      1.941  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      1.941  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.297  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
1
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WARNING SECNO=      2.297  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.371  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.435  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      2.536  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      2.536  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      2.536  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=      2.680  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.771  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      2.771  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.883  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      2.883  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.291  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      3.291  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.376  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      3.376  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.602  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

1
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FLOODWAY DATA,  BULLARD WASH (WASH 10)
PROFILE NO.  2

| STATION | FLOODWAY WIDTH | FLOODWAY SECTION AREA | FLOODWAY MEAN VELOCITY | WATER SURFACE ELEVATION WITH FLOODWAY | WATER SURFACE ELEVATION WITHOUT FLOODWAY | DIFFERENCE |
|---|---|---|---|---|---|---|
| .000 | 1247. | 817. | 1.0 | 912.3 | 912.3 | .0 |
| .047 | 1687. | 1527. | .6 | 912.5 | 912.5 | .0 |
| .121 | 1368. | 1290. | .7 | 912.7 | 912.7 | .0 |
| .201 | 1095. | 981. | .9 | 913.0 | 913.0 | .0 |
| .292 | 940. | 1121. | .8 | 913.4 | 913.4 | .0 |
| .384 | 1682. | 1465. | .6 | 913.7 | 913.7 | .0 |
| .488 | 1490. | 1435. | .6 | 914.0 | 914.0 | .0 |
| .531 | 1452. | 1375. | .6 | 914.2 | 914.2 | .0 |
| .616 | 1160. | 1660. | 2.9 | 916.1 | 916.1 | .0 |
| .668 | 665. | 934. | 5.2 | 918.3 | 918.3 | .0 |
| .776 | 510. | 1400. | 3.5 | 921.0 | 921.0 | .0 |
| .868 | 516. | 1235. | 4.0 | 922.2 | 922.2 | .0 |
| .964 | 441. | 1001. | 4.9 | 924.1 | 924.1 | .0 |
| 1.081 | 451. | 1098. | 2.4 | 926.3 | 926.3 | .0 |
| 1.153 | 462. | 1168. | 2.2 | 926.7 | 926.7 | .0 |
| 1.236 | 351. | 415. | 6.3 | 927.4 | 927.4 | .0 |
| 1.317 | 344. | 679. | 3.8 | 929.7 | 929.7 | .0 |
| 1.378 | 402. | 801. | 3.2 | 930.4 | 930.4 | .0 |
| 1.435 | 163. | 310. | 8.4 | 931.2 | 931.2 | .0 |
| 1.474 | 1034. | 952. | 2.7 | 933.6 | 933.6 | .0 |
| 1.517 | 814. | 1403. | 1.9 | 934.9 | 934.9 | .0 |
| 1.566 | 150. | 328. | 7.9 | 936.2 | 936.2 | .0 |
| 1.634 | 233. | 638. | 4.1 | 938.3 | 938.3 | .0 |
| 1.680 | 339. | 847. | 3.1 | 938.8 | 938.8 | .0 |
| 1.745 | 423. | 1269. | 2.0 | 939.2 | 939.2 | .0 |
| 1.823 | 823. | 1730. | 1.5 | 939.4 | 939.4 | .0 |
| 1.893 | 1106. | 1933. | 2.5 | 939.7 | 939.7 | .0 |
| 1.941 | 1063. | 1344. | 3.6 | 939.9 | 939.9 | .0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.988 | 1100. | 1395. | 3.5 | 940.1 | 940.1 | .0 |
| 2.058 | 1175. | 1625. | 3.0 | 941.3 | 941.3 | .0 |
| 2.185 | 725. | 986. | 5.0 | 942.7 | 942.7 | .0 |
| 2.297 | 1207. | 3629. | 1.3 | 943.5 | 943.5 | .0 |
| 2.371 | 420. | 1212. | 4.0 | 943.6 | 943.7 | -.1 |
| 2.435 | 375. | 1085. | 4.5 | 944.6 | 943.9 | .7 |
| 2.536 | 400. | 1118. | 4.4 | 946.8 | 945.8 | 1.0 |
| 2.680 | 405. | 1118. | 4.4 | 949.5 | 949.1 | .4 |
| 2.771 | 345. | 1081. | 4.5 | 951.5 | 950.6 | .9 |
| 2.883 | 350. | 1425. | 3.4 | 953.8 | 952.8 | 1.0 |
| 2.977 | 235. | 859. | 5.7 | 955.0 | 954.3 | .7 |
| 3.070 | 390. | 1277. | 3.8 | 956.9 | 956.1 | .8 |
| 3.167 | 460. | 1518. | 2.9 | 958.3 | 957.4 | .9 |
| 3.291 | 343. | 974. | 4.6 | 960.5 | 959.7 | .8 |

1



FLOODWAY DATA, BULLARD WASH (WASH 10)
PROFILE NO. 2

| STATION | FLOODWAY WIDTH | FLOODWAY SECTION AREA | FLOODWAY MEAN VELOCITY | WATER SURFACE ELEVATION WITH FLOODWAY | WATER SURFACE ELEVATION WITHOUT FLOODWAY | DIFFERENCE |
|---|---|---|---|---|---|---|
| 3.376 | 525. | 1702. | 2.6 | 962.7 | 961.8 | .9 |
| 3.491 | 390. | 1471. | 3.0 | 964.0 | 963.2 | .8 |
| 3.602 | 330. | 1132. | 3.9 | 965.5 | 964.7 | .8 |

```
1*********************************************                    ***************************************
 *  HEC-2 WATER SURFACE PROFILES            *                    *  U.S. ARMY CORPS OF ENGINEERS
 *                                          *                    *  HYDROLOGIC ENGINEERING CENTER
 *  Version   4.6.2;  May 1991              *                    *  609 SECOND STREET, SUITE D
 *                                          *                    *  DAVIS, CALIFORNIA 95616-4687
 *  RUN DATE    29OCT94    TIME   10:57:59  *                    *          (916) 756-1104
 *********************************************                    ***************************************

                                        X     X  XXXXXXX   XXXXX              XXXXX
                                        X     X  X        X     X            X     X
                                        X     X  X        X                        X
                                        XXXXXXX  XXXX     X          XXXXX    XXXXX
                                        X     X  X        X                  X
                                        X     X  X        X     X            X
                                        X     X  XXXXXXX   XXXXX             XXXXXXX
1
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                                                                          THIS RUN EXECUTED 29OCT94    10:57:59
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************


T1      BULLARD WASH OUTFALL FEASIBILITY STUDY        STANLEY CONSULTANTS, INC.
T2      FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCD #94-06)       SCI #12278
T3      BULLARD WASH REVISED                                  INPUT FILE: 12278H2A
T4
T4   ***************************************************************************
T4   THIS MODEL IS THE SAME MODEL AS WLB'S WHITE TANKS/AGUA FRIA WASH 10.H21
T4   EXCEPT ALL CROSS SECTIONS UPSTREAM OF 3.602 (YUMA ROAD) HAVE BEEN REMOVED
T4   IN ORDER TO REDUCE THE SIZE OF THE MODEL.
T4
T4   FLOW RATES HAVE BEEN REDUCED ACCORDING TO REVISED HYDROLOGY FROM THE SCI
T4   HEC-1 MODEL 12278H1A REFLECTING FUTURE UPSTREAM FLOOD CONTROL PROJECTS.
T4   ***************************************************************************
T4
T4   T1      WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY
T4   T2      100 - YEAR STORM EVENT   FLOODPLAIN RUN  FILE: 10.H2I
T4   T3      BULLARD WASH  (WASH 1C) - FROM BUCKEYE CANAL TO DYSART DRAIN.
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0      .0025        0         0         0        912        0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0        -1         0         0         0         0         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1        53        21        22        54        51         4         8
     42         5        26         0       110         0       200

NC      .07       .07       .04       .1        .3
QT        3       850       850      2100
          ***  DUE TO THE COMPLEXITY OF THE DOWNSTREAM REACH (CROSS-SECTIONS
               0.000 TO 2.297),AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN
               SHOWN IN THIS REACH.HOWEVER,A HEC-2 MODEL WAS SET UP INCLUDING
               THESE X-SECTIONS TO AID IN PRODUCING A REASONABLE APPROXIMATE
               DELINEATION.THIS APPROXIMATE DELINEATION IS AS SHOWN ON THE MAPS
               AND IS BASED ON ENGINEERING JUDGEMENT REFLCTING THE EXISTING
.
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               TOPOGRAPHY,AND USING INFORMATION FROM THE HEC-2 MODEL TO
               ESTIMATE WHERE BREAKOUT FLOWS WILL OCCUR.
               ALSO, AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN FOR
               THE UPPERMOST REACH OF BULLARD WASH (CROSS-SECTIONS 10.269 TO
               14.023). THE HEC-2 MODEL WAS ALSO UTILIZED TO ESTIMATE THE
               APPROXIMATE DELINEATION IN THIS REACH.
               A DETAILED ANALYSIS WAS PERFORMED ON BULLARD WASH FROM CROSS-
               SECTION 2.371 TO 6.320 AND FROM 9.189 TO 10.197.


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

               THE AREA BETWEEN X-SECTION 6.320 AND X-SECTION
               9.189 IS CURRENTLY UNDER CONSTRUCTION.  NO FLOODPLAIN HAS BEEN
               PREPARED FOR THIS AREA OF BULLARD WASH, HOWEVER, THE HEC-2
               ANALYSIS WAS CONTINUED BASED ON EXISTING CONDITIONS AT THE TIME
               OF THE AERIAL MAPPING TO COMPUTE WATER SURFACE ELEVATIONS
               UPSTREAM AND DOWNSTREAM OF THIS REACH.

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*** THE DISCHARGE IN FIELD 4 OF THE QT CARDS IS THE ACTUAL DISCHRAGE
    DERIVED FROM THE 100-YEAR 24-HOUR HEC1 MODEL. THIS DISCHRGE IS
    FOR COMPARISON PURPOSES ONLY AND NO PROFILE IS BEING COMPUTED
    FOR IT. DISCHARGES FOR PROFILES 1 & 2 ARE USED TO DELINEATE THE
    FLOODPLAIN AND FLOODWAY RESPECTIVELY. THESE DISCHARGES ARE BASED
    UPON THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER
    THE TOP WHERE CAPACITY IS EXCEEDED. THESE SITUATIONS ARE
    DOCUMENTED THROUGHOUT THE HEC-2 MODEL.

** BEGIN APPROXIMATE FLOODPLAIN DELINEATION

CROSS-SECTION AT BUKEYE CANAL

Q = Q AT CP364        (= 1969 CFS).
THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
OVERBANK.
EXCEEDED FLOW WILL CONTINUE AS SHEET FLOW TO THE WEST.

X1    0.000      12     9980    10120       0       0       0
GR      914    8620      912     9460   910.5    9950     912    9980   910.5   10000
GR      912   10030    912.3    10050     912   10080   910.5   10100     912   10120
GR      912   10510      914    10900
1
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ANY WSEL EXTENSION AT X1= 0.047 TO X1= 0.616 IS DUE TO THE
LIMITING ELEVATION AT THE RIGHT OVERBANK.

X1    0.047      14     9960    10100     265     240     250
GR      914    8440    913.8     8900     912    9235   911.8    9550   910.6    9875
GR      912    9950    912.3     9960     912    9975     910   10000   911.3   10035
GR      910   10070    910.3    10100     912   10370   912.5   10820

X1    0.121      14     9980    10100     390     390     390
GR      914    8845      912     9800   911.6    9920     912    9970   912.7    9980
GR      912    9985      910    10000     912   10030   912.1   10040     912   10055
GR      910   10080    910.4    10100     912   10545   912.5   10820

X1    0.201      12     9970    10100     420     420     420
GR      914    9245    912.6     9935     913    9970     912    9985     910   10000
GR      912   10025    912.1    10040     912   10055     910   10075   910.5   10100
GR      912   10240    912.5    10820

X1    0.292      12     9960    10070     480     480     480
GR      914    9525    913.5     9850   912.8    9915   913.3    9960     912    9980
GR    910.5   10000    911.9    10025   910.5   10050   912.1   10070   911.8   10150
GR      912   10220    912.5    10800

DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
X1= 0.668
X1    0.384      17     9970    10095     490     490     490
GR      916    9060      914     9620   913.2    9795     914    9965   914.3    9970
GR      914    9975      912     9985     911   10000     912   10015   912.4   10025
GR      912   10040    911.5    10050     912   10065   912.7   10095   912.3   10210
GR    912.7   10700    913.2    11370

X1    0.488      13     9970    10090     545     545     545
GR      916    9235    914.8     9580     914    9880   913.8    9925     914    9960
GR    915.2    9970      914     9980     912   10000   913.3   10035   912.3   10070
GR    913.5   10090    912.7    10500   913.2   11365

X1    0.531      12     9965    10090     230     230     230
GR      916    9360    914.1     9920   915.4    9965     914    9990   913.5   10000
GR      914   10015    914.1    10030   912.8   10065   914.2   10090     914   10105
GR    912.8   10470    913.2    11350

QT        3    3200     3200     3200

Q = Q AT CP364A       (= 3081 CFS).

X1    0.616      13     9960    10090     405     480     450
GR    917.3    9665   916.04     9670   917.1    9830   916.5    9960     916    9990
GR      915   10000    915.4    10030   913.8   10070   915.2   10090     914   10100
GR    913.8   10350      914    10790     916   10830
1
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NC     .045     .045      .03       .1       .3

ANY WSEL EXTENSION AT X1= 0.668 TO X1= 1.378 IS DUE TO THE
LIMITING ELEVATION AT THE LEFT BANK.

X1    0.668      10     9950    10035     200     290     270
GR    917.3    9620    916.8     9750   917.3    9950   916.4   10000   916.8   10035
GR      916   10080    915.5    10115     916   10160     918   10250   918.3   10290

X1    0.776      13     9975    10025     535     570     570
GR    920.6    9975      920     9985     918    9990   917.3   10000   917.9   10025
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GR     916.4      10185       918      10315       920      10325      920.8      10350      919.3      10400
GR       920      10435     919.8      10470       924      10525

X1     0.868         11      9970      10020       495        485        490
GR     921.7       9970       920       9980     918.3      10000      919.8      10020        918      10220
GR       920      10295       922      10315     922.1      10335      919.9      10380        922      10485
GR     924.5      10495

X1     0.964         15      9970      10045       505        505        505
GR     923.2       9970       922       9980       920       9985      919.2      10000        920      10015
GR       922      10020     922.5      10045       922      10060      921.5      10140        922      10235
GR     922.8      10265       922      10320     921.7      10345        922      10390        925      10420

QT         3       2596      2596       3200
                 Q = Q AT CP364A       (= 3081 CFS).
                 THIS Q  HAS BEEN REDUCED BY THE SAME AMOUNT THAT EXCEEDED THE
                 CAPACITY OF THE CHANNEL AT THE UPSTREAM REACH  X1= 1.474 TO
                 X1= 1.823,     THAT EXCEEDED FLOW WILL RETURN AT X1= 0.964

X1     1.081         13      9955      10090       595        610        620
GR     925.7       9955       924       9965       924      10000        924      10055        925      10090
GR       923      10140       923      10250       924      10260        926      10270        924      10295
GR     923.4      10355       924      10395       930      10425


                 DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                 HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                 X1= 1.435

X1     1.153         16      9945      10060       410        355        380
GR     928.4       9945       928       9955       924       9970        924      10000        924      10025
GR     925.8      10060       924      10100       923      10140        923      10240        924      10265
GR       926      10285       927      10300       924      10340      923.7      10380        924      10410
GR     930.5      10440

X1     1.236         15      9960      10060       435        435        435
GR     930.2       9960       930       9970       924       9980        924      10000        924      10025
GR       926      10040       928      10050     928.3      10060        928      10070      924.5      10130
GR       926      10160       928      10210     928.4      10250      925.9      10310      932.3      10375
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X1     1.317         15      9960      10050       430        430        430
GR     930.4       9960       930       9970       924       9985        924      10000        924      10010
GR       928      10035     928.5      10050       928      10060        927      10140        928      10210
GR       930      10240     930.4      10260     928.9      10300        930      10320        933      10365

X1     1.378         15      9960      10035       345        295        320
GR     930.8       9960       930       9970       924       9985        924      10000        924      10010
GR       928      10020     928.8      10035       928      10050      927.5      10120        928      10180
GR       930      10250     930.9      10280     929.4      10320        930      10365      934.1      10385


                 CROSS-SECTION AT STATE ROUTE 85

X1     1.435         12      9965      10070       330        180        300
GR       934       9300       932       9780     931.4       9965      926.3       9995      926.3      10000
GR     926.3      10005       928      10030       931      10070      930.5      10120        932      10140
GR       934      10175     934.5      10185

QT         3       2600      2600       3200

                 Q = Q AT CP336        (= 3082 CFS).
                 THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
                 MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
                 OVERBANK.       EXCEEDED FLOW WILL RETURN AT X1= 0.964

                 ANY WSEL EXTENSION AT X1= 1.474 TO X1= 1.823 IS DUE TO THE
                 LIMITING ELEVATION AT THE RIGHT OVERBANK.

X1     1.474          7      9985      10015       210        210        210
GR       934       8825       932       9985       930       9990        928      10000        930      10010
GR       932      10015       933      10080

NC      .045       .045       .03         .3        .5
X1     1.517          8      9905      10080       500        160        225
GR       936       9200       934       9320     932.7       9600      932.8       9800      933.2       9905
GR     932.2      10000       934      10055     934.7      10080

X1     1.566          7      9955      10045       320        210        260
GR       938       9870       936       9920       934       9955      932.5      10000        934      10045
GR       936      10060     936.1      10065

NC      .045       .045       .03         .1        .3
X1     1.634          8      9970      10025       360        360        360
GR       940       9690       938       9855       936       9910        934       9970        933      10000
GR       934      10025       936      10050     937.3      10065

X1     1.680          9      9970      10025       200        285        240
GR       940       9700       938       9800       936       9930        934       9970      933.4      10000
GR       934      10025       936      10055       938      10080      938.2      10100
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X1     1.745         12      9960      10040       280        400        345
GR     940.3       9660       940       9760       938       9825        936       9900      934.5       9960
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GR      934      9975     933.8    10000      934    10025    934.5    10040      936    10090
GR      938     10195     938.2    10210

X1    1.823        12      9970    10050      370      425      410
GR    940.3      9385       940     9425      938     9450    937.5     9500      938     9600
GR    938.2      9740       938     9785      936     9970    934.9    10000      936    10050
GR      938     10230     938.6    10255

QT        3      3200      3200     3200

                 Q = Q AT CP336       (=3082 CFS).

                 DIVIDED FLOW OCCURS FOR THE NEXT FIVE UPSTREAM CROSS-SECTIONS,
                 HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                 X1= 2.371

X1    1.893        17      9960    10040      280      370      370
GR    940.3      9055       940     9090      938     9115    937.5     9170      938     9235
GR    938.3      9390       938     9545    936.3     9650      938     9715      940     9770
GR      938      9895       937     9960    936.1    10000      937    10040      938    10110
GR      940     10215       941    10370

X1    1.941        20      9975    10025       40      290      255
GR    940.3      8925       940     8960      938     8985    937.5     9040      938     9100
GR    938.4      9255       938     9430    936.3     9510      938     9580      944     9685
GR    944.6      9820       944     9890      942     9960      940     9975      938     9990
GR    937.9     10000       938    10010      940    10025      942    10040      943    10055

NC     .045       .07       .03       .1       .3
X1    1.988        20      9950    10030       35      280      245
GR    940.3      8890       940     8930      938     8955    937.5     9000      938     9065
GR    938.4      9220       938     9420    936.3     9485      938     9540      940     9575
GR      942      9595       944     9630    944.8     9750    944.7     9810      944     9950
GR      940      9980     938.2    10000      940    10015      944    10030    944.9    10125

                 ANY WSEL EXTENSION AT X1= 2.058 TO X1= 2.185 IS DUE TO THE
                 LIMITING ELEVATIONS AT THE LEFT OVERBANK.

X1    2.058        18      9970    10035      350      370      370
GR      941      8850       940     8950      939     9020    939.5     9190      938     9500
GR    936.6      9520       938     9540      940     9565      942     9585      944     9650
GR      944      9755     945.6     9835      944     9970      940     9985    938.4    10000
GR      940     10020       944    10035      946    10085

X1    2.185        21      9965    10045      430      670      670
GR    942.5      9310       942     9360      940     9445      938     9545    937.2     9565
GR      938      9580       940     9595      942     9630      943     9765    944.1     9860
GR    944.5      9925       944     9965      942     9975      940     9985      939    10000
GR      940     10015       942    10030      944    10045      945    10185      946    10680
GR    946.2     10690
1
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            **   END OF APPROXIMATE FLOODPLAIN DELINEATION .

X1    2.297        22      9975    10040      610      450      595
GR    946.3      9310       946     9335      944     9425      942     9480      940     9530
GR    937.9      9570     938.3     9605    937.8     9655    938.1     9700    937.9     9775
GR      938      9840       940     9930    941.3     9975      940     9990    939.4    10000
GR      940     10015     940.2    10040    940.8    10040      942    10480      944    10700
GR      946     11415       947    11430

            **   BEGIN DETAILED FLOODPLAIN\FLOODWAY ANALYSIS.

X1    2.371        25      9975    10030      400      500      390
GR    949.7      8815       948     8940      946     9060      944     9145    944.5     9185
GR      944      9270       942     9315      940     9435    939.8     9520      940     9585
GR    940.6      9655       940     9710    939.4     9775      940     9815      942     9890
GR    942.3      9930       942     9975      940     9995    939.7    10000      940    10005
GR    940.7     10030       942    10385      944    10860      946    11400    949.7    11450

X1    2.435        20      9985    10085      335      335      335
GR      950      8650       948     8790      946     8890    945.2     9000      946     9090
GR      944      9250       942     9485    941.1     9720      942     9835    942.4     9950
GR      942      9985       940     9995    939.9    10000      940    10005    941.7    10085
GR      942     10360       944    10760      946    11320      948    11395    949.8    11420

QT        3      3200      3200     3200

                 CROSS-SECTION 30 FEET SOUTH OF LOWER BUKEYE RD. "EXTENDED"

                 Q = Q AT CP335       (= 3066 CFS).

X1    2.536        15      9965    10060      535      535      535
GR      951      9185       950     9300      948     9555      946     9710    945.5     9865
GR      944      9920     943.5     9935    943.8     9965    943.5    10000    943.7    10060
GR      944     10155     944.8    10500      946    10800      948    11280    950.2    11340

                 DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                 HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                 X1= 2.883

X1    2.680        17      9925    10050      735      725      760
GR      954      9265       952     9400      950     9505      948     9645    947.2     9735
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GR      948       9790      949.9      9805      948.8      9900       948      9905      947.3      9925
GR      946       9940      945.2     10000      945.6     10050       946     10165        948     10565
GR      950      10935        952     11160
1
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X1    2.771         16      9985     10020       480       480       480
GR      954       9440       952      9545       950      9660     948.1      9810       950      9880
GR    951.4       9890       950      9900     949.4      9985     947.4     10000     948.2     10020
GR    947.3      10075       948     10210       950     10505     950.9     10795       952     11105
GR    953.5      11255

X1    2.883         15      9985     10015       580       580       590
GR      958       9190       956      9360       954      9535       952      9640       950      9840
GR    949.6       9920     950.2      9985     948.5     10000     950.1     10015     949.2     10035
GR      950      10165       952     10385       954     10600       956     11230     956.5     11270

QT        3       3200      3200      3200

                Q = Q AT CP334       (= 3070 CFS).

X1    2.977         15      9980     10050       500       500       500
GR      960       9170       958      9345       956      9530       954      9660       952      9830
GR      951       9960     951.5      9980       950      9990     949.9     10000       950     10010
GR    952.1      10050       954     10480       956     10740       958     11200     958.5     11305

X1    3.070         13      9945     10025       485       495       490
GR    958.5       9510     953.8      9545     954.5      9600     954.5      9945       954      9960
GR    952.5       9975     954.2      9985     952.3     10000     953.2     10025     952.7     10060
GR      954      10290       956     10635       958     10875

QT        3       2800      2800      2800

                Q = Q AT 11334       (= 2701 CFS).

X1    3.167         18      9970     10020       475       515       510
GR    960.7       9530       956      9585       955      9625     955.4      9730     954.9      9865
GR    955.8       9935     955.1      9970       954      9990     953.9     10000       954     10005
GR    954.9      10020     954.5     10080     955.1     10120     954.8     10220       956     10425
GR      958      10770       960     10990       962     11230


                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 3.602

X1    3.291         23      9970     10020       660       650       655
GR      964       9530       962      9670     961.3      9690     961.8      9725     960.4      9770
GR    961.8       9785     960.1      9940     960.5      9970       960      9985       958      9995
GR    957.2      10000       958     10005       960     10015     960.1     10020       960     10025
GR      958      10040     957.2     10110     957.8     10360     957.6     10460       958     10700
GR      960      10910       962     10970       964     11600

X1    3.376         17      9985     10015       460       440       450
GR    967.9       9300       966      9370       964      9520       962      9630     960.5      9900
GR    961.9       9985       960      9995     958.3     10000       960     10005       961     10015
GR      960      10030     958.4     10055     958.6     10170     958.8     10365       960     10590
GR      962      10930       964     11490
1
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X1    3.491         17      9980     10020       605       605       605
GR      968       9255       966      9435       964      9555       962      9660     960.5      9930
GR    961.9       9980       960      9995     959.5     10000       960     10005     961.9     10020
GR      960      10040     959.6     10130       960     10240       962     10540       964     10735
GR      966      11000       968     11780

QT        3       2800      2800      2800
NC      .07        .07       .04        .1        .3

                CROSS-SECTION AT YUMA RD.

                Q = Q AT CP316       (= 2704 CFS).

X1    3.602         13      9880     10100       590       590       590
GR      970       9225       968      9450       966      9600       964      9750       962      9880
GR    961.9      10000       962     10100     963.2     10330       964     10445       966     10625
GR      968      10770     968.9     10945       970     11005
1
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


*PROF 1

CCHV=     .100 CEHV=     .300
*SECNO  .000
          ***  DUE TO THE COMPLEXITY OF THE DOWNSTREAM REACH (CROSS-SECTIONS
               0.000 TO 2.297),AN APPROXIMATE FLOODPLAIN DELINEATIOIN HAS BEEN
               SHOWN IN THIS REACH.HOWEVER,A HEC-2 MODEL WAS SET UP INCLUDING
               THESE X-SECTIONS TO AID IN PRODUCING A REASONABLE APPROXIMATE
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DELINEATION.THIS APPROXIMATE DELINEATION IS AS SHOWN ON THE MAPS AND IS BASED ON ENGINEERING JUDGEMENT REFLCTING THE EXISTING TOPOGRAPHY,AND USING INFORMATION FROM THE HEC-2 MODEL TO ESTIMATE WHERE BREAKOUT FLOWS WILL OCCUR.
ALSO, AN APPROXIMATE FLOODPLAIN DELINEATION HAS BEEN SHOWN FOR THE UPPERMOST REACH OF BULLARD WASH (CROSS-SECTIONS 10.269 TO 14.023). THE HEC-2 MODEL WAS ALSO UTILIZED TO ESTIMATE THE APPROXIMATE DELINEATION IN THIS REACH.
A DETAILED ANALYSIS WAS PERFORMED ON BULLARD WASH FROM CROSS-SECTION 2.371 TO 6.320 AND FROM 9.189 TO 10.197.

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**********

THE AREA BETWEEN X-SECTION 6.320 AND X-SECTION 9.189 IS CURRENTLY UNDER CONSTRUCTION. NO FLOODPLAIN HAS BEEN PREPARED FOR THIS AREA OF BULLARD WASH, HOWEVER, THE HEC-2 ANALYSIS WAS CONTINUED BASED ON EXISTING CONDITIONS AT THE TIME OF THE AERIAL MAPPING TO COMPUTE WATER SURFACE ELEVATIONS UPSTREAM AND DOWNSTREAM OF THIS REACH.

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**********

*** THE DISCHARGE IN FIELD 4 OF THE QT CARDS IS THE ACTUAL DISCHRAGE DERIVED FROM THE 100-YEAR 24-HOUR HEC1 MODEL. THIS DISCHRGE IS FOR COMPARISON PURPOSES ONLY AND NO PROFILE IS BEING COMPUTED FOR IT. DISCHARGES FOR PROFILES 1 & 2 ARE USED TO DELINEATE THE FLOODPLAIN AND FLOODWAY RESPECTIVELY. THESE DISCHARGES ARE BASED UPON THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER THE TOP WHERE CAPACITY IS EXCEEDED. THESE SITUATIONS ARE DOCUMENTED THROUGHOUT THE HEC-2 MODEL.



** BEGIN APPROXIMATE FLOODPLAIN DELINEATION

CROSS-SECTION AT BUKEYE CANAL

Q = Q AT CP364 (= 1969 CFS).
THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT OVERBANK.
EXCEEDED FLOW WILL CONTINUE AS SHEET FLOW TO THE WEST.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .000 | 1.82 | 912.32 | .00 | 912.00 | 912.34 | .02 | .00 | .00 | 912.00 |
| 850.0 | 625.2 | 160.3 | 64.6 | 576.3 | 104.5 | 133.7 | .0 | .0 | 912.00 |
| .00 | 1.08 | 1.53 | .48 | .070 | .040 | .070 | .000 | 910.50 | 9326.62 |
| .002525 | 0. | 0. | 0. | 0 | 0 | 6 | .00 | 1245.30 | 10571.93 |

*SECNO .047
3280 CROSS SECTION .05 EXTENDED .05 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.48

ANY WSEL EXTENSION AT X1= 0.047 TO X1= 0.616 IS DUE TO THE LIMITING ELEVATION AT THE RIGHT OVERBANK.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .047 | 2.55 | 912.55 | .00 | .00 | 912.55 | .01 | .21 | .00 | 912.30 |
| 850.0 | 347.1 | 275.1 | 227.8 | 766.2 | 249.2 | 510.2 | 6.9 | 8.5 | 910.30 |
| .11 | .45 | 1.10 | .45 | .070 | .040 | .070 | .000 | 910.00 | 9133.37 |
| .000410 | 265. | 250. | 240. | 3 | 0 | 0 | .00 | 1686.63 | 10820.00 |

*SECNO .121
3280 CROSS SECTION .12 EXTENDED .23 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .121 | 2.73 | 912.73 | .00 | .00 | 912.74 | .01 | .19 | .00 | 912.70 |
| 850.0 | 111.4 | 232.9 | 505.7 | 287.5 | 190.2 | 810.6 | 19.5 | 22.2 | 910.40 |
| .25 | .39 | 1.22 | .62 | .070 | .040 | .070 | .000 | 910.00 | 9452.89 |
| .000590 | 390. | 390. | 390. | 2 | 0 | 0 | .00 | 1367.11 | 10820.00 |

*SECNO .201
3280 CROSS SECTION .20 EXTENDED .53 FEET

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .201 | 3.03 | 913.03 | .00 | .00 | 913.05 | .02 | .30 | .00 | 913.00 |
| 850.0 | 12.0 | 366.8 | 471.2 | 52.8 | 228.2 | 699.3 | 30.4 | 34.1 | 910.50 |
| .36 | .23 | 1.61 | .67 | .070 | .040 | .070 | .000 | 910.00 | 9724.61 |
| .000887 | 420. | 420. | 420. | 2 | 0 | 0 | .00 | 1095.39 | 10820.00 |



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

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*SECNO  .292
3280 CROSS SECTION        .29 EXTENDED        .89 FEET

      .292      2.89    913.39       .00       .00    913.41       .02       .36       .00    913.30
     850.0       7.9     301.6     540.6      31.4     208.8     880.3      42.0      45.3    912.10
       .51       .25      1.44       .61      .070      .040      .070      .000    910.50   9860.27
   .000645      480.      480.      480.         1         0         0       .00    939.73  10800.00


*SECNO  .384

3265 DIVIDED FLOW

3280 CROSS SECTION        .38 EXTENDED        .49 FEET


                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 0.668
      .384      2.69    913.69       .00       .00    913.70       .01       .29       .00    914.30
     850.0       9.9     241.9     598.1      51.5     198.6    1214.2      56.5      59.6    912.70
       .70       .19      1.22       .49      .070      .040      .070      .000    911.00   9688.08
   .000541      490.      490.      490.         2         0         0       .00   1604.23  11370.00


*SECNO  .488

3265 DIVIDED FLOW

3280 CROSS SECTION        .49 EXTENDED        .81 FEET

      .488      2.01    914.01       .00       .00    914.02       .01       .32       .00    915.20
     850.0       1.1     141.8     707.0       9.0     132.6    1293.2      74.7      78.8    913.50
       .94       .13      1.07       .55      .070      .040      .070      .000    912.00   9875.31
   .000648      545.      545.      545.         0         0         0       .00   1469.90  11365.00


*SECNO  .531

3265 DIVIDED FLOW

3280 CROSS SECTION        .53 EXTENDED        .98 FEET
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

      .531      1.38    914.18       .00       .00    914.18       .01       .16       .00    915.40
     850.0        .1      37.2     812.8        .9      55.1    1319.2      82.1      86.4    914.20
      1.05       .06       .67       .62      .070      .040      .070      .000    912.80   9897.62
   .000757      230.      230.      230.         2         0         0       .00   1385.91  11350.00


*SECNO  .616

                Q = Q AT CP364A      (= 3081 CFS).

      .616      1.85    915.65       .00       .00    915.74       .09      1.53       .03    916.50
    3200.0        .0     209.1    2990.9        .0      80.6    1245.3      96.9      98.5    915.20
      1.10       .00      2.59      2.40      .000      .040      .070      .000    913.80   9993.50
   .006205      405.      450.      480.         5         0         0       .00    829.50  10823.00


CCHV=     .100 CEHV=     .300
*SECNO  .668
3280 CROSS SECTION        .67 EXTENDED        .57 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .67


                ANY WSEL EXTENSION AT X1= 0.668 TO X1= 1.378 IS DUE TO THE
                LIMITING ELEVATION AT THE LEFT BANK.

      .668      2.36    917.86    917.77       .00    918.27       .40      2.43       .09    917.30
    3200.0     909.4     594.7    1696.0     269.9      95.3     314.0     103.3     102.9    916.80
      1.12      3.37      6.24      5.40      .045      .030      .045      .000    915.50   9620.00
   .013643      200.      270.      290.        12        11         0       .00    624.05  10244.05


*SECNO  .776

3265 DIVIDED FLOW


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.76

      .776      3.93    920.33       .00       .00    920.47       .14      2.18       .03    920.60
    3200.0        .0     367.6    2832.4        .0     102.8     990.5     114.8     109.9    917.90
      1.17       .00      3.58      2.86      .000      .030      .045      .000    916.40   9979.44
   .001785      535.      570.      570.         5         0         0       .00    467.41  10476.99
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO  .868

3265 DIVIDED FLOW

    .868      3.47    921.47       .00       .00    921.68       .21      1.18       .02    921.70
  3200.0        .0     483.1    2716.9        .0     101.1     796.3     125.8     115.1    919.80
    1.21       .00      4.78      3.41      .000      .030      .045      .000    918.00   9971.36
 .003534      495.      490.      485.         4         0         0       .00    448.84  10458.43

*SECNO  .964
3280 CROSS SECTION       .96 EXTENDED       .36 FEET

    .964      4.36    923.56       .00       .00    923.95       .39      2.22       .05    923.20
  3200.0        .0    1260.0    1940.0        .0     186.6     566.1     135.4     120.2    922.50
    1.24       .00      6.75      3.43      .000      .030      .045      .000    919.20   9970.00
 .005635      505.      505.      505.         2         0         0       .00    435.58  10405.58

*SECNO 1.081

3265 DIVIDED FLOW

3280 CROSS SECTION       1.08 EXTENDED       .20 FEET

                Q = Q AT CP364A      (= 3081 CFS).
                THIS Q  HAS BEEN REDUCED BY THE SAME AMOUNT THAT EXCEEDED THE
                CAPACITY OF THE CHANNEL AT THE UPSTREAM REACH  X1= 1.474 TO
                X1= 1.823,    THAT EXCEEDED FLOW WILL RETURN AT X1= 0.964

   1.081      2.90    925.90       .00       .00    926.03       .12      2.05       .03    925.70
  2596.0        .0     735.7    1860.3        .0     231.1     700.0     147.3     126.4    925.00
    1.30       .00      3.18      2.66      .000      .030      .045      .000    923.00   9955.00
 .002024      595.      620.      610.         3         0         0       .00    447.85  10404.52

*SECNO 1.153

3265 DIVIDED FLOW

                DIVIDED FLOW OCCURS FOR THE NEXT FOUR UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
1
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                X1= 1.435

   1.153      3.50    926.50       .00       .00    926.59       .09       .56       .00    928.40
  2596.0        .0     572.4    2023.6        .0     205.0     881.8     155.6     130.1    925.80
    1.34       .00      2.79      2.29      .000      .030      .045      .000    923.00   9960.63
 .001216      410.      380.      355.         3         0         0       .00    446.67  10421.53

*SECNO 1.236

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
   1.236      3.42    927.42    927.42       .00    928.35       .93      1.11       .25    930.20
  2596.0        .0    1825.0     771.0        .0     205.2     203.3     163.1     133.5    928.30
    1.35       .00      8.89      3.79      .000      .030      .045      .000    924.00   9974.30
 .008284      435.      435.      435.        20         5         0       .00    240.49  10325.46

*SECNO 1.317

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.95

   1.317      5.71    929.71       .00       .00    930.05       .34      1.64       .06    930.40
  2596.0        .0    1652.1    943.9        .0     298.7     384.3     168.5     136.2    928.50
    1.38       .00      5.53      2.46      .000      .030      .045      .000    924.00   9970.71
 .002178      430.      430.      430.         3         0         0       .00    301.69  10314.86

*SECNO 1.378

3265 DIVIDED FLOW
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     1.378      6.39    930.39       .00       .00    930.64       .26       .59       .01    930.80
    2596.0        .0    1443.6    1152.4        .0     285.2     517.0     173.6     138.5    928.80
      1.40       .00      5.06      2.23      .000      .030      .045      .000    924.00   9965.14
   .001660      345.      320.      295.         3         0         0       .00    371.09  10366.90
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 1.435

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

                CROSS-SECTION AT STATE ROUTE 85

     1.435      4.87    931.17    931.17       .00    932.39      1.22       .87       .29    931.40
    2596.0        .0    2555.9      40.1        .0     285.7      23.9     176.7     139.9    931.00
      1.41       .00      8.95      1.68      .000      .030      .045      .000    926.30   9966.36
   .008504      330.      300.      180.        20        15         0       .00    162.57  10128.92

*SECNO 1.474
3280 CROSS SECTION      1.47 EXTENDED       .62 FEET

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

                Q = Q AT CP336       (= 3082 CFS).
                THIS Q HAS BEEN REDUCED TO THE CAPACITY OF THE CHANNEL PLUS A
                MAXIMUM OF 1 FOOT OVER THE LIMITING ELEVATION AT THE RIGHT
                OVERBANK.      EXCEEDED FLOW WILL RETURN AT X1= 0.964

                ANY WSEL EXTENSION AT X1= 1.474 TO X1= 1.823 IS DUE TO THE
                LIMITING ELEVATION AT THE RIGHT OVERBANK.

     1.474      5.62    933.62    933.62       .00    934.04       .42      1.27       .08    932.00
    2600.0    1465.5     961.6     172.9     760.6     118.6      72.8     179.8     142.8    932.00
      1.43      1.93      8.11      2.38      .045      .030      .045      .000    928.00   9045.72
   .004512      210.      210.      210.         3        12         0       .00   1034.28  10080.00

CCHV=     .300 CEHV=     .500
*SECNO 1.517
3280 CROSS SECTION      1.52 EXTENDED       .19 FEET
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.98

     1.517      2.68    934.88       .00       .00    934.94       .06       .80       .11    933.20
    2600.0    1796.4     803.6        .0    1083.0     320.4        .0     191.6     152.5    934.70
      1.48      1.66      2.51       .00      .045      .030      .000      .000    932.20   9266.45
   .001146      500.      225.      160.         1         0         0       .00    813.55  10080.00

*SECNO 1.566
3280 CROSS SECTION      1.57 EXTENDED       .11 FEET

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     1.566      3.71    936.21    936.21       .00    937.38      1.17       .67       .56    934.00
    2600.0     140.4    2399.1      60.4      42.9     266.5      19.0     197.6     155.8    934.00
      1.49      3.27      9.00      3.19      .045      .030      .045      .000    932.50   9914.72
   .007773      320.      260.      210.        20        11         0       .00    150.28  10065.00

CCHV=     .100 CEHV=     .300
*SECNO 1.634
3280 CROSS SECTION      1.63 EXTENDED       .97 FEET

3301 HV CHANGED MORE THAN HVINS
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.06

     1.634      5.27    938.27       .00       .00    938.66       .38      1.19       .08    934.00
    2600.0     727.3    1573.5     299.2     269.4     262.5     106.2     201.5     157.4    934.00
      1.51      2.70      5.99      2.82      .045      .030      .045      .000    933.00   9832.50
   .001824      360.      360.      360.         3         0         0       .00    232.50  10065.00


*SECNO 1.680
3280 CROSS SECTION      1.68 EXTENDED       .57 FEET

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   29OCT94      10:57:59                                                                                PAGE   18

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

     1.680      5.37    938.77       .00       .00    939.01       .24       .34       .01    934.00
    2600.0     805.5    1399.3     395.2     396.5     279.1     171.0     205.5     158.8    934.00
      1.53      2.03      5.01      2.31      .045      .030      .045      .000    933.40   9761.32
   .001176      200.      240.      285.         2         0         0       .00    338.68  10100.00


*SECNO 1.745
3280 CROSS SECTION      1.75 EXTENDED       .97 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.56

     1.745      5.37    939.17       .00       .00    939.27       .10       .24       .01    934.50
    2600.0     631.1    1329.0     639.9     419.4     410.7     439.1     213.6     161.7    934.50
      1.57      1.50      3.24      1.46      .045      .030      .045      .000    933.80   9787.12
   .000482      280.      345.      400.         2         0         0       .00    422.88  10210.00


*SECNO 1.823
3280 CROSS SECTION      1.82 EXTENDED       .81 FEET

     1.823      4.51    939.41       .00       .00    939.47       .06       .20       .00    936.00
    2600.0    1094.0     896.1     609.9     950.7     317.0     461.9     227.3     167.3    936.00
      1.63      1.15      2.83      1.32      .045      .030      .045      .000    934.90   9432.35
   .000520      370.      410.      425.         2         0         0       .00    822.65  10255.00


*SECNO 1.893

3265 DIVIDED FLOW


                Q = Q AT CP336       (=3082 CFS).

                DIVIDED FLOW OCCURS FOR THE NEXT FIVE UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 2.371

     1.893      3.53    939.63       .00       .00    939.70       .07       .23       .00    937.00
    3200.0    2093.2     794.1     312.7    1383.1     246.6     219.3     240.1     174.0    937.00
      1.68      1.51      3.22      1.43      .045      .030      .045      .000    936.10   9094.59
   .000942      280.      370.      370.         2         0         0       .00   1068.11  10195.73


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   29OCT94      10:57:59                                                                                PAGE   19

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 1.941

3265 DIVIDED FLOW


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .60

     1.941      3.43    939.73       .00       .00    939.84       .11       .12       .01    940.00
    3200.0    3029.2     170.8        .0    1163.9      58.0        .0     242.8     175.5    940.00
      1.69      2.60      2.94       .00      .045      .030      .000      .000    936.30   8963.39
   .002607       40.      255.      290.         2         0         0       .00    692.81  10022.97


CCHV=     .100 CEHV=     .300
*SECNO 1.988

3265 DIVIDED FLOW

     1.988      3.54    939.84       .00       .00    939.95       .11       .11       .00    944.00
    3200.0    3142.1      57.9        .0    1185.5      26.1        .0     244.0     176.3    944.00
      1.69      2.65      2.22       .00      .045      .030      .000      .000    936.30   8932.00
   .002625       35.      245.      280.         2         0         0       .00    672.07  10013.66
```

*SECNO 2.058

3265 DIVIDED FLOW

ANY WSEL EXTENSION AT X1= 2.058 TO X1= 2.185 IS DUE TO THE
LIMITING ELEVATIONS AT THE LEFT OVERBANK.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.058 | 4.15 | 940.75 | .00 | .00 | 940.86 | .11 | .91 | .00 | 944.00 |
| 3200.0 | 3025.6 | 174.4 | .0 | 1175.1 | 56.4 | .0 | 253.9 | 181.9 | 944.00 |
| 1.73 | 2.57 | 3.09 | .00 | .045 | .030 | .000 | .000 | 936.60 | 8875.01 |
| .002552 | 350. | 370. | 370. | 2 | 0 | 0 | .00 | 738.12 | 10022.81 |

*SECNO 2.185

3265 DIVIDED FLOW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.185 | 4.86 | 942.06 | .00 | .00 | 942.35 | .29 | 1.44 | .06 | 944.00 |
| 3200.0 | 2713.0 | 487.0 | .0 | 634.9 | 103.2 | .0 | 264.0 | 187.5 | 944.00 |
| 1.76 | 4.27 | 4.72 | .00 | .045 | .030 | .000 | .000 | 937.20 | 9354.24 |
| .004031 | 430. | 670. | 670. | 2 | 0 | 0 | .00 | 339.25 | 10030.43 |



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SECNO | DEPTH | CWSEL | CRIWS | WSELK | EG | HV | HL | OLOSS | L-BANK ELEV |
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | R-BANK ELEV |
| TIME | VLOB | VCH | VROB | XNL | XNCH | XNR | WTN | ELMIN | SSTA |
| SLOPE | XLOBL | XLCH | XLOBR | ITRIAL | IDC | ICONT | CORAR | TOPWID | ENDST |

*SECNO 2.297

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.97

** END OF APPROXIMATE FLOODPLAIN DELINEATION .

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.297 | 4.94 | 942.74 | .00 | .00 | 942.77 | .03 | .39 | .03 | 941.30 |
| 3200.0 | 2686.1 | 263.3 | 250.5 | 1959.0 | 173.7 | 622.7 | 287.3 | 196.6 | 940.80 |
| 1.89 | 1.37 | 1.52 | .40 | .045 | .030 | .070 | .000 | 937.80 | 9459.49 |
| .000256 | 610. | 595. | 450. | 3 | 0 | 0 | .00 | 1102.53 | 10562.02 |

*SECNO 2.371

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .62

** BEGIN DETAILED FLOODPLAIN\FLOODWAY ANALYSIS.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.371 | 3.50 | 942.90 | .00 | .00 | 942.93 | .04 | .16 | .00 | 942.00 |
| 3200.0 | 2467.4 | 301.7 | 430.9 | 1548.2 | 131.8 | 641.3 | 312.0 | 208.9 | 940.70 |
| 1.96 | 1.59 | 2.29 | .67 | .045 | .030 | .070 | .000 | 939.40 | 9294.95 |
| .000669 | 400. | 390. | 500. | 2 | 0 | 0 | .00 | 1301.66 | 10596.61 |

*SECNO 2.435

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .55

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.435 | 3.31 | 943.21 | .00 | .00 | 943.33 | .12 | .37 | .02 | 942.00 |
| 3200.0 | 1605.2 | 1028.7 | 566.1 | 820.5 | 243.8 | 522.0 | 327.0 | 218.8 | 941.70 |
| 2.00 | 1.96 | 4.22 | 1.08 | .045 | .030 | .070 | .000 | 939.90 | 9342.47 |
| .002218 | 335. | 335. | 335. | 2 | 0 | 0 | .00 | 1260.13 | 10602.60 |

*SECNO 2.536
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

CROSS-SECTION 30 FEET SOUTH OF LOWER BUKEYE RD. "EXTENDED"

Q = Q AT CP335 (= 3066 CFS).



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.536 | 1.90 | 945.40 | 945.40 | .00 | 945.92 | .52 | 2.33 | .12 | 943.80 |
| 3200.0 | 509.4 | 1365.3 | 1325.3 | 113.5 | 169.5 | 538.9 | 341.8 | 231.3 | 943.70 |
| 2.03 | 4.49 | 8.05 | 2.46 | .045 | .030 | .070 | .000 | 943.50 | 9868.57 |
| .012217 | 535. | 535. | 535. | 13 | 11 | 0 | .00 | 782.13 | 10650.69 |

*SECNO 2.680

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.61

DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
X1= 2.883

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     2.680      3.39    948.59       .00       .00    948.75       .16      2.79       .04    947.30
    3200.0     236.1    1592.3    1371.6     178.0     368.6     992.0     361.7     246.0    945.60
      2.10      1.33      4.32      1.38      .045      .030      .070      .000    945.20   9603.37
   .001800      735.      760.      725.         6         0         0       .00    965.08  10675.04

 *SECNO 2.771

 3265 DIVIDED FLOW

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .51

     2.771      2.78    950.08       .00       .00    950.27       .19      1.51       .01    949.40
    3200.0     688.6     466.6    2044.8     261.6      71.1     779.8     376.3     256.0    948.20
      2.14      2.63      6.56      2.62      .045      .030      .070      .000    947.30   9654.95
   .006869      480.      480.      480.         3         0         0       .00    859.60  10533.30

 *SECNO 2.883

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.71

     2.883      3.83    952.33       .00       .00    952.45       .12      2.17       .01    950.20
    3200.0    1570.1     447.7    1182.1     628.9      90.1     706.6     393.2     267.1    950.10
      2.21      2.50      4.97      1.67      .045      .030      .070      .000    948.50   9622.72
   .002339      580.      590.      580.         3         0         0       .00    797.68  10420.39

1
   29OCT94       10:57:59                                                                          PAGE   22

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *SECNO 2.977

                Q = Q AT CP334       (= 3070 CFS).

     2.977      3.79    953.69       .00       .00    954.07       .38      1.54       .08    951.50
    3200.0    1455.7    1405.9     338.4     453.9     209.6     284.9     406.9     275.8    952.10
      2.24      3.21      6.71      1.19      .045      .030      .070      .000    949.90   9686.64
   .004265      500.      500.      500.         3         0         0       .00    722.43  10409.07

 *SECNO 3.070
     3.070      3.33    955.63       .00       .00    955.75       .12      1.65       .03    954.50
    3200.0     926.8     847.3    1425.9     481.5     186.5     844.4     420.7     285.7    953.20
      2.29      1.92      4.54      1.69      .045      .030      .070      .000    952.30   9531.41
   .002739      485.      490.      495.         3         0         0       .00   1038.83  10570.24

 *SECNO 3.167

                Q = Q AT 11334       (= 2701 CFS).

     3.167      2.95    956.85       .00       .00    956.94       .09      1.19       .00    955.10
    2800.0    1257.9     522.1    1020.1     616.2     125.7     762.3     438.0     297.4    954.90
      2.35      2.04      4.15      1.34      .045      .030      .070      .000    953.90   9575.02
   .002062      475.      510.      515.         3         0         0       .00    997.16  10572.18

 *SECNO 3.291

 3265 DIVIDED FLOW

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .51

                DIVIDED FLOW OCCURS FOR THE NEXT TWO UPSTREAM CROSS-SECTIONS,
                HOWEVER,THESE FLOWS ARE EFFECTIVE DUE TO UPSTREM INFLOW AT
                X1= 3.602

     3.291      2.00    959.20       .00       .00    959.30       .10      2.35       .00    960.50
    2800.0        .0     104.3    2695.7        .0      23.2    1103.4     457.7     310.9    960.10
      2.43       .00      4.50      2.44      .000      .030      .070      .000    957.20   9989.00
   .007862      660.      655.      650.         3         0         0       .00    816.91  10825.92

1
   29OCT94       10:57:59                                                                          PAGE   23

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *SECNO 3.376

 3265 DIVIDED FLOW

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.65
```

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.376 | 2.92 | 961.22 | .00 | .00 | 961.28 | .06 | 1.98 | .00 | 961.90 |
| 2800.0 | 57.0 | 94.8 | 2648.2 | 63.2 | 31.9 | 1405.0 | 471.0 | 320.1 | 961.00 |
| 2.49 | .90 | 2.97 | 1.88 | .045 | .030 | .070 | .000 | 958.30 | 9769.59 |
| .002895 | 460. | 450. | 440. | 3 | 0 | 0 | .00 | 984.00 | 10798.16 |

*SECNO 3.491

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.491 | 3.13 | 962.63 | .00 | .00 | 962.68 | .05 | 1.40 | .00 | 961.90 |
| 2800.0 | 803.5 | 268.6 | 1727.9 | 455.2 | 79.3 | 1109.0 | 492.9 | 333.7 | 961.90 |
| 2.58 | 1.77 | 3.39 | 1.56 | .045 | .030 | .070 | .000 | 959.50 | 9626.83 |
| .001897 | 605. | 605. | 605. | 4 | 0 | 0 | .00 | 974.78 | 10601.60 |

CCHV= .100 CEHV= .300
*SECNO 3.602

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .68

CROSS-SECTION AT YUMA RD.

Q = Q AT CP316 (= 2704 CFS).

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.602 | 2.22 | 964.12 | .00 | .00 | 964.30 | .18 | 1.58 | .04 | 962.00 |
| 2800.0 | 214.4 | 1903.0 | 682.7 | 146.9 | 478.7 | 412.1 | 511.0 | 345.1 | 962.00 |
| 2.64 | 1.46 | 3.98 | 1.66 | .070 | .040 | .070 | .000 | 961.90 | 9740.57 |
| .004062 | 590. | 590. | 590. | 1 | 0 | 0 | .00 | 715.75 | 10456.32 |



THIS RUN EXECUTED 29OCT94 10:58:05

**********
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
**********

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

BULLARD WASH REVISED

SUMMARY PRINTOUT

| | SECNO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .000 | 850.00 | 912.32 | 9326.62 | 9980.00 | 10120.00 | 10571.93 | .00 | 1245.30 | 1.82 | 910.50 | 25.25 | 1.5 |
| * | .047 | 850.00 | 912.55 | 9133.37 | 9960.00 | 10100.00 | 10820.00 | .23 | 1686.63 | 2.55 | 910.00 | 4.10 | 1.1 |
| | .121 | 850.00 | 912.73 | 9452.89 | 9980.00 | 10100.00 | 10820.00 | .19 | 1367.11 | 2.73 | 910.00 | 5.90 | 1.2 |
| | .201 | 850.00 | 913.03 | 9724.61 | 9970.00 | 10100.00 | 10820.00 | .29 | 1095.39 | 3.03 | 910.00 | 8.87 | 1.6 |
| | .292 | 850.00 | 913.39 | 9860.27 | 9960.00 | 10070.00 | 10800.00 | .37 | 939.73 | 2.89 | 910.50 | 6.45 | 1.4 |
| | .384 | 850.00 | 913.69 | 9688.08 | 9970.00 | 10095.00 | 11370.00 | .30 | 1604.23 | 2.69 | 911.00 | 5.41 | 1.2 |
| | .488 | 850.00 | 914.01 | 9875.31 | 9970.00 | 10090.00 | 11365.00 | .32 | 1469.90 | 2.01 | 912.00 | 6.48 | 1.0 |
| | .531 | 850.00 | 914.18 | 9897.62 | 9965.00 | 10090.00 | 11350.00 | .16 | 1385.91 | 1.38 | 912.80 | 7.57 | .6 |
| | .616 | 3200.00 | 915.65 | 9993.50 | 9960.00 | 10090.00 | 10823.00 | 1.48 | 829.50 | 1.85 | 913.80 | 62.05 | 2.5 |
| * | .668 | 3200.00 | 917.86 | 9620.00 | 9950.00 | 10035.00 | 10244.05 | 2.21 | 624.05 | 2.36 | 915.50 | 136.43 | 6.2 |
| * | .776 | 3200.00 | 920.33 | 9979.44 | 9975.00 | 10025.00 | 10476.99 | 2.47 | 467.41 | 3.93 | 916.40 | 17.85 | 3.5 |
| | .868 | 3200.00 | 921.47 | 9971.36 | 9970.00 | 10020.00 | 10458.43 | 1.13 | 448.84 | 3.47 | 918.00 | 35.34 | 4.7 |
| | .964 | 3200.00 | 923.56 | 9970.00 | 9970.00 | 10045.00 | 10405.58 | 2.10 | 435.58 | 4.36 | 919.20 | 56.35 | 6.7 |
| | 1.081 | 2596.00 | 925.90 | 9955.00 | 9955.00 | 10090.00 | 10404.52 | 2.34 | 447.85 | 2.90 | 923.00 | 20.24 | 3.1 |
| | 1.153 | 2596.00 | 926.50 | 9960.63 | 9945.00 | 10060.00 | 10421.53 | .59 | 446.67 | 3.50 | 923.00 | 12.16 | 2.7 |
| * | 1.236 | 2596.00 | 927.42 | 9974.30 | 9960.00 | 10060.00 | 10325.46 | .93 | 240.49 | 3.42 | 924.00 | 82.84 | 8.8 |
| * | 1.317 | 2596.00 | 929.71 | 9970.71 | 9960.00 | 10050.00 | 10314.86 | 2.29 | 301.69 | 5.71 | 924.00 | 21.78 | 5.5 |



| | SECNO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | VCH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.378 | 2596.00 | 930.39 | 9965.14 | 9960.00 | 10035.00 | 10366.90 | .68 | 371.09 | 6.39 | 924.00 | 16.60 | 5.0 |
| * | 1.435 | 2596.00 | 931.17 | 9966.36 | 9965.00 | 10070.00 | 10128.92 | .78 | 162.57 | 4.87 | 926.30 | 85.04 | 8.9 |
| * | 1.474 | 2600.00 | 933.62 | 9045.72 | 9985.00 | 10015.00 | 10080.00 | 2.45 | 1034.28 | 5.62 | 928.00 | 45.12 | 8.1 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 1.517 | 2600.00 | 934.88 | 9266.45 | 9905.00 | 10080.00 | 10080.00 | 1.26 | 813.55 | 2.68 | 932.20 | 11.46 | 2.5 |
| * | 1.566 | 2600.00 | 936.21 | 9914.72 | 9955.00 | 10045.00 | 10065.00 | 1.33 | 150.28 | 3.71 | 932.50 | 77.73 | 9.0 |
| * | 1.634 | 2600.00 | 938.27 | 9832.50 | 9970.00 | 10025.00 | 10065.00 | 2.06 | 232.50 | 5.27 | 933.00 | 18.24 | 5.9 |
| | 1.680 | 2600.00 | 938.77 | 9761.32 | 9970.00 | 10025.00 | 10100.00 | .49 | 338.68 | 5.37 | 933.40 | 11.76 | 5.0 |
| * | 1.745 | 2600.00 | 939.17 | 9787.12 | 9960.00 | 10040.00 | 10210.00 | .40 | 422.88 | 5.37 | 933.80 | 4.82 | [illegible] |
| | 1.823 | 2600.00 | 939.41 | 9432.35 | 9970.00 | 10050.00 | 10255.00 | .25 | 822.65 | 4.51 | 934.90 | 5.20 | [illegible] |
| | 1.893 | 3200.00 | 939.63 | 9094.59 | 9960.00 | 10040.00 | 10195.73 | .22 | 1068.11 | 3.53 | 936.10 | 9.42 | 3.2 |
| * | 1.941 | 3200.00 | 939.73 | 8963.39 | 9975.00 | 10025.00 | 10022.97 | .10 | 692.81 | 3.43 | 936.30 | 26.07 | 2.9 |
| | 1.988 | 3200.00 | 939.84 | 8932.00 | 9950.00 | 10030.00 | 10013.66 | .11 | 672.07 | 3.54 | 936.30 | 26.25 | 2.2 |
| | 2.058 | 3200.00 | 940.75 | 8875.01 | 9970.00 | 10035.00 | 10022.81 | .91 | 738.12 | 4.15 | 936.60 | 25.52 | 3. |
| | 2.185 | 3200.00 | 942.06 | 9354.24 | 9965.00 | 10045.00 | 10030.43 | 1.31 | 339.25 | 4.86 | 937.20 | 40.31 | 4. |
| * | 2.297 | 3200.00 | 942.74 | 9459.49 | 9975.00 | 10040.00 | 10562.02 | .69 | 1102.53 | 4.94 | 937.80 | 2.56 | 1.5 |
| * | 2.371 | 3200.00 | 942.90 | 9294.95 | 9975.00 | 10030.00 | 10596.61 | .15 | 1301.66 | 3.50 | 939.40 | 6.69 | 2.2 |
| * | 2.435 | 3200.00 | 943.21 | 9342.47 | 9985.00 | 10085.00 | 10602.60 | .32 | 1260.13 | 3.31 | 939.90 | 22.18 | 4.2 |
| * | 2.536 | 3200.00 | 945.40 | 9868.57 | 9965.00 | 10060.00 | 10650.69 | 2.19 | 782.13 | 1.90 | 943.50 | 122.17 | 8.0 |
| * | 2.680 | 3200.00 | 948.59 | 9603.37 | 9925.00 | 10050.00 | 10675.04 | 3.19 | 965.08 | 3.39 | 945.20 | 18.00 | 4.3 |
| * | 2.771 | 3200.00 | 950.08 | 9654.95 | 9985.00 | 10020.00 | 10533.30 | 1.49 | 859.60 | 2.78 | 947.30 | 68.69 | 6.5 |
| * | 2.883 | 3200.00 | 952.33 | 9622.72 | 9985.00 | 10015.00 | 10420.39 | 2.25 | 797.68 | 3.83 | 948.50 | 23.39 | 4.9 |
| | 2.977 | 3200.00 | 953.69 | 9686.64 | 9980.00 | 10050.00 | 10409.07 | 1.36 | 722.43 | 3.79 | 949.90 | 42.65 | 6.7 |
| | 3.070 | 3200.00 | 955.63 | 9531.41 | 9945.00 | 10025.00 | 10570.24 | 1.94 | 1038.83 | 3.33 | 952.30 | 27.39 | 4.5 |
| | 3.167 | 2800.00 | 956.85 | 9575.02 | 9970.00 | 10020.00 | 10572.18 | 1.23 | 997.16 | 2.95 | 953.90 | 20.62 | 4.1 |
| * | 3.291 | 2800.00 | 959.20 | 9989.00 | 9970.00 | 10020.00 | 10825.92 | 2.35 | 816.91 | 2.00 | 957.20 | 78.62 | 4.5 |
| * | 3.376 | 2800.00 | 961.22 | 9769.59 | 9985.00 | 10015.00 | 10798.16 | 2.02 | 984.00 | 2.92 | 958.30 | 28.95 | 2.9 |



| | SECNO | Q | CWSEL | SSTA | STCHL | STCHR | ENDST | DIFWSX | TOPWID | DEPTH | ELMIN | 10*KS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.491 | 2800.00 | 962.63 | 9626.83 | 9980.00 | 10020.00 | 10601.60 | 1.41 | 974.78 | 3.13 | 959.50 | 18.97 | 3.3 |
| * | 3.602 | 2800.00 | 964.12 | 9740.57 | 9880.00 | 10100.00 | 10456.32 | 1.49 | 715.75 | 2.22 | 961.90 | 40.62 | 3.9 |



BULLARD WASH REVISED

SUMMARY PRINTOUT TABLE 110

| | SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .000 | 912.32 | .32 | 912.34 | 1245.30 | 625.17 | 160.26 | 64.57 | .00 | .00 | 9980.00 | 10120.00 | .0 |
| * | .047 | 912.55 | .00 | 912.55 | 1686.63 | 347.06 | 275.13 | 227.81 | .00 | .00 | 9960.00 | 10100.00 | .0 |
| | .121 | 912.73 | .00 | 912.74 | 1367.11 | 111.36 | 232.90 | 505.73 | .00 | .00 | 9980.00 | 10100.00 | .0 |
| | .201 | 913.03 | .00 | 913.05 | 1095.39 | 12.00 | 366.79 | 471.21 | .00 | .00 | 9970.00 | 10100.00 | .0 |
| | .292 | 913.39 | .00 | 913.41 | 939.73 | 7.85 | 301.57 | 540.57 | .00 | .00 | 9960.00 | 10070.00 | .0 |
| | .384 | 913.69 | .00 | 913.70 | 1604.23 | 9.94 | 241.92 | 598.14 | .00 | .00 | 9970.00 | 10095.00 | .0 |
| | .488 | 914.01 | .00 | 914.02 | 1469.90 | 1.13 | 141.84 | 707.02 | .00 | .00 | 9970.00 | 10090.00 | .0 |
| | .531 | 914.18 | .00 | 914.18 | 1385.91 | .06 | 37.19 | 812.75 | .00 | .00 | 9965.00 | 10090.00 | .0 |
| | .616 | 915.65 | .00 | 915.74 | 829.50 | .00 | 209.13 | 2990.87 | .00 | .00 | 9960.00 | 10090.00 | .0 |
| * | .668 | 917.86 | .00 | 918.27 | 624.05 | 909.37 | 594.67 | 1695.96 | .00 | .00 | 9950.00 | 10035.00 | .0 |
| * | .776 | 920.33 | .00 | 920.47 | 467.41 | .00 | 367.57 | 2832.43 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| | .868 | 921.47 | .00 | 921.68 | 448.84 | .00 | 483.09 | 2716.91 | .00 | .00 | 9970.00 | 10020.00 | [illegible] |
| | .964 | 923.56 | .00 | 923.95 | 435.58 | .00 | 1260.04 | 1939.96 | .00 | .00 | 9970.00 | 10045.00 | .0 |
| | 1.081 | 925.90 | .00 | 926.03 | 447.85 | .00 | 735.65 | 1860.35 | .00 | .00 | 9955.00 | 10090.00 | .0 |
| | 1.153 | 926.50 | .00 | 926.59 | 446.67 | .00 | 572.40 | 2023.60 | .00 | .00 | 9945.00 | 10060.00 | .0 |
| * | 1.236 | 927.42 | .00 | 928.35 | 240.49 | .00 | 1825.00 | 771.00 | .00 | .00 | 9960.00 | 10060.00 | .0 |
| * | 1.317 | 929.71 | .00 | 930.05 | 301.69 | .00 | 1652.08 | 943.92 | .00 | .00 | 9960.00 | 10050.00 | .0 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.378 | 930.39 | .00 | 930.64 | 371.09 | .00 | 1443.59 | 1152.41 | .00 | .00 | 9960.00 | 10035.00 | .0 |
| * | 1.435 | 931.17 | .00 | 932.39 | 162.57 | .00 | 2555.87 | 40.13 | .00 | .00 | 9965.00 | 10070.00 | .0 |
| * | 1.474 | 933.62 | .00 | 934.04 | 1034.28 | 1465.51 | 961.60 | 172.89 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| * | 1.517 | 934.88 | .00 | 934.94 | 813.55 | 1796.39 | 803.61 | .00 | .00 | .00 | 9905.00 | 10080.00 | .0 |
| * | 1.566 | 936.21 | .00 | 937.38 | 150.28 | 140.43 | 2399.14 | 60.43 | .00 | .00 | 9955.00 | 10045.00 | .0 |
| * | 1.634 | 938.27 | .00 | 938.66 | 232.50 | 727.29 | 1573.53 | 299.18 | .00 | .00 | 9970.00 | 10025.00 | .0 |
| | 1.680 | 938.77 | .00 | 939.01 | 338.68 | 805.50 | 1399.31 | 395.19 | .00 | .00 | 9970.00 | 10025.00 | .0 |



| | SECNO | CWSEL | DIFKWS | EG | TOPWID | QLOB | QCH | QROB | PERENC | STENCL | STCHL | STCHR | STENC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | 1.745 | 939.17 | .00 | 939.27 | 422.88 | 631.15 | 1328.97 | 639.89 | .00 | .00 | 9960.00 | 10040.00 | .0 |
| | 1.823 | 939.41 | .00 | 939.47 | 822.65 | 1094.01 | 896.10 | 609.89 | .00 | .00 | 9970.00 | 10050.00 | .0 |
| | 1.893 | 939.63 | .00 | 939.70 | 1068.11 | 2093.19 | 794.12 | 312.69 | .00 | .00 | 9960.00 | 10040.00 | .0 |
| * | 1.941 | 939.73 | .00 | 939.84 | 692.81 | 3029.18 | 170.82 | .00 | .00 | .00 | 9975.00 | 10025.00 | .0 |
| | 1.988 | 939.84 | .00 | 939.95 | 672.07 | 3142.10 | 57.90 | .00 | .00 | .00 | 9950.00 | 10030.00 | .0 |
| | 2.058 | 940.75 | .00 | 940.86 | 738.12 | 3025.59 | 174.41 | .00 | .00 | .00 | 9970.00 | 10035.00 | .0 |
| | 2.185 | 942.06 | .00 | 942.35 | 339.25 | 2713.02 | 486.98 | .00 | .00 | .00 | 9965.00 | 10045.00 | .0 |
| * | 2.297 | 942.74 | .00 | 942.77 | 1102.53 | 2686.13 | 263.33 | 250.54 | .00 | .00 | 9975.00 | 10040.00 | .0 |
| * | 2.371 | 942.90 | .00 | 942.93 | 1301.66 | 2467.40 | 301.72 | 430.88 | .00 | .00 | 9975.00 | 10030.00 | .0 |
| * | 2.435 | 943.21 | .00 | 943.33 | 1260.13 | 1605.23 | 1028.72 | 566.05 | .00 | .00 | 9985.00 | 10085.00 | .0 |
| * | 2.536 | 945.40 | .00 | 945.92 | 782.13 | 509.37 | 1365.33 | 1325.29 | .00 | .00 | 9965.00 | 10060.00 | .0 |
| * | 2.680 | 948.59 | .00 | 948.75 | 965.08 | 236.11 | 1592.26 | 1371.63 | .00 | .00 | 9925.00 | 10050.00 | .0 |
| * | 2.771 | 950.08 | .00 | 950.27 | 859.60 | 688.56 | 466.59 | 2044.85 | .00 | .00 | 9985.00 | 10020.00 | .0 |
| * | 2.883 | 952.33 | .00 | 952.45 | 797.68 | 1570.13 | 447.72 | 1182.15 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| | 2.977 | 953.69 | .00 | 954.07 | 722.43 | 1455.68 | 1405.91 | 338.41 | .00 | .00 | 9980.00 | 10050.00 | .0 |
| | 3.070 | 955.63 | .00 | 955.75 | 1038.83 | 926.78 | 847.29 | 1425.92 | .00 | .00 | 9945.00 | 10025.00 | .0 |
| | 3.167 | 956.85 | .00 | 956.94 | 997.16 | 1257.88 | 522.07 | 1020.05 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| * | 3.291 | 959.20 | .00 | 959.30 | 816.91 | .00 | 104.32 | 2695.68 | .00 | .00 | 9970.00 | 10020.00 | .0 |
| * | 3.376 | 961.22 | .00 | 961.28 | 984.00 | 57.04 | 94.79 | 2648.17 | .00 | .00 | 9985.00 | 10015.00 | .0 |
| | 3.491 | 962.63 | .00 | 962.68 | 974.78 | 803.54 | 268.56 | 1727.90 | .00 | .00 | 9980.00 | 10020.00 | .0 |
| * | 3.602 | 964.12 | .00 | 964.30 | 715.75 | 214.38 | 1902.96 | 682.66 | .00 | .00 | 9880.00 | 10100.00 | .0 |



SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      .047  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .668  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .776  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     1.236  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.236  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.236  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     1.317  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     1.435  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.435  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.435  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=     1.474  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.474  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     1.517  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     1.566  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     1.566  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     1.566  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     1.634  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     1.745  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

```
WARNING SECNO=      1.941  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.297  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.371  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.435  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      2.536  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      2.536  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      2.680  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.771  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      2.883  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.291  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.376  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      3.602  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
1
   29OCT94       10:57:59                                                                    PAGE   30
```

# APPENDIX D

# NORMAL DEPTH HYDRAULICS FOR CHANNELIZATION ALTERNATIVES

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 1, ONLY ALIGNMENT
CONCRETE SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0011 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 60.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 5.00 |
| Flow Velocity (feet per second) | 9.15 |
| Froude Number (Flow is Sub-Critical) | 0.771 |
| Velocity Head (feet) | 1.30 |
| Energy Head (feet) | 6.30 |
| Cross-Sectional Area of Flow (square feet) | 349.80 |
| Top Width of Flow (feet) | 79.99 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 1, ONLY ALIGNMENT
GROUTED RIPRAP SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0011 |
| Manning's Roughness Coefficient (n-value) | 0.0380 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 168.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 5.00 |
| Flow Velocity (feet per second) | 3.59 |
| Froude Number (Flow is Sub-Critical) | 0.291 |
| Velocity Head (feet) | 0.20 |
| Energy Head (feet) | 5.20 |
| Cross-Sectional Area of Flow (square feet) | 890.46 |
| Top Width of Flow (feet) | 188.01 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "A"
CONCRETE SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0186 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 25.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 3.51 |
| Flow Velocity (feet per second) | 28.48 |
| Froude Number (Flow is Super-Critical) | 2.958 |
| Velocity Head (feet) | 12.60 |
| Energy Head (feet) | 16.10 |
| Cross-Sectional Area of Flow (square feet) | 112.36 |
| Top Width of Flow (feet) | 39.04 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "A"
GROUTED RIPRAP SECTION, Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0186 |
| Manning's Roughness Coefficient (n-value) | 0.0380 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 40.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.86 |
| Flow Velocity (feet per second) | 13.24 |
| Froude Number (Flow is Super-Critical) | 1.158 |
| Velocity Head (feet) | 2.72 |
| Energy Head (feet) | 7.58 |
| Cross-Sectional Area of Flow (square feet) | 241.61 |
| Top Width of Flow (feet) | 59.44 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "A",EAST TRIBUTARY ALONG RAILROAD
CONCRETE SECTION, Q100=850 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 850.0 |
| Channel Bottom Slope (feet per foot) | 0.0037 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 6.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.58 |
| Flow Velocity (feet per second) | 12.26 |
| Froude Number (Flow is Super-Critical) | 1.280 |
| Velocity Head (feet) | 2.34 |
| Energy Head (feet) | 6.91 |
| Cross-Sectional Area of Flow (square feet) | 69.31 |
| Top Width of Flow (feet) | 24.30 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "A",EAST TRIBUTARY ALONG RAILROAD
GROUTED RIPRAP SECTION, Q100=850 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 850.0 |
| Channel Bottom Slope (feet per foot) | 0.0037 |
| Manning's Roughness Coefficient (n-value) | 0.0380 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 8.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 6.78 |
| Flow Velocity (feet per second) | 5.81 |
| Froude Number (Flow is Sub-Critical) | 0.502 |
| Velocity Head (feet) | 0.52 |
| Energy Head (feet) | 7.31 |
| Cross-Sectional Area of Flow (square feet) | 146.31 |
| Top Width of Flow (feet) | 35.14 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "B"
CONCRETE SECTION, Q100= 3200 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0034 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 50.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 3.94 |
| Flow Velocity (feet per second) | 14.02 |
| Froude Number (Flow is Super-Critical) | 1.327 |
| Velocity Head (feet) | 3.05 |
| Energy Head (feet) | 7.00 |
| Cross-Sectional Area of Flow (square feet) | 228.19 |
| Top Width of Flow (feet) | 65.77 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 2, ALIGNMENT "B"
GROUTED RIPRAP SECTION, Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0034 |
| Manning's Roughness Coefficient (n-value) | 0.0380 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 100.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.79 |
| Flow Velocity (feet per second) | 6.10 |
| Froude Number (Flow is Sub-Critical) | 0.512 |
| Velocity Head (feet) | 0.58 |
| Energy Head (feet) | 5.37 |
| Cross-Sectional Area of Flow (square feet) | 525.01 |
| Top Width of Flow (feet) | 119.16 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "A"
CONCRETE SECTION, DESIGN Q100= 3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0012 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 70.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.45 |
| Flow Velocity (feet per second) | 9.12 |
| Froude Number (Flow is Sub-Critical) | 0.803 |
| Velocity Head (feet) | 1.29 |
| Energy Head (feet) | 5.74 |
| Cross-Sectional Area of Flow (square feet) | 351.02 |
| Top Width of Flow (feet) | 87.80 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "A"
GROUTED RIPRAP SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0012 |
| Manning's Roughness Coefficient (n-value) | 0.0380 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 190.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.51 |
| Flow Velocity (feet per second) | 3.57 |
| Froude Number (Flow is Sub-Critical) | 0.302 |
| Velocity Head (feet) | 0.20 |
| Energy Head (feet) | 4.71 |
| Cross-Sectional Area of Flow (square feet) | 897.58 |
| Top Width of Flow (feet) | 208.04 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "A"
COMPOSITE SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0012 |
| Manning's Roughness Coefficient (n-value) | 0.0310 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 150.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.59 |
| Flow Velocity (feet per second) | 4.38 |
| Froude Number (Flow is Sub-Critical) | 0.370 |
| Velocity Head (feet) | 0.30 |
| Energy Head (feet) | 4.89 |
| Cross-Sectional Area of Flow (square feet) | 730.65 |
| Top Width of Flow (feet) | 168.36 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "A"
EARTH (UNLINED) SECTION, DESIGN Q100=3200CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0012 |
| Manning's Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 4.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 4.00 |
| Channel Bottom Width (feet) | 355.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 2.95 |
| Flow Velocity (feet per second) | 2.96 |
| Froude Number (Flow is Sub-Critical) | 0.308 |
| Velocity Head (feet) | 0.14 |
| Energy Head (feet) | 3.09 |
| Cross-Sectional Area of Flow (square feet) | 1081.94 |
| Top Width of Flow (feet) | 378.60 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "C",NORTH OF BROADWAY ROAD
CONCRETE SECTION, Q100=3200 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0029 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 42.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 4.54 |
| Flow Velocity (feet per second) | 13.78 |
| Froude Number (Flow is Super-Critical) | 1.237 |
| Velocity Head (feet) | 2.95 |
| Energy Head (feet) | 7.49 |
| Cross-Sectional Area of Flow (square feet) | 232.18 |
| Top Width of Flow (feet) | 60.18 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "C",SOUTH OF BROADWAY ROAD
CONCRETE SECTION, Q100=3200 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0004 |
| Manning's Roughness Coefficient (n-value) | 0.0140 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 150.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 3.97 |
| Flow Velocity (feet per second) | 5.11 |
| Froude Number (Flow is Sub-Critical) | 0.463 |
| Velocity Head (feet) | 0.41 |
| Energy Head (feet) | 4.37 |
| Cross-Sectional Area of Flow (square feet) | 626.37 |
| Top Width of Flow (feet) | 165.86 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "C",NORTH OF BROADWAY ROAD
EARTH SECTION, Q100=3200 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0029 |
| Manning's Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 4.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 4.00 |
| Channel Bottom Width (feet) | 225.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 2.96 |
| Flow Velocity (feet per second) | 4.57 |
| Froude Number (Flow is Sub-Critical) | 0.480 |
| Velocity Head (feet) | 0.32 |
| Energy Head (feet) | 3.28 |
| Cross-Sectional Area of Flow (square feet) | 700.64 |
| Top Width of Flow (feet) | 248.67 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

October 25, 1994
BULLARD WASH OUTFALL STUDY
SEGMENT 3, ALIGNMENT "C",SOUTH OF BROADWAY ROAD
EARTH SECTION, Q100=3200 CFS

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 3200.0 |
| Channel Bottom Slope (feet per foot) | 0.0004 |
| Manning's Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 4.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 4.00 |
| Channel Bottom Width (feet) | 600.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 3.00 |
| Flow Velocity (feet per second) | 1.74 |
| Froude Number (Flow is Sub-Critical) | 0.179 |
| Velocity Head (feet) | 0.05 |
| Energy Head (feet) | 3.05 |
| Cross-Sectional Area of Flow (square feet) | 1836.63 |
| Top Width of Flow (feet) | 624.01 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

# APPENDIX E

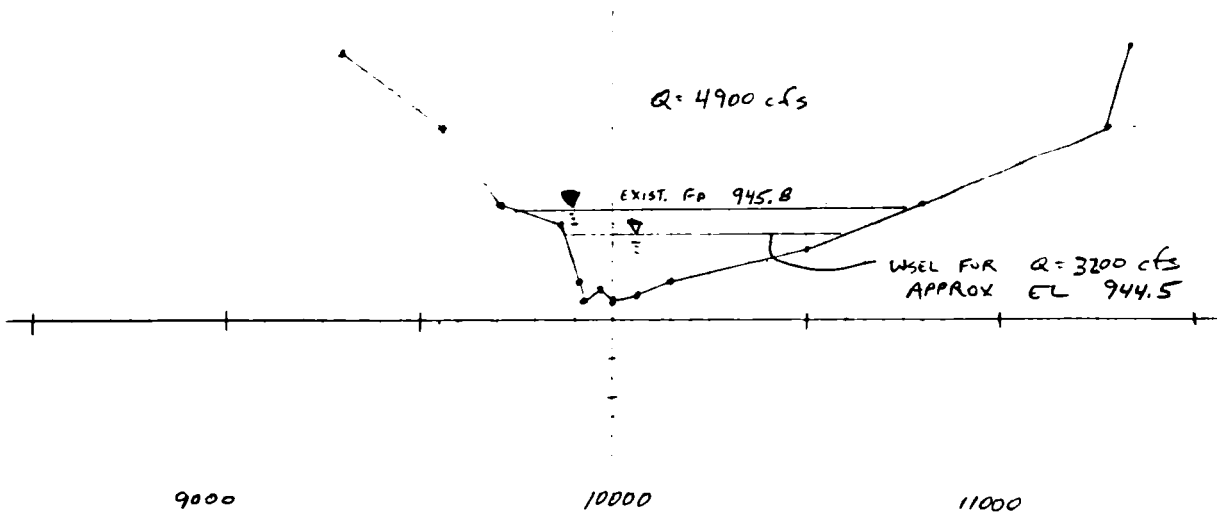
# TECHNICAL DATA FOR DETENTION BASIN ALTERNATIVES

| | | | |
|---|---|---|---|
| DESIGNED BY SW | DATE 8/5/94 | SHEET NO. 1 | PAGE NO. |
| CHECKED BY C-CB | DATE 10-21-94 | OF 6 | JOB NO. 12278 |
| REVIEWED BY | DATE | SUBJECT: BULLARD WASH | |
| APPROVED BY | DATE | | |

DETENTION BASIN 1 BULLARD WASH

ORIG. HEC-2 CROSS SECTION (WLB WHITE TANKS / AGUA FRIA ADMS)

SECTION
2.536




ASSUME THAT SIMILAR CROSS SECTIONS EXIST FOR SOME LENGTH UPSTREAM AND DOWNSTREAM.

FOR INLET DESIGN, THE CHANNEL ADJACENT TO THE NORTHEAST CORNER AND UPSTREAM WILL BE LINED TO PROVIDE A MORE STABLE HYDRAULIC SECTION.

BASED ON THE UPDATED HEC-1 PEAK DISCHARGE OF Q = 3200 cfs AND THE UPDATED HEC-2 APPROXIMATED WATER SURFACE ELEVATION OF 944.5, THE DESIGN HIGH WATER ELEVATION OF THE BASIN WILL BE 944.5.

THE BASIN INLET AND OUTLET WILL NOT BE OPTIMIZED FOR THIS STAGE OF DESIGN. THE OVERALL EFFECTS OF THE BASIN WILL BE CONSIDERED RELATIVE TO THE REVISED HYDROLOGY.

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

INLET: THE BASIN IS AN INLINE BASIN WITH FLOW THROUGH CHANNEL. THE FLOW UPSTREAM OF THE BASIN MUST BE COLLECTED VIA SOME FORM OF INLET HYDRAULICS. THE REVISED FLOODPLAIN IS APPROXIMATELY 800 FT WIDE AT THIS LOCATION.

THE MAIN CHANNEL FLOW WILL BE DIRECTED TOWARDS THE BASIN. FOR THE EAST OVERBANK AREAS, CHANNELIZATION OR THE USE OF A DIVERSION BERM MAY BE NECESSARY. THE WEST OVERBANK FLOWS WILL BE DIVERTED TOWARDS THE MAIN CHANNEL OR ALLOWED TO ENTER THE BASIN ALONG ITS NORTHERN BOUNDARY.

UPSTREAM CHANNEL LINING OR STABILIZATION MAY ALSO BE REQUIRED. THE INLET AND FLOW THROUGH CHANNEL WILL BE DESIGNED ACCORDINGLY. CP335 OF THE ORIGINAL ADMS HEC-1 MODEL IS USED AS THE LOCATION OF THE DETENTION BASIN.

OUTLET: THE TOTAL VOLUME STORED IS APPROXIMATELY 1200 AC-FT. IN ORDER TO DRAIN THE BASIN WITHIN A REASONABLE TIME PERIOD (ie, 36 HRS) AND MAINTAIN THE DESIGN HIGH WATER SURFACE ELEVATION, THE OUTLET RESULTED IN 4-60" RCP. THE UPSTREAM INVERT ELEVATION OF PIPES IS 929.0. THE DOWNSTREAM INVERT ELEVATION OF PIPES IS 926.5. THE LENGTH OF PIPE IS ESTIMATED AT 1000 FT WHICH PRODUCES A MINIMUM SLOPE OF 0.25 %.

THE ESTIMATED PEAK DISCHARGE DOWNSTREAM OF THE BASIN IS 1355 cfs. THEREFORE, THE DOWNSTREAM CHANNEL WILL BE DESIGNED FOR 1400 cfs INSTEAD OF 3200 cfs (APPROX. 58% REDUCTION OF PEAK Q).

INLET CONTROL IS ASSUMED FOR THE OUTLET PIPES.

BASIN: THE BASIN WAS DESIGNED CONCEPTUALLY. THE FOLLOWING PAGE CONTAINS THE ELEVATION-STORAGE DATA COLLECTED FROM THE PRELIMINARY BASIN GRADING PLANS AND LISTS THE GENERAL BASIN DESIGN PARAMETERS AND ASSUMPTIONS. THE MAXIMUM DEPTH OF THE BASIN IS APPROX 15.5 FT, THE AVERAGE DEPTH IS APPROXIMATELY 10 FT, AND THE AREA OF THE BASIN (W/O INLET AND OUTLET) IS APPROX 126 AC.

STANLEY CONSULTANTS, INC.
BULLARD WASH OUTFALL PROJECT
DETENTION BASIN ALTERNATIVE

3/6

Design by: SW 10/10/94
Checked by: JSB 10-21-94

WATER SURFACE ELEVATION-STORAGE RELATIONSHIP BASIN 1

| Elevation | Surface Area (acre) | Average Surface Area (acre) | Difference in Elevation (ft) | Interval Storage (acre-ft) | Storage (acre-ft) | Storage (cu. ft.) |
|---|---|---|---|---|---|---|
| 929.00 | 0.00 | | | | 0.00 | 0 |
| | | 0.92 | 1.00 | 0.92 | | |
| 930.00 | 1.84 | | | | 0.92 | 40,075 |
| | | 7.35 | 2.00 | 14.70 | | |
| 932.00 | 12.86 | | | | 15.62 | 680,407 |
| | | 23.88 | 2.00 | 47.75 | | |
| 934.00 | 34.89 | | | | 63.37 | 2,760,397 |
| | | 45.00 | 2.00 | 89.99 | | |
| 936.00 | 55.10 | | | | 153.36 | 6,680,362 |
| | | 66.12 | 2.00 | 132.23 | | |
| 938.00 | 77.13 | | | | 285.59 | 12,440,300 |
| | | 89.99 | 2.00 | 179.98 | | |
| 940.00 | 102.85 | | | | 465.57 | 20,280,229 |
| | | 114.33 | 2.00 | 228.65 | | |
| 942.00 | 125.80 | | | | 694.22 | 30,240,223 |
| | | 125.80 | 2.00 | 251.60 | | |
| 944.00 | 125.80 | | | | 945.82 | 41,199,919 |
| | | 125.80 | 2.00 | 251.60 | | |
| 946.00 | 125.80 | | | | 1197.42 | 52,159,615 |

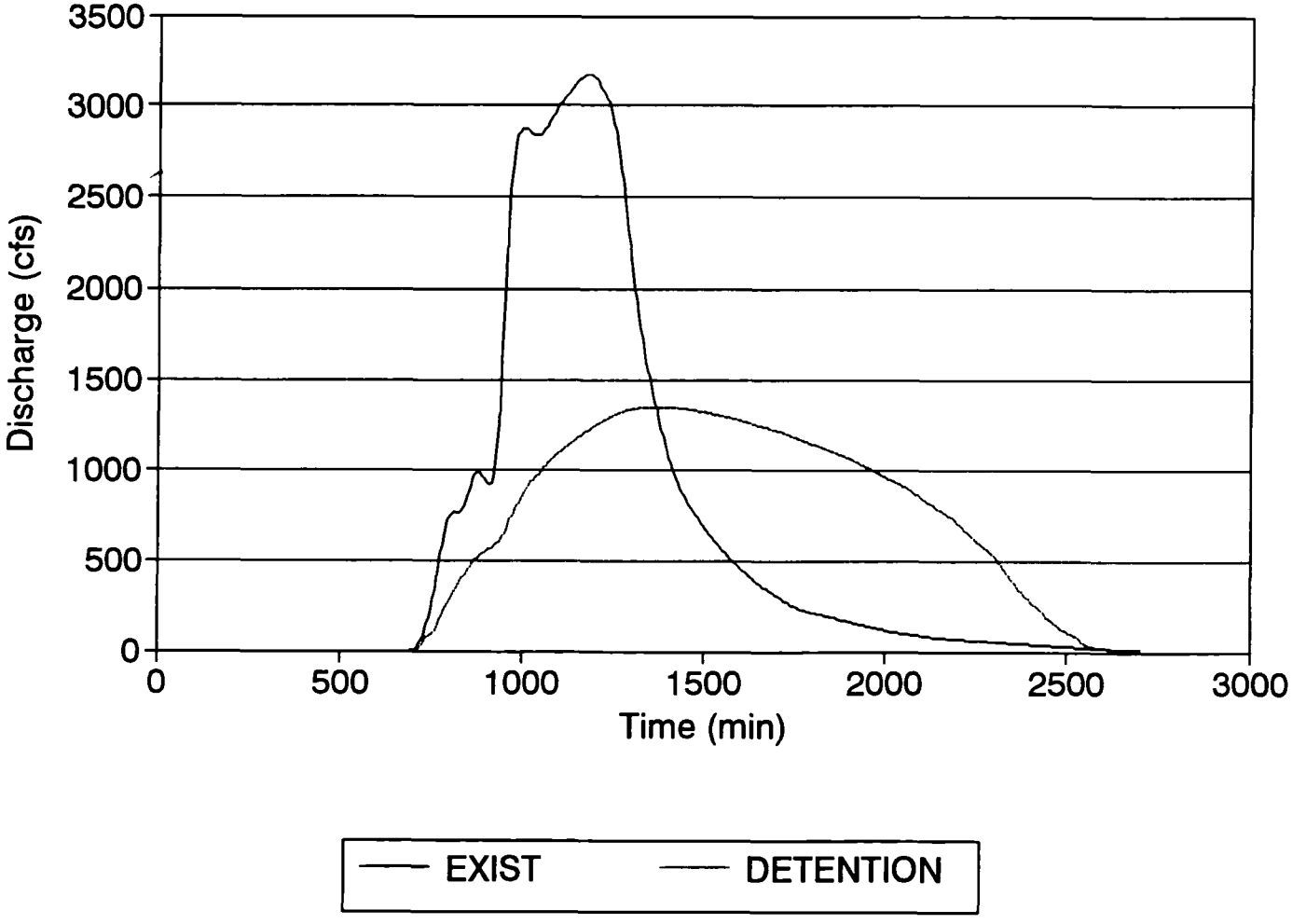
DETENTION BASIN DESIGN PARAMETERS AND ASSUMPTIONS:

1. BASIN LOCATED IN PARCEL AS SHOWN ON CONCEPT ALTERNATIVE EXHIBIT
2. TOTAL SURFACE AREA USED BY BASIN IS APPROXIMATELY 126 AC.
3. BASIN SIDES ARE 4:1 UNLINED SLOPES
4. BASIN BOTTOM IS AT MIN SLOPE OF 0.50% AND UNLINED
5. OUTFALL ELEVATION IS 929.0
6. MAXIMUM HIGH WATER IN BASIN IS 944.5 WHICH IS APPROX. 1' BELOW THE ESTIMATED WSEL IN BULLARD WASH ADJACENT TO THE BASIN IN THE ADMS AND EQUAL TO THE REVISED WSEL @ $Q_p = 3200$ cfs.
7. THE SOUTHERN BOUNDARY UTILIZES A BERM OF MAXIMUM HEIGHT 6' ABOVE EXISTING GROUND. (LENGTH OF BERM APPROX. 4000')
8. TOTAL AVAILABLE STORAGE VOLUME IS APPROX. 1200 AC-FT.

4/6 DESIGNED BY: SW 10/10/94
GKB 10-21-94

# BULLARD WASH OUTFALL FEASIBILITY STUDY

## CP335 HYDROGRAPHS FROM ADMS (REVISED)



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DETENTION BASIN 2 EAST LOCAL TRIBUTARY

NOTE: BASED ON THE EXISTING HYDROLOGY AND CURRENT ALTERNATIVES CONSIDERED, THE USE OF A DETENTION BASIN ON THE EAST LOCAL TRIBUTARY IS PRODUCTIVE ONLY IF A DETENTION BASIN IS PROPOSED FOR THE MAIN BULLARD WASH. AS THE HYDROGRAPH COMPARISON ON THE FOLLOWING GRAPH SHOWS, THE LOCAL TRIBUTARY'S PEAK FLOW COMES AND GOES BEFORE THE MAIN BULLARD WASH FLOWS, CONTRIBUTING VERY LITTLE TO THE MAIN HYDROGRAPH PEAK FLOW. DUE TO THIS REASON AND THE POTENTIAL CONFLICTS WITH THE LOCATION OF A BASIN FOR THE LOCAL TRIBUTARY, THE DETENTION BASIN IS CONSIDERED CONCEPTUALLY AND SIZED BASED ON HYDROGRAPHS AND GENERAL ASSUMPTIONS. NO ATTEMPT TO ESTIMATE THE EFFECTS ON THE PEAK DISCHARGE HAS BEEN MADE. 50% OF THE TOTAL TRIBUTARY VOLUME IS USED AS THE MINIMUM DESIGN VOLUME FOR DETENTION BASIN 2.

BASIN OUTFALL ELEVATION: 921.0

BASIN BOTTOM ELEVATION: 922.0

EXISTING GROUND ELEVATION: 932.0 (MIN)

ASSUME MAX DEPTH IN BASIN IS 8 FT

ASSUME LOWEST DEPTH IN BASIN WHEN FULL IS 4 FT

THEREFORE AVERAGE DEPTH IS 6 FT

50% OF TOTAL HYDROGRAPH VOLUME IS $0.50(210) = 105$ AC.FT

REQUIRED AREA IS $\frac{105 \text{ AC.FT}}{6 \text{ FT}} = 17.5$ AC OR 762,300 $FT^2$

THE BASIN SHOWN ON EXHIBIT 3 CONSISTS OF AN AREA OF APPROXIMATELY 23 ACRES. 4:1 SIDE SLOPES ARE PROVIDED FOR.

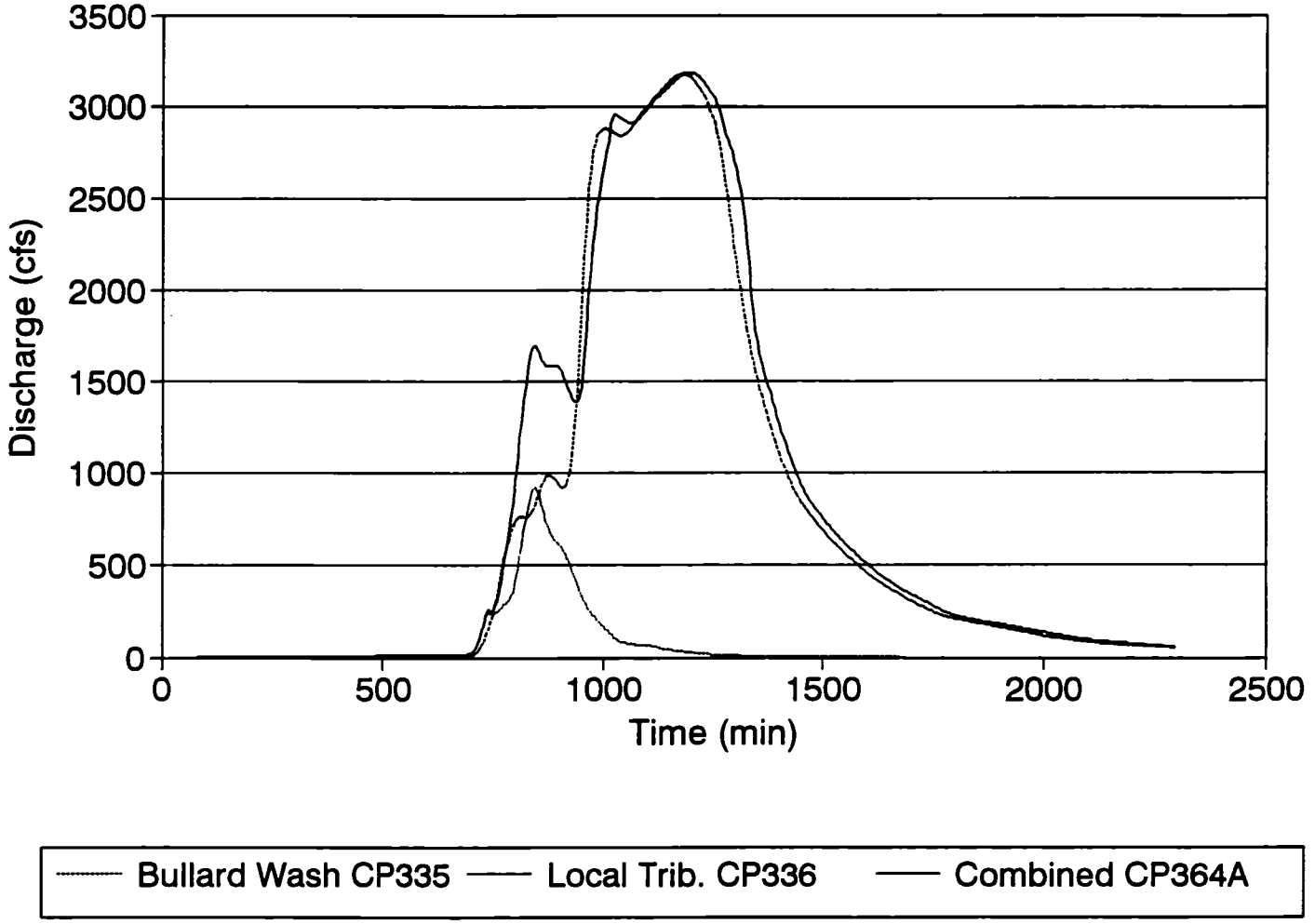
TOTAL ESTIMATED STORAGE VOLUME IS 130 AC.FT

THE APPROXIMATE LOCATION OF THE EAST LOCAL TRIBUTARY DETENTION BASIN IS DISPLAYED ON THE CONCEPT ALTERNATIVE SHEET.

6/6 DESIGNED BY SW 10/10/94
GSB 10-21-94

# BULLARD WASH OUTFALL FEASIBILITY STUDY

## HYDROGRAPHS FROM ADMS (REVISED)



# APPENDIX F

# QUANTITIES AND COSTS

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QUANTITIES AND COSTS:

THE FOLLOWING UNIT COSTS ARE USED FOR ALL COST ESTIMATES:

| DESCRIPTION | UNIT | UNIT COST |
|---|---|---|
| EXCAVATION | C.Y. | $ 3.00 |
| STRUCTURAL CONCRETE (INCLUDING REIN STEEL) | C.Y. | $ 250 |
| RIP RAP (HAND PLACED - GROUTED) | S.Y. | $ 30.00 |
| CRUSHED GRANITE | C.Y. | $ 25.00 |
| FENCING (6' CHAIN LINK - GATES) | L.F. | $ 8.00 |
| HIGHWAY BRIDGE | S.F. | $ 50 |
| RAILROAD BRIDGE | S.F. | $ 75 |
| RIGHT OF WAY (LAND PURCHASED) | | |
| - AGRICULTURAL | AC | $ 9000 |
| - FRONTAGE | AC | $ 14000 |

NOTES: EXCAVATION IS ASSUMED TO BE OF LEVEL GROUND WITH MINOR OVEREXCAVATION FOR STRUCTURAL NEEDS.

STRUCTURAL CONCRETE IS ESTIMATED FROM ADOT STANDARDS WHERE APPLICABLE AND ESTIMATED FROM GENERAL DIMENSIONS ELSEWHERE.

ALL DIMENSIONS ARE APPROXIMATE AND MAY VARY AROUND BENDS, OVER OR THROUGH STRUCTURES, AND FOR NON-UNIFORM FLOW CONDITIONS.

FLOODPLAIN STATUS IS ASSUMED TO NOT AFFECT RIGHT-OF-WAY COSTS. RIGHT-OF-WAY NEEDS WITHIN THE PHOENIX-GOODYEAR AIRPORT ARE ASSUMED TO BE NO COST (DONATED)

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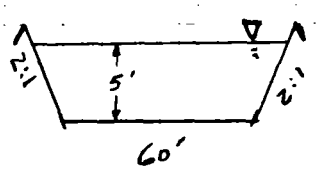
SEGMENT 1

CONCRETE CHANNEL $Q = 3200$ cfs

LENGTH = 3200 FT

6" REINFORCED CONCRETE FOR BOTH BOTTOM AND SIDES.

1' MIN FREEBOARD




EXCAVATION:

DEPTH = 7' (DEPTH PLUS 1' FREEBOARD PLUS 1' OVEREXCAVATION)

WIDTH = 60' + 2×7' + 4' (OVER EXCAVATION FOR SIDE CONST)

= 78'

VOLUME = (7')(78')(3200')/27 = 64,711 C.Y.

COST $3.00 C.Y. = $194,100

STRUCTURAL CONCRETE:

THICKNESS = 0.5'

WIDTH = $60' + 2\sqrt{6^2 + 12^2} + 2(2) = 91'$

VOLUME = (0.5')(91')(3200')/27 = 5392 C.Y.

COST $250 C.Y. $1,348,100

MAINTENANCE ROADS:

WIDTH = 14' (BOTH SIDES) = 28'

3" GRANITE = 0.25'

VOLUME = (0.25')(28')(3200')/27 = 830 C.Y.

COST $25 C.Y. $20,800

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SEGMENT 1

CONCRETE CHANNEL (CONTINUED)

FENCING:

LENGTH = 2(3200') = 6400 L.F.

COST $ 8.00 L.F. $ 51,200

RIGHT OF WAY:

LENGTH = 3200 FT

WIDTH = 60' + (2)(2)(6) + 2(20) = 124'

(LEAVES 6' ON EACH SIDE UNUSED)

AREA = (3200)(124) / 43560 = 9.1 AC

COST $0 AIRPORT LAND

| | |
|---|---|
| TOTAL CONSTRUCTION COST | $ 1,614,200 |
| 10% CONTINGENCY | $ 161,400 |
| RIGHT OF WAY | $ 0 |
| TOTAL PROJECT COST | $ 1,775,600 |

NOTE: COSTS DO NOT REFLECT UTILITY OR IRRIGATION RELOCATION

COSTS DO NOT INCLUDE ENGINEERING DESIGN OR CONSTRUCTION MANAGEMENT FEES.

| | | | |
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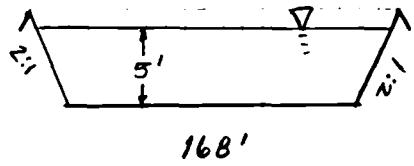
SEGMENT 1

RIP RAP CHANNEL

Q = 3200 cfs

LENGTH = 3200 FT

GROUTED HAND PLACED RIPRAP BOTTOM AND SIDES.




EXCAVATION: VOLUME = 154311 C.Y. COST $ 462,900

RIPRAP: WIDTH = $168' + 2\sqrt{6^2+12^2} + 2(2) = 199'$

AREA = (199')(3200')/9 = 70756 S.Y.

COST $30 S.Y. $ 2,122,700

MAINTENANCE ROADS: (SAME AS PREVIOUS) $ 20,800

FENCE: (SAME AS PREVIOUS) $ 51,200

RIGHT OF WAY: LENGTH = 3200 FT

WIDTH = 168' + (2)(2)(6) + 2(20) = 232 FT

AREA = (3200)(232)/43560 = 17 AC

COST $ 0

| | |
|---|---|
| TOTAL CONSTRUCTION COST | $ 2,657,600 |
| 10% CONTIGENCY | $ 265,800 |
| RIGHT OF WAY | $ 0 |
| TOTAL PROJECT COST | $ 2,923,400 |

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SEGMENT 2 ALIGNMENT A

CONCRETE CHANNEL

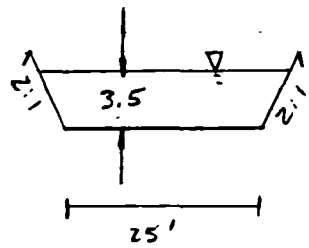
Q = 3200 cfs

LENGTH = 1800 FT

6" REINFORCED CONCRETE

SUPER CRITICAL FLOW

MIN FREEBOARD = 2 FT




EXCAVATION:

DEPTH = 3.5' + 2' (FREEBOARD) + 1' (OVEREXCAVATION) = 6.5'

WIDTH = 25' + 2(6.5) + 4' = 42'

VOLUME = (6.5')(42')(1800')/27 = 18,200 C.Y.

COST $54,600

STRUCTURAL CONCRETE:

THICKNESS = 0.5'

WIDTH = $25' + 2\left(\sqrt{5.5^2 + 11^2} + 2/2\right) = 54'$

VOLUME = (0.5')(54')(1800')/27 = 1800 C.Y.

COST $450,000

MAINTENANCE ROADS: 28'(1800')(0.25')/27 = 467 C.Y.

COST $11,700

FENCING LENGTH = 2(1800) = 3600 L.F.

COST $28,800

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SEGMENT 2 ALIGNMENT A

CONCRETE CHANNEL (CONTINUED)

RIGHT OF WAY:

LENGTH = 1800 FT

WIDTH = 25' + (2)(2)(6.5) + 2(20) = 91 FT

AREA = (1800)(91)/43560 = 3.8 AC

COST $ 0

RAILROAD BRIDGE: LENGTH (IN DIRECTION OF TRACKS) IS EQUAL TO THE TOP WIDTH OF CHANNEL (INCLUDING FREEBOARD) PLUS 10 FT EACH SIDE OR 20 FT TOTAL

LENGTH = 47 + 20 = 67 FT

WIDTH APPROX 20 FT

AREA = 67(20) = 1340 S.F.

COST $75 S.F. $100,500

RAILROAD CULVERT: INLET CONTROL BOX CULVERTS.
Q = 3200 cfs

6 - 10' WIDE x 6' HIGH
WINGWALLS AND MAX COVER TO ACCOUNT FOR RAILROAD LOADING

ADOT STD NO. B-02.05 TABLE V
ADOT STD NO. B-02.70 QUANTITIES

C.Y. = 9.724 PER L.F. OF CULVERT
LENGTH = 20 FT

20(9.724) x $250 C.Y. $48,600

HEADWALLS ADOT STD B-05.20 0° SKEW
SIX BARREL INLET 18.53 C.Y. x $250 > $12,600 TOTAL
SIX BARREL OUTLET 31.69 C.Y. x $250 $61,200

SC 3020

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SEGMENT 2 ALIGNMENT A

CONCRETE CHANNEL (CONTINUED)

MCBS BRIDGE: LENGTH (SAME AS FOR RAILROAD) : 67 FT

WIDTH : 48 FT

AREA : 3216 S.F.

COST $50 S.F. $160,800

MCBS CULVERT: SAME AS FOR RAILROAD EXCEPT FOR MINIMUM FILL 0-10'

ADOT STD NO. B-02.60 TABLE I
ADOT STD NO. B-02.70 QUANTITIES

C.Y. : 6.222 PER L.F.

LENGTH : 48 FT

48 (6.222) × $250 $ 74,700

HEADWALLS ADOT STD B-05.20 0° SKEW
(SAME AS RAILROAD) $12,600

TOTAL $87,300

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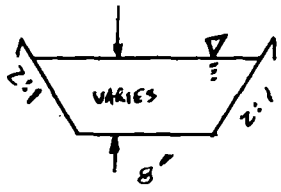
SEGMENT 2 ALIGNMENT A EAST TRIBUTARY

CONCRETE AND RIPRAP CHANNELS

EAST TRIBUTARY CHANNEL FROM LOCATION OF SEGMENT 2 ALIGNMENT B TO SEGMENT 2 ALIGNMENT A. THIS DISTANCE WILL REFLECT THE DIFFERENCE BETWEEN THE TWO ALTERNATIVES. CHANNELIZATION MAY BE REQUIRED UPSTREAM OF ALIGNMENT B BUT IS NOT INCLUDED IN THIS REPORT.

Q = 850 cfs

TYPICAL CHANNEL SECTION IS TRAPEZOIDAL RIP RAP LINED.




LENGTH = 2150 FT × 40 FT = 86000 S.F / 9 = 9555 S.Y.

GROUTED RIPRAP $30 S.Y. $ 286,700

EXCAVATION = 12,300 C.Y. × $3.00 C.Y. $ 36,900

MAINTENANCE ROAD = 280 C.Y. × $25 C.Y. $ 7,000
(3" GRANITE)

FENCING = 4300 L.F. × $8 L.F. $34,400

(CONSTRUCTION) TOTAL $365,000

RIGHT OF WAY TOTAL $ 0

SC 3020

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SEGMENT 2 ALIGNMENT A

CONCRETE CHANNEL (CONTINUED)

| | | |
|---|---|---|
| COST SUMMARY: | BULLARD CHANNEL (CONSTRUCTION COST) | $ 545,100 |
| | RAILROAD CULVERT | $ 61,200 |
| | MC 85 CULVERT | $ 87,300 |
| | EAST TRIBUTARY CHANNEL | $ 365,000 |
| | CONSTRUCTION COST | $1,058,600 |
| | 10% CONTINGENCY | $ 105,900 |
| | RIGHT OF WAY | $ 0 |
| | TOTAL PROJECT COST | $ 1,164,500 |

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SEGMENT 2 ALIGNMENT A

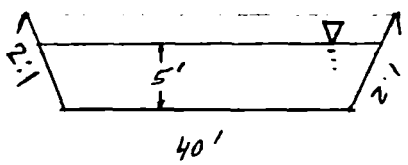
RIPRAP CHANNEL

Q = 3200 cfs

LENGTH = 1800 FT

GROUTED HAND PLACED RIPRAP

SUPERCRITICAL 2FT FREEBOARD




EXCAVATION: VOLUME = 32,000 C.Y. COST $96,000

RIPRAP: WIDTH = $40' + 2\sqrt{7^2 + 14^2} + 2(2) = 60'$

AREA: $60'(1800')/9$ = 12 000 S.Y.

COST $360,000

MAINTENANCE ROADS: (SAME AS PREVIOUS) $11,700

FENCING: (SAME AS PREVIOUS) $28,800

RIGHT OF WAY: LENGTH = 1800 FT

WIDTH = $40' + (2)(2)(7) + 2(20) = 108$ FT

AREA = 4.5 AC

COST 0

| | | | |
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SEGMENT 2 ALIGNMENT A

RIPRAP CHANNEL (CONTINUED)

RAILROAD BRIDGE: LENGTH = 88 FT

WIDTH = 20 FT

AREA = 1760 S.F.

COST $75 S.F. $132,000

RAILROAD CULVERT: (SAME AS CONCRETE CHANNEL PREVIOUS)

COST $61,200

MCDS BRIDGE: LENGTH SAME AS RAILROAD ABOVE = 88 FT

WIDTH = 48 FT

AREA = 4224 S.F.

COST $50 S.F. $211,200

MCDS CULVERT (SAME AS CONCRETE CHANNEL PREVIOUS)

$87,300

EAST TRIBUTARY CHANNEL: (SAME AS FOR CONCRETE CHANNEL)

$365000 CONSTRUCTION

$0 RIGHT OF WAY

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SEGMENT 2 ALIGNMENT A

RIPRAP CHANNEL (CONTINUED)

COST SUMMARY:

| | |
|---|---|
| BULLARD CHANNEL | $ 496,500 |
| RAILROAD CULVERT | $ 61,200 |
| MC 85 CULVERT | $ 07,300 |
| EAST TRIBUTARY CHANNEL | $ 365,000 |
| CONSTRUCTION COST | $ 1,010,000 |
| 10% CONTINGENCY | $ 101,000 |
| RIGHT OF WAY | $ 0 |
| TOTAL PROJECT COST | $ 1,111,000 |

| | | | |
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SEGMENT 2 ALIGNMENT B

CONCRETE CHANNEL

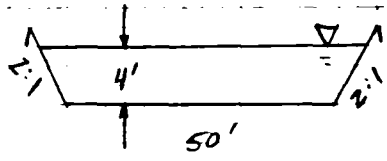
Q = 3200 cfs

LENGTH = 5350 FT

6" REINFORCED CONCRETE

SUPER CRITICAL FLOW

MIN FREEBOARD = 2 FT




EXCAVATION: VOLUME = 94,300 C.Y. COST $283,000

STRUCTURAL CONCRETE: 8008 C.Y. COST $2,002,100

MAINTENANCE ROADS: 28'(5350)(.25')/27 = 1387 C.Y.

COST $34,700

FENCING: 2(5350) = 10700 LF. COST $85,600

RIGHT OF WAY: AREA: 14AC 6.5 AC SOUTH OF MC85

$14,000 AC (FRONTAGE) COST $91,000

(ASSUME NO R/W COST WITHIN AIRPORT)

| | | | |
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SEGMENT 2 ALIGNMENT B

CONCRETE CHANNEL (CONTINUED)

RAILROAD BRIDGE: LENGTH = 94 FT

WIDTH = 20 FT

AREA = 1880 S.F.

COST $75 S.F. $141,000

RAILROAD CULVERT: (SAME AS OTHER RAILROAD CULVERTS)

$61,200

MC85 BRIDGE: LENGTH = 94 FT

WIDTH = 48 FT

AREA = 4512 S.F.

COST $50 S.F. $225,600

MC85 CULVERT: (SAME AS OTHER MC85 CULVERT)

$87,300

COST SUMMARY:

| | |
|---|---|
| BULLARD CHANNEL | $2,405,400 |
| RAILROAD CULVERT | $61,200 |
| MC85 CULVERT | $87,300 |
| CONSTRUCTION COST | $2,553,900 |
| 10% CONTINGENCY | $255,400 |
| RIGHT OF WAY | $91,000 |
| TOTAL PROJECT COST | $2,900,300 |

| | | | |
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SEGMENT 2 ALIGNMENT B

RIPRAP CHANNEL

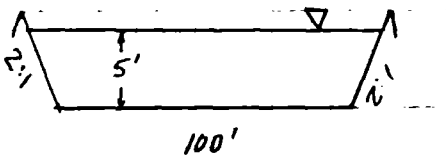
Q = 3200 cfs

LENGTH = 5350 FT

GROUTED HAND PLACED RIPRAP

SUB-CRITICAL FLOW

1' FREEBOARD




EXCAVATION: VOLUME = 163,670 C.Y. $491,000

RIPRAP: WIDTH = 131' AREA = 77872 S.Y.

COST $2,336,200

MAINTENANCE ROADS: (SAME AS PREVIOUS)

COST $34,700

FENCING: (SAME AS PREVIOUS) COST $85,600

RIGHT OF WAY WIDTH = 164' AREA = 20.1 AC

9.4 AC SOUTH OF MCBS

$14000 AC FRONTAGE COST $131,600

(ASSUME NO R/W COST WITHIN AIRPORT)

| | | | |
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SEGMENT 2 ALIGNMENT B

RIPRAP CHANNEL (CONTINUED)

RAILROAD BRIDGE: LENGTH = 144 FT

WIDTH = 20 FT

AREA = 2880 S.F.

COST $75 S.F. $216,000

RAIROAD CULVERT: (SAME AS OTHER RAILROAD CULVERTS)

$ 61,200

MCBS BRIDGE: LENGTH = 144 FT

WIDTH = 48 FT

AREA = 6912 S.F.

COST $50 S.F. $ 345,600

MCBS CULVERT (SAME AS OTHER MCBS CULVERTS)

$ 87,300

COST SUMMARY:

| | |
|---|---|
| BULLARD CHANNEL | $ 2,947,500 |
| RAILROAD CULVERT | $ 61200 |
| MCBS CULVERT | $ 87300 |
| CONSTRUCTION COST | $ 3,096,000 |
| 10% CONTINGENCY | $ 309,600 |
| RIGHT OF WAY | $ 131,600 |
| TOTAL PROJECT COST | $ 3,537,200 |

| | | | |
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SEGMENT 3 ALIGNMENT A (OR B)

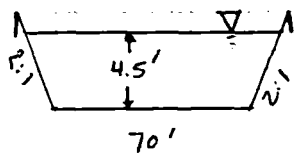
CONCRETE CHANNEL

Q = 3200 cfs

6" REIN CONCRETE

1' FREEBOARD

LENGTH = 4200 FT




EXCAVATION: DEPTH = 4.5' + 1' + 1' = 6.5'

WIDTH = 70' + 2(6.5') + 4' = 87'

VOLUME = (6.5)(87)(4200)/27 = 88000 C.Y.

COST $263,900

STRUCTURAL CONCRETE: THICKNESS = 0.5'

WIDTH = 70' + 2 $\sqrt{5.5^2 + 11^2}$ + 2(2) = 99'

VOLUME = (.5)(99)(4200)/27 = 7700 C.Y.

COST $250 C.Y. $1,925,000

MAINTENANCE ROADS: 28'(4200')(.25')/27 = 1088 C.Y.

COST $25 C.Y. $27,200

FENCING: LENGTH = 2(4200) = 8400 L.F.

COST $8 L.F. $67,200

RIGHT OF WAY: LENGTH = 4200 FT

WIDTH = 70' + (2)(2)(5.5) + 2(2') = 132'

AREA = (4200)(132)/43560 = 12.7 AC

COST $9000 AC $114,500

| | | | |
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SEGMENT 3 ALIGNMENT A (OR B)

CONCRETE CHANNEL (CONTINUED)

BID CANAL BRIDGE : OVERCHUTE OR CLEARSPAN

WIDTH = WIDTH OF CHANNEL TOP WIDTH + 20 FT EACH SIDE FOR CONTINUOUS ACCESS / MAINTENANCE.

= 132' (SEE WIDTH FROM RIGHT OF WAY)

LENGTH = CLEAR CANAL WHICH MAY BE AS WIDE AS 40' + 10 FT EACH SIDE FOR ABUTMENTS

= 60'

AREA = (132)(60) = 7920 S.F.

COST $50 S.F. $396,000

ASSOCIATED CHANNEL LINING, DROP STRUCTURE, AND STRUCTURAL VERTICAL WALLS FOR CHANNEL SIDES. COST IS REPRESENTED AS LUMP SUM FOR MISC STRUCTURAL CONCRETE.

ESTIMATED LUMP SUM $40,000

TOTAL $436,000

BID CANAL CULVERT : 3 - 10' WIDE x 6' HIGH BOX CULVERT

ADOT STD NO. B-02.30 TABLE NO. I
ADOT STD NO. B-02.70 QUANTITIES

C.Y. = 3.258 PER L.F.

LENGTH = 132'

(132)(3.258) x $250 C.Y. $107,500

HEADWALL (INLET AND OUTLET) $9,600

ASSOCIATED STRUCTURAL LUMP SUM $40,000

TOTAL $157,100

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SEGMENT 3 ALIGNMENT A (OR B)

CONCRETE CHANNEL (CONTINUED)

COST SUMMARY:

| | |
|---|---|
| CHANNEL | $ 2,283,300 |
| BID CANAL CULVERT | $157,100 |
| CONSTRUCTION COST | $ 2,440,400 |
| 10% CONTINGENCY | $ 244,000 |
| RIGHT OF WAY | $ 114,500 |
| TOTAL PROJECT COST | $ 2,798,900 |

| | | | |
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SEGMENT 3 ALIGNMENT A (OR D)

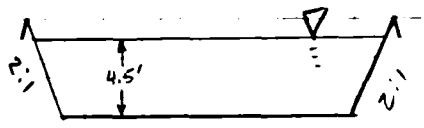
RIPRAP CHANNEL

Q = 3200 cfs

HAND PLACED GROUTED RIPRAP

1' FREEBOARD

LENGTH = 4200 FT




190'

EXCAVATION: 209,300 C.Y. $3.00 C.Y. $627,900

RIPRAP: 102,200 S.Y. $30 S.Y. $3,066,000

MAINTENANCE ROADS: $27,200

FENCING: $67,200

RIGHT OF WAY: 24.3 AC $9000 AC $218,700

BID CANAL BRIDGE (OVERCHUTE CLEARSPAN): 15120 S.F. = $756,000

MISC LUMP SUM $40,000

796,000

BID CULVERT: (3.25')(252') × $250 C.Y. $205,300

HEADWALL $9,600

MISC LUMP SUM $40,000

$254,900

SC 3020

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SEGMENT 3 ALIGNMENT A (OR B)

RIPRAP CHANNEL (CONTINUED)

| | | |
|---|---|---|
| COST SUMMARY: | CHANNEL | $ 3,788,300 |
| | BIG CANAL CULVERT | $ 254,900 |
| | CONSTRUCTION COST | $ 4,043,200 |
| | 10% CONTINGENCY | $ 404,300 |
| | RIGHT OF WAY | $ 218,700 |
| | TOTAL PROJECT COST | $ 4,666,200 |

| | | | |
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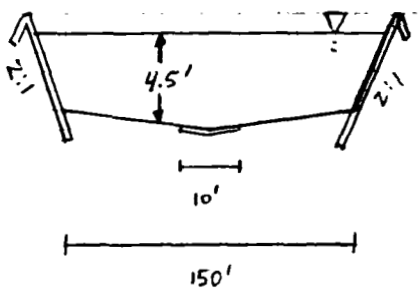
SEGMENT 3 ALIGNMENT A (OR B)

COMPOSITE CHANNEL

Q = 3200 cfs
LENGTH = 4200 FT

HARDENED SIDE SLOPES AND LOW FLOW CHANNEL - 6" REIN. CONCR.

1' FREEBOARD




EXCAVATION: 141200 C.Y. $3.00 C.Y. $423,600

STRUCTURAL CONCRETE: 3100 C.Y. $775,000

MAINTENANCE ROADS: $27,200

FENCING: $67,200

RIGHT OF WAY: 20.4 AC $9000 AC $184,000

BID CANAL BRIDGE (OVERCHUTE CLEARSPAN): 12720 S.F.

$636,000
MISC LUMP SUM 40,000
$676,000

BID CANAL CULVERT: (3.258)(212) x $250 C.Y. $172,700
HEADWALLS $9,600
MISC LUMP SUM $40,000
$222,300

| | | | |
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SEGMENT 3 ALIGNMENT A (OR B)

COMPOSITE CHANNEL (CONTINUED)

| | | |
|---|---|---|
| COST SUMMARY | CHANNEL | $ 1,293,000 |
| | BID CANAL CULVERT | $ 272,300 |
| | CONSTRUCTION COST | $ 1,565,300 |
| | 10% CONTINGENCY | $ 156,500 |
| | RIGHT OF WAY | $ 184,000 |
| | TOTAL PROJECT COST | $ 1,905,800 |

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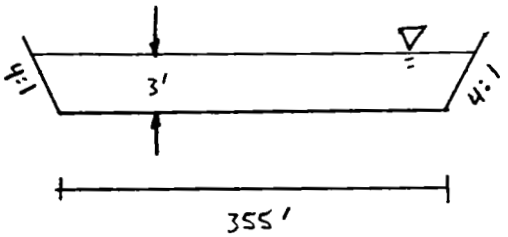
SEGMENT 3 ALIGNMENT A (OR B)

EARTH CHANNEL

Q = 3200 cfs
LENGTH = 4200 FT

EARTH BOTTOM AND SIDES
SIDE SLOPES 4:1

1' FREEBOARD




EXCAVATION: 230,800 C.Y. $692,500

MAINTENANCE ROADS: $27,200

FENCING: $67,200

RIGHT OF WAY: 41.2 AC $9000 AC $370,800

BID CANAL BRIDGE (GUERCHETTE CLEARSPAN): 25620 S.F.

$1,281,000

MISC LUMP SUM: 40,000

$1,321,000

BID CANAL CULVERT: (3.258)(427) × $250 $347,800

HEADWALLS $9,600

MISC $40,000

$397,400

| | | | |
|---|---|---|---|
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SEGMENT 3 ALIGNMENT A (OR B)

EARTH CHANNEL (CONTINUED)

COST SUMMARY:

| | |
|---|---|
| CHANNEL | $ 786,900 |
| BID CULVERT | $ 397,400 |
| CONSTRUCTION COST | $ 1,184,300 |
| 10% CONTINGENCY | $ 118,400 |
| RIGHT OF WAY | $ 370,800 |
| TOTAL PROJECT COST | $ 1,673,500 |

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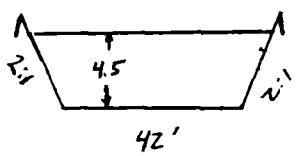
SEGMENT 3 ALIGNMENT C

THIS SEGMENT IS HYDRAULICALLY BROKEN INTO 2 SECTIONS, NORTH OF BROADWAY ROAD AND SOUTH OF BROADWAY ROAD. THE TWO SECTIONS WILL BE COMBINED FOR THE COST ESTIMATE.

ALSO, ONLY THE ALTERNATIVES OF A CONCRETE CHANNEL AND EARTH CHANNEL, REPRESENTING THE NARROWEST AND WIDEST CHANNELS RESPECTIVELY, ARE INVESTIGATED DUE TO THE FEASIBILITY AND INEFFICIENT HYDRAULIC PREFORMANCE.

CONCRETE CHANNEL (NORTH OF BROADWAY) LENGTH: 2000 FT

2' FREEBOARD (SUPER-CRITICAL)




| | | | |
|---|---|---|---|
| EXCAVATION: | 33,900 C.Y. | $3.00 C.Y. | $101,700 |
| STRUCTURAL CONCRETE: | 2777 C.Y. | $250 C.Y. | $694,400 |
| MAINTENANCE ROADS: | (22')(2000')(.25')/27 | 519 C.Y. | $13,000 |
| FENCING: | 4000 L.F. | $8.00 L.F. | $32,000 |

| | | | |
|---|---|---|---|
| RIGHT OF WAY. | 2.5 AC | $9000 AC | $22,500 |
| | 2.5 AC | $14000 AC | $35,000 |
| | | | $57,500 |

ESTRELLA PARKWAY BRIDGE: $298,700

| | |
|---|---|
| ESTRELLA PARKWAY CULVERT: | $132,000 |
| HEADWALLS | 12,600 |
| | 144,600 |

| | | | |
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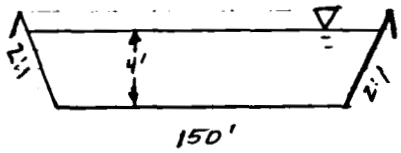
SEGMENT 3 ALIGNMENT C

CONCRETE CHANNEL (CONTINUED)

SOUTH OF BROADWAY ROAD LENGTH = 3100 FT

1' FREEBOARD




EXCAVATION: 114,400 C.Y. $3.00 $343,200

STRUCTURAL CONCRETE: 10,100 C.Y. $250 C.Y. $2,525,000

MAINTENACE ROADS: 800 C.Y. $25 C.Y. $20,000

FENCING: 6200 L.F. $8.00 L.F. $49,600

RIGHT OF WAY: 14.9 AC $14000 AC $208,600

BID CANAL BRIDGE: $670,000

BID CANAL CULVERT: $220,600

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SEGMENT 3 ALIGNMENT C

CONCRETE CHANNEL (CONTINUED)

COST SUMMARY

| | |
|---|---|
| NORTH OF BROADWAY CHANNEL | $841,100 |
| ESTRELLA CULVERT | $144,600 |
| SOUTH OF BROADWAY CHANNEL | $2,937,800 |
| CANAL CULVERT | $220,600 |

| | |
|---|---|
| CONSTRUCTION COST | $4,144,100 |
| 10% CONTINGENCY | $414,400 |
| RIGHT OF WAY | $266,100 |
| TOTAL PROJECT COST | $4,824,600 |

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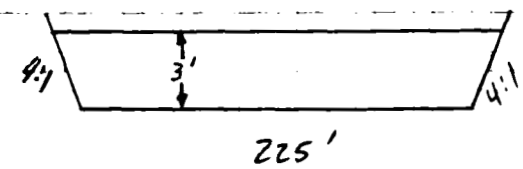
SEGMENT 3 ALIGNMENT C

EARTH CHANNEL NORTH OF BROADWAY ROAD

LENGTH = 2000 FT
1' FREEBOARD




EXCAVATION: 72,600 C.Y. $ 3.00 C.Y. $ 217,800

MAINTENANCE ROADS: $ 13000

FENCING: $ 32000

RIGHT OF WAY: 6.8 AC $ 9000 $ 61,200

6.8 AC $ 14000 $ 95,200

$ 156,400

ESTRELLA PARKWAY BRIDGE: $ 298,700 (ASSUME SAME AS CONCRETE)

ESTRELLA PARKWAY CULVERT: $ 141,600

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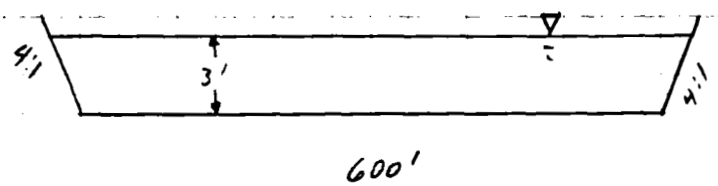
SEGMENT 3 ALIGNMENT C

EARTH CHANNEL (CONTINUED) SOUTH OF BROADWAY ROAD

LENGTH = 3100 FT
1' FREEBOARD




EXCAVATION: $ 282 900 C.Y. $ 3.00 C.Y. $ 848,700

MAINTENANCE ROADS: $ 20,000

FENCING: $ 49,600

RIGHT OF WAY: 47.8 AC $ 14000 $ 669,200

BID CANAL BRIDGE: $ 2,016,000

BID CANAL CULVERT: $ 547,300

| | | | |
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SEGMENT 3 ALIGNMENT C

EARTH CHANNEL (CONTINUED)

COST SUMMARY

| | |
|---|---|
| NORTH OF BROADWAY CHANNEL | $ 262,800 |
| ESTRELLA CULVERT | $ 144,600 |
| SOUTH OF BROADWAY CHANNEL | $ 918,300 |
| CANAL CULVERT | $ 547,300 |
| CONSTRUCTION COST | $ 1,873,000 |
| 10% CONTINGENCY | $ 187,300 |
| RIGHT OF WAY | $ 825,600 |
| TOTAL PROJECT COST | $ 2,885,900 |

| | | | |
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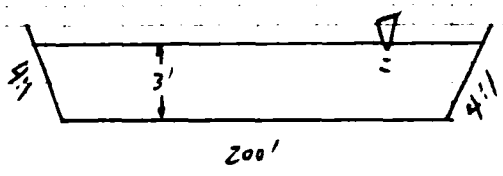
SEGMENT 4 ALIGNMENT A, B AND C

EARTH DREDGED CHANNEL: LENGTH = 1000 FT

1' FREEBOARD

4:1 OR FLATTER SIDES




EXCAVATION: 32000 C.Y. $3.00 $96,000

(10% $9,600)

NO MAINTENANCE ROAD OR FENCING PROPOSED

RIGHT OF WAY: (IF NEEDED) $50,000

TOTAL $155,600

INCLUDING CONCRETE LINED PILOT CHANNEL:

STRUCTURAL CONCRETE: $230,000

(10% $23,000)

$253,000

TOTAL $408,600

| | | | |
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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

INLET:

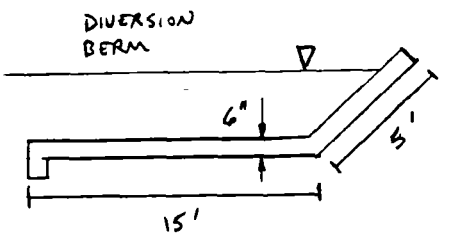
1. EXCAVATION: UPSTREAM CHANNELIZATION / DIVERSION

   APPROX 3000 C.Y. @ $3.00 C.Y. $9,000

2. CHANNEL PROTECTION / INLET PROTECTION: 6" REIN. CONC.

   1000 FT FLOODPLAIN WILL NEED TO PROVIDE STABLE INLET ALONG NORTH BOUNDARY OF BASIN AND CONSTRUCT DIVERSION BERM EAST OF EXISTING WASH. ESTIMATED 20' WIDTH.

   FLOODPLAIN FLOWS WILL BE DIVERTED TOWARDS BASIN INLET AND BASIN FLOW THROUGH CHANNEL.




   (1000 FT)(20 FT)(0.5 FT) = 10000 FT³

   = 370 C.Y. @ $250 C.Y. $92,500

3. ROADWAY CROSSING: LOW FLOW CULVERT / DIP CROSSING

   LUMP SUM ESTIMATED $10,000

4. IRRIGATION STRUCTURE(S): INVERTED SIPHON(S)

   IRRIGATION FLOWS WILL BE SIPHONED UNDER THE DIVERSION / CHANNELIZATION AND RE-INTRODUCED INTO THE EXISTING WASH CHANNEL (EAST OF THE PROPOSED BASIN)

   EST. 2 CROSSINGS @ $10,000 EA $20,000

   INLET TOTAL $131,500

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

BASIN:

1. EXCAVATION: THE BASIN EXCAVATION VOLUME IS ESTIMATED TO EQUAL THE STORAGE VOLUME.

STORAGE VOLUME = 52,159,615 FT³

= 1,931,837 C.Y. @ $3.00 $5,795,500

2. OTHER IMPROVEMENTS:

| | | |
|---|---|---|
| FENCE AROUND BASIN: | (9300 L.F.) | |
| GATE(S): | | $ 100,000 |
| * BERM CONSTRUCTION: | (4000 L.F.) | $ 1,000,000 |
| LANDSCAPING: | (126 AC) | $ 1,200,000 |
| MAINTENANCE ROAD(S): | | $ 500,000 |
| LOW FLOW CHANNEL LINING: | | $ 800,000 |
| | | $ 3,600,000 |

BASIN TOTAL $9,395,500

RIGHT-OF-WAY (INCLUDING INLET AND OUTLET) 130 AC

$9000 AC $ 1,170,000

* NOTE BERM MAY NOT BE STRUCTURALLY ACCEPTABLE WITHOUT DREDGING AND CONSTRUCTION OF RETAINING WALL. THIS COST INDICATED ABOVE DOES NOT REFLECT A RETAINING WALL BUT INCORPORATES STABILIZING AND SEEPAGE CONSIDERATIONS.

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

OUTLET:

1. 60" RCP : 4 PIPES 1000 L.F. EA
   TOTAL LENGTH 4000 L.F. @ $100 $400,000

2. HEADWALL : 2 - INLET AND OUTLET
   $6500 EA $13,000

3. SAFETY GRATES : INLET AND OUTLET $1000 PER PIPE COVERED
   8 x $1000 $8,000

4. EMERGENCY SPILLWAY: LUMP SUM $25,000

OUTLET TOTAL $446,000

TOTAL DETENTION BASIN 1 COST NOT INCLUDING THE DOWNSTREAM CHANNEL:

| | |
|---|---|
| CONSTRUCTION COST | 9,973,000 |
| 10% CONTINGENCY | 997,300 |
| RIGHT-OF-WAY | 1,170,000 |
| TOTAL COST | $12,140,300 |

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

OUTFALL CHANNEL:

THE CHANNEL DOWNSTREAM OF THE PROPOSED BASIN WILL BE DESIGNED FOR 1400 cfs. THE ORIGINAL OR EXISTING DESIGN FLOW RATE FOR THE BULLARD WASH ALTERNATIVE CHANNELS IS 3200 cfs.

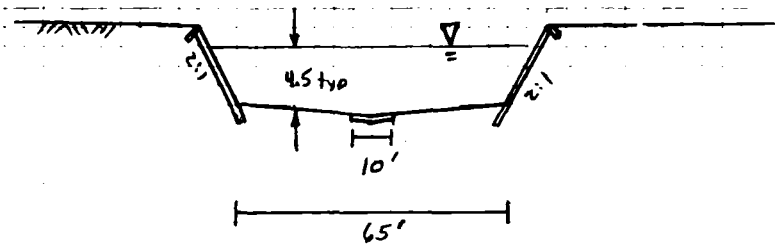
FOR THE PURPOSE OF COMPARING THE EFFECTIVENESS OF THE BASIN VS. THE COST SAVINGS OF THE DOWNSTREAM CHANNEL, THE CHANNEL WILL BE PRELIMINARILY SIZED BASED ON ONE POTENTIAL ALIGNMENT (INSTEAD OF ALL COMBINATIONS OF CHANNEL ALIGNMENTS NORTH AND SOUTH OF MC85).

THE ROADWAY, RAILROAD, AND CANAL CROSSINGS WILL BE ESTIMATED BY USING CULVERTS INSTEAD OF BRIDGES. THESE STRUCTURES WILL BE REPRESENTATIVE OF THE 1400 cfs.

FOR THE OUTFALL CHANNEL, ONLY SEGMENTS 3 AND 4 ARE REQUIRED. FOR COST COMPARISONS ONLY THE COMPOSITE CHANNEL CONFIGURATION OF ALIGNMENT A WILL BE CONSIDERED IN SEGMENT 3. SEGMENT 4 WILL USE AN EARTH DREDGED CHANNEL.

TYPICAL CHANNEL AND DIMENSIONS: SEGMENT 3 ALIGNMENT A DETENTION

COMPOSITE SECTION LINED SIDESLOPES AND LOW FLOW CHANNEL. 1' FREEBOARD TYP.

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

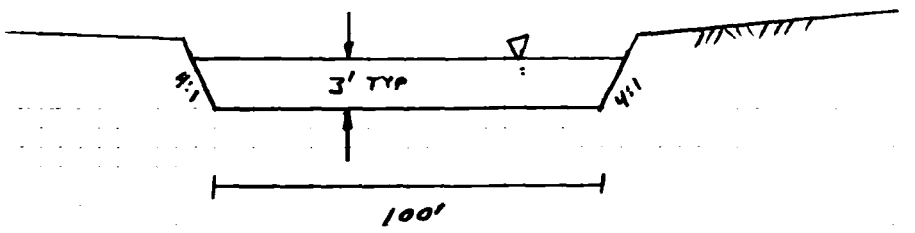
OUTFALL CHANNEL (CONTINUED) SEGMENT 3

LENGTH = 4200 FT

| | | | | | |
|---|---|---|---|---|---|
| EXCAVATION VOLUME = | 65000 C.Y. | × | $3.00 C.Y. | = | $195,000 |
| STRUCTURAL CONCRETE = | 3300 C.Y. | × | $250 C.Y. | = | $825,000 |
| MAINTENANCE ROADS (3" GRANITE) = | 1100 C.Y. | × | $25 C.Y. | | $27,500 |
| FENCING (6' CHAIN LINK) = | 8400 L.F. | × | $8 L.F | | $67,200 |
| | | | TOTAL | | $1,114,700 |

TYPICAL CHANNEL AND DIMENSIONS: SEGMENT 4

EARTH DREDGED 1' FREEBOARD TYP.




LENGTH = 1000 FT

| | | | | |
|---|---|---|---|---|
| EXCAVATION VOLUME: | 17000 C.Y | × | $3.00 C.Y. | $51,000 |
| | | | TOTAL | $51,000 |

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

RAILROAD CULVERT: Q = 1400 cfs

3 - 10' WIDE x 6' HIGH CONCRETE BOX CULVERT

WINGWALLS AND MAX COVER TO ACCOUNT FOR RAILROAD LOADING.

ADOT STD NO. B-02.35 TABLE NO. V
ADOT STD NO. B-02.70 QUANTITIES

C.Y. = 5.042 PER L.F. OF CULVERT

LENGTH = 20 FT

(20)(5.042) x $250 C.Y. = $25,200
* HEADWALLS (INLET AND OUTLET) = 9,600
TOTAL = $34,800

HIGHWAY CULVERT: Q = 1400 cfs

3 - 10' WIDE x 6' HIGH CONCRETE BOX CULVERT

WINGWALLS AND MIN COVER

ADOT STD NO B-02.30 TABLE NO. I
ADOT STD NO B-02.70 QUANTITIES

C.Y. = 3.258 PER L.F. OF CULVERT

LENGTH = 50 FT

(50)(3.258) x $250 C.Y. = $40,700
* HEADWALLS (INLET AND OUTLET) = $9,600
TOTAL = $50,300

* HEADWALLS APPROX FROM ADOT B-05.20 0° SKEW

| | | | | |
|---|---|---|---|---|
| TRIPLE BARREL | INLET | 14.33 C.Y. | x $250 | = $3600 |
| TRIPLE BARREL | OUTLET | 24.16 C.Y. | x $250 | = $6000 |
| | | | | $9600 |

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

CANAL CROSSING STRUCTURE: CANAL CULVERT 3 - 10' WIDE x 6' HIGH

Q = 325 cfs FOR NORMAL OPERATION. HOWEVER CULVERT IS SIZED TO MAINTAIN CULVERT OPERATION AND ALLOW UNSUBMERGED FLOW THROUGH THE BOX STRUCTURE TO REDUCE POTENTIAL OF CLOGGING.

BASED ON THE COMPOSITE CHANNEL UPSTREAM THE BOX WILL BE APPROX 130 FT LONG IN THE DIRECTION OF THE CANAL.

| | | | |
|---|---|---|---|
| ADOT | STD NO | B-02.30 | TABLE NO. I |
| ADOT | STD NO. | B-02.70 | QUANTITIES |

(130')(3.258 C.Y.) x $250 C.Y. = $105,900

HEADWALLS (INLET AND OUTLET) = $9,600

ASSOCIATED WITH THE CANAL CROSSING IS SIGNIFICANT MISC. CHANNEL LINING/HARDENING AND THE VERTICAL WALLS/BANKS FOR BULLARD WASH CROSSING OVER THE BOX STRUCTURE. THE WASH CROSSING WILL ALSO INCORPORATE A DROP STRUCTURE DOWNSTREAM OF THE CANAL. THESE ITEMS HAVE NOT BEEN DEFINED FOR ALL ALTERNATIVES. THE COST ESTIMATE IS REPRESENTATIVE OF REINFORCED CONCRETE STRUCTURES.

ESTIMATED LUMP SUM $40,000

TOTAL $155,500

RIGHT OF WAY FOR CHANNELIZATION:

TOTAL LENGTH OF CHANNELIZATION = 4200 FT + 1000 FT = 5200 FT

WIDTH = 130 FT x 5200 FT TOTAL $139,700

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BULLARD WASH OUTFALL FEASIBILITY STUDY

DETENTION BASIN 1 ON BULLARD WASH

QUANTITIES AND COSTS:

* TOTAL CHANNELIZATION WITH DETENTION BASIN 1

| | |
|---|---|
| CONSTRUCTION COST | $1,771,300 |
| 10% CONTINGENCY | $ 177,100 |
| RIGHT OF WAY | $168,700 |
| TOTAL COST | $ 2,117,100 |

* TOTAL CHANNELIZATION FROM EAST TRIBUTARY WITHOUT BASIN 2 (SEE SEGMENT 2 ALIGNMENT A RIPRAP CHANNEL COST) IS INCLUDED IN THE CONST. AND R/W COST FOR DETENTION BASIN 1 CHANNELIZATION COST.

ALL STRUCTURES ARE ALSO INCLUDED IN THIS SUMMARY.

| | |
|---|---|
| DETENTION BASIN 1 TOTAL COST (PAGE 3) | $12,140,300 |
| CHANNELIZATION WITH DET BASIN 1 TOTAL COST | $ 2,117,100 |

TOTAL COST FOR ALTERNATIVE: DETENTION BASIN 1

$ 14,257,400